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Impact of Board composition on performance in the South African Platinum Mining Industry

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ABSTRACT

Corporate governance debates and reforms have been advocating for majority inclusion of independent non-executive directors on the board of directors. There is spreading belief that independently structured boards is associated with the effectiveness of the board and therefore translate into high value company performance. Although studies on board composition in South Africa have been conducted, most studies paid special attention to board diversity such as gender and race but very little attention to the expertise of an independent director. The aim of this study is to examine the causal relationship between a board composition and financial performance

The research was conducted using listed South African platinum mining companies in Johannesburg Stock Exchange (JSE). Quantitative research methodology was chosen for the study. The proxies for a board composition were the size of the board, independent non-executive director and non-executive director with industry expertise. The Proxies for company performance are ROA, ROE, Tobin's q and EVA. Three hypotheses about the size of the board, proportion of independent non-executive director and non-executive directors with industry expertise were proposed and tested.

The research result on the first hypothesis suggested that a small size of the board of directors has statistical significant positive relationship with EVA as compared the larger size of the board. The second hypothesis result suggested there is statistically positive relationship between the independent non-executive director and EVA. The third hypothesis result on inclusion of non-executive with industry expertise was not conclusive.

Keywords: Board Composition, ROE, ROA, Tobin's q, EVA

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Name : Selilo Bethuel Semosa

Signature : _____

Date : 07 November 2012

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1 Chapter One: Introduction

1.1 Corporate Governance

Governance, be it in a country or in a team, will generate conflict of interest and hence, it requires the development of relationships and contracts among the different actors implicated (Aguilera, 2005). Boards of directors are a central institution in the internal governance of a company (Lefort & Urzúa, 2008). In addition to strategic decision making, they provide an oversight role in dealing with agency problems in the firm. After Enron corporate governance scandal, policymakers around the world have responded by creating codes to improve ethical standards in business, for example Sarbanes-Oxley Act in the US, the Cadbury Report and the Smith Report in the U.K (Ravina & Sapienza, 2006). Aguilera (2005) argues that the intentions of corporate governance reforms around the world is to bring greater power balance within the firm, particularly reining in over mighty chief executives and to resolving power struggles amongst the different stake holders.

Historically, the composition of the boards of directors of publically traded US corporations has differed from that of most other countries in that US boards have been characterised by substantial representation and in most cases a majority of outside directors (Dahya & McConnell, 2005). In comparison, in 1990, of the largest 25% of firms, ranked by market capitalisation, listed on the stock exchanges of the United Kingdom, France, Australia, South Africa, Hong Kong, Singapore, Malaysia, Thailand, India, Brazil and Mexico, outsiders comprised 50% or more of the board in less than 18% of the firms in each country (Dahya & McConnell, 2005). Between 1950 and 2005, the composition of large public company boards dramatically shifted towards independent directors, from approximately 20% independents to 75% independents (Gordon, 2007). According to Gordon (2007) study, the move to independent directors which began as a good governance exhortation has become in some respects a mandatory element of corporate law. During the 1990s and beyond, the global economy appears to have become caught in what might be described as “outside director euphoria” and at least 26 countries witnessed publications of guidelines that stipulated minimum levels for the representation of outside directors on boards of publicly traded companies (Dahya & McConnell, 2007).

Financial agency theory’s shareholder-maximising motto actually encouraged the managerial misbehaviour of the 1990s (Kaufman & Englander, 2005). To their bewilderment, this mantra still guides reforms for correcting the very problems it helped cause. A presumption that underlies this movement toward outside directors is that boards

with more outside directors will lead to better board decisions and as a consequence, better corporate performance (Dahya & McConnell, 2007). They argue that in large measure this presumption rests on faith rather than evidence.

Patel, Balic & Bwakira (2002) argues that the agency problem in corporate governance can be mitigated in practice in several ways: by vigilant board of directors, by timely and adequate disclosure of financial information, and possibly by a transparent ownership structure clarifying the conflict of interests in allowing majority shareholders or large creditors to manage the company. However, Kroll, Walters & Wright (2008) argue that sole reliance on director vigilance may be limiting because vigilance without relevant experience is unlikely to ensure board effectiveness. Their contention is that boards comprising vigilant directors, as well as directors with appropriate knowledge gained through experience, not only will be better monitors, but also more useful advisors to top managers. Roberts, McNulty & Stiles's (2005) view is that non-executive directors should not substitute executive director's role but should engage and support executive directors. They warned of the present dangers in the tendency for agency assumptions to dominate corporate governance debate and reforms. McGregor (2008) argued in his discussion paper that if corporate governance is to mean more than conformance, then the composition of the board needs to reflect the necessary skill, experience and expertise for the organisation being governed.

1.2 Corporate governance in South Africa

It was not until 1994 after the collapse of Apartheid that South Africa was accepted back into international organisations, business and diplomatic relations with the rest of the world began to develop and expand (Vaughn & Ryan, 2006). According to their study, South African corporations were compelled to address and embrace the improved standards of corporate governance to effectively compete in this new business environment. In response South Africa developed and implemented several innovative and comprehensive corporate governance reform initiatives. Judge Mervin King was mandated to assess the corporate governance of companies operating in South Africa, with a particular focus on: financial reporting and accounting, the responsibilities of directors, and codes of ethical conduct (Olaleye, 2010). According to Olaleye (2010), the King report is premised on the understanding that corporate governance in any society, especially that of a South Africa emerging from a history of racial inequalities, must reflect the values and aspirations of the society. The King committee emerged with a report of its assessment of corporate governance in 1994. The life of the report was quickly cut short with the release of the King II report in 2002.

The King II committee identified seven primary characteristics of good corporate governance which are: discipline, transparency, independence, accountability, responsibility, fairness and social responsibility. Miles & Jones (2009) reported that King II envisaged that companies would carry out their responsibility to their stakeholders by informing stakeholders of company performance in a voluntary report ('triple bottom line' reporting). According to their report, King II did not however, favour a legislative regime to force companies to comply with its recommendations, preferring, instead, self-regulations. This can be understood from Rossouw (2005)'s view that a stringent mandatory corporate governance regime might scare companies away from listing on national stock exchanges in Africa. Subsequently, the inclusive approach in King II was recently endorsed in the King III draft which was released in February 2009 and was enacted in 2010.

The guidelines in the King II and King III codes on board composition require boards to comprise a majority of independent non-executive directors. King III further proposes that directors who are classified as independent should have their independence assessed every year by the board, particularly those that have been on the board for longer than nine years and the results should be reported.

Corporate governance studies in South Africa on the subject of the board of directors known to the researcher include Mcube (2008), Ahwireng-Obeng & Viedge (2005) and Nyirenda (2010). Nyirenda (2010) for example, investigated board composition in companies listed on the Johannesburg Securities Exchange (JSE). Nyirenda (2010)'s motive for the study was from transformation perspective. The reason cited for the study was that South African companies have been faced with tremendous political, social and moral pressure to transform themselves and to create institutions which closely represent the societies within which they operate. Defined constructs for board composition in the context of Nyirenda (2010)'s study were gender, race, tenure and the independence of directors. It can be argued that the study was more into profiling the board and did not link this to the company performance. Mcube (2008) on the other hand, tested a theoretical framework relating to three major corporate governance theories namely, agency, stakeholder and shareholder theory in the South African platinum mining Industry. The study found out that agency theory prevails in the South African Platinum industry. Ahwireng-Obeng & Viedge (2005) investigated the influences on the performance effectiveness of non-executives directors in South Africa. Their study was conducted by means of in-depth questionnaire-based interviews and respondents (non-executive directors) who represented companies from major sector of the Johannesburg Securities

Exchange (JSE). Non-executive performance effectiveness was not linked to company performance.

1.3 Research Problem

Corporate governance guidelines such as King III propose majority inclusion of outside directors in the corporate board of directors. At issue is a widespread belief that independently structured boards will be associated with higher firm financial performance and, derivatively, better shareholder returns (Dalton & Dalton, 2005). However, empirical evidence on the association between outside directors and firm performance is mixed. Studies for different countries looking at the association between Independent non-executive directors and performance have found contradictory results (Hermalin & Weisbach, 2004).

Against the advocates of outside directors, from the stewardship theory of view, outside directors are not necessary, and they are even viewed as unhelpful to a firm's development (Luan & Tang, 2007). However, some studies have found that having more outside directors on the board improves firm performance (Luan & Tang, 2007; Uadiale, 2010; Cheng, 2008; Boone, Field, Karpoff & Raheja, 2007) while other studies found negative relationships between outside directors and firm performance (Kaufman & Englander, 2005; Dalton & Dalton, 2005). Proponents of agency theory argue that boards should be able to act independently of management and they must include a majority of outside directors. Other researchers have argued that director knowledge and expertise plays a crucial role on board dynamics and effectiveness (Petrovic, 2008; Roy, 2008; Kroll, Walters & Wright, 2008).

Although studies on board composition in South Africa have been conducted, it can be said that these studies have paid special attention to board diversity such as gender, race and size and little attention to the expertise of an independent director. It can also be understood that the studies were motivated by tremendous political, social and moral pressure faced by South African companies to transform themselves and to create institutions which closely represent the societies within which they operate. The introduction of King III guidelines will definitely add pressure to South African companies as these unequivocally states that they must apply, or explain the non-application of the principles. Boards might have difficulties in having sufficient independent, suitably skilled directors. From this premise it would be worthwhile to assess the impact of board composition not only from the diversity perspective but on its independency and competency of outside directors, especially since all directors serving on the board could

be exposed to liability in the event that statements of adherence to King III principles are made but the best practice are not followed and are not explained.

Since the studies of the impact of board composition on company performance in different countries have yielded contradictory results, it is necessary to investigate the impact of board composition on company performance in South African companies. Previous studies in South Africa investigated board composition on the entire JSE listed companies. For homogeneity reasons and recommendations from previous studies a single industry was chosen for this study namely, the South African Platinum industry.

1.4 Research objectives

The aim of this study is to understand a causal relationship between board composition (independent variables) and financial performance (dependent variables). The independent variables related to the topic and presented in the literature are the size of a board, proportion of independent non-executive directors and non-executive directors with mining or engineering operational experience. These attributes are identified as important proxies for a board composition as discussed in the literature review. The proxies for company performance are accounting based measures (Return On Assets, ROA) and Return On Equity, ROE)) and market based measures (Tobin's q and EVA). The objective of the research is three-fold and is as follows:

- To evaluate empirically examine the relationship between the size of the board and company performance in the South African Platinum industry.
- To empirically examine the relationship between a proportion of independent non-executive directors and company performance in the South African Platinum industry.
- To empirically examine the relationship between a proportion of non-executive directors with mining or engineering industries operational experience on company performance in the South African Platinum mining industry.

1.5 Research Motivation

There is no doubt that studies on the impact of board composition on company performance has been carried out extensively. It is however worth noting that it cannot be an issue of “one size fit all” and the application or the practices will be different from one country to another and different industries for that matter. It also appears that studies on board composition have paid more attention on board demographics such as gender and race but not so much on the calibre of non-executive directors.

SA Platinum mining industry was chosen because a corporate governance study conducted by Mcube (2008) that found out that agency practise prevails in this industry. It is considered a hi-tech industry with a complex environment and would require an advisory function of a board as per literature reviewed. It is also chosen because of its magnitude and its contribution to the SA economy. According to statistics from chamber of mines mining contributes 18% of GDP (8% directly and another 10% through indirect an induced effects of mining (Chamber of Mines, 2009). It is the largest contributor by value of empowerment deals to black economic empowerment in the economy. It fits perfectly with the literature review compiled as it falls in the category of complex firm and turbulent environment

2 Chapter Two: (Theory and Literature Review)

2.1 Board of Directors (BODs).

Board of Directors (BODs) are an economic institution that, in theory, helps to solve the agency problems inherent in managing an organisation (Hermalin & Weisbach, 2004). The agency problem in this context is that the interests of management may differ from the interest of the shareholders for whom the BODs work and that management may make business decisions in response to the former rather than the latter (Murphy & McIntyre, 2007).

2.2 Board role performance

Board role performance is a complex phenomenon and can be presented in three conceptual models to explain the factors impacting board role performance (Ong & Wan, 2008). They proposed three models which are the structure model, process model and mediation model.

2.2.1 Structure model

Structure model advocates the importance of board structure of outsider-insider directorship and board size (Ong & Wan, 2008). They explained that the structure model is developed under the different theories of agency, stewardship and resource dependence. Based on the literature (Daily, Dalton & Canella, 2004; Zahra & Pearce, 1989), Ong & Wan (2008) defined the four critical board roles as monitoring, service, and strategy and resource provision.

2.2.1.1 Monitoring

Risk management and protecting shareholder wealth are important monitoring roles (Ong & Wan, 2008). Boards are formed to oversee performance and ensure that stakeholder expectations are met or exceeded while complying with the legal, statutory and regulatory norms of the society in which they operate (Ramakrishnan, 2012). The relationship between board structure and the board monitoring role come from the agency perspective (Ong & Wan, 2008). Agency theory is explained by the understanding of agency relationships according to (Jensen, 1994). Agency theory suggests that there is an inherent imperfection in the relationship between capital providers (principals) and fiduciaries (agents) of that capital (Jensen, 1994). It argues that when corporate ownership is separated from corporate management, behaviours, decisions, and actions by managers will deviate from those required to maximise shareholder value.

Structurally, agency proponents argue that an impartial assessment of managers will occur more readily if the board is independent of executive management (Ong & Wan, 2008). They argue that since the insider directors are subordinates of the CEO, they will be either unwilling or in a very difficult position to perform a monitoring role. They have however noted that independence is not only a structural attribute but also a psychological trait that give rise to corresponding behaviours. They also acknowledged that the presence of independent board members does not imply that they have inherently higher standard of integrity than their executive colleagues. They have however argued that it is easier for the independent board members to take an objective view of whatever matters under review.

2.2.1.2 Service Role

The board service role is advocated under the competing theories of agency and stewardship (Ong & Wan, 2008). They suggested that under the agency perspective, the proportion of outsider directors is positively related to the board service role.

Stewardship theory has its roots in psychology and sociology (Davies, Shoorman & Donaldson, 1997). Donaldson & Davies (1989, 1991) said in Davies, Shoorman & Donaldson (1997) that stewardship theory was adapted as a theoretical framework for researchers to examine decision-making, actions and performance of executives who are acting as faithful stewards for principals. They further stated that stewardship theory suggest that managers are trustworthy and competent administrators of corporate resources and are best situated to maximise the interest of shareholders since there are most familiar with the intricacies of corporate strengths, weaknesses, opportunities and threats.

According to Ong & Wan (2008) stewardship theorists suggest a collaborative approach between directors and managers. Thus, under the stewardship theory the proportion of outsider directors is negatively related to board service role.

2.2.1.3 Strategy

Ong & Wan (2008) acknowledged that strategy is a broad term and directors are often confused as to what constitutes strategy. According to their study the strategy role can be undertaken in four ways,

1. Setting and actively reviewing the corporate definition – the "what business are we in" question

2. The gate keeping function- actively assessing and reviewing strategic proposals

3. Confidence-building – encouraging managers with good track records in their strategic aims.

4. The selection of directors – the outcomes of which send strong signals to the rest of the organisation concerning the type of person who succeeds and the standards others have to attain.

2.2.1.4 Resource provision

The resource provisions role refers to the ability of a board in bringing resources to the company (Ong & Wan, 2008). Prefffer (1972b) in Hillman, Withers & Collins (2009) asserts that boards enable firms to minimize dependence or gain resources. Resource dependency theory emphasises that resources required by organisation need to be acquired through a network of contacts and the efficiency and effectiveness in bridging network gaps will determine the quality of corporate performance (Ruigork, Peck & Keller, 2006). Boards of directors are considered important boundary-spanners that secure necessary resources, such as knowledge, capital and venture partnering arrangements (Hillman, Withers & Collins, 2009).

2.2.2 Process model

The process model tests the relationship between the board process and the board role performance (Ong & Wan, 2008). They examined three board process dimensions and explained it under effort norms, conflicts, and use of skills subsections.

2.2.2.1 Effort norms

Wageman (1995) in Ong & Wan (2008) defined effort norm as a group-level construct that refers to the group's shared belief on the level of effort each individual is expected to contribute towards a task. They argued that lack of interaction may result in the board not

reaching its full potential. According to Ong & Wan (2008), researchers such as Monks & Minow (2004) argued that boards that spend similar amount of time can exhibit different levels of effort. Ong & Wan (2008) suggested that boards that have high-effort behaviour among members should be better able to perform their roles.

2.2.2.2 Cognitive conflict

Jehn & Mannix (2001) in Ong & Wan (2008) said that cognitive conflict within groups encourages people to develop new ideas and approaches, hence enhancing group learning and assessment of situations. According to Ong & Wan (2008), the presence of disagreement and criticism from the board may require CEOs to explain, justify and possibly modify their positions on important issues. They argued that this will serve to remind management of the power and role of the board and of the importance of considering shareholder interest. They claimed that this will improve the board's performance of its monitoring role.

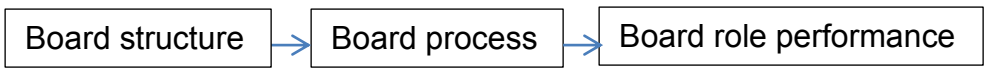
2.2.2.3 Use of skills

Boards must tap into and apply a variety of skills to function effectively in today's business environment (Ong & Wan, 2008). They argued that directors need to use functional skills and firm-specific skills to perform effectively. They also said that directors value strategically relevant experience as it will improve strategic skills and the actual use skill is of outmost significance.

2.2.3 Mediation model

The mediation model is a combination of structure and process models (Ong & Wan, 2008). According to their definition, it is sequential and posits that board structure will affect process that in turn influences performance as shown in the Figure 2.1 below.

Figure 2.1 Mediation model (Ong & Wan. 2008)



They argued that in essence, board structure has no direct impact on board role performance. Firstly, the structural board characteristics will affect the process before results appear. The second part of the mediation model is similar to that covered in the process model.

The development of mediation propositions is explained by Ong & Wan (2008) in terms of the three board process variables of effort norms, cognitive conflict and use of skills as discussed below.

2.2.3.1 Effort norms

The presence of outsider directors will boost the level of effort norms as such directors view their roles differently from those of the insider directors (Ong & Wan, 2008). In contrast, inside directors are more likely to see their directors' duties as an extension of their management functions (Ong & Wan. 2008). They argued that with the presence of a separate chairman and outsider directors, insider directors (including the CEOs) may be coerced into performing better. Furthermore, large boards may have difficulty in enhancing or even maintaining board effort norms. According to group dynamics theory, if a group grows too large, communication among directors become increasingly difficult; directors would find it harder to get to know each other and only a fraction of the board would participate in board discussions (Ong & Wan. 2008). Thus they argued, a larger board would likely be associated with a lower level of effort norms within the board.

2.2.3.2 Cognitive conflict

The presence of outsider directors is likely to enhance the level of cognitive conflict in the board (Ong & Wan, 2008). This according to Ong & Wan (2008) is because this group of directors is likely to share significantly fewer experiences with management. A larger board is likely to possess an abundance of differing perspective and Ong & Wan (2008) suggested that the proportion of outsider directors is positively related to the level of cognitive conflict.

2.2.3.3 Use of skills

According to Ong & Wan (2008) study, Hillman & Dalziel (2004) explained that outsider directors are often lawyers, financial representatives, top management of other firms, public affairs or marketing specialist, government officials and community leaders who bring with them important expertise, experience and skills. The proposed that a proportion of outside directors is positively related to the use of skills.

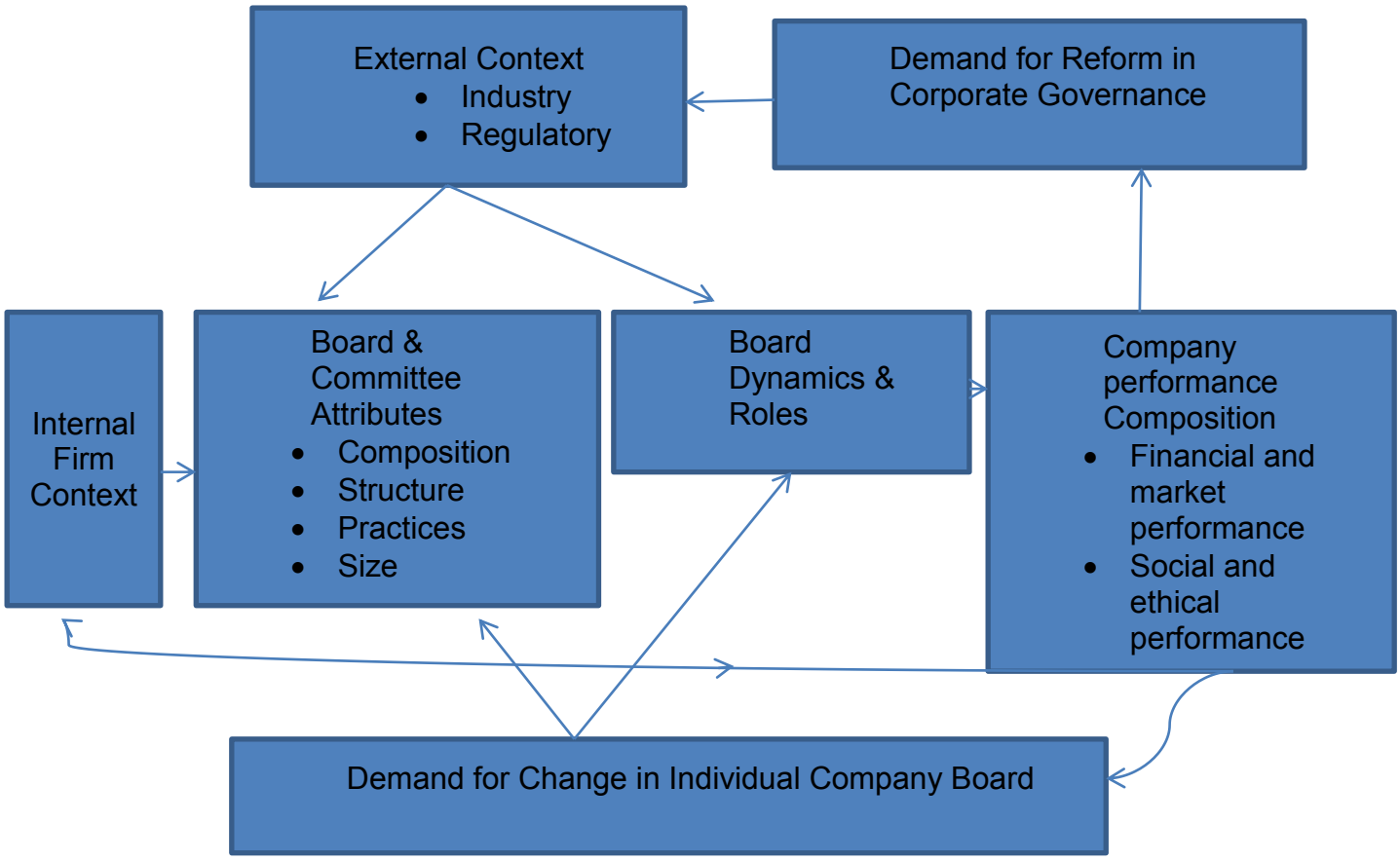
Minichilli, Zattoni and Zona (2009) cited in their study that a special issue of the British Journal of Management (Vol. 16, 2005) underlined the importance of analysing board effectiveness through the empirical examination of board behaviour. Their study considered board task performance as the ability of the board to perform six tasks related

both to service (advice, networking and strategic participation) and control (behavioural, output and strategic control). Their study controlled for most investigated board demographics characteristics (i.e. board size, CEO duality, CEO and directors shareholding, and proportion of outside directors) and for firm- and industry level variables. Their findings supported the idea that (i) the predictors they identified, and particularly board members' commitment, are far more important than board demographics for predicting board task performance; (ii) firm and industry context have an influence on board task performance; (iii) predictors have a different impact on specific sets of tasks. They concluded that their findings support the idea that several board characteristics and contingencies at both industry and firm level must be acknowledged in board design.

