Option Pricing and Corporate Report Disclosures: Managerial Incentives to Undervalue

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Abstract

This study examines disclosures of the value of executive stock options by Australian listed companies in annual reports for periods ending 2002 and 2003. Drawing on 'managerial power' theory, the study posits that managers have incentives to limit disclosures to the lowest level possible without causing significant stakeholder outrage, The study examines also the relation between the extent to which firms underprice the disclosed value of options (ie relative to a computed benchmark) and factors that are known to influence option valuation.

The results show that Australian companies underprice executive stock option disclosures in annual reports, which is consistent with US evidence that provides similar findings. The results suggest also the possibility that Australian firms manipulate the Black-Scholes (*BS*) valuation model opportunistically to undervalue options issued to directors and the top five executives. Size, leverage, firm age and profitability are found to be significant factors in explaining option underpricing. Further, the smaller the value of stock option remuneration in proportion to market capitalisation, the higher the undervaluation of stock options. As well as opportunism, this latter finding is consistent with less familiarity and expertise in valuing these instruments when options represent a lower proportion of management compensation to market capitalisation.

The findings in this study have potential implications for market participants in understanding the nature and extent of management remuneration and the relation between remuneration and firm performance. It has also implications for the implementation of AASB 2 *Share-based Payment* which requires expensing of options granted as executive remuneration. Moreover, there may be regulatory and policy implications if it can be established that preferred models of pricing options for report disclosure purposes are 'managed' for opportunistic reasons.

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1.0 Introduction

In recent years, the need for strong corporate governance practices has been gathering considerable momentum, with many efforts by corporate regulators and professional bodies to establish a set of 'best practice principles' (eg ASX 2003). While these efforts are to be commended, there seems to be little evidence that such measures have resulted in 'better-governed' firms or improved benefits to shareholders. Indeed, over the past decade, not only has the number of high profile corporate collapses in Australia increased, but the return on shareholders' funds has diminished substantially also.[1]

More recently, board accountability issues have been accentuated in the debate regarding executive remuneration and financial reporting requirements. For instance, following the collapse of HIH Ltd in Australia, Royal Commissioner Neville Owen concluded in his report to the HIH Commission that disclosure should be a central feature of corporate governance models adopted by firms (Askew & Elias, 2003).

Recent controversy suggests that stock option plans provide gains to management that are less transparent than outright compensation, and that they are often issued to the detriment of shareholders. Grossly inflated payments to retiring executives have attracted shareholder concern also, particularly in cases where the firm has underperformed (Oldfield, 2003). Yet agency theory suggests that the primary objective of financial instruments such as executive stock options is the alignment of the efforts of management with growth in shareholder value (Jensen and Meckling 1976).

Public concern over executive share options has forced some firms to rethink or even withdraw proposed option plans to avoid widespread shareholder disenchantment.[2] Notwithstanding these concerns however, a survey of the top 150 companies by remuneration adviser *Equity Strategies* failed to find any significant evidence that tougher corporate governance standards have 'diminished the intention of companies and their executives to use options' (Buffini, 2003).

Indeed, most top 150 companies have options or similar incentive schemes in place, and there were 20 new option plans approved in calendar year 2002 (Buffini, 2003: p 1).

Both disclosures surrounding director and top executive remuneration, and seemingly unjustifiable compensation packages, have attracted the attention of regulators. This has prompted regulatory bodies to examine the adequacy of the relevant disclosures in the annual financial report. In turn these concerns have resulted in amendments to corporate law in Australia (namely; the *Corporate Law Review Act* 1998), which arguably have been attempts by legislators to increase 'transparency', by focusing on the accountability of directors. Specific disclosures are now required relating to directors' remuneration packages, including of financial instruments such as executive share options.

In May 2003, the Australian Securities and Investments Commission (ASIC) issued "*Draft guidelines to valuing options in 30 June Directors' Reports*" (ASIC). This document proposed that executive option[3] values be disclosed in Directors' Reports from 30th June 2003 and be calculated using the Black-Scholes (*BS*) Option Pricing Model. Evidence exists that that the *BS* option valuation model may not be the most appropriate model for valuing executive options. Consistent with the strong incentives for managers to minimise disclosed values, in fact managers may use the model to avoid prudent disclosures (Yermack, 1998),

The purpose of this study is to examine option valuation disclosures by all Australian Stock Exchange (ASX) listed companies which use the *BS* option valuation model to value their executive share options for reporting periods ending in 2002 and 2003. The aim is to determine whether companies applying the *BS* model have properly applied the model as prescribed, ie to examine any difference between the value for issued options to directors and top executives ascribed by the company and the value calculated by applying the stringent requirements of the *BS* model. This study examines also the factors, in terms of corporate characteristics and remuneration policy, which are associated with any option pricing differential between the model and actual outcomes.

For sample companies using the *BS* option value model, this study finds significant undervaluation of executive options when actual disclosures are compared to the values calculated using the *BS* model. There are several potential implications that arise from this finding. For example, if, as it appears, managers in Australia are undervaluing executive options

in their annual financial disclosures, this may potentially lend support to a number of disclosure aversion theories posited in the literature. Moreover, the findings may provide support for international evidence that the *BS* valuation model may, at least on a practical level, be inappropriate for valuing executive share options. This finding would be concerning to regulators given the existing recommendations for its use. Also the depth of information disclosed by firms may be inadequate for the purposes of valuation under an appropriate model by shareholders attempting to revalue these instruments. This would imply that regulatory impositions need to be tightened such that an appropriate value can be attributed to the options disclosed in the financial report, and where necessary, comparisons made between firms. This becomes especially with the introduction of Australian Equivalents to International Financial Reporting Standards (AIFRS) for annual reporting periods commencing 1st January 2005 since options are required to be expensed under AIFRS. Finally if an association is established between discrepancies in option valuation and corporate characteristics influencing option values (e.g. size and leverage) this may have implications also for regulators, particularly in respect of corporate surveillance programs.

The Australian Regulatory Reporting Environment

There are a number of regulatory bodies and legislative instruments that influence the disclosures required by firms in their annual reports. The *Corporations Act 2001 (Cmwlth)* provides a comprehensive framework prescribing legal requirements for firms with respect to remuneration disclosures. The ASIC acts in the role of corporate regulator and administers the *Act* and, as such, has the ability to penalise listed firms that provide inadequate disclosures. The Australian Accounting Standards Board (AASB) issues Accounting Standards with which firms have to comply. AASB 1046 *Director and Executive Disclosures by Disclosing Entities* is the Standard relating to share-based payments for the period investigated in this study.

Following changes to the *Corporations Act* in 1998, Australian companies have been required to provide comprehensive remuneration disclosures for all directors and the five most senior executives. However, since the requirements are not prescriptive entirely, evidence suggests that diversity in disclosures exists. In many cases, firms over this period simply chose not to disclose, perhaps because of uncertainty as to how to disclose the value of instruments such as options due to the difficulties associated with valuing such instruments.

Accounting bodies and regulators, including the AASB and the ASX responded to variability in share-based payment disclosures, arguably resulting from uncertainty in the legislative

requirements, by issuing a number of amendments to Accounting Standards and Listing Rules. Changes to disclosure requirements have been influenced also by the adoption of International Accounting Standards by Australia for reporting periods commencing on or after 1 January 2005, and in particular the requirements of AASB 2 *Share-based Payments*.

In the sections that follow, a comprehensive discussion of the literature pertaining to the current study is presented, together with the development of hypotheses and an outline of the methodology. The final section discusses the results, the conclusions and potential implications.

2.0 Literature Review and Hypotheses Development

The *BS* option-pricing model (Merton 1973) is recommended by the ASIC as one of the suitable models for valuing executive stock options disclosed in financial statements (ASIC, 2003)[4]. Arguably, this initiative was a result of an urgent need for guidance by financial report preparers and their advisers; principally in relation to applying complex valuation theories to practice i.e. valuing options for reporting purposes. However, notwithstanding the theoretical appeal of *BS*, recent international evidence (Yermack, 1998) shows that the *BS* option valuation model may not be appropriate for valuing executive stock options (hereafter ESOs) and can indeed be used by managers to avoid prudent disclosures. Yermack's study uses the *BS* formula as extended by Merton (1973) to accommodate dividends. The existence of dividends requires modification of the original *BS* formula, and the convention is to assume a continuous dividend stream[5] (Conyon & Sadler, 2001).

