EVIDENCE THAT LARGE CEO STOCK OPTION GRANTS ARE DETRIMENTAL TO SHAREHOLDERS

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Abstract

We examine stock price reaction to Australian CEO stock option grants for 1987-1998. We document several empirical regularities. First, small grants (relative to outstanding equity) are characterized by positive abnormal stock returns, while large grants are characterized by negative returns. Second, abnormal shareholder returns at grant are found increasing in incentive (as expected) and CEO gain at grant, but decreasing in grant size. The positive relation with CEO gain is primarily driven by the adverse incentive effects of grant premiums, rather than grant discounts. The evidence that large grants are costly to shareholders implies CEO opportunism, which is not confined to irregular grants. Finally, ATM grants appear not to hold any advantage for shareholders over and above incentive as moderated by (large) grant size.

Keywords: executive compensation, stock options, corporate governance

1. Introduction

While several empirical studies have documented a positive market-adjusted stock price response to grant announcements, none has examined the incremental wealth effects of at-the-money (ATM) and non-ATM grants and grant size. Grant moneyness assumes importance because ATM and near-ATM grants are posited by Hall and Murphy (2002) to be optimal when option grants are add-ons to existing forms of compensation, whereas Choe (2003) does not predict general optimality of ATM grants. Hall and Murphy (2000, 2002) argue that setting exercise prices at or near the grant date market price maximizes pay-performance incentives for risk-averse, undiversified executives. ATM or near-ATM grants are optimal because the cost to shareholders is approximately equal to the incentive benefit of the grant, whereas deep option discounts/premiums create an imbalance. In sharp contrast, Choe (2003) posits a model in which exercise price and grant size adjust inversely to optimize pay-performance sensitivity. For example, higher leverage calls for a lower exercise price (*cet. par.*, implying a discount) to leave the effective exercise price unchanged. In short, grant size is expected decreasing in the volatility of new investment and increasing in leverage, which are not arguments employed in Hall and Murphy (2002). Hall and Murphy (2002) and Choe (2003) also differ in the treatment of grant size: in Hall and Murphy grant size is exogenous (and linear in incentive) whereas in Choe grant size is endogenous.

The principal aim of this paper is to document the shareholder wealth effects of grant policies, notably exercise price choice and grant size. These effects are unlikely to be anticipated when executive stock option plans are approved (i.e., adopted). In so doing, we are the first to provide evidence on some of the propositions of Hall and Murphy (2002) and Choe (2003). A secondary purpose is to examine the impact of grants discounts/premiums and grant size on the incentive embedded in a given stock option grant. We employ a unique sample of Australian CEO stock option grants which, unlike corresponding U.S. grants, are characterized by significant proportions of in-the-money (ITM) and out-of-the-money (OTM) grants which generate a richer set of interactions. We do not address the issue of stock *versus* stock option optimality.

Our key findings are as follows. Small grants (relative to outstanding equity) are characterized by positive abnormal stock returns, while large grants are characterized by negative returns, despite

similar incentive levels. ATM grants are of interest because Hall and Murphy (2000, 2002) predict they are optimal for add-on grants. ATM grants are characteristic of low risk firms and are found to be about half the size of non-ATM grants, but carry marginally higher incentive which is mirrored in positive abnormal returns at grant. In contrast, ITM grants are characterized by zero abnormal returns, while OTM grants are characterized by negative abnormal returns. Negative returns are anomalous because option grants are then implied detrimental to shareholders. We resolve the anomaly by showing empirically that OTM grants appear to be reserved by financially-distressed firms with entrenched managers. Further insights are that shareholders adjust grant size and regularity when setting incentive. In turn, grant size is found to be strongly influenced by potential financial distress and less so by pre-grant stock ownership and grant irregularity. No support is documented for Choe's (2003) predictions that grant size decreases in volatility and increases in financial leverage. Crucially, abnormal shareholder returns at grant are found increasing in incentive (as expected) and CEO gain at grant, but decreasing in grant size. The positive relation with CEO gain is primarily driven by the adverse incentive effects of grant premiums, rather than grant discounts. Thus, the evidence is that discounts *per se* are not costly to shareholders. Evidence that shareholders are worse off when grants are large implies CEO opportunism, which appears not confined to irregular grants. There is no evidence that ITM grants are rewards for past performance. Finally, and contrary to Hall and Murphy (2000, 2002), ATM grants appear not to hold any advantage for shareholders over and above incentive as moderated by (large) grant size.

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 and sample are described in Section 3, which is followed in Section 4 by the analysis. Finally, the summary and conclusions are presented in Section 5.

2. Literature review

Though executive stock option plans lay down the parameters for subsequent grants, specific details of grants are often left to the discretion of the compensation committee when authorizing a grant. Small, positive abnormal stock returns on adoption of executive stock option plans are documented by

DeFusco, Johnson and Zorn (1990), Morgan and Poulsen (2001) and Martin and Thomas (2005), and are construed as evidence that stock option plans beneficially increase top management incentive. Given their adjunct evidence, Morgan and Poulsen (2001) consider earnings signalling an unlikely alternative explanation. However, executive stock option plans (both in Australia and the U.S.) usually leave specifics of the timing, size and exercise price of future grants to the discretion of the compensation committee, so subsequent grants are the only vehicle by which shareholder wealth effects can be established.