2.3 Board role and firm performance

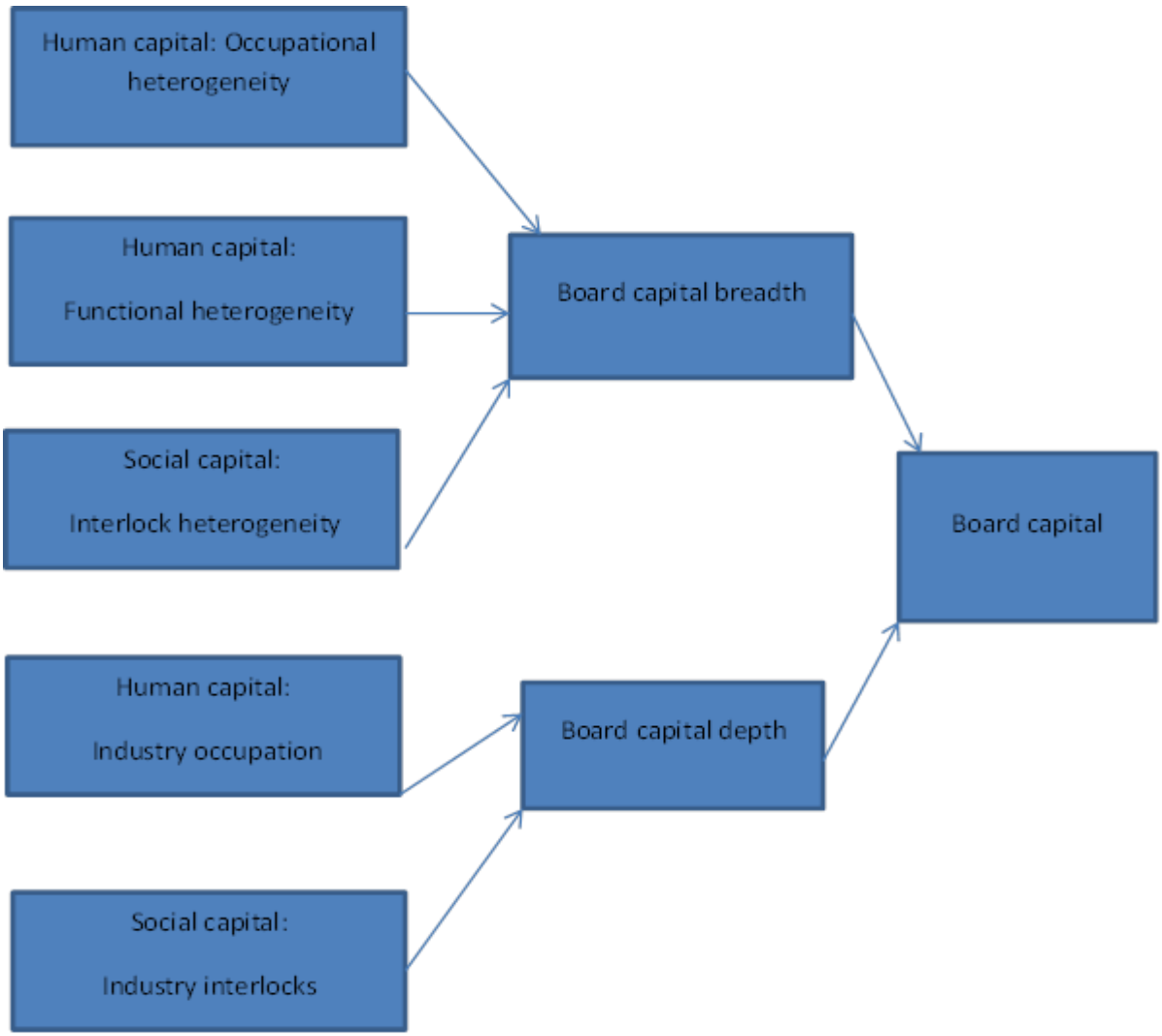
Hillman and Dalziel (2004) proposed a model that integrates agency and resource dependence perspective. They argued that integrating agency and resource dependence perspectives not only allows for a more fully specified model but also for a richer understanding of how board capital is related to both monitoring and the provision of resources and how incentives moderate these relationships. They further argued that this understanding, in turn contributes to the knowledge of boards and firm performance. Finegold, Benson & Hecht (2007) proposed that more research is needed to test the model and expand on this theory to examine the interplay of how other board roles, such as leadership development, may contribute to company performance. To guide such efforts they proposed a conceptual framework that explains the key hypothesised relationship between boards and firm performance, highlighting areas for future research as shown in Figure 2.2.

Figure 2.2 Corporates boards and company performance: a framework for future research (Finegold, Benson & Hecht (2007))



Hillman & and Dalziel (2004) defined board capital as the composite of the human and social capital of board of directors as shown in Figure 2.3. They stated that it is intended to capture the ability of the board to provide resources to the firm. Haynes & Hillman (2010) proposed that the board capital construct is composed of 'breadth' and 'depth'. They defined capital breadth as the portfolio of directors' functional, occupational, and social, professional experiences and extra-industry ties and capture the heterogeneity of the directors' human and social capital. They also defined board capital depth as the embededness of directors in the firm's primary industry through interlocking directorships, managerial positions, or occupational experience in the primary industry of the firm, and this is the sum of the directors' intra-industry human and social capital.

Figure 2.3 The model of board capital (Haynes & Hillman, 2010)

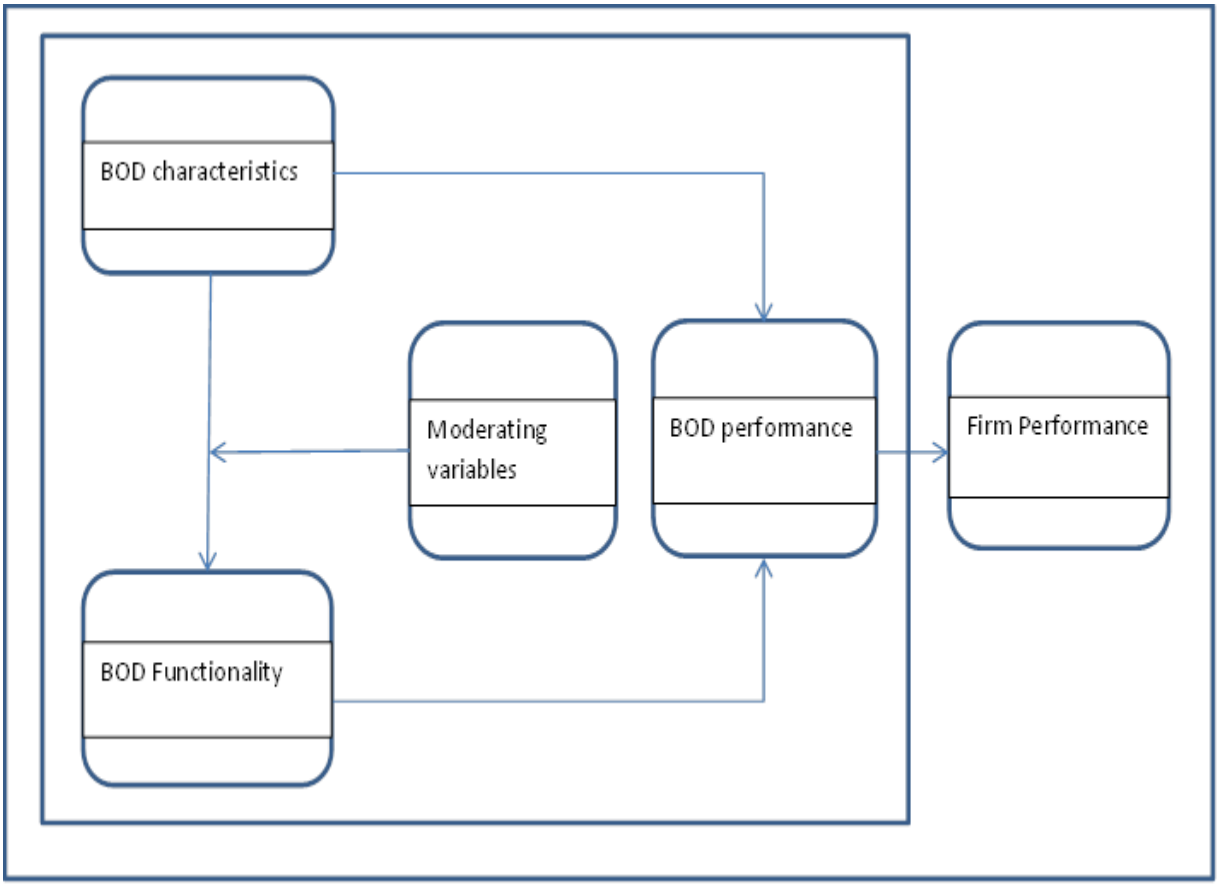


Another integrative approach to a board performance theoretical model was presented by (Murphy & McIntyre, 2007) as shown in Figure 2.4. They view BODs as organisational teams that deal with complex issues under potentially ambiguous task and role situations. They argue that the characteristics and functionality of a board plays an important role in board effectiveness, and the contribution of each of these factors is likely to be moderated by a number of environmental and firm specific variables.

Their model makes an assertion that BOD characteristics and functionality may each independently influence performance, and BOD characteristics may also influence functionality (indirectly influencing performance). They suggested that the proportion of inside directors, for example, may have a direct impact on the ability of the board to secure outside sources of funding (a performance measure) due to the number of external

contacts. However, they asserted that, perhaps more commonly, the proportion of internal directors will influence how the board goes about external funding. They also contended that the contextual factors from within and outside the organisation will moderate the relationship between BOD characteristics and performance, BOD characteristics and functionality, and BOD functionality and performance.

Figure 2.4: A model of board performance ((Murphy & McIntyre, 2007)



The two models presented show some similarities of opinion in that they both highlight the importance of board characteristics or board attributes to firm performance. Board characteristics refers to board size, number of inside versus outside directors, directors of members, CEO duality or separation, tenure, age, gender and race (Murphy & McIntyre, 2007). Board and committee attributes refers to composition, size, structure and practices (Murphy & McIntyre, 2007).

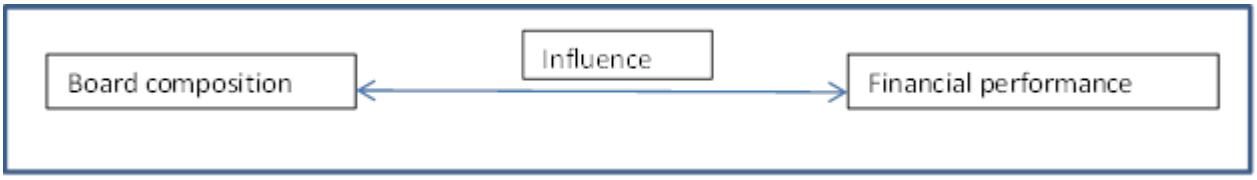
2.4 Board Composition

Board composition denotes the fraction of non-executive directors on the board as compared to their executive counter parts (Uadiale, 2010; Lawal, 2012,). The non-executive directors are normally referred to as outsiders and the executive directors are referred to as insiders. Board composition is considered an important factor in the performance of three board roles (Hillman, Keim & Luce, 2001). They stated that the relationship between the composition of the board of directors and firm financial performance has been extensively studied in terms of insider and outsider. In addition to the oversight function, some board members may contribute to strategy development, while others are involved in service, or provide technical expertise, or a combination of the above (Markarian & Parbonetti, 2007). They argued, for example, that an independent director can perform a monitoring function, and can simultaneously provide other valuable resources to the company, such as providing expertise and knowledge in specific areas, expertise on decision making processes, legitimacy making process, access to information; etc. Individual directors are potential source of valuable directors.

The board of directors needs to have the appropriate structure and this involves several dimensions (Van den Berghe & Levrau, 2004). According to their research the most frequently reported dimensions are diversity and complimentary. The other dimension reported by Van den Berghe & Levrau (2004) relates to the proportion of inside directors and outside directors, experience and knowledge of directors and size of the board. They argued that board should comprise a mix of people having different personalities and educational, occupational and functional backgrounds, but they must be complementary.

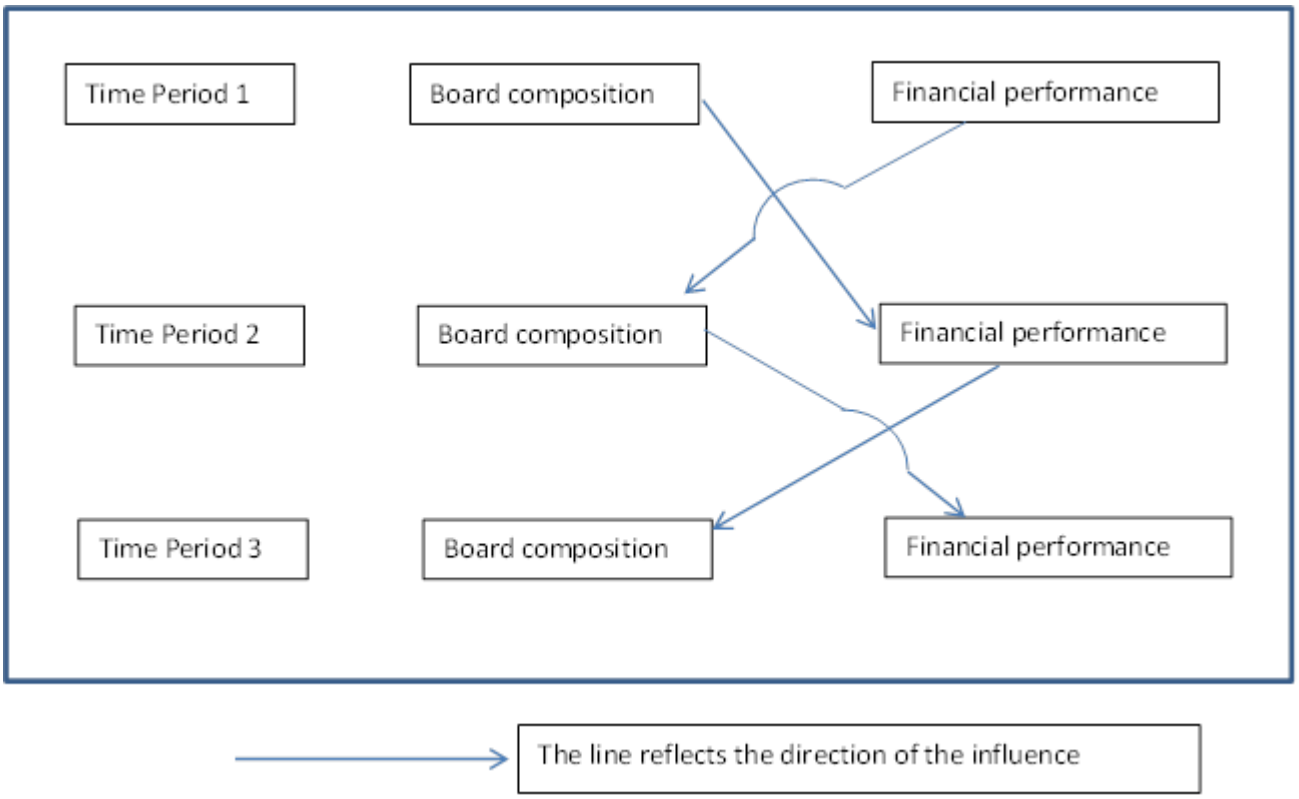
The impact of board composition on overall financial performance is not at all clear (Davidson III & Rowe, 2004). According to their study, one problem with measuring the relationship between board of director composition and financial performance could be that their relationships are endogenously determined (Hermalin and Weisbach, 2000). According to Hermalin and Weisbach (2000), in the endogenous model as shown in Figure 2.5, the influence between financial performance and board composition works both ways.

Figure 2.5: Endogenous relations between board composition and financial performance (Hermalin and Weisbach, 2000)



A second problem may be that due to fixed board terms and periodic reporting, the relation may be intertemporal (Davidson III & Rowe, 2004). They developed a theory of intertemporal endogeneity of board composition and financial performance as shown in Figure 2 6. Intertemporal endogeneity is the idea that board composition in one period influences financial performance financial performance in later periods, and financial performance in one period influences board composition in later periods. Thus, board composition and financial performance influences each other but the effect is delayed (Davidson III & Rowe, 2004).

Figure 2.6: Intertemporal endogeneity between board composition and financial performance (Davidson III & Rowe, 2004)



2.4.1 Independent non-executive directors and firm performance

From the agency perspective, boards should be able to act independently of management and therefore must include a preponderance of outside directors (Van den Berghe & Levrau, 2004). Outside directors are often thought to play the monitoring role inside boards (Hermalin & Weisbach, 2004). The reliance on outside directors proceeds from a financial agency or shareholder maximising model (Kaufman & Englander, 2005). Based on the readings of prominent finance theorists, available scholarly and anecdotal research

(Kaufman & Englander, 2005) concluded that the financial agency theory of shareholder-maximising motto actually encouraged the managerial misbehaviour of the 1990s. To their bewilderment, this mantra still guides reforms for correcting the very problems it helped cause.

Dalton & Dalton (2005) carried out meta-analysis research to investigate a relationship between outside directors and firm financial performance. They argued that when confronted with a substantial body of empirical research yielding disparate findings such as little consistency in the relationship between board composition and firm financial performance, it is appropriate to employ an analytical technique referred to as meta-analysis. Meta-analysis, according to their explanation, enables the researcher to aggregate a body of empirical research data and draw conclusions regarding a relationship of interest (i.e. the relationship between board composition and firm financial performance). They found no evidence that suggested any relationship between independent directors and firm performance. Their study also considered structural independence argument, as captured by the two most commonly employed measures of Independent non-executive directors, board composition and board leadership structure. There was no evidence, in aggregate that these indicators are associated with enhanced firm financial performance.

Markarian & Parbonetti (2007) argues that the complexity of a firm (i.e. board members carry out different functions depending on their specific expertise, and the characteristics of the internal and the external environments) means, outside directors face information asymmetries and are constrained in the decision making process, preventing them for effective oversight function. They suggested that in complex internal environments, outside directors overemphasis on financial controls can direct management efforts to maximising short-run performance, rather than focusing on long-term shareholder value. Şener, Varoğlu & Aren (2011) investigated the effect of board composition measured in terms of insider directors, outside director and affiliated director presentation, on organisational performance for different environmental conditions, which are measured in terms of munificence and dynamism of the industry in which the organisations operate and are the product of the complexity of the organisation. They found out that the effect of board composition on organisational performance varies between different environmental conditions and there exists no optimal board composition for all organisations.

Luan & Tang (2007) investigated the impact of independent outside director on firm performance. They argued that theoretically speaking, outside directors should benefit the firm but empirically, few studies have considered the true independence of outside

directors from assorted definitions. They further argued that the independence of outside directors makes the difference, and not only the insider/outside difference. They used a more stringent definition of the independence of outside directors, according to Taiwan's regulatory agency, to delineate the outsider-performance relationship. The finding of their study suggested that after controlling for a firm's past performance, independent outside director appointments do have a significantly positive impact on a firm's performance.

Duchin, Mustusaka & Ozbas (2010) carried out an empirical study to estimate the effectiveness of outside directors. To address the problem of board endogeneity they took the advantage that some firms were forced to increase the number of outsiders in response to regulations that required audit committees to be comprised entirely of independent directors. Their identification strategy was to use the "exogenous" changes in board composition brought about by the new regulations to generate estimates of the effectiveness of Independent non-executive directors that are largely free from endogeneity. Their main finding was that adding outside directors to the board does not help or hurt performance on average but outside directors significantly improve performance when their information cost is low and hurt performance when their information cost is high. Based on their findings they suggested that the literature failure to find a robust connection between board composition and firm performance may have been because of effects cancel out on average (when not conditioned by information). However, their empirical strategy delivers estimates of the effectiveness of new outside directors that are added in response to noncompliance with the new regulations. Outside directors added to the board for other reasons may be different than those added for compliance reasons.

Roberts, McNulty & Stiles (2005) questioned both the theoretical utility and empirical robustness of established distinctions in the literature about service, control and resourcing roles of boards and the adequacy of theoretically derived models of board dynamics in the literature. They also observed some of the present dangers in the tendency for agency assumptions to dominate corporate governance debates and reforms. However, they suggested that the work of outside directors is indeed vital, both for enhancing the actual effectiveness of boards and as a source of confidence to distant investors as to the effectiveness of what goes on in the board meetings. They further argue that whilst board structure, composition and independence condition board effectiveness it is the actual conduct of the outside directors vis-à-vis the inside directors that determines the board effectiveness. Instead, they suggested the merits of a focus, both theoretical and

empirical, on the practical challenges that outside directors and boards face in creating and sustaining accountability.

This view was shared by Nicholson & Kiel (2007) who examined the link between the board of directors and firm performance as predicted by the three predominant theories in corporate governance research. They found out that while each theory can explain a particular case, no single theory explains the general pattern of results. They are therefore endorsing the recent calls for more process-oriented approaches to both theory and empirical analysis to help in the understanding of how boards add value. They argued that by focusing on the monitoring role, agency theory appears to discount the impact of other board functions, such as advising management and providing access to valuable resources.

2.4.2 Size of the board and firm performance

The size of the Board of Directors (BODs) has been the subject of debate in corporate governance in many years (Uadiale, 2010). The board size represents the total head counts of directors serving on the corporate board. It is recognised as one of the unique features of board dynamics with considerable but strategic impact on the Independent non-executive directors as well as the overall quality of corporate governance (Jensen, 1994). The association between board size and the variability of corporate performance potentially arises because larger boards have both the communication or coordination problems and the agency problems (Cheng, 2008). Board size is vital to achieving the board effectiveness and it affects the quality of deliberation among members and the ability of the board to arrive at an optimal corporate decision (Lawal, 2012).

Uadiale (2010) examined the impact of board structure on corporate financial performance in Nigeria. This was done by investigating the composition of boards of directors in Nigerian firms and analysed whether board structure has an impact on financial performance, as measured by return on equity (ROE) and return on capital employed (ROCE). The findings of the study suggested that large board size should be encouraged and the composition of outside directors as members of the board should be sustained to enhance corporate financial performance. However, the researcher is of the view that the study may be improved upon by including more variables that may affect corporate financial performance.

