

The Impact of Equity-based Remuneration on Corporate Risk Strategy in the Australian Mining Sector

PhD Thesis

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October 6, 2015

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Will Charles Mackay

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Abstract

This study empirically examines whether CEO and director equity-based compensation influenced the risk strategy of listed Australian mining sector companies during 2004 to 2013, and whether risk strategy influenced shareholder value creation. The study had three broad objectives. The first was to identify the changes in remuneration structure for the CEO and directors that caused the increase in total compensation throughout this period. Following from the observed growth in equity-based compensation from part one, the second objective was to develop hypotheses to test the relationship between various forms of equity-based compensation and corporate risk strategy, and factors identified from agency and behavioural agency theories that influence firm risk taking and risk management decisions. The third objective was concerned with developing testing hypotheses to examine whether risk taking and risk management is connected to shareholder value creation.

The contribution of the study include integrating theories concerned with management equity compensation, firm risk strategy and shareholder value, and to provide insights to enable enhanced understanding of current equity-based compensation practice and corporate risk strategy within the Australian mining sector.

The study uses a pooled data set covering the ten year period 2004 to 2013. This comprises mining sector companies listed on the Australian Stock Exchange.

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List of Acronyms

AASB	Australian Accounting Standards Board
AMEX	American Stock Exchange
AMS	Australian Mining Sector
APC	Australian Productivity Commission
ASIC	Australian Securities And Investment Commission
ASX	Australian Stock Exchange
BAT	Behavioural Agency Theory
CalPERS	California Public Employees' Retirement System
CAPM	Capital Asset Pricing Model
CEO	Chief Executive Officer
CG	Corporate Governance
CGPR	Corporate Governance Principles And Recommendations
CLERP 9	Corporate Law Economic Reform Program
COSO	Committee Of Sponsoring Organisations Of The Treadway Commission
Cth	Commonwealth Of Australia
EBC	Equity-Based Compensation
EDR	Executive And Director Remuneration
EU	European Union
FASB	Us Financial Accounting Standards Board
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GIC	General Industry Classification
JORC	Joint Ore Reserves Committee
KMP	Key Management Personnel
LTI	Long-Term Incentive
NED	Non-Executive Directors
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares
R&D	Research And Development
RMRM	Risk Management Relevance Model
SARs	Stock Appreciation Rights
SEC	Securities And Exchange Commission
SFAF	Statements Of Financial Accounting Standards
SOX	Sarbanes Oxley Act Of 2002
SPE-PRMS	Society Of Petroleum Engineers Petroleum Reporting Management System
STI	Short-Term Incentive
UK	United Kingdom
US	United States Of America

Chapter 1 Introduction

1.1 Preamble

The last three decades have seen a significant rise in executive compensation across the globe (Bebchuk and Grinstein, 2005; Mishel and Sabadish, 2013; ACSI 2014). Perceptions of excessive executive compensation and the role of the board have come under increasing public scrutiny:

“Among the tasks specifically assigned to the board of directors is that of determining the structure and level of compensation of the top executives of the firm. There is perhaps no other corporate governance issue that has excited as much public controversy, particularly in the last 20 years”
(Denis 2001, p.201)

CEO compensation at BHP, Australia’s largest listed company, grew by over 3000% from 1980 to 2007 (Pottenger and Leigh, 2015), while in the UK CEO compensation at Barclay Bank grew by 4899% from 1981 to 2011 (Stratton 2011), and in the US CEO compensation increased by 875% from 1978 to 2012 (Mishel and Sabadish, 2013). A 2014 Australian survey of CEO compensation reported an increase in median statutory compensation by over 225% from 2001 to 2013 (ACSI 2014). The adoption of equity-based compensation (EBC) has had a significant impact on the total quantum of compensation being afforded to the top executives giving rise to the phrase “Fat Cats”, a favourite amongst the British tabloid press (Schwabs, 2010).

The increased reporting of friction between top management and the public (e.g. Patten, 2013; Schliebs, 2013) may be a function of increased awareness of compensation arrangements and an increase in the attention given to executive compensation in the media (Culpepper 2012). To a large extent the increase in executive compensation can be traced to the increased usage of EBC.

During the global financial crisis (GFC) many observers questioned the amount of management compensation and the way in which compensation packages were structured to encourage more risk taking. The US finance sector was identified as the main contributor to the GFC and the US government introduced reforms in the finance sector to address excessive management compensation and inappropriate risk strategies.¹ “Short-Termism” leads to inappropriate firm risk strategies when management strive to achieve short-term performance targets to maximise their compensation which leads to long-run shareholder value destruction (Fried and Shilon, 2011). “Clawback” provisions were introduced in the US to recover excess executive compensation paid to managers as a result of errors in performance measures (Dodd and Frank, 2010).

Risk strategy is defined as the company’s choice of risk taking and risk management. Where risk taking is defined as the firm’s level of investment where the payoff is uncertain (Zahra and Garvis, 2000; Barger et al., 2010) and risk management is

¹ Like the US, in 2008 the Australian government had commissioned a review into compensation in financial institutions in order to limit inappropriate risk taking and this resulted in the introduction of a number of reforms by the Australian Prudential Regulation Authority (APC, 2009).

defined as any activity designed to mitigate the volatility of cash flows resulting from movements in commodity price, foreign exchange rate, and interest rates (Smith and Stulz, 1985; Tufano 1996).

Reforms to corporate governance (CG) regulations addressing management compensation and risk management remain a government priority after over 20 years of continuous regulatory reform. In December 2009 the Australian Government issued the Australian Productivity Commission (APC) Inquiry Report into “*Executive Remuneration in Australia*”. The terms of reference for the report were to review the then current regulatory framework around the compensation of directors and executives. As a result of changes recommended in the “*Executive Remuneration in Australia*” report shareholders now vote on the Director’s Remuneration Report at the annual general meeting and there are binding consequences for the board if shareholders vote against the resolution to accept the remuneration report.²

Following consultation with various shareholder, business, industry and key stakeholder groups³, the Australian Stock Exchange (ASX) refocused attention on market participation rules through the release of the third edition of the ASX Corporate Governance Council’s *Corporate Governance Principles and*

² For more information on the Director Remuneration Report vote see Section 2.3.1 *Remuneration legislation* in Chapter 2.

³ Including the Association of Superannuation Funds of Australia Limited, Australian Council of Superannuation Investors, Australian Financial Markets Association, Australian Institute of Company Directors, Australian Shareholders’ Association, Business Council of Australia, The Institute of Chartered Accountants in Australia, CPA Australia Ltd, Group of 100, Institute of Internal Auditors and Law Council of Australia

Recommendations (CGPR). The third edition of the ASX-CGPR targets executive compensation and risk management and took effect from July 2014 (ASX 2014).

Lewellen et al. (1987) stated that the need to reduce differences in the time horizon and risk exposure between investors and managers is the major driver fuelling the evolution of EBC. The APC asserted performance compensation incorporating EBC offers:

“...an efficient means of reducing transaction costs in aligning the risk profiles of executives with those of the companies that employ them” (APC 2009, pp.191-192).

The tension between shareholders and managers over executive compensation can be explained by agency theory (Jensen and Meckling, 1976).⁴ CEO agency costs are the primary concern of shareholders but in the absence of strong corporate governance protocols a second layer of agency costs may form between directors and shareholders (Bebchuk and Fried, 2003). The primary responsibility of the board of directors is to protect the interests of shareholders by monitoring the behaviour of the CEO (Byrd and Hickman, 1992). However, conflicting director duties⁵ and equity-based director

⁴ Agency costs result from the separation of ownership and control of the company when shareholders contract a manager to manage a company on their behalf (Fama and Jensen, 1983). Agency costs include: the cost of monitoring the managers such as the cost of maintaining a board of directors and auditing the financial statements; the cost of bonding managers including compensation related expenses; and a residual loss from incomplete manager contracts (Fama and Jensen, 1983).

⁵Board roles differ between firms. The role of a director includes monitoring executive and firm performance. Directors of some firms act as stewards, whereby they actively shape firm direction and strategy (Donaldson and Davis 1991).

compensation distort the actions of directors, potentially leading to type II agency problems⁶ (Davis and Thompson, 1994; Mallette and Fowler, 1992).

Jensen and Meckling (1976) recommended the use of managerial EBC to align the interests of the CEO with the shareholders, and link greater managerial stock ownership to lower agency costs. A study by Jensen and Murphy (1990) lends support to the recommendation. Agency theorists believe managerial risk aversion can be minimised through the use of appropriately designed EBC, resulting in a firm risk strategy that is aligned with the interests of the shareholders (Harris and Raviv, 1979). However, Hall and Liebman (1997) question if issuing more equity to managers with undiversified portfolios can really reduce managerial risk aversion. Investors consider a firm's risk strategy when they value a company (Martens et al., 2007). Therefore if EBC impacts risk strategy, it has the potential to influence firm value and impact shareholder value.

Far from a simple cash payment for work done, management compensation design has become increasingly sophisticated. Modern executive compensation packages are made up of many elements including short-term incentives and long-term incentives, such as cash, bonuses, shares, options, superannuation, retirement benefits and other allowances. Managerial EBC offers the promise of improved firm performance. Substantial increases in executive compensation against a back drop of poor corporate earnings, has led many people to question the pay performance link and the

⁶ A comprehensive review of type II agency theory is provided in Section 3.2.4 of Chapter 3.

appropriateness of EBC, especially for directors. Questions remain largely unanswered about whether EBC can be used to curb manager risk aversion and optimise firm risk strategy, or improve shareholder value. Are EBC schemes simply a way for greedy managers to transfer wealth from shareholders to management (Haynes et al., 2014)?

1.2 Motivation

As noted above the use of EBC has increased for executives and directors⁷. The monetary value of management compensation is relatively easy to measure. It is difficult to evaluate if increases in EBC have resulted in improved shareholder value. Therefore, measuring the effects of adopting EBC on alternative factors such as risk strategy is important for regulators and investors to determine if the change is warranted.

This study is motivated by the gap in the current literature concerning the impact of EBC on firm risk strategy, and the impact of risk strategy on shareholder value. The explosion in executive compensation over the last 30 years raises concerns over the ability of current CG prescriptions to moderate agency costs (Mishel and Sabadish, 2013). Aside from the politically charged debate on excessive executive compensation, ongoing debate on executive compensation design has raised questions about the desirability of various equity-based elements. There are academics and

⁷The finding of this study support the noted changes in EBC for executives and directors; see Section 6.2.1 in Chapter 6.

regulators promoting the increased use of EBC (Jensen and Meckling, 1976; Murphy, 1999; APC, 2009; ASX, 2014), with others contemporaneously warning against the use of EBC (Bebchuk and Fried, 2005; Van Essen et al., 2012; APC, 2009; ASX, 2014). Opinion regarding optimal compensation design is divided as are much of the research results. EBC is well established as a means to compensate executive management. Over the last 15 years more companies are adopting EBC to compensate directors, the current trend is an increase in the ratio of EBC to total compensation (Pakela and Sinkular, 2014)⁸.

Far from one size fits all, best practice guidelines for director EBC differ for non-executive directors and executive directors (ASX, 2014). On the one hand, regulators recommend EBC to align the interests of executive directors with investors' interests while on the other hand, awarding EBC and performance incentives to non-executive directors is discouraged (ASX, 2014).⁹ The role of the board varies amongst companies from strictly monitoring executive performance to a stewardship relationship (Donaldson and Davis, 1991). Monitoring centric boards are primarily concerned with reviewing corporate strategy, the behaviour and performance of the CEO and assessing materially significant risk taking projects proposed by the CEO. Stewardship boards are more actively involved in setting corporate strategy, and influencing company direction through a “constructive relationship” with executive

⁸ Consistent with the trend observed in Section 6.2.1 in Chapter 6.

⁹ Balancing performance based incentives for the board and the need for objective oversight by the board highlights the type II agency problem between shareholders and the board.

management (Cuevas-Rodríguez et al., 2012). It is reasonable to consider differing compensation structures for directors based on the role the board performs.

Over the past two decades director compensation has changed coinciding with the increased risk and workload of taking on a directorship. Directors must commit more time to attending various sub-committees, achieve higher qualification standards and face increased risk of litigation (Pakela and Sinkular, 2014). Directors of stewardship boards are more actively involved in setting corporate risk strategy and specify the acceptable level of risk. With the increasing complexity of modern organisations and the evolving function of boards the changing role of directors from purely monitor to monitor-manager creates the potential for agency problems (Henderson and Bainbridge, 2014). EBC can be used to overcome the agency issue that arises between shareholders and directors. EBC can be used to compensate the board for the level of risk and uncertainty it assumes, and reward directors for performance. Compensation structures utilised to align the interests of executive managers with shareholders may be useful in aligning the interests of directors with shareholders. However, rewarding directors through the use of EBC schemes that reward performance when the directors do not take on stewardship tasks or influence firm risk levels may unnecessarily increase agency costs through higher director compensation without any increase in shareholder value. Reporting of shareholder dissent at Annual General Meetings (AGM) regarding executive compensation is now common in the media following “Say on Pay” voting introduced in the US, UK and Australia. This suggests not all shareholders are content with the pay arrangements within the companies they own. Aside from the issue of monitoring the board’s performance, introducing director

EBC may create other unintended consequences (Sanders and Hambrick, 2007); directors could embrace higher risk strategies or become more risk adverse depending on the incentive awarded (Windram, 2005). Finally, incentivising directors in the same manner as executives threatens the objectivity of board monitoring of executive management.

Prior research has examined CEO EBC and risk strategy with mixed results. The impact of director EBC on risk strategy is less well understood. Therefore, improving the understanding of the consequences of EBC is important for regulators, investors, and other interested stakeholder groups. Understanding the differential effect of EBC on executives and directors is essential in promoting effective board CG. Increased awareness of the interactions identified above will allow for better policy formulation by the regulators and government, and reduce shareholders' "pay is envy" (Howieson, Forthcoming). Legislative reforms across the globe are promoting shareholder activism as a way to improve corporate governance by increasing board and management accountability. Directors in the UK and Australia are required to disclose more detail on the justification for compensation policies including the quantum and use of various incentives. They are also required to explain the performance measurement criteria for key management personnel and its connection to compensation paid to directors and executives. In spite of all of the disclosure requirements, disclosures are often convoluted and hard to understand (Clarkson et al., 2006). Again and again with shareholder voting results from "say-on-pay" motions suggest there is a gap between the justification for particular compensation

arrangements, management performance and compensation payments (Corkery and Medarevic, 2013).

1.3 Objectives and motivation

As highlighted above, shareholders are often unable to observe a pay-performance link. Therefore, clarifying the effect that EBC has upon firm risk strategy may provide insight on the potential impact of changing the current EBC policies for executives and directors, and how such changes are likely to affect future shareholder value. This study seeks to understand the relationship of executive and director EBC on firm risk strategy, and the association between risk strategy and shareholder value. First the relationship between EBC and firm risk taking is considered. Second, the relationship between EBC and firm risk management is considered. Third the market's reaction to risk strategy is explored through the association of risk taking on shareholder value and the association of risk management on shareholder value.

Accordingly three main research questions are addressed in the study as follows:

Question 1: What is the impact of equity-based compensation on risk taking?

Question 2: What is the impact of equity-based compensation on risk management?

Question 3: What is the impact of risk strategy on shareholder value?

The Australian mining sector (AMS) was chosen for the study because of its unique characteristics in terms of risk taking and risk management. Mining firms are synonymous with high levels of risk taking (Burt, 1972; UNO, 2008) and the use of

risk management is widespread in that sector (Nguyen and Faff, 2002). Smith and Nau (1995) suggest mining firms adopt risk management to create and protect shareholder value. The study investigates CEO and director EBC of listed AMS companies and the impact EBC has on firm risk strategy for the period 2004 to 2013. ASX CGPR promote the use of EBC for the CEO and executive directors¹⁰ to align the interests of management with the shareholders (ASX 2003). The analysis will provide insights into the changing compensation practices within the AMS, and explore if EBC stimulates risk taking behaviour by management. Considerable reforms to the CG regulation over the last 30 years aimed at moderating agency costs have improved the managerial risk alignment between managers and shareholders without the need for complex compensation design. The use of EBC is far greater for US listed companies.¹¹ Australian companies are moving to compensation packages with higher levels of EBC in-line with the US (Pottenger and Leigh, 2015)¹². Research question one aims to validate whether EBC has any bearing on firm risk taking.

The second research question examines the impact of managerial EBC within the AMS on risk management. Firm risk management is a long standing CG issue. Following the GFC widespread board failures were revealed in the area of firm risk management (Henderson and Bainbridge, 2014). The benefits of risk management

¹⁰Although the ASX CGPR discourages the payment of options and shares to non-executive directors (ASX 2014), it does not provide any rationale for doing so.

¹¹To date, the adoption of equity payments to CEOs in Australia is significantly lower than that of the US with Australian companies adopting to pay their CEOs around 20% of their income in the form of equity compared to the US where 50% of senior compensation is in the form of equity (APC 2009).

¹²Trends observed in Section 6.2.1 of Chapter 6 provide further empirical supporting for this claim.

initiatives often extend beyond the principal-agent domain. Poor risk management practices have the potential to harm a broad range of stakeholders including creditors, employees and other non-shareholder groups. Understanding the impact EBC has upon risk management will provide policy makers with empirical insights into the effect of various equity compensation elements on management behaviour and attitude to risk.

The third research question examines the impact of risk taking and risk management upon shareholder value by examining the relationship between risk strategy and shareholder value creation. Understanding the market reaction to risk taking and risk management will provide insights into the optimal risk strategy and its relevance to the AMS.

The Capital Asset Pricing Model (CAPM) assumes investors expect a premium on the risk free rate of return to compensate them for the risk of investing in a particular company and the volatility associated with its earnings (Sharpe, 1964; Lintner, 1965). Firm risk taking and risk management impact future earnings and earnings volatility. Risk taking impacts future earnings, and earnings volatility changing the idiosyncratic risk of the company. Risk management is a company level activity that reduces a company's exposure to macroeconomic shocks and is primarily concerned with reducing earnings volatility but also impacts future earnings, changing the company exposure to systematic risk. Assuming a degree of market informational asymmetry and the existence of transaction costs, differences in risk strategy could impact the

value of a company's shares.¹³ This is of particular interest to the AMS which is synonymous with risk and uncertainty as a consequence of high levels of risk taking (Burt, 1972; Wise and Spear, 2000). In addition, risk management is commonly used to combat commodity price movements in the AMS (Smith and Nau, 1995).

Despite extensive research, the relationship between EBC and shareholder value is unclear. The study addresses the research gap and is motivated by a desire to better understand the impact of EBC on risk strategy, and the impact of risk strategy on shareholder value. In addition, owing to the emphasis in prior empirical studies on executive EBC research, director EBC is relatively less well understood. This study contributes to the research gap on director EBC by examining if the influence of EBC is the same for directors as it is for executives in relation to risk strategy.

1.4 Scope of the research

The scope of the research is a function of many factors: assumptions embedded in the theories used to ground the research, the context, the source of information, choice of independent variable, variable instrument design and methodology applied. This study focuses on the AMS because, more than any other industry, firms in the AMS are exposed to high levels of visible risk with clear choices when it comes to risk taking and risk management. The Australian market is a suitable domain to examine the mining sector due to the high number of mining firms listed on the ASX and the

¹³ In contrast, the efficient market hypothesis assumes risk management activities such as hedging have no bearing upon company value and neither enhance or diminish shareholder value (Fama, 1970).

relative importance of the mining sector to Australia's gross domestic product (GDP).¹⁴ The AMS is heavily reliant on equity markets to fund capital intensive development and high risk exploration investments, and the volatility of revenues means risk management is extremely relevant (Allday, 2015).

The study addresses risk taking and risk management, as both are influenced by management through firm risk strategy. They can be adjusted to modify either an executives' or directors' personal exposure to risk.

1.5 Summary of the findings

Ten hypotheses are advanced in this study, informed by three theoretical models widely used within accounting and finance research, including agency theory, behavioural agency theory (BAT), and CAPM.

Results from the study examining the relationship between equity compensation and firm risk taking suggest option compensation increases the level of firm risk taking when it is awarded to either the CEO or directors. The result confirms the hypotheses and is supported by the literature (e.g. Bryan et al., 2000; Sanders, 2001; Ryan and Wiggins, 2002; Hanlon et al., 2003; Dee et al., 2005; Coles et al., 2006a; Yermack, 2004; Linn and Park, 2005). However no significant relationship was observed

¹⁴ Ever since Australia's first stock exchange opened in the gold fields of Ballarat in 1885 the AMS has played an important part in the Australian capital market (Allday, 2015). In 2013-14 the AMS accounted for 8.88% of GDP of the Australian economy and over one third of listed companies on the ASX (ASX 2015).

between share compensation and risk taking regardless of whether it was paid to the CEO or director. The results support the hypotheses and are consistent with the prior literature (e.g. Bryan et al., 2000; Hall and Murphy, 2002; Ryan and Wiggins, 2002; Devers et al., 2008). The results suggest option compensation is a useful tool to promote firm risk taking within the AMS and can be used to encourage the CEOs and/or the board to take on more risk taking investment. The results do not support the use of share compensation to modify the level of firm risk taking.

Results from the study examining the relationship between equity compensation and risk management imply share compensation increases the likelihood of firm risk management but option compensation does not change the level of risk management. The findings are consistent for share compensation awarded to either the CEO or directors. The results suggest share compensation is an effective tool for promoting increased risk management by the CEO and directors, which is consistent with prior literature (Tufano, 1996; Dionne and Triki, 2013). The insignificant association between option compensation and risk management indicates companies do not need to be concerned that option compensation will cause managers to reduce risk management in order to advance their own personal wealth.

The examination of the association between firm risk taking and shareholder value indicates risk taking is positively related to shareholder value. The results suggest that firms engage in higher levels of risk taking to enhance the prospects for future returns and thereby increase shareholder value. The result is consistent with the predicted hypothesis and adds to the literature confirming the positive association (e.g., McConnell and Muscarella, 1985; Chan et al., 1990, 1995; Walls and Dyer, 1996; Brailsford and Yeoh, 2004).

Results for the study of the relationship between risk management and shareholder value show no significant association. The results suggest risk management does not increase shareholder value and refutes the predicted hypothesis.

Overall the results demonstrate EBC can influence management to change firm risk strategy. Firms need to determine their own optimal risk preference and then adopt the appropriate form of EBC to encourage management to alter risk strategy to achieve the desired objective. EBC schemes that encourage risk taking increase shareholder value. Once again firms need to pre-set the optimal level of firm risk taking and then adjust managerial EBC to incentivise management to take on the appropriate level of risk.

1.6 Outline of the thesis

This thesis comprises 7 chapters. A brief outline of the remaining chapters is provided below.

Chapter 2 is concerned with the institutional setting in Australia. First, a survey of CG mechanisms is undertaken in which four main factors are identified: capital markets, product markets, the board of directors, and CG regulations. A detailed analysis of the Australian regulatory environment is provided, including a comprehensive review of remuneration legislation, remuneration regulation, and remuneration codes of practice. This is followed by a summary of risk strategy regulations within the

Corporations Act 2001¹⁵ and ASX regulations. Listed AMS¹⁶ companies have numerous additional reporting requirements within the ASX Listing Rules and the Corporations Act 2001, and the additional legislation and regulation is summarised. Finally, a concise international comparison incorporating the US, UK, and Europe is presented.

Chapter 3 provides a comprehensive review of the literature concerning agency theory, management compensation, risk strategy and shareholder value. In addition type II agency problems between shareholders and directors are discussed. The concept of compensation is examined including analysis of the determinants of compensation and behavioural consequences associated with various different modes of compensation. Shareholder value creation and the measurement of shareholder value is then considered.

The theoretical framework and empirical hypotheses are developed in Chapter 4. The theoretical framework is derived from three underlying theories discussed in Chapter 3, incorporating agency theory, BAT and CAPM. In addition a set of testable empirical hypotheses are devised conforming to the theoretical framework and supportive literature.

Chapter 5 describes the research methodology and variable measurement. It outlines the sample description and model specification, including a detailed description of

¹⁵ ASIC monitor compliance with risk management legislation contained within the Corporations Act 2001.

¹⁶ Revisions to the ASX Listing Rules from 1st May 2013 expand the reporting requirements for extractive industries.

data collection and the models specific to the hypotheses. Following the combination of multiple databases containing ASX listed companies, a dataset of 3,163 observations for the period 2004 to 2013 remained. The chapter describes the model specification for each of the three models developed in the study. Finally, a detailed description of the dependent, independent, CG, and control variables including variable measurement is provided.

Chapter 6 presents the empirical results. Model diagnostic tools were employed to test whether the models are unbiased. Analysis techniques utilised to examine the data included descriptive statistics, multivariate regression and binary logistic approaches. The chapter reveals the results of the various models used to test the hypotheses. Robustness checks are included.

Chapter 7 provides a summary of the study and the conclusions drawn from the empirical results. The practical and policy implications are considered regarding the use of EBC for executives and directors and the potential ramifications on firm risk strategy are discussed. The theoretical connection and observed association between EBC, risk strategy, and shareholder value are reviewed. The limitations of the study are presented. Finally, future research opportunities are identified.

Chapter 2 Institutional background

2.1 Introduction

This chapter provides an overview of the institutional environment in Australia concerning corporate governance, remuneration, risk strategy and the extractive industry sector. The structure of Chapter 2 is organised as follows: Section 2.2 provides a brief review of the four key corporate governance mechanisms, capital markets, product markets, board of directors and regulation; Section 2.3 documents remuneration legislation, regulation and codes of conduct applicable to Australian firms; Section 2.4 describes risk strategy legislation and regulation applicable to Australian firms; Section 2.5 outlines legislation and regulations imposed on the Australian extractive industries sector; a brief comparison of international institutional arrangements for foreign extractive industry firms is presented in Section 2.6; and finally Section 2.7 contains a concise summary of the institutional setting for Australian firms.

2.2 Corporate governance mechanisms

The term ‘corporate governance’ (CG) first appeared in research literature in the early 1990’s coinciding with the Cadbury Report (Cadbury, 1992; Denis, 2001). However agency issues and mechanisms to deal with them have evolved since the advent of the first public company. Monitoring performance and providing appropriate incentives to management are fundamental to the governance of companies. Without the necessary checks and balances managers may shirk on their responsibility to generate the maximum profit for the

shareholders of the company. Instead they may choose to “pursue the easy life” (Kroszner, 2008, p.1), consume excess perks, pursue empire building programs that destroy firm value, or decline value creation opportunities.

In the presence of a dominant shareholder, principal-principal conflicts may arise between majority shareholders and minority shareholders giving rise to related-party transactions that benefit the dominant shareholder at the expense of the minority shareholders (Shan and McIver, 2011). Companies with weak governance structures are more likely to suffer from expropriation by managers (Shleifer and Vishny, 1997) via means such as tunneling (Shan, 2013). In addition, poor CG is associated with earning management whereby managers adjust company profits by adjusting accruals balances to achieve performance targets and thereby receive bonus compensation (Shan and Xu, 2012).

Reducing agency costs through improved CG mechanisms introduces new costs to the company. The cost of eliminating agency costs completely may be greater than the benefits. Hence the objective is to reduce agency costs to an acceptable level at a point where the benefits of improved CG outweigh costs. A multi-faceted approach seems like the only alternative given the limitations inherent in any single CG control and the ability of managers to modify their behaviour to side-step any single control. Recurring breakdowns in capital markets resulting from the separation of ownership and control are the driving force behind continued research into CG controls (MacAvoy and Millstein 2004; Roe 2005). Jensen (1993) identifies four mechanisms for controlling the divergence in interests between shareholders and managers. They are capital markets, product markets, the board of directors,

and regulation. The four governance mechanisms identified by Jensen (1993) provide a possible solution and are discussed next.

2.2.1 Capital markets

Capital markets reward efficient companies and penalize inefficient companies by pricing stock accordingly. Agency costs are a burden on company performance and hence, in an efficient market, lower agency cost companies will drive out higher agency cost companies. In spite of this, Jensen (1993) considers capital markets as an ineffective control, largely due to legal and regulatory constraints imposed upon them by government.

Considerable volumes of research support the notion that ownership structure can reduce agency costs. High ownership concentration and dominant shareholders are both negatively associated with managerial agency costs, due to the active monitoring role larger shareholders perform in looking after their own interests (Demsetz and Lehn 1985; Shleifer and Vishny 1997; La Porta et al., 2000; Singh and Davidson 2003).

European capital markets are characterised by concentrated ownership compared to Anglo-American capital markets where ownership is more dispersed (Shan and Round, 2012). In the Anglo-American model a unitary board is elected by a large number of small shareholders with less board representation and limited resources to actively control board activity. The Continental Europe two-tier board structure with a supervisory board commonly includes banks, major shareholders and institutional investors at the top level and an executive management board at the second level. This structure inherently provides greater protection against executive manager agency costs by facilitating independent oversight of executive

performance. The dominant shareholders and major creditors have access to more resources, which enables them to actively monitor executive management and company performance. Anglo-American capital markets with unitary boards are considered to play a smaller role in reducing agency costs and conversely, the Continental capital markets with two-tier boards are considered to play a more significant role (Jensen 1993; Shleifer and Vishny 1997).

2.2.2 Product markets

Product markets react too slowly. Only when the company has supplied the wrong product mix and/or uncompetitive prices are they disciplined, and this is often too late to save the company. Job losses, creditor losses and shareholder losses follow, resulting in a considerable loss of social welfare. For this reason product markets are seen as an ineffective CG tool (Jensen 1993).

2.2.3 Board of directors

Jensen (1993) points to a large body of literature detailing the many failures of the board to function as an effective internal control. Since the publication of Jensen (1993) the operational aspects of the board have experienced comprehensive reform. This is demonstrated in the CG literature which offers insights into which conditions enable the proper functioning of the board as internal controllers with the power to exert authority over management. Denis (2001) identifies three general solutions the board may use to overcome the agency problem; namely, bonding, monitoring and incentive alignment. These are all controls which can be applied from inside the company and are a common factor in corporate governance prescriptions.

2.2.4 Regulatory matrix

The Australian Government has created a regulatory matrix to support “good” CG for Australian listed entities, comprising a mixture of legislation, regulation and codes of conduct. The Corporate Law Economic Reform Program (CLERP 9) was enacted in 2004 by the Australian Government and was primarily concerned with making directors more accountable through audit reform and increasing company disclosure requirements. CLERP 9 introduced laws designed to bolster internal control mechanisms, addressing the balance of power between the board and management (Psaros 2009). CLERP 9 adopted many of the recommendations of the Bosch and Cadbury reports (Bosch et al. 1991; Cadbury 1992). CG regulation in Australia focused on two core issues. Firstly, CG law reform aimed at making individual directors and managers accountable for their actions. Secondly, CG regulation aimed at improving the efficacy of internal control mechanisms by bolstering the power of the board of directors. The Australia CG environment consists of a mix of “black letter” regulation and “soft law”, along with a collection of best practice codes and guidelines. Limiting agency issues is the core objective. CG controls continue to evolve in response to the failure of prior controls and the changing environment, and the resultant laws and regulations have received extensive attention from researchers (Shleifer and Vishny, 1997; Hills, 2008). Contemporary research includes critical reviews of the corporate and securities laws. Following the UK lead, the Australian government has placed significant emphasis on the role of company disclosures to improve CG. The reduction of information asymmetry through company disclosures has the added benefit of improving capital market efficiency, product market efficiency, and the board power dynamic.

The next section provides an overview of the regulatory environment in Australia. The target areas for the review include remuneration regulation, risk strategy regulation and extractive industry specific regulation.

2.2.5 Legislation, regulation and code

The primary function of CG legislation and regulation is to ensure company boards' and executives' act in the best interests of the shareholders. The principal instrument for the regulation of corporations in Australia is the *Corporations Act 2001* (Cth), an act of parliament passed in 2001 with numerous subsequent amendments. The act consists of rules about company registration, director's duties, management duties, financial reporting and disclosure, take-overs, equity raising and financial services. The role of the board in setting executive remuneration is regulated for all companies. The board is responsible for CEO selection, appointment and remuneration, and key management personnel (KMP) remuneration reporting. Shareholders are responsible for the election of directors to the board.

The Australian Securities and Investment Commission (ASIC) administers the act and provides guidance to companies on the interpretation of the law. ASICs' main responsibilities are to monitor compliance with, and enforcement of, the *Corporations Act 2001* (Cth). The Australian Accounting Standards Board (AASB) defines the disclosure requirements for related party transactions under AASB 124 which includes disclosures regarding the payments to key management personnel.¹⁷ The Australian Stock Exchange listing rules and

¹⁷ The term "key management personnel" includes executive management and directors (*AASB 124, para. 4*).

its Corporate Governance Principles and Recommendations form part of the regulatory framework for companies listed on the ASX. In addition, various associations and professional bodies have developed codes of best practice that complement the CG framework. Table 2-1 provides a list of the various stakeholder groups involved in the remuneration regulation process (Kovačević, 2012).

Table 2-1: Australian remuneration regulation stakeholders

Acronym	Organisation
AASB	The Australian Accounting Standards Board
ACSI	The Australian Council of Superannuation Investors
AICD	The Australian Institute of Company Directors
APRA	The Australian Prudential Regulation Authority
ASA	The Australian Shareholders' Association
ASX	The Australian Securities Exchange
BCA	The Business Council of Australia
CAMAC	The Corporations and Markets Advisory Committee
EOWA	Equal Opportunity for Women in the Workplace Agency
FSC	The Financial Services Council
APC	The Australian Productivity Commission

Source: Adapted from Kovačević 2012

2.3 Remuneration determination

The determination of executive and director remuneration in Australia is subject to a matrix of complimentary legislation, regulation and code¹⁸ (Sheehan, 2009). Remuneration legislation, remuneration regulation and codes of practice concerning remuneration are separated and discussed in the following sections respectively.

2.3.1 Remuneration legislation

There is only limited legislation in relation to executive and director remuneration (EDR) of companies in Australia, primarily concerned with market disclosure of KMP remuneration. Prior to October 1986 companies were required to report aggregate remuneration, for executives earning more than \$100,000. For a brief period in 1986 to 1987, the identification of individual directors and executives was required by law. However this was promptly revoked following objections from the business community (Hill, 2008). From 1987 to 1998 EDR legislation for listed companies was limited to the disclosure of the number of executive officers who received income over \$100,000, partitioned into \$10,000 bands. Individual executives did not need to be identified. All director remuneration was published using \$10,000 intervals.

The *Corporations Act* was amended in 1998 to include *s300A*, requiring directors to report on the nature and amount of remuneration paid to the board and senior executives. From July 1 1998, the report covered remuneration policy and its link to performance, detailing individual remuneration for all directors and the five highest paid executives. The disclosure requirements included a breakdown of the remuneration package into subcategories including

¹⁸ Since 2010, considerable effort has been made to remove duplication of CG rules and regulation in Australia.

base salary, short-term incentives, long-term incentives, other payments, and allowances (APC, 2009).

From 2004 directors were required to produce a separate remuneration report and incorporate it as part of the annual report. A non-binding shareholder vote on the remuneration report was also introduced, providing shareholders with the opportunity to voice their collective satisfaction or concern with the structure and quantum of management compensation. In 2007 remuneration became more tightly defined¹⁹ as AASB 124, *Related Party Transactions*, was embedded into the EDR regulation. A noteworthy change was the inclusion of disclosure rules for KMP.

Following the payment of a number of high profile “golden handshakes”,²⁰ legislative changes were introduced in 2009 requiring a shareholder vote for any excessive terminations payments exceeding one year’s average base salary (*Corporations Act 2001 (Cth) s200-200J*).

In a renewed push to bolster shareholder activism and under renewed pressure from institutional investors, the government introduced “two strikes”²¹ binding say-on-pay legislation enacted under the *Corporations Amendment (Improving Accountability on Director and Executive Remuneration) Act 2011(Cth)*. The *Corporations Amendment Act*

¹⁹ Refer to *Definition of Remuneration under AASB 124* for a comprehensive break down of the elements of remuneration as defined by AASB 124.

²⁰ A golden handshake is an ex-post payment to management at the termination of their employment akin to a free parting gift.

²¹ Two strikes is a regime under which a board spill vote is triggered after two consecutive say-on-pay no votes of 25% or greater at the AGM.

2011(Cth) also introduced a ban on KMP from hedging their respective remuneration rights (*Corporations Act 2001 (Cth) s206J*). This built upon CG principles advocated by the ASX that required full disclosure of any such hedge.²² *Chapter 2 part D.8 of the Corporations Act 2001 (Cth)* outlines the process entities must comply with when engaging the services of a remuneration consultant, including appointment, channels of communication, reporting and a remuneration consultant declaration.

In July 2011 the AASB announced the removal of selected Australian paragraphs from AASB 124 *Related Party Transactions*. Consequently, the government introduced legislation to move the deleted reporting requirements into the *Corporations Act 2001 (Cth)*, with only minor changes. As a result of the changes, KMP details now form part of the remuneration report and do not appear in the notes to the financial statements.

The main aims of the changes to EDR disclosure from 1998 were to improve the transparency into what KMP and directors are paid, and incorporate a shareholder feedback mechanism on the remuneration paid to management.

2.3.2 Remuneration regulation

In addition to its main role of monitoring compliance with the *Corporations Act 2001 (Cth)* ASIC published in June 2003 guidelines on permissible valuation methods for options granted to management as a component of the remuneration package. In 2011, ASIC conducted a review of remuneration disclosures of 50 remuneration reports drawn from

²² Corporate Governance Principles and Recommendation, 2nd edition, Box 3.2: Suggestions for the content of a trading policy (ASX, 2007, p.23).

ASX300 companies for the year ended June 2011. Following the review ASIC targeted four key areas for improvement including: KMP remuneration policy; non-financial performance criteria for short-term incentives; justification of performance criteria; and incentive plan conditions. ASIC has taken an active role in shaping and enforcing remuneration disclosure requirements in the remuneration reports produced by Australian firms.

AASB accounting standards (particularly AASB 2 *Share-based Payments*, AASB 119 *Employee Benefits*, AASB 124 *Related Party Disclosures*) are referenced throughout the *Corporations Act 2001* (Cth) and define how the various components of remuneration are calculated. In addition, the AASB accounting standards incorporate the financial reporting disclosure and presentation requirements for all reporting entities in Australia.

The ASX prescribes much of the CG and remuneration regulation for listed Australian companies. The ASX supports the AASB and ASIC to regulate financial reporting by overseeing continuous disclosure, and performing other monitoring activities. Companies listed with the ASX commit to comply with the Listing Rules²³ and the Corporate Governance Principles and Recommendations (CGPR).²⁴ The CG Council promotes a set of best practice recommendations. However, faced with a broad spectrum of market participants, the CG Council has adopted an “if not, why not” regime providing companies with the freedom to select those CG recommendations that fit their firm and when they elect

²³ Listing Rule 4.10.3 requires listed entities to include a statement of compliance with the CGPR in the annual report.

²⁴ Formed in 2002, the Corporate Governance Council is comprised of 21 stakeholders including business, investment and shareholder groups. The first version of the CG guidelines titled *Principles of Good Corporate Governance and Best Practice Recommendations* was released in 2003. It has undergone three revisions in 2007, 2010, and 2014.

to deviate from a recommendation, they only need flag the variation and explain the rationale for not adopting it.

The current CGPR²⁵ is comprised of eight principles aimed at achieving good CG outcomes aligned with investor expectations and promoting investor confidence in the Australian capital market (ASX, 2014). They are:

Principle 1: Lay solid foundations for management and oversight

Principle 2: Structure the board to add value

Principle 3: Promote ethical and responsible decision-making

Principle 4: Safeguard integrity in financial reporting

Principle 5: Make timely and balanced disclosure

Principle 6: Respect the rights of security holders

Principle 7: Recognise and manage risk

Principle 8: Remunerate fairly and responsibly

In regard to remuneration, Principle 8, *Remunerate fairly and responsibly*, states:

“A listed entity should endeavour to pay remuneration that is sufficient to attract, retain and motivate high quality directors and senior executives and that is aligned to the creation of value for security holders.” (ASX , 2014, p.31)

In recognition of the importance investors place on remuneration, Principle 8 contains four recommendations intended to assist in meeting the objective stated above. Firstly,

²⁵ The first edition of the CGPR contained ten principles which were consolidated into eight in the second edition in 2007 (ASX, 2007).

Recommendation 8.1 calls for the formation an independent remuneration committee²⁶ to design the remuneration framework and policies. Focus areas include director fees, superannuation and equity-based payments, and senior executive recruitment, remuneration and termination. Extensive comments are provided in relation to the design of appropriate remuneration packages for senior executives with numerous references to equity-based compensation. Secondly, Recommendation 8.2 advocates full disclosure of remuneration policies and practices, separated between non-executive directors, executive directors and senior executives. Subsequent versions of the CGPR remuneration guidance have been revised. Edition 2 of the CGPR (ASX, 2007) was modified to include guidance on termination pay and a more detailed equity-based payments section which promotes restricting hedging of risk-based equity remuneration. The CGPR (ASX, 2014) amendments include a new section on remuneration “composition” promoting an appropriate balance of fixed and performance remuneration; additional guidance on short- and long-term performance; a reference to the appropriate “*goals and risk appetite*”; the equity-based remuneration section was updated to include a warning that such schemes may lead to inappropriate investment decisions promoting “*short-termism*” or the “*taking of undue risk*”; finally, updates to the termination payments section explicitly advise against payments for misconduct.

Since the introduction of the first edition of the CGPR (ASX, 2003), the guidelines for non-executive director remuneration have undergone ongoing and major changes, most recently in the third edition of CGPR (ASX, 2014). The latest changes call for a link between the time

²⁶ Board Independence is a cornerstone of the CGPR doctrine. Principle 2 *Structure the board to add value* recommends an independent board and an independent chairperson. Independent nomination, audit, and remuneration committees are also recommended.

commitment and responsibility of the non-executive director, and fixed remuneration. For the first time the guidelines explicitly indicate that non-executive directors should not receive performance-based remuneration. However, in a major reversal of the prior position on equity-based remuneration, non-executive director option compensation is now supported²⁷ to give them “*skin in the game*”²⁸ and align their interests with those of the investors (ASX, 2014).

Moving to Recommendation 8.3, in response to recent requests from the government, a “*clawback*” policy has been included to recover excessive performance-based incentives. Lastly, Recommendation 8.4 encourages policy formation and disclosure for executives on hedging equity-based remuneration.

The Listing Rules contain additional ASX regulations covering remuneration. Listing Rule 10.14 requires shareholder approval for any director equity-based incentive plan and total payments to directors are capped under Listing Rule 10.17. Any increase in the total fees payable to directors must be approved by the shareholders. Director’s fees cannot include a commission on operating revenue. Restrictions on termination payments are covered in Listing Rule 10.18.

ASX300 listed firms’ face more stringent ASX regulations and they are required to adopt many of the CGPR. For example they must adopt Recommendation 8.1 that stipulates all

²⁷ The changes to the CGPR recognise the legitimate use of equity based compensation in the form of options to remunerate non-executive directors (ASX, 2014).

²⁸ The phrase “*skin in the game*” is used to describe a situation where management, due to their equity stake in the firm they manage, share the negative experience with shareholders following poor company outcomes.

board sub-committees contain no executive directors and instead be comprised of only non-executive directors.

The Australian Prudential Regulation Authority places restrictions on the structure of the remuneration committee, the use of remuneration consultants, equity-based remuneration, hedging, and termination payments, but these restrictions are limited to financial institutions.

Remuneration regulation is a fluid area with a vast number of changes having been introduced over recent years. The ASX listing and CG remuneration regulations are primarily concerned with disclosure which confirms compliance with the recommendation contained within the CGPR. The disclosure requirements contained within the recommendations are extensive, requiring detailed information on remuneration processes, procedure and policy. In addition, the CGPR provides comprehensive guidance through the commentary section following each recommendation. The commentary provides suggestions as to what should be the optimal compensation structure for the two classes of director and senior executive. A distinction is made regarding the appropriateness of cash and equity pay. Both short-term and long-term incentives are deemed appropriate for aligning the interests of management with the investors. Disclosure of conformance to remuneration structure guidance is not required under the CGPR.

The latest version of CGPR edition 3 (ASX, 2014) placed increased emphasis on firm risk strategy and firm remuneration practices. It included moves to incorporate risk strategy into the remuneration policy, including “*risk appetite*” involving investment decisions and “*undue risk*” addressed through risk management programs. Both areas are deemed areas of

significance in relation to CG and various stakeholders have an appetite for richer disclosures to enable a more transparent picture of the firm to be formed.

2.3.3 Remuneration code

The Australian Institute of Company Directors has a code of conduct for their members. The guidance covers various aspects of remuneration policy including remuneration committee formation, compensation structure, equity-based compensation, non-recourse loans, and disclosure.

Other stakeholder groups, for example, the Australian Council of Superannuation Investors and the Australian Shareholders Association publish guidance on remuneration best practice addressing structure and composition of remuneration packages for senior executives, executive and non-executive directors.

The codes are advanced as a mechanism by the relevant body to foster strong CG and to place pressure on members to adopt the code. Legislation and regulations related to risk strategy are examined below.

2.4 Risk strategy legislation and regulation

This section provides an overview of the legislative and regulatory constraints placed on risk strategy through the *Corporations Act 2001 (Cth)*²⁹ and ASX regulations. *Section 299A* of the *Corporations Act 2001 (Cth)* is a catch-all clause that requires the board of a company to include an informed assessment of the operations, financial position, business strategy and

²⁹ ASIC monitors and enforces compliance with the risk management protocols in the Corporation Act 2001.

future prospects for the entity in an annual directors' report. This report would normally contain a section addressing the material risks faced by the company and the measures taken to address the risks. It is at the boards' discretion to determine if they include information about the management of cash flow at risk.

Under *s295A* of the *Corporations Act 2001* (Cth) the board must ensure the assurances received from senior management (CEO) are based on “*a sound system of risk management*”. In addition, CGPR recommendation 7.2 states:

“The board should require management to design and implement the risk management and internal control system to manage the company's material business risks and report to it on whether those risks are being managed effectively. The board should disclose that management has reported to it as to the effectiveness of the company's management of its material business risks.”

(ASX 2010, p.34)

Directors and KMP are also required to demonstrate care and diligence in the management of a company and apply the “*The Business Judgement Rule*” in their deliberations under *s180* of the *Corporations Act 2001* (Cth). This extends to any risk taking activity including investment decisions. The decision to proceed with an investment that may materially impact the company's performance is also captured under *s299A* of the *Corporations Act 2001* (Cth) and ASX Listing Rule 3.1.

Under ASX Listing Rule 3.1 companies must make immediate disclosures of any event that gives rise to a material business risk that may impact on the price of a company's stock. It is at the boards' discretion to determine the appropriate level of detail disclosed. The ASX places significant weight on the importance of risk management. CGPR Principle 1: *Lay solid foundations for management and oversight*, refers to the board's duty to ensure that an appropriate risk management framework is in place. The board is also responsible for setting the company risk appetite, and informing management of the setting. CGPR Principle 7 defines procedures to devise risk strategy. The ASX describes risk taking as "*taking advantage of potential opportunities*" and risk management as "*managing potential adverse effects*". Far from directing the activities of a company, the recommendation defines a process for identification, recognition, management, and disclosure of the firm's risk exposure.

There are three recommendations within Principle 7. CGPR Recommendation 7.1 calls for the establishment of formal risk management policies to oversee, manage, and report material risks of the firm. The related commentary states: "*Risk management policies should reflect the company's risk profile*". This provides management with freedom to choose the optimal level of risk management for the individual firm. However, it might be expected that firms operating within a specific industry possess some common traits with regard to risks and their management.

Implementation of sound risk management and internal control systems is a requirement of CGPR Recommendation 7.2. The ASX highlights that the board has ultimate responsibility

for risk oversight and risk management. Internal control systems, internal audit and a risk management committee are all considered components of risk management.

The remaining two recommendations relate to compliance. Recommendation 7.3 requires the board to disclose whether or not it has received a risk and internal control disclosure, as required per section 295A of the Corporation Act 2001 and that the disclosure is based on sound control systems. Recommendation 7.4 requires full disclosure of compliance with the prior three recommendations.

Principle 7 identifies many classes of risk including: “operational, environmental, sustainability, compliance, strategic, ethical conduct, reputation or brand, technological, product or service quality, human capital, financial reporting and market-related risks” (ASX, 2010a, p.33). This study focuses on market related risks and financial risks including the following classes of risk: liquidity, funding, interest rate, foreign exchange, commodity price, credit and operating. When a firm is faced with material risk in relation to the areas identified above, it is obligated to disclose details to the market. The ASX published supplementary guidance to Principle 7 in June 2008 including a “Hypothetical example of helpful reporting”. Additional guidance is provided in Principle 7 by way of a reference to the Committee of Sponsoring Organisations of the Treadway Commission (COSO)³⁰, Risk Management Integrated Framework, and the Internal Control Integrated Framework.

³⁰ COSO is the Committee of Sponsoring Organisations of the Treadway Commission. The Risk Management Integrated Framework and Internal Control Integrated Framework form the basis of the regulatory risk management frameworks adopted by the UK and US.

There are restrictions on the accounting for risk management when financial instruments are used for hedging purposes. This area is under continual review, with the current raft of changes to AASB 9³¹, Financial Instruments, set to impact the use of financial instruments in the management of market risks.

Australian listed entities are not bound by any risk strategy legislation and regulations, they are free to set risk management and risk taking objectives without limit. The only constraint placed on them is to provide full disclosure of their activities to the market, including policies, procedures and controls to manage the risk. Recent moves to incorporate risk taking and risk management into the remuneration regulations are not duplicated in the risk strategy legislation and regulations.