While the literature identifies a number of option pricing models, the most common method in use appears to be the *BS* option pricing model, followed by the binomial model (Cox, Ross, & Rubinstein, 1979). The evidence regarding the appropriateness of the *BS* model in valuing untraded options such as ESOs is mixed. *BS* was designed to price traded European call options. Buyniski & Silver (2000) posit that *BS* will understate the value of an option, except in cases of highly volatile stocks. Alternatively, evidence exists indicating that it is possible to make a reliable estimate of the fair value of ESOs. Harrison (2002) reports that there is minimal difference in the option value regardless of which formula is used. Maller, Tan & Van De Vyver (2002) obtained in a mail-out survey to 50 firms details of features typical of ESOs issued by Australian companies. Their results indicate that a reliable value can be attributed to the options. Similarly, Carpenter (1998) provides evidence indicative of *BS'* usefulness in determining reasonably accurate estimates of ESO values. Note that this current study does not question the

validity of the model, but rather, whether the model is applied appropriately in practice for valuation and disclosure purposes.

2.1 Manipulation of the *BS* formula in pricing options

Yermack (1998) finds evidence consistent with the hypothesis that corporations exploit the flexibility of disclosure requirements to report low values for managerial compensation. Using *Fortune 500* company data, Yermack analysed the 'claimed values' of CEO stock option awards for samples of 94 (1992-93) and 88 (1993-94) firms using *BS* as the basis of valuation. His findings support the hypothesis that there is a relation between the amount by which companies under-report option values and the degree to which managers receive excessive compensation.

The *BS* formula can be exploited by shortening the expected lives of stock options and unilaterally applying discounts to the formula. According to Yermack (1998), the fact that many executives exercise their options prior to expiration (a feature permitted for American options) does not make necessarily those options less costly to shareholders *ex-ante*. Indeed, the flexibility to choose the exercise date is believed widely by finance theorists to result in American options being more valuable than European options. Furthermore, the use of historical company data for estimating an option's expected term may not be relevant for predicting future exercise patterns, since a firm's stock market performance can vary considerably across different time periods.

Often the theoretical support for making these expected life and discount adjustments to the formula is limited, and is further complicated by evidence that the *BS* formula underestimates the value of options in the first instance. Applying discounts to values, which are possibly already lower than their true value, may imply deliberate opportunism on the part of the firm (Yermack, 1998).

In contrast to Yermack's study, Balsam, Mozes and Newman (2003) find little evidence that firms manage the estimated value of their stock option grants, but do find that firm-specific incentives affect the way in which the stock option value is allocated. Balsam et al (2003) investigate whether firms manipulate their footnote disclosures under US Statement of Financial Accounting Standard (SFAS) 123, to increase perceptions of their profitability. In a random sample of 250 firms' 1997 disclosures obtained from Standard & Poor's Execucomp database, 137 firms satisfied the specific criteria for inclusion in the study. Balsam et al. (2003) find that firms with either high levels of CEO compensation or high levels of stock option compensation

relative to performance, allocate a smaller proportion of the option value to the 1996 pro forma expense. The evidence is consistent with attempts to reduce criticism relating to that compensation. Small firms and firms recently listed were found also to allocate a smaller proportion of option value to the 1996 pro forma expense.

The US is clearly at the forefront of the executive pay debate[6]. It has been suggested that perhaps the findings of US studies (such as Yermack, 1998), which indicate that managers deliberately undervalue options, and that managers may abuse their positions of power to pursue self-serving agendas, may be a US phenomenon only (Hofstede (1983); Pennings (1993); and Barkema et al (1997)). However, Barkema and Pennings (1998), in examining data on 143 top executives in medium-sized Dutch firms, suggest that there is no reason to believe that executives in other countries (under similar ownership arrangements) with sufficient leverage to manipulate their pay, would not be similarly motivated if they had the means to do so.

2.2 Rationale for using executive stock options in compensation design

Agency Theoretic Perspectives

In the context of executive remuneration, agency theory is of particular significance to the concept of efficient contracting. The use of share-based compensation is driven by the belief that tying executive remuneration to the share price mitigates the potential for managers to act outside the best interests of the firm's stakeholders. Lewellen, Loderer and Marting (1987), for instance, argue that the behaviour of executives whose remuneration is predominately independent of corporate performance (and shareholder wealth) may be characterised by greater risk aversion, shorter time horizons in appraising decisions, and diminished effort.

When ownership and control are separated, a potential problem arises in that the interests of the manager and owners do not converge, and so-called agency problems ensue (Barkema & Pennings, 1998). One means of overcoming these agency problems, as suggested by the classical agency theorists (eg Jensen and Meckling, 1976), is the issuance of options to key members of firm management. Using options to tie performance with the market measured share price is argued to dissuade managers from risk aversion in choosing value maximising projects (eg Taylor, 1994).

Agency theory implies that self-serving managers can be motivated by tying their interests to the fate of the firm (Barkema & Pennings, 1998). This is supported by a number of studies (Jensen

and Murphy, 1990; Coughlin and Schmidt, 1985; Murphy, 1985) indicating that high CEO salaries are justified by the financial impact that top managers have on their firms (Wade, Porac and Pollack, 1997). However, a number of other empirical studies suggest that there is a weak relationship between pay and performance (see Gomez-Mejia, 1994; Gomez-Mejia and Wiseman, 1997 for reviews). These studies purport that agency theory is not effective entirely in explaining how CEO pay is set, and that perhaps in some cases, share-based compensation is ineffective in reducing agency costs for a firm.

If share-based compensation has the objective of reducing agency costs, then this is perceived as 'optimal contracting'. However, if agency costs are not reduced, then managers may be manipulating their positions of power within the firm to extract rents, at the expense of shareholders. Bebchuk, Fried and Walker (2002) show that an optimal contracting approach to executive compensation is based on the underlying assumption that pay arrangements are set by a board of directors with the aim of maximising shareholder value. However, there are many features of compensation design which may be considered contrary to the objective of maximisation of shareholder wealth. Bebchuk et al (2002) examine the large body of empirical work on executive compensation to show that the desire by managers to camouflage rents can explain significant features of the executive compensation landscape, including the design of stock option plans and the use of at-the-money options. Indeed, the use of executive stock options has been considered to be not only a means of reducing the agency problem, but also a cause of this problem.

There are a number of reasons why the use of ESOs contrasts with an optimal contracting view as provided by agency theory. Benz, Kucher and Stutzer, (2001), using data for S&P 500 firms from 1992 to 1997 show that the ability of managers to skim or extract rents is shaped by institutional controls. As discussed by Benz et al, managers face rarely the downside risk of stock options, thus stock options are a relatively riskless way of increasing total compensation. They are rarely the sole form of compensation, and in addition, basic salaries typically increase as the proportion of stock options granted increases. Also, managers can apply hedging strategies to protect against any possible downside risk (Bettis, Bizjak, & Lemmon, 1999; Perry & Zenner, 2000).

Bebchuk & Jolls (1999) use a standard principal-agent framework to analyse the costs of permitting managers to extract rents in ways other then through their compensation arrangements. The ability of management to manipulate the 'pay-setting' process and persuade the board that

issuing stock options to executives is in the best interest of the firm is one example of diverting value away from shareholders. Considering that a number of studies have shown that CEO pay is unrelated to performance (e.g. Benston, 1985; Kerr and Bettis, 1987), then perhaps justifying the use of ESOs using agency theory to argue that the alignment of shareholders' interests with those of management has become archaic. For instance, Main, O'Reilly and Wade, 1995; and Finkelstein and Hambrick, 1989 indicate that "CEOs are taking advantage of their position to secure more pay than their performance warrants".

Managerial Power Theory

In contrast to optimal contracting, the managerial power approach suggests that "Boards do not act at arm's length in devising executive compensation arrangements; rather, executives have the power to influence their own pay, and they use that power to extract rents" (Bebchuk et al, 2002). Proponents of this argument believe that the desire to camouflage rent extraction might lead to the use of inefficient pay arrangements that provide sub-optimal incentives and thereby harm shareholder value. Not only are executive compensation arrangements an instrument for addressing the agency problem, they have the potential to form part of the agency problem itself (Bebchuk & Fried, 2002). For instance, intense lobbying for changes to disclosure regimes may indicate managerial aversion to those changes. Hill, Shelton, & Stevens (2002) found that economic self-interest motivated lobbying behaviour to the US Financial Accounting Standards Board exposure draft on Accounting for Stock Based Compensation.