Hall and Murphy (2002) show analytically that ATM or near-ATM stock option grants maximize incentive when grants are an add-on to the existing compensation package, including equity. Their prediction assumes relatively low CEO risk aversion and poor diversification of the CEO's private investment portfolio. Add-on options never lower the incentive built into the existing compensation package, so any add-on option grant (even at a premium) delivers at least some incentive. When stock option grants substitute for some component of existing compensation, they show that the optimum policy shifts to stock options with a zero exercise price, or restricted shares, which substantially increase pay-performance sensitivity relative to options. Thus, ATM substitute grants are less efficient than restricted shares and also inferior to ATM add-on grants. The incentive effect is linear in the size of the grant. Discount awards increase incentive because the probability of the option closing ITM is higher, but this benefit is offset by the cost of the discount. On the other hand, premiums compensate shareholders for a high probability of an option closing ITM, but at the risk that the CEO will withdraw marginal effort. In essence, ATM grants have a higher probability than non-ATM grants of recovering the cost of the option from higher incentive-benefits. OTM grants are never optimal because risk-averse executives will always give up some cash compensation to receive a smaller number of ATM options. Substitute grants also do not lower incentive because CEOs do not rationally exchange cash benefits for lesser option value[1].

Choe (2003) counters that ATM grants are optimal only by chance. His model relies on replicating the bonus provided through an optimal wage contract, such that exercise price and grant size

[1] Hall (1998) points out that that a value-neutral policy granting OTM options increases pay-performance sensitivity.

vary optimally with exogenous disturbances. The exercise price and grant size are inversely related in determining the value of a grant. For a fixed exercise price, grant size falls as the project risk rises because exercise is more likely with higher volatility. Since higher leverage reduces option value by raising the effective exercise price of options (the exercise price plus the face value of debt per share), the number of granted options increases to compensate. Grant size and hence pay-performance sensitivity therefore increase in firm leverage. Alternatively, for a fixed size option grant, the optimal exercise price increases in the volatility of the project's returns and decreases in leverage. Higher leverage calls for a decrease in the exercise price or an increase in grant size to leave option value unchanged. Garvey and Mawani (1999) report corroborating evidence from Canadian data that more levered firms set lower exercise prices. Based on such arguments, Choe (2003) specifically predicts that pay-performance sensitivity is decreasing in the volatility of stock returns but not decreasing in leverage. Pay-performance sensitivity has been questioned empirically by Hall and Murphy (1990) and Yermack (1995) and analytically by Meulbroek (2001), Hall and Murphy (2000, 2002) and Cai and Vijh (2005), but Hall and Liebman (1998) document positive pay-performance sensitivities almost entirely driven by stock and stock option holdings.

Related empirical evidence is as follows. Billett, Mauer and Zhang (2006) examine monthly stock and bond price reactions to first-time grants of options and/or restricted stock to CEOs which are argued to have a high probability of information content. They find large positive stock price reactions and large negative bond price reactions. The negative bondholder reactions are significantly larger when the CEO has little or no prior equity ownership and significantly smaller for firms with weak shareholder rights. Further, stock price reactions decrease in CEO pay-performance sensitivity (as measured by the option delta) and increase in the sensitivity of CEO wealth to stock volatility (vega). In contrast, the bond price reactions increase in delta and decrease in vega when the CEO has little or no pre-grant equity ownership.

Yermack (1997) and Aboody and Kaznick (2000) document higher market-adjusted stock returns following grants, Chauvin and Chenoy (2001) document lower adjusted stock returns prior to grant, and Narayanan and Seyhun (2006) document both. The latter find the detected stock price reversal is increasing in larger grants and attributes the reversal to managerial influence, but not excluding grant

back-dating as conjectured by Lie (2005)[2]. All four event studies rely on inference of grant dates from subsequent disclosures, notably proxy statements. In the U.S., the lag between the date of grant and announcement can be several weeks or months. An obvious difficulty with lack of timely disclosure of the grant date is that the stock market is likely to have become informed of the grant during this long interval, as evidenced for example by the flat stock returns around SEC insider filing dates (Narayanan and Seyhun, 2006). In Australia, this interval is reduced to several days but should not impact on the observed stock price response on the grant date. Our advantage is that we are able to identify discount and premium grants which are rarely observed in the U.S. Since Hall and Murphy (2002) themselves note that 94 per cent stock options granted to CEOs of S&P companies in 1998 were ATM grants[3], it is likely that a similar percentage would have applied to these studies. Further, none of these event studies relates stock price movements to grant characteristics, save for Narayanan and Seyhun (2006) who also examine the impact of scheduled and unscheduled grants.

An extensive literature looks at the relation between CEO option incentives and risk-taking, both with respect to current stock volatility and the risk of new investments. Coles, Daniel and Naveen (2006) report evidence that higher pay-performance sensitivity (delta) encourages risk-reducing investment choices, while higher option value sensitivity to stock volatility (vega) encourages riskier policy choices. They also provide a comprehensive review of issues related to CEO incentives, particularly the relation between option incentives and future risk-taking. Guay (1999) finds that stock options significantly increase the sensitivity of CEO wealth to equity risk, where the sensitivity is positively related to fims' investment opportunities. Guay interprets this result as consistent with managers receiving incentives to invest in risk-increasing projects when the potential loss from underinvestment is greatest. Guay also documents a positive relation between stock volatility and pay-performance sensitivity which increases the convexity of the relation between manager's wealth and the

[2] Prior to August 29, 2002, back-dating in U.S. grants cannot be ruled out because the 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.