2.5 Extractive industries legislation and regulations

This section provides an overview of the legislative and regulatory constraints placed on the extractive industries sector through the *Corporations Act 2001 (Cth)*³² and ASX regulations. There are only a few sections within the *Corporations Act 2001 (Cth)* that relate specifically to mining entities. Where a company's constitution states it must only engage in mining

³¹ Changes to AASB 9 introduce a new classification model, moving from the current requirements under AASB139, Financial Instruments: Recognition and Measurement, to a more principles based approach (Ernst-Young, 2015).

³² ASIC monitor and enforce compliance by mining entities with regulations in the Corporations Act 2001. In April 2013 ASIC stated its support for the recent changes to the JORC code and the SPE-PRMS by the ASX through the enhanced Listing Rules. The JORC code is the short name for *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves*. SPE-PRMS is the *Society of Petroleum Engineers Petroleum Reporting Management System* used to classify petroleum reserves.

purposes, has no recourse to recover amounts owed by partially paid up shareholders, and has share capital, then it may register as a no liability company.

Chapter 4 of the ASX Listing Rules is concerned with the periodic reporting requirements of listed Australian entities. The extractive industries have additional disclosure requirements under Chapter 5, i.e., *Additional reporting on mining and exploration activities*. While other listed entities are required to report on a half-yearly basis, extractive industry entities are required to make additional disclosures on a quarterly basis. Mining producers must submit to the ASX a quarterly production statement providing details of the mining production and development activities, the expenditures incurred, and a summary of the exploration activities undertaken for the consolidated entity. In addition, mining exploration entities must submit details pertaining to the acquisition or disposal of any mining tenement during the quarter and complete an Appendix 5B quarterly cash flow report. All reports produced by mining entities, including a statement in relation to exploration results or mineral resources, must comply with Listing Rule Appendix 5A: *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (The JORC Code)*. A new version of Joint Ore Reserves Committee (JORC) Code came into effect on the 1st December 2013 and contains guidelines for miners (excluding oil and gas) in the reporting of exploration results, mineral resources, and ore reserves. The report must be signed by a competent person to satisfy ASX Listing Rule 5.6 and Appendix 5A (paragraph 9). Miners from the oil and gas sector must comply with the Petroleum Reporting Management System (SPE-PRMS). The report must be prepared by a qualified petroleum evaluator as defined under ASX Listing Rule 19.12. In recognition of the quarterly reporting requirements, miners are exempt from having to comply with ASX Listing Rules 4.2A.3. and 4.3.a.

The AASB has published AASB 6 *Exploration for and Evaluation of Mineral Resources*. The standard prescribes the accounting treatment for transactions peculiar to the extractive industries sector and provides additional content rich disclosures for investors and financiers which enable a more transparent view of extractive industry firms.

In summary the extractive industry sector legislation and regulations discussed here are primarily concerned with promoting transparency and comparability of firm factors to assist relevant stakeholders in assessing the potential risks and rewards of firms in the extractive industry sector. The extractive industries are subject to many state and federal taxes but these are outside the scope of this study. It must however be noted that all taxing regimes have the potential to impact a firm's cash flow and hence may attract a response by the firm to mitigate any adverse outcome.

2.6 International comparison

This section provides a brief overview of the remuneration, risk and mining sector regulations in the US, UK and selected European Union countries.

The Securities and Exchange Commission (SEC) continues to oversee the disclosure of remuneration for US listed companies. Companies are required to make annual disclosures through the Form 10-K.³³ In addition to the components and value of compensation paid,³⁴

³³ The Form 10-K is the annual report that must be lodged with the SEC under the Securities Exchange Act of 1934.

companies are required to provide extensive details of the remuneration policy and procedures with specific reference to performance criteria and associated long-term incentives. Under 10-K disclosure requirements US listed firms must provide an assessment of *Risk Factors* (Item 1A), and *Quantitative and Qualitative Disclosures about Market Risk* (Item 7A). Under Item 7 of the Form, 10-K management may opt to disclose the risk management strategy the company applies in response to the risks identified. The disclosure requirements under Item 7A are far more stringent than those faced by Australian listed companies. US companies must disclose the exposure they have to market risks such as commodity price risk, foreign exchange risk, interest rate risk, and equity price risk. Disclosure of the management of the risks is also required. In addition, the US Financial Accounting Standards Board (FASB) requires firms to apply specific Statements of Financial Accounting Standards (SFAS) relevant to the oil and gas sector when preparing financial information.

The regulatory structure in the UK is very similar to that of Australia. UK listed companies are required to produce a Directors' Remuneration Report detailing remuneration policy and compensation paid to KMP and directors. Risk management of financial, operational, and compliance control is embedded in the UK Corporate Governance Code³⁵ under Section C *Accountability*. This is primarily concerned with the protecting the integrity of the financial

³⁴ The Financial Accounting Standards Board defines the measurement criteria for the components within a compensation package such as equity-based payments: SFAS 123 *Accounting for Stock-Based Compensation* and SFAS 123R *Share-Based Payments*.

³⁵ The UK Corporate Governance Code, formerly known as the Combined Code, is a product of the UK Financial Reporting Council and sets out corporate governance guidance for UK listed companies.

reporting process and the UK subscribes to IFRS and applies the same accounting standards as Australia.³⁶

EU member states have agreed to adopt strategies to regulate executive remuneration and remuneration disclosure but there is significant divergence in practice³⁷ between the member states. Under the European Union Accounts Modernisation Directive,³⁸ EU companies must include in their annual report a statement regarding the main risks facing the company. EU member states are required to adopt IFRS and therefore apply fundamentally the same accounting standards for mining as those used in Australia.

In summary, the Australian, US, and UK all require extensive disclosure of firm KMP remuneration. Risk reporting requirements vary considerably between nations with the US requiring the most complete disclosure of firm exposure to risk including qualitative risk analysis and a detailed sensitivity analysis of certain financial risk factors. All countries reviewed apply industry specific accounting reporting standards to the extractive industries sector. The common theme observed across all regions is a requirement for extensive disclosures to enable transparency.

³⁶ Although the AASB are largely the same as the IFRS, Australia has added paragraphs (AUS) to address local not-for-profit accounting issues.

³⁷ Most countries within Continental Europe have a two-tier board system comprising a supervisory board (all non-executive) and a management board. The UK, US and Australia all have a unitary board system with the board typically containing a mix of non-executive and executive directors.

³⁸ Directive 2003/51/EC

Chapter 3 Literature review

3.1 Introduction

Shareholders outsource management of the company they own to a board of directors. The board in turn appoints an executive to manage the day to day operations of the company. The separation of ownership from control gives rise to a number of agency costs (Jensen and Meckling, 1976). Different corporate governance arrangements can limit agency costs. Chapter 3 provides a literature review of: agency theory including type I and type II agency costs; remuneration arrangements designed to reduce agency costs such as managerial risk aversion; and shareholder value creation.

This chapter is organised as follows. Section 3.2 provides an overview of the agency theory literature including studies pre-dating the seminal work by Jensen and Meckling (1976) up to contemporary research building on the concepts of agency theory. The evolution of agency theory as the main theoretical framework used to explain management remuneration is discussed. In addition, type I and type II agency problems are addressed. Remuneration design is examined in Section 3.3. Next the connection between remuneration and firm performance is explored in Section 3.4 Behavioural aspects of remuneration are examined in Section 3.5 with an emphasis on risk strategy. Finally Section 3.6 examines the relationship between firm risk strategy and shareholder value creation.

3.2 Theoretical framework

3.2.1 Pre-agency theory

Adam Smith's *The Wealth of Nations*, first published in 1776, highlight many observations regarding public companies, shareholders and management. Smith makes the connection between the risks and rewards of an investment:

"The ordinary rate of profit always rises more or less with the risk." (Smith, 1776/1904, I.10.36)

He explains share price is a function of the market equilibrium and not determined by the capital contributions of owners.

"The value of a share in a joint stock is always the price which it will bring in the market; and this may be either greater or less in any proportion, than the sum which its owner stands credited for in the stock of the company." (Smith 1776/1904, V.1.105)

Smith identifies issues arising from the separation of ownership from control whereby non-owner managers are more concerned with their personal welfare at the expense of the owner.

"The directors of such companies, however, being the managers rather of other people's money than of their own, it cannot well be expected that they should watch over it with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own. Like the stewards of a rich man, they are apt to consider attention to small matters as not for their master's honour, and very easily give themselves a dispensation from having it. Negligence and profusion, therefore, must always prevail, more or less, in the management of the affairs of such a company." (Smith 1776/1904, V.1.107)

Issues identified by Smith over 200 years ago persist today, in particular agency issues. There is an enormous volume of research dating from the early 1900s concerned with theories of the firm (Hart, 1995). Much of the research of this era considered firms to be a “black box” in which labour is homogenous, the price of a unit of labour is set by the market, where supply and demand intersect (Hall and Sockice, 2001). More investment requires more units of labour in which all units of managerial labour are priced at the same rate, i.e., all managers have the same productive capacity and hence are paid the same amount for each unit of labour provided (Coase 1937).

Classical economic theory assumes the market moves towards an equilibrium point and does not consider the behavioural aspects of the actors involved. Boards and managers are understood to perform in a manner optimal to firm production, that is, profit maximization by firms is a given.

Penrose (1959) doubted the homogeneity of the entrepreneurial manager suggesting firm investment choices are governed by the ability of the manager to see and take advantage of opportunities as they arise. Penrose questions the power of the profit motive, beyond the required minimum return required by shareholders pointing to alternative outcomes delivering higher utility to the manager of the firm. Firm growth may be more valuable to managers than profitability if it brings power, prestige and public approval.

Furubotn and Pejovich (1972) acknowledge the extension of existing economic models of the theory of production to incorporate the role of managers within an organisation:

“First, an entirely new interpretation is given to the role of individual decision makers within the productive organization. The organization per se is no longer the central focus; rather, individuals are assumed to seek their own interests and to maximize utility subject to the limits established by the existing organizational structure. Second, account is taken of the fact that more than one pattern of property rights can exist and that profit (or wealth) maximization is not assured...Third, transactions costs are recognized as being greater than zero in virtually all cases of practical importance.” (Furubotn and Pejovich, 1972, p.1137)

Furubotn and Pejovich (1972) acknowledge the need to assume each decision maker is self-interested and that they will make decisions to move to their preferred operating position. They question the exclusivity of owners’ interests and the profit maximization assumption it entails, preferring to seek an understanding of firm behavior by observing the actions of the decision makers within the firm. They suggest an understanding of human motivations will lead to an understanding of firm behaviour (Furubotn and Pejovich, 1972).

Alchian and Demsetz (1972) discuss the challenges faced by firms in monitoring marginal productivity that leads to monitoring the actions of management and validity of the associated rewards. They explore the competitive advantage derived by firms through the use of team production. Furubotn and Pejovich (1972) go further suggesting an accurate assessment of productivity is essential, and team production without sensitive reward systems will lead to sub-optimal firm performance. Alchian and Demsetz (1972) label suboptimal performance by any individual as shirking and the consumption of firm resources for personal benefit as perquisites, often termed perks.

Jensen and Meckling (1976) capture shirking and perks under monitoring costs within the agency theory model. Agency theory is discussed next.

3.2.2 Agency theory

Jensen and Meckling (1976), question the modelling of a firm as a “black box”. Beyond the black box economics, agency theory is central to the development of theories of the firm with formative contributions made by Spence and Zeckhauser (1971), Alchian and Demsetz (1972), Ross (1973), Mitnick (1975) and Jensen and Meckling (1976). The adoption of agency theory as a basis for understanding the dynamics inside a firm is widespread with scholars from numerous disciplines anchoring their work from it including:

“... agency theory has been used by scholars in accounting (Demski and Feltham, 1978), economics (Spence and Zeckhauser, 1971), finance (Fama, 1980), marketing (Basu, Lai, Srinivasan and Staelin, 1985), political science (Mitnick, 1986), organizational behaviour (Eisenhardt, 1985) and sociology (White, 1985).” (Shankman, 1991, p. 321)

The drive to develop agency theory comes from a need to understand the dynamics between the principal and agent together with the consequences of their conflicting interests. The main issue identified by Jensen and Meckling (1976) is the conflict between owners and managers arising from the owners not directing and operating the businesses of the firm. Berle and Means (1932) were first to identify that the diffuse ownership structure of the limited liability company leads to a separation of ownership from control.

Extending the work of Furubotn and Pejovich (1972), Jensen and Meckling (1976) define an arrangement whereby a principal contracts another individual (the agent) to act on their behalf, in which they delegate authority to the agent to make decisions, thus an agency relationship is built. Assuming all parties act in a self-interested fashion, as utility maximisers, they review the divergence of interests between principal and agent, constructing a framework to address the agency costs arising from the agency relationship. They focus on the form of contracts between principal and agent, exploring the implications for agent behaviour under various assignments of property rights.

Jensen and Meckling (1976) develop a positive accounting theory to address the agency problems arising from the separation of ownership from control in which they construct a model aimed at reducing agency costs. They identify three elements to agency costs: (1) monitoring costs resulting from efforts to limit undesirable actions by the agent; (2) bonding costs aimed at ensuring the agent acts to protect the interests of the principal; (3) a residual loss that is the loss of value to the principal resulting from being unable to fully control the agent's action due to the inherent nature of costly contracts.³⁹

Jensen and Meckling (1976) extended a vast literature on theories relating to the firm. They are often cited as the originators of agency theory with their paper combining theories of the firm with agency theory and finance theory. However, they acknowledge that Adam Smith (1776/1904) queried the issues arising from a separation of ownership from control 200 years

³⁹ Fama and Jensen (1983) identify the cost/benefit relationship in which the cost of producing a complete contract covering all contingencies is greater than the benefit derived from such a contract, the "costly contract". As a result all contracts are incomplete and the agency cost associated with the incomplete contract is termed the residual loss.

earlier. In the same vein, assuming both the principal and the agent are utility maximisers, Jensen and Meckling (1976) argue the agent will take actions that are not always in the best interests of the principal. They explore mechanisms used to control the agent's behaviour, classifying them, as previously noted, as monitoring costs and bonding costs. There are several actors involved in monitoring management, including the board of directors, shareholders, institutional investors, creditors and auditors (Psaros, 2009). Monitoring costs include the cost of producing reliable financial reports (Benston, 1975; Jensen and Meckling, 1976). In turn managers select accounting policies⁴⁰ to maximise personal utility (Gordon, 1964; Watts and Zimmerman, 1978), diminishing the reliability of the financial reports and the monitoring power of the principal. Bonding costs are payments to the agent to restrict certain behaviour or compensation for certain actions. Agency contracts without bonding elements such as performance based pay may produce a moral hazard resulting in suboptimal managerial effort. Without appropriate bonds managers underperform and avoid new investment opportunities that would enhance shareholder value because it would deliver no direct benefit to them personally (Coase 1937). Managers are assumed to be risk-averse (Mehran 1995) and so they prefer remuneration structures in which they are exposed to a lower level of personal risk (Harris and Raviv 1979). If they have a personal equity holding in the firm they manage, this limits their ability to hold a balanced personal investment portfolio. As a consequence, managers may alter the firm's investing strategy, to suit their own position instead of a strategy that maximises shareholder wealth.

⁴⁰ Within the constraints imposed by the contracts (e.g., firm accounting policy and debt covenants).

Bonding costs include bonuses paid for achievement of annual profit targets and other immediate targets creating additional agency problems. Dechow and Sloan (1991) identify the agency issue of selecting short-term profits ahead of long-term growth, referring to it as the “horizon problem”, while Demirag and Tylecote (1992) label a tendency to prefer shorter time horizon investments as short-termism.⁴¹ Coleman (1966) suggests assigning property rights (equivalent to stock ownership) to managers to shape agent behaviour and bond them to the principal. Alchian and Demsetz (1972) explore the implications of assigning the residual claims to the agent. Similarly, Jensen and Meckling (1976) promote the inclusion of equity payments to agents to bond them to the firm. Dechow and Sloan (1991) provided empirical support for the inclusion of equity based compensation to bond CEOs to the firm and mitigate the horizon problem. They examine the relationship between research and development (R&D) investment and CEO years to retirement, and the contemporaneous impact of equity compensation. They report CEOs compensated with equity based remuneration are less likely to reduce R&D spending as they near retirement when compared to CEOs who do not receive equity based remuneration.

Furubotn and Pejovich (1972) identify three mechanisms offsetting the risk of self-interested managerial behaviour: (1) the market valuation of the firm reflects the “*capitalized value of current managerial decisions*”(p.1150) which in turn limits self-interested management behaviour; (2) the link between managerial rewards and past performance will encourage the pursuit of future profit maximisation; (3) the competition among managers will force

⁴¹ Institutional investors place pressure on managers to produce short-term profits in order for them to deliver high returns on invested funds (Sykes, 1994).

managers to perform or be replaced by managers seeking personal advancement through superior performance.

To date, agency theory and the notion of the self-interested manager have been widely accepted, although competing theories such as stakeholder theory and stewardship theory attempt to explain behaviour by management that may not be consistent with agency theory (Donaldson and Davis 1991; Donaldson and Preston 1995). Behavioural decision theory contributes to the evolution of agency theory (Wiseman and Gomez, 1998 p.134) and is incorporated in the section below.

3.2.3 Behavioural agency theory

Agency theory is criticised for being too simplistic and rational in predicting the behaviour of agents (Daily et al., 2003). Critics of agency theory claim the simplistic assumptions and restricted focus constrain its validity as a predictor of behavioural outcomes (Eisenhardt, 1989; Perrow, 1986).



Figure 3-1: Agency theory risk alignment model

Figure 3-1 demonstrates the simple linear relationship assumed by agency theory. The board monitors and bonds the CEO to modify agent risk behavior in the desired way, which in turn results in the expected firm performance (Jensen and Meckling, 1976). Other endogenous

factors influencing CEO risk behaviour or firm performance are ignored and unidirectional interaction between factors is inferred.

Research grounded in agency theory has yielded mixed results (Wiseman and Gomez, 1998). Regardless of the assumption of economically rational behaviour of the agent, empirical studies provide evidence that management consistently fail to act in a rational fashion in response to compensation (Artzner et al., 1999). These criticisms suggest the need for ‘real world’ complexity in compensation research and imply that further consideration is required in developing a theory to better explain the use of complex pay structures (Gomez and Wiseman, 1997). No single model of agency adequately explains the wide range of corporate governance arrangements observed across all countries (La Porta et al., 1997, 1998; Lubatkin et al., 2005). Behavioural Agency Theory (BAT) allows a more complex specification of the elements of compensation in which the impact of the various elements is not constant (Devers et al., 2008).

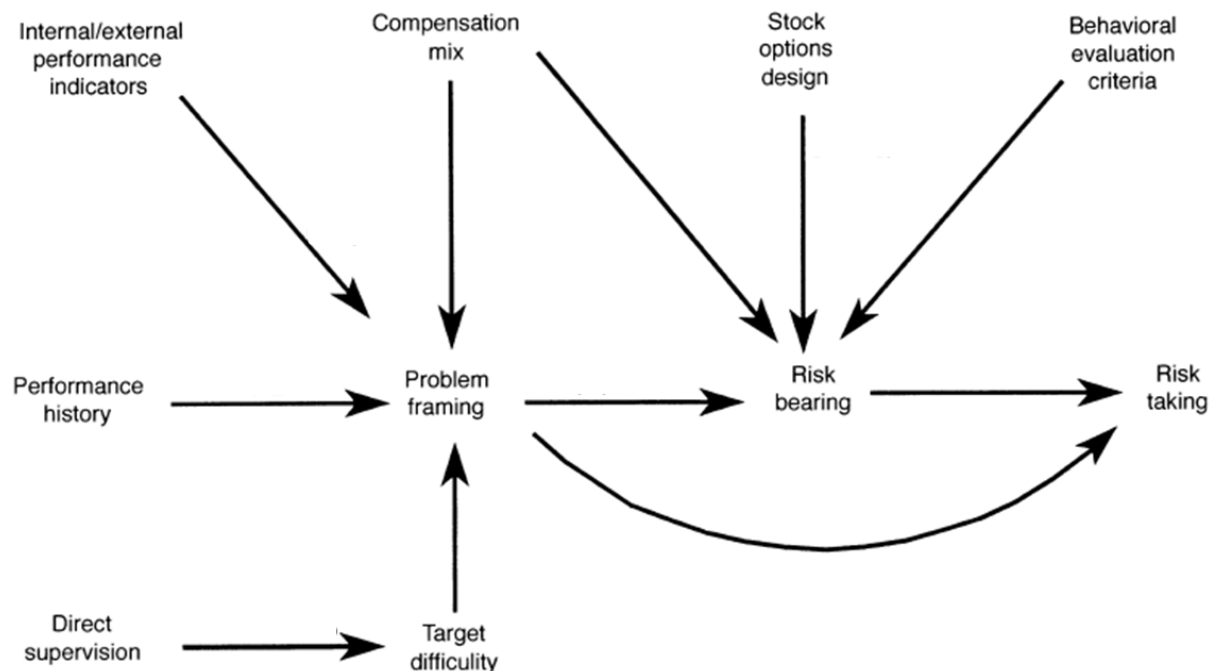


Figure 3-2: Behavioral model of managerial risk taking (Source: Wiseman and Gomez, 1998, p. 138)

Figure 3.2 illustrates the complex interactions captured through the behavioural agency model of managerial risk taking. Compensation mix and design influence agent risk bearing and subsequent risk taking behaviour. However, the compensation mix affects problem framing which in turn impacts both risk bearing and risk taking. Both the compensation mix and the design of stock and stock option compensation influence risk bearing of the agent.

In light of their prior criticism (Gomez and Wiseman, 1997), Wiseman and Gomez (1998) suggest that it is necessary to understand the risk taking behaviour of an agent. They combine both performance and monitoring factors in framing the strategic problems of the firm to explain the selection of strategic risk by the agent.

Wiseman and Gomez (1998) identify five factors that challenge the agency theory treatment of risk. Firstly, classifications of risk behaviour should not be limited to risk aversion or risk neutral and include risk seeking (Fiegenbaum, 1990; Jegers, 1991; Machina, 1983; Markowitz, 1952; Piron and Smith, 1995; Wiseman and Bromiley, 1996) and risk loving⁴² incorporating the concepts developed within the associated risk taking literature (Asch and Quandt, 1990; Bulmash and Maherz, 1985; Coffee, 1988; Piron and Smith, 1995). Secondly, agency theory assumes static risk preferences, ignoring the consequences that other factors such as agent wealth or corporate governance have upon risk preference. A more dynamic model is required acknowledging the possibility of varied risk preferences under different circumstances. Thirdly, examining monitoring and bonding alone does not explain agents'

⁴² Risk loving behaviour implies accepting a risky option where the risk is not entirely compensated (Wiseman and Gomez, 1998).

risk behaviour (Catanach and Brody, 1993; Golbe and Shull, 1991). Understanding the risk preference of the agent with any precision requires a detailed understanding of the decision situation, utilising concepts such as referencing or framing as developed in prospect theory (Kahneman and Tversky, 1979). Fourthly, Wiseman and Gomez (1998) contend that the relationship between corporate governance, monitoring, bonding, agent risk preference, and firm performance change over time in response to prior outcomes (March and Shapira, 1987; Weber and Milliman, 1997), changes in agent wealth (Kahneman and Tversky, 1979) and the changing context (Wiseman and Bromiley, 1996). Finally, Wiseman and Gomez (1998) consider that the basic risk aversion assumption developed by Jensen and Meckling (1976) should be adapted to incorporate the concept of loss aversion from prospect theory⁴³ (Kahneman and Tversky, 1979; Tversky and Kahneman, 1991).

The conflicting risk attitude of the principals and agents is fundamental to agency theory (Barney and Hesterley, 2006). Principals are defined as risk neutral in relation to the risk taking by any single company. They hold a diversified share portfolio and balance their personal risk preference by constructing the appropriate portfolio of shares (Markowitz, 1952) limiting their dependence on any particular company. Conversely, the agent is reliant on the firm due to the nature of employment in terms of both personal wealth and potential future earnings. Unlike the principal, the agent is unable to eliminate the overdependence on the firm through diversification. Consequently, the agent is likely to select firm choices that entail a lower level of risk, acting in a risk averse manner to protect their own personal wealth (Donaldson, 1961; Williamson, 1963; Jensen and Meckling, 1976). The principal prefers

⁴³ Kahneman and Tversky (1979) introduced prospect theory to more accurately reflect the observation that individuals value gains and losses differently. They noted observed decisions do not always accord with rational expectation as predicted by expected utility theory.

higher return, incurring opportunity cost when the agent forgoes risky ventures (Baysinger et al., 1991; Garen, 1994; Hill and Hansen, 1989; Hill, et al., 1988; Morck et al., 1988). Corporate governance mechanisms balance restricting management behaviour through monitoring and oversight with encouraging risk taking through appropriate management incentives, monitoring and bonding to align the risk orientation of management with shareholders (Wiseman and Gomez, 1998). The agency model achieves incentive alignment by constructing pay packages⁴⁴ in which a proportion of compensation is contingent on meeting performance hurdles (Welbourne et al., 1995). Compensation design has increased in complexity since Jensen and Meckling's 1976 paper. BAT differs from agency theory in regard to the influence of equity based pay, recognising the discrete effect of the various components of equity compensation such as stock, restricted stock, stock appreciation rights (SARs), vested stock options and unvested options (Wiseman and Gomez, 1998). Balancing fixed and incentive pay ratios is a dominant factor in compensation design (Harris and Raviv, 1979).

It is widely believed the consequences of shifting risk to the agent will reduce risk aversion (Larcker, 1983) to align with the preference of the principal (Coffee, 1988; Mehran, 1995). The opposing view suggests as agents' exposure to risk rise, they become more risk-averse (Holmstrom and Milgrom, 1987; Shavell, 1979). Due to their dependence on firm performance, managers' decisions are motivated by a desire to reduce uncertainty (Amihud and Lev, 1981; Lewellen et al., 1987; Sloan, 1993).

⁴⁴ Section 3.3 of this chapter provides detail on the various forms of compensation.

BAT can potentially contribute to agency theory (Coffee, 1988; Gomez-Mejia, 1994; Gomez-Mejia and Wiseman, 1997) given the limitations of agency theory resulting from the simplistic risk preference assumption. Agency theory has a narrow focus on monitoring costs and the use of incentives to align interests of the principal and agent, whereas BAT centres on the agent performance and agent work motivation (Pepper and Gore, 2012). BAT incorporates factors identified in behavioural economics as determinants of behaviour including loss aversion and risk preference, and reference dependence (Camerer et al., 2004). Recent advances in BAT argue that reducing agency costs via lower bonding costs is pointless if the agent is not effective at producing the performance outcome required. Achieving agent performance is primary and the efficiency of work motivation mechanics secondary (Pepper and Gore, 2012).

In summary, BAT's more advanced specification enables a broader range of factors to be included in predicting agent risk behaviour (Devers et al., 2008). The concept of risk aversion is extended to incorporate loss aversion. Hence self-interested behaviour can include behaviour that increases future wealth or minimises futures losses (Tversky & Kahneman, 1986). Wiseman and Gomez (1998) argue that redefining risk aversion assists with understanding R&D decisions (Hill and Snell, 1988), exploration and evaluation investment in the mining sector (Walls, 2005), firm diversification (Amihud and Lev, 1981; Kroll et al., 1990; Kroll, et al., 1997), and the intensity of capital investment (Hill and Snell, 1989). BAT enables a meaningful examination of compensation mix and the components of equity pay and how they combine to influence risk behaviour, which is also impacted by the specific context including governance factors.

3.2.4 Type II agency theory

Jensen and Meckling (1976) point out the universality of the agency problem:

The problem of inducing an “agent” to behave as if he were maximizing the “principal’s” welfare is quite general. It exists in all organizations and in all cooperative efforts at every level of management in firms, in universities, in mutual companies, in cooperatives, in governmental authorities and bureaus, in unions, and in relationships normally classified as agency relationships such as those common in the performing arts and the market for real estate. (Jensen and Meckling, 1976, p. 6-7)

Jensen and Meckling (1976) do not restrict the role of principal to shareholders; they acknowledge principal-agent conflict can arise under endless scenarios, and focus on the agency problems between owners and the managers, and debt holders and owners. They also mention the potential for an agency conflict to arise between the shareholders and the board of directors.

In order to simplify matters, within economics, finance and accounting, the shareholders are considered to be the principal and the management of the firm, typically the CEO, the agent principal-agent. Agency problems other than shareholder-manager conflict are termed type II agency problems and include the conflict of interests between debt holders and owner-managers (Jensen and Meckling, 1976), minority shareholders and dominant shareholders, shareholders and institutional investors, and shareholders and the board of directors. Examples of these type II conflicts are explored below.

3.2.4.1 Creditor – Shareholder conflict

There are two sources that firms can use to access finance, i.e., through either debt or equity (Modigliani and Miller, 1958). Unrestricted, managers can structure the firm's operations and financing to benefit shareholders at the expense of the creditors (Smith and Warner, 1979). Four main sources of conflicts arise: dividend payments, claim dilution, asset substitution, and underinvestment (Smith and Warner, 1979).

Debt contracts include covenants to protect the interests of the creditor and to limit the debt holder – shareholder conflict (Smith and Warner, 1979; Holthausen, 1981; Leftwich, 1983). Debt contracts commonly restrict: dividend payments, additional debt, working capital maintenance, mergers, asset disposal, and asset acquisition (Leftwich, 1983). Debt holders incur agency costs when firms shift risk to the debt holder through asset substitution (Smith and Warner, 1979; Leftwich, 1983; Jensen and Meckling, 1976). Shareholders benefit from taking on riskier investments at the expense of the creditors (Graves and Shan, 2013).

Debt issue contract terms impact upon management decisions. Shareholders incur agency costs including lost investment opportunities owing to debt covenants, monitoring and bonding costs to satisfy the debt holder, and the risk of bankruptcy costs (Jensen and Meckling, 1976). Although debt covenants restrict risky investment and financing decisions, they reduce the cost of debt to the firm and are in the best interests of the shareholder (Leftwich, 1983). Researchers have empirical findings indicating debt is effective at combating agency costs (Fox and Marcus, 1992; Gibbs, 1993) and argue it is a result of reduced informational asymmetry, monitoring by the creditors, and the stringent legal framework concerning debt (Dharwadkar et al. 2000).

3.2.4.2 Dominant Shareholder – Minority Shareholder conflict

Graves and Shan (2013) identify agency costs arising from the conflict between dominant shareholders and minority shareholders whereby the relative power of the dominant shareholders enables them to extract private benefits from the firm to the detriment of the minority shareholders. Dominant shareholder conflict arises from concentrated ownership, extensive family ownership, business group structures, and in precincts with poor legal protection for minority shareholders (Young et al., 2008; La Porta et al., 2000). Value transfer from the minority shareholders to the dominant shareholders often results when dominant shareholders gain control (Shleifer and Vishny, 1997). Expropriation can take many forms including placing cronies in key management or board positions (Faccio et al., 2001), purchasing goods and services at inflated prices from dominant shareholder firms or selling goods and services for below market prices to dominant shareholder firms (Chang and Hong, 2000; Khanna and Rivkin, 2001), and pursuing strategies for the advancement of dominant shareholders, sacrificing firm performance (Backman, 1999).

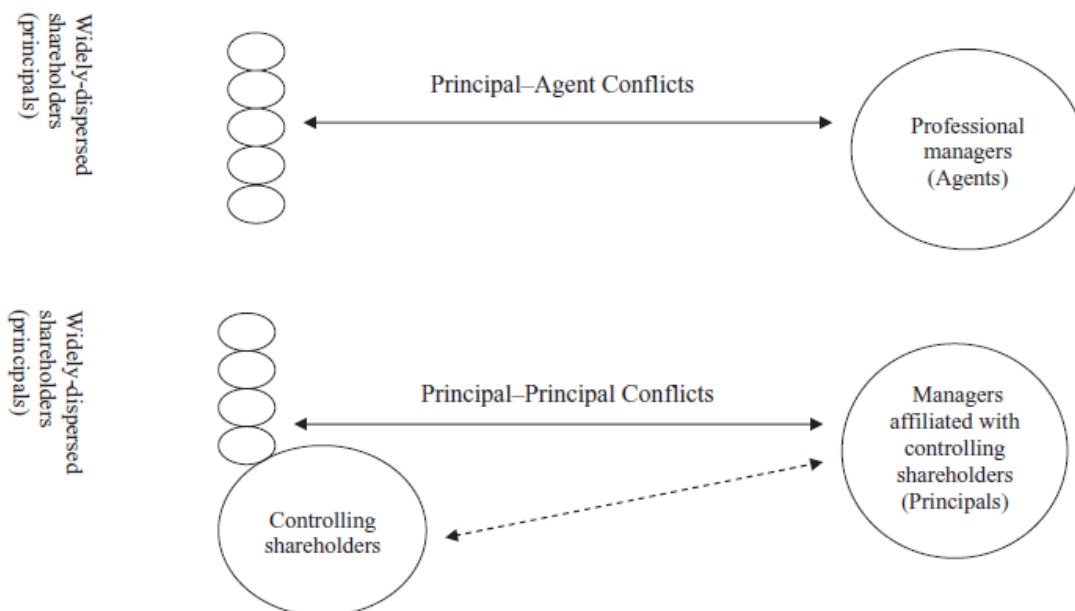


Figure 3-3: Type I and type II agency conflicts (Source: Young et al., 2008 p. 200)

Figure 3-3 demonstrates an example of type I and type II agency conflicts. Type I conflict arises when there is a conflict between managers and shareholders. Type II conflict occurs when there are multiple conflicts, in the case illustrated above there is the additional conflict between minority shareholders and majority⁴⁵ shareholders. Controlling shareholders pressure managers to act in their best interest that may be to the detriment of minority shareholders, creating a principal-principal conflict.

3.2.4.3 Institutional Investor - Shareholder conflict

Shareholders expect institutional investors such as mutual funds and superannuation companies to base decisions on maximising risk-adjusted returns (Chevalier and Ellison, 1997). Institutional investment firms prefer to increase their own net worth and the size of funds under management, which is influenced by past fund performance (Hendricks et al., 1990). Investment firms are rewarded for above market performance and as a result the current year-to-date return of a fund influences a fund manager's appetite for the riskiness of investments held in any fund portfolio (Chevalier and Ellison, 1997). Time horizon problems (Dechow and Sloan, 1991) distort institutional investors fund portfolio riskiness towards the year-end in response to the significant rewards of over achievement and the absence of reward for under performance (Lakonishok et al., 1991; Brown et al. 1996).

Institutional investors have a dual role as monitors of companies. Firstly, due to their larger relative shareholding when compared to individual investors, they are able to demand access

⁴⁵ Also labelled controlling shareholders due to the additional influence they can place upon management.

to management and extra information. Thus they have more influence over management (Shleifer and Vishny, 1986; Hartzell and Starks, 2003). In addition, they have a responsibility to actively monitor the firm and board performance as part of their advocacy role in protecting the interests of the investors they represent. Institutional investors are ultimately responsible for the investment in the firm and are accountable to the beneficiaries whose funds they invest (Yermo, 2008).

The agency problems resulting from the relationship between companies and institutional investors are captured under the dominant shareholder section above, as institutional investors jostle for preferential treatment, such as access to proprietary information or access to discounted stock placements.

3.2.4.4 Shareholder – Director conflict

Agency theory recognises that conflicting interests can occur with any contracts within the firm's nexus of contracts (Jensen and Meckling, 1976; Fama and Jensen, 1983).

The board of directors is the primary internal corporate governance instrument in developed economies (Fama and Jensen, 1983), responsible for protecting and promoting the interest of shareholders (Byrd and Hickman, 1992). In the US, UK and Australia, companies are mainly managed under a unitary or one-tier board structure.⁴⁶ The unitary board must perform the

⁴⁶ The Continental European two-tier board structure commonly includes banks, major shareholders and institutional investors at one level and executive management on the second level. This structure inherently provides greater protection against managerial agency costs as there are fewer and more dominant shareholders with a greater interest in company performance. In the Anglo-American model a unitary board is

dual functions of monitoring and oversight of executive management, and an advisory role in which they act as stewards of the company advising the executive team on strategy and steering the company towards prosperity (Donaldson and Davis 1991; Donaldson and Preston 1995; Adams et al., 2010). Directors are legally obliged to oversee management initiatives, reward good performance and penalise poor performance (CAMAC 2010).

Boards are comprised of inside directors who provide valuable information regarding the internal working of the firm, and outside directors who contribute technical expertise and experience along with objectivity in assessing the merit of executive management decisions (Byrd and Hickman, 1992). Tirole (1986) developed a three-tier agency model between principal-supervisor-agent [shareholders-directors-CEO] in which the directors monitor the CEO, and concurrently contribute to production.

Agents are bonded to shareholders through the use of *skillfully crafted* employment contracts containing a mix of performance based 'at risk' pay with fixed compensation (Govindrajana and Fisher, 1990; Hunt, 1999; Tosi et al., 1997; Hillman and Dalziel, 2003). When designing director compensation packages, boards must balance the use of equity-based incentives to promote superior firm performance and the optimal level of firm risk taking, with the need for objective management oversight (Davis and Thompson, 1994; Mallette and Fowler, 1992).

elected by a large number of small shareholders with less board representation and limited ability to actively control board activity.

Researchers have highlighted an increase in director compensation (Fedaseyeu et al., 2014; ACSI, 2014) and the inclusion of equity-based payments to directors (Farrell et al., 2008; Yermack, 2004). Lorsch and MacIver (1989) and Blair (1995) criticise boards for weak monitoring and poor strategic guidance resulting in short-termism (Coffee, 2003).⁴⁷ Director incentive pay increases the incidence of agency problems (Gerety et al., 2001).

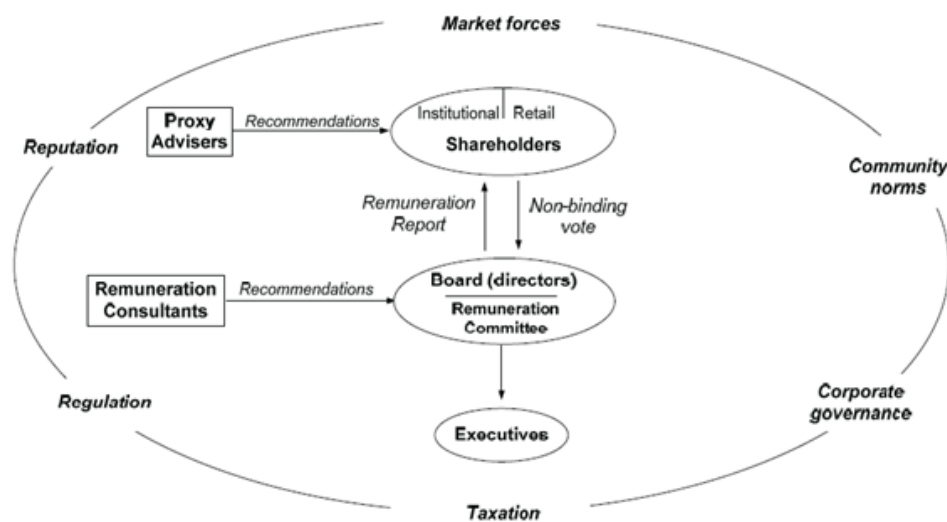


Figure 3-4: Aligning interests: shareholders, board and management (Source: APC, 2009, p.26)

Figure 3-4 above presents the unitary board approach to manage competing interests between shareholders, the board, and executives along with other factors impacting the outcome.⁴⁸

Early positivist models adopted an instrumental view of boards (Deutsch et al., 2011) assuming boards act only on behalf of the shareholder (Jensen and Meckling, 1976) by

⁴⁷ Short-termism refers to selection of projects that deliver short-term benefits at the expense of longer term projects of greater value to the firm. Agents make the adverse selection to further their personal interest, such as an annual profit bonus, to the detriment of shareholders.

⁴⁸ The Australian Corporate Governance environment includes a role for the shareholders to actively monitor the bonding/remuneration arrangements offered to executives and provide feedback to the board.

proactively assessing managerial performance in order to protect the interests of the shareholder. They treat the board of directors as a governance mechanism to limit the agency costs and ignore the agency conflict resulting from the contract between the shareholders and the board (Jensen and Meckling, 1976).

3.2.4.5 Summary type II agency theory

Regulators recommend equity-based pay to increase firm performance by aligning the interests of executive directors with investor's interests, while on the other hand awarding equity-based compensation and performance incentives to non-executive directors is discouraged.⁴⁹ As boards move along the continuum from purely a monitoring and oversight function to a more hands-on stewardship role,⁵⁰ driving and influencing company direction, then it is reasonable to consider differing pay structures for the board to overcome the agency problem that arises and to reward the board for the increase risk and uncertainty it is now exposed too. Remuneration structures utilised to align the interests of executive managers with shareholders may be useful in aligning the interests of directors with shareholders. Firm risk strategy and risk behaviour are important factors in corporate decision making (March and Shapira 1992). The agency relationship between shareholders, the board and management is influenced by remuneration structure and in turn the remuneration structure of the board and management will vary the risk preferences of the firm (Harris and Raviv 1979). However, the use of elaborate remuneration structures rewarding performance when the

⁴⁹ Balancing performance based incentives for the board and the need for objective oversight by the board highlights the type II agency problem between shareholders and the board.

⁵⁰ A stewardship role assumes involvement with the operational side of a business stepping beyond the boundary of a monitoring function and actively working with executives to influence strategy and decision making.

directors do not directly influence the performance may unnecessarily increase agency costs through the higher director remuneration, handing the directors a free gift. Aside from the issue of monitoring the board's performance, introducing complex remuneration structures to directors may create other unintended consequences. For example, directors could become more/less risk averse depending on the incentive type. Finally, board monitoring of executive management could be less objective if the board is rewarded on the same basis. The relationship between remuneration structure and CEO risk strategy is addressed in the literature. However impact on the board is less well understood, and the joint impact of the CEO and board less so (Deutsch et al., 2011).

Therefore, improving the understanding of the consequences of different remuneration designs is important for regulators, investors and other broad stakeholders. Understanding the differential effect of remuneration on executives and directors is essential in promoting an effective board system. Increased awareness of the interactions identified above will allow for better policy formulation by the regulators and government concerning remuneration. Management remuneration is discussed in Section 3.3.

Table 3-1: Summary of agency, behavioural agency and type II agency literature

Authors	Sample and Data	Model/Variables	Findings
Dechow and Sloan, 1991	91 US manufacturing firms from 1974 to 1988	R&D spending Equity compensation	STI compensation discourages investment. Equity based compensation encourages investment, thereby reducing managerial risk aversion.
Eisenhardt, 1989	Survey of literature	Beyond agency theory	Agency theory offers insights into organisational theory
Wiseman and Gomez-Mejia, 1998	Survey of literature	Behavioural agency theory model	Monitoring, performance and framing explain choice of executive strategic risk
Devers et al., 2008	Execucomp, SDC & Compustat 1992-2005	R&D, CAPEX, Debt Cash, option and share compensation	BAM helps in understanding inconsistencies in results from prior research into compensation design effects on firm risk
Pepper and Gore, 2012	Survey of literature	Behavioural agency theory model	Behavioural agency theory provides a framework for executive compensation, agent behavior, and design of executive compensation plans
Davis and Thompson, 1994		Behavioural agency theory model	Director compensation incorporating equity-based incentives must balance firm performance, optimal firm risk taking, with objective management oversight.
Gerety et al., 2001	289 US firms, from 1988 to 1998	Abnormal returns; Incentive Pay	Director incentive pay increases the incidence of agency problems.

3.3 Remuneration design

Global managerial labour markets, large complex international firms, and changes in compensation design have transformed management remuneration. The internationalisation of the compensation quantum and design reflects the globalisation of the managerial labour market (Murphy, 1999). Management compensation has increased as the size of the firm has increased (Rosen, 1982; Kostiuk, 1990; Murphy, 1999; Gabaix and Landier, 2008). In addition, the growth of executive compensation accelerated due to a significant increase in shares and options granted to executives (Conyon and Murphy, 2000; Gayle and Miller, 2009).⁵¹ Bebchuk and Fried (2005) question whether the changes to compensation structure and the growth in compensation is warranted, pointing to the inconclusive association of pay and performance. The remainder of Section 3.3 reviews the role of the various elements of managerial compensation. Section 3.3.1 examines remuneration and firm performance, and Section 3.3.2 investigates remuneration and risk behaviour.

Jensen and Meckling (1976) identify how remuneration structures bond the managers to the shareholders. They make reference to the difference between the risk appetite of the managers and the optimal risk level of the shareholders, and link greater managerial stock ownership to lower agency costs (Jensen and Meckling 1976). The use of equity-based compensation is shown to align management incentives with shareholder interests (Jensen and Murphy 1990). In contrast, firms with CEO remuneration packages consisting of a

⁵¹ An alternative view suggests the rise in CEO compensation is driven by higher CEO talent and the shifting of risk to the CEO (Sung and Swan, 2009).

smaller proportion of performance-based pay and including equity benefits have greater agency problems (Core et al. 1999).

Bonding management to shareholders' interests is ordinarily achieved through the use of employment contracts where explicit detail is given and the actions of management are detailed in the contract in line with the best interests of the shareholders (Fama and Jensen, 1983). In return, the management receive a remuneration package. The board determines the most appropriate method to monitor the performance of management. Incentive alignment is a very complex issue. Cash bonuses may be used as a short-term incentive to promote desired management behaviour. However, due to the ability of management to engage in earnings management, longer-term controls are also put in place; for example share payments or the issuing of options. Hence in aggregate, the manager is paid through the use of both short- and long-term incentives in order to minimise the agency costs of the firm (Jensen and Meckling 1976).

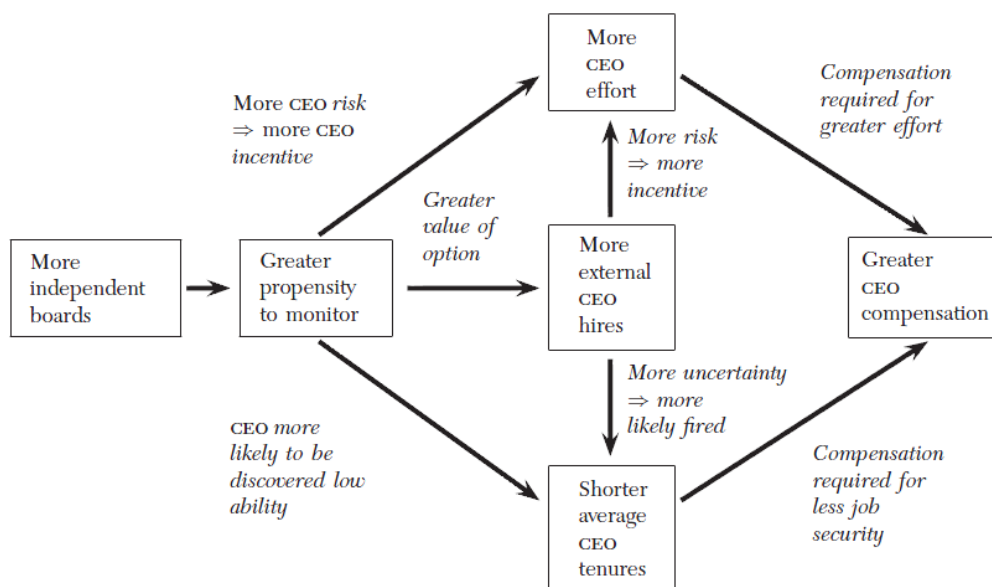


Figure 3-5: Model of board monitoring, CEO performance and CEO compensation
 (Source: Adams, Hermalin, and Weisbach, 2010, p.70)

As shown in Figure 3-5 Adams, Hermalin, and Weisbach (2010) model the relationship between board monitoring, CEO performance, and CEO compensation, and suggest strong board monitoring drives better firm performance and leads to higher CEO compensation.

From the perspective of the executive and director, remuneration is a benefit paid or payable from the company for the service rendered. In practice, executive and director remuneration often contain a mixture of elements including cash wages, leave entitlements, bonuses, non-monetary allowances, superannuation, health insurance, share based payments and termination benefits.⁵² Compensation can be categorised several ways: cash or non-cash, fixed or variable, short-term incentive (STI) or long-term incentive (LTI), and equity based or non-equity based. Equity can be classified as shares, share options or other equity instruments.

The various elements of current executive remuneration packages encapsulate the attempts by boards to attract, retain, and motivate executives (APC, 2009). Given the freedom afforded to senior management, the objective of the board is to direct management in such a way that it maximises firm performance over both the short-term and into the future. Compensation design has evolved considerably over the last four decades. Agency theorists suggest the evolution better aligns management pay for performance with the interests of the shareholders. Others dispute the pay-performance proposition, instead labelling the current arrangements opportunistic self-interested behaviour resulting from overly powerful executives and failing corporate governance arrangements (Bebchuk and Fried, 2003). In

⁵² The components of compensation are identified in AASB 124 paragraph 9 (a) to (e).

response to large increases in executive compensation (Frydman and Saks, 2010), corporate governance specialists championed reform to improve transparency of the remuneration paid to executives and directors, advocating for an increase in shareholder participation and strengthening of shareholder activism power (Sheehan, 2009). Greater disclosure of remuneration information has strengthened the executives' negotiating power regarding compensation arrangements (Posner, 2010) driving executive compensation higher.

Striking the balance between too little and too much incentive/performance compensation is an ongoing challenge. Governments and regulators are loath to act or intervene. It is only after significant market shocks that the intense political focus forces at least modest reforms (Culpepper, 2012). Possibly the single largest wave of market reforms affecting corporate governance reform, and hence executive compensation, followed the collapse of ENRON and the corporate scandals of 2000-2001 with the passing of SOX⁵³ (Cohen et al., 2004).