Bebchuk, et al (2002) introduce the concept of '*outrage costs'*. The existence of outrage costs and constraints are argued to play an important role in the exertion of managerial power. Constraints are imposed on managers through requirements for board approval and the presence of market forces, depending upon how much 'outrage' a proposed arrangement will generate among relevant stakeholders. Furthermore, outrage may cause embarrassment or harm to the reputation of directors or managers. Outrage resulting from outsiders' recognition of the presence of rent extraction provides a possible check on managers' power to extract rent, thus managers have an incentive to obscure and legitimise (camouflage) their extraction of rents.[7] In fact, Skovoroda, Main, Buck and Bruce's (2003) study of 204 UK firms from 1997-1998 outlined that issuing options tends not to provoke substantial levels of shareholder or media outrage, as options are *perceived* as an incentive alignment mechanism.

The managerial power argument is not without opposition. Snyder, 2003 believes the managerial power approach to be too simple to describe the CEO compensation process; although he admits that it fits nicely as an explanation for executives' greed. Frey & Kucher (1999), for example, oppose the view that greater power results in higher levels of compensation. Instead, they advocate the *Compensating Wage Differentials Model*, which posits that taking all factors that influence compensation into account, power does not necessarily result in higher income. This model measures power by hierarchical position (i.e. number of subordinates), and finds that since power yields higher utility, in equilibrium managers are prepared to trade-off more power with lower total compensation, *ceteris paribus*.

Murphy (2002) offers also an alternative to the managerial power theory proposed by Bebchuk et al. (2002). For those features of executive compensation outlined by Bebchuk et al. to be inconsistent with optimal contracting, Murphy outlines some alternative explanations. He equates the rent extraction theory by Bebchuk et al. with CEO bargaining power. However, according to Bebchuk & Fried (2002), bargaining with the board is seldom at arm's length, and '…there is no reason to expect *a priori* that directors will automatically make value-maximising choices'.[8] Murphy argues also that the outrage cost theory developed by Bebchuk et al. (2002) is sufficiently vague in explaining rent extraction, in that "…the authors could argue that virtually any unobserved practice is avoided because it would be considered outrageous."[9]

Murphy (2002) provides evidence for S&P 500 firms from 1992 to 2000 that newly externally hired CEOs receive in their first year almost double the compensation received by internally hired CEOs. He argues that this is inconsistent with the managerial power hypothesis; an inference with which Bebchuk et al. (2002) disagree. Firstly, the managerial power approach does not suggest that more power is the only reason why some managers are paid more than others, and where the board has selected an external CEO, this candidate is likely to be, on average, stronger than an inside hire (which would explain a higher level of compensation). In addition, externally hired CEOs are more likely to have prior experience in the role of CEO, thus having higher reservation values.[10]

The notion that managers may abuse their position of power to extract rents is not novel, nor unfounded empirically, and has been researched widely in management and organisational studies. There are a number of shortcomings of optimal contracting in explaining the phenomena, which are in opposition to the concept of the agent acting in the principal's best interest. For

instance, the following features of some option plans do not achieve the objective of reducing agency costs: rewarding management for mediocre performance, granting 'at-the-money' options, resetting exercise prices [effectively undoing the incentive effect of the options] and enabling unwinding of options whereby managers are able to hedge the risks options create, and to cash out of their options once they are granted[11].

The idea that executive compensation contracts are not necessarily aligned with maximising shareholders' wealth is not unique, and the empirical evidence supporting suboptimal compensation contracts provides grounding for theoretical explanations for this evidence (Blanchard, Lopez-de-Silanes, and Schleifer, (1994), Yermack (1995) (1997)). The managerial power approach can be viewed similarly to a *'political costs'* argument (Watts and Zimmerman, 1978). However, there are a number of factors which preclude contracts from being devised in such a way. Joskow, Rose and Wolfram (1996) present evidence indicating that managers are constrained by political pressure from outsiders in designing compensation packages. Murphy (1996) finds that managers choose accounting methods that reduce perceived levels of compensation and increase perceived levels of performance. Jensen and Murphy (1990) argue that higher reported levels of compensation subject the firm to potential scrutiny from reporters thus imposing non-pecuniary costs on executives.

The pay for performance anomaly

Bertrand and Mullainathan (2000) find evidence inconsistent with the theory of optimal contracting. Their research supports the ideas proposed by Bebchuk et al (2002). . In contrast to the contracting view and traditional principal-agent theory, the authors argue that CEOs set their own pay by intervening in the salary setting process to manipulate the compensation committee and achieve their desired remuneration. CEOs may intervene to the point whereby they may draw shareholders' attention or are singled out (by the media or shareholder activists) for having been paid excessively. In their study of reward for luck as opposed to performance, Bertrand and Mullainathan (2001) found that pay for luck was less prevalent in firms with a large shareholder represented on the board. Analysis of the data from the 51 largest oil companies in the US between 1977 and 1994 enabled the authors to conclude that oil CEOs were in fact rewarded for increases in oil prices (luck). Under optimal contracting, shareholders will not reward CEOs for changes in firm performance beyond the control of the CEO.

Coakley and Iliopoulou (2004) examined 61 UK firms over the 1997-2001 period and found that pay for performance (equity-based compensation) was not significantly related to firm performance (ROE). The authors conclude these results to be in support of managerial power theory rather than agency theory. The study highlighted also that in contrast to prior research in the UK, UK companies clearly prefer share options rather than long-term incentive plans (LTIPs). The authors believe that this supports the managerial power perspective as the preference may result from an attempt to avoid the performance related criteria associated with LTIPs not endemic of share options.

Evidence of managerial power

Seeking evidence to support Bebchuk et al's (2002) theory that managerial power distorts optimal compensation contracts, Ryan and Wiggins (2004) propose that directors (either explicitly or implicitly) negotiate their own pay. They found that CEOs, either as a result of their own power or the board's lack of independence, were able to reduce their portion of equity-based compensation in an attempt to discourage monitoring. In addition, they conclude that board of director remuneration differs in the presence of varying types of monitoring barriers in a manner suggesting self-selection with respect to monitoring effectiveness.

Barkema and Pennings (1998) argue that much of the prior research using agency theory to explain executive compensation ignores issues of politics and power. The authors investigated the impact of power on variations in executive pay. Of particular interest to the current research is the concept that top managers might use their position of power (arising from overt sources such as their share holdings, and other more *covert* or hidden sources) to manipulate their pay. Although some prior research into agency theory has identified that power is a relevant factor regarding top management pay (e.g. Jensen and Murphy, 1990), this area has not been explored in any depth (Barkema and Pennings, 1998).

According to Barkema and Pennings (1998), the ability of CEOs to obtain optimal pay is conditional upon the ability to shape decisions that favour their interests. There are two potential sources of power: overt and covert. Overt power refers to power stemming from an observable manifestation, for instance, the level of share holdings of the executive. Covert power is more clandestine in nature, in that it is observed less easily. The results of Barkema and Pennings' research are consistent with the idea that top managers manipulate their salaries and bonuses, if the formal power from their equity holdings is supported by other 'covert' sources of power.

Power and managerial discretion

Managerial discretion is the '…latitude of options top managers have in making strategic choices.' This concept was first considered by Hambrick & Finkelstein (1987). Finkelstein and Boyd (1998) examine the concept of managerial discretion in determining CEO pay. The major finding of this study (of 600 Fortune 100 firms from 1987) was a positive relation between CEO compensation and managerial discretion. This relation was found to be stronger for firms with high performance. This provides evidence that CEOs have discretion in setting their own pay. Carpenter and Golden (1997) establish a significant link between managerial power and the concept of managerial discretion.

Relation between Option Valuation and Corporate Governance

Several studies have attempted to establish a link between CEO compensation and corporate governance (Core, Holthausen, & Larcker, 1999). Coulton, James, & Taylor (2001) find no evidence (in contrast to (Nagar, Nanda, & Wysocki, 2000)) that CEO compensation disclosures are more transparent as the stock-based proportion of the compensation mix increases. Analysing data from a final sample of 161 top-500 Australian firms from 1998 to 2000, Coulton et al. (2001) measure cross-sectional variation in transparency of CEO remuneration disclosures, and test for any potential relation with corporate governance attributes. The authors note that in general, the corporate governance attributes are related insignificantly to the disclosure of the value of options.

