



Faculty of Business & Law

PhD Thesis

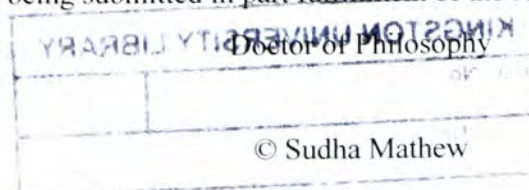
**The Influence of Board Attributes on Firm Risk in Large Publicly held UK
Firms**

By

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July 2013

This thesis is being submitted in part fulfillment of the requirements for the degree of



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Declaration of originality

I declare that this thesis has been composed by myself and has not been presented or accepted in any previous application for a degree. This work has been carried out by me unless otherwise stated, and where the work is mine, it reflects personal views and values. All quotations have been distinguished by quotation marks and all sources of information have been acknowledged by means of references including those of the internet.

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Abstract

This empirical study explores the effect of individual board attributes and combination of board attributes on managerial risk-taking in UK FTSE 350 firms. The recent financial crisis has focused the attention of regulators and all stakeholders of the firm on avoiding high risk-taking by top management. These concerns have been addressed in this study which examines the effect of board composition (board size, proportion of non-executive directors, and gender diversity), board leadership structure (presence of a powerful CEO and board executive ownership), board characteristics (age and tenure of board members) and board processes (board meeting attendance and frequency of audit committee meetings) on firm risk. This study aims to fill the gap in UK governance literature on how individual board attributes and a combination of board attributes (represented by the board composition index, the board leadership index, the board characteristics index and the board process index) associate with risk-taking in large UK corporations.

Archival data is used in this study from a panel sample of 268 listed firms on the FTSE 350, over the period 2005 to 2010. On analysing the data, this study finds support for the hypothesis that a large board size decreases firm risk. The board composition index is found to be significantly negatively related to firm risk. A powerful CEO and executive director's equity ownership is positively related to firm risk, and as expected the board leadership index is found to be significantly and positively associated with firm risk. Older board members with longer tenures reduce firm risk; and the board characteristics index is significantly and negatively related to firm risk. Better board meeting attendance and more frequent audit committee meetings reduces firm risk and as expected the board process index reduces firm risk. An overall board index constructed by combining the indices discussed above is found to be significantly associated with firm risk. This board index can be used as a board governance index to evaluate the effectiveness of the board in relation to firm risk. These findings can inform firms, investors and regulators that board attributes significantly affect firm risk and can be used as risk control mechanisms.

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List of Abbreviations

3SLS – Three Stage Least Squares
AIM – Alternative Investment Markets
ARR – Asset Return Risk
CAPM – Capital Asset Pricing Model
CAR – Capital Asset Ratio
CEO – Chief Executive Officer
FE – Fixed Effects
FRC – Financial Reporting Council
FTSE – Financial Times Stock Exchange
GLS-RE – Generalised Least Squares Random Effects
GMM – Generalised Method of Moments
ICB – Industry Classification Benchmark
IPO – Initial Public Offering
IV – Instrumental Variables
LSE – London Stock Exchange
NED – Non-Executive Director
OLS – Ordinary Least Squares
PLC – Public Limited Company
ROA – Return on Assets
TR – Total Risk
UK – United Kingdom
US – United States

Chapter 1

Introduction

The purpose of this thesis is to examine how board attributes relate to managerial risk-taking using a sample of 268 large, publicly listed UK companies, between 2005 and 2010. This study identifies the board attributes that are significantly associated with managerial risk-taking and provides a board index that can be used to gauge the effectiveness of a board in relation with risk-taking.

The contribution of this study to corporate governance literature is threefold; First, this is the first study in the UK, which relates certain board attributes such as board size, proportion of non-executive directors, gender diversity and powerful CEO, to managerial risk-taking. Previous studies that examine these board attributes use a US-based sample (Cheng, 2008; Pathan, 2009 and Lewellyn and Muller-Kahle, 2012) and a sample of Japanese firms (Nakano and Nguyen, 2012). Second, this is the first study in the literature that has related other board attributes such as equity ownership, age, tenure, board attendance and frequency of audit committee meetings, to risk-taking. The third contribution is that it is the first study to construct a board governance index representing board effectiveness in relation to risk-taking.

1.1. Research context

Sir Adrian Cadbury defined corporate governance, at the Global Corporate Governance Forum, organised by the World Bank (2000), as being "concerned with holding the balance between economic and social goals and between individual and communal goals. The corporate governance framework is there to encourage the efficient use of resources and equally to require accountability for the stewardship of

those resources. The aim is to align as nearly as possible the interests of individuals, corporations and society". Corporate governance also deals with identifying potential mechanisms by which shareholders of a corporation exercise control over management such that their interests are protected (Mallin, 2013). The board of a firm is seen as an internal control mechanism to oversee the company on behalf of the investors and stakeholders. The role of the board is to strategically guide the firm towards long-term stable growth in the interest of the shareholders (OECD, 2004).

The financial crisis of 2007-2008 has attracted the keen interest of academics and policy makers around the world to issues in corporate governance. Charles Elson, who heads the Corporate Governance Centre at the University of Delaware, said "Boards are supposed to be a company's backstop and they completely missed this crisis" (FT, 2008). The most important internal control mechanism, the board of directors, failed to control managerial risk-taking in some of the very large financial firms both in the US and the UK¹. For example, in the UK, the board of directors of the Royal Bank of Scotland approved several high risk acquisitions proposed by the chief executive Fred Goodwin (Guardian, 2011), which led to the bank coming close to bankruptcy.

The stakeholders of the firms, which were bailed out, have cast doubt on the ability of the board of directors to oversee the firm. The corporate governance infrastructure, built over the last few decades to provide checks and balances to the chief executives, was exposed as woefully inadequate by events that happened during the financial crisis. Such failures fuelled the debate on how to manage the risk facing firms and design an effective corporate governance system that would

¹ Lloyds and Royal Bank of Scotland were bailed out with taxpayers' money in 2008.

promote sustainable economic efficiency and growth whilst curtailing high risk investments. The main UK governance regulatory body, the Financial Reporting Council (FRC), has since published a report on 'Boards and Risk' (FRC, 2011) which discusses the boards' responsibility for 'better risk decision-making', and the board to determine 'the company's approach to risk, setting its culture, risk identification, oversight of risk management, and crisis management'. The report is directed towards board of directors of large publicly held companies', not only the financial firms.

Regulators and shareholders view the role of the board of directors as overseers of internal controls of the firm in the shareholders' interest (Code², 2012). Due to the increasing concern of shareholders and potential investors, regarding the high risk-taking behaviour of top managers in firms, questions are being raised related to the effectiveness of the board of directors.

In response to these concerns, this study examines if the board attributes in terms of board composition, its leadership structure, its characteristics and the processes it follows, is associated with managerial risk-taking. The questions that this study aims to answer are as follows: Are the non-executives directors on the board able to challenge plans brought forward by the management or executives of the firm, and reduce high managerial risk-taking? Can the presence of women on the board reduce risk-taking? Does the presence of a powerful CEO affect risk-taking? Is a high equity ownership at board level associated with high risk-taking? Does the age and tenure of the members of the board of directors influence risk-taking? Does the increase in

² The Combined Code was renamed 'The UK Corporate Governance Code' in 2012 and is henceforth referred to as the Code in this study.

board activity, in terms of better attendance of board meetings or more frequent audit committee meetings, affect firm risk? This study examines these questions and explores whether individual attributes as well as a combination of board attributes are associated with managerial risk-taking. The premise of the study is that a high level of risk-taking can lead to firm instability³ and increases the probability of firm insolvency.

Risk appetite is set by the top executives or management of the firm; this study aims to establish, if board attributes affect managerial risk-taking in large UK corporations and if so which attributes are more meaningful in explaining risk-taking.

1.2. Board attributes and risk-taking

According to Lord Davies (2011, p.2), 'The boardroom is where strategic decisions are made, governance applied and risk overseen.' Firms are faced with many opportunities to grow and boards have a choice of projects to invest in. Problems arise when extreme decisions are approved by boards and investments that are too risky are undertaken. A high level of risk-taking increases the probability of the firm becoming insolvent (Wright et al., 1996), which is not in the interest of any of the firm's stakeholders.