Early research focused on examining the relationship between CEO compensation and firm performance (e.g. Coughlan and Schmidt, 1985; Murphy, 1986; Jensen and Murphy, 1990; Tosi et al 2000; Merhebi et al. 2006). The granting of share options in executive compensation grew significantly from the 1980s and constitutes the largest single element of CEO compensation (Murphy, 1999; Mishel and Sabadish, 2013). Over the last decade executive compensation research has widened its focus to include behavioural consequences

⁵³ The Sarbanes Oxley Act of 2002 (SOX) is U.S. legislation passed by Congress as part of the *Public Company Accounting Reform and Investor Protection Act* and *Corporate and Auditing Accountability and Responsibility Act*. SOX imposed additional external audit requirements, aimed at improving the quality of financial reporting.

of executive compensation, and broadened the scope of research beyond the CEO to include the key management personnel and the board of directors (Devers et al., 2007).

Jensen (1993) argues director agency problems can be addressed by aligning the interests of directors and shareholders, calling for performance-based director compensation that causes directors to have *skin in the game*. He reasons that director wealth should be linked to the risk a shareholder carries for holding shares in a firm. Jensen (1993) calls for a minimum equity holding for directors either through private acquisition of equity by the director or a cumulative balance from equity-based compensation paid to the director, and that directors should maintain a considerable equity stake in the firm while a director. Aside from the alignment of interest argument, making directors owners of the firm reduces the risk of the ‘busy director’⁵⁴ (Ferris et al., 2003; Fich and Shivdasani, 2005) or passive director providing a suboptimal level of oversight (Hambrick and Jackson, 2000; Gerety et al., 2001) and free riding on the back of the board (Adam et al., 2010). Directors may have a close working relationship with the CEO, and may hold their position due to the influence of the CEO. Hence, when firm ownership is diffuse with a large number of disinterested shareholders, directors without a stake in the firm may allow the CEO to make suboptimal decisions. Bhagat and Black (1999) support the notion of greater director monitoring for directors paid with equity as they find that director equity-based compensation is positively related to disciplinary CEO removal when firm performance is poor. Consistent with the belief that performance-based pay reduces agency costs associated with executive management, performance-based director pay incentivises directors to improve performance and

⁵⁴ Directors who serve on multiple boards are labelled “busy directors” and are considered to be less effective at monitoring executive management because they over-commit themselves.

shareholder value (Holmstrom, 1979; Hart and Holmstrom, 1987). Studies investigating changes in director compensation from 1994 to 2004 document a trend away from cash only director compensation towards equity-based compensation (Yermack, 2004; Farrell et al., 2008).

In contrast, many researchers warn against the adoption of equity-based compensation for directors (Core et al., 1999; Ferrarini et al., 2009; Jensen et al., 2004). Jensen et al. (2004) argue director option compensation can result in greater agency costs. Core et al. (1999) found excessive director compensation is inversely related to firm performance in future periods, While Ferrarini et al. (2009) argue against high remuneration for non-executive directors, suggesting it may diminish the impartiality and valuable independent oversight function they add to the board.

3.4 Remuneration and performance

Considerable research effort has gone into understanding the relationship between executive compensation and firm performance (Merhebi et al., 2006). The findings of prior research suggest accounting performance has greater explanatory power than market-based measures of performance, for example total shareholder return,⁵⁵ in explaining changes to executive compensation from year-to-year (e.g. Lambert and Larker, 1987; Jensen and Murphy, 1990; Sloan, 1993). In examining changes in CEO compensation from salaries and bonuses, Jensen and Murphy (1990) observed a less than one percent change arising from share price

⁵⁵ Total shareholder return is a measure of the change in wealth of the shareholder owing to the capital gain derived through an increase in share price and the dividends paid, ordinarily measured over a financial year.

sensitivity compared to almost five percent sensitivity to accounting-based earnings measures. Hence executive compensation is heavily reliant on accounting earnings (Lambert and Larcker, 1987; Jensen and Murphy, 1990; Sloan, 1993; Merhebi et al., 2006). Australian studies have returned an indefinite outcome: a positive relationship between remuneration and firm performance (Merhebi et al., 2006); a negative or non-significant relationship between remuneration to performance (Harris and Ramsay, 1994; Iwan et al. 1998; O'Neill and Job, 1999); and a mix of negative and positive results (Matolcsy, 2000). Hence, despite considerable research, the link between executive compensation and firm performance is equivocal (APC, 2009). The direction of the any causal relationship between remuneration and performance is not clear (Kole, 1997). Each permutation is considered below.

3.4.1 Remuneration: Impact on performance

The examination of the pay-performance dynamic is founded on the assumption that compensation is a motivational tool (Devers et al., 2007). Agency theorists postulate compensation design can encourage managers to select value enhancing strategies that maximise shareholder value (Jensen and Murphy, 1990; Tosi et al., 2000). Owing to the informational asymmetry between the shareholders and the actions of management, incentive alignment through the use of performance-based compensation transfers risk to management and promotes self-monitoring by management (Conlon and Parks, 1990; Pratt et al., 1985; Eisenhardt, 1985, 1989; Fernie and Metcalf, 1995; Gomez-Mejia and Balkin, 1992; Henderson and Fredrickson, 1996; Tosi et al., 1997; Welbourne et al., 1995). Compensation design varies among firms, who select from a number of mechanisms to promote value enhancing behaviour, including the quantum of total compensation, short-term performance

bonuses, long-term incentives, shares, options, and dismissal for poor performance (Jensen and Murphy, 1990).

Empirical research results of prior studies examining the relationship between pay and performance are divided among Australian academics, reporting statistically significant results (e.g. Doucouliagos et al., 2007; Merhebi et al. 2006; O'Neill and Iob 1999) and others report insignificant results (e.g. Izan et al., 1998; Capezio, 2008). International research suggests the relationship between pay and performance is mixed (Gomez-Mejia, 1994; Gomez-Mejia and Wiseman, 1997; Jensen and Murphy, 1990; 2004; Murphy, 1999; Tosi et al 2000). Gomez-Mejia (1994) commented that in spite of the extensive empirical literature on executive compensation “*it is amazing how little we know about executive pay*”⁵⁶ (Gomez-Mejia, 1994, p.199).

Numerous studies support the association between CEO compensation and firm performance. For example, CEO cash/salary compensation is positively related to net profit (Lewellen, 1968; Ciscel, 1974; Gomez-Mejia et al., 1987; Bartlett and Miller, 1988; Belkoui and Picur, 1993), changes in a firm's net profit (Lewellen, 1968; Gomez-Mejia et al., 1987), to ROE (Belliveau et al., 1996;; Boyd, 1994; Douglas and Santerre, 1990; Finkelstein and Boyd, 1998; Gomez-Mejia et al., 1987; Mangel and Singh, 1993; Bartlett and Miller, 1988; O'Reilly et al., 1988; Rajagopalan and Prescott, 1990; Wade et al., 1997), and to ROA (Finkelstein & Boyd, 1998; Kerr and Kren, 1992; Kren and Kerr, 1997).

⁵⁶ Much of the variation can be explained through methodological variation and sample variance but the complexity of pay arrangements and the difficulty in distilling company performance to encapsulate only firm effects make the question a difficult one to answer.

Firms using STI compensation that reward executives based on accounting based measures of performance may discourage investment with longer run pay-offs such as R&D (Dechow and Sloan, 1991), and limit future profits, giving rise to a time horizon conflict.⁵⁷

Remuneration based on annual budgetary targets creates incentives for suboptimal performance once targets have been met. Performance above pre-set targets may result in a ratchet effect in which subsequent budgets increase to a much higher level following overshooting the prior year target (Murphy, 1999). Managers can adjust their work effort and investment decisions according to year-to-date company results in order to optimise their bonus plan (Holmstrom and Milgrom, 1987) for current and future periods (Healy, 1985; Gibbons and Murphy, 1992). STI schemes promote income reducing manipulations (negative accruals) when it is unlikely the performance hurdle will be met, or performance is beyond the ceiling of the bonus plan (Healy, 1985). Firm performance within the incentive zone encourages executives to bring forward future earnings in order to realise a large bonus in the current year (Gibbons and Murphy, 1992). The knock-on consequences of high performance may impede the effectiveness of elements within the compensation mix.

The excessive use of short-term 'at risk' incentives within the financial services sector is considered a main reason for the global financial crisis (Isaksson and Kirkpatrick, 2009). STI based compensation promotes earnings management whereby executives boost their short-term bonus payments by focusing on short-term firm value creation, sacrificing longer-term firm value (Healy, 1985; Gibbons and Murphy, 1992; Guidry et al., 1999).

⁵⁷ In contrast to the predictions of time horizon conflict, Gibbons and Murphy (1992) find no evidence of reduced advertising or R&D expenditures as CEO's near retirement.

CEO STIs are positively related to (1) firm net profit (Gomez-Mejia et al., 1987); (2) changes in firm's net profit over 1 year (Gomez-Mejia et al., 1987; Werner and Tosi, 1995); (3) firm's ROE (Douglas and Santerre, 1990; Finkelstein and Hambrick, 1989; Gomez-Mejia et al., 1987; Wade et al., 1997;); and (4) a reduction in ROE over 1 year (Werner and Tosi, 1995).

Core et al., (2003) consider LTI compensation an important ingredient of the contract between the board and executives in aligning the interests of management with the interests of shareholders. Finkelstein and Boyd (1998) observed a negative relationship and Milkovich and Bloom (1998) found LTIs were negatively related to firm performance in high tech firms. Generally, CEO LTIs are positively related to: (1) shareholder value (Habib and Ljungqvist, 2005); (2) firm's net profit (Gomez-Mejia et al., 1987; Core and Larcker, 2002); (3) increases in future firm's net profit (Gomez-Mejia et al., 1987); (4) ROA (Finkelstein & Boyd, 1998); and (5) ROE (Gomez-Mejia et al., 1987; Wade et al., 1997).

Firms may elect to utilise either shares and/or options when devising equity based compensation schemes. There are several reasons why firms use options to compensate executives to align the interests of executives and shareholders. Options provide:

“...a strong incentive “to work harder and smarter” to increase share value, giving them opportunities to acquire major stakes in the companies they manage, using option qualifying periods to increase their commitment to the firm, remunerating them in tax effective ways, and, inducing conservative types to seek greater returns by taking bigger risks.”

(Brown and Howieson, 1994, p.23)

Although several researchers conclude option compensation is a more effective incentive than stock-based pay in delivering higher performance (Smith and Stulz, 1985; Hambrick and Finkelstein, 1995; Lippert and Porter, 1997; Hanlon et al., 2003), the empirical results are equivocal. Limited research suggests there is a positive relationship between option compensation and firm performance. CEO option compensation is positively associated with changes in ROE over one year (Hambrick and Finkelstein, 1995). Hanlon et al., (2003) observed an improvement in firm performance following option grants to the key management personnel. In contrast, Habib and Ljungqvist (2005) report a negative association of shareholder value with CEO option holdings. A study of option compensation adoption amongst Japanese firms, following changes to government regulations allowing their use, identified abnormal returns in the announcement period of the option grant followed by improved firm performance (Kato et al., 2005).

Conversely, payment of options increases the likelihood of share price manipulation by management (Bebchuk and Fried, 2003). Executives manage earnings when options are granted to secure them for a lower price (Coles et al., 2006b), and manipulate earnings near the exercise date in order to increase the value of the option (Gillespie and Zweig, 2010). Executives receiving equity-based pay manipulate earnings, and sell their shares when the share is artificially overpriced (Bergstresser and Philippon, 2006).

The shift to compensate directors with equity-based compensation is consistent with the increase in equity-based compensation paid to executives, occurring through the same period (Perry and Zenner, 2000; Barron and Waddell, 2003). As a consequence of the changes to the

structure of director compensation, research has focused on either stock or option-based pay (Morck et al., 1988; Perry and Zenner, 2000; Fich and Shivdasani, 2005; Bhagat and Bolton, 2008; Dey and Liu, 2011).

Firms introduce equity-based compensation schemes for directors in order to tie their personal wealth to the performance of the firm (Perry, 2000; Fich and Shivdasani, 2005). Over time the financial stake directors have in the firm grows as does their interest in the firm's performance. Prior studies examining the link between independent director equity ownership levels and firm performance provide significant and positive evidence that such a relationship does exist (e.g. Morck et al., 1988; Perry, 2000; Fich and Shivdasani, 2005; Becher et al., 2005; Dey and Liu, 2011).

Bhagat and Bolton (2008) posit the primary motivation driving the adoption of director equity-based compensation is a need to improve director monitoring efficacy, they corroborate the previous research by finding a positive relationship between director equity ownership and firm performance (present and future performance). In addition, previous studies suggest that firms with directors compensated with equity-based pay experience higher growth rates, higher valuation of investments (Becher et al., 2005; Dey and Liu, 2011), and an increase in the quality of financial reports (Dey and Liu, 2011), all without incurring an equivalent increase in firm risk (Becher et al., 2005).

While options are distinct from ordinary shares, they can have the same effect when used to compensate directors. For example, consistent with the observed impact of shares, Fich and

Shivdasani (2005) observe an increase in the valuation of investments⁵⁸ and higher levels of firm performance where firms compensate independent directors with options. However, they note that when the director's equity stake in the firm grows to represent a significantly large proportion of their personal investment portfolio, the director may move to a more defensive position favouring lower risk firm investments. They comment, under these circumstances director option compensation may be too costly for the firm and detrimental to the shareholders' wealth.

In addition to director equity-based compensation, Dey and Liu (2011) investigate the impact of social connections between the CEO and directors, and the relationship this has on board monitoring of the CEO and firm performance. They document that firms with directors having more shared social and professional networks with the CEO, deliver lower firm performance, lower investment valuations, and exhibit lower quality financial reporting. Dey and Liu (2011) also acknowledge director equity-based pay can improve the situation and observe that firms compensating directors with equity-based pay achieve higher firm performance, higher investment valuations, and higher quality of financial reporting. Their findings demonstrate that other factors interact with managerial compensation to affect firm performance.

There are many factors influencing firm performance, which can be internal factors, such as executive strategy and the associated decisions and external factors, including market forces, both of which affect firm performance (Porter and McGahan, 1997; Yermack, 1997). The

⁵⁸ Fich and Shivdasani (2005) use market-to-book value as the proxy instrument.

difficulty is in distilling how the various factors are influencing the pay-performance relationship. The myriad of inter related factors caused by this endogeneity issue confounds the inconsistency in the research results (Tosi et al., 2000; Devers et al., 2007).

3.4.2 Performance: Impact on remuneration

The relationship between performance and pay has yielded conflicting results. Some studies have found that firm performance is a powerful predictor of CEO remuneration (Ehrenberg and Milkovich, 1987). However, other empirical results fail to support a link between firm performance and CEO compensation (e.g. Gomez-Mejia, 1994), and firm performance is a very poor predictor of CEO compensation (e.g. Tosi et al., 2000). Perhaps it was no surprise when Main et al. (1996) linked increases in firm performance to rising executive compensation for compensation schemes containing share options.

Early studies examining the impact of past firm performance (based on the accounting measure net income) on CEO pay identified a positive relationship (McGuire et al., 1962; Ciscel, 1974). Research into the sensitivity of pay to performance identified a weak association between firm performance and CEO pay, noting the change in wealth effects of share ownership are three times more than compensation (Jensen and Murphy, 1990). Building on the results of Jensen and Murphy (1990), Yermack (2004) in a study of both executives and directors found sensitivity of pay to performance is one hundred times less for directors compared to executives.

As the value of a CEO's ownership stake in the company increases the sensitivity of CEO wealth from compensation decreases compared to the change in CEO wealth resulting from changes in share price (Hall and Liebman, 1997; Hall and Murphy, 2003). Examining the 1993 to 1998 period, Core et al., (2011) reported the ratio of CEO share portfolio to total annual compensation was on average 30.3 to 1, which means for every \$100,000 of annual compensation the average CEO owns \$3,030,000 of shares. Hence CEO equity holding is a more powerful motivator than incentive-based remuneration.

Studying from a different angle, Demsetz and Lehn (1985) theorise the optimal level of executive equity holdings is a function of firm size and the complexity of the firm's operations,⁵⁹ and the instability of the firm's operating environment. The optimality of managerial equity ownership has implications for the level of equity incentives. Prior research has found a positive relationship between managerial ownership levels and firm performance (McConnell and Servaes, 1990), and firms utilising equity-based remuneration experience higher performance (Frye, 2004). The use of options within compensation plans is positively correlated with firm performance (Blasi et al., 2000), although it varies depending upon the organisational level of the recipient (Ittner and Larcker, 2001). Morck et al., (1988) consider the level of CEO shareholdings and equity incentives to be below the level required for maximising firm performance.

Despite the extensive research into the topic:

⁵⁹ Firm complexity is a proxy for the difficulty of monitoring executive actions by the board of directors.

“There is presently no theoretical or empirical consensus on how stock options and managerial equity ownership affect firm performance.” (Core et al., 2003, p. 34)

A meta-analysis conducted in 2000 of 42 CEO compensation studies found differences in firm size can explain CEO pay variance between firms, accounting for over 40% of the variance, whereas firm performance explains fewer than five percent of the variance (Tosi et al., 2000). Table 3-2 provides a summary of studies concerned with remuneration structure and firm performance.

Table 3-2: Summary of studies on remuneration structure and firm performance

Author(s)	Sample and Data	Model/Variable(s)	Findings
Jensen and Murphy, 1990	US based study, various datasets, main dataset is a Forbes based sample of 1295 firms from 1974 to 1986.	Sensitivity of CEO wealth to Shareholder Value CEO option compensation and CEO share ownership	The use of equity-based compensation is shown to align management incentives with shareholder interests
Adams et al., 2010	Literature Review	Corporate Governance Model incorporating the board of directors	Strong board monitoring improves firm performance and leads to higher CEO compensation
Bebchuk and Fried, 2003	Theoretical Argument	Model of Managerial Power where executive compensation is causing agency issues.	No pay and performance link. Current compensation is a function of self-interested overly powerful executives.
Tosi et al., 2000	Literature Review	A meta-analysis of CEO compensation	The relationship between pay and performance is mixed.
Core, Guay and Larker, 2003	Literature Review	A survey of executive equity-based compensation.	Equity-based compensation aligns the interests of management with the interests of shareholders.
Coles, Hertzels and Kalpathy, 2006	US based study of 159 firms from 2001 to 2001	Option compensation Earnings management	Executives manage earnings when options are granted to secure them for a lower price.

3.4.3 Other factors shaping remuneration

There are many other factors that influence managerial compensation beyond firm performance; for example, firm size (e.g. Smith and Watt, 1992; Linn and Park, 2005; Tosi et al., 2000), growth opportunities (e.g. Linn and Park, 2005; Gaver and Gaver, 1993; Mehran, 1995), and other institutional factors such as institutional setting and industry factors (e.g. Diprete et al., 2010; Murphy, 1999; Reda et al., 2008). Patton (1951) identified both internal and external labour market forces that shape executive compensation. Compensation rates and structures are not always set by an efficient market for managerial labour; instead informational asymmetry, inequitable bargaining power, and rigid institutional factors limit the prospect of an optimal outcome for shareholders (Bebchuk and Fried, 2003; Hill and Yablon, 2002).

Firms announce equity-based incentive compensation schemes to the market to signal: superior firm performance (Perry, 2000; Fich and Shivdasani, 2005); the firm appetite for growth (Smith and Watt, 1992); and that incentives are in place to maximise the uptake of investment opportunities (Mehran, 1995; Himmelberg et al., 1999).

CEO compensation design is most likely to shift from cash bonus to equity-based compensation following CEO turnover and is most heavily influenced by firm characteristics (Matolcsy et al., 2012), and often occurs following industry deregulation (Becher et al., 2005).

The following sections discuss four key factors considered to shape remuneration including firm size, share ownership, CG, and institutional forces.

3.4.3.1 Firm size

Firm size is considered a major factor effecting the firm CG environment (Hermalin and Weisbach, 1991) including compensation. Smith and Watt (1992) believe management compensation is a function of firm size and Linn and Park (2005) provide empirical support by establishing a positive association between firm size and director compensation. CEOs can influence firm size⁶⁰ more than firm performance (Tosi et al., 2000). CEOs of firms completing a major acquisition experience a considerable increase in compensation (Kroll et al., 1990). Firm size is offered as a proxy for organisational complexity to justify higher rates of compensation (Kostiuk, 1990; Posner, 1987). The added complexity increases the number of hierarchical layers and increases the rate of compensation at each level of management (Mahoney, 1979; Conyon and Peck, 1998). Risk averse CEOs can minimise exposure to compensation volatility by delinking compensation and firm performance, instead coupling compensation to firm size (Dyl, 1988; Kroll et al., 1993; Herman, 1981). Directors also benefit from a compensation policy associated with firm size (Crystal, 1991). In addition to firm size, Smith and Watt (1992) find a positive relationship between firm growth opportunities and the use of equity-based incentives to compensate executives. Numerous other studies confirm the association between growth opportunities and CEO equity

⁶⁰ Using a composite measure of firm size comprising 16 different measures of size (see Tosi et al., 2000, p.308 Table 1).

compensation (Gaver and Gaver, 1993; Mehran, 1995) as well as growth opportunities and outside director equity compensation (Linn and Park, 2005).

3.4.3.2 Share ownership

Studies exploring the association of share ownership and compensation have found CEO shareholding is negatively associated to CEO total compensation (Allen, 1981; Lambert et al., 1993) and in the presence of external block holders with more than a five percent shareholding in the firm (Lambert et al., 1993).

3.4.3.3 Corporate governance

Shareholders and management may have conflicting views regarding optimal compensation design (Fleming and Schaupp, 2012). The board of directors is responsible for setting CEO compensation and hence it is no surprise that board characteristics have a bearing on CEO compensation (Core et al., 1999). CEO pay is higher where (1) the CEO is also the chair of the board (CEO duality), (2) a majority of directors are outside directors⁶¹ (Lambert et al., 1993; Boyd, 1994),⁶² (3) outside directors are appointed by the CEO (Crystal, 1991; Lambert et al., 1993), and (4) outside directors become ‘busy’ directors (Core et al., 1999). Rosenstein and Wyatt (1990) and Bryd and Hickman (1992) find a positive share price reaction associated with independent boards. In contrast, Yermack (1996) finds no relationship between the level of board independence and firm performance. The independence of the compensation committee increases the level of CEO pay and the pay-performance sensitivity.

⁶¹ Outside directors are either in old age or serve more than three boards.

⁶² In contrast, Finkelstein and Hambrick (1989) find no relationship; while Deutsch (2005) found a negative relationship between the proportion of outside directors and the use of CEO performance-based incentives.

Having an insider on the compensation committee increases CEO pay and reduces the pay-performance relationship (Newman and Mozes, 1997).

3.4.3.4 Institutional forces

Blake and Davis (1964, p.464) define institutional forces in terms of: "*norms clustered around a given functional requirement are often collectively designated as 'institution'.*"

Although a major factor in shaping the institutional setting, industry factors are only one element of institutional factors. Benchmarking within industries has become common place in deriving and justifying the level and design of managerial compensation (Murphy, 1999; Reda et al., 2008), the increase in board reliance on remuneration consultants only fuelling the shift to a standard remuneration model (Diprete et al., 2010). Extensive remuneration regulation has led to the institutionalising of many pay practices (Diprete et al., 2010). Conyon and Murphy (2000) argue that there is weak evidence of the principal-agent conflict determining compensation. Instead they consider taxation effects, statutory and non-statutory regulation as the key drivers of management compensation. Brown and Howieson (1994) explain option compensation is a function of both agency problems and institutional factors. They list the need for alignment of interests with shareholders⁶³ and the tax effectiveness of option compensation as factors influencing remuneration design.

Owing to the significant level of uncertainty, informational asymmetry, and almost complete managerial discretion, high-tech firms compensate CEOs based on innovation such as R&D

⁶³ Both short-term and long-term interest alignment between managers and shareholders including motivating managers to take bigger risks.

and patents rather than firm performance. Hence, there is no significant association observed between CEO compensation and firm performance in such firms (Balkin et al., 2000).

In a review of the impact of systematic and unsystematic risk on CEO compensation, Miller et al., (2002) record no relationship between market (systematic) risk and CEO compensation. In contrast, they do find a link between firm specific (unsystematic) risk and the level of 'at risk' compensation. Further, they plot a curvilinear relationship for firm specific risk and 'at risk' compensation and find a maximum level of firm specific risk a CEO will extend to. Beyond that point higher levels of compensation actually reduce firm level risk taking.

Cash constrained firms are more likely to adopt managerial compensation packages containing equity and stock options as a substitute for cash (Dechow et al., 1996; Core and Guay, 1999). Ongoing access to capital is a major factor within the mining sector, particularly for new firms, small cap firms and exploration only firms (Ernst-Young, 2014; PWC 2014).

Compensation designed to influence risk seeking behaviour and take advantage of growth opportunities is most relevant to firms in high growth industries (Smith and Watt, 1992). In contrast, Bizjak et al. (1993) observed a lower rate of 'at risk' incentive remuneration in high growth firms such as exploratory firms. Higher risk mining firms pay executives a higher ratio of variable compensation and higher levels of performance-based compensation than low risk mining firms (Kent et al., 2001). Firms pay outside directors more and include higher levels of incentive compensation where monitoring costs are high in order to align

director and shareholder interests (Linn and Park, 2005). Owing to the high level of uncertainty and informational asymmetry, monitoring costs are high in the mining sector. The impact of remuneration on management behavior is discussed in Section 3.3.2.

3.5 Remuneration and risk strategy

Managers may find themselves in a position where they are unable to hold the optimal investment portfolio (Markowitz, 1952; Eisenhardt, 1989). This could be due to the payment of shares and options to managers by firms with restrictive vesting and disposal rules and changes in offsetting laws⁶⁴ that restrict managers from hedging their exposure to falls in the value of the employing firm. Managers are overly reliant on the firm as a core source of their personal income, may face dismissal following a poorly performing risky project, and are exposed to a loss of personal wealth following corporate insolvency or financial distress (Coffee, 1988; Hill et al., 1993; Deutsch et al., 2011). As a consequence, managers may alter the firm's investing strategy, and tailor it to suit their own position instead of adopting a strategy that maximises shareholder wealth (Jensen and Meckling, 1976). One main reason behind the misalignment of interest between the principal and agent is the difference in attitude between the manager and shareholders towards risk (Shankman, 1999).

Jensen and Meckling (1976) divide agency costs into two broad categories, i.e., moral hazard and adverse selection. Moral hazard refers to issues in monitoring the performance of management, encapsulating management decision-making affecting the firm risk. The level

⁶⁴ Corporations Act 2001(Section 206J) for more details see Chapter 2.

of firm risk is a product of both risk taking decisions and risk management decisions (Stulz, 2003). Executive remuneration structures can be used to encourage a level of risk taking⁶⁵ and risk management that aligns management and shareholder interests (Smith and Watts 1982; Lambert and Larcker 1985; Jensen and Meckling 1976). Hanlon et al. (2003) argue that skilfully crafted incentive compensation will not lead to excessive increases in the level of firm risk. However, managers are assumed to be risk averse and pursue a suboptimal level of corporate risk due to an inability to diversify their own risk exposure as a consequence of equity-based payments in their remuneration structure (Godfrey et al. 2006). Risk aversion has the potential to be a significant agency cost in the extractive industries sector due to under investment or inappropriate investment. The core value proposition for the AMS is the potential to reap in large speculative gains following positive exploration activity and exploration activity is inherently very risky.

Empirical research has yielded mixed results regarding the use of equity-based compensation to shape firm risk strategy in terms of (1) the relationship between management options and equity holdings and finance strategy (Mehran, 1995; Tufano, 1996; Berger et al., 1997; Esty, 1997; Schrand and Unal, 1998; Rogers, 2002; Cole et al., 2006); (2) the relationship between equity-based compensation and R&D is positive (Ryan and Wiggins, 2002); (3) the adoption of option compensation schemes is positively related to higher stock returns volatility (Agrawal and Mandelker, 1987; DeFusco et al., 1990); and (4) sensitivity of CEO wealth to share return volatility are positively related (Cohen et al., 2000).

⁶⁵ Windram (2005) cautions against using EBC to encourage risk taking in the finance sector, stating it could lead to excessive risk taking that could undermine financial market stability.

CEO risk taking preferences are not static, changing through the duration of their career and possibly even throughout their tenure at a particular firm (MacCrimmon and Wehrung, 1990). Early career CEOs take on riskier investment activity than those nearing retirement (Sanders, 1999). Core and Guay (1999) suggest optimal compensation design is also dynamic, noting the optimal ratio of executive equity incentives changes over time.

In an alternative line of research examining CEO risk taking incentives and audit fees,⁶⁶ Fargher et al. (2013) document a positive relationship between risk taking incentives and both audit fees and going concern audit opinions, suggesting compensation design can impact the level of firm risk.

3.5.1 Remuneration: Impact on risk behaviour

In the absence of incentives CEOs prefer risk avoidance and hence will underinvest (Hall and Liebman, 1997), particularly if they bear the risk and their successors reap the rewards (Sanders and Hambrick, 2007). Jensen and Meckling (1976) propose that owing to the informational asymmetry resulting from the unobservable management behaviour by the shareholders, a mechanism such as incentive compensation is required to align the risk preference of the manager with the shareholder. Risk is correlated with return (Fama, 1976; Sharpe, 1964) and shareholders seek higher returns, hence prefer risk taking CEOs.

⁶⁶ Wysocki (2010) posits five reasons for a possible association between executive compensation and audit fees: complexity, risk, strict governance, managerial entrenchment and managerial empire building.

Risk is described within the psychology and finance fields in terms of variance or dispersion of the expected outcome (Libby and Fishburn, 1977). Variance encapsulates uncertainty stemming from incomplete information (Baird and Thomas, 1985). Typically, risk and uncertainty are the two conditions faced by management when making investment decisions due to costly, incomplete, and asymmetric information. Prendergast (2002) suggests that principals opt for monitoring of executives' outcomes when informational asymmetry is significant and the environment is sufficiently risky.

As shown in Figure 3-6, optimal risk strategy in turn drives improved firm performance over both the short- and long-term. The implicit assumption is that compensation impacts behaviour which then influences firm performance (Devers et al., 2007).



Figure 3-6: Expanded model of compensation, risk strategy, and performance

Boards impose compensation risk on executives by tying the executive compensation to firm performance (Core et al. 2003), aligning shareholder and management interests and discouraging managerial risk aversion (Devers et al., 2007). The supremacy of shareholder value creation as the dominant corporate objective grew throughout the 1980s (Davis, 2005; Fligstein, 1993) and fuelled the growth in incentive and equity compensation (Useem, 1993).

There is considerable research regarding the relationship between CEO compensation and behaviour. Management engage in earnings management to maximise the value of STIs (Healy, 1985; Grant et al., 2009), and the use of equity-based incentives encourages accrual earning management (Grant et al., 2009). The ratio of CEO equity compensation to total compensation and CEO equity holdings are positively related to firm information disclosure (Nagar et al., 2003). The incidence of voluntary liquidations that enhance shareholder wealth is positively related to the sensitivity of CEO option compensation to share price movements and CEO equity holdings (Mehran et al., 1998). Executives holding higher rates of underwater options⁶⁷ are more likely to be seeking alternative employment (Dunford et al., 2005).

With the proliferation in the use of stock options to compensate executives (Yermack, 2004; Farrell et al., 2008), considerable research has identified several common behavioural consequences associated with granting stock options as part of compensation. CEOs time the issue of stock options with expected share price rises (Yermack, 1997). CEOs manage the release of price sensitive information to the market near scheduled option grant dates to enhance personal wealth (Aboody and Kasznik, 2000). Executives engage in earnings management close to option reissue periods in order to gain the lowest price for subsequent options (Coles et al., 2006b). Firms engage in backdating the issue date of options granted to executives to increase the value of options without having to recognise the true value of the compensation to the market (Lie, 2005; Heron and Lie, 2007).

⁶⁷ Underwater options refers to options that are out of the money and have little intrinsic value.

The rate of misreporting and subsequent restatement is related to the sensitivity of CEO option holding to the underlying share price (Burns and Kedia, 2006). Firms compensating executives with options are associated with lower dividends (Lambert et al., 1989), and are more likely to repurchase shares from the market at the expense of paying out higher dividends (Fenn and Liang, 2001). However, Erickson et al. (2006) found no relationship between executive LTIs and fraudulent financial reporting, whereas Armstrong et al. (2010) observed a weak negative effect of executive LTIs on restatement, SEC prosecution and shareholder lawsuits.

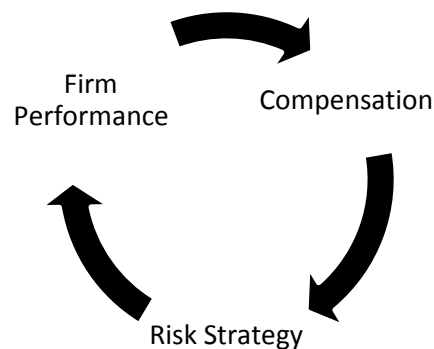


Figure 3-7: The interaction between compensation and risk strategy

As shown in Figure 3-7 the relationship between compensation, risk strategy and performance is circular, which indicates compensation can impact firm risk strategy, which can impact firm performance, which in turn influences compensation.

In summary, elements of compensation packages produce difference behavioural responses. In particular, as noted above, there is considerable evidence pointing to extensive managerial

opportunism in the case of option compensation. A review of the literature concerned with the relationship between remuneration and risk taking is now undertaken.

3.5.2 Remuneration: Impact on risk taking

Modern compensation design incorporates base salary, STIs, LTIs and other allowances including non-cash perks.⁶⁸ The impacts of the discrete components of executive compensation on firm risk taking are discussed below.

3.5.2.1 Base salary level and risk taking

Managers prefer higher base salaries. STIs and LTIs are often calculated with reference to the base salary and expressed as a factor of base salary so increasing base salary has a flow-on effect with positive consequences for the other elements in a compensation packet (Murphy, 1999).

Dow (2001) argues base salary is necessary with a compensation package. Otherwise the resultant level of risk bearing by managers would cause an adversely low level of risk taking by the firm. Milkovich and Bloom (1998) and O'Connor et al. (2013) provide empirical support, finding a positive relationship between base salary and firm risk taking.

3.5.2.2 STI compensation and risk taking

Empirical research suggests the impact of STIs on firm risk taking demonstrates both positive and negative consequences for the firm. The relationship between STIs and risk taking is

⁶⁸ Base salary is commonly termed cash, fixed, or base compensation. STIs incorporate cash bonuses. LTIs include equity based compensation, shares and share options.

negative (Milkovich and Bloom, 1998). STIs promote R&D investment⁶⁹ when investment activity is visible to the market and when it is invisible to the market R&D investment is reduced (Bebchuk and Stole, 1993).

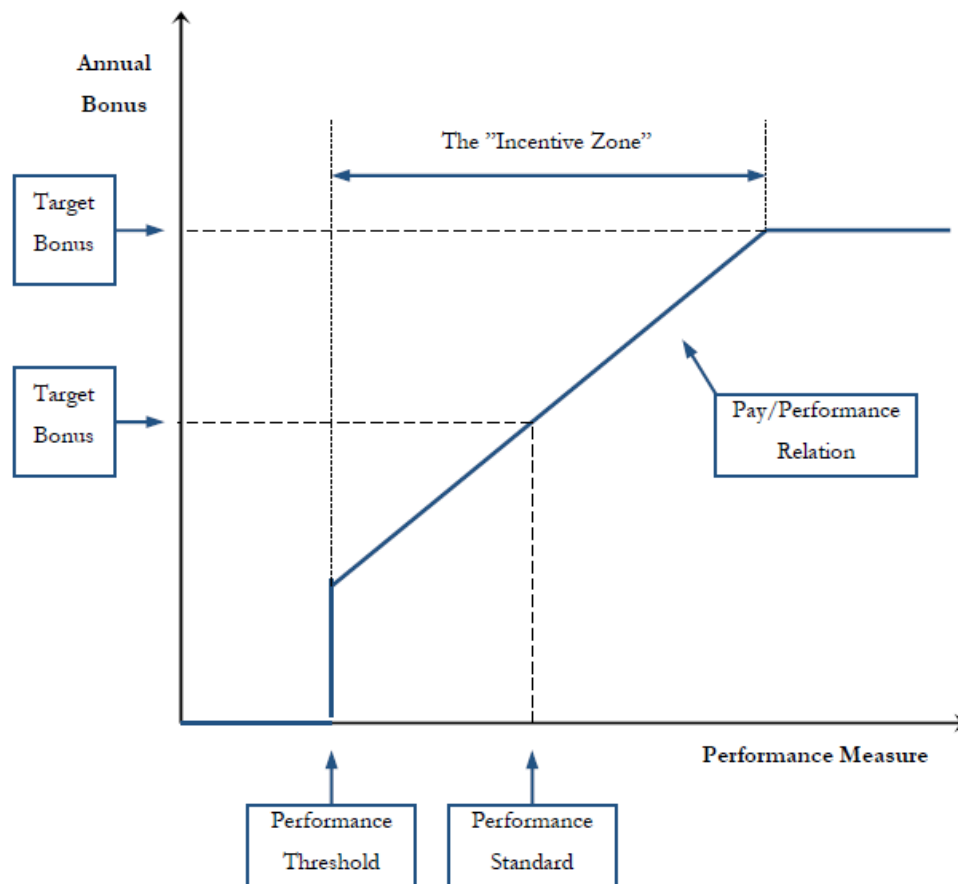


Figure 3-8: Components of a typical bonus plan

(Source: Murphy, 1999, p.249)

Figure 3-8 demonstrates the relationship between firm performance and the annual bonus payment (STI). The promise of a bonus incentivises the CEO to lift firm performance to a target level in order to receive the STI. When bonuses are capped it limits the incentive zone

⁶⁹ R&D investment is considered to be a risky long-term undertaking.

and is assumed to cap firm performance (Healy, 1985; Murphy, 1999). Aside from the short-term boost to firm performance, cash bonuses paid for achievement of annual profit targets may promote short-sighted management investments, and have other undesirable side effects.

In addition, there is a considerable literature regarding real earnings management in which managers are found to manipulate real operating activities in order to meet short-run performance targets (Healy and Wahlen, 1999; Fudenberg and Tirole, 1995; Dechow and Skinner, 2000). Examining the relationship between STIs and discretionary spending, including R&D, advertising and maintenance expenses, Graham et al., (2005) found 80% of CEOs compensated with STIs would reduce spending to meet a performance target, and over 50% would delay a new project to meet an earnings target even if this was value destroying for the firm.

3.5.2.3 LTI compensation and risk taking

LTI schemes use a longer time horizon with three to five years to measure firm performance (Murphy, 1999). LTIs can be cash bonuses but are more often equity-based such as restricted stock or share options,⁷⁰ although executives' value restricted shares more highly than options (Hall and Murphy, 2002).

The increased use of equity-based compensation, such as shares and options, accelerated during the late 1990's (Murphy, 1999; Perry and Zenner, 2000) increasing the sensitivity of executive wealth to the firm share price (Hall and Liebman, 1997; Jensen and Murphy, 1990;

⁷⁰ Restricted shares expose management to both the upside and downside of changes in share price (Poteshman et al., 2005). The value of restricted shares accumulates from the grant date until the date of potential sale, while an option only has value when it is in the money (Devers et al., 2008).

Coles et al., 2006a). CEO's with higher sensitivity to changes in the firm share price take on riskier choices, including higher R&D investment,⁷¹ lower levels of property, plant and equipment investment, are less diversified, and more highly leveraged (Coles et al., 2006a). Empirical results are mixed. A survey of the literature by Prendergast (2002) identified 11 studies examining the relationship between LTIs and measures of firm risk⁷² The results yield three positive results, and three negative results associating LTIs and firm risk. Confounding the ambiguity, five studies found no evidence of a statistically significant relationship between LTIs and firm risk. The results suggest the dynamic connecting LTIs and firm risk is not yet understood, with Prendergast (2002) calling for further research.

3.5.2.4 Equity based compensation and risk taking

Firms adopting equity-based executive compensation are more likely to invest in R&D than firms using accounting based incentives (Xue, 2007). Contradictory results found equity-based compensation is negatively associated with R&D investment (O'Connor et al., 2013).

Although it is widely believed equity-based compensation increases risk taking by management (e.g. Murphy, 1999; Coles et al., 2006a), it may have an upper bound. As the level of management share ownership rises beyond a tipping point managers may have a diminished appetite for further risk taking (Amihud and Lev, 1981; Smith and Stulz, 1985).

⁷¹ Equity based incentives are considered to promote long-term investment projects like R&D as the long-term potential payoff is reflected in the current share price (Jensen 1986). In contrast, others posit equity incentives push additional risk onto management resulting in reduction in risky project investment, as managers attempt to protect their own wealth (Fama, 1980; Lambert, 1986).

⁷² Prendergast (2002) utilises CEO equity ownership as a proxy for executive incentives and studies surveyed concerning risk taking used both volatility of earnings, and idiosyncratic risk as a proxy for measuring risk.

Godfrey et al. (2006) warn equity-based payments may cause managers to become more risk averse, and may pursue a suboptimal level of corporate risk due to an inability to diversify their own risk exposure as a consequence of equity-based payments. Empirical research results support the limits of equity-based compensation to increase risk taking, and found increasing CEO restricted share ownership triggers greater risk aversity in the CEO (May, 1995), leading to a reduction in risky investments (Bryan et al., 2000; Hall and Murphy, 2002; Devers et al., 2008).

Cohen et al. (2008) in an analysis of the impact of the regulatory changes introduced under SOX found increases in accrual-based earning management were associated with increases in the ratio of equity-based remuneration paid to executives. Cohen et al. (2004) found the assignment of additional liability to executives resulted in lower ratios of equity-based compensation in total compensation packages. They also found a drop in the level of risk taking by firms, leading to an inference that reducing equity-based pay reduces risk taking by executives.

3.5.2.5 Option compensation and risk taking

Although there are many explanations for the use of options within compensation programs, the fundamental justification for their use is to motivate management to take more risk than they would through the granting of shares alone (Murphy, 1999). Option compensation

encourages CEOs to take on riskier investments⁷³ for the betterment of the shareholders (Haugen and Senbet, 1981; Jensen and Murphy, 1990; Rajgopal and Shevlin, 2002; Sanders, 2001; Tufano, 1996). Management granted options⁷⁴ benefit from the upside of any share price appreciation, yet are not penalised when the share price falls (Sanders, 1999). The assertion that options encourage risk taking is supported by the ‘at risk’ decision-making literature in which decision makers faced with only an upside payoff and no downside risk focus on upside opportunities and ignore the downside risk which the shareholders bear (Kahneman and Tversky, 1979; Shapira, 1995). Executives with asymmetric incentives are myopic, directing attention to the largest possible payoff and they are less likely to be concerned with the rational calculation of the downside risk. Hence, they make bigger bets without regard for the losses (Kahneman and Tversky, 1979; Shapira, 1995).

Bryan et al. (2000) and Ryan and Wiggins (2002) observe a positive relationship between R&D investment and the use of options in executive compensation. They also find the inverse outcome when examining equity pay, that is, a negative relationship between risk taking and compensation awarding shares. CEOs with underwater options divert investment away from less risky investments to R&D projects (Coles et al., 2006a). Sanders et al. (2001) report a positive link between option compensation and acquisitions. Taking the investigation into acquisitions, Datta et al. (2004) find that the use of CEO share options compensation

⁷³ Two fundamental finance assumptions explain the theoretical justification for this assertion. Firstly return is a positive function of risk (Sharpe, 1970). Secondly, share option valuation is a positive function of the underlying share price volatility (Black and Scholes, 1973).

⁷⁴ Share options granted to management are call option contracts and entitle the holder to purchase a predetermined quantity of shares at a future date (vesting date) at a set exercise price (strike price) at the date of issue (grant date). There is no obligation to proceed with the purchase. Options are in the money (above water) if the market price of the underlying share (equity instrument) is above the exercise price, otherwise they are deemed out of the money (under water) when below the market price (Murphy, 1999; Devers et al., 2008).

schemes promotes value enhancing acquisitions, riskier acquisitions (Wright et al., 2002), and increases post-acquisition firm risk.

Examining the mining sector, Rajgopal and Shevlin (2002) find awarding share options increases CEO risk taking, utilising exploration investment as a proxy. In contrast, Desai and Dharmapala (2006) find that, in the absence of good corporate governance, option compensation does not increase risk taking.

Accounting for the option value, Carpenter (2000) develops a theoretical model in which she predicts “extremely” underwater options can motivate excessive risk taking (Dow and Raposo, 2005), and “extremely” above water can trigger excessive risk aversion (Devers et al., 2007).

Many academics argue research results provide strong support for the assertion equity compensation in the form of shares is related to lower levels of risk taking, while the convexity of option payoffs results in more risk taking occurring when equity compensation is in the form of options (Tufano, 1996; Guay, 1999; Rajgopal & Shevlin, 2002; Lewellen, 2006; Coles et al., 2006a).

Fargher et al. (2013) examine the effect of equity-based compensation on risk taking and describe how CEO wealth sensitivity to changes in share prices (delta) is negatively related to risk taking (Brockman et al., 2010), and CEO wealth sensitivity to volatility in share prices is positively related to risk taking (Brockman et al., 2010; Chen and Ma, 2011). Deutsch et al. (2010) investigate the joint effect of executive and director option compensation on risk

taking. They observed an increase in firm risk taking when either the CEO, or outside directors, or both are paid share options. In addition they noted that paying outside directors share options had a significantly stronger effect on firm risk taking than paying CEOs share options.

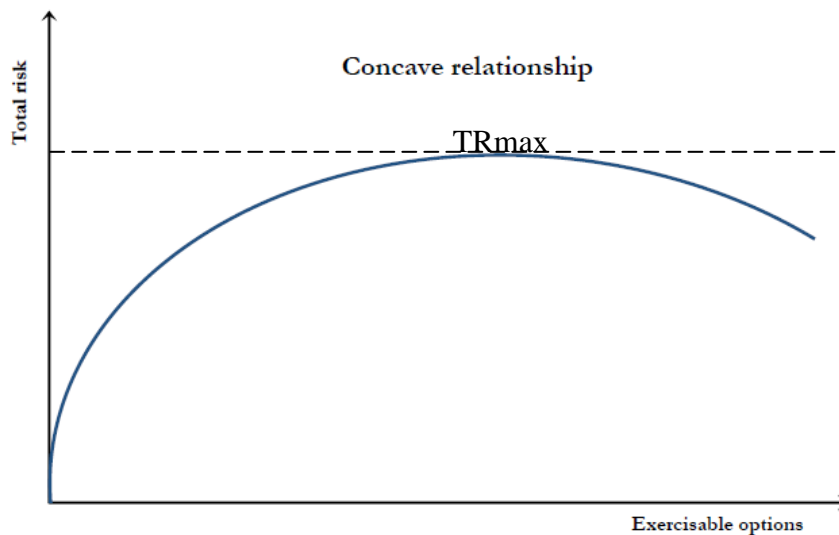


Figure 3-9: Relationship between total risk and exercisable options (Source: Devers et al., 2008, p. 551)

Figure 3-9 illustrates the convex relationship between total firm risk and the size of the manager's share option holding. Beyond the midpoint (TRmax) in the diagram managers become more concerned with the negative consequences to their own personal wealth than the upside to the shareholders of further risk taking, preventing them from additional risk taking and encouraging a more defensive overall risk strategy for the firm (Amihud and Lev, 1981).

In contrast, researchers have noted that agency costs arising from the use of option compensation reduces their power as an incentive alignment tool (Devers et al., 2007). Early

exercise of options is associated with share price volatility (Bettis et al., 2005) and increases in share price (Heath et al., 1999). Others argue that the process of share option valuation is far too complicated to be able to affect executive behaviour regarding the timing of exercise (Bergman and Jenter, 2007).

Option-based compensation is positively associated with accrual-based earnings management (Cheng and Warfield, 2005; Bergstresser, and Philippon, 2006). However, on the related matter of accounting fraud, Johnson et al., (2009) find only equity holdings but not options are associated with accounting fraud, whereas Erickson et al., (2006) find no significant relationship between equity pay and accounting fraud.

Current research threads examining the relationship option compensation and risk taking suggest that the relationship is not linear (Devers et al., 2008). The efficacy of option compensation as a lever to stimulate higher levels of firm risk taking may be bounded by the cumulative impact it has on the risk profile of the individual executive or director as illustrated in Figure 3-9.

3.5.3 Director compensation

Although there is extensive literature documenting the effect of executive compensation on firm risk behaviour, the effects of board compensation design have received less attention (Hermalin and Weisbach, 1991; Cyert et al., 2002; Deutsch et al., 2007; Hoskisson et al., 2002; Kor, 2006; Linn and Park, 2005; Deutsch et al., 2011). Boards are commonly considered in a functional sense as a mechanism to monitor executives, control executive

behaviour and approve strategic direction (Kemp, 2006; Ruigrok et al., 2006). Independent directors play a well-defined oversight role (Eisenhardt, 1989; Rechner and Dalton, 1991; Boyd, 1994; Tihanyi et al., 2003).

Studies investigating the relationship between director compensation and firm risk taking have produced mixed results (Morck et al., 1988; Jensen, 1993; Perry, 2000; Godfrey et al. 2006; Deutsch, 2007; Lim and McCann, 2013).