[3] Narayanan and Seyhun (2006) suggest two reasons why ITM grants are rare in the U.S.: first, FASB rules require discounts (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 nonperformance-based compensation exceeds $1 million a year. However, Baranchuk (2006) finds no evidence that accounting rules influence option granting decisions.

stock price. Aggarwal and Samwick (1999) find that pay-performance sensitivity decreases in the variance of firm performance. Carpenter (2000) presents a model in which larger grants induce the manager to reduce the volatility of new investments, while at the same time deep OTM grants possible provide incentives for excessive risk-taking in order to increase the probability of exercise. Remaining evidence is summarized as follows. Lewellen, Loderer and Martin (1987), Matsunaga (1995), Yermack (1995) and Kole (1997) who detect no relation between managerial stock ownership and stock option compensation. Jensen and Murphy (1990) and Hall and Liebman (1998) document a positive pay-performance relation between CEO and shareholder wealth.

3. Data, sample and measures

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), lodged within 14 days of the grant (Section 205G). 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). Thus, grant announcements typically occur some days following the actual grant. Accordingly, the grant announcement date is selected as the date on which the firm notified the ASX of a stock option grant. This date could be the same date as the grant or a date not more than 14 days after the grant. Hence, in Australia, the reporting lag with respect to stock option grants is considerably lower than that applying to U.S. grants in the 1990s[4]. In other words, this lag is considered short enough to allow for stock option grant announcements to still convey significant information about the grant. Exercise details were obtained from the ASX *Additions to the Official List*. Observations were deleted if

[4] 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 getting 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.

another major announcement (such as a capital reconstruction or change in dividend policy) was made less than three days either side of the grant announcement date.

Consistent with Hall and Murphy (2000, 2002), incentive is measured by the partial derivative of the Black-Scholes option value with respect to the stock price, $N(d_1)$, adjusted for dividends. Following Meulbroek (2001), we also adjust the incentive for CEO risk aversion which is assumed to increase with stock volatility on the same scale as that reported by Meulbroek. Specifically, the upper bound of CEO value is 70 per cent of Black-Scholes value (assuming zero CEO diversification) and the lower bound is 53 per cent for the firm with the highest standard deviation risk in the sample[5]. Minor undervaluation remains because stock options are American, but the right of early exercise is nearly always constrained by vesting restrictions; exercise itself is often constrained by hurdle requirements. Apart from idiosyncratic contracting provisions, European valuation should be very highly correlated with an American valuation. Consistent with most recent studies (for example Hall and Liebman, 1998) pay-performance sensitivity is incentive multiplied by the number of granted options, which provides a dollar sensitivity of grant value to stock price movements[6].

The sample comprises 168 stock option grants made to 65 CEOs made by 51 listed Australian companies during the period 1987-1998. Since no Australian executive compensation databases are available, all grant data were obtained from an 'options' keyword search of all ASX-listed companies included in *Huntleys' DatAnalysis* service. We have no reason to believe any bias was introduced into the sample selection procedure through use of this keyword (which also picked up quoted options). The sample derivation is summarized thus:

Randomly-selected sample (all years)	426
less companies with quoted options	112

	314
less deletions for:	
Foreign firms	(15)
Inadequate ASX disclosures	(47)
Grants within 3 days of other major announcements	(58)
Inconsistencies in data	(26)
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[5] Simulations show that the proportionate fall in $N(d_1)$ almost exactly matches the proportionate change in the call price; none of the results of the paper is materially affected by the very close approximation.
[6] Baker and Hall (2004) explore the implications of dollar versus relative measures of incentive but do not arrive at a general conclusion.

Final sample	168

Financially-distressed firms were not excluded from the filtered sample in order to generalize the analysis. No distinction was made between first and subsequent grants to the same CEO. Where portions of a grant are exercised/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[7]. Each grant is treated as independent from any prior grants to the same CEO. The quality of Australian disclosure is on a par with the U.K. data of Conyon and Sadler (2001)[8]. Of the 168 grants, 74 are multiple grants made on the same date to the same CEO, but are differentiated either by expiry date or exercise price, or both. Compensation specialists 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 option premium at grant (i.e., an OTM grant) is defined to occur when the stock price at grant exceeds the exercise price by 5 or more per cent; likewise, an award discount (i.e., an ITM grant) occurs when the stock price falls below the exercise price by the same percentage. Notional discounts/premiums below 5 per cent are therefore classified as ATM awards. The resulting 10 per cent spread is considered wide enough to classify virtually all ATM grants correctly, i.e., Type 1 error is believed negligible. A wide spread also captures many near-ATM grants which is 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

[7] 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).
[8] 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*.

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 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.

Sample descriptors are presented in Table 1 by grant size relative to outstanding shares stock. Grant size is the number of granted options divided by the number of outstanding ordinary shares prior to grant. Nearly three-quarters of the sample comprises irregular grants (i.e., grants not made annually for at least three consecutive years to the same CEO and with a maximum variation of two months), the proportion of which rises with higher relative grant size quartiles. Just over 60 per cent of all grants are subsequently exercised, with the lowest grant size quartile showing the lowest percentage (52.4). *Cet. par.*, higher pre-grant CEO stock ownership is expected to diminish the incentive value of stock options at the margin because more options reduce the value of shareholders' residual claim. There is no discernible pattern in pre-grant stock ownership across grant size quartiles. Several pre-grant firm characteristics are also shown, namely: stock volatility, stock beta, financial leverage, interest coverage, ROA, market-to-book of assets and firm size (measured by *ln*(total assets)). Financial leverage and interest coverage represent debt-related risks, while market-to-book of assets represents pre-grant investment opportunities. Most display erratic behaviour across grant size quartiles, but firm size exhibits a tendency to decline with upward steps in grant size (r = -.448, p = .000), suggesting that relatively large grants are a characteristic of smaller firms.