The board is made up of a collection of individuals with different experiences, skills and perspectives, who come together to make decisions on a collective basis. Besides giving strategic advice, boards monitor management and oversee the running of the firm (Mallin, 2013). For the appropriate decisions to be made at board level, the board composition and processes adopted by the firm become important. The ability

³ Instability of firm performance is characterized by high stock volatility.

of a board member to provide valuable input and challenge decisions made depends on their independence, their background and expertise, among other attributes. They have the responsibility of providing oversight in the shareholders' interest and the decisions they make can have an effect on the performance of a firm (Mallin, 2013). Poor performance of the board in monitoring management and its inability to give good strategic advice leads to lower share value, instability and potentially to a threat of takeover (Mallin, 2013). Previous studies from the UK⁴, examine how board attributes are associated with firm performance; this study extends the literature to find how board attributes relate to firm risk using a sample of 268 firms from the FTSE 350 Index⁵. This study uses measures such as volatility of the firm's stock price, which is known as total firm risk, as a proxy for managerial risk-taking. Other measures for firm risk are used as a test of robustness of the results and they include the probability of insolvency of the firm (which is the inverse of the z-score), firm specific volatility or idiosyncratic risk, and asset return risk.

Internal corporate governance mechanisms such as: appointing more non-executive/independent directors; introducing internal control systems by establishing board committees; monitoring directors' remuneration; having finance experts who are independent on the audit committee board; annual re-election of the board; are some of the established ways with which to discipline corporate management (Code, 2012). The assumption is that better monitoring of executives and providing a challenge to executive decision-making will lead to growth and stability of the firm. The Financial Reporting Council has guidelines and recommendations on board

⁴ Weir and Laing (2003); Guest (2009) and Hagedorff (2010) have examined board attributes in relation to firm performance using UK based samples.

⁵ FTSE 350 Index is a combination of the FTSE 100 index which is comprised of the 100 largest firms and the FTSE 250 index which is an index of the next largest 250 firms.

composition and processes that firms need to follow. The aim of the guidelines is to ensure that firms comply with best practice in the interest of shareholders, who want to maximise returns on their investment. The Code (2012) includes guidance that requires the board of directors to identify, evaluate, and manage risks facing the company and report it, so as to make clear the nature, scope and scale of risks facing a firm. This disclosure requirement is looked upon as a regulatory tool which informs the shareholders and the market and effectively empowers the shareholders. The close coupling of the board and risk management makes it relevant to study the association of board attributes to managerial risk-taking.

The management formulates plans for the firm and these plans are brought forward to the board for approval. Some of the strategic choices that the board makes are critical choices such as divesting a division, investing in research and development or negotiating a takeover bid (Kosnik, 1987). These decisions, it is argued in this study, depend on the risk choices of the board members and may be influenced by several factors such as chief executives who are powerful, non-executive board members, the number of members on the board, the presence of women on the board, the ownership structure of board members, experience of board members and processes that the board follows. Managerial risk-taking reflects the board's choice of investment risk from all the investment choices it has. Previous studies have shown that an appetite for risk-taking will result in high variance in asset composition and risk aversion will result in a low variance in asset structure (Wright *et al.*, 1996). Palmer and Wiseman (1999) developed a holistic model of risk-taking that demonstrated that managerial risk-taking is significantly and positively related to firm risk; therefore, this study uses firm risk as a proxy for managerial risk-taking.

This study explores individual board attributes and how they associate with firm risk as well as how a combination of board attributes relate to firm risk. It is proposed that a certain combination of board attributes can lower firm risk.

1.3. The extant literature and the gap in the research

Shareholders - who are often the main suppliers of finance to a large public firm - do not usually have the ability to monitor the executives who run the firm, due to their diffused shareholdings (Shleifer and Vishny, 1997). Therefore, the monitoring function is provided by the board of directors. The notion that directors' interest may not be the same as that of the shareholders is not new and in fact was advanced as early as the eighteenth century. Berle and Means (1932) advanced the work of Adam Smith (1776), and proposed that there is a conflict of interest between the shareholders (who want maximum returns on their investment) and the top firm executives (who may be acting in their own interest). This conflict has come to be known as the agency problem. Most of the governance literature is based on agency theory, where boards are seen as the controlling mechanism between shareholders and management of the firm.

Agency theorists such as Eisenhardt (1989) observed that shareholders and top firm executives may have different attitudes towards risk and they may prefer different actions because they have different risk preferences. Shareholders have nothing but their investment to lose and are therefore risk-seeking (Galai and Masulis, 1976; Jensen and Meckling, 1976). On the other hand, studies have shown that executives of a firm prefer less risk (i.e. they are risk-averse) due to the fact that an executive's wealth is made up of a portfolio of tangible assets (job, salary and future cash flows) as well as their human capital (skill and experience), which is usually concentrated in

the firm that the executive works for (Galai and Masulis, 1976; Amihud and Lev, 1981). The executives' concentrated wealth and human capital is non-diversible, unlike that of investors, who can have a diversified portfolio. If the firm fails due to risky projects that are undertaken, then the executives stand to lose their jobs and their human capital investments. Therefore, risk-averse executives may reject risky projects (Amihud and Lev, 1981). However, from the recent financial crisis it is evident that risky plans were backed by firm executives and therefore, it is argued in this study, that the agency theory assumption, that executives are either risk-averse or risk-neutral, needs to be extended. This assumption is extended by using the behavioural theory of the firm, which supports the view that strategic decisions made by the executives may be aspirational and therefore executives may be risk-seeking as well.

Surveys by Zahra and Pearce (1989), Daily, Dalton, Ellstrand and Johnson (1998), Hermalin and Weisbach (2003) and Adams, Hermalin and Weisbach (2010), of the literature on board of directors show that there is a large amount of literature that examines the three way relationship between shareholders, firms' top management and the board of directors. Hermalin and Weisbach (2003) in their review of governance literature note that studies can be divided into three categories. First, the studies that examine the influence of board attributes (usually board size and composition) on firm performance (Bhagat and Black, 2002). The second category are studies that analyse board attributes effect on an action (such as CEO replacement, firm takeover or executive compensation, one such example being Yermack (1996) who studies the effect of board size on CEO turnover); and the last category of studies are those that examine the factors that contribute to the makeup

of board attributes (such as Linck, Netter and Yang (2008) who study the factors that affect board composition).

This study stands apart from those described above, since it analyses the influence of multiple board attributes on managerial risk-taking which is shown to affect firm performance (Mukherji, Desai and Wright, 2008). Some of the board attributes have been examined previously in relation to managerial risk-taking; these include topics of ownership structure (Wright *et al.*, 1996), board size and independence (Cheng, 2008; Pathan, 2009), CEO compensation (DeFusco, Johnson and Zorn, 1990; Rajgopal and Shevlin, 2002; Coles, Daniel, and Naveen, 2008; Low, 2009) and the presence of a powerful CEO (Lewellyn and Muller-Kahle, 2012). All these studies use a US-based data sample. This will be the first study to examine other board attributes such as gender diversity, board executive ownership, age and tenure of board members, and processes followed by the board in association with managerial risk-taking.

Governance studies evaluating the effectiveness of UK boards are scarce (Weir and Laing, 2003; Guest 2009; Hagendorff, 2010). No studies were found that used a UK data sample to examine the impact of board attributes on managerial risk-taking. Therefore, this study attempts to extend the literature by exploring how board attributes associate with managerial risk-taking in UK firms.

Many of the US based studies such as Cheng, (2008) and Pathan (2009) do not indicate in their study how firm risk influences firm performance. Unlike these earlier studies, this study provides empirical results to show that high firm risk leads to poor firm performance. This study makes a valuable theoretical contribution to the governance literature in developing hypotheses based on the argument that high firm

risk leads to poor firm performance. Previous studies on risk and risk-taking have shown that high stock volatility increase the probability of firm insolvency (Shapira, 1994; Crouhy, Galai and Mark, 2006). This study confirms that high firm risk leads to poor firm performance empirically in Chapter 8.

Furthermore, this study encompasses all relevant board attributes identified from theoretical constructs, whereas most previous studies examine only a handful of board attributes. For example, Cheng (2008) and Pathan's (2009) studies, both, focus on board size and Lewellyn and Muller-Kahle's (2012) study focuses on the influence of a powerful CEO on firm risk. No studies were found in the literature that examines the effect of a combination of board variables on firm risk. In this study, board attributes are categorised into four groups, namely board composition, board leadership structure, board characteristics and board processes. The category of board composition consists of the variables board size, proportion of non-executive directors and gender diversity. Board leadership structure is made up of a combination of variables representing a powerful CEO and board executives' equity ownership. The category of board characteristics is made up of a combination of variables representing board age and tenure. Board processes are examined by combining board meeting attendance and frequency of audit committee meetings. This will also be the first study that examines the effect of a combination of all the board attributes (by constructing a board governance index) on firm risk. This board index is an overall governance index representing board effectiveness in managing firm risk.