Equity-based compensation is an effective instrument to bond directors to shareholders by tying director wealth to shareholder wealth (Jensen, 1993; Carey et al., 1996). In the US, the California Public Employees' Retirement System (CalPERS) and National Association of Corporate Directors encourage the use of equity-based compensation as an efficient and effective mechanism to align the interests of shareholders and the directors.⁷⁵

Paying directors with incentive compensation improves CEO monitoring (Hermalin and Weisbach, 1998; Gillette et al., 2003), while director option compensation should promote higher levels of firm risk taking (Yermack, 2004; Linn and Park, 2005). Empirical results suggest that firms paying directors with incentive compensation are more likely to experience CEO turnover following poor firm performance (Perry, 2000) and make more acquisitions (Deutsch et al., 2011).

⁷⁵ CalPERS is the largest public pension fund in the US. The National Association of Corporate Directors' Blue Ribbon Report (1995) encourages firms to use director equity-based compensation.

Focusing on options compensation, prior studies find that compensating directors with options is related to higher shareholder value (Morck et al., 1988) and promotes greater risk taking (Lim and McCann, 2013). Wiseman and Gomez-Meja (1998) summarise by noting that if you pay enough share options even the most risk averse CEO will become a “*risk-lover*”.

Beyond monitoring firm performance and controlling executive behaviour, boards can make a significant contribution through the provision of strategic advice and oversight (Golden and Zajac, 2001; Deutsch et al., 2011). Daily et al. (1999) warn against the use of director equity-based compensation and Yermack (2004) identifies the potential conflict of interests that may result following the introduction of director equity-based compensation. On the negative side, director option-based compensation promotes discretionary disclosure manipulation (Bergstresser and Philippon, 2006; Burns and Kedia, 2006) and earnings management (Boumosleh, 2012).

Combining both CEO and directors option compensation, Deutsch et al. (2011) explore the interaction of compensating the CEO and directors with option compensation and the resultant level of risk taking. The results indicates that the use of option-based compensation in any permutation increases firm risk taking, however director option compensation has a greater impact than CEO option compensation (Deutsch et al., 2011).⁷⁶

⁷⁶ In fact Deutsch et al. (2011) found director option compensation is a substitute for CEO option compensation, and when combined awarding director option compensation actually decreases the impact of CEO option compensation on risk taking.

In summary, the popularity of option-based compensation in the UK, US and Australia has increased significantly over the last decade. From a theoretical stand point this should result in greater risk taking and superior firm performance as the board and executives strive for a slice of the improvement in share value. However, as the share price rises and falls the management team will have either an incentive to take radical risk in order to redirect the share price skyward or will become defensive and attempt to lock-in gains by reducing risk taking (Windram, 2005).

Unfortunately, the results of prior studies are mixed and are yet to deliver a clear understanding of the dynamics relating compensation design and firm risk taking. Deutsch et al., (2011) provides early insights into the joint effect of CEO and director option compensation on risk taking. Yet there is no research examining the impact of the elements that comprise total compensation of the board and the CEO and the joint relative impact upon firm level risk taking.

3.5.3.1 Other factors impacting risk taking

Behavioral accounting considers managerial risk aversion in a different light, with the presumption that managers are loss averse and more concerned with reducing exposure to loss than a single objective of maximising gains (Kahnemen & Tversky, 1979). Hence the context of risk taking becomes all important in framing the ultimate risk taking decision (Devers et al., 2007). Firm specific factors can impact risk taking, i.e., centrally controlled firms make risk taking decisions more quickly (Pablo et al., 1996); quicker risk taking

decisions improve financial success (Wally and Baum, 1994); and trust of subordinates and less rigid procedures enhance risk taking (Bozeman and Kingsley, 1998; Coleman, 2006).

Prior studies have linked changes to executive remuneration structure with managerial risk management (Tufano 1996; Harris and Raviv 1979). This topic will be discussed in greater detail in the next section. Table 3-3 provides a summary of the key literature regarding remuneration structure and firm risk taking.

Table 3-3: Summary of studies on remuneration structure and risk taking

Author(s)	Sample and Data	Variable(s)	Findings
Prendergast, 2002	11 studies between LTIs and measures of firm risk	Meta-analysis	Results from prior literature presented 3 positive results, 3 negative results and 5 no significant results on the relationship between LTI and firm risk.
Deutsch et al., 2011	US S&P 1500 firms from 1997 to 2006	Option compensation book value to market CAPEX per employee	Paying CEO, Outside directors, or both with stock options increases risk taking.
Agrawal and Mandelker, 1987	153 acquiring firms and 56 divesting firms, a total of 209 firms, during 1974 to 1981	managerial equity stake share price volatility	Management equity holding increases firm riskiness.
Ryan and Wiggins, 2002	1088 US firms across the 1997 fiscal year.	option compensation R&D spending	Option compensation increases R&D spending.
Hanlon et al., 2003	1069 observations based on S&P 1500 firms between 1992 and 2000	Option compensation Firm risk taking	Granting options to executives encourages risk taking.

Xue, 2007	US high-tech firms from 1992 to 2000 with 401 firm-year observations	Equity-based compensation R&D spending	Firms adopting equity-based executive compensation are more likely to invest in R&D.
Rajgopal and Shevlin, 2002	US oil and gas companies for the period 1992 to 1997. 121 observations drawn from the S&P Execucomp database	CEO option compensation Future exploration investment	Managerial option compensation induces investment in riskier exploration projects.
Lim and McCann, 2013	278 US firms from 1993 to 2006	Option compensation Firm risk taking	Director option compensation is positively related to firm risk taking.

3.5.4 Remuneration: Impact on risk management

Evidence relating share option compensation to an increase in risk taking is limited (Sanders and Hambrick, 2007). Tufano (1996) identifies an association between CEO share option compensation and a reduction in firm risk management within the mining sector. A subsequent study by Rajgopal and Shevlin (2002) corroborates the results while examining the oil and gas sector. Risk strategy comprises two components, i.e., risk taking and risk management. Increasing risk taking or decreasing risk management both achieve an increase in the firm level of risk.

Jensen and Meckling (1976) promote the use of equity-based compensation as a means to encourage risk averse managers to take on more risk. However, elements of compensation schemes designed to limit agency costs may have unintended consequences. For example, Tufano (1996) observes an increase in the level of risk management for CEOs with higher levels of share compensation. Tufano argues the increased risk exposure from the manager's equity holding heightens the manager's aversion to firm risk, and leads to higher levels of hedging to reduce the firm's exposure to risk and hence firm risk level.

There are four main reasons that firms manage risk: (1) to reduce financial distress costs; (2) to reduce expected firm tax liability; (3) to reduce underinvestment from debt covenants; and (4) management risk aversion (Smith and Stulz, 1985). This section will limit the scope of the literature review to management risk aversion in association with managerial compensation.

Following the theorised association linking equity-based compensation with firm risk management (Smith and Stulz, 1985), Tufano (1996) delivers empirical evidence regarding the impact of share-based compensation on firm risk management, and option compensation on firm risk management. The basic theory linking these factors and the subsequent empirical research results are provided below. Share-based compensation and firm risk management are reviewed first, followed by option compensation and risk management.⁷⁷

Consistent with agency theory, managers holding undiversified share portfolios or having a significant proportion of their personal wealth tied to the firm are likely to be risk averse and hence reduce firm risk, possibly through risk management (Smith and Stulz, 1985). Put another way, the expected utility of a risk averse manager holding a significant equity stake in the firm is subject to the variance of the firm's future earnings (Geczy et al., 1997). Risk management strategies changing the distribution of firm earnings change the expected utility of the manager (Haushalter, 2000). The results of empirical studies examining the relationship between share compensation/ownership and risk management found that (1) higher levels of share ownership are positively associated with corporate hedging (Dionne and Triki, 2005; Tufano, 1996; Haushalter, 2000; Geczy et al., 1997; Lel, 2011; Berkman and Bradbury, 1996) and (2) conversely share compensation/ownership is negatively associated with risk management (Lel, 2011; Gay and Nam, 1998).

On the other hand, earnings volatility increases a firm's share price volatility bringing about an increase in the value of the firm's options (Knopf et al., (2002). Hence, option

⁷⁷ The vast majority of empirical studies examining the relationship of managerial compensation schemes' on firm risk management focus upon equity-based compensation.

compensation creates an incentive for managers to increase earnings volatility by reducing risk management (Tufano 1996; Geczy et al., 1997). The results of empirical studies examining the relationship between option compensation and risk management indicated that (1) higher levels of option compensation are positively associated with corporate hedging (Bartram 2007; Gay and Nam, 1998; Geczy et al., 1997; Knopf et al., 2002) and (2) conversely, option compensation is negatively associated with risk management (Tufano, 1996; Haushalter, 2000; Rajgopal and Shevlin, 2002; Dionne and Triki, 2005).

Several studies fail to find a relationship between managerial incentives and risk management (Géczy et al., 1997; Gay and Nam, 1998; Allayannis and Weston, 2001; Haushalter, 2000). Rogers (2002) notes option grants induce similar incentives to share compensation. Option compensation schemes often set the strike price close to market price meaning the slightest positive share price movement places them in the money (Gay and Nam, 1998) and deep underwater options are often replaced with at the money options (Browning and Jerski, 1997).

Stulz (2001) points out performance compensation linked to share price exposes managers to market forces beyond the control of the manager and not connected to management decisions. Linking management compensation to systemic risk can reduce shareholder value as a consequence of dysfunctional behaviour by managers attempting to reduce their own and hence firm risk exposure (Stulz, 2001). Systemic risk reduces the market's ability to discern management performance from firm performance. It follows that underperforming managers have an incentive to avoid risk management (Breedon and Viswanathan, 1998). Table 3-4

provides a summary of the research literature examining the association between remuneration structure and risk management.

Table 3-4: Summary of studies on remuneration structure and risk management

Author(s)	Sample and Data	Independent Variable(s)	Findings
Tufano, 1996	48 listed North American gold mining companies, from 1991 to 1993	CEO option compensation CEO share compensation Firm risk management	CEO option compensation reduces firm risk management. CEO share compensation increases firm risk management.
Rajgopal and Shevlin, 2002	US oil and gas companies for the period 1992 to 1997. 121 observations drawn from the S&P Execucomp database	CEO option compensation Firm risk management	Executive option compensation reduces firm's risk management
Knopf, Nam, and Thornton, 2002	260 US S&P 500 firms, from the year 1996	Firm risk management Equity-based compensation	CEOs reduce risk management when options are more sensitive to firm share price volatility. However if the options are more sensitive to the share price, CEOs increase firm risk management.
Rogers, 2002	524 US firms, from 1994 to 1995	Equity-based compensation foreign currency risk management interest rate risk management	Share grants increase risk management and management option compensation reduces risk management.
Borokhovich et al., 2004	284 non-financial US firms from the year 1995	Proportion of Non-executive directors interest rate risk management	Firms with more non-executive directors increase risk management.

3.5.4.1 Other factors impacting risk management

Lel (2011) introduces corporate governance as a moderating variable with an objective of examining the relationship between corporate governance and risk management and finds that where a firm has weak corporate governance, risk management is related to managerial risk aversion, and firms with strong corporate governance use risk management to reduce external funding costs. Firm risk management is negatively associated with CFO tenure (Tufano, 1996), and could be influenced by management education level (Tufano, 1996; Dionne and Triki, 2005). While independent boards have greater influence over executive decisions (Berrone & Gomez-Mejia, 2009), they encourage increased firm risk management (Borokhovich et al., 2004).

The extent of foreign operations increases the likelihood of firm risk management by managing foreign exchange risk through foreign debt (Elliott et al., 2003; Kedia and Mozumdar, 2003; Keloharju and Niskanen, 2001). Risk management lowers earnings volatility and firm specific risk, thereby reducing the level of compensation required to attract managers to a firm (DeMarzo and Duffie, 1995).

3.6 Shareholder value creation

The fundamental reason for an individual to make an investment is grounded in the expectation of greater future returns. From an economics standpoint, individuals choose to consume now or invest and consume later. Reducing consumption today reduces utility. However the expected increase in future consumption (the increase in shareholder wealth

from investing) leads to a higher level of total expected utility. A rational utility maximising individual will forgo consumption in favour of investment if it is expected to increase the net present value of lifetime consumption (Copeland and Weston, 1988).

The capital market pricing model (CAPM) is broadly accepted within finance research. CAPM describes the expected relationship between the expected rate of return on an asset and the risk of holding the asset, measured by the standard deviation of earnings (Sharpe, 1970). Investors require compensation for investments carrying more risk, where risk is a function of the likely distribution of future earnings. Investors are risk averse. For any given value of future income they prefer a secure income stream over a less predictable one (Sharpe, 1970). Consequently, much research has investigated the assumed relationship between higher risks and higher returns.

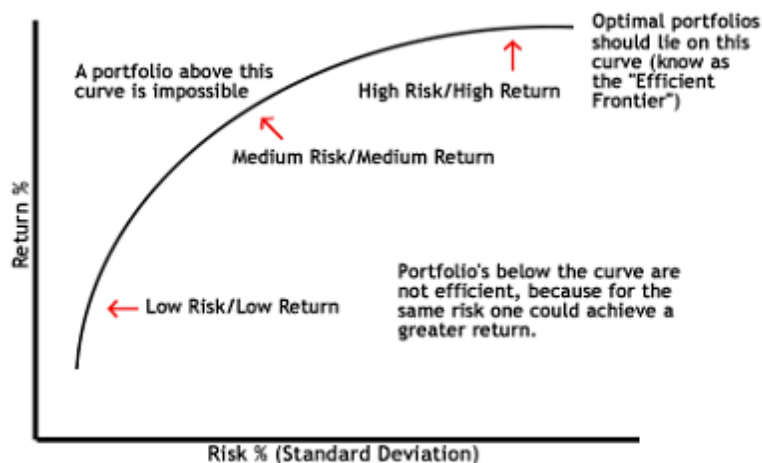


Figure 3-10: Theorised relationship between Risk and Return

(Source: Seeking Alpha, <http://seekingalpha.com/> accessed 12 August, 2014)

Figure 3-10 demonstrates the theorised relationship between investment risk and return. Suppose firm AAA has a return $i\%$, by investing in project X with a return of $i+1\%$, the firm can increase the return to shareholders. However project X increases the risk to the firm. Hence the firm will only enjoy an upward shift in its share price if the value weighted return of project X is greater than the amount needed to compensate shareholders for the additional risk they now bear.

CAPM has not successfully predicted the risk-return relationship based on the market risk premium in empirical *ex-ante* studies (Andriotto and Teti, 2013). CAPM and many of the management theories ignore risks specific to an individual firm (Coleman, 2006). Many other factors have been identified by researchers attempting to understand more about what drives performance (Schlegel, 2014). Most of these studies have identified firm size, shareholder value, momentum, and earnings volatility to equity returns (e.g. Fama and French, 1993; Carhart, 1997; Blitz et al., 2014).

Empirical results support the influence of firm specific factors. Rumelt (1991) finds 49% of company profits could be explained by firm specific factors and only 16% of profit was linked to industry factors while Palmer and Wiseman (1999) established a connection between managerial risk preference and the level of firm risk. There are only limited empirical studies that have linked firm risk and firm performance (Coleman, 2006).

3.6.1 Risk strategy and shareholder value

Strategic risk management is concerned with decision making incorporating risk factors affecting the firm where the outcome is uncertain, and impact long-run firm survival (Baird and Thomas, 1985). Globalisation has increased the spectrum of firm risk strategies following the proliferation of risk taking opportunities, and rising risk management threats. Global capital markets create access to investment funds while contemporaneously, investors can easily move funds to higher yields firms (Armitage and Jog, 1997). The market punishes managers for making decisions that destroy the long-run value of the firm by removing funds, ultimately reducing the share price (Stein, 1989).

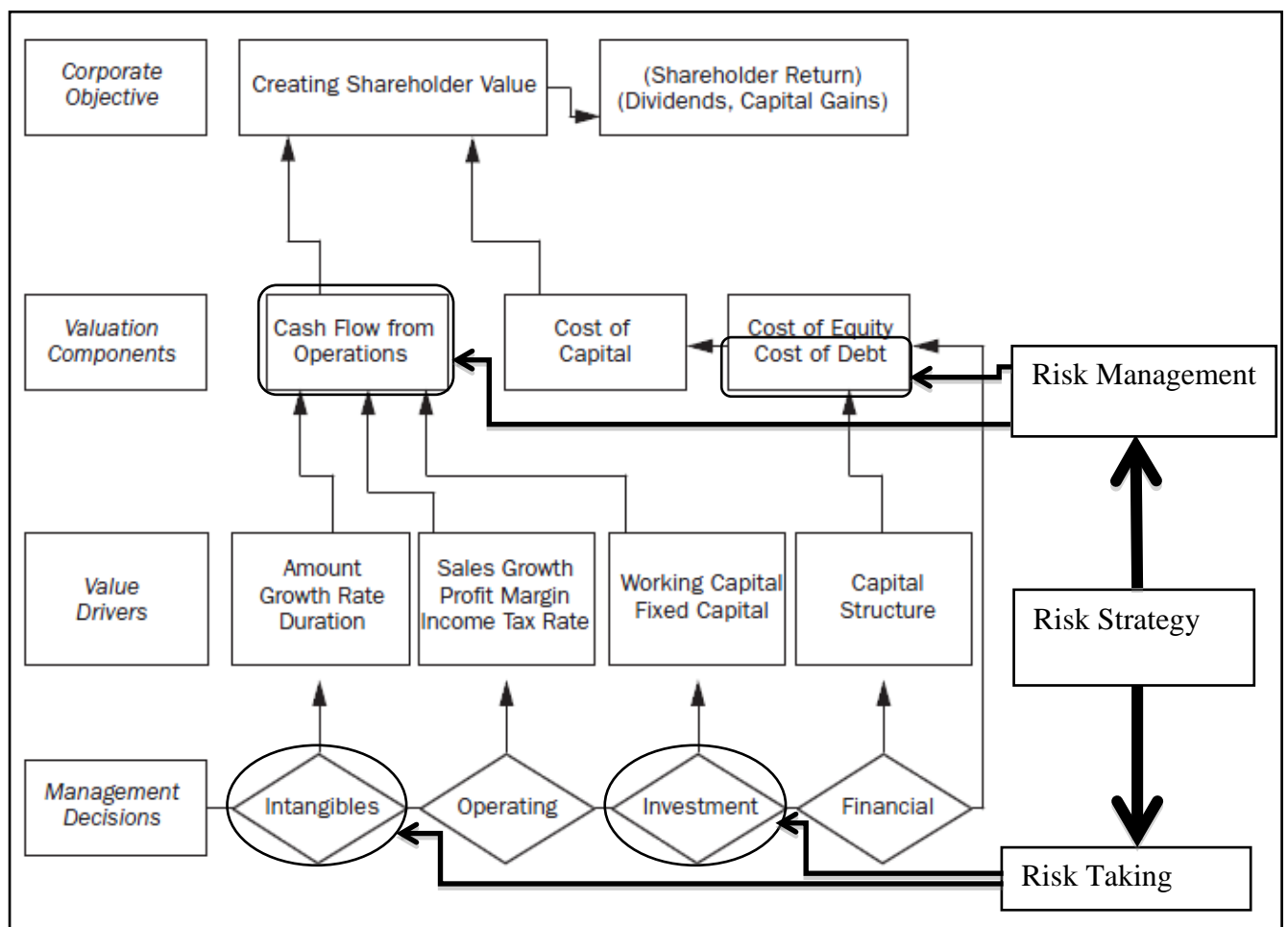


Figure 3-11: Risk strategy and drivers of shareholder value (Source: Adapted from Armitage and Jog, 1997, p. 3)

Baird and Thomas (1985) suggest that firm risk strategy and shareholder value are interconnected. Figure 3-11 illustrates the decisions available to management and how they flow through to shareholder value creation. Firstly, risk strategy shapes management decisions regarding risk taking, setting the level of intangible investment (R&D) and tangible investment (PP&E). The mix of short- and long-run investment impacts short- and long-run cash flows and shareholder value. Secondly, risk strategy modifies cash flow volatility and hence earnings volatility in line with risk management objectives and may enhance shareholder value. In addition, reducing earnings volatility is thought to lead to a reduction in the costs of debt due to the lowering of risk to the creditor, increasing shareholder value.

Shareholder value creation is a function of current firm performance and expected future firm performance. Firm performance metrics continue to evolve, incorporating a mixture of short- and long-term measures based on accounting and market information. In the main, institutional investors' performance incentives rely on quarterly- or annual-based performance. Hence they favour firms with short-term returns (Aguilera et al., 2007; Baysinger et al., 1991; Graves, 1988) and thus invest less in long-term projects, such as capital investment and R&D (Aguilera et al., 2007; Graves, 1988). In contrast, high ratios of institutional investors are related to a higher level of R&D (Baysinger et al., 1991; Hill and Hansen, 1991).

There is considerable evidence of a relationship between the various different measures of risk including analyst forecasts, credit default, volatility of earnings, the beta of CAPM, total shareholder return volatility, debt to equity, and asset utilisation/ROA/capital intensity

(Miller and Reuer, 1996; Miller and Bromiley, 1990). The impacts of the discrete elements of risk strategy upon shareholder value creation are reviewed below.

3.6.1.1 Risk taking impact on shareholder value

Providing a rational theory for the premium⁷⁸ demanded by investors for assuming more risk is relatively straight forward. In contrast, the association between increased risk⁷⁹ and higher shareholder returns is less well understood.

McConnell and Muscarella, (1985) assert that under traditional equity valuation the share price of a firm is a function of the discounted future cash flows from existing investments and the net present value of future investment opportunities available to the firm. Results from their seminal study investigating the value relevance of capital expenditure announcements to firm share prices find announcements of an increase (decrease) in planned capital expenditure are signalling to the market an increase (decrease) in future investment opportunities or future expected cash flows and result in an increase (decrease) in the share price (McConnell and Muscarella, 1985), thereby creating (reducing) shareholder value (Chung et al., 1998; Brailsford and Yeoh, 2004). However, McConnell and Muscarella (1985) noted an industry effect for the mining sector where the market reaction to exploration and development announcements is negative. Not all studies report a positive association between risk taking investment and shareholder value. Researchers have reported, announcements of reduced capital expenditure were associated with a rise in shareholder value (e.g. Statman and Sepe,

⁷⁸ Premium infers a rate of return above the market rate of return.

⁷⁹ In the context of risk taking, risk is defined as a measure of the distribution of expected earnings.

1989; Afshar et al., 1992; Kalra et al., 1994), and risk taking is negatively associated with shareholder returns (Singh, 1986; Devers et al., 2006).

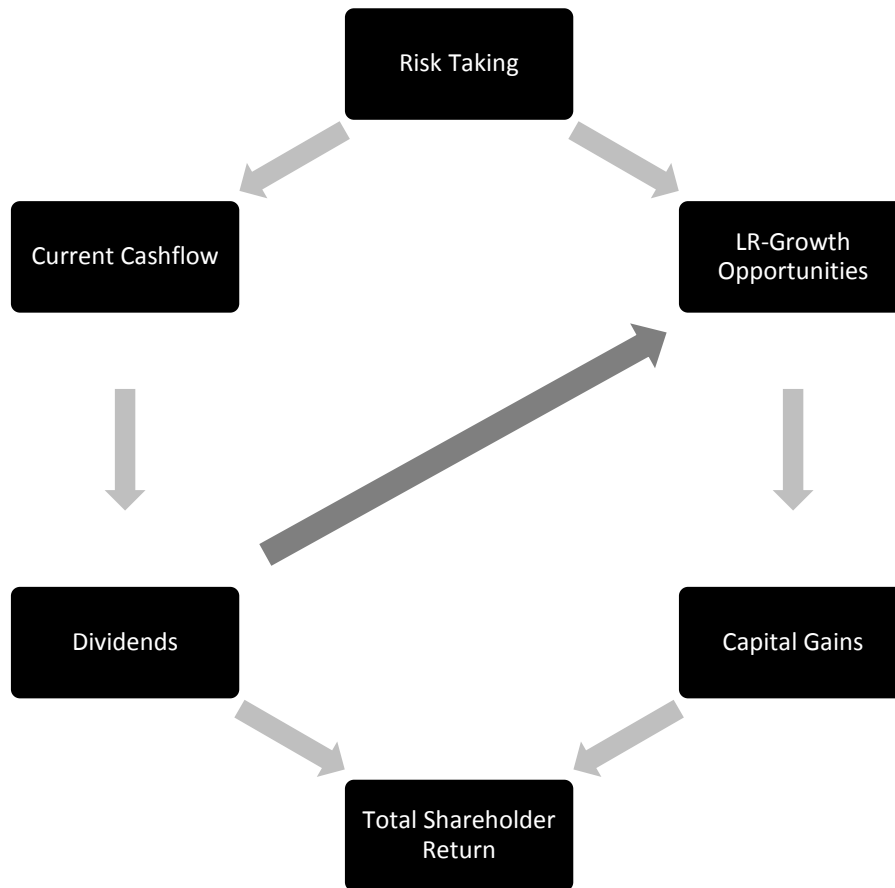


Figure 3-12: Linking risk taking to shareholder value creation

Firm risk taking decisions entail investment in one of two kinds of assets, i.e., low risk capital assets that deliver an immediate or near term boost to cash flows over either a medium to long period, and high risk investments incorporating the potential for super-profits against highly uncertain payoffs (for example, R&D or mineral exploration). Note it is assumed the payment of dividends to shareholders or reinvestment of profits has no impact of the total shareholder return as predicted by dividend irrelevance theory (Miller and Modigliani, 1961).

Figure 3-12 illustrates the manner in which the market incorporates the value relevance of all risk taking investments through either a positive impact on expected earnings or an increase in the market value of the firm's assets.

3.6.1.1.1 Investment characteristics

Research into firm risk taking and shareholder value has explored the impact of a broad range of investment types. Investment categories investigated include R&D (Woolridge and Snow, 1990; Palmer and Wiseman, 1999; Barth et al., 2001; O'Connor et al., 2013), acquisitions (Rau and Vermaelen, 1998), exploration (Walls, 2005), size (Jones et al., 2004); time to cash generation (Burton et al., 1999), joint ventures (Woolridge and Snow, 1990), start up⁸⁰ (Davis, 1985; Camerer and Lovo, 1999), and capital expenditure (Woolridge and Snow, 1990; Akbar et al., 2008).

Prior empirical results identified a positive link between both joint venture investment, R&D investment, and shareholder value creation (Woolridge and Snow, 1990). Jarrell and Lehn. (1985) notes a positive stock price reaction to announcement of new R&D projects. In contrast, Chan et al. (2001) failed to find a direct link between R&D and future share returns. Upon stratification, high-tech firms experience a positive share price reaction but low-tech firms suffer a negative share price reaction (Chan et al., 1990; Chung et al., 1998). Adding firm research intensity compared to industry average is shown to increase the benefit or upswing to share price for firms with higher than average research intensity. The size of

⁸⁰ "Start ups" are defined as the formation of a new business .

investment spending is also significant (Chan et al., 1990). In contrast, Jones et al. (2004) find no significant association of size on investment return. Palmer and Wiseman (1999) find less than one in three R&D projects deliver a positive return on investment.

Rau and Vermaelen (1998) observe a negative relationship between acquisitions and shareholder value. They find acquiring firms under-perform the market in the three years following acquisitions by four percent (when controlling for firm size and book to market value). Davis (1985) reports near zero ROI for start-up ventures in the first five years, and Camerer and Lovallo (1999) document low survival rates for start-up ventures. Other results reported a positive association between risk taking and shareholder value creation once the investment generates immediate cash flows (Burton et al., 1999);

3.6.1.1.2 Firm characteristics

The impact of firm characteristics on firm risk taking and shareholder value has also received considerable attention. Key firm characteristics identified include firm size (Jones et al., 2004), high technology versus low technology (Chan et al., 1990; Chung et al., 1998), R&D intensity (Chan et al., 2001), industry (McConnell and Muscarella, 1985), and free cash flows (Vogt, 1997).

R&D has long been the preferred proxy for risk taking because it has a long gestation period and a relatively high rate of uncertainty compared to alternative capital investments making it harder for potential investors to discern between bad and good investments (Leland and Pyle, 1977). However, informational asymmetry is a necessary component of any R&D project

owing to the difficulty and expense of enforcing property rights over intellectual property, and it results in higher funding costs for R&D (O'Connor et al., 2013).

Firm risk taking is positively associated with shareholder value creation when the firm has (1) higher cash flows (Vogt, 1997), and (2) valuable investment opportunities (Chung et al., 1998). Conversely, firm risk taking is negatively associated with shareholder value creation when the firm size is larger and interest rates are higher (Jones et al., 2004);

Coleman (1984) finds uranium exploration investments have less chance of recovering the initial investment, while Mackenzie and Doggett (1992) note exploration in Australia consistently returns less than 10% and typical exploration projects have a ten million dollar budget in which there is only a 28% probability of discovering an economic mineral reserve.⁸¹ Investments by high risk tolerance firms outperform low risk tolerance firms within the petroleum industry (Walls, 2005). Guay (1999) and Rajgopal and Shevlin, (2002), in studies on the oil and exploration industry, find a positive association between risk taking and the expected volatility of earnings. On the other hand, Born and Ryan (2000), Del-Brio et al. (2003), and Kim et al. (2005) did not find a significant association between risk taking and shareholder value creation.

Imperfect markets and information asymmetry mean investment decisions often rely on management beliefs and subjective judgements (Smith and Nau, 1995).

⁸¹ An economic mineral reserve is one in which the costs associated with extracting the mineral is less than the market value of the mineral.

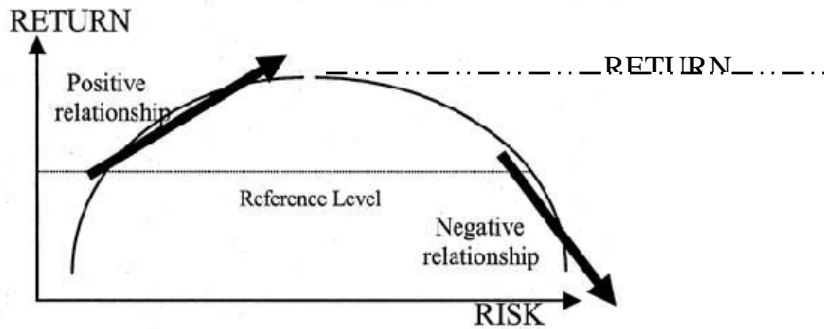


Figure 3-13: Concave risk and return relationship

(Source: Coleman 2006, p.245)

Coleman (2006) proposes an alternative risk and return relationship. Figure 3-13 suggests an alternative risk return dynamic, beyond the return ceiling, labelled RETURNmax, investments with a higher level of risk yielding a lower return. Low levels of risk represent a lack of diversification and hence limit the potential to achieve the market portfolio return. The point of maximum return is equivalent to the efficient market portfolio. Any further risk increases the cost of debt and equity demanded by creditors and shareholders to compensate for the additional risk exposure, without an equivalent increase in return (Coleman, 2006). This results in a net reduction to the rate of return. Several studies provide empirical support to the concave risk return relationship (Fiegenbaum and Thomas, 1988; Walls and Dyer, 1996; Coleman, 2006).

Walls (2005) remarks on the two sided nature of risk strategy and its relevance to the mining sector:

“Risk and risk management are fundamental elements of the exploration and production competitive landscape. Managing petroleum risk is a complex and essential task, with both immediate and lasting effects on firm performance.”

(Walls, 2005, p.127)

Table 3-5 provides a concise summary of the key literature concerned with risk strategy and shareholder wealth.

Table 3-5: Studies on risk taking impact on shareholder value

Author(s)	Sample and Data	Independent Variable(s)	Findings
McConnell and Muscarella, 1985	658 US firms listed on the NYSE or the AMEX, 1975 to 1981	Capital budget announcements Firm share price	Firms announcing increases in planned capital expenditure were signalling to the market an increase in future investment opportunities and/or future expected earnings which then resulted in an upward correction to the share price and creating shareholder value They note an exception for the mining sector
Woolridge and Snow, 1990	767 risk taking decisions by 248 US firms in 102 industries, 1972 to 1987	Risk taking strategy Firm share price	Markets reward firms for developing risk taking strategies in the belief that it will increase shareholders' wealth

Brailsford and Yeoh, 2004	170 ASX listed firms from 1995 to 1997	CAPEX announcements Firm share price	Managers engage in risk taking investment to increase shareholder value
Akbar et al., 2008	884 risk taking decisions by 426 UK firms from 1990 to 2003	Investment announcements Firm share price	Announcements of an increase in risk taking expenditure have a positive impact on the firm share price, regardless of the type of project undertaken.

3.6.1.2 Risk management: Impact on shareholder value

Economic theory presupposes risk management is not value relevant and cannot increase shareholder value, assuming efficient capital markets (Fama, 1970).⁸² Modigliani and Miller (1958) theorise risk management is a part of firm financing policy and therefore is irrelevant. They argue risk management policy is incapable of creating shareholder value (Culp and Miller, 1995; Smith and Nau, 1995; Stulz, 2001; Bartram, 2000). The common premise for firm risk management irrelevance lies in the capacity of individual investors to select their own risk-return portfolio costlessly. Hence they do not benefit from firm level risk management.

Firms operate in imperfect markets in which there are taxes, transaction costs, bankruptcy costs, informational asymmetries and agency costs. Capital market imperfections create a legitimate role for firm risk management (Fite and Pfleiderer, 1995; Nance et al., 1993; Stulz, 2001). Risk management can increase shareholder value by limiting the impact of volatile capital markets on firm share price and improve the transparency of managerial performance by delineating the impact caused by management decision and market movements (Campbell and Kracaw, 1987; Bartram, 2000).

Risk management can have a positive impact on shareholder value when firms face financial distress costs, costly finance and corporate taxes (Aretz and Bartram, 2010; Bartram et al., 2011). Firms can benefit from a lower cost of capital, and debtholder agency costs are

⁸² The Efficient Market Hypothesis (EMH) assumes share prices always encapsulate all information, there is no informational asymmetry. In addition, capital market efficiency assumes: (1) no transaction costs; (2) investors are price takers; (3) costless information; (4) no taxes; and (5) no bankruptcy costs.

reduced when firms engage in risk management, owing to the reduction in overall firm risk (Morellec and Smith, 2007). Large blockholders with an undiversified share portfolio benefit from the reduction in unsystematic risk (Aretz and Bartram, 2010; Bartram et al., 2011).

Smith and Stulz (1985) build a theoretical framework to validate firm level risk management. They argue risk management may enhance shareholder value due to three factors, i.e., taxes, contracting costs and firm investment decisions. Since 1985 risk management research has focussed on providing empirical evidence of the value of firm risk management (Dionne and Triki, 2013). Expanding on the original three factors identified by Smith and Stulz (1985), there are five factors broadly considered to be the key determinants of corporate risk management (Dionne and Triki, 2013) providing a platform for the risk management relevance model.

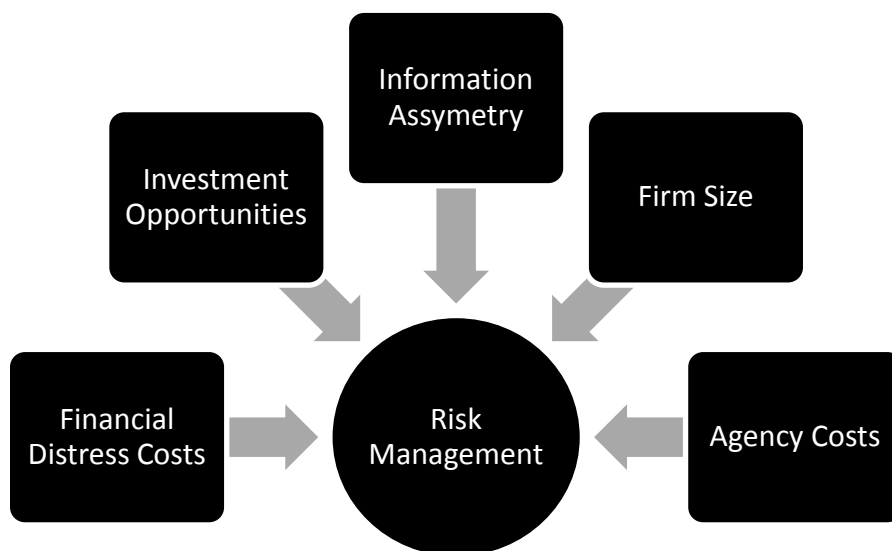


Figure 3-14: Determinants of risk management

The five key determinants of risk management identified in Figure 3-14 are discussed separately below.

3.6.1.2.1 Financial distress costs

The risk of bankruptcy induces firms to engage in risk management (Smith and Stulz, 1985). Shareholders are entitled to any residual remaining after payments to the debt holders, taxes, and bankruptcy costs. Highly leveraged firms require higher cash flows to fund their debt obligations. Volatile cash flows can force a firm into bankruptcy if it has insufficient cash to pay creditors, often leading to costly disputes with creditors (Warner, 1977b). Reducing the variability of future shareholder value through risk management reduces the probability of realising bankruptcy costs thereby enhancing value to the shareholders (Smith and Stulz, 1985; Stulz, 2001; Raposo, 1999; Santomero, 1995; Dolde, 1993; Rawls and Smithson, 1990; Smith et al., 1990; Mayers and Smith, 1982). Direct bankruptcy costs are estimated to be from one percent to three percent of shareholder value (Weiss, 1990; Warner, 1977a). In addition to direct bankruptcy costs, firms incur indirect financial distress costs from damage to reputation, such as withdrawal of supplier credit, loss of customers, and higher compensation charges (Dionne and Triki, 2013). Indirect financial distress costs can be up to 20% of shareholder value (Cutler and Summers, 1988).

Empirical results indicate firm risk management is positively associated with financial distress costs (Tufano, 1996; Dionne and Triki, 2013) and the long-term debt ratio (Bartram et al., 2009; Dionne and Triki, 2005; Graham and Rogers, 2002; Haushalter 2000; Guay 1999; Gay and Nam, 1998; Howton and Perfect, 1998; Fok et al., 1997; Berkman and

Bradbury, 1996; Mian 1996). However, Lel (2011) retested the association between risk management and financial distress with the inclusion of corporate governance factors. Lel found the association of risk management and financial distress is only significant in firms with strong forms of corporate governance.

3.6.1.2.2 Investment opportunities

Firms with rich risk taking investment options risk manage future cash flows when external financing costs are high in order to secure the availability of internal funds for future investment (Froot et al., 1994). Risk management reduces the distribution of expected earnings thereby reducing the risk of funds shortage that can lead to under investment and vice versa (Aretz and Bartram, 2010). In addition, firms with many rich investment options increase the level of risk management to reduce exposure to financial distress (Lin et al., 2008). Empirical research results indicated a positive association between investment opportunities and risk management (Nance et al., 1993; Géczy et al., 1997; Gay and Nam, 1998; Knopf et al., 2002).

3.6.1.2.3 Information Asymmetry

Firm operational complexity gives rise to information asymmetry when shareholders cannot observe management behaviour. Firm risk management reduces the opacity of management performance by separating market factors impacting performance from management decisions (Stulz, 1990). When there is a higher level of informational asymmetry in relation to management capability, risk management assists in measuring management performance

(Breedon and Viswanathan, 1998). High quality financial reporting reduces informational asymmetry.

The results of empirical investigations connecting informational asymmetry and risk management found a positive relationship between the level of informational asymmetry and risk management (Aretz and Bartram, 2010; Dionne and Triki, 2013);

3.6.1.2.4 Firm size

If risk management costs are proportional to firm size, smaller firms should engage in more risk management (Smith and Stulz, 1985). Larger firms may require less risk management due to product or geographical diversity, in contrast, if risk management is largely a fixed cost larger firms can benefit from the economies of scale and might hedge more (Dionne and Triki, 2013).

Empirical results revealed a positive relationship between firm size and risk management (Bartram, 2000; Berkman et al., 2002), although smaller firms engage in a higher ratio of risk management than larger firms (Graham and Rogers, 2002; Allayannis and Ofek, 2001; Haushalter, 2000).

3.6.1.2.5 Agency costs

Managerial personal risk preferences affect firm risk management choice (Amihud and Lev, 1981; May, 1985; Tufano, 1996). Managerial compensation design can impact on managerial risk management behaviour. Option compensation is considered to increase a manager's

appetite for risky investment, whereas shares are considered to promote risk management (Dionne and Triki, 2013), increasing either management option holdings or share holdings exaggerates the behaviour.

In contrast to traditional agency costs, Smith and Stulz (1985) postulate a case in favour of firm risk management to reduce a manager's personal risk exposure arising from firm value volatility. Further they include employees, suppliers, and customers as additional individuals unable to diversify their risk in the case of the firm failure. They argue that if the total cost of risk management is less than the costs required to compensate management, employees, and suppliers, plus the increase in customers' revenues, then risk management is value enhancing for shareholders (Smith and Stulz, 1985).

Several studies report a positive relationship between share compensation and risk management (Tufano, 1996; Rogers, 2002; Dionne and Triki, 2013). In contrast, some studies find a negative association (Geczy et al., 1997; Gay and Nam, 1998).

Turning to option holdings, researchers observed a positive link connecting managerial option holdings and firm risk management (Géczy et al., 1997; Gay and Nam, 1998), while others observed a negative association (Haushalter, 2000; Dionne and Triki, 2005). Nguyen and Faff (2002) doubt firm risk management is caused by self-serving managers. They suggest firms use risk management to manage cash flows and avoid costly financial distress with the overall aim of maximising shareholder value.

3.6.1.3 Summary risk management and shareholder value

Risk management enhances shareholder wealth by reducing financial distress costs and taxes, securing the uptake of future investment opportunities, and enabling improved monitoring of management performance (Dionne and Triki, 2013). Risk management in the mining sector can reduce the risk of earnings volatility due to commodity price movements (Smith and Nau, 1995), in addition to foreign exchange and interest rate market risk.

Research examining the direct link between firm risk and shareholder value creation has produced mixed results: (1) risk management increases shareholder value (Allayannis and Weston, 2001; Graham and Rogers, 2002; Nelson et al., 2005; Carter et al., 2006; Bartram et al., 2011), (2) risk management decreases shareholder value (Fauver and Naranjo, 2010), and (3) the impact of risk management on shareholder value is insignificant (Guay and Kothari, 2003; Lookman, 2004; Jin and Jorion, 2006; Nguyen and Faff, 2002).

Although there are a number of legitimate reasons for a firm to manage exposure to market volatility, conflicting results regarding the relationship between risk management and shareholder value call into question the need for a company to engage in risk management when the shareholders can manage risk through the market. Table 3-6 provides a summary of the key literature regarding risk management and shareholder value.

Table 3-6: Studies on risk management impact on shareholder value

Author(s)	Sample and Data	Independent Variable(s)	Findings
Allaynnis and Weston, 2001	270 large US firms from 1990 to 1995	Foreign currency risk management Firm share price	Investors' value risk management for firms exposed to market risk
Carter et al., 2006	US airline companies during 1994 to 2000	Hedging Capital investment	The principal benefit to shareholders from risk management is a reduction in underinvestment costs.
Aabo, 2001	8 blue-chip Danish industrial companies listed on the Copenhagen Stock Exchange in 1997	Risk management Share price	Foreign exchange risk management increases shareholder value and reduces in investor perceived firm risk exposure.
Bartram et al., 2011	6888 non-financial firms from 47	Risk management	Risk management reduced firm

	countries (including 4812 non-US firms) from 2000 to 2001.	Firm total risk Systematic risk Firm share price	total risk and systematic risk. Furthermore, the effect of risk management on shareholder value is positive.
Nelson et al., 2005	1308 US listed firms from 1995 to 1999	Risk management Firm share price	Firms that manage risk outperform firms that do not manage risk firms by 4.3%.

3.7 Summary of chapter

The literature reviewed in Chapter 3 reveals, the complexity of modern remuneration design, and highlights the link between executive remuneration and firm performance is difficult to establish empirically. Agency issues identified between shareholders the board and executives are influenced by the form of remuneration policies adopted by the firm and in turn the choice of EBC issued to the board and executives will vary the risk preferences of the firm (Harris and Raviv 1979). EBC is used to align the interests of executives with shareholders and could assist in aligning the interests of directors with shareholders. Studies have examined the association of executives and directors EBC on firm risk strategy with mixed results. Firm risk strategy and risk behaviour are important factors in corporate decision making (March and Shapira 1992). The use of executive and director EBC to optimise the risk strategy must be balanced against encouraging excessive risk strategies that could potential lead to shareholder value destruction (Windram, 2005) and when directors are remunerated with EBC monitoring of executive management may be compromised. Although the literature addresses the relationship between CEO EBC and firm risk strategy in some contexts the impact on the director EBC is less well understood (Deutsch et al., 2011).

The gaps in the literature concerning EBC and firm risk strategy suggest the tension between the compensating executives and directors with either share or option compensation arise from the need to address different organisational objectives. In addition before director compensation can be optimised, more needs to be understood regarding the discrete impact of share and option compensation given the differences in the role of the board when

compared to executive management, and different outcomes associated with the various incentives.

The association between shareholder value creation and firm risk strategy is presented in Section 3.6. Prior literature provides theoretical and empirical support for a positive association of risk taking and shareholder value creation. There is considerable theory based literature supportive of risk management and shareholder value. However the results from empirical research have yielded mixed results. There are gaps in the literature regarding the link between elements of risk strategy within different contexts, such as the AMS. Next chapter 4 develops hypotheses based on the literature identified in chapter 3 with the aim of contributing to fill gaps in the literature.

Chapter 4 Hypotheses Development

4.1 Introduction

The findings of the literature reviewed in Chapter 3 suggest firms' structure management compensation in order to align the interests of management with the interests of the shareholders, and that the use of equity-based compensation (EBC) is an essential element of management compensation design. There is only weak evidence supporting the notion that compensation design can drive firm performance. However, there is empirical support for the assertion that EBC changes management behaviour, in particular choices regarding the firm's risk strategy. The level of firm risk is a product of both risk taking and risk management decisions (Stulz, 2003). Given the significant increase in management compensation (e.g. Murphy, 1999; Rosen, 1982; Kostiuk, 1990; Gabaix and Landier, 2008), increased use of EBC (e.g. Conyon and Murphy, 2000; Lublin, 2006; Gayle and Miller, 2009; Sung and Swan, 2009), and increases in disclosure of firm risk strategy and management compensation (e.g. Clarkson et al., 2006; Merhebi et al., 2006; Emm et al., 2007; Liu and Taylor, 2008), three sets of hypotheses are developed. The hypotheses examine the validity of the extant agency theory concerned with executive compensation and firm risk strategy, and extend it to embrace director compensation.

Section 4.2 presents the theoretical framework for this study. Hypotheses 1a, 1b, 1c and 1b are developed in Section 4.3, and are concerned with firm risk taking and EBC. Section 4.4 presents the risk management and EBC hypotheses of 2a, 2b, 2c and 2d. Finally, shareholder wealth creation and risk strategy hypotheses of 3a and 3b are developed in Section 4.5.

4.2 Theoretical framework

Firm profit maximization is a fundamental axiom of neoclassical economic theory (Anderson and Ross, 2005). Potential shareholders are motivated to invest in firms with prospects of stable cash flows and superior firm performance in the future. In order to secure capital from investors firm managers must develop risk strategies that enhance the value of the firm and in turn the wealth of the shareholders, all under conditions of uncertainty (Copeland and Weston, 1988). The rate of return and the volatility of earnings are essential factors of any risk strategy, and are fundamentals in determining the value of a firm according to the CAPM (Sharpe, 1964; Lintner, 1965). Investors are often considered risk neutral, but they are also risk averse. For any given level of return a rational investor will prefer the investment with the lowest risk, and for any given level of risk the investment with the highest rate of return (Fischer and Dornbusch, 1984). It follows that risk strategies that reduce risk for the same level of return or increase return for the same level of risk will result in an increase in the value of a firm and therefore increase shareholder value. Management's risk taking decisions can change a firm's rates of return and risk management decisions can change the volatility of earnings. Therefore, risk strategies encapsulating risk taking and risk management can influence shareholder value creation.

The theoretical framework developed in this section is grounded by the assumption that all firms are profit maximisers, investors are rational, and agency problems arise when owners delegate control of the firm to management. The framework enhances the concepts in agency theory, incorporating aspects of behavioural agency theory, such as contextual factors and

dynamic interactions between factors (Cuevas-Rodríguez et al., 2012). The framework extends the concept of management risk aversion by taking both risk taking and risk management factors into account when analysing firm risk strategy. The resultant model enables analysis of the relationship between firm risk strategy and EBC of the CEO and/or directors of a firm.

Traditional theories of the firm assume management decisions would always seek to maximise firm profit. In contrast, agency theory explores the notion of self-interested managers who are more concerned for their own welfare than the welfare of the shareholders and hence may execute risk strategies that reduce the value of the firm, if they are better served as a consequence. Informational asymmetry and conflicting interests between shareholders and management generate agency costs.

Management compensated with a fixed wage lacks the incentive to increase the value of the firm. They are best served by consuming perks and reducing firm exposure to risk. Alternatively, they could invest in empire building projects that improve their personal status and future compensation⁸³ while reducing the shareholder value. Short-term incentives and bonus pay may encourage a minimum performance firm level, below the level where no incentive payment is made. However such incentives introduce additional agency problems including opportunistic financial reporting, earnings management, and short-sighted investments that boost short-term performance and result in long-term value destruction.

⁸³ Executive compensation is positively correlated with firm size (Linn and Park, 2005) CEOs can influence firm size more than performance (Tosi et al., 2000). Therefore increasing the size of the firm will enable the CEO to negotiate a higher wage (Dyl, 1988; Kroll et al., 1993).