Coulton et al. (2001), in support of other prior studies, found that larger firms reveal more information about CEO compensation, and also that firms performing relatively well are more forthcoming. In support of the managerial power argument proposed previously, the authors linked less transparent disclosures with managerial concerns of justifying excessive remuneration where the firm had poorly performed. Also in support of the managerial power theory, the authors found that remuneration disclosures are significantly less transparent for CEOs with high levels of remuneration. However, they do not directly link their findings with the managerial power argument as is posited in this study. In contrast, Eng and Mak (2003) found no link between disclosure and profitability.

A number of studies have documented also the impact of firm characteristics such as size, listing and managerial ownership on disclosure (Eng & Mak, 2003). Prior studies including Chow and

Wong-Boren (1987), Meek et al. (1995) and Eng and Mak (2003) acknowledge firm size and financial leverage as firm characteristics associated with quality of disclosure. In the same way that larger firms wish to appear as 'transparent' and 'responsibly-governed' as possible, they may also undervalue options so that they do not invoke stakeholder outrage. It is expected that the results of analysis relating to the level of debt will be similar to Eng and Mak (2003), i.e. firms with greater debt (higher leverage) are more likely to undervalue their ESOs.

Studies which examine executive compensation have also observed the impact of growth on the level of compensation. Growth firms have greater information asymmetry and agency costs (Smith and Watts, 1992; Gaver and Gaver, 1993). Core, Holthausen and Larcker (1999) examine the impact of board and ownership structure on cross-sectional variation in CEO compensation for 205 listed U.S firms from 1982-1984. The results show that larger firms and firms with higher investment opportunities (proxied by market-to-book ratio) pay higher CEO compensation, which the authors interpret as reflecting their demand for higher-quality managerial talent. Eng and Mak (2003) also used the market-to-book ratio as a proxy for growth opportunities, but found no significant relation between disclosure and growth opportunities. Similarly, Balsam et al (2003) found that growth as a firm characteristic was not significant in determining whether firms manage their stock option expense.

Aboody & Kasznik (2000) investigate whether CEOs manage the timing of their voluntary disclosures with respect to stock option awards. Their findings suggest that CEOs manage the timing of their disclosure decisions opportunistically, to maximise their stock option compensation. Following on from other studies in support of managerial power, this research purports that if top management has the power to structure pay to its liking as evidenced by Ryan & Wiggins (2004), then it is not unreasonable to suggest that management may have the power to value certain financial instruments present in their compensation contracts to suit their own self interest. The current study investigates further the possibility of opportunistic behaviour on the part of managers, specifically that managers will opportunistically undervalue stock options.

Hypotheses

Given the empirical themes articulated above, it is expected that the managerial power theory will provide support for the hypotheses outlined below.

If the theory of 'Managerial Power' holds, i.e. that managers are 'disclosure' averse and have incentives to minimise disclosure, we would expect to find that managers will deliberately undervalue stock options to avoid stakeholder outrage and reputational harm. Thus, hypothesis 1 is stated as follows:

***H_1*: Company valuations of ESOs are lower than valuations based on a stringent application of the *BS* option valuation model.**

Moreover, since larger firms have more to lose from stakeholder outrage and reputational harm than smaller firms; we would also expect to find that:

H_2: **There is a positive association between the proportionate difference in stock option values calculated by companies compared to *BS* valuation, and firm size**.

To further investigate the monitoring aspects of agency theory, the current study also examines the effect of the extent of leverage on option pricing. This stems from Jensen & Meckling (1976), since the higher the degree of leverage; the more closely the firm is monitored by its creditors. A highly levered firm would thus experience more harm to its reputation via abuses of power (for instance, if it remunerates executives beyond a responsible level). Accordingly, highly levered firms may be more likely to undervalue options to mask the extent of remuneration thus avoiding potential stakeholder outrage. Hence it is expected that:

H_3: **There is a negative[12] association between the proportionate difference in stock option values calculated by companies compared to *BS* valuation, and highly levered firms.**

Core et al (1999) found that larger firms and firms with higher investment opportunities (proxied by market-to-book ratio) pay higher CEO compensation. In contrast, Eng and Mak (2003) found no significant relation between disclosure and growth opportunities. Similarly, Balsam et al (2003) found that growth as a firm characteristic was not significant in determining whether firms manage their stock option expense. Balsam et al (2003) posit that higher growth firms are more likely to need external funding, and that these firms may believe that greater profitability leads to greater and less costly access to external funding. Thus these firms may be more likely to undervalue options to increase perceptions of their profitability. This leads to the fourth hypothesis which states that:

H_4: **There is a positive association between the proportionate difference in stock option values calculated by companies compared to *BS* valuation, and firm growth as measured by the market to book ratio.**

Balsam et al (2003) found that firms with high CEO stock option compensation relative to firm performance allocated a smaller value to pro forma expense following a regulatory change to the way this expense is allocated. It is expected that the higher the proportion of options as a percentage of total remuneration, the greater the incentive to undervalue these instruments, understate total compensation and avoid criticism from stakeholders. Hypothesis 5 can be stated as follows for companies that have undervalued their ESOs:

H_5: **There is a positive association between the level of stock option discount and the proportionate difference in stock option values calculated by companies compared to *BS* valuation as a percentage of total remuneration.**

Similarly, firms with high ratios of options to market capitalisation might have greater incentive to undervalue options in order to understate total compensation and avoid criticism from stakeholders. Therefore, it might be expected that:

H_6: **There is a positive association between the proportionate difference in stock option values calculated by companies compared to *BS* valuation, and the value of total options to market capitalisation.**

Taking into account findings by Core et al (1999) and Eng and Mak (2003) that firm performance is not related to levels of pay and disclosure respectively, it could be reasonably expected that firms with profitability and/or cashflow problems may have more to lose from stakeholder outrage. Therefore, it is to be expected that:

H_7: **There is a positive association between the proportionate difference in stock option values calculated by companies compared to *BS* valuation, and firms with negative return on assets, and,**

H_8: **There is a negative association between the proportionate difference in stock option values calculated by companies compared to *BS* valuation, and firms with less cashflow.**

As recently listed firms allocated smaller proportions of ESO values to the expense in Balsam et al's (2003) study, we would expect to find that recently listed firms are more likely to undervalue options, as a means of increasing perceptions of their profitability. This may also be related to Hypothesis 5 above because recently listed firms are perhaps more likely to remunerate with option compensation than cash compensation. Consequently, we would also expect that for companies that have undervalued their ESOs:

H_9: There is a positive association between the proportionate difference in stock option values calculated by companies compared to *BS* valuation and firms that have listed within 5 years from the end of the reporting period.

3.0 Data and Methodology

The study is concerned with the 'reported value' of executive stock options issued to directors and the top 5 executives as shown in the remuneration disclosures in the Directors' Report, a report required pursuant to the *Corporations Act* (2001) and which forms part of the annual financial report. The financial reports of Australian listed companies were examined for the years 2002 and 2003 and relevant data was collected from the Directors' Report and from the Notes to the Financial Report[13]. This data is used to calculate a 'benchmark' option value by applying strictly the *BS* option valuation model, adjusted for expected dividends. The firm's reported value per option (ie as disclosed by all firms that specifically stated the application of the *BS* model) is obtained from the relevant remuneration disclosures in the Notes to the financial report.

This study uses annual report disclosure information for periods ending 2002 and 2003 respectively for each included company included in the sample. From the entire population of companies for 2002, only those companies with available data that included the value of executive share options in their financial report and applied the *BS* valuation model were included. Moreover, for year 2003, only those companies that were previously included in the 2002 sample were included. Companies not existing in 2002, or not issuing options in 2003, or not applying *BS* as the valuation model in both years; were excluded.

The initial sources of annual reports data were the *Connect 4* and *DatAnalysis* commercial databases. Several annual reports missing from these databases were obtained following direct telephone contact with the relevant companies. From a population of approximately 1406 companies in year 2002, 899 firms issued ESOs during the period. Table 1 illustrates the sample selection process for year 2002.