Some of the researchers' findings advocate that corporate boards should be small and comprise mainly independent directors (Cheng, 2008; Boone, Field, Karpoff & Raheja, 2007). Their studies are consistent with the view that it takes more compromises for larger board to reach consensus, and consequently, decisions of larger boards are less extreme, leading to less variable corporate performance. However, this view is contradicted by Uchida (2011)'s research study on Japanese firms. Uchida (2011)'s study showed that Japanese firms that substantially decreased board size tended to adopt an officer system and so did not substantially decrease the size of the management team (executive officers and directors). This tendency, according to their findings, was especially evident for high-performing firms that face less information asymmetry. The study also found out that the downsizing of the board size did not show performance improvements suggesting that board downsizing does not necessarily raise shareholder value. Cheng & Al-Najjar (2011) found out that Chinese board size is primary driven by firm complexity and their Independent non-executive directors is mainly driven by regulation. They argued in their study, that China is an especially interesting case because it has adopted many of the corporate governance mechanisms of developed economies but also added new governance factors such as state ownership and supervisory board which are not features of Anglo-American and German models.

De Andres, Azofra & Lopez (2005)'s findings on the analysis of the board size and its composition and firm value showed that there is a negative relationship between firm value and the size of board of directors. They argued that this relationship holds when they controlled for alternative definitions of firm size and for board composition, the boards internal functioning, country effect and industry effect. They suggested that the finding of their results confirms previous papers that showed that companies with oversize boards of directors have poorer performance both in countries where internal mechanisms of governance dominate and in countries where external mechanisms are predominant. They cited that the negative effect of board size on the firm could be due to poorer communication and coordination inside the board. This could be because their study did not take into count endogeneity problems reflecting the way decisions are being made in the board.

2.4.3 Director expertise (experience and knowledge) and firm performance.

Forbes & Milliken (1999); Hambrick, Li, Xin & Tsui (2001) and Li & Hambrick (2005) in Petrovic (2008) said based on the notion that the individual's demographic characteristics, such as nationality, education, and functional experience, tend to confer the individual with certain information and points of view, and the main argument of their studies was that

different forms of board composition in terms of director demographic characteristics (homogenous versus diverse groups) have different effects on board relationships (cognitive conflict and relationship conflict/group cohesiveness) and consequently board dynamics and effectiveness.

Roy (2008) provided empirical evidence to companies examining board process aimed at improving directors' overall expertise. This was built on argument based on Mckinsey (2008) that, to ensure strong oversight and relevant input into strategic decisions, companies must ensure that board members have the required skills and knowledge. They examined directors' qualifications in terms of:

1) Knowledge and expertise; and

2) Skills and values

Ideally, the members of a board of directors are highly qualified to provide professional advice to the managers of the firm (Hambrick, Werde & Zajac, 2008). They further mentioned that exploiting this expertise requires that the managers inform the board about their strategic intentions to invite the board to critique and comment these plans.

Kroll, Walters & Wright (2008) argued that relying solely on director vigilance may be limiting because vigilance without relevant experience is unlikely to ensure board effectiveness. They anticipated in their study that director's act not only as monitors of managerial decisions, but also as providers of advice to senior executives. Although their study focused on the effect on acquisition outcomes of the interaction of board vigilance and director experiential learning it was considered relevant to this study because it raises the contention that board comprising vigilant directors, as well as directors with appropriate knowledge gained through experience, not only will be better monitors, but also more useful advisors to top managers. Their empirical findings indicated that vigilant boards rich in appropriate experience are associated with superior acquisition outcomes. They argued that sole reliance on agency theory when considering board of director's results in an underspecified explanation of board of directors. Although the study focussed on acquisition outcomes it was still considered relevant to this study as acquisitions are part of financial performance.

2.5 Variable definitions

2.5.1 Independent variables (Board composition)

Inside directors are those who are full-time executive members of the board and outside directors are defined as non-executives without any financial or personal ties to company management

- Board Size (BS) = total head counts of directors serving on the corporate board at the financial year end.
- Outside Directors on Board (ODB) = Proportion of outside directors to inside directors serving on the board
- Outside Directors with Industry Expertise (ODE) = outside directors serving on board with industry knowledge and experience

2.5.2 Dependent variables (Financial Performance)

Previous research linking BOD characteristics to organisational effectiveness has primarily focused on linking the variables of board size, composition, and independence to a variety of financial indicators (McIntyre, Murphy & Mitchell, 2007). Adjaoud, Zeghal & Andaleeb (2007) argued that one possible reason of the diverse and inconclusive results on the relationship between the board's characteristics and firm performance could be because of weakness in conceptual framing and empirical weakness in measuring board characteristics or in the measurement of firm performance or both. For example, they used traditional accounting –based measures such as ROI,ROE,EPS, market-to-book value ratio and value creation measures such as EVA® and MVA on the study of the effect of board's quality on performance. Their results showed no significant relationships between corporate governance and performance when using traditional measures, such as ROI, ROE, EPS and market-to-book. However, their results revealed significant links between board's quality and performance when the latter is captured by value performance measure, such as market value added and economic value added. Krivogorsky (2006) suggested that accounting-based performance measures such as ROE, ROA & ROI are historical reports not directly affected by changes in equity markets and have several limitations. They also argued that first; they are affected by accounting conventions for valuing assets and revenue recognition. In particular, they argued that different methods are applied to value tangible and intangible assets or income as an accrual-based measure, which could be manipulated. Secondly, reported total assets consist of mixed attributes of current and historic costs, while revenues are recorded at current dollars.

Murphy, McIntyre & Mitchell (2007) stated that the mainstream governance literature continues to examine single board characteristics in relation to a number of different

financial indicators. Typical financial indicators they referred to include Tobin's q and ROA, market-to-book value, debt financing costs, yield spreads, share price and financial distress. They argued for the usage of Tobin's q measure because of its direct linkage to agency costs according to an argument made by Hermalin & Weisbach (1991) that a q above one indicates that the market views the firm's internal organisation as exceptionally good or the expected agency costs as particularly small. They also suggested that economic value added (EVA) can be used as a financial measure because it is essential to measure what the firm has created over and above its cost to do so.

For the purpose of this study accounting based performance and market based performance will be used to get an insight from a market and company perspective.

Accounting Based Measures

- ROA = Return on assets ratio, defined as profit before taxation divided by total assets

- ROE = Return on equity ratio, defined as profits after taxation divided by shareholders equity

Market Based Measures

- Tobin's q = Market value of firm's asserts divided by replacement costs ((Murphy & McIntyre, 2007). In other words it can be expressed mathematically as follows:

  = market value/Replacement value

- EVA Economic Value identifies economic profit after all cost including the firm's cost of capital ((Murphy & McIntyre, 2007). NOPAT is the net operating profit after tax, WACC is weighted average cost of capital and Capital denotes the resources used by the firm to create value in question. It is expressed mathematically as follows:

  EVA = NOPAT – (WACC) * Capital:

2.6 Concluding Remarks

The literature presented in this study present contradictory views about corporate governance theory and raises questions about the impact of the board composition on company performance. The questions that need to answered are as follows:

- Is there any relationship between the size of the board and company performance?
- Is there any relationship between the proportion of independent non-executive directors and company performance?
- Is there any relationship between the proportion of non-executive directors with industry expertise and company performance?

3 Chapter Three Research Hypothesis

3.1 Introduction

Essentially all research should start with a list one meaning full research question, which typically leads to at least one hypothesis investigated through empirical study (Abowitz & Toole, 2010). The research question in this study is: is there any relationship between board composition and company performance in the platinum mining industry? The proxies for Board composition are size of the board, proportion of independent non-executive directors and proportion of non-executive directors with mining or engineering operational experience. It is always necessary to recognise the generation of hypothesis and testing of hypotheses (Boaduo, 2011). According to Boaduo (2011), it is important to realise that same procedure used to search a set of data for relationships can also be used to test hypothesis to see if there is strong evidence that a relationship is just more than a chance pattern in the data.

3.2 Hypotheses

Empirical studies conducted by Cheng (2008); Boone, Field, Karpoff & Raheja (2007) and De Andres, Azofra & Lopez (2005) on the size of the board and company performance presented in the literature section of this research suggested that there is a negative relationship between company performances. There is however another school of thought that takes a view that says decreasing the size of the board tends to adopt the officer system especially for complex and high-performing firms (Uchida, 2011). It was from these contradictions that a hypothesis stating that there relationship between firm performance and the size of the board is negative was stated.

First Hypothesis: size of the board and company performance

H1. The relationship between company performance and the size of the board is negative

Previous studies on independent non-executive directors reported in chapter 2 (literature review) of this research presented a mixed views on the impact of independent non-executive directors on board performance and therefore company performance. For example, the proponents of agency theory argued that the board should act independently and should therefore include preponderance of outside directors (Van den Berghe & Levrau, 2004; Luan & Tang, 2007). Roberts, McNulty & Stiles (2005) observed some of the present dangers in the tendency of for agency assumptions to dominate corporate

governance debate and reform. They suggested that the work of outside directors is vital, both for enhancing the actual effectiveness of the board and as a source of confidence to distant investors as to the effectiveness of what goes on in the board. However, other studies such as the one carried out by Dalton & Dalton (2005) and Markarian & Parbonetti (2007) found no evidence suggesting any relationship between independent directors and firm performance. Based on these conflicting views a hypothesis suggesting that there is positive relationship between frim performance and the proportion of independent non-executive directors was stated.

Second Hypothesis: proportion of independent non-executive directors and company performance

H2.The relationship between company performance and the proportion of independent directors is positively related.

Previous studies presented in chapter 2 of this research such as Kroll, Walters & Wright (2008) on this topic argued that relying solely on director vigilance may be limiting because vigilance without relevant experience is unlikely to ensure board effectiveness. Their empirical findings indicated that vigilant boards rich in appropriate experience are associated with superior outcomes. Roy (2008) added to the argument by saying that companies must ensure that board members have the required skills and knowledge. A hypothesis suggesting that there is positive relationship between firm performance and the proportion of non-executive director with industry relevant experience was proposed.

Third Hypothesis: non-executive directors with mining industry expertise and company performance

H3. The relationship between company performance and the proportion of non-executive director with industry relevant experience

4 Chapter Four: Research Methodology

4.1 Introduction

Babbie (2008) in Abowitz and Toole (2010) defined research design as process that involves a set of decisions regarding what topic is to be studied among what population, with what research methods, for what purpose. This chapter begins by outlining a proposed research method in section 4.1 followed by unit of analysis in section 4.2. The proposed population of relevance is outlined in section 4.3 followed by an explanation of sample size and selection in section 4.4. Data collection and data analysis are described in section 4.5. The chapter concludes by highlighting the potential research limitations in section 4.6.

4.2 Research Design

There are two types of scientific research methods commonly used in business and management research areas and the two methods are qualitative or quantitative methods (Saunders & Lewis, 2012). When selecting appropriate methodology, the researcher needs to be aware of the complexity of the issues and the appropriate research philosophy that influence his or her decision. The quantitative research design is rooted in the philosophy of positivism (Saunders & Lewis, 2012).

Quantitative, positivistic research is arguably the most widely understood approach to scientific research and could be considered the dominant research paradigm (Mcvilly, Stancliffe, Trevor, Parmenter & Burton-Smith, 2008). They explained that the main concern of a positivist researcher is to study observable and measurable variables in certain controllable conditions and to describe the reaction of these variables to treatment applied by the researcher. Johnson & Harris (2002) stated that the primary objective of quantitative research rests on aggregating numbers into statistics to facilitate the interpretation of data results in reaching conclusions on research question.

The aim of this research is examine if there is a causal relationship between board attributes (independent variables) and company performance (dependent variables). A fundamental appeal of causal modelling is the ability to combine cause-effect information, based on theoretical construction, with statistical data to provide a quantitative assessment of relationships among the studied variables (Anderson & Vastag, 2004). In the context of this research, the purpose for employing causal modelling is to develop an explanation of relationships between the independent variables and the dependent variable and also to provide a basis for inferences.

According to Anderson & Vastag (2004) a causal study would ideally take the form of a randomised controlled experiment conducted over an appropriate time period. This view is also shared by Antonakis, Bendahan, Jacquart & Lalive (2010). However, they also cite that unfortunately randomised controlled experiments can seldom, if ever, be utilised to provide causal relationships and therefore causal modelling methods for non-experimental data are of interest. Antonakis, Bendahan, Jacquart & Lalive (2010) took a simple, pragmatic, and widely-shared view of causality without being concerned about the nature of causes or philosophical foundations of causality, but more specifically how to measure the effect of a cause. They explained that to measure causal effects, they needed an effect (y) and a presumed cause (x). Based on Kenny (1979) they listed three classic conditions that must exist and the conditions are as follows:

1. X must precede y temporarily
2. X must be reliably correlated with y (beyond chance)
3. The relationship between x and y must not be explained by other causes.

According to their explanation, the first condition is rather straight-forward: however in the case of simultaneity, a cause and effect could have feedback loops. The second condition requires a statistically reliable relationships (and thus quantitative data). The third condition is the one that poses the most difficulties and has to do with exogeneity of x (i.e., that x varies randomly and is not correlated with omitted causes).

This study assumes the second condition of causal relationship whereby the dependent variables, X (ROA, ROE, Tobin's q and EVA) are presumed to be correlated with Y (Size of the board, Proportion of independent non-executive directors and non-executive directors with mining or engineering experience). Platinum price is used as control variable for linear regression analysis.

4.3 Unit of analysis

Any phenomenon can be studied at various levels of analysis. The unit of analysis refers to the type of entity or object that is studied. The unit of analysis in this study will be the board attributes as a proxy of board composition and company performance of the South African Platinum mining companies.

4.3.1 Board attributes unit of analysis

The independent variables related to the topic and presented in the literature review are the size of a board, proportion of independent non-executive directors on the board and proportion of non-executive directors with mining or engineering operational experience on the board. These attributes are identified as important proxies for a board composition as discussed in the literature section. Board size is the headcount of the directors of the board. Director expertise in the context of this study refers to a director with mining or engineering operational experience in contrast to Roy (2008) definition director expertise which is defined in terms of industry experience, educational background, specific knowledge and board experience, skills and values. This would introduce more variables which would be difficult and subjective to quantify for a quantitative study.

4.3.2 Company performance based Measures

For the purpose of this study, accounting based performance and market based performance will be used as a proxy for company performance.

4.3.2.1 Accounting based measures

- ROE = Return on equity ratio, defined as profits after taxation divided by shareholders equity

$$= \frac{Net\ Profit}{Equity}$$

- ROA = Return on assets ratio, defined as profit before taxation divided by total assets

$$= \frac{Net\ Profit}{Total\ assets}$$

4.3.2.2 Market Based Measures

- Tobin's q = Market value of equity plus debt divided by replacement costs of total assets ((Murphy & McIntyre, 2007). In other words it can be expressed mathematically as follows:

$$= \frac{Market\ value\ of\ equity + Debt}{Total\ assets}$$

- EVA Economic Value identifies economic profit after all cost including the firm's cost of capital ((Murphy & McIntyre, 2007). NOPAT is the net operating profit after

tax, WACC is weighted average cost of capital and Capital denotes the resources used by the firm to create value in question. It is expressed mathematically as follows:

EVA = NOPAT – (WACC) * Capital:

EVA was calculated from McGregor BFA using a method similar to the one used by Prinsloo (2007) and the calculation results were similar.

The method used by Prinsloo (2007) to calculate the adjusted EVA was based on in-depth and reputable literature which can be trusted. It is not the aim of this study to re-invent the wheel and for this reason Prinsloo (2007) method of calculating adjusted EVA was chosen.

4.4 Population of relevance

A population is the set of all members about which a study intends to make inferences, where an inference is a statement about a numerical characteristic of the population (Albright, Winston & Zappe, 2009). A population is built up of elementary units, which cannot be further decomposed. According to Albright, Wiston & Zappe (2009), the relevant population contains all members about which a study intends to make inferences.

The population of relevance chosen for this study is from listed South African Platinum mining companies in Johannesburg Stock Exchange (JSE). The homogeneity of the of this industry, permits relatively easy comparisons of performance across the sample. The choice of the population of relevance for this research is supported by the view shared by Davidson III & Rowe (2004) that in an attempt to improve the analysis of the performance-board composition endogeneity question studies should focus on a single industry for sample choice and statistical procedure. They also argued that the causal link from board composition to financial performance may be weak and influenced by many factors including past and current directors. Furthermore, the factors influencing performance may be difficult to measure and control in a study and may vary across company types and industries. To mitigate the measurement type inherent in this type, they therefore focused on one industry. Furthermore, Mcube (2008) revealed that agency theory prevails in the South African Platinum industry and it would be interesting to examine the implications of this prevalence on company performance. Prinsloo (2007) also conducted a study for this industry which compared the economic value created from this industry in a growing platinum industry.

4.5 Sample size and selection

Sampling is the process of selecting units (e.g., people, organizations) from a population of interest so that by studying the sample we may fairly generalise our results back to the population from which they were chosen (Trochim, 2007). In making a decision of which sampling plan to select there are two initial questions to ask; they type of sample or sampling procedure and the size. Probability sampling is defined by Saunders & Lewis (2012) as a variety of sampling techniques for selecting a sample at random from a complete list of the population. They justified their explanation by saying that because you have a complete list and select at random, you know the chance or probability of each member of the population being selected. They further defined non-probability sampling as a variety of techniques for selecting a sample when you do not have a complete list of the population. Since there is no complete list of the population, a sample cannot be selected at random.

Probability based sampling is the preferred sampling method because it minimises the chance of bias within the data. However, probability based sampling is rarely feasible in many situations or applied settings such as in the context of this research. For the purpose of this study, five largest platinum producers of the platinum mining companies were chosen sample for this study. The rationale behind this choice is because all these companies account for more than 80% of South African Platinum production (Matthey, 2011). The choice of as the sampling method for this research is non-probabilistic and judgemental. However, the largest challenge was the small sample size and limited time series data. Fellows & Liu (2008) in Abowitz and Toole (2010), said research based on non-probability sampling techniques, such as convenience samples, can provide useful insights but is limited with regard to the accuracy of estimates and its generalizability to larger populations. Abowitz and Toole (2010) further argued that with non-probability based samples in particular, size of the sampling error (random error) cannot be estimated due to chance nor can they determine sample bias

The results of this study cannot make inferences about the larger population (the entire mining industry), but could be used to make inferences to the platinum mining industry. A combination of cross-section and time series data was used to develop better control of the problems of the measurement of performance due to limited time series data and a small population. It is a common practice in corporate governance to use cross-sectional data pertaining to a performance measure and its explanatory board characteristics (Murphy, McIntyre & Mitchell, 2007).

4.6 Data collection, Data Analysis

4.6.1 Data Collection

Data is defined in Boaduo (2011), citing (Fits-Gibbon & Morris, 1987; Wiersma, 2000; Gay and Airasian, 2000; Bryman, 2004; Baker, 1999; Miles and Huberman, 1994), as a series of observations, measurements, facts and information that are required to be collected, systematically organised, treated, analysed and interpreted to provide the research report. Numerical data can be statistically treated, analysed and interpreted. Researchers use data collected by other researchers in relation to other research problems as part of the usual gathering of secondary resources as in the case of population census, or reports of other researchers or even in published and unpublished documented sources (Boaduo, 2011). Such data broadly constitute secondary data.

Secondary data was used for the purpose of this research and was sourced from publicly available sources. The primary source of data for this study included; publicly listed company annual reports and company annual reports for a director profile. McGregor BFA was used to collect the required information for calculating the financial and market based variables. McGregor BFA website provides real-time and historical financial and company information on South African listed companies. Standardised financial statements were used rather than normal financial published statements. This ensures that the financial statement results of the respective listed companies are comparable with each other.

Board composition can change over time, as explained by Davidson III & Rowe (2004), so to mitigate endogeneity problem it helps to assess data over a longer period of time. Data was collected over a ten year window period between 2002 and 2011. This is how far published annual reports of platinum mining listed on Johannesburg Securities Exchange (JSE) go back on companies' websites. A ten year period is reflective of two business cycles where business cycle is a five year period. This approach is suitable for the platinum mining industry which is cyclic by nature. It is a common practice in corporate governance to use cross-sectional and longitudinal data pertaining to a performance measure and its explanatory board characteristics (Murphy, McIntyre & Mitchell, 2007).

Data that was collected from the annual reports relating to the board of directors of each company included the following:

- The name of each director

- Board position (i.e. executive or non-executive/independent director)
- Previous experience
- Education and external board appointments on other public listed company
- A director with relevant industry experience relevant to the engineering or mining industry

4.6.2 Data Analysis

4.6.2.1 Data interpretation

Since all data in quantitative research are given a numeric value, the interpretation of data in quantitative research requires the use of statistics (Botti & Endacott, 2008). According to their definitions, descriptive statistics include the principles for organising and summarising raw data whilst the inferential statistics include the principles for deciding whether the data collected shows the expected differences and patterns. The analysis and interpretation of data should focus on context, intention and process to be able to give a valid interpretation of the data obtained in the field and literature review for the study (Boaduo, 2011).

The level of data available for analysis determines whether the statistical tests to be applied are selected from the parametric or non-parametric group of tests, and that is a fundamental distinction between statistical tests (Botti & Endacott, 2008). According to their explanation, parametric statistics use the arithmetic mean (average) and therefore data must be measured at the interval or ratio level. They further explained that the use of these tests is based on a key assumption about the way the data are distributed. According to Story (2004) in Botti & Endacott (2008) this assumption is that data have come from a population that has a normal distribution and according to their explanation normal distribution has the following properties:

- It represents the theoretical distribution of population scores.
- It is a bell-shaped curve
- It has well-defined properties that are based on the mean and variation from the mean (standard deviation).
- It is symmetrical around the mean, so that equal numbers of cases fall close to the mean, very few cases fall at the extreme arms of the curve.

- The area under distribution curve represents a probability about the distribution scores of 68.3%, 95.4% and 99.7%.

Non-parametric statistic does not rely on assumptions about distribution of data discussed above so they are often referred to as assumption-free tests (Botti & Endacott, 2008). They argued, for this reason, non-parametric analyses are considered less powerful and less likely to find a significant effect if one exists.

For the purpose of this research data was grouped in accordance of the research constructs namely; independent variable (board composition) and dependent variables (company performance). An Excel spreadsheet was used to arrange the raw data from company annual reports and McGregor BFA in numeric form. The independent variables were coded and transferred into SPSS Statistical tool. SPSS statistical program was used to interpret the collected data. SPSS is a computer program used for survey authoring and deployment (IBM SPSS Data Collection), data mining (IBM SPSS Modeler), text analytics, statistical analysis, and collaboration and deployment (Wikipedia). A parametric test was chosen for the purpose of this study since interval data (annual basis) was converted into numeric form and averaged over time. Linear regression model with Anova test was chosen for the study.