Short-term incentives do not reward managers for investing in longer term projects and may indeed penalise managers if the long-term project reduces short-term performance. Long-term incentives can partially offset investment horizon issues. Shifting from cash-based compensation to EBC improves the longevity of the incentive by tying the manager to firm performance beyond the achievement of the immediate goal, such as positive net present value for future cash flows and superior market performance. For example, granting shares with restrictive disposal conditions ties the manager's wealth to the company share price for the period of the prohibition. Long-term incentives with appropriate vesting conditions tie the wealth of management to the success of past decisions over a much longer time frame, thereby addressing the incentive alignment problem.

Jensen and Meckling (1976) bring together the concept of risk averse managers and the use of equity compensation to overcome risk aversion. They propose an incentive-alignment hypothesis to bond management to the firm by granting them a stake in the ownership of the firm in order to align the interests of managers and shareholders. Extending the concepts developed by Coleman (1966) and Alchian and Demetz (1972), Jensen and Meckling (1976) argue that assigning a portion of the rights of ownership of the firm and residual income to management through the use of EBC will result in optimal management behaviour in regard to risk strategy and firm performance.

EBC, including share and option compensation, is effective at encouraging value enhancing risk taking decisions (Coles et al., 2006a). Share compensation also promotes value enhancing risk management decisions (Dionne and Triki, 2013). Management and shareholders benefit from the increase in firm value (Smith and Stulz, 1985). The effect of

option compensation is more complicated because the value of an option is a function of share price and a function of firm earnings volatility (Knopf et al., 2002). Risk management reduces the volatility of company earnings and consequently reduces the value of the underlying options. Therefore option compensation does not promote risk management (Rajgopal and Shevlin, 2002) due to the negative association between risk management and option value.

Shareholders of public companies assign responsibility and authority to the board of directors. The boards manage and oversee the executives who facilitate the daily operations of the firm including oversight of the CEO. Boards limit agency costs by monitoring the CEO and bonding the CEO to shareholders, thereby aligning the interests of the two parties. Bonding is achieved through employment contracts which set the expected level of performance, acceptable behaviour and the compensation structure. Compensation structure includes short-run and long-run performance hurdles and any grants of EBC. Monitoring mechanisms include board oversight, external/internal auditors, company policies, internal controls, corporate governance guidelines and company regulations.

Agency theory is elegant in its simplicity, owing much of its development to economic theory, yet it ignores many other relevant and important factors contributing to management behaviour. For example, the individual manager's circumstances (Rabin, 1998), often labelled the reference frame or context. In addition, the assumptions made under agency theory regarding risk averse managers and risk neutral shareholders (originating from portfolio theory) limit its application to predict or explain real world phenomena.

Behavioural agency theory (BAT) takes the basic elements of agency theory and integrates additional factors that are likely to influence the efficacy of the bonding/compensation structure at achieving interest alignment in regard to risk taking. BAT incorporates contextual factors framing the agency environment of the individual firm and manager. The BAT model includes various performance indicators (internal/external), past firm performance, direct supervision, and compensation mix (shares and options) to frame the agency problem. In addition, BAT considers the impact that context specific agency problems and management risk bearing have on shaping risk taking decisions.

The conceptual model developed for this study is illustrated in Figure 4.1. The model is built on the theoretical concepts in accordance with agency theory, BAT, Type II agency theory, CAPM, and the risk management relevance model (RMRM). The conceptual model illustrates that firm risk strategy is a function of the combined effect of agent risk aversion and the corporate governance (CG) environment. Four factors are considered in relation to agent risk aversion including share compensation, option compensation, equity holding, and the CG environment. In addition, the conceptual model asserts that firm risk taking and risk management are drivers of shareholder value. The model incorporates six variables that shape the firm's CG environment: firm performance, leverage, CEO-Board power relations, ownership concentration, financial reporting quality and firm size.

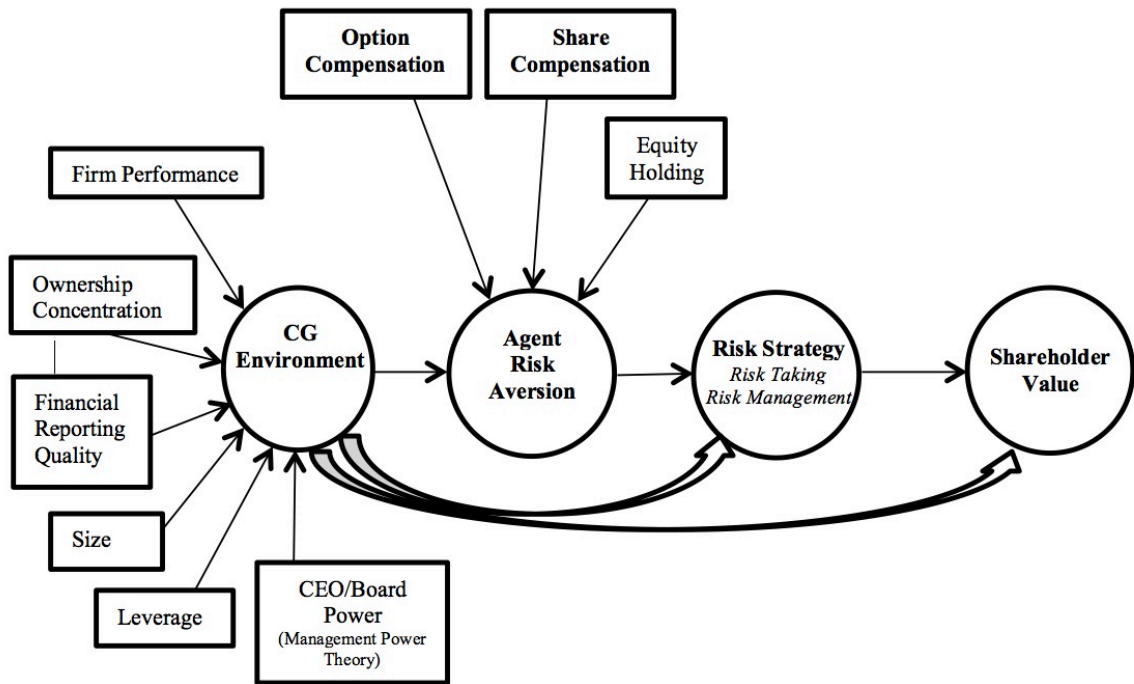


Figure 4-1: Moderating effect of equity compensation on risk aversion and shareholder value

In summary, firm risk strategy is a function of management decisions at the CEO and board level. A number of factors shape the CG environment including CEO-board balance of power, leverage, size, performance, ownership concentration, and financial reporting quality. Effective monitoring of management is determined by the CG environment. The potency of EBC as a bonding mechanism to change managerial risk strategy is reliant on a strong CG environment. EBC is used to control CEO behaviour to optimize risk strategy. The payoff for option compensation is different to the payoff for share compensation; hence the form of EBC paid influences CEO firm risk strategy. In addition, managerial equity holding is thought to influence risk behaviour. Risk strategy influences current and future earnings, and earnings volatility and thus is relevant to firm valuation but the CG environment is a moderating factor. Figure 4.2 illustrates the link between risk strategy and shareholder value;

risk management affects cash flow volatility, cost of debt and dividends; risk taking shapes investment, future earnings and dividends; cash flows, future earning and cost of debt interact with investment; and shareholder value is a function of all of the factors.

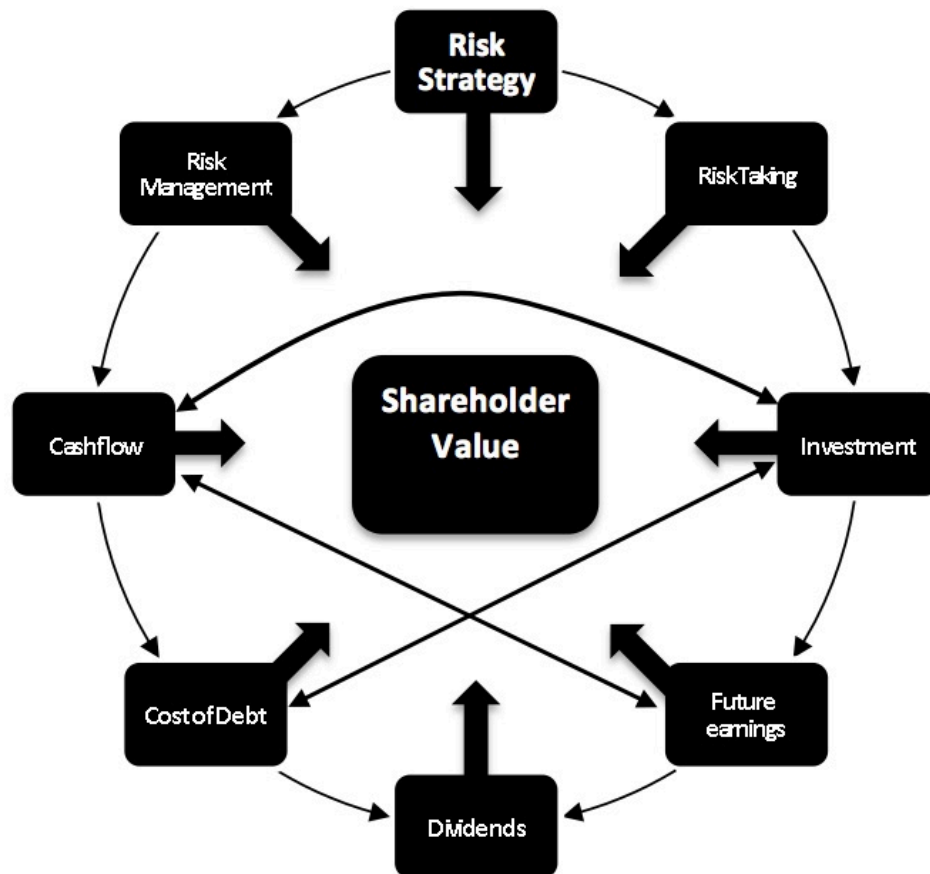


Figure 4-2: Risk strategy as a driver of shareholder value

4.3 Risk taking and equity-based compensation hypotheses

This section presents four hypotheses concerning the relationship of firm risk taking and EBC. Firstly CEO compensation is addressed in Section 4.3.1, followed by director compensation in Section 4.3.2.

4.3.1 Firm risk taking and CEO equity-based compensation

Jensen and Meckling (1976) explain how the remuneration structure can be used to bond managers, referring to the difference between the risk appetite of the managers and the optimal risk level of the shareholders, and linking greater managerial equity ownership to lower agency costs.

Jensen and Murphy (1990) test the pay-performance sensitivity for 2,213 US CEOs listed in the Forbes executive compensation survey from 1974 to 1986. They report a \$3.25 change in CEO wealth for every \$1,000 change in shareholder wealth, of which \$2.50 relates to all shares and options held by the CEO, and conclude EBC aligns management and shareholder interests, although they comment the incentive effect of pay-for-performance is only weak. They note the incentive effect of director pay-performance is considerably weaker, at only 75c per \$1,000.

Subsequent research identified differences in the effects of various forms of EBC. Core et al. (1999) extend the pay-performance research by focusing on option compensation. They examine a sample of 205 US firms from 1982 to 1984, and find that firms with poor

corporate governance extract greater option compensation and were associated with lower levels of firm performance.

EBC is promoted on the grounds that it aligns the interests of shareholders and managers by encouraging managers to take on more risks. Option compensation creates an incentive for managers to take more risk (Brown and Howieson, 1994). In a US based study Agrawal and Mandelker (1987) investigate whether management equity holding changes firm riskiness. They identify 153 acquiring firms and 56 divesting firms, a total of 209 firms, during 1974 to 1981 and report a positive relationship between managerial equity stake and share price volatility of a firm. Hanlon et al. (2003) examine how option compensation impacts firm risk taking by using 1,069 observations based on S&P 1500 firms between 1992 and 2000. The results report an increase in future operating income following the granting of options to top executives, and acknowledge granting options to executives encourages risk taking.

Research and development (R&D) is commonly used as a proxy for risk taking in compensation research. In a study of US high-tech firms from 1992 to 2000 with 401 firm-year observations, Xue (2007) reports that firms adopting equity-based executive compensation are more likely to invest in R&D than firms using accounting-based incentives (Xue, 2007).

There is only limited empirical research into the discrete effect of share compensation. Prior research is either concerned with the effect of total EBC or option compensation (Chen and Ma, 2011). A study by Ryan and Wiggins (2002) examined the relationship between risk taking (R&D) and CEO compensation in 1,088 US firms across the 1997 fiscal year. They

develop two separate models, the first model does not distinguish between the various forms of EBC, and the second model segregates the forms of EBC. Results for the first model reveal a positive relationship between R&D and EBC and results for the second model find a positive relationship between R&D and options compensation but share compensation has a negative influence on R&D. The findings support the hypothesis of the different effects of share compensation and option compensation, where options promote risk taking and shares encourage risk avoidance. Shares and options grants create an upside opportunity for management. In addition share grants expose managers to downside risk, thereby motivating managers to avoid higher risk investments in favour of lower risk choices (Ryan and Wiggins, 2002).

In addition, industry factors influence both EBC policy and R&D investment. Ryan and Wiggins (2002) report high growth firms engage in higher level of R&D and issue more option compensation. While in an examination of the mining industry, Rajgopal and Shevlin (2002) analyse US oil and gas companies for the period 1992 to 1997 to explore whether managerial option compensation induces investment in riskier exploration projects. Based on the study of 121 observations drawn from the S&P Execucomp database they find evidence of a positive link between CEO option compensation and future exploration investment. Conversely, based on 299 observations of 116 US firms from 1982 to 1984 Holthausen et al. (1995) find no relationship between R&D and EBC.

The underlying premise is based on the proposition in agency theory that EBC is an effective mechanism to limit agency costs resulting from risk aversion and results in CEOs taking riskier investment decisions. Early theoretical literature predicted EBC would enhance the

likelihood of CEOs making value enhancing investment decisions (e.g. Coleman, 1966; Jensen and Mackling, 1976). Options are more potent as option holders share the upside benefit, but are not exposed to the downside risk. Ryan and Wiggins (2002) observe a positive correlation between option compensation and firm risk taking. Overall the empirical results suggest option compensation is positively associated with risk taking.

In regards to share compensation and risk taking the results are unclear, recent studies suggest that share compensation is an ineffective mechanism to increase risk taking investments and may cause a reduction in risky investments (e.g. Bryan et al., 2000; Hall and Murphy, 2002; Devers et al., 2008). The mixed empirical results raise doubts over the association of share compensation and firm risk taking investment. Therefore no significant relationship is expected. According to the empirical findings, the hypotheses are developed as follows:

H1a: *Ceteris paribus*, CEO option compensation is positively related to firm risk taking in Australian mining firms.

H1b: *Ceteris paribus*, CEO share compensation is not related to firm risk taking in Australian mining firms.

4.3.2 Firm risk taking and director equity-based compensation

There are mixed opinions on the merit of director EBC. Jensen (1993) identifies the positives associated with director equity-based compensation and argues director agency problems can be eliminated through equity-based director compensation, causing directors to have skin in

the game. If directors' wealth is tied to shareholders' wealth, directors will be more inclined to embrace value enhancing risky investments. However Jensen et al., (2004) argue against director option compensation, stating it can result in greater agency costs. This argument is supported by Core et al., (1999) who report a negative relationship between director equity compensation and subsequent firm performance. In addition, Ferrarini et al., (2009) recognise an alternative role for directors as gate keepers. They argue non-executive directors bring an impartial position to the boardroom and provide a valuable independent oversight function. They suggest compensating directors with shares and options threatens the impartiality of the board oversight function. Deutsch et al. (2011) address aspects of CEO remuneration and firm risk strategy, and note that the impact of director compensation is less researched, while the combined impact of CEO and director compensation is least understood.

Recent studies incorporate a broader net by including key management personnel (KMP) and/or directors in the analysis. For example, Coles et al. (2006) examine 1,500 US firms in the S&P 500, S&P Midcap 400, and S&P Smallcap 600 from 1992 to 2002. They find empirical support for a strong causal link between managerial compensation structure and firm risk taking, including investment in R&D and higher levels of leverage. They also examine the impact of KMP compensation on risk taking and identify the CEO as the main driving force behind risk strategy, while the remaining KMP exhibits lower explanatory power. It must be noted these studies do not focus on directors in isolation.

Deutsch et al. (2011) investigate the joint effect of executive and director option compensation on risk taking. Based on 1,165 US firms from the S&P 1500 during 1997 to

2006, they find an increase in firm risk taking when either the CEO, or outside directors, or both are paid via options. In addition, they note paying outside directors with options had a significantly stronger effect on firm risk taking than paying the CEO options. Extending the Deutsch et al. (2007, 2011) studies, Lim and McCann (2013) examine the influence of director options compensation on firm risk taking and find director option compensation, both absolute and relative values, is positively associated with firm risk taking. Unlike prior research focused on the CEO as the sole decision maker (e.g. Wright et al. 2002), Deutsch et al. (2007) suggest directors influence firm risk taking investment behavior when engaged properly and directors have an important role to play in shaping firm risk taking behaviour. Unfortunately, prior research concerned with director EBC offer no empirical evidence regarding the association between director share compensation and firm risk taking.

Despite uncertainty about the effect of director EBC, several studies analysing changes in director compensation from 1994 to 2004 have documented a trend towards EBC (e.g. Yermack, 2004; Farrell et al., 2008). Director EBC has become increasingly popular over the last decade (APC, 2009) and is a common feature among Australian listed firms (APC, 2009). It has become so popular that the practice, once considered undesirable, is now recommended by the ASX as a mechanism to strengthen corporate governance (ASX, 2010). Extant theoretical arguments and prior positive findings suggest directors paid option compensation are more likely to endorse riskier investment proposals and hence result in higher levels of firm risk taking. Owing to the absence of empirical research on director share compensation and risk taking, results from CEO share compensation and risk taking studies have been used to inform the predicted association. Conflicting empirical findings on

the relationship between share compensation and risk taking suggest the two factors are not related. Accordingly the following hypotheses are formed:

H1c: *Ceteris paribus*, director option compensation is positively related to firm risk taking in Australian mining firms.

H1d: *Ceteris paribus*, director share compensation is not related to firm risk taking in Australian mining firms.

4.4 Risk management and equity-based compensation hypotheses

The next section presents four hypotheses concerning the relationship of firm risk management and EBC. Firstly CEO compensation is addressed in Section 4.4.1, followed by director compensation in Section 4.4.2.

4.4.1 Risk management and CEO equity-based compensation

The major contribution of Rajgopal and Shevlin (2002) was to empirically test the causal relation between managerial option compensation and firm risk taking, as outlined in the previous section. However, they also document a significantly negative association between executive option compensation and firm's risk management, and identify that firms paying executives with options are less likely to hedge firm exposure to changes in oil price. Hence, EBC influences overall firm risk strategy, impacting firm risk taking and firm risk management decisions. Increasing risk taking or decreasing risk management increases the firm level risk. The next hypotheses address risk management behaviour.

Smith and Stulz (1985) examine the factors shaping firm hedging policy. They predict higher levels of management option compensation will result in less hedging, and higher levels of management share compensation leads to more hedging, and they encourage future researchers to perform empirical tests of their hypotheses. Tufano (1996) takes up the challenge by investigating the risk management practices of firms in the gold mining industry, and analyses 48 North American gold mining companies listed on the US or Canadian stock exchanges that are included in the Global Hedge Survey, the Reuter Link database, and the COMPUSTAT database. Consistent with Smith and Stulz's (1985) predictions, Tufano (1996) identifies a significantly negative association between CEO option compensation and firm risk management and a significant positive association between CEO share compensation and firm risk management. A subsequent study by Rajgopal and Shevlin (2002) mirrors the results in the context of the oil and gas sector. Knopf et al., (2002) study 260 US firms to observe the relationship between firm risk management and EBC. They suggest the relationship of share and option compensation on firm risk management depends on whether the sensitivity of the share and option valuation is greater for increases in share price or returns volatility. They found share and option valuations that are sensitive to share prices led to increased firm risk management. In contrast, option valuations sensitive to returns volatility resulted in reduced firm risk management.

Moving beyond the mining sector studies, Rogers (2002) examines 524 US firms from all industry sectors excluding the financial sector. Rogers (2002) is concerned with the effect of managerial EBC and firm hedging of foreign currency risk and interest rate risk and reports a

significant positive association with share grants and risk management. However, Rogers (2002) does not find a negative relationship between management option compensation and risk management.

Based on the theoretical argument presented by Smith and Stulz (1985) and the subsequent empirical support from a number of mining sector studies (e.g. Tufano, 1996; Rajgopal and Shevlin, 2002), CEOs paid more shares should seek higher levels of firm risk management than those paid fewer or no shares (Dionne and Triki, 2013). The results for CEO option compensation and firm risk management are mixed, some find significant results (e.g. Tufano, 1996; Rajgopal and Shevlin, 2002) and other studies return no significant results (e.g. Rogers, 2002). CEO option compensation might reduce incentives for the CEO to manage risk because options are more valuable when firm share price is more volatile (Knopf et al., 2002). Based on limited results a negative association between CEO option compensation and firm risk management is expected. Accordingly, the following hypotheses are developed as follows:

H2a: *Ceteris paribus*, CEO option compensation is negatively related to firm risk management in Australian mining firms.

H2b: *Ceteris paribus*, CEO share compensation is positively related to firm risk management in Australian mining firms.

4.4.2 Risk management and director equity-based compensation

The unitary board model adopted in Australia gives rise to type II agency issues between shareholders and directors, and the dual role of directors as monitors and stewards magnify the issues. Director EBC is considered a potential fix to address type II agency costs. Empirical research focused on director EBC and firm risk management is elusive. Most empirical studies investigating the relationship between managerial EBC and firm risk management aggregate share and option compensation of all KMP and directors of the company when quantifying the value of management risk management incentives (e.g. Tufano, 1996; Geczy et al., 1997; Gay and Nam, 1998; Knopf et al., 2002; Nguyen and Faff, 2002; Faff et al., 2011). Borokhovich et al. (2004) examine the influence of directors on firm risk management, based on data from 284 non-financial US firms in 1995, and report a significantly positive association between non-executive directors and interest rate risk management but find no evidence of managerial benefit resulting from firm interest rate risk management. They conclude that outside non-executive directors play an important role in firm risk management policy.

Building on the results of prior studies that have examined the association of management EBC on risk management, and consistent with the hypotheses developed for CEO equity compensation and firm risk management the following hypotheses are proposed:

H2c: *Ceteris paribus*, director option compensation is negatively related to firm risk management in Australian mining firms.

H2d: *Ceteris paribus*, director share compensation is positively related to firm risk management in Australian mining firms.

4.5 Shareholder value creation and risk strategy

Managers are required to make decisions that create additional firm value and thus increase shareholders' wealth under conditions of uncertainty (Copeland and Weston, 1988). Firm risk strategy entails management decisions covering risk taking investments and risk management, both of which can enhance shareholder value (Baird and Thomas, 1985).

The next section presents two hypotheses concerning the relationship of shareholder wealth creation with firm risk strategy. Firstly, risk taking is addressed in Section 4.5.1, followed by risk management in Section 4.5.2.

4.5.1 Shareholder value creation and risk taking

Risk taking investments expose shareholders to greater potential returns, either in the short-run through an increase in firm performance or in the long-run through an increase in expected firm performance in the future. Prior research results point to a relationship between risk taking, earnings volatility, and total shareholder return (Miller and Reuer, 1996; Miller and Bromiley, 1990).

McConnell and Muscarella (1985) examine the value relevance of future risk taking investment to firm share price within various industry groups. The study was based on a sample of 658 US firms listed on either the New York Stock Exchange (NYSE) or the American Stock Exchange (AMEX), a constituent of the Investment Statistics Laboratory,

and which had made a capital budget announcement from 1975 to 1981. They observe a significantly positive association between increased risk taking investment announcements and firm share price. They suggest that firms announcing increases in planned capital expenditure were signalling to the market an increase in future investment opportunities and/or future expected earnings which then resulted in an upward correction to the share price, creating shareholder value (Chung et al., 1998; Brailsford and Yeoh, 2004). However, McConnell and Muscarella (1985) note an exception for the mining sector: the market reaction to future exploration and development expenditure announcements was negative.

Woolridge and Snow (1990) analyse 767 risk taking decisions by 248 US firms in 102 industries from 1972 to 1987, and observe a significantly positive reaction to risk taking by the stock market. They argue markets rewards firms for developing risk taking strategies in the belief that it will increase shareholders' wealth. Similarly, based on 884 risk taking decisions by 426 UK firms from 1990 to 2003 Akbar et al. (2008) report a positive reaction to the announcement of an increase in risk taking expenditure by the stock market, regardless of the type of project undertaken.

An Australian study by Brailsford and Yeoh (2004), based on 170 ASX listed firms from the SIRCA database, investigating the market reaction to capital expenditures announcements found a positive market reaction to capital expenditure announcements for high growth firms.

Based on the assumption managers engage in risk taking investment to increase shareholder value, the hypothesis is developed as follows:

H3a: *Ceteris paribus*, shareholder value creation is positively associated with firm risk taking within the Australian mining sector.

4.5.2 Shareholder value creation and risk management

Risk management can enhance shareholder value by reducing financial distress costs and taxes, safeguarding future cash flows for future investment opportunities, and enabling the transparency of management performance (Dionne and Triki, 2013). Risk management in the mining sector can reduce the earnings volatility due to market risk including commodity price risk (Smith and Nau, 1995), foreign exchange risk, and interest rate risk. Mining companies commonly engage in hedging commodity price, foreign exchange and interest rates, utilising financial instruments as a way to manage their financial risk exposure (Chalmers and Godfrey, 2004).

Despite numerous studies on capital markets and risk management, there is limited empirical evidence suggesting a positive capital market reaction to risk management (Bartram 2007; Carter et al. 2006; Allayannis and Weston 2001; Nelson et al. 2005). Tufano (1996) considers that risk management is irrelevant since investors can diversify their investments and optimise their own level of risk management individually, assuming efficient capital markets (Modigliani and Miller 1958). Therefore, firm risk management strategy should not influence firm market value. However, markets are imperfect and firms can benefit from strategies that insulate them from volatile cash flows (Jin and Jorion 2006). There are two theoretical benefits from risk management that impact a firm's market value. First, firms

exposed to cash flow risks (i.e. foreign exchange, interest rate and commodity price) can hedge against the volatile cash flow through the use of financial derivatives which in turn will increase the market value of the firm (Stulz 1996). Second, risk management increases equity value by reducing the cost of financial distress in imperfect markets (Stulz 1996).

Allayannis and Weston (2001) examine the association between foreign currency risk management and shareholder wealth creation using data from 270 large US firms from 1990 to 1995. They observe an average hedging premium of 4.87% to the share price for firms exposed to exchange rate risk when they manage their exposure through the use of foreign currency derivatives. Their results suggest investors' value management attempts to manage firms' exposure to market risk. In a follow up study by Carter et al. (2006), they observed a hedging premium of 14% in the US airline industry. The study investigated jet fuel hedging by US airline companies during 1994 to 2000 and observed a positive relation between hedging and capital investment, and assert that the principal benefit to shareholders from jet fuel price risk management comes from a reduction in underinvestment costs.

In addition, Aabo (2001) conducts a study on foreign currency risk management based on eight blue-chip Danish industrial companies listed on the Copenhagen Stock Exchange in 1997. After conducting interviews with the companies regarding foreign exchange risk management, Aabo (2001) reveals that companies are concerned with the cash flow implications, not the impact on the company share price. The results reveal foreign exchange risk management increases shareholder value and suggest a reduction in investor perceived risk is associated with firm foreign exchange risk exposure. Aabo (2001, p. 379) also notes that it appears most "*companies have not yet reached a systematic risk*

management of ongoing competitive exposures” to address their ongoing exposure to market risks.

Bartram et al. (2011) conduct an extensive international study of the effect of risk management on firm risk and shareholder value, based on 6,888 non-financial firms from 47 countries (including 4,812 non-US firms) from 2000 to 2001. They find strong evidence that risk management reduced firm total risk and systematic risk. Furthermore, the effect of risk management on shareholder value is positive.

Although numerous studies demonstrate risk management may offer many benefits for firms exposed to market based risk, Nelson et al. (2005) report only 20% of firms engage in risk management, based on 1,308 US listed firms from 1995 to 1999. They observe hedging firms outperform non-hedging firms by 4.3%, but upon stratification between the various derivatives, the gains are limited to firms that hedge foreign exchange.

Risk management can increase shareholder value by limiting the impact of volatile commodity markets and foreign exchange markets on firm share price, and improve the transparency of managerial performance by delineating the impact caused by management decisions and market movements (Campbell and Kracaw, 1987; Bartram, 2000; Bartram et al., 2011). Additionally, risk management can reduce underinvestment (Carter et al., 2006). Accordingly, the following hypothesis is formed as follows:

H3b: *Ceteris paribus*, shareholder value is positively associated with risk management for Australian listed mining firms.

4.6 Summary

This chapter provides a detailed review of factors influencing firm risk strategy, in particular the role of EBC in shaping firm risk taking and risk management decisions. The conceptual model developed for this study is built on the theoretical concepts from agency theory, BAT, Type II agency theory, CAPM, and the risk management relevance model.

Following the theoretical framework in Section 4.2, this chapter describes and develops three models encapsulating ten hypotheses for empirical testing in Sections 4.3, Sections 4.4, and Sections 4.5. The hypotheses are summarised in Table 4-1 below. In the next chapter the research methodology and design is presented including data sampling and collection, empirical schema, model specification, and variable measurement.

13Table 4-1: Summary of hypotheses

Hypothesis	Theory	Supportive Literature
H1a: <i>Ceteris paribus</i> , CEO option compensation is positively related to firm risk taking in Australian mining firms.	CEO option compensation reduces agency cost by encouraging risk taking	Brown and Howieson, 1994; Tufano, 1996; Rajgopal and Shevlin, 2002; Hanlon et al., 2003; Deutsch et al., 2011.
H1b: <i>Ceteris paribus</i> , CEO share compensation is not related to firm risk taking in Australian mining firms.	CEO Share compensation is ineffective at encouraging risk taking	Holthausen et al., 1995; Core et al., 1999; Ryan and Wiggins, 2002.
H1c: <i>Ceteris paribus</i> , director option compensation is positively related to firm risk taking in Australian mining firms.	Director option compensation reduces type II agency cost by encouraging risk taking	Brown and Howieson, 1994; Tufano, 1996; Rajgopal and Shevlin, 2002; Hanlon et al., 2003; Deutsch et al., 2011.
H1d: <i>Ceteris paribus</i> , director share compensation is not related to firm risk taking in Australian mining firms.	Director share compensation is ineffective at encouraging risk taking	Holthausen et al., 1995; Core et al., 1999; Ryan and Wiggins, 2002.
H2a: <i>Ceteris paribus</i> , CEO option compensation is negatively related to firm risk management in Australian mining firms.	CEO option compensation reduces agency cost by reducing risk aversion, and therefore reduces risk management	Smith and Stulz, 1985; Tufano, 1996; Rajgopal and Shevlin, 2002; Rogers 2002;

H2b: <i>Ceteris paribus</i> , CEO share compensation is positively related to firm risk management in Australian mining firms.	CEO share compensation increases firm risk management	Smith and Stulz, 1985; Tufano, 1996; Dionne and Triki, 2013; Rogers 2002;
H2c: <i>Ceteris paribus</i> , director option compensation is negatively related to firm risk management in Australian mining firms.	Director option compensation reduces agency cost by reducing risk aversion, and therefore reduces risk management	Smith and Stulz, 1985; Tufano, 1996; Rajgopal and Shevlin, 2002; Rogers 2002;
H2d: <i>Ceteris paribus</i> , director share compensation is positively related to firm risk management in Australian mining firms.	Director share compensation increases firm risk management	Smith and Stulz, 1985; Tufano, 1996; Dionne and Triki, 2013;
H3a: <i>Ceteris paribus</i> , shareholder value creation is positively associated with firm risk taking within the Australian mining sector	Firm risk taking creates positive value for shareholders	Woolridge and Snow, 1990; Miller and Reuer, 1996; Miller and Bromiley, 1990; Akbar et al., 2008.
H3b: <i>Ceteris paribus</i> , shareholder value creation is positively associated with risk management for Australian listed mining firms.	Firm risk management creates positive value for shareholders	Stulz, 1996; Carter et al., 2006; Bartram et al., 2011; Dionne and Triki, 2013

Chapter 5 Research methodology and variable measurement

5.1 Introduction

This chapter outlines the sample description and model specification, including a detailed description of data collection and the models specific to the hypotheses. The models developed test the hypotheses by examining whether equity-based remuneration alters firm risk strategy and explore whether firm risk strategy creates value for shareholders. Data were selected to enable the execution of the models developed.

This chapter is organised as follows. Section 5.2 describes the data collection. An empirical schema is specified in Section 5.3. Model specifications for the testable hypotheses are presented in Section 5.4. Variable definitions and measurement are presented in Section 5.5, including dependent, independent, corporate governance (CG), and control variables. Finally, Section 5.6 provides a concise summary of this chapter.

5.2 Data collection

This study analysed secondary data by utilising ordinary least squares (OLS) pooled regression and binary logistic regression functions within EViews 8. Multivariate OLS pooled regression is commonly used in research concerned with CG, financial reporting, remuneration, risk management, risk taking, firm value, and industry to examine the relationship between a continuous variable that is believed to be dependent on multiple other

factors (e.g. Khoo, 1994; Ahmed and Courtis, 1999; Fich and Shivdasani, 2005; Jin and Jorion, 2006; Bartram, 2007; Sundaram and Yermack, 2007; Gallery and Nelson, 2008).

The study is based on Australian listed mining firms identified by the general industry classification (GIC) code for the mining industry, extracted from the Australian Stock Exchange (ASX) covering the period 2004 to 2013.

This study combines remuneration data, risk taking data, risk management data, CG data, accounting and financial market data from multiple data sources including Connect 4, SIRCA, FinAnalysis, SDC Platinum, MorningStar, Thomson One Banker and Datastream. Sophisticated data migration and data integrity techniques were utilised to produce a single and comprehensive data set for modelling in EViews.

Combining data from various databases presents two key challenges; namely, (1) maintaining data sample size and (2) synchronisation of the data sets to a single and comprehensive database while retaining data integrity. Figure 5.1 illustrates the downside of increasing the number of factors included in the analysis when the data is derived from multiple sources, including data of remuneration, CG, firm performance, market performance, risk taking and risk management. The final subsets contain a population of 3102 observations for the models concerned with risk taking and 3163 observations for the models concerned with risk management. The circle in the middle of Figure 5.1 represents the total number of firms in the data sample, the remaining firms are excluded.

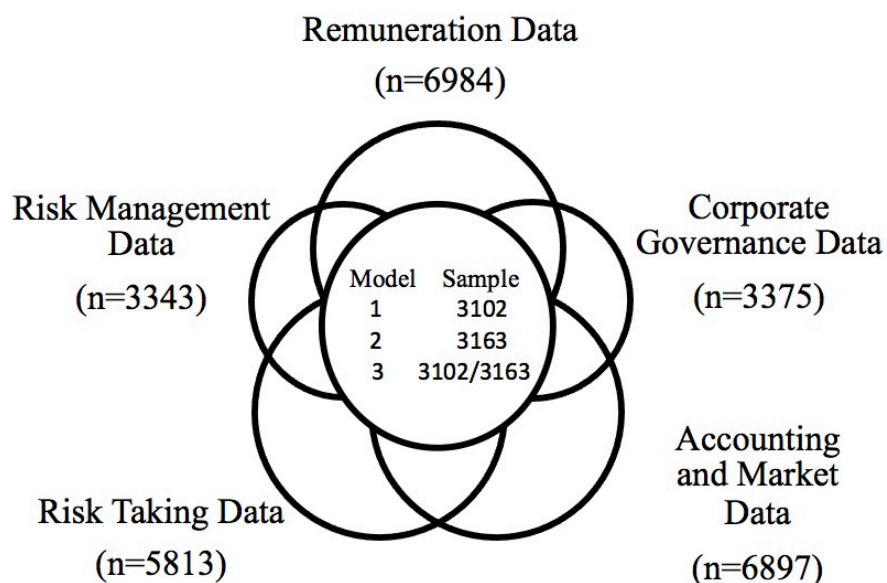


Figure 5-1: Key data sets defining sampling

Data synchronisation involved matching firm ASX codes across the various databases, checking continuity of the ASX code over an extended period, and matching various data sources to the correct financial reporting period.

Table 5-1: Data utilisation table

Data Group	Risk taking models: Sample as Percentage of Observations	Risk management models: Sample as Percentage of Observations	Observations
Remuneration	44%	45%	6984
Risk Taking	53%	54%	5813
Risk Management	93%	95%	3343
Corporate Governance	92%	94%	3375
Accounting and Market data	45%	46%	6897
Total Sample Size	3102	3163	

Table 5-2: Observations by year breakdown

Key data sets	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Remuneration	402	465	523	637	733	804	811	871	882	856	6984
Risk Taking	331	387	416	535	614	636	667	754	797	676	5813
Risk Management	199	225	262	303	362	361	386	416	457	372	3343
Corporate Governance	232	255	277	336	364	322	372	445	438	334	3375
Accounting & Market	397	453	525	668	720	760	833	887	898	756	6897
Total (year)	1561	1785	2003	2479	2793	2883	3069	3373	3472	2994	26412

Data were collected from 2004 to 2013. A detailed review of the data collection for the five key data sets is presented below. Data sets are presented as follows: Section 5.2.1 for remuneration data, Section 5.2.2 for risk taking data, Section 5.2.3 for risk management data, Section 5.2.4 for corporate governance data and Section 5.2.5 for accounting and market data.

5.2.1 Remuneration data

In order to analyse the long-run influence of remuneration structure in the mining sector, a long-term and comprehensive data set was preferred. Connect 4 is the most comprehensive database that provides remuneration data for ASX listed companies since 2004. Data were extracted for all mining companies from 2004 to 2013. The Australian Accounting Standards Board (AASB)⁸⁴ and the Corporations Act 2001 specify the remuneration disclosure requirements for key management personnel (KMP) and directors: salary, bonus, superannuation, allowances, termination payments, options and shares payments. In addition,

⁸⁴ AASB 124 is the financial reporting standard for related party transactions and encapsulates executive and director remuneration disclosure requirements. Changes to AASB 124 came into effect from 1 July 2013 removing KMP remuneration disclosure requirements from the financial statement notes section into the remuneration report.

(<http://www.kpmg.com/AU/en/IssuesAndInsights/ArticlesPublications/Flash-Reports/Documents/13ru-009.pdf>-July 2013).

the SIRCA CG database provided a secondary source of remuneration data for a limited number of Australian listed mining firms from 2000 to 2012.

In total 6984 firm-year observations were collected from the Connect 4 remuneration database. As demonstrated in Table 5-1 only 3102 (44%) of the remuneration observations were used in the risk taking models and 3163 (45%) in the risk management models. Table 5-3 below provides a breakdown of the remuneration data for each director category, and illustrates the increasing presence of non-executive directors on companies' boards.

Table 5-3: Overview of Connect 4 boardroom remuneration data

Remuneration Data	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Chairman	340	411	499	657	836	924	960	1039	1113	1089	7868
Executive Directors	425	523	645	849	1084	1122	1130	1212	1315	1215	9520
Non-Executive Directors	814	936	1108	1496	1914	2142	2276	2490	2850	2719	18745
TOTAL	1579	1870	2252	3002	3834	4188	4366	4741	5278	5023	36133

5.2.2 Risk taking data

Data were collected for the period 2004 to 2013 for the constructed risk taking variable (*RiskT*), discussed in detail in Section 5.5.1.1. There were five inputs used to calculate the risk taking variable including research and development (R&D) expenditure, exploration and evaluation expenditure, capital expenditure, depreciation expense, and acquisition disclosure information. Refer to Section 5.5.1.1 for a complete discussion of variable selection.

FinAnalysis was chosen as the primary source of accounting data for the calculation of the *RiskT* variable because of the coverage of Australian listed firms and the breadth of the data

contained within the database. In addition, SDC Platinum⁸⁵ was used to source merger and acquisition (M&A) data used in calculating *RiskT*.

5.2.3 Risk management data

FinAnalysis was used as the primary source for risk management data. A thorough review of all financial statement and disclosure data contained within the FinAnalysis database was undertaken in which all accounts reflecting the use of derivatives were identified. Of the 3163 firms remaining in the combined sample, 500 (16%) were categorised as derivative users and 2663 (84%) as non-derivative users.

5.2.4 Corporate governance data

CG data were sourced from three primary sources: Connect 4, SIRCA, and MorningStar. Four CG factors important to monitoring management were measured including CEO duality, board independence, ownership concentration, and financial reporting integrity (Williamson 1988; Denis 2001).

CEO duality limits board oversight whereas an independent chairperson strengthens a board's monitoring of management (Jensen, 1993; Adams et al., 2010). Independent boards are superior at monitoring management actions (Hermalin and Weisbach, 2003) and are more likely to discipline the CEO (Mackay et al., 2015). Board factors were collected from Connect 4 and SIRCA CG databases, including CEO duality and board independence.

⁸⁵ SDC Platinum is a Thomson Reuters subscription database that provides detailed Australian merger and acquisition information.

Large shareholders can play an important role in management monitoring owing to power they often possess over the company board (Shleifer and Vishny, 1986). Ownership concentration is a measure of large shareholders' power to monitor management. Ownership concentration information was extracted from Morningstar.

ASX listed firms are required to have their annual report audited by an independent external auditor to validate the integrity of the financial reports (*Corporations Act 2001 (Cth) s 301*). External audits provide a crucial monitoring mechanism within the CG framework (Habib, 2013; Rezaee, 2008). Poor audit quality is an indicator of weak monitoring of management. Using a Big 4 audit firm to perform the audit is considered to improve financial reporting quality and hence external oversight of management. A qualified audit opinion indicates low financial reporting quality, poor management reporting, and poor oversight of management. Firm audit data were collected from Morningstar and SIRCA CG database including: audit firm and audit option.

5.2.5 Accounting and market data

Accounting and market data from company annual reports was sourced from three databases: FinAnalysis, Thompson One Banker, and DatAnalysis. Additional market data was extracted from the Datastream database. Leverage was measured by total debt divided by total assets. Firm size was measured by firm sales. Firm performance was measured by return on equity (ROE).

5.3 Empirical schema

Figures 5-2 and 5-3 illustrate the hypothesised relationship between the variables examined in this study by building on the conceptual framework and the hypotheses from Chapter 4. Three theoretical models form the basis for the predicted relationships: agency theory informs the hypothesised relationship between equity compensation and risk strategy; behavioural agency theory (BAT) incorporates contextual factors (including firm attributes and CG) beyond the traditional agency model; the capital asset pricing model (CAPM) informs the hypothesised association between risk strategy and firm pricing.

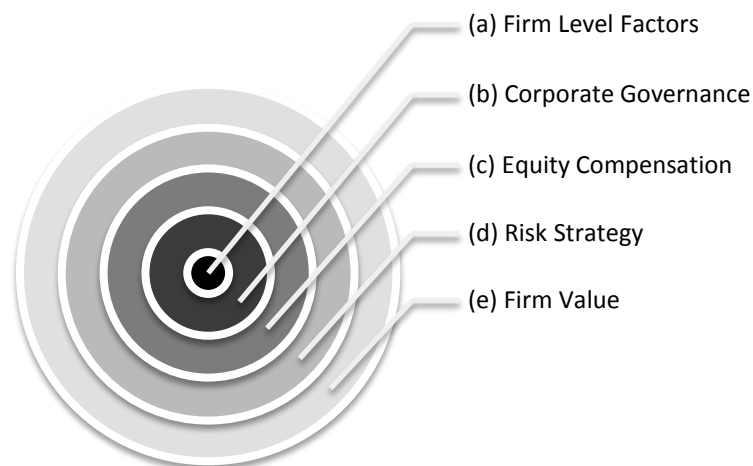
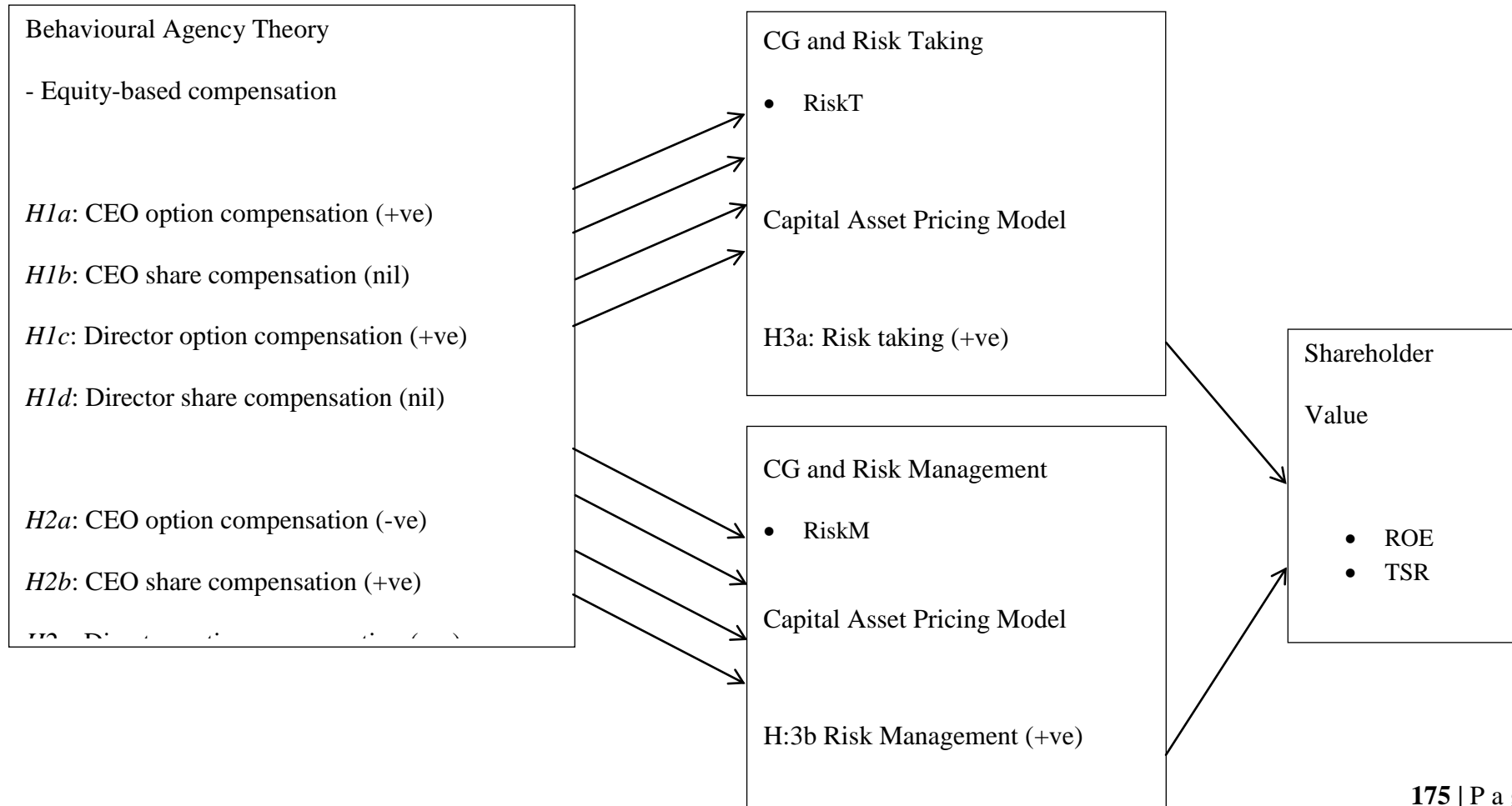


Figure 5-2 Linking agency theory, behavioural agency theory, and CAPM

Figure 5-2 demonstrates the traditional agency theory proposition that managerial risk aversion can be reduced through the use of managerial equity compensation (c), to optimise firm risk strategy (d) (Jensen and Meckling, 1976). CAPM predicts firm value (e) is a function of risk, and risk is a function of risk strategy (d) (Sharpe, 1964; Lintner, 1965). BAT introduces contextual factors into the equation including firm level factors (a), and CG (b)

(Wiseman and Gomez-Mejia, 1998). The nested circles suggest firm value is influenced by a number of factors and that those factors compound on one another, for example corporate governance impacts equity compensation and the two factors then influence risk strategy.

Figure 5-3: Empirical schema of factors affecting firm risk strategy and shareholder value



Based on the hypotheses developed in Chapter 4, ten relationships are identified in the empirical schema. Figure 5-3 illustrates the linkages between the hypotheses. Hypotheses H1a to H1d are concerned with testing the BAT model in which additional factors extend the traditional agency theory framework. H1a to H1d examine the impact of equity-based compensation on firm risk taking. While hypotheses H2a to H2d consider the impact of equity-based compensation on firm risk management applying the BAT model. Both H1 and H2 control for CEO or director compensation and option or share compensation.

Moreover, H3a and H3b consider the relationship between firm risk strategy and shareholder value creation, examining firm risk taking and firm risk management discretely.

In summary, the empirical schema illustrates the relationships of firm level factors, CG, equity based compensation, risk strategy and shareholder value creation. The ten models presented in Section 5.5 allows for the hypotheses developed in Chapter 4 to be empirically tested.

5.4 Model specification

Based on the hypotheses developed in Chapter 4 and the empirical schema presented in Section 5.3, the general theoretical models are formed as follows:

Risk Taking =

$$\int (\text{Equity compensation, Corporate Governance Factors and Control Factors})$$

Risk Management =

$$\int (\text{Equity compensation, Corporate Governance Factors and Control Factors})$$

Shareholder Value Creation =

$$\int (\text{Risk Strategy, Corporate Governance Factors and Control Factors})$$

Where equity compensation is comprised of option and share compensation and risk strategy is comprised of risk taking and risk management

The three theoretical models above are operationalised into regression models to enable the empirical specification to be determined. Models 1 and 2 examine the association between the use of equity compensation and firm risk strategy. Model 3 examines the relationship of firm risk strategy and shareholder value creation. A detailed description of all of the variables is provided immediately after the presentation of the three models, in Section 5.5.