TABLE 1 ABOUT HERE

The Notes to the financial reports were reviewed for critical information. For each cache of options granted and valued using the *BS* model, it was necessary to identify if sufficient

information had been disclosed to enable an adequate *BS* revaluation to be completed. The required information consists of the grant date, the number of options granted to the director or executive officer, exercise price, expiry date or term of the option, the value (based on *BS*), either of total options granted, or the value per option. From this information, it was possible then to identify/estimate the stock price at grant date, time to maturity, expected dividend yield, returns volatility, and the risk free interest rate. Of the 899 firms reporting a value for or number of options, the *BS* model was used reportedly in 195 cases. Table 1 shows also the number of companies using each of several alternative option pricing models. Of the 195 firms using *BS*, 112 (57%) were deleted as a result of either inadequate data, or some other circumstance, which prevented a reliable value from being obtained upon reworking the *BS* equation.[14] Firms were deleted from the sample because, for instance, the option value was not denominated in Australian Dollars, the firm was not listed for sufficient time for an adequate share price history to be obtained, the volatility of the firm's share price was equal to zero[15], foreign firms cross-listed on the ASX where reports were not in the Australian required format, the options were over shares in another firm or the firm had stipulated that the valuation had been made at reporting date.[16]

We noted that many firms did not disclose sufficient data to enable some options to be re-valued using the *BS* formulae and this outcome coincides with Murphy's (1996) findings, i.e. given that managers bear the non-pecuniary costs from reporting high levels of compensation, they have incentives to adopt reporting practices that reduce these reported costs, including non-disclosure of information. Arguably, in the Australian context, managers were given some discretion on whether or not to disclose executive option remuneration details for the 2002 annual reporting period (i.e. as an unfortunate consequence of a loophole in corporate legislation existing at that time), and those firms that chose not to report relevant option compensation data during this period, avoided effectively the possibility of criticism over their compensation practices.

Of the 97 firms using *BS* which did disclose adequate data in 2002, in some cases more than one tranche of options was issued, thus for some firms there is more than one observation. In total, the 83 firms resulted in 172 observations (or option grants) for the 2002-reporting year. Of the 195 firms identified initially as using the *BS* model, only 9 (5%) disclosed all of the assumptions upon which their *BS* calculations were based. Thus in addition to grant and expiry dates[17], option value, number of options in each tranche and exercise prices, these firms disclosed additionally the volatility of the firm's share price[18], the risk free rate, and the share price[19] used as inputs to

the formula. One of these firms was eliminated from the final sample as its option values were disclosed in another currency.

For the 2003 reporting year, the same 97 firms included in 2002's reports were examined. Satisfying the criteria were 43 firms. From these 43 firms, 48 option grants are present. Hence the total sample size across 2002 and 2003 is 221. For the regression, not all data for all variables is available for a further 10 companies and so the sample size is reduced to 211.

Operationalisation of Variables

Dependent Variable

The dependent variable **PROPDIFF** represents the proportionate difference in stock option value between the firm's disclosed value and that calculated according the to *BS* formula. This is calculated as the option value benchmark **BSVAL** for the company as calculated by strict application of the *BS* model, compared with the option value as disclosed by the firm **COVAL**, divided by the calculated *BS* option value **BSVAL.** The benchmark option value **BSVAL** is determined using the *BS* (1973) valuation formula:

$$P_o = P_s N(d_1) - \frac{E\, N(d_2)}{e_{rt}}$$

where:

$$d_1 = \frac{\ln(P_s/E) + (r + 1/2\sigma^2)t \text{ and}}{\sigma\sqrt{t}}$$

$$d_2 = \frac{\ln(P_s/E) + (r - 1/2\sigma^2)t \text{ and where:}}{\sigma\sqrt{t}}$$

P_o	=	the current value of the option
P_s	=	the current price of the share (observable)
E	=	the exercise price of the option
E	=	2.71828 (observable)
t	=	the time remaining before expiration (in years) (observable)
r	=	the continuously compounded risk free rate of interest (observable)
σ	=	the standard deviation of the continuously compounded annual rate of return in the shares (not observable)
$\ln(P_s/E)$	=	the natural logarithm of (P_s/E)
$N(d_2)$	=	the probability that a deviation less than *d* will occur in a normal distribution with a mean of zero and a standard deviation of one.

Detail relating to the relevant sources of data and methods of measurement required to compute the *BS* option values is shown in Appendix 1

Regression Model

An Ordinary Least Squares *(OLS)* regression is used to test for associations between the dependent and independent variables. The mathematical form of the *OLS* regression is shown below together with an explanation of the variables used in the model:

$$PROPDIFF = \beta_0 + \beta_1 Size + \beta_2 Lev + \beta_3 Growth + \beta_4 OptProp + \beta_5 Mktcap + \beta_6 Age + \beta_7 Loss + \beta_8 DefFCF + \beta_9 Year + \beta_{10} OldEcon + \varepsilon$$

where:

PROPDIFF	=	(BSVAL – COVAL)/ BSVAL
β_0	=	Constant term
Size	=	Log (Market Capitalisation)
Lev	=	Total Liabilities/Total Assets
Growth	=	Log of Market: Book ratio
OptProp	=	Log of the proportion of stock option value as a percentage of total options
OptMktcap	=	Proportion of stock option values as a percentage of market capitalisation
Age	=	Dummy variable – listed for greater than 5 years =1, otherwise 0
Loss	=	Dummy variable = 1 where ROA<0 (loss), otherwise 0
DefFCF	=	Free cash flow divided by total assets
Year (2003)	=	Dummy Variable –year 2003 = 1, otherwise 0
OldEcon	=	Dummy variable = 1 if old economy, 0 otherwise
ε	=	Error term

Independent Variables

In the following paragraphs, the theoretical basis for the inclusion of the independent variables, and the source of the data for the measurement of these variables, is discussed.

Size: Consistent with the approach in Jensen and Murphy (1990) and Conyon et al. (2002), firm size is measured by market capitalisation or market value of equity (MVE) at the end of the financial year. The market value of equity is obtained from Aspect Huntley's *FinAnalysis* at the

end of the 2002 reporting period for each firm in the 2002 sample and the end of the 2003 reporting period for the 2003 sample. Similarly to Conyon et al. (2002), the logarithm of MVE is selected as a means of transformation to avoid any potential skewness associated with use of dollar values.

Lev: As in the study by Eng and Mak (2003), leverage is computed by dividing total liabilities by total assets. These two variables are obtained from *FinAnalysis* at the end of the 2002 and 2003 reporting periods for each firm.

Growth: Similar to Balsam et al. (2003), Coulton et al. (2001) and Eng and Mak (2003), growth is proxied by the ratio of the firm's market value of equity divided by the firm's book value of equity at fiscal year end. The market capitalisation is obtained from *FinAnalysis*. The book value per share (from *FinAnalysis*) is multiplied by the number of shares outstanding to compute the book value of equity.

OptProp: Following Coulton et al. (2001), this measure is the ratio of the value of stock options awarded to the directors and the top 5 executives divided by total compensation (including option values). These values are obtained from the remuneration disclosures in either the directors' report or the notes to the accounts.

OptMktcap: Total option values are expressed as a percentage of market capitalisation. The ratio is measured as stock options awarded to the directors and the top 5 executives divided by market capitalisation (as obtained from *FinAnalysis*).

Age: Similar to Balsam et al. (2003), firms are categorised as having 'recently listed' if they listed less than 5 years before the focal year. The firm listing date and the balance date are obtained from *FinAnalysis* and the age of the firm calculated. This variable is operationalised as a dummy variable recorded as 0 for less than five years and 1 for greater than five years.

Loss and DefFCF: Following Core et al (1999) and Eng and Mak (2003), profitability is measured by return on assets (ROA). A dummy variable is operationalised as 1 if ROA is less than 0 (loss) and 0 where ROA is greater than 0. DefFCF represents free cashflow (gross cashflow less gross investment) divided by total assets, all data obtained from *FinAnalysis*.

Control Variables:

A dummy variable is included for 'high tech' firms, as applied in Balsam et al. (2003), and controls for industry specific factors associated with the level of option valuation. In accordance with Jones and Sharma's (2001) classification of firms as 'old' or 'new' economy, the variable is recorded as 0 for firms classified as 'high-tech or new' economy and 1 otherwise according to the GICS classification[20]. Additionally, to control for the fact that the data spans two years, a dummy variable, operationalised as 0 for 2002 and 1 for 2003**,** is included.