The independent variables are tabulated in table 4.1 and are listed as follows:

- Size of the board size
- % of non-executive directors in the company board
- % of non-executive directors with mining or engineering operational experience in the company board
- % of Independent non-executive directors in the company board

The dependent variables are tabulated in table 4.2 and are listed as follows:

- ROA
- ROE
- Tobin's q
- EVA

4.6.2.2 Validity and Reliability of the results.

Understanding issues of internal and external validity in experiments, as well as measurement construct validity and statistical significance (statistical conclusiveness validity), helps us understand the broader problems of causal inference, generalizability, measurement reliability and validity, and statistical inference in any other types of research (Abowitz & Toole, 2010). Internal (contextual validity) as it is called in quantitative and qualitative research, is one of the most essential manifestations of validity (Ihantola & Kihn, 2011). They further stated that internal validity asserts that variations in the dependent variables result from variations in the independent variables. Ryan, Scapens & Theobald (2002) in Ihantola & Kihn (2011) said external validity is a key criterion in quantitative research. It determines whether one can draw more general conclusions on the basis of the model used and data collected, and whether results may be generalised to other samples, time periods and settings (Ihantola & Kihn, 2011).

According to Ihantola & Kihn (2011), threats of the internal validity of quantitative work may occur throughout the research process. They stated that during research design, the threats to internal validity include insufficient knowledge of, or contradictions in, the logic. Furthermore, according to their study, deficiencies in the later stages of the research can also lead to studies with low internal validity. Researcher bias and errors in statistical testing, illusory correlation and causal error are some examples of threats during data analysis and interpretations that can lead to low internal validity (Ihantola & Kihn, 2011). According to their definition, researcher bias means that the researcher has a personal bias in favour of one technique over another. Three typical problems may threaten the external validity of quantitative study according to Ryan, Scapens & Theobald (2002) in Ihantola & Kihn (2011); population, time and environmental validity. According to their definition population validity refers to whether inferences can be drawn from a study of a given population. The question analysed concern, for example, whether a relationship between two variables exists in the population at large and not only in the sample selected (Ihantola & Kihn, 2011). Time validity shows the extent to which the results of a particular study at a point in time can be generalised to other time periods. Environmental validity indicates whether results can be generalised across settings.

Reliability is based on the application of uniform measurement rules and the uniformity of measurement results over time (Abowitz & Toole, 2010). They explained that the same indicator should produce consistent and stable results (all else being equal). According to Abowitz & Toole (2010), archival data is subject to biases and problems or reliability. They mentioned that often the specific measures needed do not match the data or indicators

available and/or do not have access to information on the possible measurement errors that pertain to the ones used.

This study took into consideration the potential threats to validity of the results throughout the research process. To counteract internal validity threats related to insufficient knowledge of, or contradiction, as explained by Ihantola & Kihn (2011), an in-depth literature review regarding board composition and company performance was carried out. Furthermore, the researcher's personal involvement and interest in the platinum industry extinguished the internal validity arising from insufficient knowledge. Other threats related to deficiencies in the later stages of research such as data collection, research bias and errors in statistical testing were also considered. For example, data collected in this study is from annual reports of listed platinum mining companies and McGregor BFA. The method of collecting annual reports is a common practice in business research methods and is consistent with previous studies on this topic. Researchers use data collected by other researchers in relation to other research problems as part of the usual gathering of secondary sources as in the case of population census, or the reports of other researchers or even in published and unpublished documented sources (Boaduo, 2011). The method used to calculate the market performance measure EVA, which was not readily available, was similar to the one used by Prinsloo (2007) based on the literature on EVA reported in the literature review.

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Table 4.1 Independent variables (Board composition)

	Year	Size of the board	% -Executive directors in the board	% of Executive directors with mining or engineering qualifications	% of Executive directors with mining or engineering operational experience	% of non-executive directors in the board	% of non-executive directors with mining or engineering qualifications	% of non-executive directors with mining or engineering operational experience	% of independent non-executive directors in the board
Impala	2002	10	30%	10%	10%	70%	20%	20%	40%
Impala	2003	11	36%	18%	18%	64%	18%	18%	36%
Impala	2004	16	25%	13%	13%	75%	19%	13%	69%
Impala	2005	12	33%	17%	17%	67%	8%	8%	58%
Impala	2006	13	38%	23%	23%	62%	8%	8%	54%
Impala	2007	13	31%	15%	15%	69%	8%	8%	54%
Impala	2008	13	31%	15%	15%	69%	8%	8%	54%
Impala	2009	13	31%	15%	15%	69%	8%	8%	54%
Impala	2010	9	44%	11%	22%	56%	11%	11%	44%
Impala	2011	13	23%	0%	8%	77%	15%	15%	62%
	Year	Size of the	% -Executive directors in the boa	% of Executive directors with mining or engineering qualifications	% of Executive directors with mining or engineering operational experience	% of non-executive directors in the board	% of non-executive directors with mining or engineering qualifications	% of non-executive directors with mining or engineering operational experience	% of independent non-executive directors in the board
Anglo Platinum	2002	13	46%	15%	15%	54%	15%	31%	23%
Anglo Platinum	2003	16	38%	25%	25%	63%	13%	25%	25%
Anglo Platinum	2004	19	37%	26%	26%	63%	16%	26%	21%
Anglo Platinum	2005	19	37%	26%	26%	63%	16%	26%	21%
Anglo Platinum	2006	20	40%	25%	25%	60%	10%	25%	20%
Anglo Platinum	2007	15	53%	33%	33%	47%	13%	20%	33%
Anglo Platinum	2008	12	17%	8%	8%	83%	8%	25%	42%
Anglo Platinum	2009	11	18%	9%	9%	82%	9%	9%	45%
Anglo Platinum	2010	12	17%	8%	8%	83%	17%	25%	42%
Anglo Platinum	2011	13	15%	8%	8%	85%	15%	23%	54%
	Year	Size of the	% -Executive directors in the boa	% of Executive directors with mining or engineering qualifications	% of Executive directors with mining or engineering operational experience	% of non-executive directors in the board	% of non-executive directors with mining or engineering qualifications	% of non-executive directors with mining or engineering operational experience	% of independent non-executive directors in the board
Lonmin	2002	9	56%	11%	33%	44%	0%	0%	44%
Lonmin	2003	12	42%	8%	25%	58%	0%	0%	33%
Lonmin	2004	9	44%	22%	22%	56%	0%	0%	56%
Lonmin	2005	9	33%	11%	11%	67%	11%	22%	67%
Lonmin	2006	9	33%	11%	11%	67%	11%	22%	67%
Lonmin	2007	11	27%	9%	9%	73%	9%	18%	73%
Lonmin	2008	10	20%	0%	0%	80%	10%	20%	80%
Lonmin	2009	9	22%	0%	0%	78%	0%	22%	78%
Lonmin	2010	11	27%	0%	9%	73%	0%	27%	64%
Lonmin	2011	11	18%	0%	9%	82%	9%	36%	55%
	Year	Size of the	% -Executive directors in the boa	% of Executive directors with mining or engineering qualifications	% of Executive directors with mining or engineering operational experience	% of non-executive directors in the board	% of non-executive directors with mining or engineering qualifications	% of non-executive directors with mining or engineering operational experience	% of independent non-executive directors in the board
Aquarius	2 002	6	33%	17%	17%	67%	0%	25%	0%
Aquarius	2 003	6	33%	17%	17%	67%	0%	25%	0%
Aquarius	2 004	7	14%	14%	14%	86%	0%	33%	0%
Aquarius	2 005	8	13%	13%	13%	88%	0%	29%	0%
Aquarius	2 006	8	13%	13%	13%	88%	0%	43%	0%
Aquarius	2 007	9	11%	11%	11%	89%	0%	38%	0%
Aquarius	2 008	7	14%	14%	14%	86%	0%	33%	0%
Aquarius	2 009	7	14%	14%	14%	86%	0%	33%	0%
Aquarius	2 010	8	13%	13%	13%	88%	0%	29%	0%
Aquarius	2 011	8	13%	13%	13%	88%	0%	29%	0%
	Year	Size of the	% -Executive directors in the boa	% of Executive directors with mining or engineering qualifications	% of Executive directors with mining or engineering operational experience	% of non-executive directors in the board	% of non-executive directors with mining or engineering qualifications	% of non-executive directors with mining or engineering operational experience	% of independent non-executive directors in the board
Northam	2 002	10	10%	10%	10%	90%	20%	40%	10%
Northam	2 003	9	0%	0%	0%	100%	33%	44%	11%
Northam	2 004	8	0%	0%	0%	100%	38%	38%	0%
Northam	2 005	9	11%	11%	11%	89%	33%	33%	22%
Northam	2 006	10	10%	10%	10%	90%	30%	30%	20%
Northam	2 007	9	11%	11%	11%	89%	22%	22%	22%
Northam	2 008	8	13%	13%	13%	88%	25%	38%	38%
Northam	2 009	8	13%	13%	13%	88%	25%	38%	38%
Northam	2 010	11	18%	9%	9%	82%	27%	36%	36%
Northam	2 011	11	18%	9%	9%	82%	27%	36%	36%

Table 4.2 Dependent variables (company performance)

	Year	EVA	Tobin Q	Return on Average Assets %	Return on Average Equity %
Impala	2002	9 305 678	6	77	224
Impala	2003	5 248 482	5	65	156
Impala	2004	1 924 981	6	46	111
Impala	2005	3 037 147	4	50	92
Impala	2006	6 003 960	8	65	112
Impala	2007	11 135 010	4	57	87
Impala	2008	12 923 503	5	52	74
Impala	2009	10 552 842	3	31	42
Impala	2010	3 573 829	4	28	33
Impala	2011	5 789 063	4	36	44
	Year	EVA	Tobin Q	Return on Average Assets %	Return on Average Equity %
Anglo Platinum	2002	22 247 288	16	136.47	5,731.78
Anglo Platinum	2003	6 724 539	10	86.78	-147.27
Anglo Platinum	2004	3 657 393	7	80.51	-155.44
Anglo Platinum	2005	5 141 792	7	83.77	-750.05
Anglo Platinum	2006	14 059 687	9	142.19	-924.76
Anglo Platinum	2007	18 286 196	15	133.55	-501.18
Anglo Platinum	2008	20 204 345	11	98.15	-349.52
Anglo Platinum	2009	2 042 697	7	30.59	-78.03
Anglo Platinum	2010	5 597 555	7	48.22	2,102.03
Anglo Platinum	2011	-35 171 699	2	19.01	25.93
	Year	EVA	Tobin Q	Return on Average Assets %	Return on Average Equity %
Lonmin	2002	1 112 169	44	134.27	307.83
Lonmin	2003	318 491	24	85.26	304.3
Lonmin	2004	508 237	47	162.66	-442.11
Lonmin	2005	466 510	48	177.16	-125.52
Lonmin	2006	421 793	60	195.35	-354.29
Lonmin	2007	1 108 918	65	133.1	1,786.88
Lonmin	2008	524 841	54	147.83	581.88
Lonmin	2009	-316 954	30	2.23	6.27
Lonmin	2010	75 146	23	45.4	111.92
Lonmin	2011	140 321	22	56.81	148.29
	Year	EVA	Tobin Q	Return on Average Assets %	Return on Average Equity %
Aquarius	2 002	0	0	0	0
Aquarius	2 003	0	0	0	0
Aquarius	2 004	0	0	0	0
Aquarius	2 005	290 961	3	27.78	140.94
Aquarius	2 006	161 794	5	80.87	161.5
Aquarius	2 007	340 261	9	111.73	147.96
Aquarius	2 008	294 598	48	160.51	232.59
Aquarius	2 009	-23 970	22	-1.89	-17.04
Aquarius	2 010	237 774	24	28.61	49.13
Aquarius	2 011	59 853	21	28.26	38.38
	Year	EVA	Tobin Q	Return on Average Assets %	Return on Average Equity %
Northam	2 002	1 862 660	4	76.44	138.92
Northam	2 003	219 234	5	59.94	91.7
Northam	2 004	114 818	3	66.46	91.81
Northam	2 005	120 047	3	48.5	63.49
Northam	2 006	720 962	5	111.81	182.87
Northam	2 007	1 144 510	7	145.92	278.15
Northam	2 008	1 468 040	6	119.17	192.92
Northam	2 009	5 364 016	5	52.21	69.38
Northam	2 010	-229 466	6	46.86	60.34
Northam	2 011	-41 608	5	22.2	30.81

4.7 Potential Research Limitations

Sample size is too small and small sample size often relates to weaker inference and poor level of confidence compared with larger sample size. Larger sample size is usually associated with lower margins of error in the accuracy of research findings. The scope of the research is limited to board composition and does not take into account the effectiveness of the board operations which might have an influence on the outcome of the study.

5 Chapter Five: Results

5.1 Introduction

This chapter presents the research results and the findings between a relationship between board composition and company performance. For the purpose of this study, the proxies for board composition are the size of the board, proportion of non-executive directors with mining or engineering operational experience and proportion of independence non-executive directors on the board. The proxies for company performance are ROA, ROE, Tobin's q and EVA as discussed in chapter 3 and chapter 4. Section 5.2 of the results presents the findings of the relationship between the size of the board and company performance. Section 5.3 of the results presents the findings of the relationship between the proportion of non-executive directors with mining or engineering operational experience and company performance. Section 5.4 of the results presents the findings of a relationship between the proportion of independent non-executive directors in the board and company performance. Lastly, section 5.5 presents the regression results describing the relationship between company performance and board composition for the respective platinum mining companies.

5.2 Descriptive Statistics.

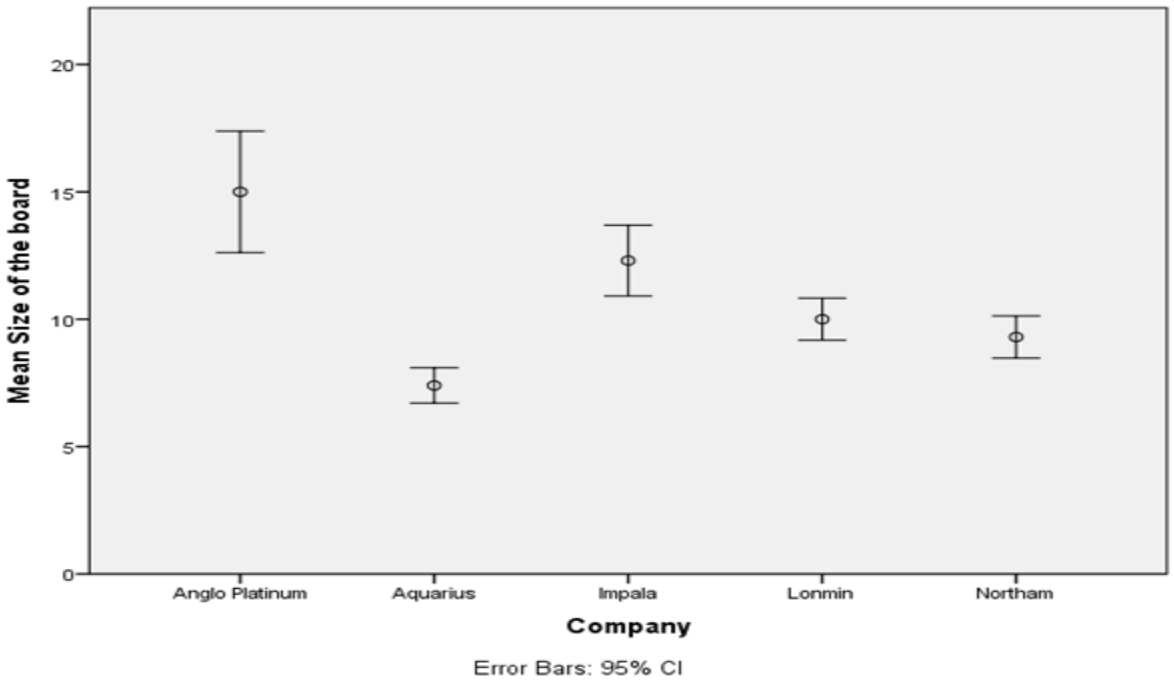
Descriptive statistics include the principles for organising and summarising raw data whilst the inferential statistics include the principles for deciding whether the data collected shows the expected differences and patterns (Botti & Endacott, 2008).

5.2.1 Size of the Board and company performance.

5.2.1.1 Size of the board for platinum mining companies.

Figure 5.1 shows mean size of the board error bar graphs at 95% confidence interval for respective platinum mining companies. Anglo Platinum has a larger mean size of the board followed by Impala Platinum, Lonmin, Northam and Aquarius respectively. Variation in the mean size follows the same order for the respective companies.

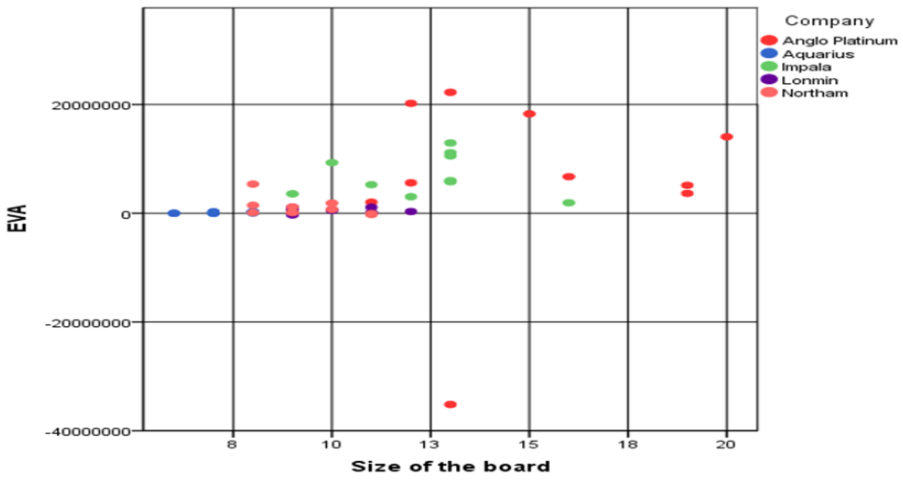
Figure 5.1: Mean size of the board error bar graphs at 95% confidence interval for respective platinum mining companies



5.2.1.2 Size of the Board and EVA

Figure 5.2 below shows a scatterplot graphs depicting relationship between the size of the board and economic value add (EVA) of the respective platinum mining companies. It is difficult to draw any trends from the Anglo Platinum scatterplot graphs about any relationships between the size of the board and EVA. With and increasing size of the board, EVA appears to be scattered all over and there is no clear trend. The same applies to Impala Platinum scatterplot graph which does not show clear trends between EVA and the size of the board. Aquarius, Northam and Lonmin Eva do not appear to be impacted by an increase in the size of the board and remain almost at zero with an increasing board size.

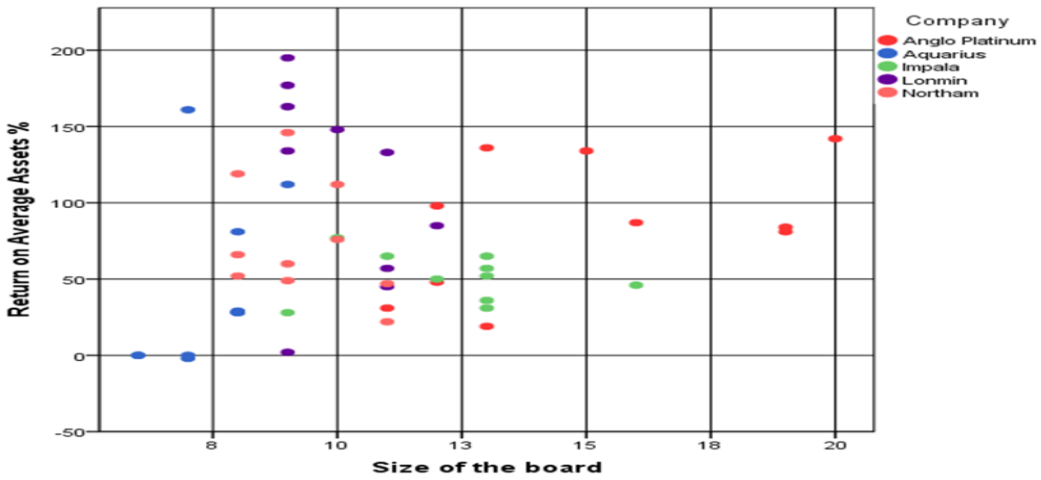
Figure 5.2: Relationship between the Size of the board and EVA for the respective platinum companies.



5.2.1.3 Size of the board and ROA

Figure 5.3 shows a scatterplot depicting a relationship between the size the board and ROA. It can be seen from the scatterplot that there does not seem to any relationship between the size of the board and ROA. For example, Anglo Platinum ROA is scattered all over with an increasing size of the board. Similarly, Lonmin does not show an increase in ROA with an increase in board size. Impala Platinum seems to have less variation in ROA with an increase size of the board as compared with other companies.

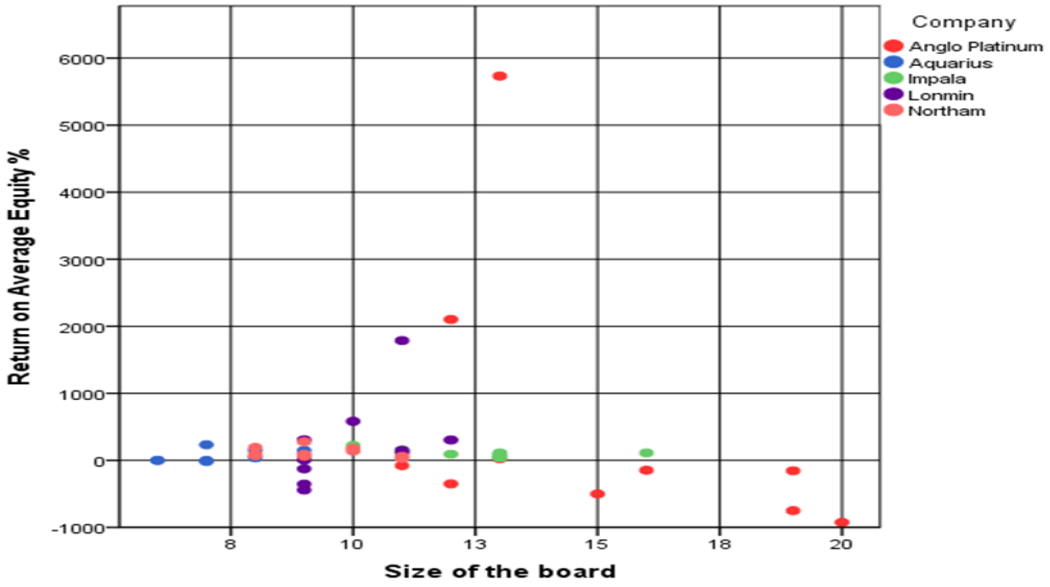
Figure 5.3 Relationship between the Size of the board and ROA for the respective platinum companies



5.2.1.4 Size of the board and ROE

Figure 5.4 shows a scatterplot depicting the relationship between the size of the board and return on equity (ROE) for the respective platinum mining companies. Anglo Platinum ROE shows more fluctuation at small board size and a downward trend with an increasing board size. Impala Platinum, Northam and Aquarius ROE's remains stable even with an increasing size of the board. Lonmin ROE is also fluctuating with an increasing size of the board but on the positive side.