5.4.1 Model 1: Equity compensation and risk taking hypotheses

The relationship between risk taking (*RiskT*) and equity compensation will be tested using a pooled OLS regression defined as follows:

$$\text{RiskT} = \int (\text{Equity Compensation, CG, controls})$$

Where *RiskT* is defined in section 5.5.1.1 and Equity Compensation is comprised of: Option Compensation (OptionComp) and Share Compensation (ShareComp)

$$\text{RiskT}_i = \alpha + \beta_1 \text{CEO_OptionComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H1a})$$

$$\text{RiskT}_i = \alpha + \beta_1 \text{CEO_ShareComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H1b})$$

The model will first be used to examine the impact of CEO equity compensation on firm risk taking (*H1a and H1b*). CEO compensation will be replaced by director (*Dir*) compensation in the second iteration of the analysis (*H1c and H1d*).

$$\text{RiskT}_i = \alpha + \beta_1 \text{DIR_OptionComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H1c})$$

$$\text{RiskT}_i = \alpha + \beta_1 \text{DIR_ShareComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H1d})$$

5.4.2 Model 2: Equity compensation and risk management hypotheses

The relationship between risk management (*RiskM*) and equity compensation will be tested with a binary logistic regression.

$$\text{RiskM} = \int (\text{Equity compensation, CG, controls})$$

Where *RiskM* is defined in section 5.5.1.2. and Equity Compensation is comprised of: Option Compensation (OptionComp) and Share Compensation (ShareComp)

$$\text{RiskM}_i = \alpha + \beta_1 \text{CEO_OptionComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H2a})$$

$$\text{RiskM}_i = \alpha + \beta_1 \text{CEO_ShareComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H2b})$$

Consistent with Model 1, Model 2 was first used to examine the impact of CEO equity compensation on firm risk management (*H2a and H2b*). CEO compensation was replaced by director (*DIR*) compensation in the second iteration of the analysis (*H2c and H2d*).

$$\text{RiskM}_i = \alpha + \beta_1 \text{DIR_OptionComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H2c})$$

$$\text{RiskM}_i = \alpha + \beta_1 \text{DIR_ShareComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H2d})$$

5.4.3 Model 3: Risk strategy and shareholder value creation hypotheses

The relationship between risk taking, risk management and shareholder value creation (*ShValueCreation*) will be examined through a pooled multivariate OLS regression.

$$\text{ShValue Creation} = \int (\text{RiskT}, \text{RiskM}, \text{CG}, \text{controls})$$

Where *RiskT* is defined in section 5.5.1.1, and *RiskM* is defined in section 5.5.1.2.

$$\begin{aligned} \text{ShValueCreation}_i = & \alpha + \beta_1 \text{RiskT}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i \\ & + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \varepsilon_i \quad \dots \text{ (H3a)} \end{aligned}$$

$$\begin{aligned} \text{ShValueCreation}_i = & \alpha + \beta_1 \text{RiskM}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i \\ & + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \varepsilon_i \quad \dots \text{ (H3b)} \end{aligned}$$

Accounting and financial market based measures of firm value were tested, see Section 5.5.1.3 for more details.

5.5 Variable measurement

This section provides a description of the variables used in the three models outlined above. Dependent variables are discussed in Section 5.5.1. Section 5.5.2 outlines the independent variables. All remaining CG and control variables are explained in Section 5.5.3.

5.5.1 Dependent variables

The dependent variables for Models 1, 2, and 3 are presented below.

5.5.1.1 Model 1- Risk Taking

Risk taking refers to the firm's investments as selected by management. Numerous factors have been used in prior research to estimate firm level risk taking, including R&D expenditure (Dechow and Sloan, 1991; Bebchuk and Stole, 1993; Himmelberg and Petersen, 1994; Dechow and Skinner, 2000; Ryan and Wiggins, 2002; Coles et al., 2006a; O'Connor et al., 2013), R&D intensity (Baysinger et al., 1991; Dechow

and Sloan, 1991; Graves, 1988; Hill and Snell, 1988; Kochhar and David, 1996; Deutsch, 2007; Wu and Tu, 2007), capital expenditure (Aggarwal and Samwick, 2003; Coles et al., 2006a), acquisitions (Sanders, 2001; Bliss and Rosen, 2001; Datta et al., 2004; Devers et al., 2006), strategic risk taking (Devers et al., 2008) and investment intensity (Linn & Park, 2005).

Linn and Park (2005) incorporate R&D, capital expenditure and acquisitions to capture firm investment and then deflated it by depreciation to determine investment intensity. The dependent variable Risk Taking (*RiskT*) is based on a modified investment intensity variable in which exploration and evaluation expenditure (E&E)⁸⁶ is added to the formula to capture risk taking unique to the mining sector. Although E&E is an intangible, it is excluded from the intangibles standard AASB 138 that covers R&D and accounted for under a separate standard AASB 6 developed to address exploration for, and evaluation of, mineral resources (AASB, 2015). Given the focus of the mining sector, it is reasonable to include E&E with R&D to capture the firm investment on intangibles.

The dependent variable Risk Taking (*RiskT*) is a proxy for the firm level of risky investments, which is defined as the sum of research and development (*R&D*) expenditure, exploration and evaluation expenditure (*E&E*),⁸⁷ capital expenditure

⁸⁶ Tufano (1996) identifies E&E as a firm factor when analysing the CEO incentives and firm risk management.

⁸⁷ According to Skinner (1993), E&E is unique to the extractive industries and is included as a component of risk taking based on the same rationale that supports the inclusion of R&D expenditure.

(*CAPEX*), and acquisitions (*ACQ*) divided by the depreciation expense (*DEPR*) (Skinner 1993; Linn and Park 2005).

$$RiskT = [R\&D + E\&E + CAPEX + ACQ] \div DEPR^{88}$$

In summary, *RiskT* is a measure of the investment in a financial year reported in both the annual report and the firm's ASX disclosures deflated by depreciation.

R&D and *E&E* are intangible assets. AASB 138 outlines the accounting definition, recognition, and measurement of intangible assets including *R&D* expenditure and excludes *E&E* (AASB, 2015). *R&D* expenditure refers to costs incurred in the pursuit or development of knowledge and understanding. AASB 6 outlines the accounting definition, recognition, and measurement of *E&E* of mineral resources (AASB, 2015). The definition of *E&E* is consistent with *R&D* although restricted to mineral resources. AASB 6 Appendix A defines *E&E* expenditures as:

“Expenditures incurred by an entity in connection with the exploration for and evaluation of mineral resources before the technical feasibility and commercial viability of extracting a mineral resource are demonstrable”

(AASB, 2015, p. 224)

⁸⁸ The Institute of Chartered Accountants in England and Wales adopt the definition of risk advocated by the U.K. Accounting Standards Board in FRS 5, *“Uncertainty as to the amount of benefits. The term includes both potential for gain and exposure to loss”* (ICAEW 2002). In a similar vein, the expenditures captured in *RiskT* represent an investment that may deliver a future gain or loss with a high degree of uncertainty. Hence they have been utilised as a proxy for risk taking (consistent with prior studies, without the inclusion of E&E), although they could also be used as a proxy for growth.

CAPEX refers to total cost incurred in the accounting period for assets that will deliver an enduring benefit to the firm. *ACQ* is defined as the total amount paid by the firm in the accounting period to acquire other firms determined at the date of successful completion of the acquisition. *DEPR* is the depreciation charge recognised by the firm in compliance with AASB 116 (AASB, 2015).

5.5.1.2 Model 2 – Risk Management

Risk Management refers to the use of derivatives to reduce the variability of earnings by a firm. The introduction of AASB 1033 in 1999 titled Presentation and Disclosure of Financial Instruments heralded the consistent and uniform reporting on the usage of derivatives by Australian firms (Faff et al., 2011). AASB 1033 was superseded by AASB 132 in July 2004. Subsequent changes to the financial instrument standards have increased the reporting requirements on the usage of derivatives by firms. There are currently four financial instrument standards: AASB 7 Financial Instruments: Disclosures; AASB 9 Financial Instruments; AASB 132 Financial Instruments: Presentation; and AASB 139 Financial Instruments: Recognition and Measurement (AASB, 2015).

Prior researchers have adopted various proxies to measure firm risk management including hedging surveys (Tufano, 1996; Haushalter, 2000), notional value of derivatives (Haushalter 2000, 2001; Dionne and Triki 2005; Lel 2011) and derivative usage (Bartram et al., 2009; Mian 1996; Nance et al., 1993; Allayannis and Weston, 2001; Nguyen and Faff, 2002; Nelson et al., 2005; Nguyen et al., 2010). Empirical

risk management studies most commonly employ a binary variable of firm derivative usage to test their hypotheses (e.g. Bartram et al., 2009; Mian 1996; Nance et al., 1993; Allayannis and Weston, 2001; Nguyen and Faff, 2002; Nelson, 2005; Nguyen et al., 2010) and this proxy is used to indicate that the firm is managing firm risk through hedging (Aretz and Bartram, 2010).

The dependent variable Risk Management (*RiskM*) is a dichotomous variable equal to 1 if the firm uses derivatives, 0 otherwise if the firm does not use derivatives. Binary coding of firm derivative usage is the most common proxy for risk management within the research literature (Aretz and Bartram, 2010).

5.5.1.3 Model 3- Shareholder value creation

Shareholder value creation is a measure of financial performance of the firm. Shareholder value creation is calculated using return on equity, an accounting-based measure of firm performance (Lambert and Larcker, 1987; Van Essen et al., 2012). Return on equity (*ROE*) is commonly used as an accounting measure of firm performance in the research literature (e.g. Finkelstein and Boyd, 1998; Gomez-Mejia et al., 1987). This study utilises *ROE* for the accounting- based measure of firm performance, calculated by dividing earnings by the book value of total equity. *ROE* measures the rate of return the firm generated from the level of firm equity. Higher *ROE* implies more efficient usage of resources and superior firm performance.

5.5.2 Independent variables

The independent variables for Models 1, 2 and 3 are presented below.

5.5.2.1 Independent variables in Models 1 and 2

The risk characteristics differ between option compensation and share compensation, and are considered important factors of compensation packaging in shaping risk strategy outcomes (Tufano, 1996; Deutsch, 2007).

Prior studies examining the effects of management equity-based compensation have adopted various measures of equity compensation including option compensation (e.g. Murphy, 1999; Bryan et al., 2000; Hanlon et al., 2003; Rajgopal and Shevlin, 2002; Deutsch et al., 2011; Lim and McCann, 2013) and share compensation (e.g. Agrawal and Mandelker, 1987; Bryan et al., 2000; Ryan and Wiggins, 2002; Devers et al., 2008).

To investigate the influence of equity-based compensation on firm risk strategy two independent variables were utilised in the regression including option compensation (*OptionComp*) and share compensation (*ShareComp*).

OptionComp refers to the value of options granted to the individual during the fiscal period. According to the Share-based Payments standard AASB 2 firms can calculate the value of option compensation using either the Black and Scholes (1973) option valuation equation or any alternative option pricing model that considers the factors identified in AASB 2 Appendix B6 (AASB, 2015). This is not expected to bias the

results because prior research has identified that alternative option valuation methods are highly correlated with each other regardless of the option valuation method applied (Lambert et al., 1993; Sanders et al. 1995; Deutsch, 2007).

ShareComp refers to the value of shares granted to the individual during the fiscal period. Share compensation valuations do not account for any vesting restrictions but they do incorporate adjustments for restrictions to dividends and post-vesting transfer limitations as per AASB 2 (AASB, 2015).

5.5.2.2 Independent variables in Model 3

The independent variables employed in Model 3 to examine the association of shareholder value creation and risk strategy are *RiskT* and *RiskM*, defined in Sections 5.5.1.1 and Section 5.5.1.2 respectively.

5.5.3 Corporate governance, financial reporting quality and control variables

Control variables are included in the models to control for other factors that have previously been shown in the research literature to impact on risk taking, risk management, and shareholder value. All control variables are defined below and summarised in Table 5-4.⁸⁹

⁸⁹ A control variables table outlining the predicted sign of the variables and literary support is provided in Table 5-4.

CEO duality (*CEODuality*) exists if the role of chairman of the board is held by the CEO of the company. A CEO who is also the chairman is not independent. A chairperson is deemed independent if they are not a serving or past executive of the company or materially related to the company⁹⁰. In stark contrast to CEO duality, an independent chairperson is considered to strengthen board independence as the chairperson has an influential role in directing the focus and deliberations of the board, enhancing the monitoring and disciplinary functions of the board (e.g. Brickley et al., 1997; Ryan and Wiggins, 2002; Grossman and Cannella, 2006).

A board is considered independent when more than 50% of the directors are independent directors. Independent Board (*IndBoard*) reflects the relative power of the independent directors to influence board decisions, and is commonly used to proxy for the monitoring capacity of the board over executive management (e.g. Leftwich et al., 1981; Forker 1992; White et al., 2007; Shan and Taylor 2008).

Ownership Concentration (*OwnConc*) quantifies the portion of firm shares held by the top 20 largest shareholders to the total outstanding shares in the market (e.g. Craswell and Taylor, 1992; McKinnon and Dalimunthe, 1993; Mitchell et al., 1995; Grossman & Cannella, 2006).

Financial reporting quality is measured using two variables: Big 4 audit firm (*FRQ1*) and audit opinion (*FRQ2*). Big 4 audit firms are credited with delivering high quality

⁹⁰ For the ASX definition of director independence refer to the *Corporate Governance Principles and Recommendations*, 3rd Edition, (ASX 2014)

audits and thereby improve the integrity of the financial reports. *FRQ1* is a binary variable and indicates whether the firm is audited by a Big 4 audit firm (e.g. Dopuch et al., 1987; Reynolds and Francis, 2000; Craswell et al. 2002; Francis and Yu, 2009; Fargher et al., 2013). An unqualified audit opinion reflects the view the independent auditor considers the financial report to represent a true and fair of the company performance and financial position over the past financial year. *FRQ2* is a binary variable and indicates if a company received an unqualified or qualified audit report and is a proxy for the quality of the financial report (Bell et al., 2001; Chan et al., 2006; Chi et al., 2012; Fargher et al., 2013).

Leverage (*Leverage*) reflects the firm's finance structure (e.g. Berkman and Bradbury, 1996; Ryan and Wiggins, 2002; Grossman & Cannella, 2006).

Firm size (*FirmSize*) is measured by the natural logarithm of firm sales (e.g. Trotman and Bradley, 1981; Fich and Shivdasani, 2005; Coles et al., 2006a).

Firm Performance (*FirmPerform*) is measured by accounting and market based indicators including return on equity (e.g. Finkelstein and Boyd, 1998; Gomez-Mejia et al., 1987).

5.6 Summary

Chapter 5 has explained the research design and methodology used in this study, detailing the sampling technique used for sample selection and the methods used for

data collection. The pooled regression dataset comprises 3,244 firm-year observations of ASX listed firms from the mining sector during 2004 – 2013. Sources of data collection include FinAnalysis, DatAnalysis, Thomson One Banker, SDC Platinum, Morningstar, Connect 4, Datastream, SIRCA, I/B/E/S, ASX and companies' websites.

Based on concepts established in Chapter 4, an empirical schema is formulated and the corresponding models are formed. The dependent, independent, CG and control variables are explained. The three models use three discrete dependent variables: risk taking, risk management and shareholder value. Risk taking measures the level of firm risk taking investment. Risk management categorises firms as either derivative users or non-derivative users. Shareholder value is calculated by an accounting based measure of company performance. The independent variables can be classified into three categories, i.e., equity-based compensation, corporate governance factors and firm level controls. The models embody three theoretical concepts from accounting and finance, i.e., agency theory, BAT, and CAPM. Appendix 5A details a comprehensive review of the variables including definitions, measurement and the primary source. The descriptive statistics, results of hypotheses and results discussion will be presented in Chapter 6.

Table 5-4: Variable definition and measurement

Variable Acronym	Definition	Expected Sign to DVs	Measurement	Source
Dependent/Independent Variables:				
RiskT	Risk Taking (<i>RiskT</i>) is a proxy for the firm level of risky investments. It is the sum of research and development expenditure (<i>R&D</i>), exploration and evaluation expenditure (<i>E&E</i>), capital expenditure (<i>CAPEX</i>), and acquisitions (<i>ACQ</i>) divided by the depreciation expense (<i>DEPR</i>).	+ve	$RiskT = [R\&D + E\&E + CAPEX + ACQ] \div DEPR$ <i>R&D</i> is the research and development expenditure reported in the annual report by a firm. <i>E&E</i> is the exploration and evaluation expenditure reported in the annual report by a firm. <i>CAPEX</i> is the capital expenditure reported in the annual report by a firm. <i>ACQ</i> is the value of firms acquired by the firm in the financial year. disclosed to the ASX under the continuous reporting regime. <i>DEPR</i> is the depreciation expense reported in the annual report by a firm.	FinAnalysis/ SDC Platinum
RiskM	Risk Management (<i>RiskM</i>) reflects a firm's usage of derivatives in reporting period.	+ve	A dichotomous variable, coded to 1 if the firm uses derivatives, otherwise 0 if the firm does not use derivatives.	FinAnalysis
Dependent Variable:				
ShValue Creation	Shareholder value creation (<i>ShValueCreation</i>) is calculated using return on	N/A	Return on assets (<i>ROE</i>) is an accounting-based measure of firm performance calculated by dividing earnings by the total value of equity.	FinAnalysis
Independent Variables:				
OptionComp	Option Compensation is the disclosed value of options paid to the CEO or director.	+ve & -ve	Equals the dollar value of option compensation paid disclosed in the remuneration report.	Connect 4/ SIRCA
ShareComp	Share Compensation is the disclosed value of shares paid to the CEO or director.	Nil & +ve	Equals the dollar value of compensation paid as shares disclosed in the remuneration report.	Connect 4/ SIRCA

(continued)

Variable Acronym	Definition	Expected Sign to DVs	Measurement	Source
Corporate governance variables:				
CEODuality	CEO duality exists if the CEO is also the board chairman.	N/A	Dichotomous variable, coded to 1 if the CEO is also the chairman of the board, otherwise coded as 0.	Connect4
IndepBoard	Board comprised of greater than 50% independent	N/A	Dichotomous variable, coded to 1 if at least half of the board are non-executive directors, otherwise coded as 0.	Connect4
OwnConc	Shareholding structure of major shareholders in firm	N/A	OwnConc = (Shares held by Top 20 Shareholders) / Total Shares The proportion of shares held by the top 20 shareholders.	Morningstar
FRQ1	External auditor is a Big 4 firm	N/A	Dichotomous variable, coded to 1 if the company auditor is a Big 4 accounting firm, otherwise coded as 0.	Morningstar/ SIRCA
FRQ2	Annual Report has an unqualified audit opinion	N/A	Dichotomous variable, coded to 1 if the independent audit report of the annual report is unqualified, otherwise coded as 0.	Morningstar/ SIRCA
Control variables:				
Leverage	Debt-to-assets ratio	N/A	Total debt divided by total assets.	FinAnalysis, Thompson One
FirmSize	The natural logarithm of sales	N/A	Size = ln(sales).	Banker, and DatAnalysis
FirmPerform	Return on equity	N/A	ROE is calculated by dividing earnings by total equity.	

Chapter 6 Results

6.1 Introduction

This chapter presents the empirical results from the study of managerial compensation, firm risk strategy and firm performance. Information was compiled from secondary data sources for Australian listed mining companies between 2004 and 2013 forming a single pooled data set. Data analysis techniques undertaken include descriptive statistics, multivariate and binary logistic analyses. EViews 8 was used for the multivariate and logistic analyses. Descriptive statistics were generated with Excel 2010. Model diagnostics were generated using EViews 8 and Stata 12.

Chapter 6 is structured as follows. Section 6.2 provides descriptive statistics. Section 6.3 discusses model diagnostics. The first two tests provided a bivariate analysis of the correlations for the variables using Pearson's r and the Spearman rank matrix. The third test examined collinearity between the variables using the variance inflation factor (VIF) method. Section 6.4 to 6.6 present the results of multivariate analysis designed to test the hypotheses developed in Chapter 4 by using the models formed in Chapter 5. Section 6.7 details the results of robustness tests. Section 6.8 summarises the findings presented in this chapter.

6.2 Descriptive statistics

This section provides the descriptive statistics for the variables used in the study. A review of CEO and board compensation over the period from 2004 to 2013 is presented in Section 6.2.1. Trends in total compensation, cash, equity and other forms of compensation for each of the CEO, chairperson and non-executive directors (NED) are illustrated in figures. In addition, ratios of the elements of compensation for the CEO, chairperson and NED are provided. The descriptive statistics for key variables are exhibited in Section 6.2.2. The dependent variables including risk taking (*RiskT*), risk management (*RiskM*), and shareholder value creation (*ShValueCreation*) are discussed in Section 6.2.2.1. Independent variables appear in Section 6.2.2.2., including four categories i.e., equity compensation, corporate governance, financial reporting quality and control variables.

6.2.1 CEO and board compensation

This section outlines CEO and board compensation and observable trends over a ten year period of 2004–2013.

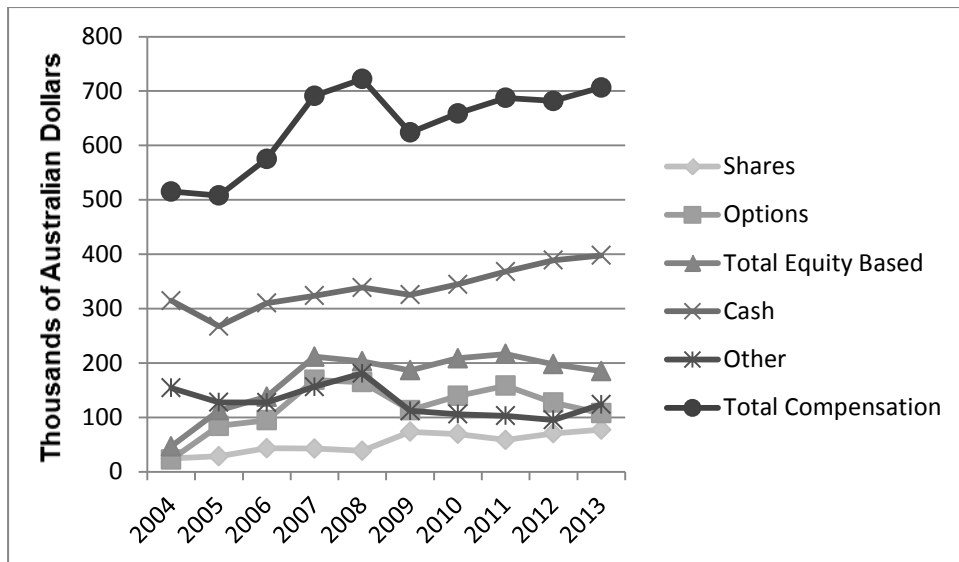


Figure 6-1: Mean CEO compensation in mining companies 2004 to 2013

Figure 6-1 displays the trend in CEO compensation from 2004 to 2013. Over the ten year period mean total compensation increased from \$515,363 in 2004 up to \$722,244 in 2008 ending at \$706,581 in 2013. Observed minimum (maximum) individual CEO total compensation in 2004 was \$3,000 (\$8,630,000) and in 2013 it was \$87,500 (\$10,198,000). Total compensation grew rapidly from 2004 to 2008. From 2008 to 2009 there was a significant decrease in CEO total compensation. Total compensation has increasing by 3% per annum in absolute terms from 2009 to 2013. (At the height of the market boom, prior to the GFC, the maximum individual total compensation was observed in 2007 at \$20,061,000 and it coincides with the period of highest ratio of equity compensation to total compensation). Hence, the rise in total CEO compensation can largely be attributed to the increase in equity compensation.

The mean of CEO option compensation increased from \$22,564 in 2004, up to \$168,880 in 2007 and ended down at \$107,661 in 2013. The minimum (maximum) CEO option compensation in 2004 was \$0 (\$445,144) and in 2013 it was \$0

(\$5,265,000) (the maximum option compensation was observed in 2007 at \$6,261,094, when option valuations were influenced by the positive market outlook). Options accounted for only 4.4% of CEO total compensation in 2004, growing to 24.4% in 2007 before retreating to 15.2% in 2013.

The mean CEO share compensation increased from \$24,162 in 2004 up to \$73,375 in 2009 and remains flat at \$77,325 in 2013. The minimum (maximum) CEO share compensation in 2004 was \$0 (\$1,120,000) and in 2013 it was \$0 (\$6,011,000). The reversion to share compensation in place of option compensation reflects the differences in the holding values for shares compared to options during a market downturn. Options can potentially be valued at zero, whereas shares normally hold some value as the residual claimants in the firm. Shares accounted for only 4.7% of CEO total compensation in 2004, growing to 11.8% in 2009 before falling to 10.9 % in 2013.

The mean CEO cash compensation grew at steady rate of from 2004 (\$310,225) to 2013 (\$397,936) increasing by 2.8% per annum in absolute terms. Overall, total equity compensation accounted for 26.1% of CEO total compensation in 2013 compared to only 9.1% in 2004. Mining firms have changed the structure of CEO compensation to incorporate a greater weighting of equity compensation.

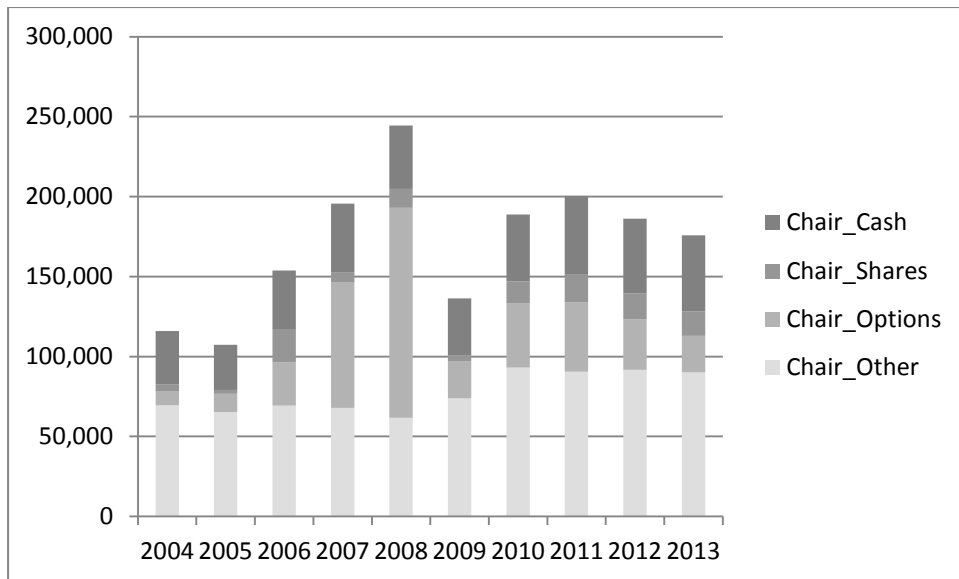


Figure 6-2: Breakdown of mean chairperson compensation 2004 to 2013

Figure 6-2 highlights the rise in the use of equity compensation to compensate the chairperson over the observed period. The ratio of option compensation has changed through the period and in 2008 accounted for more than half of the compensation granted to the chairperson and demonstrates a gradual shift to option compensation as the preferred form of equity compensation. Chair_Other is a catch-all category and demonstrates the creative compensation packaging afforded to the chairperson.⁹¹

The trend in chairperson compensation from 2004 to 2013 illustrated in Figure 6-2 is discussed next. Over this period the mean total compensation increased from \$115,856 in 2004 up to \$244,443 in 2008 and fell to \$175,888 in 2013. Observed minimum (maximum) individual chairperson total compensation (excludes CEO-Chairman) in 2004 was \$1,700 (\$963,000) and in 2013 it was \$1,505 (\$2,698,767).

⁹¹ This study is primarily concerned with equity-based compensation and hence does not investigate the the effect of non-equity compensation such as those identified in Chair_Other. Superannuation payments and consulting fees make up the majority of Chair_Other.

Mean chairperson option compensation increased from \$8,477 in 2004 up to \$131,287 in 2008 and ending at \$90,113 in 2013. The minimum (maximum) chairperson option compensation in 2004 was \$0 (\$374,256) and in 2013 it was \$0 (\$2,632,500). Option payments accounted for only 7.3% of chairperson total compensation in 2004, growing to 54% in 2007 before retreating to 13% in 2013.

The mean chairperson share compensation increased from \$4,630 in 2004 up to \$20,445 in 2006 and ended at \$15,324 in 2013. The minimum (maximum) chairperson share compensation in 2004 was \$0 (\$400,000) and in 2013 it was \$0 (\$663,561). Share payments accounted for only 4.0% of Chairperson total compensation in 2004, growing to 13.3% in 2006 before falling to 8.7% in 2013.

All remaining chairperson compensation (Chair_Other) comprises payments in the form of: superannuation, consulting fees, committee fees, bonuses, allowances, non-cash benefits (including motor vehicle), termination payments and other payments. Chair_Other represents more than 50% of total chairperson compensation in 4 of the 10 years from 2004 to 2013. In 2013 Chair_Other comprised: 34% superannuation payments, 37% consulting fees and the remaining 6 categories represented 29% (the ratios are consistent with prior year observation of Chair_Other).

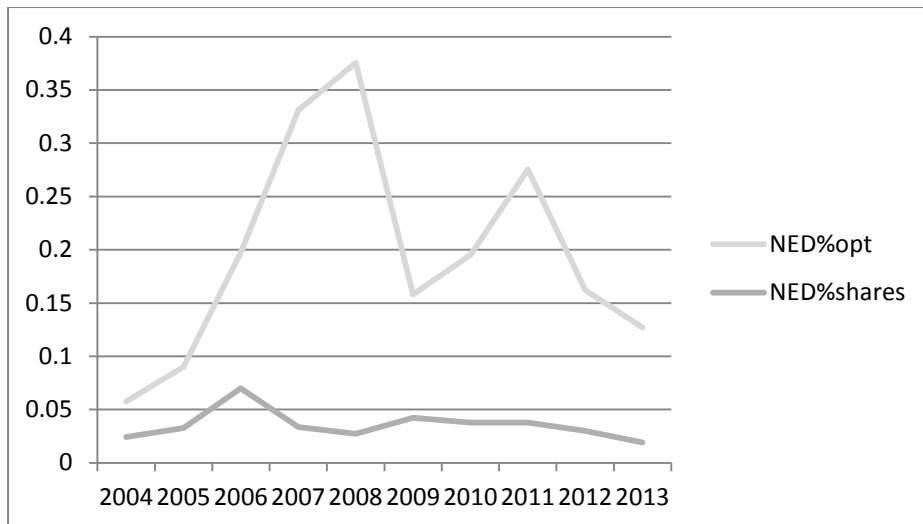


Figure 6-3: Percentage of equity in non-executive director compensation

Figure 6-3 illustrates the change in usage of equity in NED compensation from 2004 to 2013. Over the period the mean total compensation increased from \$46,589 in 2004 up to \$93,449 in 2008 and fell to \$82,105 in 2013.

The mean NED option compensation increased from \$2,690 in 2004 up to \$35,100 in 2008 and dropped to \$10,432 in 2013. Option payments accounted for only 5.8% of NED total compensation in 2004, growing to 37.6% in 2008 before retreating to 12.7% in 2013.

The mean NED share compensation increased from \$1,135 in 2004 up to \$2,561 in 2008 before subsiding to \$1,562 in 2013. Share payments accounted for only 2.4% of NED total compensation in 2004, growing to 2.7% in 2008 before falling to 1.9% in 2013.

Figure 6-3 suggests there has been a significant change in the structure of NED compensation from 2013 with greater reliance placed on the issuing of option

compensation. Although the financial market downturn impacted the option compensation valuation, option compensation remains an important element of NED compensation and represents more than 6 times the value of share compensation paid.

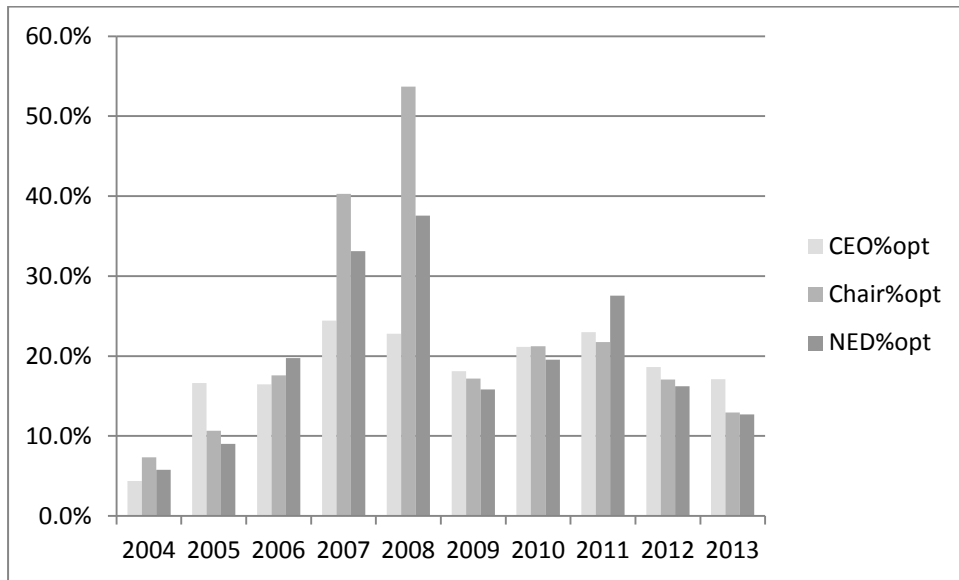


Figure 6-4: Mean managerial option compensation 2004-2013

Figure 6-4 demonstrates the increase in the use of options to compensate management. From 2004 to 2008 the percentage of option compensation to total compensation grew significantly, particularly for directors. Option compensation relative to total compensation fell sharply in 2009 and levelled out from 2009 to 2013.

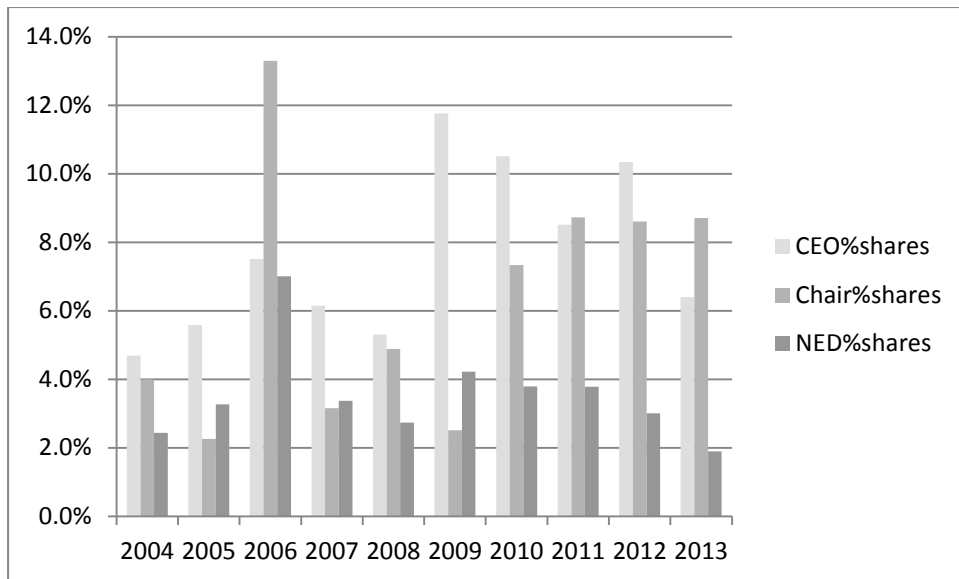


Figure 6-5: Mean share compensation as a percentage of total compensation 2004-2013

In comparison changes to the percentage of managerial share compensation, illustrated in Figure 6-5, rose sharply from 2004 to 2006, declined for 2007 and 2008, rising again significantly in 2009 then levelling out from 2009 to 2013. The significant increase in the percentage of CEO share compensation in 2009 corresponds to a contemporaneous fall in the percentage of CEO option compensation during which the ratio of option compensation declined by 4.7% and share compensation rose by 6.5%. The same substitution of options for shares can be observed for chairperson and NED compensation but to a lesser degree.

According to agency theory, option compensation creates incentives for management to take greater risks. Bebchuk and Fried (2010) argue that the financial market crisis of 2008-2008 can be linked to the inappropriate risk taking by finance executives fuelled by the increase in option compensation within the finance sector. Figure 6-4, illustrated above, provides evidence of a significant increase in option compensation

prior to the GFC and significant fall following the GFC for both directors and the CEO in the mining sector.

In summary both the quantum and structure of managerial compensation has experienced significant fluctuation from 2004 to 2013, with the most pronounced changes occurring between 2004 and 2008 and then moderating from 2008 to 2013.

Overall mean CEO total compensation growth was modest, increasing by 22% across the 10-year period. By comparison in the same period the use of option compensation grew by 377% and share compensation by 66.7%. The growth was subdued for directors with mean director total compensation, actually falling by 12.9% in the period 2004 to 2013. However the shifting preference to equity compensation was also observed for directors' pay with option compensation rising by 117% and share compensation by 71%.

The use of option compensation by firms to compensate the CEO and directors is gaining favour as evidenced by the significant increase in the adoption of option compensation. The rise and fall in the valuation of option compensation demonstrates the theoretical justification for its use. Managers benefit from higher option compensation at times when the value of the firm is increasing. Conversely, when the value of the firm decreases the value of option compensation decreases. The same can be observed with share compensation but owing to the leverage associated with options the potential upside for executives and the board is far greater for option compensation.

6.2.2 Key variable descriptive statistics

Table 6-1: Descriptive statistics on key variables

	Mean	Median	SD	Min.	Max.
Dependent variable					
RiskT	3.24	3.54	2.51	-6.55	11.12
RiskM	0.16	0	0.37	0	1
FirmPerform(ROE)	-0.35	-0.14	0.78	-5.25	0.74
FirmPerform(TSR)	0.58	0.09	1.65	-0.88	10.28
Independent variable					
CEO_OptionComp	183.24	0	294.33	0	1,399.16
CEO_ShareComp	47.91	0	183.50	0	1,200.48
DIR_OptionComp	61.87	0	110.71	0	614.78
DIR_ShareComp	10.65	0	41.25	0	294.84
CEODuality	0.16	0	0.37	0	1
IndBoard	0.63	1	0.48	0	1
OwnConc	57.60	57.40	16.82	8.96	100
FRQ1	0.17	0	0.37	0	1
FRQ2	0.49	0	0.50	0	1
Leverage	0.16	0.08	0.19	0	0.83
FirmSize (ln)	13.71	12.99	10.10	6.91	25.01
FirmSize (\$,000)	899.34	437.00	24.36	1	72,834,000

6.2.2.1 Dependent variable descriptive statistics

Table 6-1 presents the descriptive statistics for the key variables. The table shows mean (median) Risk Taking (*RiskT*) was 3.24 (3.54) with a maximum of 11.12 and a minimum of -6.55. The mean Risk Management (*RiskMt*) was 0.16, representing 500 firms using derivatives to manage risk and 2,663 firms not using derivatives. The mean (median) accounting measure of firm performance, Return on Equity (*ROE*), was -0.35 (-0.14) with a maximum of 0.74 and a minimum of -5.25. The negative *ROEs* in Table 6-1 can be explained by the 2,164 firms from the sample yielding negative earnings results. This can be compared to the mean (median) market measure of performance, Total Shareholder Return (*TSR*), of 0.58 (0.09) with a maximum of 10.28 and a minimum of -0.88. The difference between *ROE* and *TSR* demonstrates that the market valuation of a firm is more than a function of accounting earnings, particularly within the mining industry, driven in part by the speculative nature of mining investment. Firm value for exploration firms is a function of the values of assets in place plus the value of the growth potential (Damodaran, 2012),

6.2.2.2 Independent variable descriptive statistics

A brief review of the independent variables from Table 6-1 follows. The mean square root of CEO option compensation⁹² (*CEO_OptionComp*), was 183.24 with a maximum of 1,399.16 and a minimum of 0. The mean square root of CEO share compensation (*CEO_ShareComp*), which excludes option compensation, was 47.91 with a maximum of 1,200.48 and a minimum of 0. The mean square root of director

⁹² Owing to the wide dispersion of CEO option compensation payments and the existence of zero values for CEO option compensation the square root is used in place of the natural logarithm.

option compensation (*DIR_OptionComp*), was 61.87 with a maximum of 614.78 and a minimum of 0. The mean square root of director share compensation (*DIR_ShareComp*) which excludes option compensation was 10.65 with a maximum of 294.84 and a minimum of 0.

6.2.2.3 Corporate governance and control variable descriptive statistics

The corporate governance variables reveal that a total of 519 (or 16%) of firms have a joint CEO and chairperson, or CEO duality (*CEODuality*). Given the high proportion of small mining companies listed on the ASX⁹³, a higher rate of CEO duality in the mining sector compared to the rate observed in the full population is expected.⁹⁴ In comparison, 64% of firm boards are comprised of an independent board of directors (*IndBoard*), with a total of 2,076 independent boards in the sample.⁹⁵ Ownership structure is commonly used as a proxy for management oversight (e.g. Holderness and Sheeham, 1988; Barclay and Holderness, 1991; Singh and Davidson, 2003). The top 20 shareholders (*OwnConc*) hold a mean (median) 57.60% (57.40%) of the shares in firms in the Australian mining sector with a maximum of 100% of shares and a minimum of 8.96% of shares.

⁹³ As at April 30 2015 small mining firms (market capitalisation under \$100 million) represent 35% of the ASX listings by number, which only represents 0.5% of total market capitalisation. In contrast, Australia's largest miner, BHP Billiton Ltd, represents 5% of the total market capitalisation.

⁹⁴ In the USA the *Sarbanes Oxley Act* 2002 mandated changes to CG impacting board structure and other aspects of CG. In contrast, the *Principles of Good Corporate Governance and Best Practice Recommendations* introduced in Australia by the ASX following CLERP 9 is a voluntary regime (ASX, 2003). Under the "if not, why not" reporting scheme, compliance is assumed and non-compliance must be disclosed in the annual report. Compliance with CG recommendations can be expensive and hence if the cost outweighs the benefit on a firm basis, then it is common for firms to disclose that non-compliance with the specific recommendation is due to the cost burden. The cost of independent boards and the separation of job roles are often too much for smaller firms to bear. Hence many firms disclose non-compliance with the recommendation for an independent board, independent chairperson, non-CEO duality and the formation of other sub committees due to small firm size and the expense of implementing the recommendations (ASX, 2010).

⁹⁵ ASX *Principles of Good Corporate Governance and Best Practice Recommendations* 2.1 encourage firms to structure boards with a majority of independent directors (ASX, 2010).

Table 6-2: Breakdown of financial reporting quality by firm size

Firm Size	Smallest 100	Largest 100	All Firms
Big 4 Auditor	8%	63%	17%
Unqualified Audit Opinion	45%	98%	49%

Table 6-2 provides a breakdown of the financial reporting quality information. 541 firms use a Big 4 auditor (*FRQ1*) to audit the report representing 17% of all firms in the sample, in which larger firms are more likely to use a Big 4 auditor (63% of largest 100 firms) compared with small firms (8% of the smallest 100 firms). Only 1,600 firms received an unqualified audit report (*FRQ2*) representing 49% of the mining firms examined. Again larger firms are more likely to receive an unqualified audit report, 98 of the largest 100 firms achieved an unqualified audit report compared to only 45 unqualified audit reports for the smallest 100 firms. The combination of the Big 4 auditor and unqualified audit reports points to better quality financial reporting by larger firms when compared to smaller firms in the mining sector.

The mean (median) firm leverage (*Leverage*), was 0.16 (0.08) with a maximum of 0.83 and a minimum of 0. The mean (median) firm revenue (*FirmSize*) was \$899,340 (\$437,000) with a maximum of \$72,834,000,000 and a minimum of \$1,000.

6.3 Model diagnostics

Various model diagnostic tools were employed to test that the models are unbiased. Pearson and Spearman correlation matrixes were used to check for potential

collinearity issues. A variance inflation factor (VIF) test was used to confirm the results of Pearson and Spearman. Finally, the Ramsay RESET test was used to check for model misspecification in terms of non-linear possibilities.⁹⁶

6.3.1 Pearson and Spearman analysis

Correlation coefficients are a measure of the association between two random variables, variable x and the error term u , in a regression model (Gujarati, 2012). If uncorrelated, then x and u are not linearly related. That is, they are linearly independent i.e.:

$$E(u/x) = E(u)$$

The Pearson correlation test and the Spearman's rank order test were used to check for potential multicollinearity problems. The Pearson correlation test is the most commonly used and is appropriate when analysing financial data. Pearson's correlation test measures the magnitude of the linear relationship amongst normally distributed variables (Gujarati, 2012). The equation for the Pearson correlation test between variable A and B is displayed below:

$$\rho_{X,Y} = \frac{cov(X,Y)}{\sigma_X \sigma_Y}$$

where:

X = series or portfolio original return series

Y = series or portfolio return series lagged one period

ρ = rho denotes correlation

σ_X and σ_Y = the standard deviation of series X and Y respectively; and

$cov(X,Y)$ = the covariance of series X and Y

⁹⁶ The results of the Ramsey RESET tests are provided with the main results from the regression..

The Spearman's rank correlation method is commonly used when a non-linear relationship exists between the variables or they are not normally distributed. Spearman's rank correlation method makes no assumptions regarding the data distribution and hence is more appropriate in the case of data with large outliers (Gujarati, 2012). The Spearman's rank correlation method ranks the data by assigning a rank number to each data point, the correlation is then calculated using the Pearson method on the rank data. The Pearson correlation method is appropriate for use in calculating the magnitude of the linear relationship between two data series when the series data is normally distributed. While the Spearman's rank correlation method is appropriate for series data that is not normally distributed (Startz, 2013).

Pearson correlation coefficients are displayed in the lower left half of Panel A and Spearman correlation coefficients are displayed in the upper right half of Panel A for the correlation matrices displayed in Table 6-3 and Table 6-4. The correlation scores between the independent variables in Model 1 and Model 2 are presented in Table 6-3 below. The largest Pearson correlation value in the sample is 0.45 (between *CEO_OptionComp* and *Leverage*). The largest Spearman correlation value in the sample is 0.48 (between *CEO_OptionComp* and *Leverage*).

The correlation scores between the independent variables in Model 3 are presented in Table 6-4 below. The largest Pearson correlation value in the sample is 0.47 (between *FirmSize* and *RiskM*). The largest Spearman correlation value in the sample is 0.44 (between *FRQ1* and *FRQ2*). All reported correlation values are well below the critical value of 0.7 (Deutsch et al., 2011), therefore there is no evidence of a multicollinearity problem in Model 1, Model 2 or Model 3.

Table 6-3: H1& H2 Pearson and Spearman correlation matrix

Panel A: Pearson and Spearman Correlation Matrix for H1a, H1b, H2a and H2b										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 CEO_OptionComp	—	-0.113***	0.484***	-0.052***	0.007	0.030*	0.091***	0.079***	0.154***	0.037**
2 CEO_ShareComp	-0.048***	—	-0.112***	-0.050***	0.026	0.085***	0.091***	0.093***	0.116***	0.077***
3 Leverage	0.448***	-0.088***	—	0.061***	-0.023	-0.033*	-0.030*	-0.043**	-0.038**	-0.106***
4 CEODuality	-0.029	-0.057***	0.101***	—	-0.091***	0.025	0.034*	-0.011	-0.053***	-0.054***
5 IndBoard	0.019	0.056***	-0.024	-0.091***	—	0.034*	0.184***	0.130***	0.130***	0.088***
6 OwnConc	0.089***	0.124***	-0.008	0.024	0.033*	—	0.141***	0.158***	0.198***	0.222***
7 FRQ1	0.139***	0.117***	0.005	0.034*	0.184***	0.143***	—	0.439***	0.319***	0.246***
8 FRQ2	0.169***	0.125***	0.026***	-0.011	0.130***	0.148***	0.429***	—	0.429***	0.287***
9 FirmSize	0.233***	0.230***	-0.028	-0.069***	0.161***	0.224***	0.439***	0.359***	—	0.416***
10 FirmPerform	0.060***	0.065***	-0.040**	-0.013	0.032*	0.106***	0.127***	0.111***	0.229***	—

Panel B: Additional Correlation Values for director compensation variables in H1c, H1d, H2c and H2d										
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
DIR_OptionComp	(Pearson)		-0.047***	0.083***	-0.049***	0.017	0.033***	0.067*	0.042**	-0.016
DIR_ShareComp			0.001	-0.033*	0.014	0.051***	0.065***	0.070***	0.135***	0.018
DIR_OptionComp	(Spearman)		-0.070***	0.054***	-0.045**	0.005	0.013	0.000	0.037**	-0.072***
DIR_ShareComp			0.062***	-0.025	0.013	0.041**	0.078***	0.064***	0.093***	0.035**

Pearson correlation coefficients are displayed in the lower left half side of Panel A of the table; Spearman correlation coefficients are displayed in the upper right half side of Panel A of the table. Significance levels are annotated by below: 10 percent - *, 5 percent - **, and 1 percent - ***.