4.0 Results

Descriptives

Table 2 shows the distribution of industries within the sample of firms. For the final sample of 83 firms, the greatest industry concentration consists of 24 (29%) mining/materials firms, followed by 11 software and services firms. These findings show, with the exception of mining, a relatively even spread of firms across all industries.

TABLE 2 ABOUT HERE

Table 3 shows the descriptive statistics for the data required to compute the dependent variable; together with the calculated 'benchmark' option value and the option value as disclosed by the firm (per option), divided by the calculated *BS* option value.[21]. We note that the mean option value disclosed by companies is \$0.32 cents, whereas the mean option value calculated as the benchmark using the *BS* model is \$0.38 cents. H_1 predicts that: "*Company valuations of ESOs are lower than valuations based on a stringent application of the BS option valuation model.*" The results reflect a significant difference in the means of the two tested variables (t = -2.328, p < 0.05). This finding therefore provides empirical support for H_1.

TABLE 3 ABOUT HERE

Table 4 shows attributes of the raw data for the independent variables. The mean values for companies selected in the final sample are as follows; market capitalisation \$8.79 hundred million, leverage 40.7%, firm age (period since listing) 13 years, proportion of options to total remuneration 15.29%, total remuneration (including options) \$3.38M. The difference in mean values between the company option value and the *BS* benchmark option value is examined in the

following section. Table 5 shows the Pearson correlations matrix, and it is noted that the only correlation above 0.5 is between DefFCF and Loss which is to be expected and which we do not consider to be problematic. Nevertheless, the mean variance inflation factor is reported with results.

TABLES 4 and 5 ABOUT HERE

Multivariate Results

As explained above, OLS regression is employed to test whether hypotheses H_2 to H_9 are supported. Table 6 reports the results and shows that size (p-value 0.044), leverage (p-value 0.001), option value to market value (p-value 0.015), loss (p-value 0.013), and firm age (p-value 0.086) are all significant variables in explaining the proportionate difference in option values. Moreover, when interacting together, the variables account for 11.54% (adjusted R^2) of the variability of the option proportion around its mean value. The omnibus test (F-statistic = 10.00, p-value = 0.00) demonstrates that the model is statistically significant. The regression is estimated using *White's* Heteroscedasticity-Consistent Covariance (HCCM) Estimator (White, 1980) and the cluster function within STATA to control for autocorrelation since observations from the same company appear both within a year and across the two years. Additionally, the mean variance inflation factor (VIFs) reveals that multicollinearity is not problematic.

TABLE 6 ABOUT HERE

Firm Size

The results in Table 6 also suggest that firm size is not an important determinant of the proportionate discrepancy between the firm's valuation and the actual valuation, and thus H_2, that *"There is a positive association between the proportionate difference in stock option values and firm size",* cannot be supported. Contrary to the stated hypothesis however, there is a significant negative relation between the proportionate difference in option value and the size of the firm. Thus larger firms are significantly associated with lower proportionate difference in option values (t = -2.0330, p = < .05). Indeed it appears that smaller firms are associated with higher option values and this may potentially be explained by smaller companies being less likely to have expertise in option valuation techniques and perhaps less likely to have a 'Big 4' auditor scrutinising pricing calculation for audit purposes (although this is not tested here).

Leverage

The results also show that leverage is a significant predictor of the proportionate discrepancy between the firm's valuation and the actual valuation and thus H_3 is supported. Thus highly levered firms are significantly associated with higher option values (t = -3.5450, p = <.01). This suggests therefore that, highly levered firms are associated with higher differences in option values, indicating that more highly leveraged companies have incentives to undervalue options thus avoiding the possibility of stakeholder outrage.

Growth

Table 6 shows that firm growth is not statistically significant in predicting option values (t = 0.8130, p > 0.10). Thus H_4 that "*There is a positive association between the proportionate difference in stock option values and firm growth as measured by the market to book ratio",* is not supported. The sign of the coefficient is, however, in the predicted direction, showing that there is a positive association between the growth of the firm and the differences between the two stock option values. A plausible explanation for these results may be that 'outrage' issues might be less important for high growth firms that may have less incentive to 'camouflage' the value of ESOs. Also, perhaps high growth firms may be more likely to have subsequent share issues, and in this regard might exercise greater caution in preparing their financial statements and avoid activities which might jeopardise their chances of raising funds in a competitive environment.

Proportion of Total Compensation

The findings in Table 6 show also that, contrary to expectations, the extent to which firms remunerate their executives with stock options, ie as a proportion of total compensation, is not statistically significant, (t = -0.3820, p > 0.10), and thus H_5, is not supported.

Proportion of Market Capitalisation

Contrary to H_6, that *"There is a positive association between the proportionate difference in stock option values and the value of total options to market capitalisation",* the results in Table 6 show a significant negative relation between the difference in option values and market capitalisation (t = -2.48, p = 0.015). Thus firms with high percentages of options in proportion to market capitalisation are more likely to have smaller differences between the firm option value and the benchmark option value. As with the 'firm size' argument stated above, these results could be attributable to the lack of valuation expertise and experience in smaller firms, especially since these firms are less likely to engage Big 4 auditors.

Negative Earnings

The findings in Table 6 also provide empirical support for H_7, that "*There is a positive association between the proportionate difference in stock option values and firms with negative return on assets"*. The results show a positive and statistically significant association between the difference in stock option values and loss making firms ($t = 2.531$, $p < 0.05$). Indeed firms that incur losses are more likely to be susceptible to greater scrutiny as a consequence of poor performance and arguably have greater incentives to avoid further shareholder scrutiny. Therefore, consistent with the results in Table 6, loss-making firms are more likely to engage in undervaluing ESOs in corporate report disclosures, than their profit–making counterparts.

Cashflows

Contrary to H_8, that "*There is a positive association between the proportionate difference in stock option values and firms with negative return on assets* ", the results in Table 6 show that despite the sign of the coefficients being in the predicted direction, the results are not statistically ($t = 0.8320$, $p > 0.10$).

Firm Age

Consistent with H_9, that "*There is a positive association between the proportionate difference in stock option values and firms that have listed within 5 years from the end of the reporting period"* the results show that there is a statistically significant, albeit weak, and positive association between the proportionate difference in stock option values and the firms listing within a five-year time frame ($t = 1.7320$, $p < 0.10$). These findings suggest that younger firms, i.e. those that listed within the last five years, are more susceptible to shareholder outrage and are thus more likely to have incentives to undervalue their ESOs.

Control Variables

As stated above, the study controlled for industry effects (ie new economy and high technology firms) and for the year options were granted (2002/2003) by including dummy variables.Neither of these variables is significant

Conclusions, Implications, Limitations and Future Research

This study examines all firms that disclosed the use of the *BS* option valuation model as the basis for calculating their reported values of executive stock options in their annual financial report for

the year ending 2002 . Subsequent disclosures for the same companies for year ending 2003 were examined aslo, which may create survivorship bias in the sample. The aim of the study is to examine whether, as hypothesised, there are significant differences in the valuation of options as disclosed by the company in financial reports, compared with a benchmark calculation of option value based on a strict application of the requirements of the *BS* valuation model. The study examines also the relation between option value differentials and a variety of factors known to influence option pricing and other factors that might provide managerial incentives to manipulate disclosed option values. Considering the paucity of Australian research examining the disclosure and valuation of executive stock options, this study provides a further contribution to the finance, financial reporting, and corporate governance literatures. The study includes a review of the relevant literature relating to principal and agent relationships, managerial power, and financial disclosure aversion theories, and examines whether current themes in the literature can explain the diversity of share option valuations for external reporting purposes.

The study provides empirical support for existing international evidence that companies exploit valuation models to underprice stock options for reporting purposes. To some extent these findings are not unexpected given that the *BS* valuation model is not precise., i.e. it relies heavily on the availability of specific information, some of which is not readily observable. In this regard there is considerable latitude in application, a phenomenon which can be exploited by companies having sufficient incentives to do so, for example, to avoid shareholder outrage.

Further, and perhaps as a consequence of 'first-time' application uncertainty, one alarming outcome is the extensive number of companies 'opting out' of providing any valuation of options whatsoever for this period, and the number of companies that did provide a valuation but did not disclose concomitantly all of the information required to validate the calculation of option values. These companies had to be excluded from the study which ultimately impacted on sample size. However, a more perplexing issue is the value relevance of option disclosures where the basis of those disclosures is not revealed. Indeed incomplete information is likely to be of little benefit to shareholders and could be the basis for uncertainty and thus greater shareholder concern. Worse still, incomplete information has the propensity to be misleading. Some of these issues will attract undoubtedly the interest of regulators who have an overriding obligation to maintain market integrity though compliance regimes that keep market participants well informed.