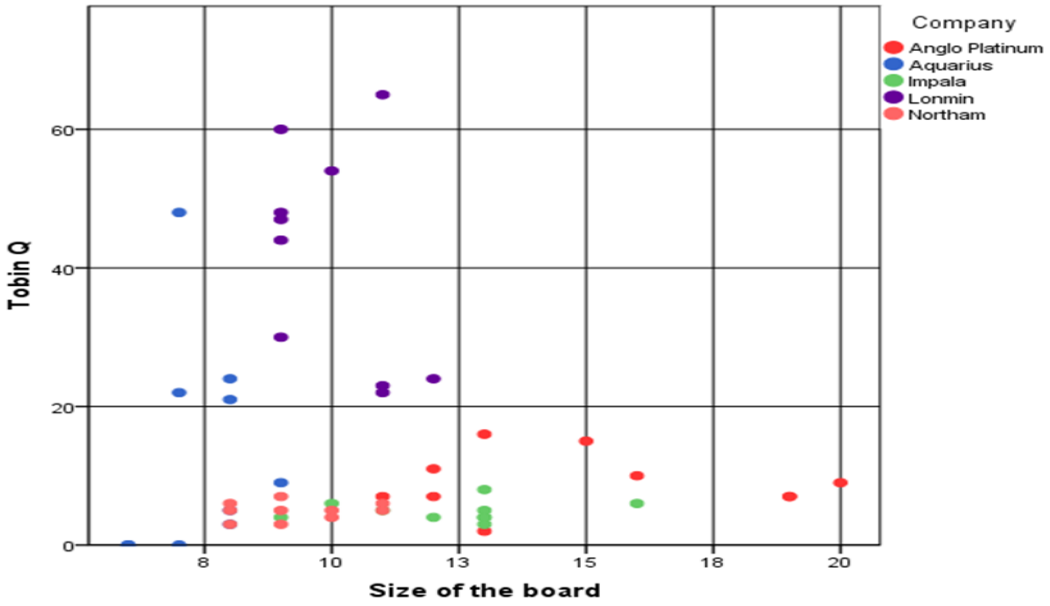
Figure 5.4 Relationship between the Size of the board and ROE for the respective platinum companies



5.2.1.5 Size of the board and Tobin's q

Figure 5.5 shows a scatterplot depicting a relationship between the size of the board and Tobin's q for the respective platinum mining companies. Anglo Platinum, Impala Platinum and Northam Tobin's q's remains relatively the same with an increasing size of the board size and they appear to be stable. Lonmin Tobin's q is scattered around and shows more variation with an increasing size of the board size. It is however, higher than that of Anglo Platinum, Northam, Aquarius and Impala Platinum. There does not seem to be any relationship between Tobin's q and the size of the board for Lonmin.

Figure 5.5: Relationship between the Size of the board and Tobin's q for the respective platinum companies.



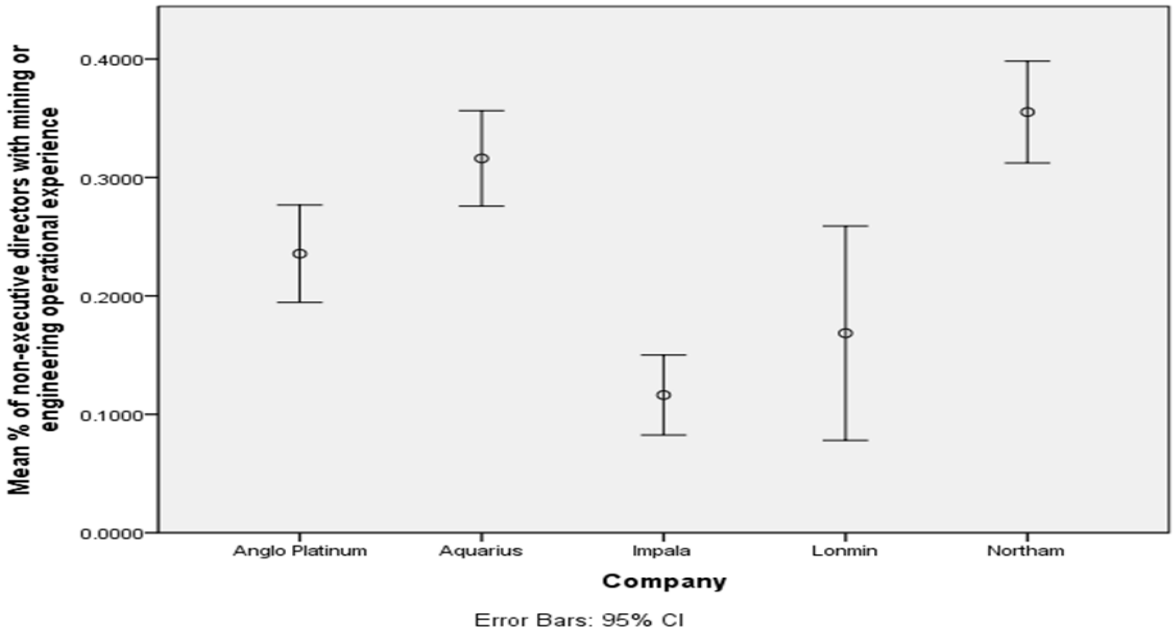
5.2.2 Non-executive directors with mining or engineering operational experience and company performance.

5.2.2.1 Non-executive with mining or engineering operational experience of platinum mining companies.

Figure 5.6 shows mean percentage of non-executive directors with mining or engineering operational experience error bar graphs at 95 percentage confidence interval for respective platinum mining companies. At 95 percentage confidence interval, Anglo Platinum Mean percentage of non-executive directors with mining or engineering operational experience overlaps with Aquarius and Lonmin mean percentages of non-executive directors with mining or engineering operational experience. The overlapping means at 95 percentage confidence interval for these companies implies that the percentages of non-executive directors with mining or engineering operational experience are statistically the same. The mean percentages for Anglo Platinum, Aquarius and Lonmin are approximately 0.25, 0.31 and 0.19 respectively. It is interesting to note that Impala Platinum mean percentage of non-executive directors with mining or operational experience error bar does not overlap with Anglo Platinum, Aquarius and Northam which implies that Impala Platinum mean percentage of non-executive directors with mining or

engineering experience is not statistically the same with those companies. Also worth noting is that Impala Platinum mean percentage of non-executive directors with mining or engineering experience is the lowest amongst all companies at approximately 0.125 percentage.

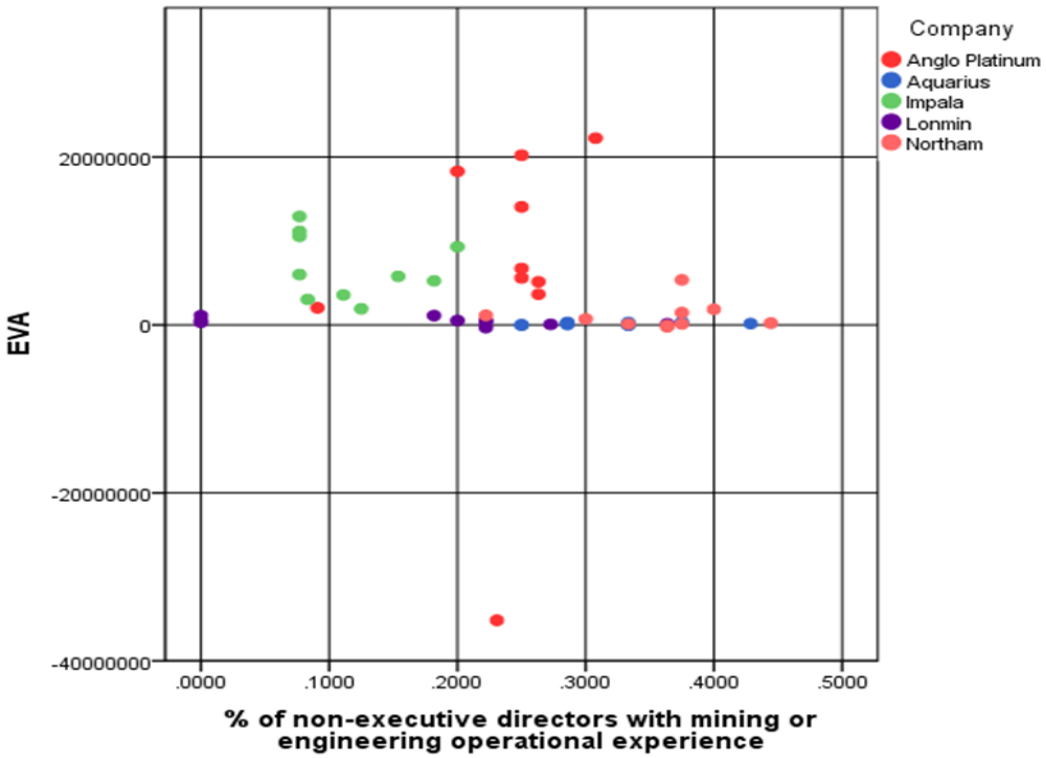
Figure 5.6: Mean percentage of non-executive directors with mining or engineering operational experience error bar graphs at 95% confidence interval for respective platinum mining companies



5.2.2.2 Non-executive with mining or engineering operational experience and EVA.

Figure 5.7 shows a scatterplot depicting the relationship between the proportion of non-executive directors with mining or engineering operational experience and EVA for the respective platinum mining companies. Aquarius, Northam and Lonmin remains stable at zero most of the time even with an increasing percentage of non-executive directors with mining or engineering operations experience. Anglo Platinum EVA seems to be relatively higher when the percentage of non-executive directors with mining or engineering operational experience increases. Impala Platinum EVA showed variability at the lowest fixed percentage of non-executive directors and increased steadily with an increasing percentage of non-executive directors with mining and engineering operational experience.

Figure 5.7: Relationship between proportion of non-executive directors with mining or engineering operational experience and EVA for the respective platinum companies.

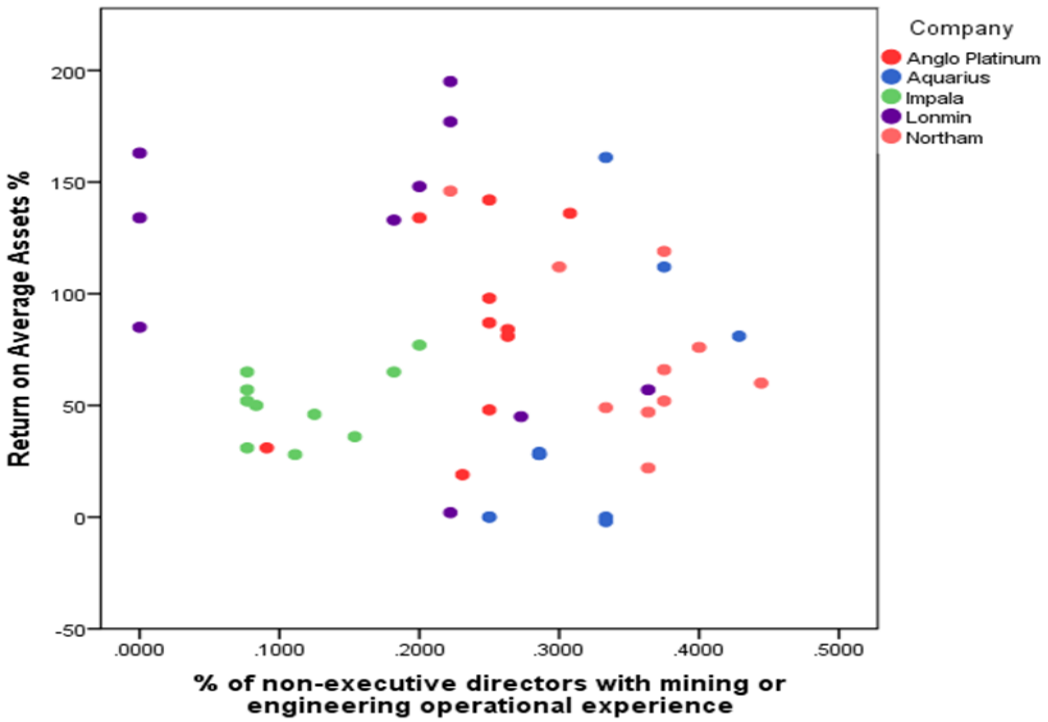


5.2.2.3 Non-executive with mining or engineering operational experience and ROA.

Figure 5.8 shows a scatterplot depicting the relationship between the percentage of non-executive directors with mining or engineering operational experience and return on assets (ROA). Anglo Platinum, Northam, Aquarius and Lonmin ROA's show too much

variability and there are no clear trends to deduce any findings. Impala Platinum ROA variations is much less with an increasing percentage of non-executive directors with mining or engineering operational experience.

Figure 5.8: Relationship between proportion of non-executive directors with mining or engineering operational experience and ROA for the respective platinum companies

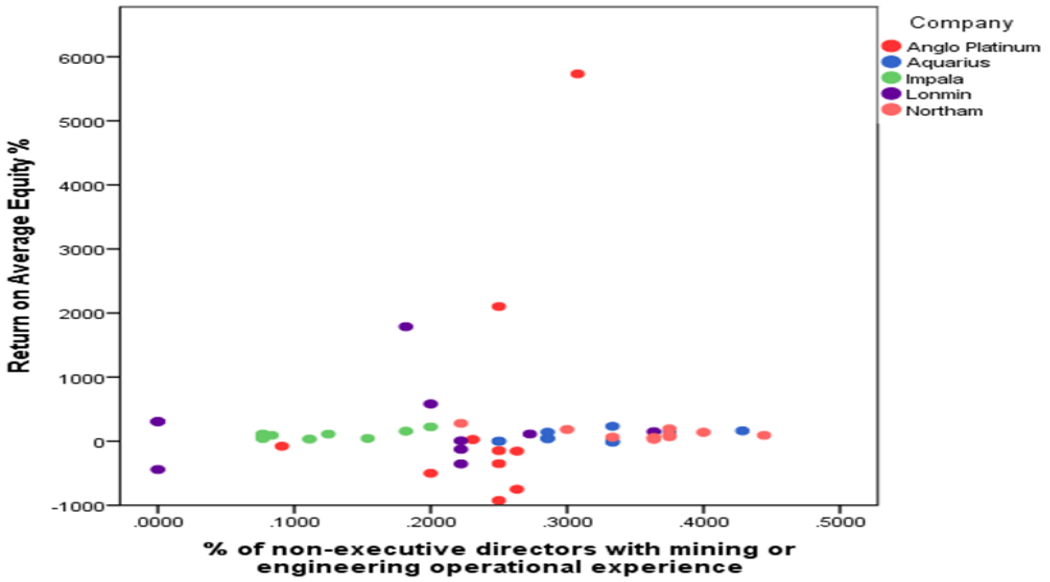


5.2.2.4 Non-executive with mining or engineering operational experience and ROE.

Figure 5.9 shows a scatterplot depicting a relationship between the percentage of non-executive directors with mining or engineering operational experience and Return on Equity (ROE). Anglo Platinum ROE seems to be scattered and does not show a relationship with the percentage of non-executive directors with mining or engineering operational experience. Impala Platinum, Northam and Aquarius ROE's remain stable with

an increasing percentage of non-executive directors with mining or engineering operational experience. In other words, ROE's for these three companies are not affected by an increase in percentage of non-executive directors with mining or engineering operational experience. Lonmin ROE was initially showing an increase with an increase in percentage of non-executive directors with mining or engineering operational experience but later remain at the same level with an increase in percentage of non-executive directors with mining or engineering operational experience.

Figure 5.9: Relationship between proportion of non-executive directors with mining or engineering operational experience and ROE for the respective platinum companies

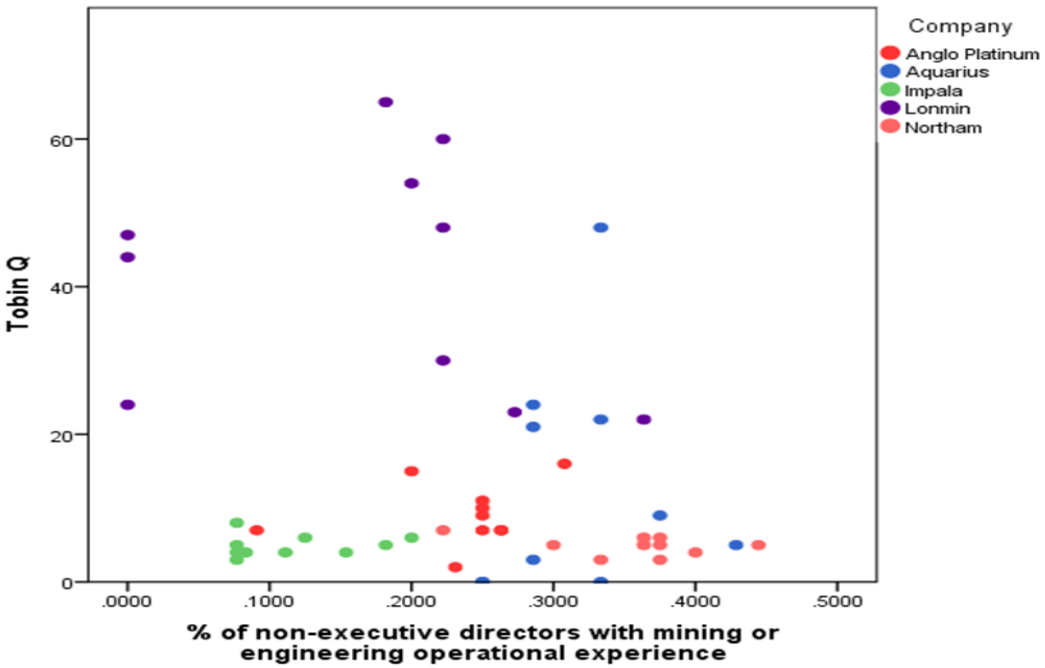


5.2.2.5 Non-executive with mining or engineering operational experience and Tobin's q.

Figure 5.10 shows a scatterplot depicting a relationship between Tobin's q and percentage of non-executive directors with mining or engineering operational experience. There does not seem to any relationship between Tobin's q and percentage of non-executive directors with mining or engineering operational experience for Lonmin, Anglo Platinum and Aquarius Platinum. These companies Tobin's q shows higher variation with an increasing percentage of non-executive directors with mining or engineering experience. However, as

for Impala Platinum and Northam Tobin's q does not change and remains stable with an increasing percentage of non-executive directors with mining or engineering operational experience.

Figure 5.10 Mean percentage of Independent non-executive directors in the board error bar graphs at 95% confidence interval for respective platinum mining companies



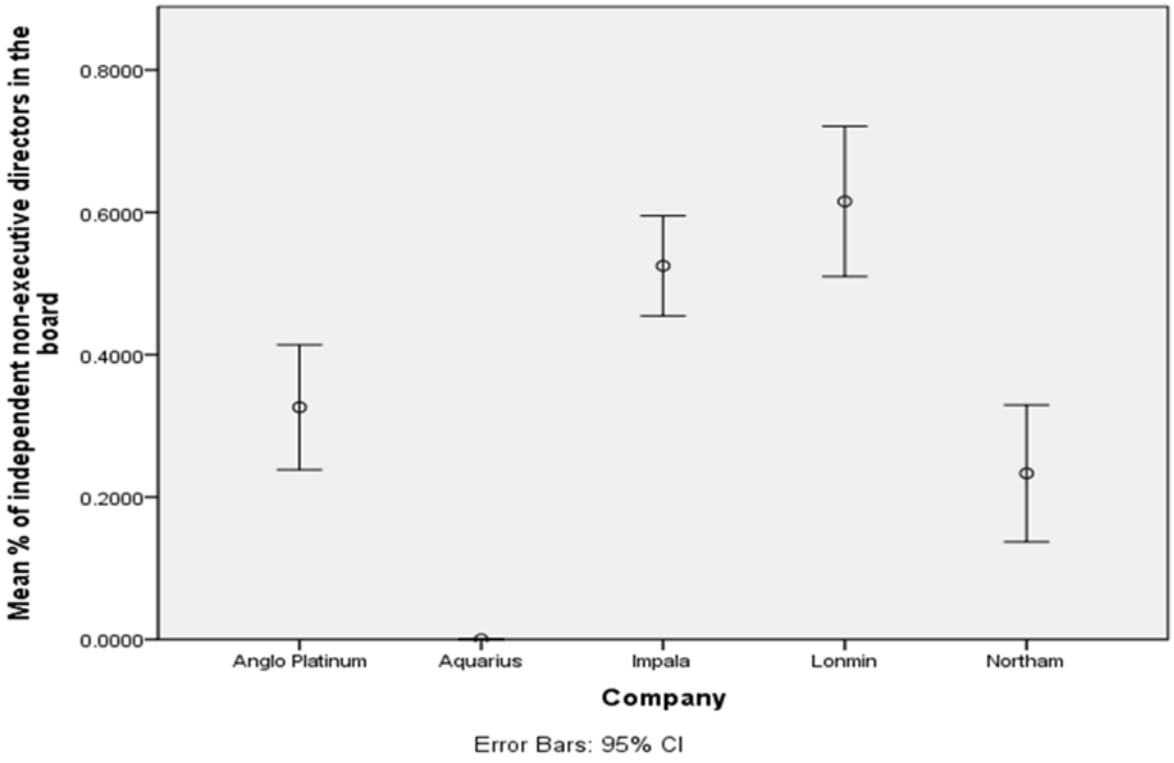
5.2.3 Independent non-executive directors and company performance

5.2.3.1 Independent non-executive directors for platinum mining companies.

Figure 5.11 shows mean percentage of independent non-executive directors in the board error bar graphs at 95 percentage confidence level for the respective Platinum mining companies. Impala Platinum and Lonmin mean percentages of independent non-executive directors in the board overlaps. This implies that the mean percentages of the independent non-executive directors in the board for these two companies are statistically the same. The mean percentage of independent non-executive directors in the board for Impala Platinum and Lonmin are approximately 0.52 and 0.6 respectively. Anglo Platinum mean percentage of independent non-executive directors in the board overlaps with Northam

mean percentage of independent non-executive directors in the board at 95 percentage confidence interval. The mean percentage of independent non-executive directors in the board for Anglo Platinum and Northam are approximately at 0.35 and 0.26 respectively. Aquarius mean percentage of independent non-executive directors in the board is at zero implying that there is no independency in the board.