There is only limited empirical evidence as to whether internal governance codes prescribed by the UK regulators enable boards to be more effective. In the UK, the

recommendation is to have at least 50% non-executives on the board to increase independent monitoring of management and improve firm performance (Code, 2012). But, Weir and Laing (2001) find a negative relationship between non-executive director representation and firm performance. Regulators believe that the regulatory guidelines will make boards more effective, resulting in better performance by the company. This study aims to determine if the regulatory guidelines are relevant, that is if they actually make boards more effective and improve the financial stability of the firm. Another reason for this study is that governance regulation is evolving and so are the characteristics and processes of the boards which follow these guidelines. Even though the sample for the study is between the periods 2005 to 2010 which is before the current regulation (Code, 2012), the results of the study can inform regulators on those board attributes that make the boards more effective. This study aims to investigate agency issues and the effectiveness of governance mechanisms in the UK, in a period that has witnessed an intensive discussion on corporate governance issues, which would be of considerable importance.

Furthermore, some of the previous studies on internal governance have assumed that board attributes are exogenous to firm performance and therefore used estimation methods that might not be appropriate (Yermack, 1996). This bias could have resulted in incorrect results. This study aims to use the most recent developments in econometrics to avoid the problem of endogeneity in governance variables.

Additionally, this study will give an up-to-date picture of how board attributes have evolved over the sample period and how they affect managerial risk-taking in UK firms.

1.4. Aims and objectives

The aim of this study is to investigate the effect of board attributes on managerial risk-taking in large UK firms. More specifically the aims of the study are,

- To determine the influence of board composition (board size, proportion of non-executive directors, and gender diversity) on firm risk.
- To determine the influence of board leadership structure (powerful CEO and executive directors' equity holding) on firm risk.
- To determine the influence of board characteristics (age and tenure) on firm risk.
- To determine the influence of board processes (board meeting attendance and frequency of audit committee meeting) on firm risk.
- To determine the influence of a combination of all the attributes of the board of directors with firm risk.

Firm risk is used as a proxy for managerial risk-taking and is measured as the variability in firm performance, using both accounting and market data.

The objective of this study is to find if, and how, board attributes affect managerial risk-taking in UK firms. This will inform stakeholders of large UK firms on how to use board attributes to assess firm risk. Firms can use the results of this study to re-examine board composition, board leadership structure, board characteristics and board processes, while regulators can use the results of the study to guide their policies on boards attributes.

1.5. Methodology and data

This study employs a quantitative approach to address the research questions. A theoretical model is developed based on Zahra and Pearce's (1989) integrated model of boards. This model has also been adopted, in a book on corporate governance, by Stiles and Taylor (2002). Hypotheses are developed based on existing theories (agency theory and the behavioural theory of the firm) and the results of previous studies in a wide variety of fields, including the strategic management, behavioural psychology, decision making, and governance literature. Secondary data is collected from 268 UK firms which are listed on the FTSE 350 index over the period 2005 to 2010. Empirical models that associate board attributes to managerial risk-taking are derived to test the hypotheses on the collected panel data. The most compatible estimation method is used to test the empirical model which is the generalised least squares random effects method. Endogeneity concerns which may arise due to reverse causality are also addressed and tests of robustness are conducted to confirm the results of the study.

1.6. Main findings and contribution to UK governance literature

This study makes three main contributions to the governance literature.

This is the first study that associates board attributes such as board size and proportion of non-executive directors, gender diversity, and powerful CEO on the board to managerial risk-taking using a UK-based data sample. Previous studies examining these attributes are non UK-based samples.

The empirical findings of this study show that a large board reduces firm risk. This result is consistent with that of previous studies (Cheng, 2008; Pathan, 2009) that use a US-based data sample. It is proposed that in larger boards there are varied opinions

and the decision is usually a compromise of extreme opinions, therefore, a large board will produce less extreme or risky decisions (Cheng, 2008). This result can inform large UK firms in using board size as an internal risk control mechanism.

The findings of this study also show that the proportion of non-executive directors on the board is not significantly related to risk-taking. Even though the average board in large UK firms has more than 50% of the board who are non-executives, this does not appear to have a significant effect on managerial risk-taking. The role of non-executive directors to provide a challenge to the executive decisions made, at board level, is not significant. This may be because the part time non-executive directors do not have much relevant firm-related information to mount a challenge to decisions made (McNulty and Pettigrew, 1999).

This study also finds that the presence of women on the board has no significant effect on managerial risk-taking in large UK firms. This may be due to the fact that not enough firms have women represented on boards such as to have a significant impact (Huse and Solberg, 2006).

The results of this study show, that in large UK firms, a powerful CEO increases firm risk. This significant relation can be explained by the behavioural theory of the firm, which proposes that actions taken by the executives depend on their aspiration levels. The actions taken by executives can be risk-seeking or risk-averse. This result rejects the explanation of agency theorists that executives may only be risk-averse or risk-neutral (Eisenhardt, 1989). This finding informs firms to comply with the guidelines of avoiding duality of the CEO-chairperson position at the helm of the firm, as well as not having executives holding the position of chairperson.

The second contribution of this study relates to examining the effect of specific board attributes (board executives' equity ownership, age, tenure, board attendance, and frequency of audit committee meetings) not previously tested in the existing risk-related literature. Specifically, this is the first study to associate board executive ownership to managerial risk-taking. A high proportion of equity held by board executives is found to be associated with more risk-taking behaviour, which may be due to self-interest of the executives who may invest in riskier projects to get higher returns on equity held, without considering the downside risk.

This is also the first study to associate age and tenure of board members to risk-taking. However, board members' age is not found to be significantly related to total firm risk. Thus, having older directors does not necessarily lead to a more effective board. It is found that having longer tenured board members reduces managerial risk-taking. Therefore, it is proposed that long-tenured board members have good organizational knowledge, extensive experience and better relations with other board members and this works towards reducing firm risk.

This is the first study that examines board activity in association with firm risk. The results show that higher board meeting attendance and more frequent audit committee meetings are found to be associated with less firm risk. However, this relationship is not significant. This may be due to the fact that there is not much variation in the data on board meeting attendance and frequency of audit committee meetings.

The final contribution of the study relates to examining how the board attributes in combination, are associated with managerial risk-taking. Based on Zahra and Pearce's (1989) model governance indices are constructed that represent the four

board governance attributes: composition, leadership structure, characteristics and process. The results show that the board composition index is significantly related to firm risk. Specifically, a combination of a large board with more non-executives and at least one woman on the board is found to significantly reduce firm risk. Moreover, board leadership structure, a combination of the variables of powerful CEO and executive directors' equity ownership, is found to positively and significantly influence firm risk. The study also found that the board characteristics index (a variable comprising of a combination of mean board age and mean board tenure) is significantly and negatively associated with managerial risk-taking. The board process index, which combines the variables of board meeting attendance and frequency of audit committee meetings is found to be significantly and negatively related to firm risk. It is proposed that more activity in terms of board processes will lower firm level performance volatility.

Furthermore, an overall governance index representing board effectiveness is constructed. Empirically, this overall board index is significantly related to firm risk, which shows that board attributes have a significant effect on firm risk. This governance index has the advantage of capturing the combination of board attributes in one measure. This could potentially be used by academicians as well as by regulators and other stakeholders to gauge the effectiveness of the board in managing firm risk.

1.7. Structure of the thesis

Chapter 2 discusses the topic of corporate governance, the internal and external mechanisms of control, and the governance framework in the UK offered by the regulators. Chapter 3 reviews the role and structure of the board as well as the

different theories of the board in the literature. Chapter 4 discusses the definition of risk, the relationship between firm risk and performance, and the theories of risk-taking offered in the literature. Chapter 5 reviews the literature on board attributes and based on this review, hypotheses are developed as to how board attributes are associated with firm risk. Board attributes are grouped into four categories, namely board composition (board size, proportion of non-executive directors and gender diversity), board leadership structure (powerful CEO and executive ownership), board characteristics (age and tenure), and board processes (frequency of audit committee meeting and board meeting attendance). Hypotheses are also constructed on how the combination of variables may affect firm risk. In chapter 6 the methodology used in the study is discussed, specifically, the research philosophy, approach and strategy as well as the research design. The data sample and data selection process are discussed and the variables that are used in the empirical model explained. Furthermore, the reasons for choosing the generalised least squares random effects method to estimate the empirical model are given. Chapter 7 presents and discusses the descriptive statistics related to the data sample. Chapter 8 presents the multivariate analysis and discusses the results. Tests of robustness are included in this chapter. It also includes the responses from five directors who were interviewed to validate the results. Chapter 9 offers a conclusion to the study with a summary of the findings and implications, limitations of the study and recommendations for future research.