This study reports also several significant findings that establish links between pricing differentials and firm-specific factors, such as size, age, leverage, composition of executive compensation schemes and so forth. For example, firm size is a significant factor in explaining pricing differentials suggesting that smaller firms are more likely to underprice options. The degree of leverage is also a significant factor in explaining pricing, which is consistent with prior studies. Thus small firm and highly levered firms can be perceived to be more risk and thus are subject to the greater monitoring which in turn, would provide significant incentives for these firms to underprice ESOs (thus avoiding the possibility of even greater scrutiny and subsequent stakeholder outrage).

The study finds also significant associations between firms' disclosed option values and the proportion of total option value relative to market capitalisation, the age of the firm post listing and firms that incur losses. Arguably, the specific circumstances of the relevant firms (e.g., small size, loss making etc) attract greater public interest, thus providing strong incentives for disclosing option values less likely to result in shareholder discontent. There may be some implications in these findings for market participants. For example, knowing that these firms have the propensity to 'massage' option values, the market may demand greater returns to compensate for higher risk associated with disclosure uncertainty and information asymmetry.

As expected, the results are analogous with US findings that managers under-value ESOs. Furthermore, this study provides a link between managerial incentives to underprice ESOs in corporate disclosures with 'Managerial Power' or 'Political Costs' theories. More particularly, the results are consistent with firms expected to generate higher stakeholder outrage resulting from negative perceptions of remuneration perceived as 'inflated', having more incentives to undervalue stock options. Moreover, the link between firm size, leverage and firm profitability associated with the underpricing of ESOs is consistent with the 'managerial power' hypothesis.

Subsequent to the period of this research, ASIC issued "*Draft guidelines to valuing options in 30 June Directors' Reports*" proposing that ESO values be disclosed in directors' reports from 30th June 2003, and additionally, Australian Accounting Standard AASB2 *Share-based Payments* has been issued to first apply from 1st January, 2005. These regulatory initiatives, now require, *inter-alia*, a considerable amount of information be disclosed with respect to directors' remuneration, including ESOs. AASB 2 requires the expensing of options under AIFRS and AASB 1047 *Disclosing the Impacts of Adopting Australian Equivalents to International Financial Reporting*

Standards requires retrospective expensing for comparatives in the first AIFRS financial report of options issued after 7th November 2002. Given these new requirements, more extensive future research can be undertaken to determine whether pricing differentials between firm disclosures of ESO values and option values determined by properly applying an appropriate measurement model (such as the *BS* model), continue to persist. Further areas of research that can extend the current study, stem from the work of Yermack (1998). For instance, a further study could include variables acting as proxies for managerial power such as managerial share ownership and the length of directors' service. The role of the auditor in the process of validating the valuation of options in corporate disclosures would also add an interesting dimension to themes adopted in this study.

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Table 1: Data Screening Process

Financial Reporting Year 2002	No.	No.
ASX listed companies (30/6/02)		1406
Less Companies with no GICS sector code	66	
Less Companies with unobtainable reports	28	
Less Firms listed during the financial year	7	
Firms whose annual reports were obtained and screened for data		1305
Less Firms not reporting value or number of options	406	
Firms reporting value or number of options		**899**
Reporting/Valuation Method		
No valuation method was stipulated and/or no option value given		655
BS	195	
Binomial	10	
Trinomial	1	
Intrinsic or Fair Value	9	
Hay OPM	1	
Roll-Geske OPM	1	
OPM combining BS and Binomial	1	
Capitalisation of future maintainable earnings method	1	
Method ascribed by Income Tax Assessment Act 1936	12	
Actuarial simulation methodology	1	
Actual Method not disclosed	12	244
		899
BS Firms		195
Firms whereby the data provided was inadequate for the valuation to be reworked, or there was a problem which impeded a reliable revaluation from being completed	99	
Companies with stock option awards to either CEO, Top 5 executive officers or the directors with missing values	13	
Final sample of companies with stock option awards to either CEO, Top 5 executive officers or the directors		**83**
Total number of option grants to be recalculated for the 83 firms	172	
Number of firms disclosing all inputs to the BS valuation formula	9	

Financial Reporting Year 2003		
Firms which satisfied the appropriate criteria in the 2002-2003 sample		83
Final sample of companies with stock option awards to either CEO, Top 5 executive officers or the directors		31
Total number of option grants to be revalued for the 31 firms		49
Final Sample 2002-2003		**221**

Table 2: Industry Classification

Industry Group	Frequency	Percentage
Diversified Financials	2	2.38
Hotels Restaurants & Leisure	3	3.57
Software & Services	11	13.10
Materials	24	28.57
Banks	3	3.57
Retailing	3	3.57
Pharmaceuticals & Biotechnology	5	5.95
Technology Hardware & Equipment	3	3.57
Food & Staples Retailing	1	1.19
Media	2	2.38
Commercial Services & Supplies	5	5.95
Food Beverage & Tobacco	6	7.14
Health Care Equipment & Services	2	2.38
Energy	5	5.95
Capital Goods	3	3.57
Telecommunication Services	2	2.38
Transportation	1	1.19
Automobile & Components	2	2.38
Utilities	1	1.19

Table 3: Option Value Variables

	Company value Per option($) (coval)	**Black Scholes Benchmark option value ($) (bsval)**
Mean	0.322	0.384
Median	0.088	0.177
Maximum	2.740	2.894
Minimum	0.000	0.001
Std. Dev.	0.493	0.488
Skewness	2.315	2.619
Kurtosis	8.777	11.147
Jarque-Bera	504.583	863.945
Probability	0.000	0.000
Sum	71.058	84.751
Sum Sq. Dev.	53.517	52.371
Observations	221	221
t	-2.328	
p	0.021**	

**Significant at 0.05 level.

COMPANY VALUE PER OPTION = Company's reported Value Per Option

BLACK SCHOLES BENCHMARK OPTION VALUE = Option Value computed by the researcher

Table 4: Panel A

Descriptive Statistics for the Independent Variables

n=221

Variable	Mean Value	Median Value	Maximum	Minimum	Std. Dev.
Deflated Free Cashflow ($)	-0.109	-0.039	1.545	-1.193	0.304
Leverage (%)	0.407	0.370	1.708	0.009	0.278
Market Capitalisation ($M)	8.79E+08	1.07E+08	2.90E+10	2.288,	3.74E+09
Growth (Market to Book Ratio) (%)	2.306	1.806	17.000	-0.278	2.117
Total Option Proportion (%)	0.153	0.111	0.480	0.000	0.151
Age of the firm (years)	13.203	11.494	50.280	1.416	11.341
Return on Assets (%)	-0.053	0.006	0.605	-1.146	0.239
Option Value:Market Cap (%)	0.004	0.002	0.028	0.000	0.005
Total Remuneration ($M)	3.123	2.081	30.200	0.125	3.744
Old Economy (Dummy)	0.805	1.000	1.000	0.000	

Table 5: Pearson Correlation Matrix (N=221)

	PROPDIFF	Loss	Size	Lev	Growth	OptProp	OptMktcap	DefFCF	Year (2003)	OldEcon
Loss	0.202**									
Size	-0.253*	-0.401*								
Lev	-0.246*	-0.332*	0.347*							
Growth	0.027	0.145**	0.161**	-0.240*						
OptProp	-0.114***	0.311*	0.260*	0.032	0.240*					
OptMktcap	-0.069	0.326*	-0.340*	0.138**	-0.002	0.447*				
DefFCF	-0.127***	-0.572*	0.182**	0.225*	-0.146**	-0.192*	0.027			
Year (2003)	-0.018	-0.052	-0.018	0.004	0.002	-0.311*	-0.151**	-0.036		
OldEcon	-0.079	-0.054	0.141**	0.181*	-0.095	0.102	-0.143**	-0.102	0.042	
Age	-0.039	-0.100	0.303*	0.162**	-0.042	0.253*	0.007	-0.066	0.056	0.160**