Figure 5.11: Mean percentage of Independent non-executive directors in the board error bar graphs at 95% confidence interval for respective platinum mining companies

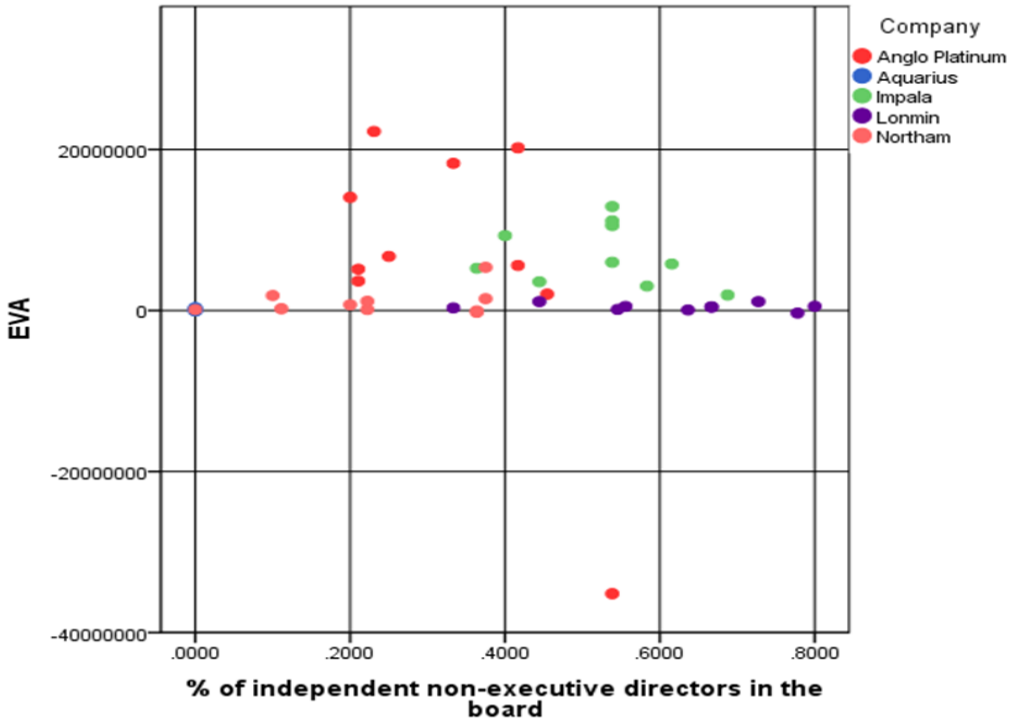


5.2.3.2 Independent non-executive directors and EVA.

Figure 5.12 shows a scatterplot depicting the relationship between the percentage of independent non-executive directors in the board and Economic Value Add (EVA).It can be said that even though the Anglo Platinum graph is scattered, EVA showed an upward trend with an increase in the percentage of independent non-executive directors to some limit and later declined when that limit was reached. Impala Platinum, EVA seems to be range-bound at the same level with an exception of a period where the percentage of

independent non-executive directors was fixed. As for Lonmin, Northam EVA remained flat at zero with an increase in percentage of independent non-executive directors.

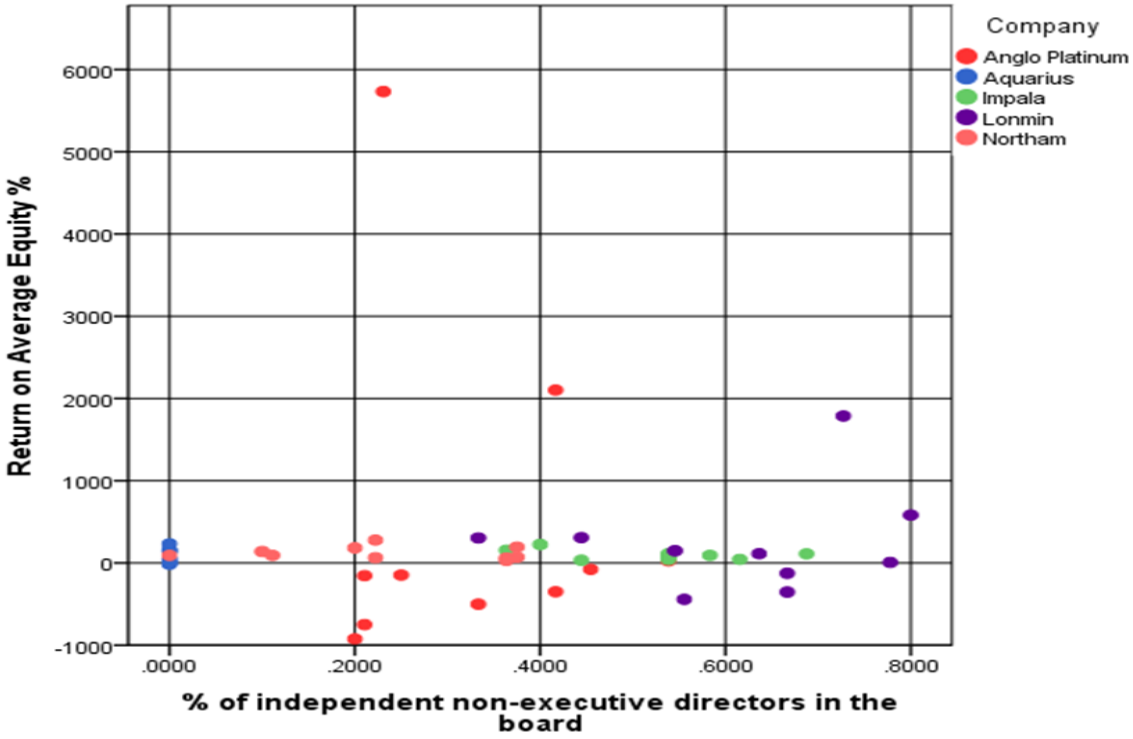
Figure 5.12: Relationship between percentage of independent non-executive directors with mining or engineering operational experience and EVA for the respective platinum companies.



5.2.3.3 Independent non-executive directors and ROE.

Figure 5.13 shows a scatterplot depicting the relationship between the percentages of independent nonexecutive directors in the board and ROE for the respective companies. Anglo Platinum ROE does not seem to be increasing with an increasing percentage of independent non-executive directors. It is not clear to read the trends from the scatterplot of any relationship between the percentage of independent non-executive directors in the board and ROE for Anglo Platinum. Impala Platinum ROE remain the same with an increasing percentage of independent non-executive directors in the board and the same applies to Northam. Lonmin ROE remains relatively the same with an increasing percentage of independent non-executive directors.

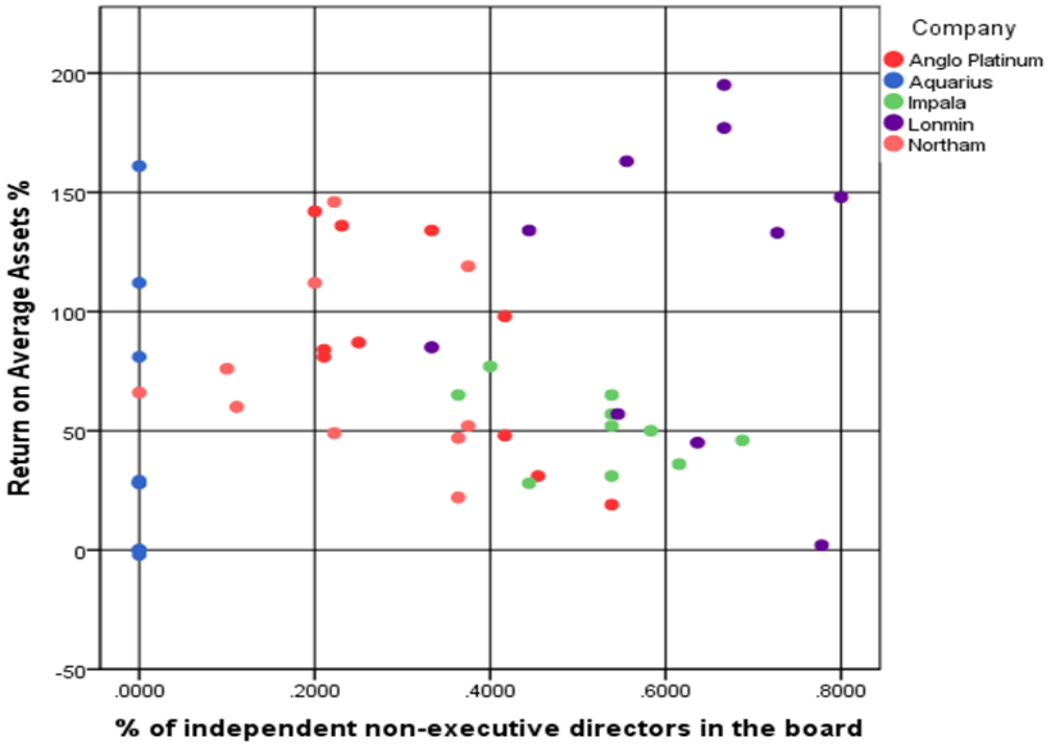
Figure 5.13: Relationship between percentage of independent non-executive directors and ROE for the respective platinum companies.



5.2.3.4 Independent non-executive directors and ROA.

Figure 5.14 shows a scatterplot depicting a relationship between the percentage of independent non-executive directors in the board and ROA. No relationship between the percentage of independent non-executive directors in the board and ROA can be drawn from the scatter plot for all platinum mining companies. The plots are scattered and to draw any conclusion.

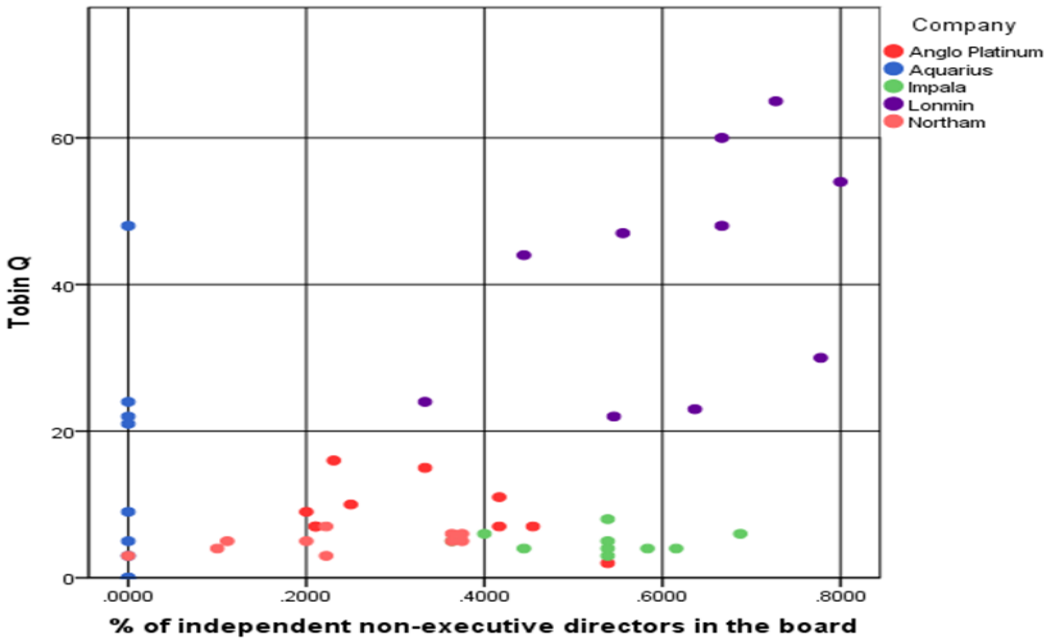
Figure 5.14: Relationship between percentage of independent non-executive directors in the board and ROA for the respective platinum companies.



5.2.3.5 Independent non-executive directors and Tobin's q.

Figure 5.15 shows a scatterplot depicting a relationship between the percentages of independent non-executive directors in the board and Tobin's q for the respective companies. It is not clear to read from Anglo Platinum scatterplot if there is any relationship between the percentages of independent non-executive directors in the board and Tobin's q. Impala Platinum and Northam Tobin's q does not seem to change much with an increasing percentage of independent non-executive directors in the board.

Figure 5.15: Relationship between percentage of independent non-executive directors with mining or engineering operational experience and Tobin's q for the respective platinum companies.



5.3 Linear Regression Model Results with Platinum Price as control variable

5.3.1 Mean EVA and EVA Regression Model for Platinum mining companies

Figure 5.16 shows an error bar graphs depicting Mean EVA for respective platinum companies at 95% confidence interval. Anglo Platinum Mean EVA shows too much variability (noise) and this may be an indication of instability in company performance. In contrast to Anglo Platinum Mean EVA, Impala Platinum mean EVA is relatively stable and does not show much variability. Aquarius, Lonmin and Northam Mean EVA's are almost at zero and do not show much variability as well. Impala Platinum has the highest and relatively stable Mean EVA.

Figure 5.16: Mean EVA error bar graphs for respective Platinum mining companies at 95% confidence interval

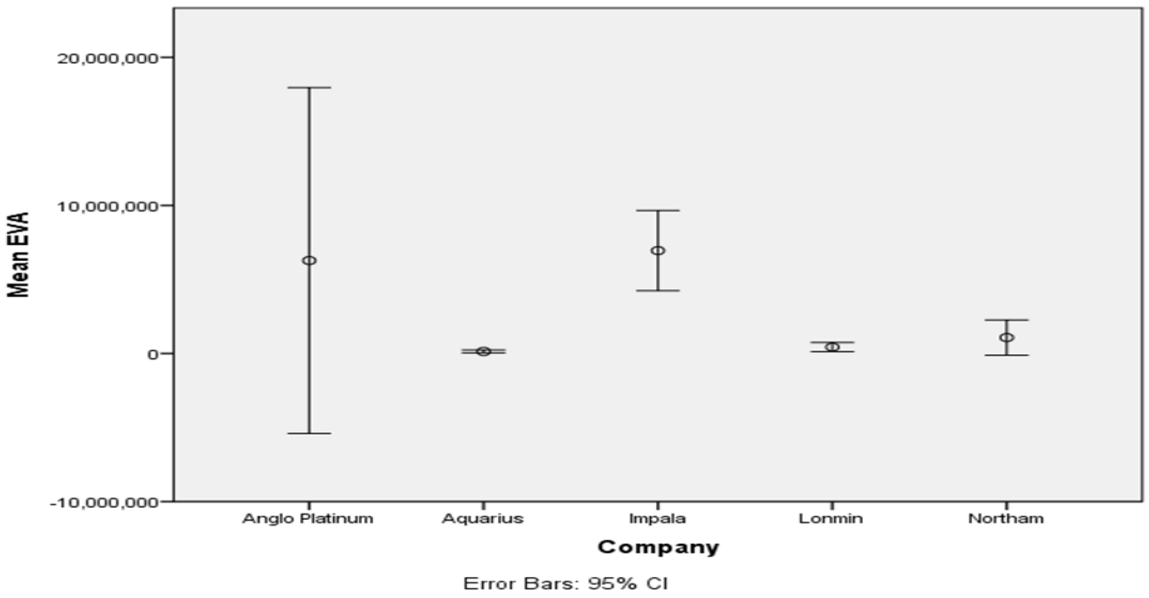


Table 5.1 below shows EVA regression model for respective Platinum mining companies. Impala Platinum, Anglo Platinum and Lonmin EVA regression model fits very well with adjusted R-square of 1, 0.942 and 1 respectively even though with small observation. Furthermore, the Anova P-values for the regression models of these respective companies are all less than 0.05 implying that the EVA regression model has a predictive power and is statically significant. Aquarius and Northam EVA regression models do not fit very well as compared to Impala Platinum, Anglo Platinum and Lonmin as indicated by their R-square and adjusted R-square. Moreover, their Anova P-values are higher than 0.05 which implies that their EVA models do not have strong predictive power and are statistically insignificant. The predictors (predicting variables) for the model are tabulated as shown in Table 5.1 below.

Table 5.1 EVA Regression Model for Platinum mining companies

EVA REGRESSION MODEL						
	IMPALA PLATINUM		ANGLO PLATINUM		LONMIN	
R-Square		1		0.987		1
Adjusted R-Square		1		0.942		1
Anova P-value (Sig)		0.006		0.045		0.013
	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)
Platinum Price US$ average	0.685	0.011	0.985	0.037	-0.134	0.091
Size of the board	7.907	0.007	-1.618	0.02	0.453	0.016
% of executive directors with mining or engineering operational experience	-14.282	0.006	n/a	n/a	3.544	0.009
% of executive directors with mining or engineering qualifications	1.784	0.008	0.378	0.344	-0.247	0.027
% of independent non-executive directors in the board	-0.795	0.012	-2.525	0.017	2.21	0.007
% of non-executive directors in the board	-15.779	0.007	0.085	0.776	1.182	0.026
% of non-executive directors with mining or engineering operational experience	4.038	0.01	-0.085	0.613	-0.393	0.026
% of non-executive directors with mining or engineering qualifications	-4.706	0.008	-0.265	0.128	0.549	0.01
	AQUARIUS		NORTHAM			
R-Square		0.517		0.732		
Adjusted R-Square		-0.087		-0.205		
Anova P-value (Sig)		0.576		0.664		
	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)		
Platinum Price US$ average	0.109	0.843	-0.957	0.525		
Size of the board	2.789	0.703	-0.719	0.497		
% of executive directors with mining or engineering operational experience	n/a	n/a	n/a	n/a		
% of executive directors with mining or engineering qualifications	2.434	0.784	-0.496	0.783		
% of independent non-executive directors in the board	n/a	n/a	0.982	0.553		
% of non-executive directors in the board	0.359	0.867	-0.462	0.839		
% of non-executive directors with mining or engineering operational experience	-0.065	0.901	-0.135	0.86		
% of non-executive directors with mining or engineering qualifications	n/a	n/a	-0.486	0.469		

5.3.2 Mean Tobin's q and Tobin's q Regression Models for Platinum mining companies.

Figure 5.17 below shows an error bar graphs depicting Mean Tobin's q for the respective platinum companies at 95% confidence interval. Lonmin exhibits a higher mean Tobin's q but also shows positive variability. It is followed by Aquarius which also shows positive variability and then Anglo Platinum with less variability. Impala Platinum and Northam shows the lowest mean Tobin's q and have less variability.

Figure 5.17: Error Bar Mean Tobin's q graphs for respective Platinum mining companies at 95 percentage confidence interval.

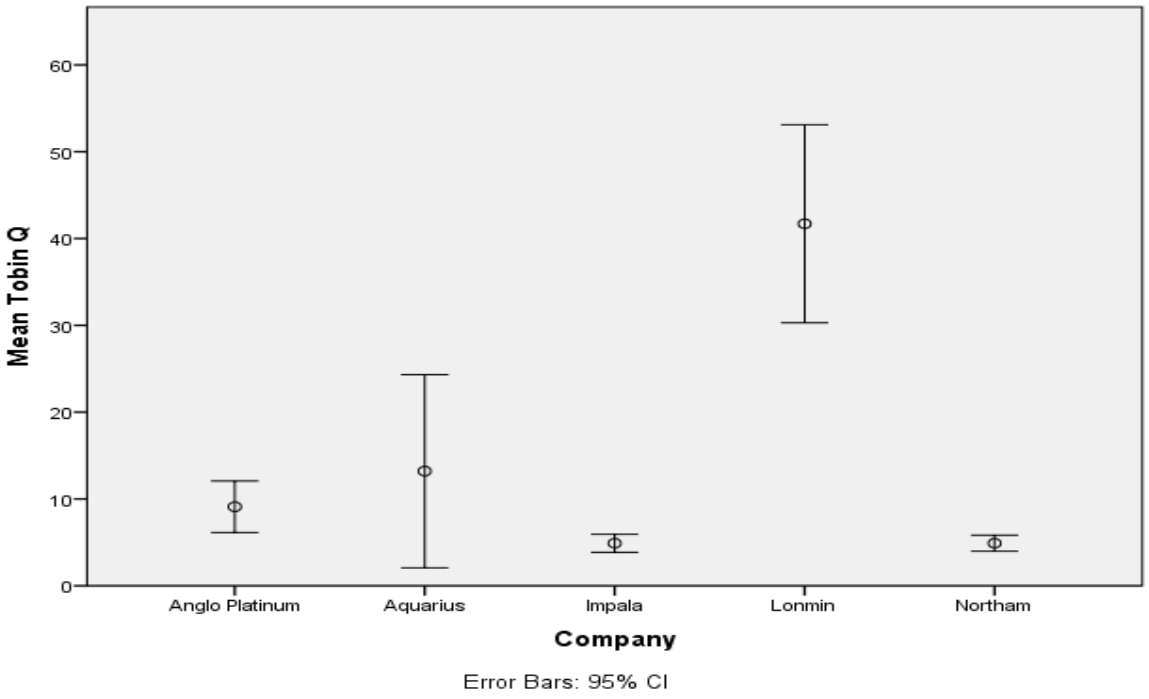


Table 5.2 shows Tobin's q regression models for the respective Platinum mining companies. Anglo Platinum shows a perfect fit for a regression model with adjusted R-square of 0.976. It is however worth noting that the regression model excluded the percentage of executive directors with mining or engineering operational experience predictor. Also worth noting is that Anglo Platinum Tobin's q regression model was the only model with Anova p-value less than 0.05. This implies that the regression model has a strong predictor power and is statistically significant. Other Platinum mining companies have Anova p-values of greater than 0.05 and therefore their regression models are statistically insignificant.

Table 5.2 Tobin's q Regression Model for Platinum mining companies.

TOBIN Q REGRESSION MODEL						
	IMPALA PLATINUM		ANGLO PLATINUM		LONMIN	
R-Square		0.993		0.995		0.688
Adjusted R-Square		0.933		0.976		8.915
Anova P-value (Sig)		0.187		0.019		0.394
	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)
Platinum Price US$ average	1.396	0.171	0.408	0.085	0.096	0.903
Size of the board	16.38	0.111	-1.267	0.014	0.234	0.636
% of executive directors with mining or engineering operational experience	-30.045	0.095	0	0	0.712	0.743
% of executive directors with mining or engineering qualifications	5.304	0.086	0.226	0.374	0.16	0.721
% of independent non-executive directors in the board	3.48	0.083	-0.982	0.045	1.292	0.358
% of non-executive directors in the board	-36.338	0.099	-0.715	0.052	-0.282	0.887
% of non-executive directors with mining or engineering operational experience	13.899	0.091	0.223	0.139	-0.467	0.541
% of non-executive directors with mining or engineering qualifications	-11.143	0.112	-0.309	0.045	0.674	0.257
	AQUARIUS		NORTHAM			
R-Square		0.86		0.946		
Adjusted R-Square		0.685		0.756		
Anova P-value (Sig)		0.074		0.177		
	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)		
Platinum Price US$ average	1.054	0.019	0.406	0.547		
Size of the board	2.611	0.515	0.541	0.304		
% of executive directors with mining or engineering operational experience	n/a	n/a	n/a	n/a		
% of executive directors with mining or engineering qualifications	4.088	0.412	-0.336	0.683		
% of independent non-executive directors in the board	n/a	n/a	1.327	0.168		
% of non-executive directors in the board	1.134	0.353	1.702	0.2		
% of non-executive directors with mining or engineering operational experience	-0.005	0.985	-0.518	0.23		
% of non-executive directors with mining or engineering qualifications	n/a	n/a	-0.873	0.072		

5.3.3 Mean ROA and ROA Regression Model for platinum mining companies.

Figure 5.18 below shows an error bar mean return on average assets (ROA) graphs for respective Platinum mining companies at 95 percentage confidence interval. The mean ROA graphs are overlapping suggesting that they are statistically not much different. However, Aquarius and Lonmin exhibit much variation relative to Angloplatinum, Northam and Impala Platinum in order of variations and mean return on average assets.

Figure 5.18: Mean ROA error bar graphs for respective Platinum mining companies at 95 percentage confidence interval.