4. Analysis

Option grant characteristics, including incentive and pay-performance sensitivity, are detailed in Table 2 by grant size quartiles. Incentive is flat across the quartiles. Only pay-performance sensitivity displays any regular tendency, with an approximately doubling of pay-performance sensitivity as the quartiles are ascended. [-1, 1] three-day cumulative abnormal returns (CARs) at grant are positive (median 0.0122)

for the smallest grants (1st quartile) and negative (median -0.0158) for the largest grants[9]. With respect to the continuous data, grant CARs are positively related to incentive (r=.251, p=.001) but not pay-performance sensitivity (r= .020, p=.796), which mirrors the apparent dysfunctionality of large option grants.

Firm characteristics are analyzed by grant moneyness in Table 3. ITM grants tend to be irregular, are largely confined to non-resource companies and exhibit a high exercise rate. It is not surprising to observe that OTM grants are roughly double ITM grants for that sector. Resource companies are riskier stocks than non-resource companies, so resource companies can 'afford' to impose premiums given a higher likelihood of exercise, other things equal. OTM grants tend more regular than ITM and ATM grants, have more than twice the resource stock representation and exhibit a lower exercise rate than ITM options. ATM grants exhibit an exercise rate closely similar to that of ITM grants. Not surprisingly, OTM grants exhibit the lowest exercise rate (52.1 per cent). The values of all firm characteristics are pre-grant. Stock volatility is significantly lower for ATM grants compared to non-ATM grants. The only other regularity worthy of note is the higher market-to-book value for ITM grants.

Table 4 shows grant characteristics by moneyness. The grant characteristics are the same as those reviewed in Table 2. CEO gains and option/stock value are artefacts of the moneyness classifications. Several regularities emerge. First, ATM grants are about half the size of ITM and OTM grants, but incorporate higher incentive than the non-ATM grants as predicted by Hall and Murphy (2002). The net result is flat pay-performance sensitivity across the moneyness classifications. Thus, the lower size of ATM grants is offset by stronger incentive. Importantly, [-1, 1] CARs are zero for ITM grants, positive for ATM grants and negative for OTM grants. Implications are that shareholders do not benefit from discounts (especially for larger grants), lose when premium grants are made, and benefit only when grants are ATM. Positive CARs for ATM grants are supportive of Hall and Murphy (2002)

[9] The grant date is day 0; following Morgan and Poulsen (2001), a three-day window is employed to capture grant announcements made after the close of trading on day 0. CARs are the cumulative differences between expected and raw or observed stock returns, where expected returns are calculated using the standard CAPM. Raw shareholder returns are adjusted for capitalization changes and dividend payments that occurred during the event window. Beta factors for this model were estimated using the market model. CARs are aggregated across the sample with each case being equally-weighted.

who do not predict large differences with respect to non-ATM grants (as add-ons). Consistent with Hall and Murphy incentive is found highest for ATM grants but, as shown in Table 3, ATM grants are also associated with low contemporaneous stock volatility and lower pre-grant investment opportunities relative to ITM grants. Two effects are apparent. First, the higher incentive for ATM grants versus non-ATM grants is aligned with lower pre-grant stock volatility and lower investment opportunities (from Table 3), which is expected to the extent that option grants are designed to increase risk-taking. Second, incentive and grant size are inverse for ATM grants, which implies that shareholders do not treat the two decision variables as complementary. Evidently, the sum of these relationships is beneficial to shareholders.

The zero wealth effect of discounted grants implies that discounts do not benefit shareholders. Specifically, pre-grant stock volatility, investment opportunities and grant size are higher than for ATM grants, but incentive is lower. Given significantly higher pre-grant investment opportunities for ITM grants, evidence of discounts implies the higher pre-grant stock volatility for these grants is not enough to guarantee exercise (i.e., prior acceptance of risk-increasing projects). By corollary, ATM grants are not discounted (and are not largest) because (i) they have lower investment opportunities than ITM grants, and (ii) already deliver the highest incentive. Premium option grants are puzzling. OTM grants have lower pre-grant investment opportunities than ITM grants but similar pre-grant stock volatility, incentive and grant size. Since, ITM grants carry zero benefits for shareholders, it follows that CARs for OTM grants should be even lower.

To trace the source of the negative CARs for OTM grants, Table 5 reports a logit regression of OTM grant (=1) on risk-related variables, pre-grant CEO stock ownership, grant size and grant irregularity. Two dimensions of risk are represented: pre-grant stock volatility and a binary variable for financial distress, set at unity when interest coverage ≥ 2. Interest coverage is the ratio of earnings before interest and tax (EBIT) to interest paid. A value of interest coverage below 2 implies the firm potentially faces financial distress, which is often temporary. The estimation is satisfactory and shows that OTM grants are more likely associated with firms in financial distress and high CEO stock ownership. Grant size and stock volatility fail to achieve significance, indicating that the decision to apply a premium is unaffected by the size of the grant and total firm risk. Following Hall and Murphy

(2002), premium options are least costly to shareholders but also provide the least incentive. Since shareholders benefit from CEOs accepting the most risky investments in distress scenarios, near-ATM options are predicated. However, entrenchment (implied by moderate CEO stock ownership) means that wealth gains from successful turn-arounds are likely to be channelled into higher executive compensation. Thus, OTM grants in the context of (i) potential financial distress and (ii) CEO entrenchment are expected to be costly to shareholders. Shareholders preference for premium grants in distress scenarios possibly is driven by the apparent cheapness of such grants.