Chapter 2

Corporate governance in the UK

2.1. Introduction

The idea of governance in terms of governing a nation is ancient but ‘Corporate Governance’ is a comparatively new phrase and did not come into use until the 1980’s (Tricker, 2012), in relation with large firms. In small family owned firms the owners are in charge of running the firm unlike large corporations where the owners who are the investors in the firm let managers run the firm. This separation of ownership from the management of the firm causes conflict of interest in how the firm is being run (Berle and Means, 1932). The famous quote by Adam Smith (1776, p.304) sums up this problem,

‘The directors of companies, being the managers of other people’s money rather than their own, cannot well be expected to watch over it with the same anxious vigilance with which (they) watch over their own’.

Corporate governance relates to resolving of the conflict between the managers and owners. The board of directors at the apex of the corporation is appointed by the shareholders of large corporations so that they can resolve these conflicts and direct the firm towards growth, and maximize returns for the investor.

In the UK, the Financial Reporting Council is responsible for issuing and reviewing corporate governance codes that provide guidelines in how to better govern firms⁶. The development of governance codes has been driven by corporate scandals, corporate bankruptcies or financial crises. The Cadbury report (1992) was in

⁶ The Financial reporting council is the independent regulatory body in the UK, responsible for promoting high quality corporate governance.

response to various scandals and collapses of listed firms in the 1980's and 1990's most notably Coloroll, BCCI, Maxwell Communications and Polly Peck (Mallin, 2013). The collapse of these firms was in part due to aggressive acquisitions. The charges faced by these firms included money laundering, accounting fraud and theft (Mallin, 2013). Most of the investors in these firms lost their investments.

The Cadbury report (1992) discusses the composition, operation and contribution of board members in order to improve the monitoring capability of the board. Since then there has been the Greenbury report (1995) that focussed on the best practise for director remuneration and then the Hampel report (1998) that reviewed the previous reports and brought them together with a recommendation that no changes were required in the governance code. The Combined code was published in 1998 by the London stock exchange and drew together recommendations of the previous reports. The Turnbull report (1999) confirmed that it was the responsibility of the board that the firm had a sound system of internal control and they were required to assess risks facing the firm and report on this in the annual report. Since then, the combined code has been updated in 2003, 2006, 2008, and more recently in 2010 and 2012. The Davies report (2011) recommended that large UK firms should increase the representation of women on boards and have at least 25% of women on boards by 2015. The codes set the standards of best practice such that the boards are effective in providing sound advice to the management. The compliance to these codes is on a 'comply or explain' basis; that is, a firm may comply with the code and if it does not, it needs to explain why it has not complied with the code to the regulatory body.

In this chapter, corporate governance and mechanisms of control in governance are discussed first, followed by an examination of the evolution of the regulatory governance guidelines that firms are recommended to follow.

2.2. Corporations and Corporate governance

Corporate governance deals with the type of business which is the corporation.⁷ In the UK, corporations are legal entities and they raise capital by issuing shares in the firm. These publicly held companies have the abbreviation PLC at the end of their names which stands for public limited companies. PLCs can be listed or unlisted on the London stock exchange (LSE). This study uses a data sample of 268 PLCs from the FTSE 350 Index, listed on the LSE.

In the public limited company, there is the concept of limited liability, whereby the shareholder's financial liability is limited to their investment in the company. If the company with limited liability is sued, then the shareholders are not liable for any debts of the company, and stand to lose only their investment in the company (Mallin, 2013).

Most of the shareholders have a small share in the company and are not capable of running the company due to not having the time, ability or desire. Therefore, the shareholders elect the board of directors, which in turn appoints managers to run the day to day operations of the firm (Companies Act, 2006)⁸. One of the problems for the shareholders in large corporations is that they are not able to decide how their investment should be used in running the firm since the managers, appointed by the board, are running the firm. Sometimes, there is a conflict of interest between what the investors want and what the managers of the firm are doing. This problem was highlighted by Berle and Means (1932) and they suggest that there is a separation in ownership and control in these firms. This is due to the fact that hundreds or

⁷ Sole proprietorship and partnership are the other types of business categories.

⁸ The Companies act (2006) was passed as an act of the Parliament of the UK and provides a comprehensive code of company law, and it made changes to almost every facet of the law in relation to companies.

thousands of shareholders or owners cannot collectively run the firm, but it has to be left to managers (agents). Agents left to their own devices with the investors' money can act in their own self-interest in the form of perks, benefits, and power (Jensen and Meckling, 1976). This cost has since come to be known as agency costs. The managers who are most likely to increase agency costs are the top level executives who have no bosses to control them unlike mid-level firm executives (Mallin, 2013). The shareholders depend on the board of directors to monitor the activities of the managers and strategically direct the company towards stable growth. Much of the regulation on boards is driven by the desire to reduce agency costs (Hermalin and Weisbach, 2003) and improve the returns to the shareholders.

In corporate governance literature the common concern of theorists is that of managers who instead of improving the returns to the investors, act in their own self-interest (Berle and Means, 1932; Jensen and Meckling, 1976). According to the Cadbury Report (1992), 'Corporate governance is a system by which companies are directed and controlled. Boards of directors are responsible for the governance of their companies. The shareholders' role in governance is to appoint the directors and the auditors and to satisfy themselves that an appropriate governance structure is in place'. Shleifer and Vishny (1997, p.737) in their review of corporate governance literature, explain 'Corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment'. According to Monks and Minow (2004), corporate governance, ensures that employees or managers are accountable for the work they perform so as to increase the value of the company, and is concerned with steering a company in a strategic direction so that it can achieve its long term goals and objectives. Boards of directors are entrusted with governing the firm, whereas managers, manage the firm.

The central focus of corporate governance is the shareholders, board and management since both regulators and company law focuses on these players. From an economic perspective, corporate governance is about maximising the wealth of owners. From the company's perspective, corporate governance aims to balance the shareholders' interest with those of the other stakeholders i.e. employees, customers, suppliers, and the public so as to gain long term value. From a public policy perspective, corporate governance is about fostering an enterprise and ensuring that it is accountable. From a stakeholder's point of view, corporate governance gives direction to the company to use resources efficiently, make sound investments, and at the same time the board of directors are accountable to the stakeholders (Coyle, 2002).

The following section examines both external and internal mechanisms of control which act as the monitoring mechanism for the managers of the firm. The board of directors is seen as the most important internal mechanism of control by both the shareholders and governance regulators (Mallin, 2013).

2.3. Mechanisms of control

Corporate governance encompasses internal and external mechanisms of control (Monks and Minow, 2004). Internal mechanisms of control are within the control of the firm's shareholders and board of directors while, external mechanisms allude to exogenous factors which have a bearing on the extent of agency costs (Monks and Minow, 2004). A review of both external and internal mechanisms of control and their limitations is discussed in the following section.

2.3.1. External mechanisms of control

Some of the external mechanisms of control which can discipline management are competition and the threat of takeovers, disclosure of financial statements and auditing, as well as governance indices provided by rating agencies (Mallin, 2013). These external mechanisms of control are discussed in the section below.

2.3.1.1. Competition and threat of takeover

Competitive markets are a form of governance mechanism to control management of firms. If the firm is able to grow in a competitive field of players, then the management is seen as doing its job, but when it is not meeting expected performance targets, then there can be a threat of takeover from a firm with a stronger management. Stigler (1958) was of the view that competition in the product market should minimise problems with the efficiency of the management but Shleifer and Vishny (1997, p. 738) argue, that although "... product market competition is probably the most powerful force toward economic efficiency in the world; we are sceptical that it alone can solve the problem of corporate governance." They explain that if managers wanted to serve their own interests, then they would, in spite of market competition.