CEO_OptionComp = SQRT of option compensation paid to CEO. CEO_ShareComp = SQRT of share compensation paid to CEO. DIR_OptionComp = SQRT of option compensation paid to Directors. DIR_ShareComp = SQRT of share compensation paid to Directors. Leverage = the ratio of total debt to total assets. CEODuality = Chairperson role held by the CEO. IndBoard = majority of directors are independent directors. OwnConc = percentage of shares held by top 20 shareholders. FRQ1 = Big 4 audit firm. FRQ2 = unqualified audit report. FirmSize = firm size, natural logarithm of firm sales. FirmPerform = firm performance, measured by Return on Equity.

Table 6-4: H3 Pearson and Spearman correlation matrix

Pearson and Spearman Correlation Matrix for H3a and H3b									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RiskT	—	-0.226***	0.084***	0.001	-0.050***	-0.038**	-0.104***	-0.139***	-0.306***
RiskM	-0.215***	—	-0.048***	-0.038**	0.061***	0.166***	0.218***	0.263***	0.393***
Leverage	0.081***	-0.030*	—	0.063***	-0.023	-0.031*	-0.030*	-0.042**	-0.044**
CEODuality	-0.004	-0.038**	0.104***	—	-0.095***	0.022	0.033*	-0.017	-0.058***
IndBoard	-0.050***	0.061***	-0.023	-0.095***	—	0.034*	0.184***	0.133***	0.124***
OwnConc	-0.030**	0.176***	-0.007	0.021	0.033*	—	0.141***	0.155***	0.199***
FRQ1	-0.096***	0.218***	0.005	0.033*	0.184***	0.143***	—	0.442***	0.318***
FRQ2	-0.133***	0.263***	0.027	-0.017	0.133***	0.144***	0.442***	—	0.433***
FirmSize	-0.340***	0.468***	-0.031*	-0.075***	0.155***	0.225***	0.356***	0.432***	—

Pearson correlation coefficients are displayed in the lower left half side of the table; Spearman correlation coefficients are displayed in the upper right half side of the table. Significance levels are annotated by below: 10 percent —*, 5 percent —**, and 1 percent —***.

RiskT = firm risk taking, firm investment deflated by depreciation. RiskM = firm risk management, binary variable of firm derivative usage. Leverage = the ratio of total debt to total assets. CEODuality = Chairperson role held by the CEO. IndBoard = majority of directors are independent directors. OwnConc = percentage of shares held by top 20 shareholders. FRQ1 = Big 4 audit firm. FRQ2 = unqualified audit report. FirmSize = firm size, natural logarithm of firm sales.

6.3.2 VIF testing

A high level of multicollinearity is caused by a linear relationship between the relevant explanatory variables. Near or high multicollinearity indicates several practical issues in regression modelling including: large variance and covariance of the estimators; incorrect acceptance in the null hypothesis; insignificant coefficient t ratios; and an overstated R^2 (Gujarati and Porter, 2010).

The variance inflation factors (VIF) test is a method used to examine collinearity levels between variables (regressors) within a model. VIF for a single regressor is obtained by use of the R^2 value of the regression of the regressor against all other explanatory variables in the regression model:

$$VIF_j = \frac{1}{1 - R_j^2}$$

where, VIF for regressor j is the reciprocal of the inverse of R^2 from the regression (Gujarati and Porter, 2010).

The VIFs presented in Tables 6-5 to 6-7 reveal how much the variance of the coefficient estimate of a variable (regressor) can be attributed to collinearity with the other variables (regressors) in the regression modelled. A VIF critical value of 10 would suggest multicollinearity between variables in the model (Gujarati, 2012). The largest VIF value observed in Tables 6-5 to 6-7, relates to the variable firm size (*FirmSize*). Results of the VIF Diagnostic test for Models: H1a, H1b, H2a and H2b, shown in Table 6-5, indicate the largest value is 1.56; H1c, H1d, H2c and H2d, shown in Table 6-6, indicate the largest VIF value is 1.41; H3a and H3b, shown in Table 6-7, indicate the largest VIF value is 1.81. All reported VIF values are well below the

critical value of 10 and so a multicollinearity problem does not exist in any of the models presented.

Table 6-5: VIF diagnostic H1a, b & H2a, b

Variables	VIF	SQRT VIF	Tolerance	R ²
CEO_OptionComp	1.09	1.04	0.9193	0.0807
CEO_ShareComp	1.08	1.04	0.9238	0.0762
Leverage	1.12	1.06	0.8928	0.1072
CEODuality	1.02	1.01	0.9784	0.0216
IndBoard	1.06	1.03	0.9442	0.0558
OwnConc	1.08	1.04	0.9252	0.0748
FRQ1	1.33	1.15	0.7514	0.2486
FRQ2	1.40	1.18	0.7167	0.2833
FirmSize	1.56	1.25	0.6391	0.3609
FirmPerform	1.08	1.04	0.9226	0.0774
Mean VIF	1.18			

CEO_OptionComp = SQRT of option compensation paid to CEO. CEO_ShareComp = SQRT of share compensation paid to CEO. Leverage = the ratio of total debt to total assets. CEODuality = Chairperson role held by the CEO. IndBoard = majority of directors are independent directors. OwnConc = percentage of shares held by top 20 shareholders. FRQ1 = Big 4 audit firm. FRQ2 = unqualified audit report. FirmSize = firm size, natural logarithm of firm sales. FirmPerform = firm performance, measured by Return on Equity.

Gujarati (2003) suggests that there is no evidence of multicollinearity if the VIF value is below the critical level of 10. The maximum VIF value in Table 6-5 is 1.56, hence all VIF values are well below the critical level. Significance levels are annotated by below: 10 percent – *, 5 percent – **, and 1 percent – ***.

Table 6-6: VIF diagnostic H1c, d & H2c, d

Variables	VIF	SQRT VIF	Tolerance	R ²
DIR_OptionComp	1.02	1.01	0.9801	0.0199
DIR_ShareComp	1.02	1.01	0.9787	0.0213
Leverage	1.04	1.02	0.9653	0.0347
CEODuality	1.03	1.01	0.9744	0.0256
IndBoard	1.06	1.03	0.9436	0.0564
OwnConc	1.07	1.04	0.9325	0.0675
FRQ1	1.33	1.15	0.7525	0.2475
FRQ2	1.39	1.18	0.7178	0.2822
FirmSize	1.41	1.19	0.7091	0.2909
FirmPerform	1.07	1.03	0.9364	0.0636
Mean VIF	1.02			

DIR_OptionComp = SQRT of option compensation paid to Directors. DIR_ShareComp = SQRT of share compensation paid to Directors.

Leverage = the ratio of total debt to total assets. CEODuality = Chairperson role held by the CEO. IndBoard = majority of directors are independent directors. OwnConc = percentage of shares held by top 20 shareholders. FRQ1 = Big 4 audit firm. FRQ2 = unqualified audit report. FirmSize = firm size, natural logarithm of firm sales. FirmPerform = firm performance, measured by Return on Equity.

Gujarati (2003) suggests that there is no evidence of multicollinearity if the VIF value is below the critical level of 10. The maximum VIF value in Table 6-6 is 1.41, hence all VIF values are well below the critical level. Significance levels are annotated by below: 10 percent – *, 5 percent – **, and 1 percent – ***.

Table 6-7: VIF diagnostic H3a, b

Variables	VIF	SQRT VIF	Tolerance	R ²
RiskT	1.17	1.08	0.8582	0.1418
RiskM	1.37	1.17	0.7285	0.2715
Leverage	1.38	1.17	0.7248	0.2752
CEODuality	1.02	1.01	0.9788	0.0212
IndBoard	1.06	1.03	0.9454	0.0546
OwnConc	1.08	1.04	0.9250	0.075
FRQ1	1.34	1.16	0.7468	0.2532
FRQ2	1.40	1.18	0.7137	0.2863
FirmSize	1.81	1.34	0.5528	0.4472
Mean VIF	1.29			

RiskT = firm risk taking, firm investment deflated by depreciation. RiskM = firm risk management, binary variable of firm derivative usage. Leverage = the ratio of total debt to total assets. CEODuality = Chairperson role held by the CEO. IndBoard = majority of directors are independent directors. OwnConc = percentage of shares held by top 20 shareholders. FRQ1 = Big 4 audit firm. FRQ2 = unqualified audit report. FirmSize = firm size, natural logarithm of firm sales. FirmPerform = firm performance, measured by Return on Equity.

Gujarati (2003) suggests that there is no evidence of multicollinearity if the VIF value is below the critical level of 10. The maximum VIF value in Table 6-7 is 1.81, hence all VIF values are well below the critical level. Significance levels are annotated by below: 10 percent – *, 5 percent – **, and 1 percent – ***.

6.4 Results for equity compensation and risk taking

Table 6-8 provides the pooled OLS regression results to test the four hypotheses (H1a, H1b, H1c, H1d) developed in Section 4.3 of Chapter 4 and shown in Figure 5.3 of chapter 5. OLS regression minimises the sum of squared residuals to determine the best fitted line and equation for the linear model. The adjusted R^2 measures how close the data is to the fitted regression line, it reports how much of the variation in the dependent variable can be explained by the model.⁹⁷ The adjusted R^2 s are 0.1646, 0.1608, 0.168 and 0.1605 for Model H1a, H1b, H1c and H1d respectively. The F -statistics of 68.9, 67.01, 70.6 and 66.9 are all statistically significant at 1% level.

Equity-based compensation could be an effective mechanism to limit agency costs because it results in CEOs taking riskier investment decisions. Early theory predicts equity-based compensation enhances CEOs value creating investment decisions (e.g. Coleman, 1966; Jensen and Mackling, 1976). Subsequent empirical studies report an increase in risk taking associated with option compensation (e.g. Ryan and Wiggins, 2002; Rajgopal and Shevlin, 2002; Xue, 2007). Recent studies suggest share compensation does not increase firm risk taking (e.g., Bryan et al., 2000; Hall and Murphy, 2002; Devers et al., 2008).

The hypotheses presented in Chapter 4 Section 4.3.1 were used to test the propositions stated above and are presented below:

H1a: *Ceteris paribus*, CEO option compensation is positively related to firm risk taking in Australian mining firms.

⁹⁷ Wooldridge (2013) notes low R -squareds in social science are common, and states “seemingly low R -squared does not necessarily mean that an OLS regression equation is useless” (p.39).

H1b: *Ceteris paribus*, CEO share compensation is not related to firm risk taking in Australian mining firms.

Next, the impact of director equity compensation is considered. Several US based studies have noted a change in the structure of director compensation, with an uptake in equity-based compensation (e.g. Yermack, 2004; Farrell et al., 2008). In Australia there has been a trend towards equity-based compensation for directors (APC, 2009) and equity compensation is now widely used to compensate directors in Australian listed firms as reported in Section 6.2.1. Although director equity compensation was once considered taboo by corporate regulators, it is now seen as a CG tool to strengthen director performance (ASX 2010). Recent empirical results support the proposition that director option compensation increases firm risk taking (Deutsch et al., 2007, 2011; Lim and McCann, 2013) but the impact of share compensation on firm risk taking is not reported by these studies. Consistent with the early theoretical arguments and prior positive findings for the CEO, the hypotheses below test whether directors' option compensation and share compensation is associated with the level of firm risk taking. Therefore the following hypotheses were stated in Section 4.32 of Chapter 4:

H1c: *Ceteris paribus*, director option compensation is positively related to firm risk taking in Australian mining firms.

H1d: *Ceteris paribus*, director share compensation is not related to firm risk taking in Australian mining firms.

Table 6-8 provides the pooled OLS regression results for each of the four hypotheses, i.e., H1a, H1b, H1c and H1d. The results and analysis of each model are presented next.

Table 6-8: Risk taking and equity compensation regression results^{a,b,c}

Independent Variable	Model	Model	Model	Model
	H1a	H1b	H1c	H1d
	Clmn (1)	Clmn (2)	Clmn (3)	Clmn (4)
CEO_OptionCo	0.0006 ^{***} (3.936) [+]			
CEO_ShareCom		0.0003 (1.1176) [?]		
DIR_OptionCo			0.0009 ^{***} (5.2986) [+]	
DIR_ShareCom				0.0004 (0.6284) [?]
CEODuality	-0.2202 ^{**} (-1.9712)	-0.2237 ^{**} (-1.9960)	-0.2496 ^{**} (-2.2387)	0.2268 ^{**} (-2.0239)
IndBoard	-0.0471 (-0.5481)	-0.0600 (-0.6964)	-0.0671 (-0.7821)	-0.0588 (-0.6824)
OwnConc	0.0064 ^{**} (2.5349)	0.0065 ^{***} (2.5902)	0.0065 ^{***} (2.6053)	0.0068 ^{***} (2.6915)
FRQ1	0.1394 (1.1179)	0.1540 (1.2329)	0.1753 (1.4092)	0.1552 (1.2420)
FRQ2	0.0039 (0.0404)	0.0270 (0.2823)	0.0070 (0.0739)	0.0287 (0.3001)
Leverage	-0.6262 ^{***} (-7.0709)	-0.6463 ^{***} (-7.2946)	-0.6069 ^{***} (-6.854)	-0.6483 ^{***} (-7.3178)
FirmSize	-0.2944 ^{***} (-18.6732)	-0.2869 ^{***} (-18.1697)	-0.2840 ^{***} (-18.3050)	-0.2844 ^{***} (-18.2385)
FirmPerform	0.4775 ^{***} (8.7227)	0.4748 ^{***} (8.6544)	0.4903 ^{***} (8.9628)	0.4762 ^{***} (8.6756)
Intercept	5.1417 ^{***} (29.8060)	5.1704 ^{***} (29.7349)	5.0665 ^{***} (29.3100)	5.1467 ^{***} (29.7527)
Adjusted R²	0.1646	0.1608	0.1680	0.1605
F-statistic	68.9 ^{***}	67.01 ^{***}	70.6 ^{***}	66.9 ^{***}
Observations	3102	3102	3102	3102

^a First value presented is the coefficient estimate and the *t*-statistic is provided in parenthesis.

^b Ramsey Regression Specification Error Test (RESET) was used to examine if the powers of fitted variables existed in the regression models presented. The RESET test starts with the second power continuing through to the fourth power. The individual *t*-statistics were all insignificant, indicating the regression models demonstrated no evidence of nonlinear effects.

^c Two-tailed *p*-values were used to determine significance: * if *p* < 0.1; ** if *p* < 0.05; *** if *p* < 0.01.

Table 6-8 reports results of pooled OLS regression models as follows:

$$\text{RiskT}_i = \alpha + \beta_1 \text{CEO_OptionComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H1a})$$

$$\text{RiskT}_i = \alpha + \beta_1 \text{CEO_ShareComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H1b})$$

$$\text{RiskT}_i = \alpha + \beta_1 \text{DIR_OptionComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H1c})$$

$$\text{RiskT}_i = \alpha + \beta_1 \text{DIR_ShareComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots(\text{H1d})$$

where, RiskT (dependent variable) = the natural logarithm of firm risk taking. CEO_OptionComp = SQRT of option compensation paid to CEO. CEO_ShareComp = SQRT of share compensation paid to CEO. DIR_OptionComp = SQRT of option compensation paid to directors. DIR_ShareComp = SQRT of share compensation paid to directors. CEODuality = CEO duality, dichotomous variable, coded as 1 when chairperson role held by the CEO or 0 otherwise. IndBoard = board independence, dichotomous variable, coded 1 when majority⁹⁸ of directors are independent directors or 0 otherwise. OwnConc = ownership concentration, percentage of shares held by top 20 shareholders. FRQ1 = financial reporting quality variable 1, dichotomous variable, coded as 1 when the firm is audited by a Big 4 audit firm, 0 otherwise. FRQ2 = financial reporting quality variable 2, dichotomous variable, coded as 1 when the firm receives an unqualified audit report of its annual report, 0 otherwise. Leverage = the ratio of total debts to total assets. FirmSize = natural logarithm of firm sales. FirmPerform = firm performance, measured by return on equity (ROE).

⁹⁸ The board is classified independent if the number of independent directors divided by total number of directors on the board is greater than 50%.

6.4.1 H1a regression analysis

H1a predicted a positive relationship between *CEO option compensation and firm risk taking*. The result of the model H1a illustrated in Column 1 of Table 6-8 reveal the coefficient of CEO option compensation ($\beta_1 = 0.0006$, $t = 3.936$) is significantly positive at the 1% level. The finding supports the prediction of H1a indicating that an increase in CEO option compensation is associated with an increase in the level of firm risk taking, and is consistent with the prior empirical results of Bryan et al. (2000), Sanders (2001), Ryan and Wiggins (2002), Hanlon et al. (2003) Dee et al., (2005), Coles et al., (2006), and Deutsch et al., (2011). It implies the payment of options to the CEO as a form of compensation encourages the CEO to make more risk taking investment decisions and therefore is an effective tool at mitigating CEO risk aversion predicted by agency theory.

The results of Model H1a provide additional evidence in an Australian context for the theoretical proposition of Coleman (1966) and Jensen and Meckling (1976) predicting that equity-based compensation would enhance the likelihood of CEOs making value enhancing investment decisions. The structure of CEO compensation is an important organizational corporate governance mechanism shaping value-critical decisions regarding firm investment policy (Coles et al., 2006a). Although there are many explanations for the use of options within compensation programs, the fundamental justification for the use of option compensation is to motivate management to take more risk than they would through the granting of shares alone (Murphy, 1999). Wiseman and Gomez-Meja (1998) note that if a CEO is paid enough option compensation, then even the most risk adverse CEO will become a “risk-lover”.

In addition, the results are consistent with an earlier mining sector study by Rajgopal and Shevlin (2002) in which they analyse US oil and gas companies for the period 1992 to 1997 and found evidence of a positive link between CEO option compensation and future exploration investment. Rajgopal and Shevlin (2002) suggest CEO option compensation induces CEOs to invest in riskier assets.

In summary, CEO option compensation is associated with an increase in the level of firm risk taking within the Australian mining sector, suggesting CEO option compensation induces risk taking mining investments. The results provide important empirical evidence to the ongoing debate regarding the effectiveness of CEO option compensation at changing CEO behaviour. CEO option compensation can be an effective corporate governance tool to manage CEO behaviour in order to overcome managerial risk aversion and promote firm risk taking activity.

6.4.2 H1b regression analysis

H1b tests whether there is an association between *CEO share compensation* and firm risk taking. The result of the model H1b provided in Column 2 of Table 6-8 reveal the coefficient of CEO share compensation is insignificant. The finding supports hypothesis H1b and suggests that any attempt to stimulate the CEO to increase firm risk taking through the use of share compensation may not be an effective strategy.

The results of Model H1b are consistent with prior research studies that found share compensation is an ineffective mechanism to increase risk taking investments (e.g. Bryan et al., 2000; Hall and Murphy, 2002; Ryan and Wiggins, 2002; Devers et al., 2008).

The theoretical proposition in favour of CEO share compensation is grounded in tying the interests of the CEO to shareholder interests. Therefore, granting shares to the CEO is supposed to deliver value enhancing risk taking investment by the CEO and overcome CEO risk aversion (Jensen and Meckling, 1976). On the other hand, share compensation exposes the CEO to downside risk thereby motivating the CEO to avoid higher risk investments in favour of lower risk choices (Ryan and Wiggins, 2002).

In summary CEO share compensation is not associated with an increase in the level of risk taking investment. The results provide important empirical evidence to the ongoing debate regarding the effectiveness of CEO share compensation at changing CEO risk taking.

The combined results of H1a and H1b point to the merit of CEO option compensation over CEO share compensation for promoting firm risk taking strategy⁹⁹. Academics have argued that prior research results provide support for the assertion share compensation is related to lower levels of risk taking, while the convexity of option payoffs results in more risk taking when options compensation is paid (Tufano, 1996; Guay, 1999; Rajgopal & Shevlin, 2002; Lewellen, 2006; Coles et al., 2006a). The results presented in Section 6.4.1 and Section 6.4.2 are consistent with the prior assertions and support the merit of CEO option compensation over CEO share compensation to encourage firm risk taking strategy.

6.4.3 H1c regression analysis

H1c expects to find a positive relationship between *director option compensation* and firm risk taking. The result of Model H1c shown in Column 3 of Table 6-8 demonstrates a

⁹⁹ A discussion regarding option compensation and excessive risk taking is provided in chapter 7.

statistically significant positive relation between director option compensation and firm risk taking. The coefficient of director option compensation ($\beta_1 = 0.0009$, $t = 5.2986$) is significant at the 1% level and is 1.5 times larger than the coefficient for CEO option compensation. Thus H1c is supported. This finding suggests director option compensation promotes firm risk taking investment and can be considered an effective mechanism for overcoming managerial risk aversion. In addition it may reduce type II agency costs originating from the conflict between shareholders and directors by aligning the interests of directors with the shareholders (Jensen and Meckling, 1976).

This finding is supported by agency theory. Awarding equity compensation to directors assists in overcoming agency issues by tying directors' wealth to shareholders' returns (Jensen, 1993; Carey et al., 1996). Moreover, the finding also validates Yermack (2004) and Linn and Park (2005) in that director option compensation encourages higher levels of firm risk taking investment.

The finding of H1c contributes to the debate regarding the efficacy of option compensation to improve director performance and oversight against the backdrop of increasing director option compensation (Daily et al., 2003), and rising shareholder concerns over the actual cost versus the benefit received (Daily et al., 1999; Dalton and Daily, 2001; Gerety et al., 2001; Bebchuk and Fried, 2005). More specifically, it provides evidence that director option compensation results in a reduction in director risk aversion (Dee et al., 2005). Directors paid with options will be more inclined to approve riskier investment initiatives in order to bolster firm performance. Consequently, director option compensation should result in greater risk taking and superior firm performance as director wealth is directly linked to firm value through their personal stake in firm equity.

Combining the results of hypotheses H1a and H1c, which examine the relationship of CEO option compensation and director option compensation on firm risk taking respectively, both results reveal a positive relationship between option compensation and firm risk taking. The findings lend further support to Deutsch et al. (2011) which reported that the use of option based compensation paid to either the CEO or directors increases firm risk taking. However, director option compensation has a greater impact than CEO option compensation.

In summary, CEO and director option compensation increases the level of firm risk taking within the Australian mining sector. This provides important empirical evidence to the ongoing debate regarding the effectiveness of option compensation at changing director behaviour in the boardroom. Director option compensation may be an effective corporate governance tool to manage director performance and engagement in the boardroom in order to overcome passive directors, director risk aversion and enhance firm risk taking activity.

6.4.4 H1d regression analysis

H1d tests whether *director share compensation changes firm risk taking* by examining the relationship between director share compensation and firm risk taking. The results of Model H1d presented in Column 4 of Table 6-8 reveal the coefficient for director share compensation is insignificant. The finding support hypothesis H1d and indicates any attempt to stimulate directors to increase firm risk taking through the use of share compensation may not be an effective strategy.

The results of Model H1d are consistent with the finding of H1b, and with prior research studies that observed no change in risk taking investment when share compensation is awarded to management (e.g. Bryan et al., 2000; Hall and Murphy, 2002; Ryan and Wiggins, 2002; Devers et al., 2008). The results suggest remuneration in the form of shares does not change firm level risk taking investment.

The results of H1c and H1d imply that the form of equity compensation is important to directors when it comes to firm risk taking decisions. This provides empirical evidence that director share compensation does not appear to be an effective corporate governance tool to promote firm risk taking activity for Australian mining firms.

6.4.5 Summary H1 regression controls analysis

As shown in Table 6-8, five control variables returned with significant results.

Ownership concentration and firm performance are significantly positively related to firm risk taking. Firms with higher ownership concentration have fewer investors with a larger stake in the firm. They have access to more resources and incentive to proactively monitor management risk taking decisions (Deutsch et al., 2011). Firm performance impacts the willingness of managers to pursue risk taking investment (Deutsch et al., 2011). The results from Table 6-8 report a positive association between firm performance and risk taking consistent with earlier studies (e.g. Chung et al., 1998; Brailsford and Yeoh, 2004; Walls, 2005).

CEO duality, leverage, and firm size reveal significant and negative association with firm risk taking. CEO duality is believed to increase agency issues due to the relative power of the

CEO-chairman to rule over the board (Brickley et al., 1994). The reduction in monitoring and oversight leads to a less than optimal level of firm risk taking investments. The CEO-chairman dominates the board and deters directors from becoming actively involved in strategic risk taking investment decisions (Lim and McCann, 2013). Deutsch et al. (2011) report a negative association between CEO duality and firm risk taking corresponding with the reported relation displayed in Table 6-8.

Stulz (1996) argues that firms with higher levels of leverage may be restricted and unable to take on risk taking investments when compared to firms with lower leverage. When firm leverage is sufficiently high managers are either unable (Stulz, 1996) or unwilling to take on additional risk taking investments (Furubotn and Pejovich, 1972), consistent with the negative association between leverage and risk taking reported in Table 6-8

Firm size affects firm risk taking differently depending on the contextual factors. In the contextual setting of mining firms, it was observed that firm size is negatively related to risk taking investment. This reflects the nature of the mining sector, where firms moving beyond exploration into production reduce relative risk taking and size increases in-line with the additional capital requirements needed to exploit the mineral deposit.

Board independence (*IndBoard*), Big 4 auditor (*FRQ1*) and unqualified audit opinion (*FRQ2*) return insignificant results suggesting they do not influence firm risk taking within the Australian mining sector. Board independence is promoted on the grounds that it will improve monitoring and oversight of executive management performance. Hence it is not surprising that the association with firm risk taking is insignificant. *FRQ1* and *FRQ2* are indicators of the quality of the financial reporting. Hence, although a valuable CG proxy and

important to shareholders, it is not surprising the association with firm risk taking is insignificant.

6.5 Results risk management

Table 6-9 provides the regression results using binary logistic models to examine the four hypotheses (H2a, H2b, H2c, H2d) in Figure 5.3 of chapter 5. Binary logistic regression estimates the probability a characteristic is present given the values of the explanatory variables in the model. The psuedo R^2 s are 0.2555, 0.2559, 0.2547 and 0.2572 for Model H2a, H2b, H2c and H2d respectively. The Wald χ^2 s of 705.4, 706.5, 703.1, and 710.1 for Models H2a, H2b, H2c and H2d respectively, are all statistically significant at the 1% level.

Equity-based compensation aligns the interests of management with the interests of shareholders (Jensen and Meckling, 1976). As noted in Section 6.4, managerial equity compensation can affect firm risk taking. Managers paid equity compensation may modify their personal risk exposure by changing the risk profile of the firm which also applies to firm risk management.

Rajgopal and Shevlin (2002) document a positive relationship between option compensation and risk taking, but find a negative association between option compensation and risk management. According to theory developed by Smith and Stulz (1985), managerial option compensation reduces risk management and managerial share compensation increases risk management due to the differences in the payoff for options compared to shares. Options are more valuable when earnings are more volatile (Knopf et al., 2002), hence leading to lower risk management. In contrast, share compensation increases managerial exposure to firm risk,

hence leading to higher risk management. Tufano (1996) provides empirical support for the theory.

The hypotheses used to test the propositions are stated below:

H2a: *Ceteris paribus*, CEO option compensation is negatively related to firm risk management in Australian mining firms.

H2b: *Ceteris paribus*, CEO share compensation is positively related to firm risk management in Australian mining firms.

Director equity compensation is considered next. Director option and share compensation has increased significantly over time (Yermack, 2004; Farrell et al., 2008). The observations within the AMS, reported in Section 6.2.1, are consistent with prior findings. It has been noted that director independence is related to firm risk management (Borokhovich et al., 2004). The association of director equity compensation and firm risk management is unknown. Informed by the propositions developed for CEO equity compensation and risk management, the following hypotheses were used to test the propositions stated above:

H2c: *Ceteris paribus*, director option compensation is negatively related to firm risk management in Australian mining firms.

H2d: *Ceteris paribus*, director share compensation is positively related to firm risk management in Australian mining firms.

The next section presents the results for the four hypotheses concerning the relationship of firm risk management and equity-based compensation.

Table 6-9: Risk management and equity compensation regression results^{a,b,c}

Independent Variable	Model H2a	Model H2b	Model H2c	Model H2d
	Clmn (1)	Clmn (2)	Clmn (3)	Clmn (4)
CEO_OptionComp	0.0003 (1.6226) [-]			
CEO_ShareComp		0.0002** (2.2091) [+]		
DIR_OptionComp			0.0000 (0.1082) [-]	
DIR_ShareComp				0.0037*** (2.9203) [+]
CEODuality	0.0850 (0.5329)	0.0944 (0.5932)	0.0839 (0.5245)	0.1105 (0.6893)
IndBoard	-0.0669 (-0.5367)	-0.0789 (-0.6330)	-0.0758 (-0.6096)	-0.0859 (-0.6918)
OwnConc	0.0089** (2.4447)	0.0088** (2.4455)	0.0091*** (2.5152)	0.0090*** (2.4990)
FRQ1	0.1131 (0.7956)	0.1251 (0.8764)	0.1215 (0.8567)	0.1037 (0.7272)
FRQ2	0.4652*** (3.1806)	0.4798*** (3.2968)	0.4780*** (3.2663)	0.4823*** (3.3188)
Leverage	0.5158*** (4.224)	0.5129*** (4.2169)	0.5044*** (4.1283)	0.5140*** (4.2323)
FirmSize	0.3158*** (11.0181)	0.3134*** (10.8365)	0.3203*** (11.2629)	0.3189*** (11.2117)
FirmPerform	0.1384 (0.8860)	0.1415 (0.8982)	0.1367 (0.8806)	0.1474 (0.9515)
Intercept	-5.1578*** (-17.7635)	-5.1170*** (-17.5325)	-5.1747*** (-17.8135)	-5.1839*** (-17.8667)
Psuedo R²	0.2555	0.2559	0.2547	0.2572
Wald χ^2	705.40***	706.45***	703.11***	710.09***
Observations	3163	3163	3163	3163

Notes:

^a First value presented is the coefficient estimate and the z-statistic is provided in parenthesis.

^b Two-tailed p-values were used to determine significance: * if $p < 0.1$; ** if $p < 0.05$; *** if $p < 0.01$.

^c Logistic regression models were corrected for heteroskedasticity by selecting the White test because heteroskedasticity violates the assumption of constant variance (Baltagi et al., 2006).

Table 6-9 reports the results of the binary logistic regression models:

$$\text{RiskM}_i = \alpha + \beta_1 \text{CEO_OptionComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots \text{ (H2a)}$$

$$\text{RiskM}_i = \alpha + \beta_1 \text{CEO_ShareComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots \text{ (H2b)}$$

$$\text{RiskM}_i = \alpha + \beta_1 \text{DIR_OptionComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots \text{ (H2c)}$$

$$\text{RiskM}_i = \alpha + \beta_1 \text{DIR_ShareComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i \quad \dots \text{ (H2d)}$$

where, RiskM (dependent variable) = risk management, dichotomous variable, coded as 1 when the firm is a derivative user, 0 otherwise. CEO_OptionComp = SQRT of option compensation paid to CEO. CEO_ShareComp = SQRT of share compensation paid to CEO. DIR_OptionComp = SQRT of option compensation paid to directors. DIR_ShareComp = SQRT of share compensation paid to directors. CEODuality = CEO duality, dichotomous variable, coded as 1 when chairperson role held by the CEO or 0 otherwise. IndBoard = board independence, dichotomous variable, coded 1 when majority of directors are independent directors or 0 if not majority independent directors. OwnConc = ownership concentration, percentage of shares held by top 20 shareholders. FRQ1 = financial reporting quality variable 1, dichotomous variable, coded as 1 when the firm is audited by a Big 4 audit firm, 0 otherwise. FRQ2 = financial reporting quality variable 2, dichotomous variable, coded as 1 when the firm receives an unqualified audit report of its annual report, 0 otherwise. Leverage = the ratio of total debt to total assets. FirmSize = natural logarithm of firm sales. FirmPerform = firm performance, measured by return on equity (ROE).

6.5.1 H2a regression analysis

H2a tests whether *CEO option compensation increases firm risk management*. The result of Model H2a illustrated in Column 1 of Table 6-9 reveals an insignificant coefficient of CEO option compensation. H2a is not supported, indicating CEO option compensation is not associated with firm risk management.

Carpenter (2000) identified that option compensation causes two opposite consequences on managerial wealth depending on the moneyness¹⁰⁰ of the options. Hence option compensation can precipitate conflicting behavioural responses in regard to firm risk management. In the first phase, CEO wealth rises with an increase in share return volatility, reflecting the options potential payoff, hence the CEO is incentivized to reduce firm risk management. Next in phase two, the payoff from options becomes secondary to the potential downside a reduction in share price causes to CEO wealth (attributable to either converted options (shares) or in the money options). When conditions satisfy this phase, the CEO is motivated to protect personal wealth attributable to the personal option and shareholding in the firm, and therefore increase the level of firm risk management.

In summary, CEO option compensation does not influence the level of firm risk management which implies shareholders do not need to be concerned the CEO will change the firm risk management strategy as a consequence of option compensation to the detriment of the firm and shareholders.

¹⁰⁰ 'Moneyness' is a term describing the relationship between the strike price of an option and the current trading price of its underlying security.

6.5.2 H2b regression analysis

H2b tests whether *CEO share compensation increases firm risk management*. The results of Model H2b illustrated in column 2 of Table 6-9 reveal that the coefficient of CEO share compensation ($\beta_1 = 0.0002$, $z = 2.2091$) is positive and significant at the 5% level. The finding confirms H2b and indicates an increase in the CEO share compensation is associated with an increase in the level of firm risk management. The payment of share compensation to the CEO increases firm risk management.

The result is consistent with Tufano (1996) and supports the claim of Smith and Stulz (1985) that CEO share compensation will result in an increase in firm risk management. They assert the CEO will be motivated to manage more firm risk due to personal risk aversion associated with the CEO's personal undiversified wealth being linked to the firm as a consequence of share compensation.

Following recent reforms prohibiting managerial hedging of at risk equity-based compensation in the US and Australia, the only avenue remaining for management to moderate or eliminate their personal risk is at the firm level.

In summary, CEOs compensated with shares hold an unbalanced portfolio in which they are disproportionately exposed to performance of the firm they manage. In order to limit their personal exposure to loss they engage in higher levels of firm risk management to shield the firm and themselves from possible downside exposure in the market such as falling commodity prices.

6.5.3 H2c regression analysis

H2c tests whether *director option compensation is negatively correlated with firm risk management*. The result of Model H2c illustrated in Column 3 of Table 6-9 reveals the coefficient of director option compensation is insignificant. Thus H2c is not supported which implies the payment of options to directors as a form of compensation does not impact upon firm risk management.

Aside from prior research examining the impact of CEO option compensation upon firm risk management there is no prior research directly concerned with director option compensation and firm risk management. However, the result of Model H2c is consistent with Faff et al. (2011), which found that there was no association between managerial option holdings and firm risk management, where managerial option holding is the sum of executive and director option holdings.

Recent regulatory reforms¹⁰¹ have identified the role of the board in firm risk management and the importance of appropriate director compensation. The results of this study suggest director option compensation does not motivate directors to adjust firm risk management.

6.5.4 H2d regression analysis

H2d tests whether *director share compensation increases firm risk management*. The result of Model H2d illustrated in Column 4 of Table 6-9 reveals the coefficient of director share compensation ($\beta_1 = 0.0037$, $z = 2.9203$) is significantly positive at the 1% level. Thus H2d is

¹⁰¹ The CGPR 3rd edition includes an update to Principle 7: *Recognise and manage risk* and Principle 8: *Remunerate fairly and responsibly* (ASX, 2014). In addition s295A *Corporation Act 2001(Cth)* requires the Board of Directors to produce a statement regarding the effectiveness of risk management systems and must be signed by the CEO and CFO.

supported. The finding implies that the payment of shares to directors as a form of compensation does encourage the board to increase firm risk management. The coefficient of director share compensation is 18.5 times larger than the coefficient for CEO share compensation. Every dollar of share compensation paid to directors is associated with a greater rise in risk management when compared to the CEO share compensation.

There is no prior research examining the discrete effect of director share compensation on firm risk management. Limited prior research has investigated the joint impact of director and executive shareholding on firm risk management. Dionne and Triki (2013) examined the influence of combined director and executive shareholding on firm risk management. They cite Smith and Stulz (1985) and predict and observe a positive relationship between managerial shareholding and risk management.

The results demonstrate that director share compensation may be an effective mechanism to increase director engagement towards increased diligence regarding firm risk management. The ongoing debate on how equity-based compensation for directors may shape board behaviour struggles to reconcile the monitoring/oversight function of the board with the desire to increase firm performance. Ultimately the board must balance the risk/reward scales to reflect the preferences of the shareholders. On the one hand, any form of director equity compensation in the form of shares binds the director's interests to those of the shareholder, value enhancing firm risk management decisions increase the wealth of directors and shareholders alike. Therefore, director share compensation will motivate directors to critically evaluate risk management decisions and only approve value enhancing proposals. In contrast, an increase in the director's personal stake in the firm, directly attributable to share compensation, will provoke defensive behaviour by directors to protect their personal wealth

exposure. Directors paid with share compensation will be motivated to increase firm risk management to minimise the personal loss of wealth resulting from unfavourable market conditions for the firm. Balancing director personal preferences with shareholder interests caused by the introduction of director share compensation threatens one of the most important board functions, objective oversight of executive management decisions.

6.5.5 Summary H2 regression controls analysis

As shown in Table 6-9, four of the control variables return significant results, i.e., firm risk management is significantly and positively related to ownership concentration, unqualified audit report (*FRQ2*), leverage and firm size.¹⁰²

Higher levels of substantial shareholders¹⁰³ and institutional investors increase ownership concentration. Substantial shareholders with an undiversified share portfolio benefit from risk management as a result of the reduction in unsystematic risk (Aretz and Bartram, 2010; Bartram et al., 2011). Larger investors such as institutional investors have greater incentive to monitor management decisions. Risk management improves the transparency of managerial performance by delineating the impact caused by management decision and market movements (Campbell and Kracaw, 1987), thereby enabling improved monitoring of management.

¹⁰² Although not reported here, using alternate proxies for firm size such as the natural log of market capitalization and natural log of total assets produced similar results.

¹⁰³ It is a requirement under the ASX listing rules that shareholders with greater than five percent of company issued shares, referred to as substantial shareholders, are to be disclosed in the annual report.

Fargher et al., (2013) state that the audit opinion is a direct function of client risk. Therefore firms engaging in risk management are comparatively less risky and more likely to receive an unqualified audit report. Firms instituting risk management are likely to possess the necessary skills and knowledge to use derivatives to offset various risks and are more capable of disclosing complex information regarding risk management to auditors and investors (Birt et al., 2013). Prima facie, they are more likely to attain an unqualified audit report.

Highly leveraged firms manage firm risk (Dolde, 1995; Tufano, 1996; Geczy et al., 1997). Risk management is associated with financial leverage (Berkman et al., 2002; Nguyen and Faff, 2002; Birt et al., 2013). Creditors to leveraged firms impose debt covenants on borrowers (Smith and Warner, 1979) such as strict risk management requirements to reduce the risk of losses resulting for default. Debt covenants transfer the control of key management decisions to creditors when the value of their outstanding debt is at risk (Ball and Shivakumar, 2006). Risk management lowers the cost of capital as debtholder agency costs are reduced (Morellec and Smith, 2007). Risk management can mitigate cash flow variability and hence enable firms to take up valuable risk taking investment opportunities (Stulz, 1996).

Firm size is positively associated with risk management (Berkman et al., 2002; Nguyen and Faff, 2002; Heaney and Winata, 2005). Larger firms have greater access to the resources required to engage in risk management including the complex set of skills required to manage and monitor the use of financial instruments (Gay and Nam, 1998; Haushalter, 2000; Berkman et al., 2002; Dionne and Triki 2013).

CEO Duality (*CEODuality*), Independent Board (*IndBoard*), Big 4 auditor (*FRQ1*) and Firm Performance (*FirmPerform*) return insignificant results suggesting they are not associated

with firm risk management within the Australian mining sector. The independence of the board and CEO duality are not associated with risk management suggesting risk management is not effected by the strength of board oversight of executive management. One could assume Big 4 auditor firms would be better placed to audit risk management practices within a firm. However there is no significant association between the use of a Big 4 firm and risk management. Firms can elect to use or not use risk management. The insignificant association with firm performance suggests firms do not engage in risk management to improve firm performance.

In conclusion the results of Models H2b and H2d suggest that CEO and director share compensation does encourage management to adopt firm risk management through the use of derivatives. The results provide insights into one of the potential side effects of increasing share compensation to directors. The output from Models H2a and H2c reveals managerial option compensation does not influence firm risk management.

6.6 Results for shareholder value creation

Table 6-10 provides the pooled OLS regression results to test the two hypotheses (H3a, H3b) in Figure 5.3 of chapter 5. The adjusted R^2 s are 0.0833 and 0.0561 for Model H3a and H3b respectively. The F -statistics of 36.37 and 24.58 are statistically significant at 1% level.

The CEO, supported by the board, is expected to set firm risk strategy to create additional firm value for shareholders under conditions of uncertainty (Copeland and Weston, 1988). Risk strategy encompasses risk taking and risk management decision making by management and is expected to influence shareholder value creation.

Numerous studies report a positive association of risk taking and shareholder value creation (e.g. Miller and Bromiley, 1990; Woolridge and Snow, 1990; Miller and Reuer, 1996; Akbar et al., 2008). Assuming firms engage in risk taking investment to increase firm value, the hypothesis listed below is tested:

H3a: *Ceteris paribus*, shareholder value creation is positively associated with firm risk taking within the Australian mining sector.

Advocates in favour of risk management propose it increases shareholder value by reducing financial distress costs and taxes, minimises cash flow volatility and hence protects future investment opportunities, and reduces opacity of management performance (Dionne and Triki, 2013).

Several studies provide empirical evidence of a positive association of risk management and shareholder value creation (Allayannis and Weston 2001; Carter et al. 2006; Nelson et al. 2005; Bartram et al., 2011). In order to examine the relationship between firm risk management and shareholder value creation the following hypothesis is tested:

H3b: *Ceteris paribus*, shareholder value creation is positively associated with risk management for Australian listed mining firms.

The results of hypotheses H3a and H3b are presented in Table 6-10.

Table 6-10: Shareholder value creation and risk strategy regression results ^{a,b,c}

	Model H3a	Model H3b
	(ROE)	(ROE)
Independent Variables	Clmn(1)	Clmn(2)
RiskT	0.0579 ^{***} (8.3213)	
	[+]	
RiskM		-0.0498 (-1.2407)
		[+]
CEODuality	0.0085 (0.2194)	0.0023 (0.0592)
IndBoard	-0.0078 (-0.2673)	-0.0176 (-0.5933)
OwnConc	0.0021 ^{**} (2.4006)	0.0026 ^{***} (2.9752)
FRQ1	0.0358 (0.9484)	0.05 (1.3303)
FRQ2	0.0393 (1.2213)	0.0445 (1.3562)
Leverage	-0.0003 ^{***} (-2.7274)	-0.0002 [*] (-1.839)
FirmSize	0.0628 ^{***} (11.3386)	0.0515 ^{***} (9.7761)
Intercept	-1.0861 ^{***} (-15.2891)	-0.8548 ^{***} (-14.1771)
Adjusted R²	0.0833	0.0561
F-statistic	36.37 ^{***}	24.58 ^{***}
Observations	3102	3163

Notes:

^a First value presented is the coefficient estimate and the *t*-statistic is provided in parenthesis.

^b Two-tailed *p*-values were used to determine significance: * if *p* < 0.1; ** if *p* < 0.05; *** if *p* < 0.01.

^c The Ramsey Regression Specification Error Test (RESET) was used to examine if the powers of fitted variables existed in the regression models presented. The RESET test starts with the second power continuing through to the fourth power. The individual *t*-statistics were all insignificant, indicating the regression models demonstrated no evidence of nonlinear effects.

Table 6-10 reports results of OLS regression models:

Model H3a

$$\text{ShValueCreation}_i = \alpha + \beta_1 \text{RiskT}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i \\ + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \varepsilon_i$$

Model H3b

$$\text{ShValueCreation}_i = \alpha + \beta_1 \text{RiskM}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i \\ + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \varepsilon_i$$

where, ShValueCreation = accounting based measure of shareholder value creation, measured by return on equity (ROE). RiskT = the natural log of firm risk taking. RiskM = risk management, dichotomous variable, coded as 1 when the firm is a derivative user, 0 otherwise. CEODuality = CEO duality, dichotomous variable, coded as 1 when chairperson role held by the CEO or 0 otherwise. IndBoard = board independence, dichotomous variable, coded 1 when majority of directors are independent directors or 0 if not majority independent directors. OwnConc = ownership concentration, percentage of shares held by top 20 shareholders. FRQ1 = financial reporting quality variable 1, dichotomous variable, coded as 1 when the firm is audited by a Big 4 audit firm, 0 otherwise. FRQ2 = financial reporting quality variable 2, dichotomous variable, coded as 1 when the firm receives an unqualified audit report of its annual report, 0 otherwise. Leverage = the ratio of total debt to total assets. FirmSize = natural logarithm of firm sales.

6.6.1 H3a regression analysis

H3a tests whether *firm risk taking increases shareholder value*, by examining the relationship between firm risk taking and shareholder value creation. The result of Model H3a displayed in Column 1 of Table 6-10 reveals that the coefficient of risk taking ($\beta_1 = 0.0579$, $t = 8.3213$) is significantly positive at the 1% level. Thus H3a is supported. The finding infers firm risk taking enhances shareholder value through the increase in shareholder value creation it invokes.

The result is consistent with the prior empirical work of McConnell and Muscarella (1985), Chan et al. (1990), Chaney and Devinney (1992), Brailsford and Yeoh (2004), and Kim et al. (2005), which all reported a positive market reaction to the announcement of risk taking investment. McConnell and Muscarella (1985) suggest risk taking investment signals an expected increase in future earnings, which is reflected by an increase in the share price, and in turn an increase in shareholder wealth. In addition, the result corroborates the Walls and Dyer (1996) study of oil and gas producers that observed a positive link between actual risk taking expenditure and shareholder value creation. They argue firm risk taking policy seems to matter and significantly impacts firm economic performance. Walls (2005) makes stronger inferences concerning the causal relationship between firm risk taking behaviour and firm performance over an extended period, and concludes highly risk averse firms generate inferior returns for shareholders when compared to the relative higher returns produced by firms exhibiting a relatively higher appetite for risk taking. Therefore, equity-based compensation can help to shape appropriate management behaviour.

6.6.2 H3b regression analysis

H3b tests whether *firm risk management increases* shareholder value creation. The result of Model H3b displayed in Column 2 of Table 6-10 reveals that the coefficient of risk management is not significant. Thus H3b is not supported. The finding is congruent with Jin and Jorion (2006), which investigated the association between firm risk management and shareholder value creation for a group of US based oil and gas companies, and found no difference in the performance between firms that manage risk and firms that do not engage in risk management. They speculate if risk management does not improve shareholder value creation, then it may be motivated by management risk aversion.

The result conforms with the predictions of Tufano (1996), whereby he assumes risk management is irrelevant since investors can diversify their investments and optimise their own level of risk management individually, assuming efficient capital markets (Modigliani and Miller 1958). Therefore, firm risk management strategy does not influence shareholder value creation.

The results contradict Stulz's (1996) hypothesized link between firm risk management and shareholder value creation. Although risk management may reduce firm cash flow volatility and the likelihood of firm financial distress, the result implies the market does not value such managerial interventions. Possibly the motive behind firm risk management is managerial risk aversion and not increasing shareholder value creation. The result does not suggest firm risk management reduces shareholder wealth but nor does it increase shareholder wealth.

6.6.3 Summary H3 regression controls analysis

Three of the control variables return significant results. Shareholder value creation is significantly and positively related to ownership concentration and firm size,¹⁰⁴ and significantly and negatively associated with leverage.

The results, provided in Table 6-10, show a positive association between ownership concentration and shareholder value creation in all models. This finding is congruent with prior empirical research by Krivogorsky (2006), which suggests that large shareholders¹⁰⁵ complement corporate governance mechanisms and provide improved monitoring of shareholder value creation. Brickley et al. (1988 and 1994), Agarwal and Mandelker (1990) and Bathala et al. (1994) observed a positive association of ownership concentration and shareholder value creation. They infer larger investors, such as institutional investors, have an incentive and the resources to monitor management decisions. The results indicate large shareholders can and will act to intervene when management make decisions to the detriment of shareholders as predicted by Shleifer and Vishny (1986).

The results report a positive association between firm size and shareholder value creation in all models. The empirical US based study by Hall and Weiss (1967) observed a positive relationship between firm size and shareholder value creation.¹⁰⁶ They conclude large firms are endowed with all of the same resources as smaller

¹⁰⁴ Although not reported here, substitute proxies for firm size such as the natural log of total assets and natural log of market capitalization produced similar results.

¹⁰⁵ Substantial shareholders and institutional investors increase ownership concentration by virtue of the fact they hold large equity stakes in the company and concentrate the ownership amongst a smaller group of investors.

¹⁰⁶ Hall and Weiss (1967) achieve consistent results using both ROA and ROE to measure firm performance.

firms. However, large firms can also employ large scale production and benefit from the efficiency of economies of scale, and they have access to capital markets beyond the reach of smaller firms. Both factors enable larger firms to generate greater returns and sustain higher levels of shareholder value creation.

The results show a negative relationship connecting leverage to shareholder value creation consistent with studies by Lang et al. (1996) and Gonzalez (2013). Lang et al. (1996) report a negative relation between leverage and firm performance. They conclude that firms with valuable growth opportunities access equity to fund growth instead of debt. Gonzalez (2013) examined leverage and shareholder value creation in the context of economic downturns and contend that firms with higher leverage are saddled with higher financial distress costs which in turn drag down shareholder value creation. He asserts that, during periods of increasing funding costs, shareholders are more exposed to financial risk if they hold shares in highly leveraged firms relative to firms with less debt.