Table 6 presents the results of several least square regressions to examine interactions between incentive, grant size and grant discounts/premiums with an intention of sourcing the positive and negative abnormal returns detected earlier for ATM and OTM grants, respectively. The full set of pre-grant control variables comprise potential financial distress, CEO stock ownership, stock volatility, and financial leverage. The full set of grant characteristics comprises incentive (adjusted delta), CEO gain, grant size and grant regularity. All regression parameters are satisfactory[10]. Estimation (1) tests the extent to which pre-grant firm characteristics influence the relation between incentive and grant size along with grant regularity. 2SLS estimation is used because endogeneity is present: incentive is affected by exercise price which in turn determines CEO gain. The two estimated equations (omitting firm subscripts) are:

$$\text{Grant size} = \alpha_0 + \alpha_1\text{CEO gain} + \alpha_2\text{CEO stock ownership} + \alpha_3\text{Stock volatility} + \alpha_4\text{Financial leverage} + \alpha_5\text{Potential financial distress} + \varepsilon \quad \text{(i)}$$

$$\text{Incentive} = \beta_0 + \beta_1\text{Grant size} + \beta_2\text{Irregular grant} + \varepsilon \quad \text{(ii)}$$

Estimation (1) shows that grant size decreases in incentive while grant irregularity is increasing. The inference is that high-incentive option grants are smaller and irregular relative to low-incentive option grants. Thus, we provide evidence that shareholders reserve high-incentive awards for irregular grants and rely on a higher incentive rather than a larger grant in arriving at a given pay-performance sensitivity. Pay-performance sensitivity constructs mask this substitution effect.

[10] For OLS estimations, the Durbin-Watson *d* statistic becomes a test for heteroscedasticity when the data are appropriately ordered, in this case by $N(d_1)$ adjusted for dividends and CEO risk aversion.

Estimation (2) of Table 6 shows that grant size is positively related to potential financial distress and grant irregularity, but negatively related to incentive (measured by delta adjusted for risk-aversion). The finding that grant size operates against incentive is not suggested in the literature which assumes that grant size is incentive-neutral. It is noteworthy that grant size is statistically unrelated to CEO gain (i.e., discounts/premiums at grant). The latter result clearly suggests that grant pricing and size are not traded-off against the other. Estimation (2A) is a partial test of Choe (2003) grant size prediction, as far as the data permit. Specifically, stock volatility proxies the risk of desired new investments, which *per force* is assumed as the same as existing assets and *cet. par.* is expected decreasing in grant size. Choe (2003, p. 593) argues that an increase in the volatility in returns increases the value of options, which *cet. par.* causes the manager to choose a risky project more often. Financial leverage is also added because Choe (2003, p. 593) argues that an increase in leverage decreases the value of options by raising the effective exercise price of options, being the sum of the exercise price and the face value of debt. Thus, for a fixed exercise price, grant size should increase as leverage increases. Incentive is excluded from the list of explanatory variables of estimation (1A) because it is very highly correlated with stock volatility (r = 0.835, p = .000). The results of estimation (2A) are similar to those of estimation (2). Of the two new explanatory variables, stock volatility achieves minor significance but is incorrectly signed while leverage is insignificant. Thus, a preliminary test of the Choe (2003) model fails to generate empirical support.

Shareholder wealth effects of CEO option grants are tested in estimations (3) and (3A) of Table 6. Of the two control variables (potential financial distress and CEO stock ownership) and the four grant characteristics (incentive, CEO gain, grant size and grant irregularity), three grant characteristics in estimation (2) are identified as drivers of shareholder returns: incentive and CEO gain contribute positively while grant size contributes negatively. The first of these findings confirms that option grants successfully create incentive. However, the incentive coefficient of 0.195 is well below the sample mean incentive value of 0.595 (refer Table 2) and suggests that at least some option grants benefit shareholders minimally, if at all. The positive coefficient on CEO gain is consistent with the evidence reported earlier in Table 4 that OTM grants are detrimental to shareholders *vis à vis* ITM and ATM grants. The negative coefficient on grant size is further evidence that large grants are detrimental to shareholders. Finally, we

find that shareholder returns are invariant with respect to potential financial distress, CEO stock ownership and grant irregularity. Thus, we infer that CEO stock option grants do not benefit shareholders any more when firms are facing potential financial distress. Likewise, option incentive value is unaffected by variations in pre-grant CEO stock ownership as well as grant irregularity. The latter outcome implies that stock option grants are no more effective for irregular than regular grants, so we have no evidence that irregular grants are timed to match incentive with new investment desired by shareholders.

All the coefficients obtained on grant characteristics of estimation (3) contain an element of surprise. First, CEO stock options appear less effective than expected, raising the possibility that the Black-Scholes value, even adjusted for risk aversion, is still too high. The most likely candidate reason is related to the likelihood of CEO termination before expiry. Yermack (1998) reports that firms discount reported Black-Scholes value by about 20 per cent, with many firms citing (i) the probability that the executives might leave the firm before their options vest and also (ii) the possibility of executive turnover between vesting and expiry. When options 'work' voluntary terminations are expected lower, whereas when options do not 'work' involuntary terminations are expected higher. Involuntary terminations are the expected source of depressed option valuations because Warner, Watts and Wruck (1988) report that performance and the incidence of departures are inversely related. To support this explanation, 38/65 of our sampled CEOs have tenures of less than two years, which in Australia is the typical vesting period. Second, grant discounts and premiums are not policy variables in most compensation models, yet we document evidence that the practice is of some benefit to shareholders. Third, large grants are costly to shareholders. Finally, irregular grants appear no more effective than regular grants. Taken together, and apart from the deficiencies of OTM grants (refer Table 5), this evidence suggests that CEO stock options (at least) are not as effective as theory would suggest.