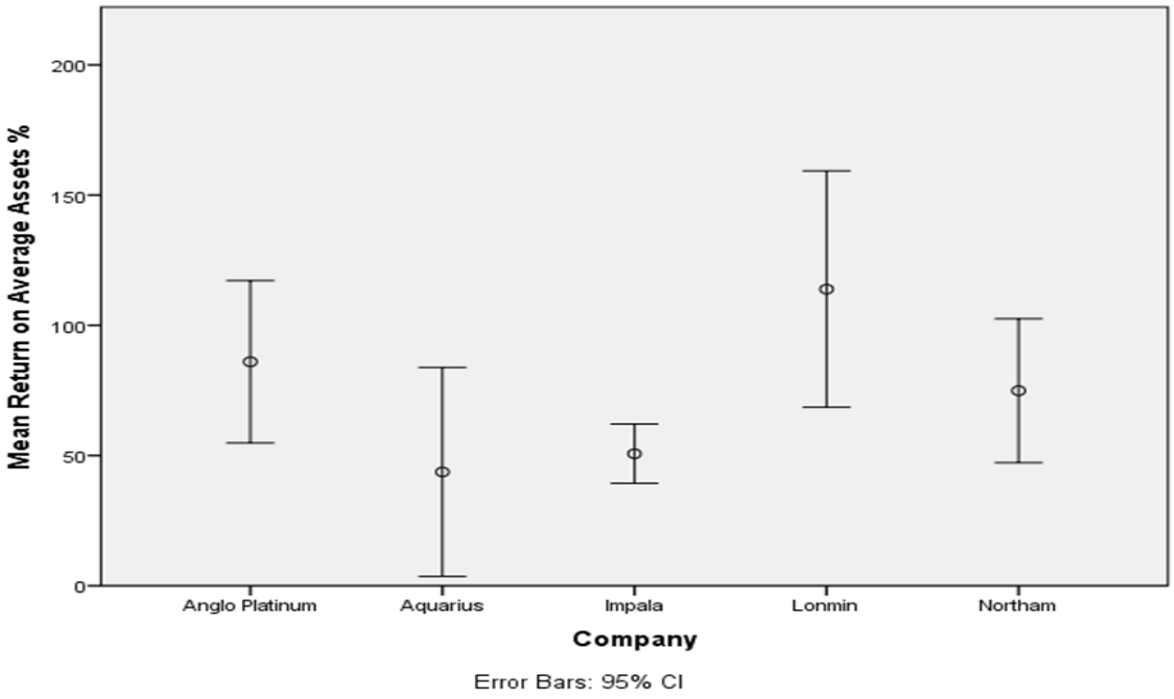


Table 5.3 shows ROA regression models for the respective Platinum mining companies. Similarly to Tobin's q regression models Anglo Platinum ROA regression model is the only one with Anova P-value of less than 0.05. The regression model is also fitting well with the adjusted R-square of 0.996. It has however also excluded the percentage of executive director with mining or engineering operational experience predictor.

Table 5.3 ROA Regression Models for Platinum mining companies.

ROA REGRESSION MODEL						
	IMPALA PLATINUM		ANGLO PLATINUM		LONMIN	
R-Square		0.866		0.999		0.996
Adjusted R-Square		-0.026		0.996		0.965
Anova P-value (Sig)		0.66		0.003		0.136
	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)
Platinum Price US$ average	1.021	0.62	0.618	0.006	0.858	0.153
Size of the board	6.447	0.669	-0.249	0.05	-0.042	0.788
% of executive directors with mining or engineering operational experience	-14.483	0.564	0	0	-1.677	0.205
% of executive directors with mining or engineering qualifications	4.078	0.384	-0.391	0.037	0.319	0.219
% of independent non-executive directors in the board	1.925	0.477	-0.796	0.011	-0.53	0.303
% of non-executive directors in the board	-15.962	0.604	-1.089	0.004	-2.194	0.151
% of non-executive directors with mining or engineering operational experience	6.857	0.541	0.273	0.017	-0.486	0.224
% of non-executive directors with mining or engineering qualifications	-5.028	0.634	-0.42	0.004	0.997	0.062
	AQUARIUS		NORTHAM			
R-Square		0.567		0.927		
Adjusted R-Square		0.026		0.67		
Anova P-value (Sig)		0.496		0.234		
	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)		
Platinum Price US$ average	0.635	0.262	1.341	0.178		
Size of the board	4.515	0.522	0.563	0.344		
% of executive directors with mining or engineering operational experience	n/a	n/a	n/a	n/a		
% of executive directors with mining or engineering qualifications	5.306	0.536	1.608	0.191		
% of independent non-executive directors in the board	n/a	n/a	-0.499	0.564		
% of non-executive directors in the board	0.612	0.763	2.634	0.129		
% of non-executive directors with mining or engineering operational experience	0.534	0.316	-0.155	0.703		
% of non-executive directors with mining or engineering qualifications	n/a	n/a	-0.456	0.253		

5.3.4 Mean ROE and ROE Regression Models for platinum mining companies.

Figure 5.19 below shows an error bar mean ROAE graphs for respective Platinum mining companies at 95 percentage confidence interval. Anglo Platinum shows a higher mean ROAE but with a higher variations ranging from negative to positive ROAE. It is followed by Lonmin which has a relatively low variation compared to Anglo Platinum but also ranging from negative to positive mean ROAE. Aquarius, Impala Platinum and Northam have almost the same mean ROAE and very little mean ROAE variations. Their ROAE's are positive but are just above zero ROAE.

Figure 5.19: Mean (ROE) error bar graphs for respective Platinum mining companies at 95 percentage confidence interval

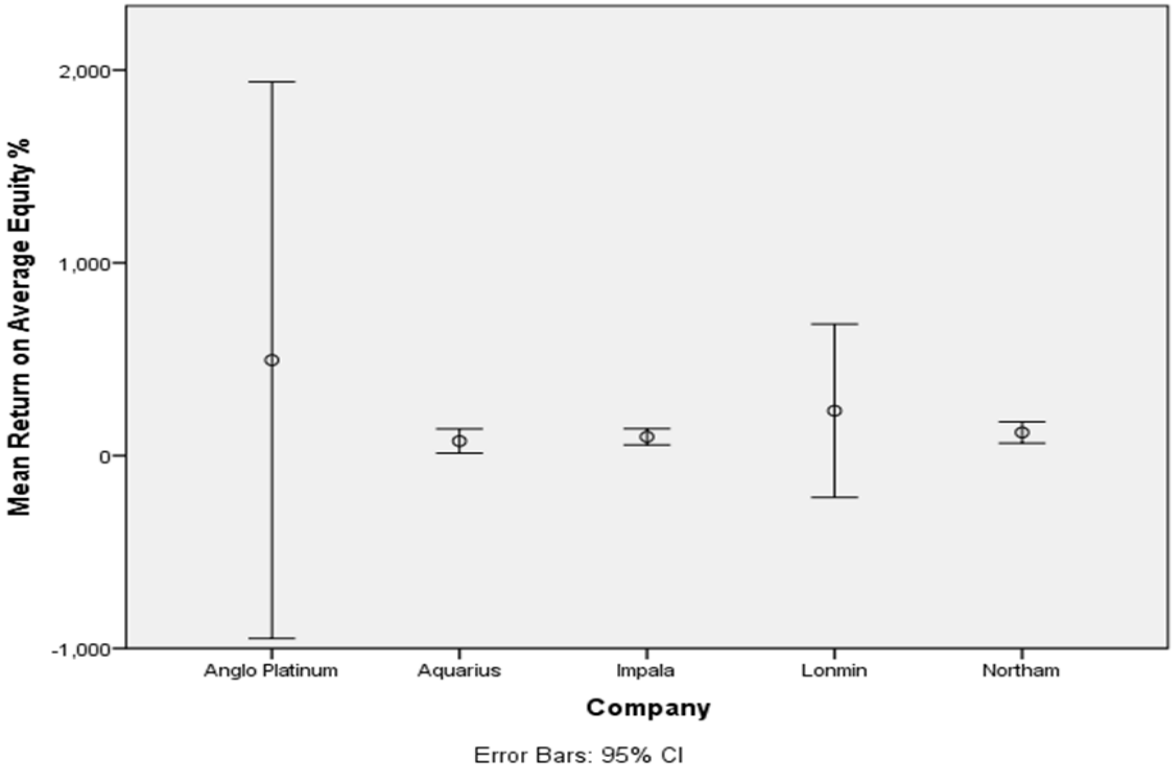


Table 5.4 shows ROE's regression models for respective Platinum mining companies. Anglo Platinum ROE regression model is the only model that has a strong predictive power. It has an Anova P-value of 0.027 which implies that it statistically significant. The model has excluded the percentage of executive directors with mining or engineering operational experience.

Table 5.4 ROE Regression Models for Platinum mining companies.

ROE REGRESSION MODEL						
	IMPALA PLATINUM		ANGLO PLATINUM		LONMIN	
R-Square		0.973		0.992		0.992
Adjusted R-Square		0.756		0.965		0.927
Anova P-value (Sig)		0.351		0.027		0.195
	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)
Platinum Price US$ average	0.396	0.685	0.042	0.808	-1.159	-1.159
Size of the board	6.021	0.471	-0.468	0.118	1.07	1.07
% of executive directors with mining or engineering operational experience	-12.998	0.374	0	0	4.724	4.724
% of executive directors with mining or engineering qualifications	2.936	0.278	-1.47	0.025	-0.416	-0.416
% of independent non-executive directors in the board	1.359	0.364	-0.67	0.121	3.2	3.2
% of non-executive directors in the board	-14.614	0.407	-1.127	0.031	3.05	3.05
% of non-executive directors with mining or engineering operational experience	5.4	0.391	-0.033	0.792	-0.185	-0.185
% of non-executive directors with mining or engineering qualifications	-4.037	0.48	0.404	0.038	0.055	0.055
	AQUARIUS		NORTHAM			
R-Square		0.374		0.95		
Adjusted R-Square		-0.408		0.775		
Anova P-value (Sig)		0.781		0.164		
	Standard Coefficient	P Value (Sig)	Standard Coefficient	P Value (Sig)		
Platinum Price US$ average	0.241	0.701	1.176	0.162		
Size of the board	-0.295	0.971	0.542	0.288		
% of executive directors with mining or engineering operational experience	n/a	n/a	n/a	n/a		
% of executive directors with mining or engineering qualifications	-0.716	0.943	1.329	0.191		
% of independent non-executive directors in the board	n/a	n/a	-0.437	0.542		
% of non-executive directors in the board	-0.367	0.88	2.408	0.109		
% of non-executive directors with mining or engineering operational experience	0.448	0.469	-0.251	0.479		
% of non-executive directors with mining or engineering qualifications	n/a	n/a	-0.601	0.127		

6 Chapter six: Discussion of Results

6.1 Introduction

This chapter presents the discussion of the results of the research on the relationship between board composition and company performance. It starts by the discussion of the results on a relationship between the size of the board and company performance in section 6.2. Section 6.3 presents the discussion of the results on a relationship between the proportion of independent non-executive directors and company performance. Section 6.4 presents the discussion of the results on a relationship between the proportion of non-executive directors with mining or engineering experience and company performance.

6.2 Size of the Board and company performance

As explained in the research hypothesis chapter, previous studies (Cheng, 2008; Boone, Field, Karpoff & Raheja, 2007; De Andres, Azofra & Lopez, 2005) on the size of the board and company performance presented in the literature section of this research, had a dominant view suggesting that there is a negative relationship between company performances. There is however another school of thought that takes a view that says decreasing the size of the board tended to adopt the officer system especially for complex and high-performing firms (Uchida, 2011). It was from this angle that a hypothesis stating that the relationship between firm performance and the size of the board is negative, was proposed.

First Hypothesis: size of the board and company performance

H1. The relationship between company performance and the size of the board is negative

It is worth noting from the results presented in chapter 5 section 5.2.1 that the size of the board of the sampled platinum companies increases with the size of the company. The size of the platinum companies from the largest to the smallest is in the following order; Anglo Platinum, Impala Platinum, Lonmin, Northam and Aquarius with respect to market capitalisation and production (Matthey, 2011). The mean size of the board of directors with

Anglo Platinum, Impala Platinum, Lonmin, Northam and Aquarius are approximately 15, 13, 10, 9 and 7 respectively.

6.2.1 Size of the board and accounting based measures.

Accounting measures were coded with return on assets (ROA) and return on equity (ROE) as explained in chapter 3 of this research. Anglo Platinum's regression model, tabulated in Table 5.3, reported adjusted R-square, Anova P-value and size of the board standard Beta co-efficient P-value of 0.996, 0.003 and 0.05 respectively. The size of the board Beta coefficient of the Anglo Platinum is negative 0.249 suggesting that there is an inverse relationship between the size of the board and ROA. The reason why for Anglo Platinum, the size of the board predictor was statistically significant could be because the Anglo Platinum board is the largest of all of the platinum mining companies. The negative correlation between the size of the board and ROA for Anglo Platinum indicates that the size of the board should be reduced to realise improvements in ROA.

Similarly to ROA regression model results, ROE regression model results for Anglo Platinum, tabulated in Table 5.4, fitted well and had statistically significant predictive power for ROE. Anglo Platinum ROE regression model reported adjusted R-square, Anova P-value and size of the board p value of 0.965, 0.027 and 0.118 respectively. The size of the board P-value of greater than 0.05 suggests that the size of the board predictors is not statistically significant and is a weak predictor of ROE.

The results of this study on the size of the board and accounting measures ROA and ROE are consistent with the findings of a previous study carried out by Murphy, McIntyre & Mitchel (2007) and O'Connell & Cramer (2010). They ran ROA regression models to test relationships between a firm's performance and the number of directors comprising its board and found that the size of the board exhibits a significant negative association with ROA. The results seem to agree with argument presented by Cheng (2008) and Lawal (2012) that larger boards have communication and co-ordination problems and this affects the quality of deliberations among members to arrive at optimal corporate decisions. This may be the case for Anglo Platinum because it has a larger board compared with other platinum mining companies.

6.2.2 Size of the board and Market Based Measures.

As explained in chapter 2 (literature review), market based measures are preferred because they are considered to be robust since they are not subject to direct manipulation by management.

Tobin's q Regression model results, tabulated in Table 5.2, suggested that only Anglo Platinum Tobin's q models fitted well and had strong predictive for Tobin's q. However, the results reported from the scatterplot (Figure 5.5) and error bar (Figure 5.17) graphs in chapter 5 indicated that Anglo Platinum, Impala Platinum, Northam Tobin's q's remained relatively stable with increasing size of the board with exception of Lonmin and Aquarius. The adjusted R-square P-value and Anova P-value were 0.976 and 0.019 respectively. The size of the board P-value and size of the board Beta co-efficient were 0.014 and negative 1.267. This suggests that even though the size of the board is the statistically significant predictor of Tobin's q, there is a negative or inverse relationship between Anglo Platinum size of the board and Tobin's q.

Anglo Platinum, Impala Platinum and Lonmin EVA regression models fitted well and had statistically significant predictive power of EVA. These are the three biggest players in the platinum mining companies. The Adjusted R-Square and the Anova P-value for the regression models of these three companies were 0.942, 1, 1 and 0.045, 0.006 and 0.013 respectively. The size of the board Beta standard coefficients and their corresponding P-values were (-1.618, 0.02), (7.907, 0.007) and (0.453, 0.016) for these respective companies. The P-values less than 0.05 for these companies suggest that the size of the board predictor is a statistically significant predictor for EVA. Similarly to ROA and Tobin's q regression models, Anglo Platinum regression model size of the board Beta coefficient is negative, suggesting that there is an inverse relationship between Anglo Platinum size of the board and EVA. Also worth noting is that there is positive relationship between the size of the board and EVA's of Impala Platinum and Lonmin.

The results of board size and market base measures (Tobin's q and EVA) present mixed results on the relationship between the size of the board and market based performance measures. Anglo Platinum regression Tobin's q and EVA models suggest that there is a negative relationship between the size of the board and market based measures for Anglo Platinum. Impala Platinum, Lonmin and Aquarius Tobin's q regression models were not

statically significant, suggesting that the size of the board for these companies is not a statistically significant predictor of Tobin's q. On the other hand, Impala Platinum and Lonmin EVA regression models responded statistically positively, suggesting that the size of the board is positively related to EVA. This goes back to the argument that suggests that EVA is a good performance measure tool compared with other performance measures.

The results are consistent with Adjaoud, Zeghal & Andaleeb (2007) who found striking empirical results when performance was based on accounting income-based measures, the differences between the best and worst boards was not significant which is consistent with the majority of previous studies. However, when performance was defined in terms of economic-value measures, statistically significant differences were found between higher ranked and lower ranked firms. These results suggest that performance measures adjusting for risk and cost of equity (as Economic value Added) lead to a better correlation with governance.

Overall, the findings of the results on the relationship between the size of the board and company performance seem to suggest that neither a small size board nor larger size of the board has statistically significant relationship with company performance. Perhaps the reason why the Anglo Platinum regression model fitted well and its size of the board, but was consistently found to be negatively related to company performance, is because it had a larger board than is required. The findings are consistent with the previous finding by Coles, Daniel & Naveen (2008) that the size of the board and one of the performance measures (Tobin's q) is U-shaped, suggesting that either very small or very large boards are optimal.

6.3 Independent non-executive directors and company performance.

Previous studies on independent non-executive directors, reported in chapter 2 (literature review) of this research, presented a mixed view on the impact of independent non-executive directors on board performance and therefore company performance. For example, the proponents of agency theory argued that the board should act independently and should therefore include a preponderance of outside directors (Van den Berghe & Levrau, 2004; Luan & Tang, 2007). Roberts, McNulty & Stiles (2005) observed some of the present dangers in the tendency for agency

assumptions to dominate corporate governance debate and reform. They suggested that the work of outside directors is vital, both for enhancing the actual effectiveness of the board and as a source of confidence to distant investors as to the effectiveness of what goes on the board. However, other studies such as the one carried out by Dalton & Dalton (2005) and Markarian & Parbonetti (2007) found no evidence suggesting any relationship between independent directors and firm performance. Based on these conflicting views, a hypothesis suggesting that there is a positive relationship between firm performance and the proportion of independent non-executive directors was proposed.

Second Hypothesis: proportion of independent non-executive directors and company performance

H2.The relationship between company performance and the proportion of independent directors is positively related.

For the purpose of this research the mean percentage of independent non-executive directors in the board at a 95 percentage confidence interval for the platinum mining companies was presented in chapter 5 in the form of an error bar graph (Figure 5.11). It appears from the plot that the percentage of independent non-executive directors in the board increases for the companies in the order of Aquarius, Northam, Anglo Platinum, Impala Platinum and Lonmin. Lonmin has more independent non-executive directors compared with other platinum mining companies.

6.3.1 Independent non-executive directors and accounting measures.

The results reported from the scatterplot (Figure 5.14) and mean ROA error bar (Figure 5.18) graphs in chapter 5, indicated more variations of ROA with increasing independent non-executive directors. It was not possible to draw any relationship between the independent non-executive directors and ROA from the scatterplot for the sample platinum mining companies.

As explained previously, Anglo Platinum ROA regression model was the only model that fitted very well and was a strong predictor model with statistically significant results. Anglo Platinum regression model Adjusted R-square and Anova P-value were 0.996, 0.003 respectively. The percentage of independent non-executive director's standard Beta

coefficient p-value was 0.011, implying that the percentage of independent non-executive directors is a statistically significant predictor of ROA. However, the negative 0.796 standard Beta co-efficient suggests that there is an inverse or negative correlation between the percentage of independent non-executive directors and ROA for Anglo Platinum. This implies that the percentage of non-executive directors for Anglo Platinum should be reduced to see further improvements in Anglo Platinum in ROA. Other companies' ROA regression models were not statistically significant and showed no strong predictive power. As a result, they were not worth discussion.

Similarly to the ROA regression model, the Anglo Platinum ROE regression model fitted well and showed statistically significant predictive power for ROE. However, the percentage or proportion of independent non-executive director's standard Beta coefficient P-value is greater than 0.05 at 0.121. This, in other words, means that the proportion of independent non-executive directors on the board of Anglo Platinum is not a statistically significant predictor of ROE. The same could be said for other platinum mining companies because their Anova P-values suggested that their ROE regression models do not have statistically significant predictive power.

The findings of the statistical results from the ROA and ROE regression models are not statistically significant. Only the Anglo Platinum ROA regression model suggested that the proportion of independent non-executive directors is negatively related to accounting performance measures. This suggests that there is no statistical relationship between independent non-executive directors and ROA. The finding of these results contradicts Van den Berghe & Levrau (2004) and Luan & Tang (2007) whose findings suggest that firms that chose to appoint independent outside directors have a higher corporate profit. Their studies used ROA and ROE as a performance measure.

6.3.2 Independent non-executive directors and market based measures.

The results presented from scatterplot (Figure 5.15) and mean Tobin's q error bar graphs in chapter 5, indicated that Impala Platinum and Northam mean Tobin's q's showed more stability over time with an increasing percentage of independent non-executive directors. Aquarius and Lonmin showed many variations in Tobin's q over time, and were reported as having the highest Tobin's q. It was also not possible to draw any relationship between

the percentage of independent non-executive directors and Tobin's q from the Anglo Platinum scatterplot graph.

Tobin's q regression model for platinum mining companies results, reported in chapter 5, indicated that the Anglo Platinum regression model was the only one which showed a perfect fit and statistically significant predictive power for Tobin's q. The adjusted R-square and Anova P-value were 0.976 and 0.019 respectively. The proportion of independent non-executive directors on the board standard Beta co-efficient P-value was 0.045 which is less than 0.05. This implies that the proportion of independent non-executive directors is a statistically significant predictor of Tobin's q for Anglo Platinum Tobin's q regression model. However, the standard Beta coefficient is negative 0.982 suggesting that there is negative correlation between the proportion of independent non-executive directors and Tobin's q.

The results presented from the scatterplot (Figure 5.12) and mean EVA error bar (Figure 5.16) graphs indicated that Anglo Platinum mean EVA showed too much variation (noise) as compared to Impala Platinum, Northam, Lonmin and Aquarius in decreasing order. As explained earlier in the section, EVA regression models for Anglo Platinum, Impala Platinum and Lonmin fitted well and had statistically significant predictive power of EVA. The Adjusted R-Square and the Anova P-value for the regression models of these three companies were 0.942, 1, 1 and 0.045, 0.006 and 0.013 respectively.

The proportion of independent non-executive directors Beta standard coefficients and corresponding P-values were (-2.525, 0.017), (-0.795, 0.012) and (2.21, 0.007) for these respective companies. The P-values less than 0.05 for these companies suggest that the proportion of independent non-executive directors is a statistically significant predictor for EVA. Anglo Platinum and Anglo Platinum EVA regression models proportion of independent non-executive directors Beta coefficients are negative, suggesting that there is an inverse relationship between the proportion of independent non-executive directors and EVA for these companies. However, Lonmin proportion of independent non-executive directors' standard Beta coefficient suggests there is positive relationship between the proportion of independent non-executive directors and EVA for Lonmin.

The findings of the statistical results from the regression models suggest the proportion of independent non-executive directors is negatively related to market based performance

measures (Tobin's q and ROE) with the exception of Lonmin. Lonmin EVA regression model responded positively suggesting that there is positive relationship between independent non-executive directors and EVA. It is worth noting that Lonmin has more independent non-executive directors than all the other platinum mining companies sampled. Moreover, the majority of the independent non-executive directors are British and London based.