*** significant at p<.01, **significant at p<.05, ***significant at p<.10**

Table 6 : OLS Regression of PROPDIFF

Explanatory Variable	**Notation**						
Dependent Variable	**PropDiff**	**Expected Sign**	**Actual Sign**	**Coeff.**	**Robust Std. Err.**	**t**	**P>[t]**
Constant Term	C	?	+	5.816	2.598	2.239	0.027**
Size	Size	+	-	-0.298	0.147	-2.033	0.044**
Leverage	Lev	-	-	-0.831	0.234	-3.545	0.001***
Growth	Growth	+	+	0.037	0.045	0.813	0.418
Total Option Proportion	OptProp	+	-	-0.569	1.490	-0.382	0.703
Option to Market Cap.	OptMktcap	+	-	-57.285	23.097	-2.480	0.015**
Age	Age[#]	+	+	0.355	0.205	1.732	0.086*
Loss	Loss[##]	+	+	0.540	0.214	2.531	0.013**
Deflated Free Cashflow	DefFCF	-	+	0.251	0.302	0.832	0.407
Year (2003)	Year (2003)	?	-	-0.323	0.203	-1.591	0.114
Old Economy	OldEco	?	-	-0.189	0.141	-1.341	0.183
F(10, 117)	10						
Prob > F	0.000						
R^2	0.158						
Adj R^2	0.115						
No.of clusters	118						
No of Obs	211						

Notes: * and ** and *** indicate significance at the 10%, 5% and 1% levels respectively.
The dependent variable equals the $\frac{\text{BS calculated option value - Firm Option Value}}{\text{BS calculated option value}}$

[#]AgeDummy is a dummy variable, equal to 0 if the firm has listed within 5 years of the end of the firms 2003 reporting period, and 1 if the firm has been listed longer than 5 years from this period.
[##]LossDummy is a dummy variable, equal to 1 if the firm's ROE <0, and 1 if ROE >1.
[###]OldEconomy Dummy is a dummy variable, equal to 0 if the firm is classified as "high tech./new economy" and 1 otherwise (according to the GICS classification).

Appendix 1

Item to be measured	Source of Data/Method of Measurement
Stock price at grant date	The grant date of each ESO issue is disclosed in the directors report or the footnotes to the financial statements in the firm's *annual report*, The stock price at the grant date was then obtained from *Datastream* for each option grant. The end of day stock price was used (consistent with Yermack, 1998).
Time to maturity	Option life is disclosed in the footnotes to the financial statements. This is calculated as the difference between the disclosed expiry date and the issue date of the option (in years).
Exercise Price	Strike price of ESO – disclosed in the footnotes to the financial statements**.**
Number of options	Number of ESO in each grant as disclosed in either the director's report or notes to the financial statements.
Expected Dividend Yield	Estimates of the option values are adjusted for future expected dividend payments. Similarly to Bowe et al. (2003), this is measured by prior financial year dividends (i.e. 2001 in this study) obtained from *FinAnalysis* divided by stock price three months after the end of the financial year[22] (from *Datastream*).
Returns Volatility*	The daily return index (RI) was accessed from *Datastream,* and the standard deviation of continuously compounded returns calculated as the annualised volatility of returns in the 120 days[23] preceding the financial year-end. Returns are calculated as the natural log of the daily return index: $R_{it} = \ln \frac{(RI_{it})}{(RI_{it-1})}$ where: R_{it} = the daily return of company *i* in time period *t.* RI_{it} = return index of company *i* in time period *t*. RI_{it-1}= return index of company *i* in time period *t-1* and: $\delta_i = std_{i,120} \times \sqrt{253}$, where: δ_i = annual estimate of expected volatility of stock returns. $std_{i,120}$ = standard deviation of stock returns in the 120 days preceding the option grant date. 253 = the assumed number of trading days in the financial year.[24]
Risk-free interest Rate	Following Yermack (1998), the appropriate risk free rate was selected as the yield at grant date of the Treasury bond with duration closest to *t* (time to maturity). e treasury bond rate with duration closest to *t* was chosen as a proxy for the k-less asset, and treasury bond rates for durations 2, 5 and 10 years obtained from *Reserve Bank of Australia (RBA) website*.

*Consistent with the findings in Yermack (1998), we find a small number of firms in the sample that disclosed the month of the option grant but not the specific date of the stock option award. Thus for the purpose of estimating stock return volatility prior to the award date, it has been assumed that option awards were made on the day of the month corresponding to the same day of the month of the exercise date. We further note that the use of estimates in this study may not be an ideal proxy for actual data, and caution that any findings in the study must be interpreted in the context of this limitation.

Endnotes

[1] For example, according to IBIS World, the average return on equity (ROE) for Australia's top 1000 companies has been halved in the past 15 years to 6.7% in 2001-02 (Way & Thomson, 2003). In contrast, companies in the United States have achieved an average ROE of 25% and in Britain; the average rate is about 17-18% for the same period.
[2] See Robertson, (2003), p. 10; Gluyas, (2003), p. 19; Mitchell, (2003), p. 10.
[3] A share option is a contract that gives the holder the right but not the obligation, to subscribe to the entity's shares at a fixed or determinable price for a specified period of time.[3]
[4] Guidelines released by ASIC at the 30th June 2003 are as follows: For the purposes of the disclosure of emoluments of directors and executive officers under s 300A of the Corporations Act, firms should draw on the IASB Exposure Draft ED 2 Share-based Payment (7/11/02) as a basis for valuing options. ED 2/ED108 Paragraph 20 states that *"…the fair value of options granted shall be estimated by applying an option pricing model, such as the BS model…"*
[5] Merton's extension to the formula introduces this modification.
[6] Which is understandable given the enormous gaps between the pay of a typical CEO and an average worker. Figures given by Graef Crystal (1991) indicate that the pay of an average American CEO exceeded the pay of an average American worker by 160 times in 1991, a figure which would most certainly have increased over the ensuing years to today.
[7] Examples of stakeholder outrage include refusals by retiring directors to accept large termination payments following shareholder outrage or controversy.
[8] Bebchuk & Fried, 2002, p.2.
[9] Murphy, 2002, p.857.
[10] Bebchuk et al, 2002, p.751.
[11] See The Economist, 2002.
[12] The association is predicted to be negative as leverage has been calculated as TA/TL.
[13] Details of options issued to the parties of interest were contained within numerous sections of these Notes.
[14] Reasons as to why there was a shortcoming in the company disclosure and reliable data could not be obtained included: failure to disclose the grant date; lack of expiry date or term to maturity; disclosure of the values of options and shares or performance rights as an aggregate, thus rendering the individual value of options unable to be determined; inadequate information to identify exactly which options were being valued in their disclosure (where there were multiple tranches of options); disclosure of a value range per option, but no individual values; failure to disclose the exercise price of the option; and the firm providing an exercise price range, but no specific exercise price.
[15] For one firm within the sample the 120-day volatility prior to grant date was equal to zero, which impaired the ability of the BS formula to compute an option value.
[16] This was stipulated in only one case. However, there is a possibility that a number of firms valued their options at reporting date and have not revealed this in their disclosure.
[17] These inputs enable the calculation of the term of the option.
[18] However, in only one case the time period upon which the volatility was obtained was included also as part of this disclosure.
[19] Only four of these firms disclosed the share price upon which the calculation was based, making it difficult to determine whether the firm was valuing the options at grant date or at balance-end date.
[20] New economy firms belong to the following five GICS sectors: 1) Software and Services, 2) Pharmaceuticals and Biotechnology, 3) Technology Hardware and Equipment, 4) Healthcare Equipment and Services and 5) Telecommunications.
[21] These values are all per option, and the calculation is based on 120-day historical volatility.
[22] Note that not all firms in the sample had a reporting date as at 30th June. There were a variety of reporting dates, and the balance dates were obtained from *DatAnalysis*. When estimating variables which require the reporting date to be taken into account i.e. as above for the dividend yield, the firms were grouped according to their respective balance dates when collecting the necessary information.
[23] For robustness, the volatility was computed also from 365 days prior to grant, to assess whether 120 days was not an adequate time period to capture the expected volatility of the underlying share. No difference in results arose from this analysis.
[24] Yermack's paper did not specify the assumed number of trading days in the year, nor the return measure used as the basis of returns or the source of this measure. Consequently, the calculation of this measure follows Bowe et al. (2003), following a meeting with one of the authors (Mr. Koh). However, the choice of 120 days as the appropriate period follows Yermack, as Bowe et al. chose 100 days prior to grant (following Aboody [1996]).