Jensen (1988, 1993) argues that takeovers are a crucial and effective corporate governance device to deter the managers from promoting their own interests, and for managers to perform well. Firms where the management is acting in self-interest will find that the firm performance is diverging from the expected performance. In this case, the investors will prefer different management that will run the firm such that there is growth in the firm. This demonstrates that management can be disciplined if they do not perform well by the threat of takeover (Jensen, 1988). Poorly performing firms may receive a tender offer from another firm and the shareholders could decide

whether they wish to accept the offer. If they accept the offer, the acquiring firm may fire the managers of the target firm. A fluid takeover market would thus create incentives for managers to act in the best interests of the shareholders to avoid being fired in a takeover (Caprio and Levine, 2002). But Shleifer and Vishny (1997) in their survey of corporate governance literature find that take-overs are no longer a threat to poorly performing firms due to the following facts,

- Takeovers are expensive for the bidder, as they have to take into consideration the increased price that the firm shareholder's will demand in anticipation of a higher share price of the firm. The higher price may be more than the bidder is willing to pay to gain control of the management of the firm (Shleifer and Vishny, 1997).
- Takeovers require a liquid capital market (Shleifer and Vishny, 1997; Caprio and Levine, 2002).

In the US, firms have protection against takeovers in the form of poison pills⁹ and staggered boards¹⁰ and they are known as shareholder rights plan. These protections are controversial since they hinder an active market for corporate control and are unlawful in the UK. A study by Tao-Hsien and Min-Ming (2011) proposes that takeover protection has an impact on investment policy of the firm. They find that takeover protection is linked to lower capital expenditure and higher research and development expense.

⁹ Poison pills are a defensive strategy used against corporate takeovers. It changes the company's stock plan or financial condition that is intended to make the corporation unattractive to the buyer.

¹⁰ Board members are elected at different times. Staggered terms make hostile takeovers more difficult because the potential acquirer can replace only so many directors at a time.

2.3.1.2. Disclosure of financial statements and auditing

The Financial reporting council sets standards for accounting and reporting of financial statements for UK firms, and the Companies Act (2006) requires firms by law, to publish in their annual report the financial statements, so as to disseminate information about the company to its shareholders and the public generally. The three main financial statements of a firm are the income statement, balance sheet, and statement of cash flows, which are used by investors to assess the value of the firm, its profits, and its risk. These financial disclosures inform shareholders of the activities of the management and help to minimise agency costs (Watts and Zimmerman, 1983).

Firms have internal auditors to advise the management and board of directors on the financial reporting and operating procedures of the firm. The internal auditors check that the financial records are accurate and there is compliance with the accounting standards. Firms also appoint external auditors that play an important role in checking the financial reports of the firm. External checking of accounts is seen as a control function that can eliminate fraud or misreporting of financial figures by the firm. Internal and external scrutiny of the financial statements helps to reduce agency costs between managers and shareholders (La Porta *et al.*, 2000).

In spite of disclosure and auditing of financial statements, firms such as Enron¹¹ were able to commit fraud.

¹¹ Prior to Enron becoming bankrupt in 2001, its reported financial condition, was sustained in most part by institutionalised, systematic and creatively planned accounting fraud, when it was able to hide billions of dollars in debt. Enron's auditors, Arthur Anderson, subsequently were found guilty of fraud, which put them out of business in 2002.

2.3.1.3. Corporate governance indices provided by rating agencies

Rating agencies publish ratings of firms, to inform investors in the merits of investing in a firm, based on how well the firms follow regulatory governance guidelines. Therefore, rating agencies act as a control mechanism for firms to follow regulatory guidelines and improve governance of the firm. There are a number of rating agencies, including credit rating agencies that have developed indices to measure corporate governance performance. Some of the well-known indices from around the world are FTSE-Institutional Shareholder Services (ISS) corporate governance index, Standard & Poor's corporate governance scores, Dow Jones Sustainability Index and Business in the Community Corporate Responsibility Index (Mallin, 2013). In their scoring system, these indices include corporate governance guidelines adopted by the firm. For example, the FTSE-ISS index series for the UK, USA, Europe and Japan rank over 2000 companies using five areas of comparison that include:

- board composition and independence
- compensation
- ownership
- audit process
- Shareholder rights/takeover defences (ISS, 2010).

These indices can help investors to compare firms according to their governance score, to find if they are being well governed, before they invest in a firm. The corporate governance score published by the agencies can act as a catalyst for firms to improve their internal control mechanisms. Larcker, Richardson, and Tuna (2005) report that corporate governance ratings are associated with the level of future

operating performance and firms with a good governance rating perform better (UNCTAD, 2005).

In the next section, the internal mechanisms of control are discussed.

2.3.2. Internal mechanisms of control

Internal governance mechanisms refer to governance structures and processes that are within the control of the board of directors and the firm's shareholders. Many of the internal mechanisms of control are discussed in detail in Chapter 5 (literature review and hypotheses development), and this section presents a short survey of the literature on internal mechanisms of control and how they affect the monitoring ability of the board.

Two main methods of internal mechanisms of control are discussed by academics and they are non-executive directors and compensation in the form of equity¹². The non-executive directors (henceforth NEDs) on the board are seen as a control mechanism and their job includes providing constructive challenge to the executive members in their strategies. Fama (1980) and Fama and Jensen (1983a; 1983b) argue that the proportion of NEDs will help to rein in the behaviour of managers and therefore, many studies examine the association of the proportion of NEDs on the board to firm performance (Muth and Donaldson, 1998; Hermalin, and Weisbach, 2001; Bhagat and Black, 2002).

The other internal control mechanism discussed often in the literature is in terms of equity compensation (Hermalin and Weisbach, 2003). Executive members (the management) when compensated with equity in the firm have their goals for the firm

¹² See Zahra and Pearce (1989), Dalton *et al.* (1998) and Hermalin and Weisbach (2003) for a survey of the literature on board attributes.

aligned with the investors in the firm (Jensen and Meckling, 1976 and Benston, 1985). Equity ownership is seen as a control mechanism, since it can reduce the costs to investors' funds from being misused by management (Demsetz and Lehn, 1985; Saunders, Strock, and Travlos, 1990; Schleifer and Vishny, 1997; Demsetz, Saldenberg, Strahan, 1997; Caprio and Levine, 2002; Iannotta, Nocera, Sironi, 2007; Laeven and Levine, 2009).

Some of the less discussed internal control mechanisms in the literature include diversity of the board, the committees, and the processes that the board follows. Women on the board provide a different perspective in their choices of investment decisions and could provide a challenge to the top executives of the firm. Their impact on governance and firm performance has been studied by Carter, Simkins and Simpson (2003); Adams and Ferreira (2009); Eklund, Palmberg and Wiberg (2009). Increased board meeting frequency and presence of audit committee can improve the monitoring ability of the board; Vafeas (1999) and Klein (2002) report that these board attributes significantly influence firm performance. Spira (2006) finds that the presence of audit committees and the number of non-executive directors on the audit committee act as an internal control mechanism and improve the performance of firms.

Other board attributes that influence governance of the firm have been examined in the literature and they are board size (Yermack 1996; Eisenberg, Sundgren, and Well, 1998; Coles, Daniel, Naveen, 2008); powerful CEO (Daily and Dalton, 1994; Lewellyn and Muller-Kahle, 2012); the expertise of board members (May, 1995; Guner, Malmendier, Tate, 2008; Duchin, Matsusaka, Ozbas, 2010), and the age and tenure of board members (Vafeas, 2003, Golden and Zajac, 2001).

Many of these studies use a US-based sample of firms, and analyse the effect of internal mechanisms of control on firm performance. There is a gap in the literature on how board attributes may be used as internal risk control mechanisms in UK firms. This study aims to find how board composition, board leadership structure, board characteristics and the board processes affect firm risk. Board composition uses the variables of board size, percentage of non-executive directors and gender diversity. The leadership structure of the board uses the variables of powerful CEO and equity held by the executive directors. Equity ownership of executive directors is examined as opposed to basic compensation, since it is used as an internal control mechanism used by firms and also, it is the variable component of the compensation package which is shown to be associated with risk-taking (Demsetz and Lehn, 1985). Board characteristics which represent the expertise and skill of board members are examined using the measure of tenure and age of board members. Board activity, in terms of frequency of audit committee meetings and board meeting attendance are also analysed. Only the frequency of audit committee meetings is analysed since the audit committee is most relevant to the monitoring ability of the board.