Overall, the findings of the results on the proportion of independent non-executive directors and company performance present mixed findings. Lonmin, which has a larger representation of independent non-executive directors, results suggest that there is positive relationship between the proportion of independent non-executive directors and performance measure, EVA but not the other performance measures such as Tobin's q, ROA and ROE. On the other side, Anglo Platinum results suggest that there is negative relationship between independent non-executive directors and company performance measures, ROA, Tobin's q and EVA. Furthermore, an Impala Platinum result also seems to suggest that there is a negative relationship between independent non-executive directors.

An explanation for these mixed results could be that from 2006 to 2011, as shown in Table 4.1, Lonmin aggressively increased its representation of independent non-executive directors with non-executive directors with mining or engineering operational experience on the board to 24%. Anglo Platinum's and Impala Platinum's, on the other hand, representation of non-executive directors within the last five years (2006 to 2011) were 21% and 10% respectively. If the argument made by Adjaoud, Zeghal & Andaleeb (2007) is carried along that EVA leads to better correlation with governance, these results therefore suggest that there is a positive relationship between the proportion of independent non-executive directors and company performance EVA provided that there is more representation of independent non-executive directors with business expertise.

6.4 Non-executive directors with mining and engineering operational experience and company performance

Previous studies presented in chapter 2 of this research such as Kroll, Walters & Wright (2008) on this topic argued that relying solely on director vigilance may be limiting because vigilance without relevant experience is unlikely to ensure board effectiveness. Their

empirical findings indicated that vigilant boards rich in appropriate experience are associated with superior outcomes. Roy (2008) added to the argument by saying that companies must ensure that board members have the required skills and knowledge. A hypothesis suggesting that there is a positive relationship between firm performance and the proportion of non-executive directors with industry relevant experience was proposed.

Third Hypothesis: non-executive directors with mining industry expertise and company performance.

H3. The relationship between company performance and the proportion of non-executive director with industry experience

The results presented in section 5.3.1 in chapter 5, described the representation of non-executive directors with mining or engineering operational experience on the board of the platinum mining companies. The mean percentages of non-executive directors with mining or engineering operational experience from the error bar graphs at 95 percentage confidence level indicated that Northam had more representation, followed by Aquarius, Anglo platinum, Lonmin and Impala Platinum. Impala Platinum had the lowest representation of non-executive directors with mining or engineering operational experience at approximately 0.14 mean percentages.

6.4.1 Proportion of non-executive directors with mining or engineering operational experience and accounting measures.

The results and findings presented in chapter 5 from the scatterplot (Figure 5.8) and mean ROA error bar (Figure 5.18) graphs, indicated that there was more variations of ROA's of Anglo Platinum, Aquarius, Lonmin and Northam with an increase in the proportion of independent non-executive directors with mining or engineering operational experience. Impala Platinum was the only exception with low variations and showed stable ROA with the changes in the proportion of non-executive directors with mining or engineering operational experience.

The Anglo Platinum regression model tabulated in Table 5.3, reported adjusted R-square and Anova P-value were 0.996, 0.003 respectively. The proportion of non-executive directors with mining or engineering operational experience for Anglo Platinum ROA regression model standard Beta coefficient and corresponding P-value for Anglo Platinum

regression model were 0.273 and 0.017. These results suggest that there is positive relationship between the proportion of non-executive directors with mining or engineering operational experience and ROA.

As explained previously, the Anglo Platinum ROE regression model fitted well and showed statistically significant predictive power for ROE. However, the percentage or proportion of non-executive directors with mining or engineering operational experience standard beta coefficient P-value is greater than 0.05 at 0.792. This implies that the proportion of non-executive directors with mining or engineering operational experience is not a statistically significant predictor of ROE for Anglo Platinum.

The findings of the statistical results from the regression models suggest the proportion of non-executive directors with mining or engineering operational experience is positively related to ROA for Anglo Platinum. However, the ROE regression model suggested otherwise. Non-executives with mining or engineering operational experience was not a statistically significant predictor for ROE.

6.4.2 Proportion of non-executive directors with mining or engineering operational experience and market measures.

The Tobin's q regression model for platinum mining companies results, reported in chapter 5, indicated that the Anglo Platinum regression model was the only one which showed a perfect fit and was a statistically significant predictive power for Tobin's q. The adjusted R-square and Anova P-value were 0.976 and 0.019 respectively. The proportion of non-executive directors with mining or engineering operational experience standard Beta coefficient P-value is 0.139 which is greater than 0.05. This implies that the proportion of non-executive directors with engineering or operational experience is a statistically insignificant predictor of Tobin's q for Anglo Platinum Tobin's q regression model.

The proportion of non-executive directors with mining or engineering operational experience results presented from the scatterplot (Figure 5.7) and mean EVA error bar (Figure 5.16) graphs indicated that Aquarius, Northam and Lonmin mean EVA remained at zero and did not change with an increasing percentage of non-executive directors with mining or engineering operational experience. Impala Platinum and Anglo Platinum showed a positive trend with an increasing percentage of non-executive directors with mining or engineering operational experience.

As explained in the previous section, EVA regression models for Anglo Platinum, Impala Platinum and Lonmin fitted well and had a statistically significant predictive power of EVA. The Adjusted R-Square and the Anova P-value for the regression models of these three companies were 0.942, 1, 1 and 0.045, 0.006 and 0.013 respectively.

The proportion of non-executive directors with mining or engineering operational experience Beta standard coefficients and corresponding P-values were (-0.085, 0.613), (4.038, 0.01) and (-0.393, 0.026) for these respective companies EVA regression models. The P-values less than 0.05 for Impala Platinum and Lonmin suggest that the proportion of non-executive directors with mining or engineering experience is a statistically significant predictor for EVA. The Anglo Platinum standard Beta co-efficient P-value of 0.613 is greater than 0.05 suggest the non-executive director with mining or engineering operational experience is not a statistically significant predictor of EVA and therefore did not warrant further discussion. The Lonmin EVA regression model proportion of dependent non-executive directors with mining or engineering operational experience Beta coefficients is negative suggesting that there is an inverse relationship between the proportion of non-executive directors with mining or engineering operational experience and EVA. On the other hand, Impala Platinum non-executive directors with mining or engineering operational experience positive standard Beta co-efficient suggests there is a positive relationship between the proportion of non-executive directors with mining or engineering experience and EVA.

The findings of the statistical results from Tobin's q regression models suggest the proportion of non-executive directors with mining or engineering operational experience is statistically insignificant, non-executives with mining or engineering operational experience was not a statistically significant predictor of Tobin's q for all platinum mining companies sampled. The statistical results from EVA regression models suggested that Lonmin's proportion of non-executive directors with mining or engineering operational experience is negatively related to EVA. However, Impala Platinum's EVA regression model suggested that the proportion of non-executive directors with mining or engineering operational experience is positive.

Overall, the finding of the results using EVA (better performance measure) as suggested by Adjaoud, Zeghal & Andaleeb (2007) seems to suggest that either more representation of non-executive directors with industry expertise or less representation are

optimal for company performance. Impala Platinum has the lowest representation of non-executive directors with mining or engineering operational experience and therefore showed a positive relationship between non-executive directors with mining or engineering experience whilst Lonmin, which had more representation, showed a negative relationship.

7 Chapter Seven: Conclusion

This chapter presents the main research and the research limitations. It also presents recommendations for future research and managerial implications to stakeholders based on the finding of the research.

7.1 Research Findings

The main purpose of the study was to determine if there is any relationship between board compositions and company performance in the South African Platinum Industry. The proxies for board composition were the size of the board, proportion of independent non-executive directors and non-executive directors with mining or engineering operational experience. The proxies for company performance were the accounting measures (ROA and ROE) and market based measures (Tobin's q and EVA). EVA regression models responded statistically significant for most of the predictors (independent variables) compared with other performance measures and is consistent with the suggestion that performance measures adjusting for risk and cost of equity (as Economic Value Added) lead to better correlation with governance. Platinum price was a control variable in all regression models.

The research finding on the first hypothesis suggests that a small size of the board of directors has statistically significant relationship with performance of the company in the platinum industry as compared to larger board of directors. Anglo Platinum which has the largest board of directors' results was found to be negatively related to company performance as measured by EVA. Impala Platinum and Lonmin which had smaller board of directors compared with Anglo Platinum boards size responded positively with EVA as a performance measure. This finding is consistent with previous studies (Cheng, 2008 & Lawal, 2012) and confirms the view that larger boards have communication and coordination problems and this affects the quality of deliberations among members to arrive at optimal corporate decision.

The second hypothesis test result suggests that there is positive relationship between the proportion independent non-executive directors and company performance measure EVA provided that there is a significant but not excessive representation of independent non-executive directors with industry operational experience. This conclusion is supported by the fact that Lonmin had almost a quarter representations (25%) of independent non-

executive directors with industry experience and Anglo Platinum and Lonmin had 21% and 10% independent non-executive directors with mining or engineering experience during the period between 2006 and 2011.

The third hypothesis presented mixed results with Impala Platinum indicating that there is positive relationship between non-executive directors with mining or operational experience and EVA. Lonmin statistical results suggest there is a negative relationship between non-executives with mining or engineering experience. The finding of these results is not conclusive.

7.2 Research limitations

The research had a number of significant limitations. Firstly, there was not enough literature or study on the topic discussed in South Africa known to the researcher. Studies on board composition in South Africa paid more attention on board demographics such as gender and race but not so much on the calibre of non-executive directors. There is abundance literature on this topic it seems to be based on United States (US), United Kingdom, Japan and China but the subject it is not one size fit all.

The second limitation was the defining directors' expertise construct in the context of defining an independent variable for measure with industry expertise. For example Roy (2008) examined director's qualification in terms of knowledge, expertise, skills and values. In this study industry expertise was coded or defined as operational experience based on the number of years in mining or engineering industry. This is subjective in a sense that not everyone who has worked in the industry is in an expert.

The third and last limitation was the sample size and the limited time series data. This compounded the problem because Platinum mining is a cyclic business and as such a test conducted at one time cannot be used to make inference at another time period. The sample size was non-probabilistic and judgemental. Fellows & Liu (2008) in Abowitz and Toole (2010) said research based on nonprobability sampling techniques, such as convenience samples, can provide useful insights but is limited with regard to the accuracy of estimates and its generalizability to larger populations. Abowitz and Toole (2010) further argued that with non-probability based samples in particular, size of the sampling error (random error) cannot be estimated due to chance nor determine sample bias.

7.3 Recommendations

This research has laid a foundation for further study to be done in the filled of board compositions and company performance in South African complex and high-technology industry. The result of this study could contribute to empirical literatures on the topics related to corporate governance in South African mining industry.

The findings of the results were not conclusive on the inclusion of directors with industry expertise and this could be because of the judge mental and bias definition of industry expertise construct. Future research in this work should consider adopting the director qualification constructs in terms of Roy (2008) definition of director qualification which include knowledge, expertise, skills and values. This would require a combination of quantitative and qualitative research method.

Though the study focused on platinum mining industry there is an opportunity to roll out this study to the whole South African mining industry and manufacturing companies. A cross-sectional study can be conducted in the entire manufacturing and mining industry.

Future research in this field could also look at effectiveness and performance of boards in South African mining industry or manufacturing companies because this study made an assumption that a good board composition translates into good company performance which might not be the case. A combination of qualitative study can be carried out to get more insights into a board operations and effectiveness.

7.4 Stake holder Implications

The South African Platinum mining industry has been in a state of decline for the past decade. Its safety record and production has been appalling which indicates that there are serious problems at leadership level. Directors with financial expertise dominate most boards of this industry and the board's representation of independent directors has largely been as a results response to king guidelines and government charters. Furthermore, the representation of independent director must be based on what value the director brings to the board.

It is imperative that a board any company should have representation from historical disadvantaged people and community representative but this should not compromise the quality or the calibre of a required director of a board. Appointments of directors based on political connection or shareholder political agenda does not do justice to the shareholder or any stakeholder.

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Appendices

Appendix 1: Platinum mining companies board representation

	Size of the board	% -Executive directors in the board	% of Executive directors with mining or engineering qualifications	% of Executive directors with mining or engineering operational experience
Impala	10	30.00%	10.00%	10.00%
Impala	11	36.36%	18.18%	18.18%
Impala	16	25.00%	12.50%	12.50%
Impala	12	33.33%	16.67%	16.67%
Impala	13	38.46%	23.08%	23.08%
Impala	13	30.77%	15.38%	15.38%
Impala	13	30.77%	15.38%	15.38%
Impala	13	30.77%	15.38%	15.38%
Impala	9	44.44%	11.11%	22.22%
Impala	13	23.08%	0.00%	7.69%
	Size of the board	% -Executive directors in the board	% of Executive directors with mining or engineering qualifications	% of Executive directors with mining or engineering operational experience
Anglo Platinum	13	46.15%	15.38%	15.38%
Anglo Platinum	16	37.50%	25.00%	25.00%
Anglo Platinum	19	36.84%	26.32%	26.32%
Anglo Platinum	19	36.84%	26.32%	26.32%
Anglo Platinum	20	40.00%	25.00%	25.00%
Anglo Platinum	15	53.33%	33.33%	33.33%
Anglo Platinum	12	16.67%	8.33%	8.33%
Anglo Platinum	11	18.18%	9.09%	9.09%
Anglo Platinum	12	16.67%	8.33%	8.33%
Anglo Platinum	13	15.38%	7.69%	7.69%
	Size of the board	% -Executive directors in the board	% of Executive directors with mining or engineering qualifications	% of Executive directors with mining or engineering operational experience
Lonmin	9	55.56%	11.11%	33.33%
Lonmin	12	41.67%	8.33%	25.00%
Lonmin	9	44.44%	22.22%	22.22%
Lonmin	9	33.33%	11.11%	11.11%
Lonmin	9	33.33%	11.11%	11.11%
Lonmin	11	27.27%	9.09%	9.09%
Lonmin	10	20.00%	0.00%	0.00%
Lonmin	9	22.22%	0.00%	0.00%
Lonmin	11	27.27%	0.00%	9.09%
Lonmin	11	18.18%	0.00%	9.09%
	Size of the board	% -Executive directors in the board	% of Executive directors with mining or engineering qualifications	% of Executive directors with mining or engineering operational experience
Aquarius	6	33.33%	16.67%	16.67%
Aquarius	6	33.33%	16.67%	16.67%
Aquarius	7	14.29%	14.29%	14.29%
Aquarius	8	12.50%	12.50%	12.50%
Aquarius	8	12.50%	12.50%	12.50%
Aquarius	9	11.11%	11.11%	11.11%
Aquarius	7	14.29%	14.29%	14.29%
Aquarius	7	14.29%	14.29%	14.29%
Aquarius	8	12.50%	12.50%	12.50%
Aquarius	8	12.50%	12.50%	12.50%
	Size of the board	% -Executive directors in the board	% of Executive directors with mining or engineering qualifications	% of Executive directors with mining or engineering operational experience
Northam	10	10.00%	10.00%	10.00%
Northam	9	0.00%	0.00%	0.00%
Northam	8	0.00%	0.00%	0.00%
Northam	9	11.11%	11.11%	11.11%
Northam	10	10.00%	10.00%	10.00%
Northam	9	11.11%	11.11%	11.11%
Northam	8	12.50%	12.50%	12.50%
Northam	8	12.50%	12.50%	12.50%
Northam	11	18.18%	9.09%	9.09%
Northam	11	18.18%	9.09%	9.09%

	Size of the board	% of non-executive directors in the board	% of non-executive directors with mining or engineering qualifications	% of non-executive directors with mining or engineering operational experience	% of independent non-executive directors in the board
Impala	10	70%	20%	20%	40%
Impala	11	64%	18%	18%	36%
Impala	16	75%	19%	13%	69%
Impala	12	67%	8%	8%	58%
Impala	13	62%	8%	8%	54%
Impala	13	69%	8%	8%	54%
Impala	13	69%	8%	8%	54%
Impala	13	69%	8%	8%	54%
Impala	9	56%	11%	11%	44%
Impala	13	77%	15%	15%	62%
	Size of the board	% of non-executive directors in the board	% of non-executive directors with mining or engineering qualifications	% of non-executive directors with mining or engineering operational experience	% of independent non-executive directors in the board
Anglo Platinum	13	54%	15%	31%	23%
Anglo Platinum	16	63%	13%	25%	25%
Anglo Platinum	19	63%	16%	26%	21%
Anglo Platinum	19	63%	16%	26%	21%
Anglo Platinum	20	60%	10%	25%	20%
Anglo Platinum	15	47%	13%	20%	33%
Anglo Platinum	12	83%	8%	25%	42%
Anglo Platinum	11	82%	9%	9%	45%
Anglo Platinum	12	83%	17%	25%	42%
Anglo Platinum	13	85%	15%	23%	54%
	Size of the board	% of non-executive directors in the board	% of non-executive directors with mining or engineering qualifications	% of non-executive directors with mining or engineering operational experience	% of independent non-executive directors in the board
Lonmin	9	44%	0%	0%	44%
Lonmin	12	58%	0%	0%	33%
Lonmin	9	56%	0%	0%	56%
Lonmin	9	67%	11%	22%	67%
Lonmin	9	67%	11%	22%	67%
Lonmin	11	73%	9%	18%	73%
Lonmin	10	80%	10%	20%	80%
Lonmin	9	78%	0%	22%	78%
Lonmin	11	73%	0%	27%	64%
Lonmin	11	82%	9%	36%	55%
	Size of the board	% of non-executive directors in the board	% of non-executive directors with mining or engineering qualifications	% of non-executive directors with mining or engineering operational experience	% of independent non-executive directors in the board
Aquarius	6	67%	0%	25%	0%
Aquarius	6	67%	0%	25%	0%
Aquarius	7	86%	0%	33%	0%
Aquarius	8	88%	0%	29%	0%
Aquarius	8	88%	0%	43%	0%
Aquarius	9	89%	0%	38%	0%
Aquarius	7	86%	0%	33%	0%
Aquarius	7	86%	0%	33%	0%
Aquarius	8	88%	0%	29%	0%
Aquarius	8	88%	0%	29%	0%
	Size of the board	% of non-executive directors in the board	% of non-executive directors with mining or engineering qualifications	% of non-executive directors with mining or engineering operational experience	% of independent non-executive directors in the board
Northam	10	90%	20%	40%	10%
Northam	9	100%	33%	44%	11%
Northam	8	100%	38%	38%	0%
Northam	9	89%	33%	33%	22%
Northam	10	90%	30%	30%	20%
Northam	9	89%	22%	22%	22%
Northam	8	88%	25%	38%	38%
Northam	8	88%	25%	38%	38%
Northam	11	82%	27%	36%	36%
Northam	11	82%	27%	36%	36%

Appendix 2: Platinum mining company performance measures

	Year	EVA	Tobin Q	Return on Average Assets %	Return on Average Equity %
Impala	2002	9 305 678	6	77	224
Impala	2003	5 248 482	5	65	156
Impala	2004	1 924 981	6	46	111
Impala	2005	3 037 147	4	50	92
Impala	2006	6 003 960	8	65	112
Impala	2007	11 135 010	4	57	87
Impala	2008	12 923 503	5	52	74
Impala	2009	10 552 842	3	31	42
Impala	2010	3 573 829	4	28	33
Impala	2011	5 789 063	4	36	44
	Year	EVA	Tobin Q	Return on Average Assets %	Return on Average Equity %
Anglo Platinum	2002	22 247 288	16	136.47	5,731.78
Anglo Platinum	2003	6 724 539	10	86.78	-147.27
Anglo Platinum	2004	3 657 393	7	80.51	-155.44
Anglo Platinum	2005	5 141 792	7	83.77	-750.05
Anglo Platinum	2006	14 059 687	9	142.19	-924.76
Anglo Platinum	2007	18 286 196	15	133.55	-501.18
Anglo Platinum	2008	20 204 345	11	98.15	-349.52
Anglo Platinum	2009	2 042 697	7	30.59	-78.03
Anglo Platinum	2010	5 597 555	7	48.22	2,102.03
Anglo Platinum	2011	-35 171 699	2	19.01	25.93
	Year	EVA	Tobin Q	Return on Average Assets %	Return on Average Equity %
Lonmin	2002	1 112 169	44	134.27	307.83
Lonmin	2003	318 491	24	85.26	304.3
Lonmin	2004	508 237	47	162.66	-442.11
Lonmin	2005	466 510	48	177.16	-125.52
Lonmin	2006	421 793	60	195.35	-354.29
Lonmin	2007	1 108 918	65	133.1	1,786.88
Lonmin	2008	524 841	54	147.83	581.88
Lonmin	2009	-316 954	30	2.23	6.27

Lonmin	2010	75 146	23	45.4	111.92
Lonmin	2011	140 321	22	56.81	148.29
	Year	EVA	Tobin Q	Return on Average Assets %	Return on Average Equity %
Aquarius	2 002	0	0	0	0
Aquarius	2 003	0	0	0	0
Aquarius	2 004	0	0	0	0
Aquarius	2 005	290 961	3	27.78	140.94
Aquarius	2 006	161 794	5	80.87	161.5
Aquarius	2 007	340 261	9	111.73	147.96
Aquarius	2 008	294 598	48	160.51	232.59
Aquarius	2 009	-23 970	22	-1.89	-17.04
Aquarius	2 010	237 774	24	28.61	49.13
Aquarius	2 011	59 853	21	28.26	38.38
	Year	EVA	Tobin Q	Return on Average Assets %	Return on Average Equity %
Northam	2 002	1 862 660	4	76.44	138.92
Northam	2 003	219 234	5	59.94	91.7
Northam	2 004	114 818	3	66.46	91.81
Northam	2 005	120 047	3	48.5	63.49
Northam	2 006	720 962	5	111.81	182.87
Northam	2 007	1 144 510	7	145.92	278.15
Northam	2 008	1 468 040	6	119.17	192.92
Northam	2 009	5 364 016	5	52.21	69.38
Northam	2 010	-229 466	6	46.86	60.34
Northam	2 011	-41 608	5	22.2	30.81

Appendix 3: Platinum Prices in US$/oz

		Platinum Price: US$ per troy oz monthly average											
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Average**
2002	474	473	514	542	536	559	527	548	558	583	590	598	**542**
2003	631	684	678	628	651	664	684	695	707	734	763	809	**694**
2004	852	847	901	887	813	810	812	851	850	845	856	853	**848**
2005	861	867	870	868	868	883	875	901	917	933	965	979	**899**
2006	1031	1042	1044	1103	1261	1191	1232	1235	1187	1087	1184	1125	**1144**
2007	1149	1207	1221	1280	1305	1288	1306	1265	1310	1412	1451	1494	**1307**
2008	1587	2005	2050	1995	2060	2043	1914	1495	1232	920	844	850	**1583**
2009	955	1039	1085	1171	1137	1222	1166	1248	1294	1335	1406	1449	**1209**
2010	1568	1525	1601	1719	1632	1558	1527	1543	1595	1692	1696	1715	**1614**
2011	1789	1829	1770	1800	1792	1774	1762	1809	1751	1540	1599	1463	**1723**