To test the main Hall and Murphy (2002) proposition that ATM add-on grants are more efficient than non-ATM add-on grants, estimation (3) is re-run with an ATM binary variable substituted for CEO award gain. The regression parameters are generally inferior from those for estimation (3A) and, importantly, ATM fails to achieve significance. Thus, the evidence is that ATM grants *per se* do not benefit shareholders. Rather, shareholders are shown to benefit *via* the incentive mechanism (albeit at

low statistical significance). This outcome lends some support to Choe's (2003) incentive model in which non-ATM grants can also be optimal. The insignificance of ATM grants also constitutes evidence that back-dating (at least in Australia) because back-dating would have been expected to higher returns for ATM grants.

5. Summary and conclusions

Using data on Australian CEO option grants for 1987-1998, our research has yielded a plethora of fresh insights on the interactions between option incentive, grant discounts/premiums, grant size and shareholder returns at grant. Key findings are as follows. Small grants (relative to outstanding equity) exhibit positive abnormal stock returns, while large grants are characterized by negative returns. Option incentive is found inversely related to grant size and high for irregular grants. In turn, grant size strongly increases in potential financial distress and to a lesser degree, grant irregularity. No empirical support is found for Choe's (2003) that grant size decreases in volatility and increases in leverage. Crucially, abnormal shareholder returns at grant are found increasing in incentive (as expected) and CEO gain at grant, but decreasing in grant size. The positive relation with CEO gain is primarily driven by the adverse incentive effects of grant premiums, rather than grant discounts. The evidence is that discounts *per se* are not costly to shareholders. The propensity for shareholders to lose as grant size increases is not recognized by any stock option compensation models. Evidence that shareholders lose when grants are large implies an agency problem of equity: namely, CEO opportunism. The problem seems general because the effect is not confined to irregular grants that potentially offer more scope for opportunistic behaviour. Finally, ATM grants are found to be about half the size and have half the pay-performance sensitivity of non-ATM grants, yet carry marginally higher incentive. However, limited empirical support is found for Hall and Murphy's (2000, 2002) prediction that ATM grants are optimal (for add-on awards) because the small positive shareholder gains associated with ATM grants are economically insignificant.

Further research is needed to determine why it is that large grants are detrimental to shareholders and why it is that shareholder returns at grant are increasing in CEO gains. Neither of these regularities is adequately represented in the analytical literature. Finally, the flow through effect

of shareholder returns on option incentive seems appreciable lower than expected and raises a general question relating to the effectiveness of CEO stock options generally.

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Table 1 Sample Descriptors

Grant size is the number of granted options divided by the number of outstanding ordinary shares prior to grant. Irregular grants are grants not made annually for at least three consecutive years to the same CEO and with a maximum variation of two months. Pre-grant CEO stock ownership is expressed as a percentage of the number of outstanding ordinary shares. 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 award. The stock beta is determined from estimating the market model over a minimum of 36 months prior to award. Financial leverage is the ratio of total debt to total assets, all at book. Interest coverage is the ratio of earnings before interest and tax (EBIT) to interest paid. ROA is the ratio of earnings before interest and taxes (EBIT) to total assets, all at book. Market-to-book of assets is the sum of the market value of equity 90 days prior to grant plus the book value of debt, both divided by total assets of book. Firm size is measured by *ln*(total assets).

		Grant size				Group differences: *t* statistic; *Z* statistic		
	Whole sample	1st quartile	2nd quartile	3rd quartile	4th quartile	1st v 2nd quartile	2nd v 3rd quartile	3rd v 4th quartile
Number of grants	*168*	*42*	*42*	*42*	*42*			
Percentage of irregular grants	73.8	61.9	73.8	78.6	81.0			
Percentage of subsequently exercised grants	60.7	52.4	61.9	64.3	64.3			
Descriptive statistics								
Grant size								
mean	0.340	0.020	0.092	0.237	1.011			
median	0.145	0.018	0.096	0.237	0.541			
Pre-grant CEO stock ownership								
mean	1.960	0.499	0.972	2.052	4.316	0.824	1.132	1.419
median	0.036	0.005	0.098	0.034	0.354	2.555††	1.119	2.058††
Pre-grant firm characteristics								
Stock volatility								
mean	12.334	9.950	11.634	12.972	14.779	1.190	0.711	0.922
median	9.900	7.700	9.300	9.200	12.500	1.643	0.465	1.893†
Stock beta								
mean	1.215	1.321	1.163	1.278	1.097	0.705	0.568	0.865
median	1.080	1.295	0.990	1.070	0.980	0.522	0.443	0.283
Financial leverage								
mean	0.190	0.149	0.187	0.242	0.182	1.712†	1.879†	1.833†
median	0.180	0.141	0.180	0.254	0.179	1.789	1.597	1.432
ln(Interest coverage)								
mean	1.612	2.078	2.364	1.124	0.882	0.732	3.049†††	0.402
median	1.675	2.109	1.795	1.574	1.536	0.152	3.799†††	0.277
ROA								
mean	0.079	0.084	0.110	0.064	0.059	1.428	2.997†††	0.161
median	0.089	0.097	0.103	0.079	0.086	0.975	3.405†††	0.814
Market-to-book of assets								
mean	1.297	1.108	1.058	1.367	1.658	0.469	1.255	0.771
median	1.043	0.962	1.028	1.043	1.096	0.519	0.107	1.194
Firm size								
mean	5.912	7.287	6.225	5.653	4.484	3.984†††	1.558	2.865†††
median	5.947	7.691	5.947	5.981	4.731	3.445†††	1.203	2.944

††† denotes two-tailed significance for $\alpha \leq .01$.