Governance codes were formulated to aid the shareholders to achieve maximum returns on their investment, to reduce agency costs, to provide guidelines for firms to follow and bring transparency to the governance procedure in firms (Hermalin and Weisbach, 2003). Governance codes are discussed in the following section.

2.4. Governance codes in the UK

The evolution of the governance codes over the years since the Cadbury report in 1992 is discussed in this section.

2.4.1. Cadbury report (1992)

The Cadbury report was in response to major corporate scandals, such as the collapse of the BCCI bank and the Robert Maxwell pension funds scandal, both in 1991 that led to the development of corporate governance in the UK (FRC, 2006). In response to the occurrence of the financial scandals in the 1980's involving UK listed companies, which led to a fall in investor confidence in the quality of company's financial reporting, a committee was established in May 1991 by the Financial reporting council, the London stock exchange, and the accountancy profession. This committee published the Cadbury report (1992), formally entitled 'The report of the committee on the financial aspects of corporate governance' in December 1992. The key focus of the provisions of the Code of Best Practice primarily related to the composition of the board of director's, the appointment and independence of NEDs, the service contracts and remuneration of executive directors, and company's financial reporting and controls (Cadbury, 1992).

Some of the main recommendations made were as follows:

- The majority of NEDs should be independent of management and free from any business or other relationship;
 - NEDs should be appointed for specified terms;
 - service contracts should not exceed three years;
 - executive remuneration should be subject to the recommendations of a remuneration committee made up entirely or mainly of NEDs; and
 - an audit committee, comprising of at least three NEDs, should be established
- (Cadbury, 1992)

Following publication of the code, the London stock exchange introduced a requirement into the Listing rules¹³ requesting all companies to include a statement of compliance, or non-compliance, with the provisions, in their annual report and accounts. Institutional investors and investment banks urged those listed companies for which they provided sponsorship and advice to adopt the provisions. As a result, many companies changed their governance procedures and conduct accordingly (Cadbury, 1992).

2.4.2. Greenbury report (1995)

During the 1990's the issue of director's remuneration was becoming a primary concern for investors and the public at large. Specifically, the levels of remuneration of executive directors in privatised industries were rising but, the remuneration packages were failing to provide the necessary incentives for directors to perform better.

Consequently, it was recognised that corporate governance issues relating to director's remuneration needed to be addressed in a more rigorous manner. This led to the establishment of the Greenbury Committee.

The Committee's findings were documented in the Greenbury report (1995), which incorporated a code of best practice on director's remuneration.

Specifically, four main issues were dealt with, and they are as follows:

- the role of a remuneration committee in setting the remuneration packages for the CEO and other directors;

¹³ The Listing rules are a set of mandatory standards for any company wishing to list its shares or securities for sale to the public, including principles on executive pay and the requirement to comply or explain noncompliance with the UK Corporate Governance Code.

- The required level of disclosure needed by shareholders regarding details of director's remuneration and whether there is the need to obtain shareholder approval;
- Specific guidelines for determining a remuneration policy for directors; and
- Service contracts and provisions binding the company to pay compensation to a director, particularly in the event of dismissal for unsatisfactory performance (Greenbury report, 1995).

As in the Cadbury Code (1992), the Greenbury Code (1995) recommended the establishment of a remuneration committee, comprising entirely of NEDs, to determine the remuneration of the executive directors. However, in terms of service contracts, Greenbury recommended a maximum notice period of 12 months rather than three years as suggested by Cadbury.

Following publication, the recommendations of Greenbury report (1995) were also taken on board by the London stock exchange and incorporated into the UK listing rules. However, unlike the Cadbury Code (1992) it was not widely accepted, as many believed that the recommendations made did not sufficiently deal with the issue of linking directors pay to the company's performance in the interests of shareholders.

2.4.3. Hampel report (1998)

The Hampel Committee was established in 1996 to review and revise the earlier recommendations of the Cadbury and Greenbury Committees on roles for executive directors and institutional investors. The final report emphasised principles of good governance rather than explicit rules in order to reduce the regulatory burden on companies and avoid 'box-ticking' so as to be flexible enough to be applicable to all companies (Hampel, 1998). It was recognised that good corporate governance will largely depend on the particular situation of each company.

This report viewed governance from a strict principal/agent perspective regarding corporate governance as an opportunity to enhance long term shareholder value, which was asserted as the primary objective of the company. This was a new development from the Cadbury (1992) and Greenbury (1995) Codes which had primarily focused on preventing the abuse of the discretionary authority entrusted to management. In particular, the report favoured greater shareholder involvement in company affairs. For example, while the report recommended that unrelated proposals should not be bundled under one resolution, shareholders, particularly institutional shareholders, were expected to adopt a 'considered policy' on voting (Hampel, 1998).

Another key advance was in the area of accountability and audit. The board was identified as having responsibility to maintain a sound system of internal control, thereby safeguarding shareholders' investments (although the board was not required to report on the effectiveness of the controls) (Hampel, 1998). Further, the board was to be held accountable for all aspects of risk management, as opposed to just the financial controls as recommended by Cadbury.

The Hampel report did not advance the debate on director's remuneration, choosing only to reiterate principles inherent in the Greenbury report. In particular, the report did not believe that directors' remuneration was a matter for shareholder approval in the general meeting. This would not become a requirement until the introduction of the directors' remuneration report regulations in 2002.

2.4.4. Combined code (1998)

The Combined Code (1998) consolidated the principles and recommendations of the Cadbury, Greenbury and Hampel reports. The code is divided into two sections, the

first outlines principles of best practice and their supporting provisions for companies, while the second does the same for shareholders. Compliance with the code is not mandatory, but firms are required to provide shareholders with sufficient information to be able to assess the extent of compliance with the code. Instances of non-compliance are to be justified to shareholders in the annual report.

The first part of the code covers topics such as the composition and operations of the Board, directors' remuneration, relationship with shareholders, the supply of information, accountability and audit. The fact that the code has provided both principles and provisions has resulted in a code that is powerful enough to effect specific recommendations and flexible enough to be applicable to most companies (Combined Code, 1998).

The second part of the code covers the topic of shareholder voting, dialogue with companies and the evaluation of governance disclosures. As institutional investors invest on behalf of the shareholders they represent, they have a responsibility to hold the companies in which they invest, to account. In particular, the code recognised that the responsibility for maintaining good dialogue and mutual understanding belongs to both companies and its institutional investors (Combined Code, 1998).

2.4.5. Higgs report (2003)

The Enron and Worldcom¹⁴ scandals in the US led to the Combined Code to be updated regarding the role of NEDs. A report was published in 2003 following Derek Higgs' report into the role of NEDs. The report examined the role, independence and recruitment of NEDs. Higgs viewed the NEDs role as:

¹⁴ Enron was the seventh largest company in the US before the fraudulent accounting was revealed, leading to the firm becoming insolvent in 2001. Worldcom became insolvent in 2002, also for fraudulent accounting.

- making contributions to corporate strategy;
- monitoring the performance of executive management;
- satisfying themselves regarding the effectiveness of internal control;
- setting the remuneration of executive directors; and
- being involved in the nomination, removal and succession planning of senior management (Higgs Report, 2003).

The report recommended a number of changes to the Combined Code (1998) and a revision of the code in July 2003 incorporated most of the Higgs recommendations. The Combined Code (1998) recommended that boards should comprise of at least one-third NEDs, a majority of who should be independent. However, the code does not detail how to assess independence. Therefore, Higgs outlined a series of tests of independence such as length of service (10 years), associations to executive management, financial interest or significant shareholding. In particular cross-directorships were identified as compromising independence, the simplest case being where two directors act as executive directors and NEDs alternatively at two companies (Higgs Report, 2003). However, in practice there may be a complicated network of inter-relationships known as ‘an old boy’s club’ such that it remains difficult to externally determine a directors’ independence.

With regard to recruitment, Higgs recommended stronger provisions governing nomination committees and called for all listed companies to establish a nomination committee, chaired by an independent NED (not the chairperson) and comprising a majority of independent NEDs. However, it was recognised that the recommendations regarding NEDs would be harder for smaller companies to adopt.