CEO Duality (*CEODuality*), Independent Board (*IndBoard*), Big 4 auditor (*FRQ1*) and Unqualified Audit Opinion (*FRQ2*) return insignificant results suggesting they do not influence shareholder value creation within the Australian mining sector. The combined results suggest that CG arrangements improving monitoring and oversight of the board, such as board independence and non-CEO duality, are not associated with improved firm performance. In addition the confidence shareholders may place in improved financial reporting quality associated with Big 4 auditors and unqualified audit opinions does not translate to a statistically significant change in firm

performance. This may be unique to the AMS or it could signal that improved CG is no guarantee for improved firm performance.

In conclusion, Models H3a and Model H3b examine the association between firm risk strategy and shareholder value creation. First, Model H3a investigated firm risk taking and shareholder value creation. The result supported H3a and suggests shareholder value creation is positively associated with risk management for Australian listed mining firms. This implies firm risk taking policy is an important consideration influencing shareholder value creation. Any impediment to firm risk taking investment may be to the detriment of shareholder wealth. Second, Model H3b explored firm risk management and shareholder value creation. The result did not support H3b thereby raising the question, why then do firms manage risk if it does not enhance shareholder wealth? Managerial risk aversion is one possible explanation for why firms elect to engage in risk management.

6.7 Robustness checksecks

To test the robustness of the results, alternative measures of shareholder value creation, risk strategy, and equity compensation were drawn from earlier literature. In terms of the first set of hypotheses, the proxies of key independent variables are restructured as follows. CEO option compensation (Model H1a), CEO share compensation (Model H1b), director option compensation (Model H1c), and director share compensation (Model H1d) are surrogated by binary codification, similar to the dummy variable used by Rajgopal and Shevlin, (2002) for stock option compensation. A value of 1 represents the payment of the relevant form of compensation and 0 otherwise. In the second set of hypotheses of Models H2a, H2b, H2c and H2d, the dependent variable for risk management is replaced by an alternate proxy for risk management, the ratio of book to market value. Regarding the third set of hypotheses of Models H3a and H3b, the dependent variable is replaced by alternative measures of firm performance: return on assets (ROA) as an accounting measure and a market based measure of total shareholder return (TSR) in the same manner as Morck et al. (1988). The global financial crisis (GFC) brought economic and financial exogenous shocks, so as a consequence the impact of GFC is also investigated. The results of the robustness testing were highly similar to the main analysis and are discussed in detail below.

6.7.1 Tests of robustness Model 1

The robustness test for Model 1 modifies the continuous variables utilised in Model 1 for the key variables of interest, CEO option compensation, CEO equity compensation, director option compensation and director equity compensation to a binary variables reflecting the use of EBC for the CEO or director. This is consistent with the Rajgopal and Shevlin, (2002) study of magnitude of risk incentives of CEO and risk taking using a binary variable for measurement of stock option plan adoption. Use of a binary variable in place of a continuous variable enables the impact of the adoption of option or equity compensation to be analysed without the distortion associated with subsequent valuation of the value of the financial instrument. It also eliminates EBC measurement differences allowable under the financial reporting standards (AASB 2, *Share-based Payment*).

Table 6-11: Alternative risk taking and equity compensation results ^{a,b}

Independent Variable	Alternative Model H1a	Alternative Model H1b	Alternative Model H1c	Alternative Model H1d
	Clmn (1)	Clmn (2)	Clmn (3)	Clmn (4)
CEO_OptionCompB	0.174 ^{**} (2.124) (+)			
CEO_ShareCompB		0.0572 (0.4124) (?)		
DIR_OptionCompB			0.2742 ^{***} (2.8881) (+)	
DIR_ShareCompB				0.0919 (0.4727) (?)
CEODuality	-0.2167 [*] (-1.9344)	-0.2274 ^{**} (-2.0294)	-0.2416 ^{**} (-2.1597)	-0.229 ^{**} (-2.0451)
IndBoard	-0.0549 (-0.6371)	-0.0585 (-0.6792)	-0.0573 (-0.6658)	-0.059 (-0.6844)
OwnConc	0.0069 ^{***} (2.7268)	0.0067 ^{***} (2.6628)	0.0068 ^{***} (2.7164)	0.0068 (2.6926)
FRQ1	0.1461 (1.1692)	0.1565 (1.2526)	0.1565 (1.2547)	0.1571 (1.2579)
FRQ2	0.0346 (0.3617)	0.0279 (0.2922)	0.0334 (0.3499)	0.0287 (0.3)
Leverage	-0.2865 ^{***} (-18.3468)	-0.2847 ^{***} (-18.1834)	-0.2815 (-18.0618)	-0.2843 (-18.233)
FirmSize	-0.6381 ^{***} (-7.1977)	-0.6488 ^{***} (-7.3217)	-0.6352 ^{***} (-7.1703)	-0.6479 ^{***} (-7.3134)
FirmPerform	0.4769 ^{***} (8.697)	0.4749 ^{***} (8.6536)	0.4805 ^{***} (8.7634)	0.4759 ^{***} (8.671)
Intercept	5.0766 ^{***} (28.8123)	5.1511 ^{***} (29.7828)	5.0595 ^{***} (28.8308)	5.1463 ^{***} (29.7352)
Adjusted R²	0.1617	0.1605	0.1627	0.1605
F-statistic	67.44 ^{***}	66.87 ^{***}	67.95 ^{***}	66.87 ^{***}
Observations	3102	3102	3102	3102

^a First value presented is the coefficient estimate and the *t*-statistic is provided in parenthesis.

^b Two-tailed *p*-values were used to determine significance: * if *p* < 0.1; ** if *p* < 0.05; *** if *p* < 0.01.

Table 6-11 reports results of OLS regression models:

Model H1a

$$\text{RiskT}_i = \alpha + \beta_1 \text{CEO_OptionCompB}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i$$

Model H1b

$$\text{RiskT}_i = \alpha + \beta_1 \text{CEO_ShareCompB}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i$$

Model H1c

$$\text{RiskT}_i = \alpha + \beta_1 \text{DIR_OptionCompB}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i$$

Model H1d

$$\text{RiskT}_i = \alpha + \beta_1 \text{DIR_ShareCompB}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i$$

where, RiskT (dependent variable) = the natural log of firm risk taking.

CEO_OptionCompB = dichotomous variable, coded 1 when option compensation

paid to CEO, 0 otherwise. CEO_ShareCompB = dichotomous variable, coded 1 when

share compensation paid to CEO, 0 otherwise. DIR_OptionCompB = dichotomous

variable, coded 1 when option compensation paid to Directors, 0 otherwise.

DIR_ShareCompB = dichotomous variable, coded 1 when share compensation paid to

Directors, 0 otherwise. Leverage = the ratio of total debt to total assets. CEODuality =

CEO duality, dichotomous variable, coded as 1 when Chairperson role held by the

CEO or 0 if not. IndBoard = board independence, dichotomous variable, coded 1

when majority of directors are independent directors or 0 if not majority independent

directors. OwnConc = ownership concentration, percentage of shares held by top 20

shareholders. FRQ1 = Financial Reporting Quality variable 1, dichotomous variable,

coded as 1 when the firm is audited by a Big 4 audit firm, 0 otherwise. FRQ2 = Financial Reporting Quality variable 2, dichotomous variable, coded as 1 when the firm receives an unqualified audit report of its annual report, 0 otherwise. FirmSize = natural logarithm of firm sales. FirmPerform = firm performance, measured by return on equity (ROE).

6.7.2 Discussion of results from robustness Model 1

The result of the alternative Model H1a illustrated in Column 1 of Table 6-11 reveals the coefficient of CEO option compensation ($\beta_1 = 0.174$, $t = 2.124$) has a positive significance at the 5% level. The finding is consistent with the result of H1a in Table 6-8 and supports the assertion that increases in CEO option compensation is associated with increases in the level of firm risk taking.

The result of the alternative Model H1b illustrated in Column 2 of Table 6-11 reveals an insignificant coefficient of CEO share compensation. The result matches Model H1b in Table 6-8.

The result of the alternative Model H1c shown in Table 6-11 Column 3 demonstrates a significant and positive relation between director option compensation ($\beta_1 = 0.2742$, $t = 2.8881$) and firm risk taking at the 1% level. This finding is consistent Model H1c.

The results of the alternative Model H1d illustrated in Column 4 of Table 6-11 reveals the coefficient of director share compensation is insignificant. The findings report no significant association between director share compensation and firm risk taking.

6.7.3 Tests of robustness Model 2

The robustness test for Model 2 switches the dependent variable from an internal proxy of risk management to a market based measure of risk management. The ratio of book value of assets to firm market value (Smith and Watts 1992) is used to proxy for the level of firm risk management. Baker and Filbeck (2014) suggest firms optimise their risk management through a process of selecting between various choices including avoidance, retention, prevention and transfer to alter the distribution of potential earnings outcomes. Risk management measured by book to market¹⁰⁷ reflects the choice of a portfolio of assets and liabilities to produce an acceptable level of risk (Baker and Filbeck, 2014).

¹⁰⁷ Chan and Chen (1991) provide additional support for using the ratio of book to market as a proxy of risk management, stating higher market to book ratios are an indicator of financial distress.

Table 6-12: Alternate risk management and equity compensation regression results^{a,b}

Independent Variable	Alternative	Alternative	Alternative	Alternative
	Model	Model	Model	Model
	H2a	H2b	H2c	H2d
	Clmn (1)	Clmn (2)	Clmn (3)	Clmn (4)
CEO_OptionComp	0.0003 (1.591) (-)			
CEO_ShareComp		0.0009*** (3.1103) (+)		
DIR_OptionComp			0.0011 (1.2351) (-)	
DIR_ShareComp				0.0033*** (2.5852) (+)
Leverage	0.0008** (2.3736)	0.0012*** (3.7828)	0.0005 (0.8012)	0.0012*** (3.6881)
CEODuality	0.2482* (1.7349)	0.2478* (1.7378)	0.2321 (1.6267)	0.2385* (1.6731)
IndBoard	0.4391*** (4.0223)	0.4304*** (3.9485)	0.4445*** (4.0606)	0.4381*** (4.0166)
OwnConc	0.0112*** (3.5141)	0.0106*** (3.341)	0.0113*** (3.5606)	0.0112*** (3.529)
FRQ1	-0.2566 (-1.6138)	-0.2592 (-1.633)	-0.2467 (-1.5532)	-0.2519 (-1.5871)
FRQ2	0.8215*** (6.7849)	0.8248*** (6.8273)	0.8255*** (6.8203)	0.8276*** (6.8478)
FirmSize	-0.0935*** (-4.7993)	-0.0974*** (-5.0299)	-0.0898*** (-4.6757)	-0.0927*** (-4.8259)
FirmPerform	-1.0369*** (-15.3422)	-1.0361*** (-15.351)	-1.035*** (-15.3152)	-1.0316*** (-15.2747)
Intercept	1.1867*** (5.4092)	1.2412*** (5.6405)	1.1671*** (5.3196)	1.1824*** (5.3956)
Adjusted R²	0.0983	0.1003	0.098	0.0995
F- statistic	39.3***	40.18***	39.18***	39.81***
Observations	3163	3163	3163	3163

Notes:

^a First value presented is the coefficient estimate and the z-statistic is provided in parenthesis.

^b Two-tailed p-values were used to determine significance: * if $p < 0.1$; ** if $p < 0.05$; *** if $p < 0.01$.

Table 6-12 reports the results of the OLS regression models:

Model H2a

$$\text{RiskM2}_i = \alpha + \beta_1 \text{CEO_OptionComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i$$

Model H2b

$$\text{RiskM2}_i = \alpha + \beta_1 \text{CEO_ShareComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i$$

Model H2c

$$\text{RiskM2}_i = \alpha + \beta_1 \text{DIR_OptionComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i$$

Model H2d

$$\text{RiskM2}_i = \alpha + \beta_1 \text{DIR_ShareComp}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{FirmPerform}_i + \varepsilon_i$$

where, RiskM2 (dependent variable) = ratio of book-to-market value, a market based measure of firm risk management. CEO_OptionComp = SQRT of option compensation paid to CEO. CEO_ShareComp = SQRT of share compensation paid to CEO. DIR_OptionComp = SQRT of option compensation paid to Directors. DIR_ShareComp = SQRT of share compensation paid to Directors. Leverage = the ratio of total debt to total assets. CEODuality = CEO duality, dichotomous variable, coded as 1 when Chairperson role held by the CEO or 0 if not the CEO. IndBoard = board independence, dichotomous variable, coded 1 when majority of directors are independent directors or 0 if not majority independent directors. OwnConc = ownership concentration, percentage of shares held by top 20 shareholders. FRQ1 = Financial Reporting Quality variable 1, dichotomous variable, coded as 1 when the firm is audited by a Big 4 audit firm, 0 otherwise. FRQ2 = Financial Reporting

Quality variable 2, dichotomous variable, coded as 1 when the firm receives an unqualified audit report of its annual report, 0 otherwise. FirmSize = natural logarithm of firm sales. FirmPerform = firm performance, measured by return on equity (ROE).

6.7.4 Results of robustness Model 2

The result of the alternative Model H2a illustrated in Column 1 of Table 6-12 reveals that the coefficient of CEO option compensation is insignificant. The finding supports the result of H2a in Table 6-9 reporting no association between CEO option compensation and firm risk management.

The result of the alternate Model H2b illustrated in Column 2 of Table 6-12 reveals that the coefficient of CEO share compensation ($\beta_1 = 0.0009$, $t = 3.1103$) is positive and significant at the 1% level. The finding is consistent with the result of H2b, indicating CEO share compensation is associated with firm risk management.

The result of the alternative Model H2c illustrated in Column 3 of Table 6-12 reveals that the coefficient for director option compensation is insignificant. The finding is consistent with the primary result of Model H2c and infers that director option compensation is not related to firm risk management.

The result of the alternative Model H2d illustrated in Column 4 of Table 6-12 reveals that the coefficient of director share compensation ($\beta_1 = 0.0033$, $t = 2.5852$) has a positive significance at the 1% level. The finding is consistent with the primary result of H2d.

6.7.5 Tests of robustness Model 3

Shareholder value creation can be calculated using accounting-based measures of firm performance and market-based measures of firm performance¹⁰⁸ (Lambert and Larcker, 1987; Tosi et al., 2000; Van Essen et al., 2012). The robustness test for Model 3 switches the dependent variable in Model 3, shareholder value creation, to an alternate accounting based measure return on assets (alternate Model 3a-1, 3b-1) and a market based measure total shareholder returns (alternate Model 3a-2, 3b-2).

Return on assets (*ROA*) is an accounting-based measure of firm profitability calculated by dividing firm profit by total firm assets. *ROA* is a historic measure of firm performance that reflects the earnings a firm generates from the stock of assets at its disposal during the reporting period and is used widely in accounting and finance research (e.g. Agrawal and Mandelker 1987; Werner and Tosi, 1995; Core and Larker, 2002; Nguyen et al., 2010).

Total Shareholder Return (*TSR*) is a market based performance measure calculated by summing the dividend payments paid to shareholders representing their share of distributed earnings and the change in share price reflecting the capital gain or loss associated with holding the shares.¹⁰⁹ *TSR* calculates the change in wealth to shareholder over a reporting period attributable to ownership of the share and encapsulates historic performance and future performance expectations of the firm.

¹⁰⁸ See Morck et al. (1988), and Lambert and Larcker, (1987) for more information regarding the use of accounting and market-based measures of firm performance.

¹⁰⁹ Adjustments are made to account for dilutive events such as new share issues or share buy backs.

TSR is calculated as a percentage return to shareholders (Lambert and Larcker, 1987). An increase in *TSR* reflects higher performance, and conversely a reduction suggests lower performance. The use of Total shareholder return (*TSR*) as a market measure of firm performance in the research literature is widespread (e.g. Conyon and Peck, 1998; Aggarwal and Samwick, 2003; Siegel and Hambrick, 2005).

Table 6-13: Alternate shareholder value creation and risk strategy results^{a,b,c}

Independent Variables	Alternate Model 3a-1 _(ROA)	Alternate Model 3b-1 _(ROA)	Alternate Model 3a-2 _(TSR)	Alternate Model 3b-2 _(TSR)
	Clmn (1)	Clmn (2)	Clmn (3)	Clmn (4)
RiskT	0.0447 ^{***} (9.7509) (+)		11.328 ^{***} (2.643) (+)	
RiskM		0.0068 (0.2984) (+)		3.6703 (0.0903) (+)
Leverage	-0.0002 ^{***} (-3.0252)	-0.0001 [*] (-1.895)	0.1148 (1.4276)	0.1202 (1.4942)
CEODuality	-0.0099 (-0.3707)	-0.0209 (-0.7724)	93.146 ^{**} (2.0815)	97.9316 ^{**} (2.2111)
IndBoard	-0.0267 (-1.4087)	-0.0357 [*] (-1.8334)	46.1448 [*] (1.9516)	46.337 ^{**} (2.012)
OwnConc	0.0012 ^{**} (2.1929)	0.0015 ^{***} (2.6601)	-0.8549 (-1.154)	-0.8689 (-1.1946)
FRQ1	0.0538 ^{***} (2.5798)	0.0664 ^{***} (3.1826)	-6.5797 (-0.169)	-6.2894 (-0.1637)
FRQ2	0.06 ^{***} (2.7097)	0.0588 ^{***} (2.5858)	57.2757 [*] (1.8706)	55.7524 [*] (1.8259)
FirmSize	0.0522 ^{***} (14.2965)	0.0414 ^{***} (11.7962)	-8.7545 ^{**} (-2.1607)	-12.0462 ^{***} (-2.7601)
Intercept	-0.8574 ^{***} (-19.0201)	-0.6612 ^{***} (-16.9427)	158.5117 ^{***} (3.119)	217.0118 ^{***} (4.8124)
Adjusted R²	0.129	0.0932	0.0117	0.0099
F-statistic	58.63 ^{***}	41.79 ^{***}	3.94 ^{***}	3.54 ^{***}
Observations	3102	3163	1991 ^e	2030 ^e

Notes:

^a First value presented is the coefficient estimate and the *t*-statistic is provided in parenthesis.

^b Two-tailed *p*-values were used to determine significance: * if *p* < 0.1; ** if *p* < 0.05; *** if *p* < 0.01.

^c Use of the alternate Shareholder Value Creation variable reduces the sample size from 3102 to 1991 for Model 3a-1 compared to Model 3a-2, and from 3163 to 2030 for Model 3b-1 compared to Model 3b-2.

^d The observations in Alternate Model 3a-2 and 3b-2 are a subset of the full sample used in the primary models and robustness tests. The reduction in the sample size from 3102 to 1991 and 3163 to 2030 respectively is a reflection of the limited *TSR* data available from Datastream, all other factors remain unchanged.

Table 6-13 reports results of OLS regression models:

Model 3a-1

$$\text{ShValueCreation_ROA}_i = \alpha + \beta_1 \text{RiskT}_i + \gamma_1 \text{Leverage}_i + \gamma_2 \text{CEODuality}_i + \gamma_3 \text{IndBoard}_i \\ + \gamma_4 \text{OwnConc}_i + \gamma_5 \text{FRQ1}_i + \gamma_6 \text{FRQ2}_i + \gamma_7 \text{FirmSize}_i + \varepsilon_i$$

Model 3b-1

$$\text{ShValueCreation_ROA}_i = \alpha + \beta_1 \text{RiskM}_i + \gamma_1 \text{Leverage}_i + \gamma_2 \text{CEODuality}_i + \gamma_3 \text{IndBoard}_i \\ + \gamma_4 \text{OwnConc}_i + \gamma_5 \text{FRQ1}_i + \gamma_6 \text{FRQ2}_i + \gamma_7 \text{FirmSize}_i + \varepsilon_i$$

Model 3a-2

$$\text{ShValueCreation_TSR}_i = \alpha + \beta_1 \text{RiskT}_i + \gamma_1 \text{Leverage}_i + \gamma_2 \text{CEODuality}_i + \gamma_3 \text{IndBoard}_i \\ + \gamma_4 \text{OwnConc}_i + \gamma_5 \text{FRQ1}_i + \gamma_6 \text{FRQ2}_i + \gamma_7 \text{FirmSize}_i + \varepsilon_i$$

Model 3b-2

$$\text{ShValueCreation_TSR}_i = \alpha + \beta_1 \text{RiskM}_i + \gamma_1 \text{Leverage}_i + \gamma_2 \text{CEODuality}_i + \gamma_3 \text{IndBoard}_i \\ + \gamma_4 \text{OwnConc}_i + \gamma_5 \text{FRQ1}_i + \gamma_6 \text{FRQ2}_i + \gamma_7 \text{FirmSize}_i + \varepsilon_i$$

where, ShValueCreation_ROA = accounting measure of shareholder value creation, measured by Return On Assets (ROA). ShValueCreation_TSR = market measure of shareholder value creation, measured by Total Shareholder Return (TSR). RiskT = the natural log of firm risk taking. RiskM (dependent variable) = risk management, dichotomous variable, coded as 1 when the firm is a derivative user, 0 otherwise. Leverage = the ratio of total debt to total assets. CEODuality = CEO duality, dichotomous variable, coded as 1 when Chairperson role held by the CEO or 0 if not the CEO. IndBoard = board independence, dichotomous variable, coded 1 when majority of directors are independent directors or 0 if not majority independent directors. OwnConc = ownership concentration, percentage of shares held by top 20 shareholders. FRQ1 = Financial Reporting Quality variable 1, dichotomous variable, coded as 1 when the firm is audited by a Big 4 audit firm, 0 otherwise. FRQ2 =

Financial Reporting Quality variable 2, dichotomous variable, coded as 1 when the firm receives an unqualified audit report of its annual report, 0 otherwise. FirmSize = natural logarithm of firm sales.

6.7.6 Results of Robustness Model 3

The result of the alternate Model 3a-1 displayed in Column 1 of Table 6-13 reveals the coefficient of risk taking ($\beta_1 = 0.0447$, $t = 9.7509$) is significantly positive at the 1% level. The alternate Model 3a-1 and Model 3a utilises accounting measures of performance and yield consistent results. The alternate Model 3a-2, displayed in Column 3 of Table 6-13, utilised a market-based measure of firm performance and reports the same result as Model 3a. The coefficient of risk taking ($\beta_1 = 11.328$, $t = 2.643$) is significantly positive at the 1% level.

The result of the alternate Model 3b-1 displayed in Column 2 of Table 6-13 reveals the coefficient of risk management is not significant. The alternate Model 3b-1 and Model 3b utilise accounting measures of performance and yield similar results. The alternate Model 3b-2, displayed in Column 4 of Table 6-13, utilised a market based measure of firm performance and reports the same result as Model 3b.

6.7.7 Impact of the Global Financial Crisis

The Global Financial Crisis (GFC) of 2008 caused an economic exogenous shock to financial markets and is likely to have adversely impacted shareholder value creation (Aldamen et al., 2012; Kestens et al., 2012). Accordingly, the GFC robustness tests

are used to assess whether controlling for the GFC alters the observed associations for shareholder value creation, risk taking investment or risk management.

6.7.7.1 Impact of the Global Financial Crisis for Model 1 and Model 2

First, tests were undertaken to investigate whether the GFC influences the results for Model 1 and Model 2. The GFC tests (*GFC-TI*) utilize a dummy variable to control for the year of the GFC.

Table 6-14: GFC-T1 regression results^{a,b,c,d}:

Independent Variable	Model	Model
	H1a,b,c,d	H2a,b,c,d
	Clmn (1)	Clmn (2)
CEO_OptionComp	0.0003* (1.7885) [+]	0.0003 (1.6262) [-]
CEO_ShareComp	0.0004 (1.6069) [-/+]	0.0002* (1.9368) [+]
DIR_OptionComp	0.0008*** (3.9899) [+]	-0.0000 (-0.1963) [-]
DIR_ShareComp	0.0003 (0.4547) [-/+]	0.0033** (2.5511) [+]
GFC	0.0050 (0.0567)	0.0285 (0.2269)
Intercept^c	5.0998*** (27.7242)	-5.1303*** (-16.8780)
Adjusted R²/Psuedo R²	0.1685	0.2589
F-statistic/ Wald χ^2	49.3530***	714.8357***
Observations	3102	3163

^a First value presented is the coefficient estimate and the *t*-statistic is provided in parenthesis.

^b First value presented is the coefficient estimate and the *z*-statistic is provided in parenthesis.

^c Column 1 reports the results of regression Model 1 and column 2 the results of regression Model 2.

^d Although not reported here, all other control variables yielded results consistent with the results provided in:

Table 6-8: Risk Taking and Equity Compensation Regression Output, and

Table 6-9: Risk Management and Equity Compensation Regression Output

Table 6-14 reports results of pooled OLS regression models in column 1:

$$\text{RiskT}_i = \alpha + \beta_1 \text{CEO_OptionComp}_i + \gamma_1 \text{GFC}_i + \text{Controls} + \varepsilon_i \quad \dots(\text{H1a})$$

$$\text{RiskT}_i = \alpha + \beta_1 \text{CEO_ShareComp}_i + \gamma_1 \text{GFC}_i + \text{Controls} + \varepsilon_i \quad \dots(\text{H1b})$$

$$\text{RiskT}_i = \alpha + \beta_1 \text{DIR_OptionComp}_i + \gamma_1 \text{GFC}_i + \text{Controls} + \varepsilon_i \quad \dots(\text{H1c})$$

$$\text{RiskT}_i = \alpha + \beta_1 \text{DIR_ShareComp}_i + \gamma_1 \text{GFC}_i + \text{Controls} + \varepsilon_i \quad \dots(\text{H1d})$$

Table 6-14 reports results of the binary logistic regression models in column 2:

$$\text{RiskM}_i = \alpha + \beta_1 \text{CEO_OptionComp}_i + \gamma_1 \text{GFC}_i + \text{Controls} + \varepsilon_i \quad \dots(\text{H2a})$$

$$\text{RiskM}_i = \alpha + \beta_1 \text{CEO_ShareComp}_i + \gamma_1 \text{GFC}_i + \text{Controls} + \varepsilon_i \quad \dots(\text{H2b})$$

$$\text{RiskM}_i = \alpha + \beta_1 \text{DIR_OptionComp}_i + \gamma_1 \text{GFC}_i + \text{Controls} + \varepsilon_i \quad \dots(\text{H2c})$$

$$\text{RiskM}_i = \alpha + \beta_1 \text{DIR_ShareComp}_i + \gamma_1 \text{GFC}_i + \text{Controls} + \varepsilon_i \quad \dots(\text{H2d})$$

where, RiskT (dependent variable) = the natural logarithm of firm risk taking. RiskM (dependent variable) = risk management, dichotomous variable, coded as 1 when the firm is a derivative user, 0 otherwise. CEO_OptionComp = SQRT of option compensation paid to CEO. CEO_ShareComp = SQRT of share compensation paid to CEO. DIR_OptionComp = SQRT of option compensation paid to Directors. DIR_ShareComp = SQRT of share compensation paid to Directors. GFC = Global Financial Crisis, dichotomous variable, coded as 1 in the GFC year¹¹⁰ or 0 otherwise; Control variables include: Leverage = the ratio of total debt to total assets; CEODuality = CEO duality, dichotomous variable, coded as 1 when Chairperson role held by the CEO or 0 otherwise; IndBoard = board independence, dichotomous variable, coded 1 when majority of directors are independent directors or 0 if not majority independent directors; OwnConc = ownership concentration, percentage of shares held by top 20 shareholders; FRQ1 = Financial Reporting Quality variable 1, dichotomous variable, coded as 1 when the firm is audited by a Big 4 audit firm, 0 otherwise; FRQ2 = Financial Reporting Quality variable 2, dichotomous variable,

¹¹⁰ The coefficient of the variable GFC remains insignificant regardless of whether the year chosen is 2008 or 2009.

coded as 1 when the firm receives an unqualified audit report of its annual report, 0 otherwise; FirmSize = natural logarithm of firm sales; and FirmPerform = firm performance, measured by return on equity (ROE). GFC = Global Financial Crisis, dichotomous variable, coded as 1 in the GFC year or 0 otherwise.

The results presented in Table 6.14 reveal the coefficients of GFC dummy are insignificant for Model 1 and Model 2 and the coefficients of independent variables in Model 1 and 2 are consistent with the primary results presented in Tables 6-8 and Table 6-9, suggesting that the GFC had no impact on firm's risk taking and risk management.

6.7.7.2 Impact of Global Financial Crisis for Model 3

The second GFC test (*GFC-T2*) utilizes a dummy variable to control for the year of the GFC.

Table 6-15: GFC-T2 regression results ^{a,b}

	Model H3a	Model H3b
	(ROE)	(ROE)
Independent Variables	Clmn(1)	Clmn(2)
RiskT	0.0502 ^{***} (8.7081) [+]	
RiskM		-0.0025 (-0.0587) [+]
CEODuality	-0.0072 (-0.1981)	-0.0083 (-0.2237)
IndBoard	-0.0152 (-0.544)	-0.0289 (-1.0095)
OwnConc	0.0027 ^{***} (3.2947)	0.0032 ^{***} (3.7975)
FRQ1	0.0419 (1.034)	0.0513 (1.2349)
FRQ2	0.0368 (1.187)	0.0435 (1.3764)
Leverage	-0.2098 ^{***} (-7.3145)	-0.2427 ^{***} (-8.2622)
FirmSize	0.0695 ^{***} (13.4251)	0.0588 ^{***} (10.9506)
Intercept	-1.1008 ^{***} (-18.2398)	-0.8928 ^{***} (-15.8695)
GFC	-0.0378 (-0.9295)	0.0002 (0.0054)
Adjusted R²	0.0958	0.0773
F-statistic	37.52 ^{***}	29.34 ^{***}
Observations	3102	3163

Notes:

^a First value presented is the coefficient estimate and the *t*-statistic is provided in parenthesis.

^b Two-tailed *p*-values were used to determine significance: * if *p* < 0.1; ** if *p* < 0.05; *** if *p* < 0.01.

Table 6-15 reports results of OLS regression models:

Model H3a

$$\text{ShValueCreation}_i = \alpha + \beta_1 \text{RiskT}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{GFC}_i + \varepsilon_i$$

Model H3b

$$\text{ShValueCreation}_i = \alpha + \beta_1 \text{RiskM}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \gamma_8 \text{GFC}_i + \varepsilon_i$$

where, ShValueCreation = accounting based measure of shareholder value creation, measured by return on equity (ROE). RiskT = the natural log of firm risk taking. RiskM = risk management, dichotomous variable, coded as 1 when the firm is a derivative user, 0 otherwise. CEODuality = CEO duality, dichotomous variable, coded as 1 when chairperson role held by the CEO or 0 otherwise. IndBoard = board independence, dichotomous variable, coded 1 when majority of directors are independent directors or 0 if not majority independent directors. OwnConc = ownership concentration, percentage of shares held by top 20 shareholders. FRQ1 = financial reporting quality variable 1, dichotomous variable, coded as 1 when the firm is audited by a Big 4 audit firm, 0 otherwise. FRQ2 = financial reporting quality variable 2, dichotomous variable, coded as 1 when the firm receives an unqualified audit report of its annual report, 0 otherwise. Leverage = the ratio of total debt to total assets. FirmSize = natural logarithm of firm sales. GFC = Global Financial Crisis, dichotomous variable, coded as 1 in the GFC year or 0 otherwise.

Results for Table 6.15 reveal insignificant coefficients for the GFC dummy variable and the coefficients for independent variable (i.e. RiskT in Model H3a and RiskM in

Model H3b) remain consistent with the primary findings in Table 6-10. The results suggest the Model 3 is robust to the effects of the GFC.¹¹¹

The third GFC test (*GFC-T3*) divides the sample into two periods, pre-GFC and post GFC. Model 3 is re-performed for each of the two new data sets.

¹¹¹ The coefficient of the variable GFC remains insignificant regardless of whether the year chosen is 2008 or 2009. Modifying the variable to the multiyear period 2008-2009 does not change the results.

Table 6-16: GFC-T3 regression results ^{a,b}

Time Period	Pre-GFC		Post-GFC	
Independent Variables	Model H3a	Model H3b	Model H3a	Model H3b
	Clmn(1)	Clmn(2)	Clmn(3)	Clmn(4)
RiskT	0.0487 ^{***} (5.7232)		0.0502 ^{***} (6.5906)	
RiskM		-0.027 (-0.4527)		0.0267 (0.4664)
CEODuality	-0.146 ^{***} (-2.8963)	-0.1495 ^{***} (-2.9293)	0.0863 [*] (1.6796)	0.0886 [*] (1.686)
IndBoard	-0.0281 (-0.6105)	-0.0203 (-0.4356)	-0.0258 (-0.7154)	-0.0497 (-1.3481)
OwnConc	0.0023 [*] (1.874)	0.0033 ^{***} (2.6929)	0.0029 (2.691)	0.003 ^{***} (2.7476)
FRQ1	0.1536 ^{**} (2.9038)	0.167 ^{***} (3.1136)	-0.1324 ^{**} (-1.9904)	-0.1151 [*] (-1.6762)
FRQ2	0.026 (0.5609)	0.0128 (0.2733)	0.0399 (0.9705)	0.0513 (1.2214)
Leverage	-0.0729 [*] (-1.726)	-0.0915 ^{**} (-2.1564)	-0.2833 ^{***} (-7.4462)	-0.3276 ^{***} (-8.3224)
FirmSize	0.0517 ^{***} (6.5208)	0.039 ^{***} (4.77)	0.0772 ^{***} (11.3914)	0.067 ^{***} (9.5534)
Intercept	-0.9424 ^{***} (-10.141)	-0.7502 ^{***} (-8.5436)	-1.1572 ^{***} (-14.5732)	-0.931 ^{***} (-12.7694)
Adjusted R²	0.0988	0.072	0.1035	0.0853
F-statistic	16.63 ^{***}	12.19 ^{***}	29.28 ^{***}	24.39 ^{***}
Observations	1141	1155	1961	2008

Notes:

^a First value presented is the coefficient estimate and the *t*-statistic is provided in parenthesis.

^b Two-tailed *p*-values were used to determine significance: * if *p* < 0.1; ** if *p* < 0.05; *** if *p* < 0.01.

Table 6-16 reports results of OLS regression models presented below for Pre-GFC and Post-GFC:

Model H3a

$$\text{ShValueCreation}_i = \alpha + \beta_1 \text{RiskT}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \varepsilon_i$$

Model H3b

$$\text{ShValueCreation}_i = \alpha + \beta_1 \text{RiskM}_i + \gamma_1 \text{CEODuality}_i + \gamma_2 \text{IndBoard}_i + \gamma_3 \text{OwnConc}_i + \gamma_4 \text{FRQ1}_i + \gamma_5 \text{FRQ2}_i + \gamma_6 \text{Leverage}_i + \gamma_7 \text{FirmSize}_i + \varepsilon_i$$

where, ShValueCreation = accounting based measure of shareholder value creation, measured by return on equity (ROE). RiskT = the natural log of firm risk taking. RiskM = risk management, dichotomous variable, coded as 1 when the firm is a derivative user, 0 otherwise. CEODuality = CEO duality, dichotomous variable, coded as 1 when chairperson role held by the CEO or 0 otherwise. IndBoard = board independence, dichotomous variable, coded 1 when majority of directors are independent directors or 0 if not majority independent directors. OwnConc = ownership concentration, percentage of shares held by top 20 shareholders. FRQ1 = financial reporting quality variable 1, dichotomous variable, coded as 1 when the firm is audited by a Big 4 audit firm, 0 otherwise. FRQ2 = financial reporting quality variable 2, dichotomous variable, coded as 1 when the firm receives an unqualified audit report of its annual report, 0 otherwise. Leverage = the ratio of total debt to total assets. FirmSize = natural logarithm of firm sales.

The results displayed in Table 6.16 are consistent with the primary results reported in Table 6-10 and also with GFC-T2, suggesting Model 3 is robust to the effects of the GFC.

6.8 Summary of results

Chapter 6 reports on the results of the regression analysis conducted to test the ten hypotheses developed in Chapter 4 using the models formed and explained in Chapter 5. Among them, seven hypotheses are supported including H1a, H1b, H1c, H1d, H2b, H2d and H3a. The remaining three hypotheses modelled H2a, H2c and H3b, are not supported in terms of the key variables of interest, see Table 6-17 below.

Table 6-17: Summary of results

Hypo-thesis	Dependent Variable	Independent Variable	Expected Sign	Regression Result	Supportive Literature
H1a	Risk Taking	CEO option comp	+	Yes	Ryan and Wiggins (2002) Coles et al. (2006a)
H1b	Risk Taking	CEO share comp	nil	Yes	Ryan and Wiggins (2002) Devers et al. (2008)
H1c	Risk Taking	DIR option comp	+	Yes	Deutsch et al. (2007) Deutsch et al. (2011)
H1d	Risk Taking	DIR share comp	nil	Yes	Ryan and Wiggins (2002) Devers et al. (2008)
H2a	Risk Management	CEO option comp	-	nil	Géczy et al.(1997)
H2b	Risk Management	CEO share comp	+	Yes	Smith and Stulz (1985) Tufano (1996)
H2c	Risk Management	DIR option comp	-	nil	Faff et al. (2011)
H2d	Risk Management	DIR share comp	+	Yes	Smith and Stulz (1985) Dionne and Triki (2013)
H3a	Firm Performance	Risk Taking	+	Yes	Walls and Dyer (1996)
H3b	Firm Performance	Risk Management	+	No	Jin and Jorion (2006)

In conclusion, managerial equity compensation appears to change firm risk strategy. The direction of the association of equity compensation granted to either the CEO or directors and risk strategy is largely consistent but the magnitude of the coefficient does change. Managerial equity compensation influences firm risk taking and firm risk management. Consistent with the prior literature, firm risk taking does create value for shareholders. The association between risk management and firm value creation is less well understood and the results of this study do not find an association between firm risk management with shareholder value creation.

Chapter 7 Conclusion

7.1 Introduction

This chapter provides a summary of the thesis by presenting a high level review of the theoretical propositions and the associated empirical findings. On the basis of the findings, the policy implications regarding the usage of equity-based compensation (EBC) are discussed. This is of particular importance to Australian regulators given the observed shift in remuneration practices. Limitations of the study and future research directions on risk strategy and equity compensation are also discussed.

7.2 Summary of thesis

This study investigates the impact of executive and director equity compensation upon firm risk strategy and the association between firm risk strategy and firm performance. The study consists of three main objectives. The first objective was to conduct a review of trends in CEO and director EBC within the Australian mining sector for the period 2004 to 2013. During this period sentiment shifted regarding the use of EBC for the CEO and directors.

The second objective was to develop testable hypotheses to examine the impact of CEO and director equity compensation upon firm risk strategy, including two dimensions of risk strategy: firm risk taking and firm risk management. The theoretical assumptions underpinning the hypotheses argue that equity compensation

can achieve targeted changes to CEO and director behaviour regarding firm risk strategy.

The third objective was to develop testable hypotheses to examine the relationship between firm risk strategy and shareholder value creation. The hypotheses were formed based on the assumption that firm risk strategy, including risk taking and risk management impact on shareholder value.

A summary of Chapters 2-6 follows. Chapter 2 provided a background review of regulations in Australia concerning CG, remuneration, and risk strategy. Changes to remuneration legislation, regulations and codes have focused on improving transparency and accountability of managerial compensation through enhanced disclosure requirements. Most recently issues concerning equity compensation and risk strategy have come under greater scrutiny. The key problems identified are: the potential for managerial equity compensation to induce excessive firm risk and hence value destroying decisions; and the need for increased involvement by the board on risk strategy. Financial market regulators are primarily concerned with market stability and market confidence. Improving management compensation disclosures and controlling excessive risk taking are high on the policy agenda. Reforms broadly aimed at fostering optimal investment conditions, without taking on too much risk and protecting against avoidable risk.

The literature review presented in Chapter 3 provided a comprehensive review across three core areas including theoretical framework, management remuneration and shareholder value creation. The review of the relevant theory contained within the

theoretical framework is used to explain the use of equity compensation by firms and the likely consequences for firms following the adoption of equity compensation.

The remuneration section presented an overview of the remuneration literature regarding remuneration, performance and risk strategy. It identified conflicting theories and mixed empirical findings around the topic of executive and director remuneration raising questions on the suitability of EBC as a tool to change management behaviour. Finally the shareholder value creation section presented the theory and empirical findings associating risk strategy and shareholder value creation. The risk taking literature was strongly supportive of the shareholder value creation proposition whereas the risk management literature identified conflicting theory and mixed empirical results.

Three sets of hypotheses were developed in Chapter 4 after considering the theory and empirical findings from Chapter 3 with the changes to the institutional environment identified in Chapter 2. One set of hypotheses was used to examine the association of equity compensation on risk taking. The second set tested the association of equity compensation on risk management. The third set tested the relationship between risk strategy and shareholder value creation.

Chapter 5 outlined the research methodology, specifying the sample description and model specification for the hypotheses, the data collection, variable definitions and variable measurement. Information published in company annual reports and financial market data were accessed via various commercial databases to measure the variables identified in the study. The combined dataset enabled the three objectives to be answered.

Results of the study and a discussion on the findings were presented in Chapter 6. A brief summary of the key descriptive statistics and empirical findings are presented below:

- Descriptive statistics illustrate an upward trend in CEO equity compensation from 2004 to 2008, resulting from a sharp rise in option compensation whereas share compensation remained flat. From 2009 option compensation fell significantly, partially offset by an increase in share compensation. CEO total compensation, cash, option and share compensation all increased from 2004 to 2013.
- Further analysis demonstrates a significant rise in director option compensation from 2004 to 2008. From 2009 director option compensation has levelled while the ratio of share compensation increased.
- In summary equity compensation as a percentage of total compensation is increasing. There was a flip in the usage of share and option compensation for key management personnel (KMP) from 2004 to 2013. In 2004 KMP were paid a higher ratio of share compensation relative to option compensation whereas in 2013 KMP were paid a higher ratio of option compensation relative to share compensation.
- In relation to risk taking, the results of multivariate analysis identified a positive relationship between risk taking and option compensation for both the CEO and directors. This finding implies option compensation is an effective tool for increasing risk taking by management within Australian mining firms and suggests it may be an effective CG mechanism to limit managerial risk

aversion. The association of risk taking and share compensation yielded insignificant results, suggesting management share compensation does not change the level of firm risk taking activity.

- In relation to risk management, the results of multivariate analysis identified a positive relationship between risk management and managerial share compensation for both the CEO and directors. The finding implies share compensation does influence KMP to increase firm risk management. The results concerned with risk management and option compensation reported no significant relationship of risk management on CEO and director option compensation.
- In relation to shareholder value creation, the results of multivariate analysis reveals a positive association between shareholder value creation and risk taking, whereas there is no significant relationship for shareholder value creation and risk management.

The results suggest firm risk taking increases shareholder value. Australian mining sector (AMS) companies enhance shareholder value when they take on higher levels of risk taking investment.¹¹² Risk management is not associated with shareholder value.

¹¹² Problems arise when management incentives promote excessive risk taking by management which exposes shareholders and debt holders to undesirable levels of risk and potential losses (Clark and Edmonds, 2015). Management options that are “under water” create an incentive for managers to approve high risk taking investments with minimal risk to personal wealth (Sanders, 1999; Coles et al., 2006b), while shareholders and debt holders are exposed to loss. However, management share compensation ties managers to shareholders and they share the potential for gains and losses (Jensen and Murphy, 1990; Coles et al., 2006a).

- Combining the finding regarding shareholder value and risk strategy and the association between EBC and risk strategy, with the trends in CEO and director compensation allows for the following observations to be drawn.

The current preference toward CEO and director share compensation may enhance firm risk management, which is an ongoing priority of the government and regulators. However based on the results for the AMS it will not enhance shareholder value.

On the other hand, a decrease in CEO and director option compensation may lead to lower levels of risk taking by AMS companies leading to, *ceteris paribus*, a reduction in shareholder value.

The significance of this study is to deliver a thorough empirical analysis of the relationship of CEO and director equity compensation and firm risk strategy in the Australian mining sector. The study extends our understanding of the association of option and share compensation on firm risk strategy by providing new insights regarding director equity compensation, filling a gap in the literature. The findings suggest director equity compensation is potent in modifying firm risk strategy. In addition, the study provides further empirical evidence on CEO equity compensation and risk strategy. Boards wanting to adjust firm risk strategy can use appropriately designed CEO compensation packages to encourage risk taking investment by increasing option compensation, or promote risk management by increasing share compensation.

7.3 Policy implications

The rapid growth in CEO and director compensation can be directly traced to an increase in equity compensation. Government and regulators continue to make corporate governance reforms regarding compensation which aim to improve financial market confidence by modifying management behaviour. Several policy implications can be drawn from this study.

Firstly, there is a legitimate place for EBC for executive management as a tool to align the interests of management with shareholders. Secondly, the form of equity-based compensation matters. Management incentives resulting from share compensation differ to option compensation. Third, the use of director equity-based compensation must balance the dual role of the board as monitors and stewards. Fourth, the regulatory environment should encourage risk taking investment within limits. Fifth, firms need to provide clear disclosures relating to risk management policy enabling the market to incorporate firm specific risk into the firm valuation.

The ASX CG code is a voluntary regime in which companies are free to choose the principles and guidance they will comply with, including how they compensate executives and directors. If policy makers are concerned about the excessive risk taking¹¹³ or objective oversight of risk taking, then it is clear the current approach, allowing director option compensation, may be in need of review. Restricting director

¹¹³ The counter argument recommends awarding equity to directors to give them “skin in the game”. Jensen (1993) and Carey et al., (1996) claim this improves firm performance as they now share in the upside and suffer on the downside. However, Daily et al. (1999) warn against the use of director equity compensation, suggesting directors must be independent and free of any construct that could diminish objective monitoring of executive management.

option compensation is one possible way of controlling excessive risk taking by the board (see Clark and Edmonds, 2015).

Risk management is also attracting considerable attention from policy setters (APRA 2010; ASX 2010, 2014; OECD, 2009 and UK CG code 2006). The study identifies a positive association between share compensation and risk management. Attempts to increase director involvement in risk management may be positively influenced with further reinforcement of director share compensation. Regulators have signalled the importance of board risk management oversight and introduced policies to encouraged companies to disclose risk management strategies in an attempt keep markets better informed. Regulators place importance on risk management as an integral ingredient in creating stable financial markets. Policy makers need to clearly enunciate the benefits associated with firm risk management if they are to continue to pursue the current policies. Director equity compensation recommendations should be designed to support firm risk management objectives.

CEO EBC appears to be effective at shaping behaviour regarding risk strategy (see ASX, 2014). Within the context of the mining sector risk taking is associated with shareholder value and hence compensation promoting increased risk taking appears to be appropriate. However, lessons from the GFC indicated EBC may be better suited to some industries, such as the AMS, than others like the finance sector. Therefore a single policy for the whole of market may not be the optimal approach.

Finally, policy setters must be reminded that type II agency issues between shareholders and directors place theoretical limits regarding the role of the board. In

the absence of a new theoretical paradigm, the board's obligation to act as both a monitor and steward combined with the use of director equity compensation will inevitably give rise to conflicted decision making (Henderson and Bainbridge, 2014).

7.4 Research limitations

The limitations of this study are presented in this section addressing potential contextual boundaries and measurement limitations.

First, the study is limited to the Australian mining sector and therefore legislative, regulatory, and institutional factors may limit comparison with mining sectors from other countries. This is particularly the case where the use of equity compensation is inconsistent within Australia and the CG regime differs when compared with another country. In addition the findings of the study may not be relevant to other industries within the Australian capital market. The unique characteristics of the mining sector are likely to influence the observed results in a way that may not accord with the dynamics of various other industries. The study only examines listed mining sector firms. Therefore the results of the research might not be relevant to unlisted mining firms.

Second, the measurement of CEO and director option compensation varies amongst companies. The accounting standard governing the reporting of share based payments, AASB 2, allows choice when valuing option compensation, giving rise to the risk of data inconsistencies. AASB 2 allows firms to elect from a number of valuation models when valuing options granted to management. This choice may limit the

comparability of option payments across firms. However, prior research has identified that alternative option valuation methods are highly correlated with each other and therefore it is not expected to have a significant impact or to bias the results (Lambert et al., 1993; Sanders et al. 1995; Deutsch, 2007).

Third the risk management analysis is based on derivative usage. Therefore it is not possible to observe whether mining firms are hedging or speculating. Consistent with Berkman et al. (2002) the assumption taken is that firms are unlikely to report the use of derivatives in the case of speculation.

7.5 Future research

There are a number of future research opportunities identified in the study. Current regulatory reforms aimed at improving disclosure of executive and director remuneration information will provide more detailed disclosure on the basis for awarding the remuneration. This will open future research opportunities regarding executive and director remuneration. The latest CG guidance promoting increased involvement by the board on risk management and enhanced risk management disclosures will enable new research into firm risk management dynamics. Combining the additional information contained in remuneration disclosures with the enhanced risk reporting will allow for a more detailed examination of the association of remuneration and firm risk strategy to be undertaken in the future.

In addition a risk strategy index, incorporating both risk taking and risk management factors, could be developed to aid with studies investigating the total impact on risk strategy from various other variables. In the context of the mining sector, risk taking is associated with shareholder value. Additional studies could be undertaken to determine whether risk taking creates value for shareholders in other industries, providing insights into the benefit of awarding EBC within the other industries. In a similar vein the relationship between risk management and shareholder value could be examined for alternative industries.

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