†† denotes two-tailed significance for $.01 < \alpha \leq .05$

† denotes two-tailed significance for $.05 < \alpha \leq .10$

Table 2 Grant characteristics and shareholder returns at grant

Grant size is the number of granted options divided by the number of outstanding ordinary shares prior to grant. The adjusted value per CEO granted option is the Black-Scholes call value adjusted for dividends and CEO risk-aversion consistent with the scale reported by Meulbroek (2001). Incentive is the partial derivative of the adjusted Black-Scholes option value with respect to the stock price. Pay-performance sensitivity is incentive multiplied by the number of granted options and divided by the number of outstanding ordinary shares prior to grant. CEO gain is the stock price at grant *minus* the exercise price, divided by the stock price at grant. A premium grant (OTM) occurs when the stock price on the grant date exceeds the exercise price by 5 or more per cent; a discount grant (ITM) occurs when exercise price on the grant date exceeds the stock price by 5 or more per cent. [-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 CAPM.

		Grant size				Group differences: *t* statistic; *Z* statistic		
	Whole sample	1st quartile	2nd quartile	3rd quartile	4th quartile	1st v 2nd quartile	2nd v 3rd quartile	3rd v 4th quartile
Number of grants	*168*	*42*	*42*	*42*	*42*			
Adjusted value per CEO granted option/ Stock price at grant (%)								
mean	44.60	45.11	45.30	44.29	43.65	0.147	0.706	0.427
median	45.79	45.66	45.90	44.39	46.10	0.649	1.253	0.134
Incentive								
mean	0.595	0.611	0.603	0.596	0.569	0.839	0.613	2.225††
median	0.600	0.619	0.610	0.601	0.569	1.096	0.045	2.362††
Pay-performance sensitivity								
mean	0.321	0.067	0.145	0.437	0.635	-2.731†††	-3.658†††	-1.496
median	0.128	0.036	0.076	0.183	0.472	-3.248†††	-4.134†††	-2.505††
CEO gain at grant								
mean	0.0152	-0.0103	0.0111	0.0173	0.0429	0.684	0.157	0.517
median	0.0134	0.0500	0.0181	0.0152	0.0464	1.150	0.470	0.837
[-1, 1] raw shareholder returns at grant								
mean	-0.0001	0.0096*	0.0040	-0.0002	-0.0138***			
median	-0.0001	0.0000	-0.0001	-0.0002	-0.0031**			
[-1, 1] CARs at grant								
mean	0.0021	0.0172***	0.0057	0.0001	-0.0144***			
median	0.0018	0.0122***	0.0010	0.0039	-0.0158***			

*** denotes two-tailed significance from zero for $\alpha \leq .01$.
** denotes two-tailed significance from zero for $.01 < \alpha \leq .05$
* denotes two-tailed significance from zero for $.05 < \alpha \leq .10$
††† denotes two-tailed significance for $\alpha \leq .01$.
†† denotes two-tailed significance for $.01 < \alpha \leq .05$

Table 3 Pre-grant firm characteristics by grant moneyness

A premium grant (OTM) occurs when the stock price on the grant date exceeds the exercise price by 5 or more per cent; a discount grant (ITM) occurs when exercise price on the grant date exceeds the stock 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. 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. Market-to-book of assets is the sum of the market value of equity 90 days prior to 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. Interest coverage is the ratio of earnings before interest and tax (EBIT) to interest paid.

	Whole sample	Discount grants (ITM)	At-the-money grants (ATM)	Premium grants (OTM)
Number of grants	*168*	*65*	*55*	*48*
Percentage of irregular grants	73.8	80.0	72.7	66.7
Percentage of companies in resource sector	17.9	12.6	18.2	29.2
Percentage of subsequently exercised options	60.7	64.6	63.6	52.1
Pre-grant firm characteristics				
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††
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		2.251†††		0.980
Z statistic		2.960†††		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†
ln(Interest coverage)				
mean	1.612	1.631	1.944	1.206
median	1.675	1.698	1.804	1.612
Group differences:				
t statistic		0.882		1.404
Z statistic		1.285		1.746†

††† denotes two-tailed significance for $\alpha \leq .01$.
†† denotes two-tailed significance for $.01 < \alpha \leq .05$
† denotes two-tailed significance for $.05 < \alpha \leq .10$

Table 4 Grant characteristics by moneyness

CEO gain is the stock price at grant *minus* the exercise price, divided by the stock price at grant. A premium grant (OTM) occurs when the stock price on the grant date exceeds the exercise price by 5 or more per cent; a discount grant (ITM) occurs when exercise price on the grant date exceeds the stock 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). Adjusted value per CEO granted option is the Black-Scholes call value adjusted for dividends and CEO risk aversion consistent with the scale reported by Meulbroek (2001). Incentive is the partial derivative of the adjusted Black-Scholes option 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 CAPM.