2.4.6. Revised Combined code (2003)

The revised Combined Code, published in July 2003 was a direct result of the recommendations of the Higgs report outlined above and also the Smith review concerning audit committees. As with the Combined Code published in 1998, companies were required to report on their compliance to the Code and explain areas of non-compliance. The Code calls for:

- A separation of the roles of the chairperson and chief executive. The chairperson should satisfy the criteria for independence on appointment, but should not, thereafter, be considered independent when assessing the balance of board membership;
- A board of at least half independent NEDs. The Code defines independence as recommended by the Higgs Report;
- Candidates for board selection to be drawn from a wider pool;
- The board, its committees and directors to be subject to an annual performance review;
- At least one member of the audit committee to have recent and relevant financial experience; and
- In contrast to the Higgs Report, the revised Code permits the chairperson to chair the nominations committee, except where the committee is considering the appointment of the chairperson's successor (Code, 2012).

2.4.7. The Turnbull report 2005 and 2010 review

The Turnbull report was first published in 1999 and set out best practice on internal control and risk management for UK listed companies. It informed boards of directors of their obligation to keep good internal control of their firm, with good audits to ensure quality of the financial statements and reduce fraud.

In October 2005 the Financial Reporting Council (FRC) issued an updated version of the guidance wherein it was emphasized to the boards their responsibility to implement risk management and internal control as an integral part of the running of the business and inform the investors in how it is being implemented. The report also mentions that the board should consider risk management in the way it makes investment decisions about the firm (Turnbull report, 2005).

The report was reviewed in 2010 after the financial crisis and the important changes are as follows.

- Boards to review on a continuing basis their application of the governance guidance and look on the internal control statement as an opportunity to communicate to their shareholders how they manage risk and internal control.
- Boards were required to confirm in the annual report that necessary action has been or is being taken to remedy any significant failings or weaknesses identified from their review of the effectiveness of the internal control system, and to include in the annual report such information as considered necessary to assist shareholders' understanding of the main features of the company's risk management processes and system of internal control (Turnbull report, 2010).

2.4.8. Davies report (2011)

In 2011, Lord Davies released a set of recommendations in the Davies report to increase representation of women on corporate boards. After consultation with the industry, the report did not recommend quotas for women on boards like in countries such as Norway where boards are required to have at least 40% of women. The recommendations are as follows:

- FTSE 350 companies should set out the percentage of women they aim to have on their boards in 2013 and 2015. FTSE 100 boards should aim for a minimum of 25% female representation by 2015.
- Quoted companies to disclose each year the proportion of women on the board, women in senior executive positions and female employees in the whole organisation.
- Recommend the UK corporate governance code to be amended to require listed companies to establish a policy regarding women on boards and to disclose this in the annual report.
- Disclosure of information on how appointments are made and how it addresses the issue of diversity in the annual report.
- Encourage firms to advertise NED's position on the board. Also, recommend the hiring agencies to follow best practice in processes used in selecting candidates for recommendation. Recommend candidates from within the firm as well as from the field of academics, entrepreneurs and senior women from other fields (Davies report, 2011).

The report emphasises that women on boards matter because diversity of views can improve the quality of decision making and therefore improve corporate performance.

2.4.9. The Code (2010)

In 2010, the FRC released a reviewed version of the Combined Code from 2005, henceforth known as the Code. This code is reviewed to give a complete understanding of the evolution of the governance codes even though these guidelines were published at the end of the sample period of this study which is between 2005 and 2010. This code sets out standards of good practice for UK listed companies on

board composition and development, remuneration, shareholder relations, accountability and audit, role of the institutional shareholder and governance of risk.

The Code retains the broad principles of the existing Combined Code, including the "comply or explain" approach. With the aim of helping company boards become more effective and more accountable, the FRC sought to make "limited but significant" changes to the Combined Code, rather than a wholesale redraft. The main changes to be brought in by the Code include the following:

- the introduction of four new principles, addressing the chairperson's responsibility for leading the board, the need for all directors to devote sufficient time to their role, the requirement on NEDs to provide constructive challenge, and the need for the board to have a balance of skills and experience.
- The annual re-election of all directors of FTSE 350 companies which is intended to increase accountability.
- Measures to promote the diversity of boards, in particular, in relation with the benefits of diversity on the grounds of gender, and
- New provisions and clarifications to existing provisions requiring FTSE 350 companies to have externally facilitated board effectiveness reviews at least every three years, and measures requiring more transparency around the company's business model and its approach to risk, including linking performance-related pay to the company's risk profile and long term performance (Code, 2010).

2.4.10. The Code (2012)

In September 2012, the FRC released a reviewed version of Code (2010). The main additions to the Combined code (2012) are as follows:

- Companies are encouraged to recognise the contribution made by other providers of capital, other than the shareholders, and to confirm the board's interest in listening to the views of such providers;
- Companies should set out the background for actions it is taking and provide a clear rationale for this action. Also, describe any mitigating actions taken to address any additional risk it faces;
- The board should confirm that the annual report and accounts provide fair and balanced information to the shareholder. The audit committee should provide advice to the board in this matter;
- Another duty of the audit committee is to report to the board on how it has discharged its responsibilities;
- The audit committee is encouraged to report the process by which they have assessed the effectiveness of the external audit, rather than state whether they believe the audit was effective.
- FTSE 350 companies should put the external audit contract out to tender at least every ten years with the aim of obtaining the best quality and most effective audit.
- Boards are expected to disclose the identity of executive search consultancies, board reviewers and remuneration consultants, and whether they have any other connection with the company.
- Companies are expected to disclose their policy on gender diversity, any measurable objectives that have been set for implementing the policy, and

progress on achieving the objectives. Also, the companies are to consider the balance of skills, experience, independence and knowledge of the company on the board, its diversity (including gender), how the board works together as a unit, and other factors relevant to its effectiveness as part of the board evaluation (Combined Code, 2012).

2.5. The essential features of UK corporate governance

The regulators in the UK have guidelines that companies can use in governance so that the monitoring ability of the board is enhanced. The main features are as follows:

- There is a unitary board where the board members are collectively responsible for directing and monitoring the company.
- There is a division of powers at the top of the company. The CEO is in charge of running the company and the chairperson (NED) is in charge of the board.
- The guidelines recommend a balance of NEDs and executive directors. At least 50% of the board members need to be independent NEDs.
- There should be formal and transparent procedures for appointing board directors and these appointments should be ratified by shareholders.
- The board and its committees should undergo a regular evaluation.
- A remuneration committee should have transparent methods to set the remuneration of the executives.
- Remuneration should be linked to performance.
- Transparent methods should be used for disclosing the assessment of the company's position (including accounts) by the use of audit committee chaired by a NED with adequate financial experience.

- There should be a close relationship between the board, shareholders and other providers of capital.
- Meetings to be held for shareholders to express opinions.
- Better representation of women on boards (FRC, 2006; FRC, 2011).

The 'comply or explain' policy allows firms to explain why they do not follow the recommended guidelines. Most of the FTSE firms (in the sample used in this study) follow the guideline with regards to the representation of NEDs. There are a number of firms in the study sample that do not follow the guidelines of having a Chairperson of the board who is non-executive and firms where there is duality of CEO-Chairperson position (e.g. Burren Energy, Bunzl PLC, Burberry group, among many others). Also the representation of women on boards of FTSE firms is poor (only 8% of board members, among 268 FTSE firms in the sample, are women).

The Financial Reporting Council (FRC) is given the responsibility to maintain the governance codes. If companies did not adhere to the code, then the Listing Rules of the London stock exchange requires the companies to publish a statement in the annual report on why they did not comply with the guidelines.

The objective of the guidelines on internal governance such as independence of board members, the time spent by the board members on a job, presence of risk committee, etc. is to make transparent to the shareholder the decision-making process of the board and increase their confidence in the governance process. The regulators use these codes to promote effective governance practices which they hope would lead to better performance of the companies. These guidelines as prescribed by the regulators and whether they improve firm performance, is not supported conclusively by empirical literature.

2.6. Summary

This chapter discussed the concept of corporate governance in the UK. The main theme in corporate governance is to protect the interest of the owners of the firm such that they can obtain maximum returns on their investment. Large corporations have diffused ownership and therefore, the board employs a management team to run the firm. The concern for the owners or shareholders of the firm is that the management team will benefit themselves with their money instead of investing it in the right strategy for growth of the firm. External mechanisms of control such as competition, takeovers, and regulation exist for controlling the management but there are problems with respect to whether these mechanisms actually achieve this. Internal mechanisms of control such as appointing more NEDS on the board, that can challenge management, are also used. Another popular internal control mechanism is firm equity; when management are compensated with firm equity, their goals for the firm align with those of the investors. Previous literature on boards has shown that board attributes such as board size, women on the board, powerful CEO, age, tenure, frequency of audit committee meetings and board meetings also influence firm performance.