	Whole sample	Discount grants (ITM)		ATM grants (ATM)		Premium grants (OTM)
Number of grants	*168*	*65*		*55*		*48*
CEO gain at grant						
mean	0.0152	0.1817***		0.0032		-0.1963***
median	0.0134	0.1864***		0.0095		-0.1509***
Adjusted value per CEO granted option/ Stock price at grant (%)						
mean	44.60	47.19		44.53		41.15
median	45.79	48.13		44.92		43.28
Group differences:						
t statistic			3.451†††		2.513††	
Z statistic			3.817†††		2.100††	
Grant size						
mean	0.3401	0.4265		0.1685		0.4197
median	0.1446	0.2060		0.1162		0.1960
Group differences:						
t statistic			3.204†††		2.431††	
Z statistic			2.275††		2.673†††	
Incentive						
mean	0.595	0.583		0.611		0.592
median	0.600	0.597		0.626		0.591
Group differences:						
t statistic			2.913†††		1.908†	
Z statistic			2.120††		2.367††	
Pay-performance sensitivity						
mean	0.321	0.346		0.307		0.303
median	0.128	0.123		0.134		0.120
Group differences:						
t statistic			0.417		0.044	
Z statistic			-0.040		0.145	
[-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†††	

*** denotes two-tailed significance from zero for $\alpha \leq .01$.
** denotes two-tailed significance from zero for $.01 < \alpha \leq .05$.
††† denotes two-tailed significance for $\alpha \leq .01$.
†† denotes two-tailed significance for $.01 < \alpha \leq .05$
† denotes two-tailed significance for $.05 < \alpha \leq .10$

Table 5 Logit regression of OTM grant on selected variables

A premium grant (OTM =1) occurs when the stock price on the grant date exceeds the exercise price by 5 or more per cent. Potential financial distress is indicated when interest coverage ≥ 2 and is logged to moderate outliers; interest coverage is the ratio of earnings before interest and tax (EBIT) to interest paid. 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. CEO stock ownership is pre-grant and expressed as a percentage of the number of outstanding ordinary shares. Grant size is the number of granted options divided by the number of outstanding ordinary shares prior to grant. 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. Wald statistics are shown in parentheses.

n=168	
Chi-square	16.502
Significance	.006
Cox & Snell R^2	.094
Overall correct classification	71.4
Constant	-0.415 (0.741)
Potential financial distress (=1)	1.120** (6.034)
Stock volatility	-0.039 (1.954)
CEO stock ownership	0.076** (4.387)
Grant size	0.033 (0.016)
Irregular grant (=1)	-0.652 (2.613)

*** denotes two-tailed significance from zero for $\alpha \leq .01$.

** denotes two-tailed significance from zero for $.01 < \alpha \leq .05$

Table 6 Regressions

Grant size is the number of granted options divided by the number of outstanding ordinary shares prior to grant. [-1, 1] cumulative abnormal returns (CARs) at grant are determined by subtracting expected stock returns from raw returns for this interval, where expected returns are given by the CAPM; raw shareholder returns are adjusted for capitalization changes and dividend payments occurring during the event window. Potential financial distress is indicated when interest coverage ≥ 2 and is logged to moderate outliers; interest coverage is the ratio of earnings before interest and tax (EBIT) to interest paid. CEO stock ownership is pre-grant and expressed as a percentage of the number of outstanding ordinary shares. 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. Financial leverage is the ratio of total debt to total assets, all at book. Incentive is the partial derivative of the adjusted Black-Scholes option value with respect to the stock price. Adjusted value per CEO granted option is the Black-Scholes call value adjusted for dividends and CEO risk aversion consistent with the scale reported by Meulbroek (2001). CEO gain is the stock price at grant *minus* the exercise price, divided by the stock price at grant. An ATM grant is one which the stock price on the grant date does not exceed/fall below 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. *t* statistics are shown in parentheses.

Dependent variable:	2SLS (eqn. 2) (1) Incentive	OLS (2) Grant size	OLS (2A) Grant size	OLS (3) [-1, 1] CARs at grant	OLS (3A) [-1, 1] CARs at grant
n=168					
Adjusted R^2	.053	.148	.129	.128	.097
F	5.632	6.784	5.109	5.098	3.991
Probability	.004	.000	.000	.000	.001
Durbin-Watson		1.895	1.895	1.829	1.945
Constant	0.384***	1.548**	-0.179	-0.118**	-0.089*
	(5.940)	(2.569)	(-1.203)	(-2.494)	(-1.867)
Controls					
Potential financial distress (=1)		0.402***	0.440***	-0.004	-0.008
		(3.166)	(3.248)	(-0.396)	(-0.835)
CEO stock ownership		0.017*	0.020**	-0.001	-0.001*
		(1.906)	(2.207)	(-0.891)	(-1.282)
Stock volatility			0.011*		
			(1.722)		
Financial leverage			0.430		
			(1.111)		
Grant characteristics					
Incentive (adjusted delta)		-2.583**		0.195**	0.140*
		(-2.544)		(2.441)	(1.725)
CEO gain		0.053	0.048	0.055***	
		(0.198)	(0.175)	(2.645)	
ATM grant (=1)					0.009
					(1.082)
Grant size	-0.047***			-0.013**	-0.012*
	(-2.662)			(-2.065)	(-1.883)
Irregular grant (=1)	0.307***	0.289**	0.231**	0.013	0.017
	(3.139)	(2.550)	(2.028)	(1.495)	(1.847)

*** denotes two-tailed significance from zero for $\alpha \leq .01$.

** denotes two-tailed significance from zero for $.01 < \alpha \leq .05$

* denotes two-tailed significance from zero for $.05 < \alpha \leq .10$