This chapter also discussed the various regulatory codes that provide guidelines for best practice in governance and it also discussed how the guidelines have evolved over the years in the UK. From this discussion it is clear that the regulators in the UK view the board in the principal-agent perspective and that one of the roles of the board is seen as monitoring role with the task of overseeing the risks facing the firm.

The next chapter examines the role of the board from a legal, regulatory and academic perspective.

Chapter 3

Theories of the board

3.1. Introduction

Even though the term ‘Corporate Governance’ is fairly new and has been discussed only over the last twenty years or so, the theories that underlie corporate governance are fairly old and are drawn from various disciplines that include finance, economics, accounting, law, management and organisational behaviour (Mallin, 2013).

This chapter begins by providing a legal perspective of the board by discussing the purpose and legality of the board. Next, the role of the board from the regulatory perspective is discussed. This is followed by examining the composition of the board, particularly the role of the chairperson, CEO, non-executive members and sub-committees. Thereafter, the academic perspective of the role of the board is discussed by examining the theories of the board in the literature. The theories include agency theory, stewardship theory, resource dependence theory, class hegemony theory, managerial hegemony theory, transaction cost theory, and stakeholder theory. Agency theory is discussed in depth since this study uses it to formulate the conceptual framework. Also, the agency model of board attributes developed by Zahra and Pearce (1989) and how it relates to the systemic performance of the firm is discussed; based on this model the theoretical model for this study is developed. Finally, the behavioural theory of the firm is discussed which is used in conjunction with the agency theory to formulate the conceptual framework for this study.

3.2. The legality of the board

The head of corporate governance at the Institute of directors¹⁵, Roger Barker says that the UK corporate governance model ‘emphasises board engagement with shareholders and compliance with a voluntary code of best practice’ (Barker, 2008), which he believes is flexible and does not stifle wealth creation. Even though there is a voluntary code of best practice, there are a few legal necessities that boards have to fulfil.

The first directors of a firm are appointed when the firm is first registered, and subsequent appointments of directors are governed by the firm’s article of association. The articles specify the composition of the board as agreed by the shareholder (Companies Act, 2006).

In the UK, listed companies have a unitary board, and it is responsible to monitor the managers effectively and drive the enterprise forward. A board which functions well in steering the company in the right direction increases the confidence of the shareholder of its long term viability. In the UK and most other countries, boards are legal necessities in public limited companies. At least two directors are required on the board, but the functions of the directors are not defined (Parkinson 1993:56). The legal emphasis is on protecting and enhancing the interests of the shareholder.

The Companies Act (2006) highlights the link between responsible business behaviour and business success. The act has defined the statutory duties of the directors on the board which include the duty to exercise reasonable care, skill and

¹⁵ The Institute of directors was established in 1903 and incorporated in 1906, to support, represent and set standards for company directors.

diligence; duty to exercise independent judgment; duty to act within powers in accordance with the company constitution and the duty to avoid conflicts of interest.

The Companies Act (2006) explains these duties with the following points, that directors of firms need to heed,

- The board should encourage directors, particularly NEDs, to enquire into the conduct of the company's affairs.
- The board must ensure that directors should have a proper flow of information to enable them to comply with their statutory duties.
- The directors should act within their powers, in accordance with the company's constitution, and use those powers only for the purposes for which they were conferred.
- The board should be both collectively, and where appropriate individually, responsible for the conduct of employees and other staff.
- The directors should promote the success of the company for the benefit of its members.
- The directors should exercise reasonable care, skill and diligence.
- The directors should avoid conflicts of interest.
- The directors should not accept benefits from third parties.
- The directors should declare an interest in a proposed transaction or arrangement (Companies Act, 2006).

According to the Institute of Directors, one of the main statutory duties of the directors is the financial account reporting and the directors' report. It is the responsibility of the directors to ensure that the company maintains full and accurate accounting records. The directors are also personally liable for their acts and

omissions in directing the firm. In case that the company directors are found legally liable for wrongdoing, the Company Directors' Disqualification Act, 1986, can be used to disqualify a director of a company for a period of between two and fifteen years (Mallin, 2013). Also, the Insolvency Act, 1986, can be used where directors are made personally liable for the company's debts. Other acts which can be used legally against directors are the Health and Safety at Work Act 1974, and the Corporate Manslaughter and Corporate Homicide Act 2007, and the Bribery Act 2010 (Mallin, 2013).

3.3. Role of the board

One of the reasons why boards are present is that they are a product of regulation; the Companies Act (2006) requires the shareholders to appoint a board. Hermalin and Weisbach (2003) propose that boards can be seen as a market solution to solving agency problems in large firms. The board is seen as a mechanism that would monitor management on behalf of the shareholders, such that the management does not benefit itself, but works towards providing maximum returns to the investors (Cadbury, 1992). The corporate board also has the responsibility to monitor the firm's activities in the interest of all the firm's stakeholders including creditors, employees, society, as well as the stockholders (Mallin, 2013).

A commission that was set up by the New York Stock Exchange in September 2009 to examine the core principles of corporate governance and make recommendations for corporations to follow, said that 'a board's fundamental objective is to build long-term sustainable growth in shareholder value, so corporate policies that encourage high risk-taking for the sake of short-term increases in stock price are inconsistent with sound corporate governance' (NYSE, 2010). The board is looked upon as a

mechanism that curtails short term risk-taking but increases long term sustainable growth.

When a firm is facing problems, the corporate board usually becomes the centre of attention, and they are ultimately seen to be responsible for the firm. In 2008, problems arose from the near bankruptcy of British banks such as the Royal Bank of Scotland, when the government had to step in to capitalise the banks (effectively with tax payers' money) (Guardian, 2011). The chairperson and CEO of the bank were questioned by the treasury committee to determine the cause of the failure, the reason for the failure of the bank was seen as the weak governance by the board which approved the high risk acquisitions made by the chief executive Fred Goodwin (Guardian, 2011).

According to the Institute of directors in the UK, the primary responsibilities of the board of directors include, determining the company's strategic objectives and policies; monitoring progress towards achieving the objectives and policies; appointing senior management; and accounting for the company's activities to relevant parties, mainly shareholders.

According to the FRC, the role of the board includes,

- promoting the success of the company by directing and supervising the company's affairs;
- providing entrepreneurial leadership within prudent and effective controls where risk is assessed and managed;
- setting strategic aims and ensuring sufficient resources (financial and human) are available to meet objectives;
- reviewing management performance;

- setting corporate values and standards;
- Ensuring obligations to shareholders and others are met (FRC, 2006).

Stiles and Taylor (2002) mention that the board has a strategic, controlling and an institutional role. The board plays a *strategic role* in setting the direction for the company in line with organisation and shareholder goals by reviewing strategic proposals, assessing them and advising changes if required; using confidence building techniques by encouraging managers who perform well along the strategic aims of the board; selecting directors who are accomplished and can be looked up to (Stiles and Taylor, 2002). The strategic role includes making strategic decisions that firms use to grow, such as mergers and acquisitions, diversification, adopting new technologies or innovate by investing in research and development (Griffiths and Wall, 2007; Constantinos, 1997; Clemons, 1991; and Zhu and Weyant, 2003). Such decisions are inherently risk-bearing (Amihud and Lev, 1981).

The board also has a *controlling function* in monitoring of managers of the company in the interest of the shareholders (Berle and Means, 1932). The assumption is that the managers may act in their own self-interest. The control is exerted by the directors who have the powers of assessing senior managers, determining incentives and sanctions and setting performance goals.

In an *institutional role*, the board of directors have a statutory and fiduciary responsibility on behalf of the shareholders as well as the ability to anticipate and tackle external forces which may impact the organisation (Stiles and Taylor, 2002).

Some of the governance literature has found that the above mentioned responsibilities are not borne by directors. Mace (1971) in his descriptive study interviewed seventy five directors to find out the role of the board. His results show

that the board was a sounding board for the top management and CEO of the company and only occasionally gave their counsel when the issue that arose was in their area of expertise. Regarding the monitoring and disciplining role of the board Mace (1971) suggested that discipline stems largely from the CEO and other top management knowing 'that periodically they must appear before a board made up largely of their peers' (p.180). Lorsch and MacIver (1989) conducted a mixed method study of board of directors in the US and their role by collecting data using questionnaires and following it up with case studies of directors. They find in their study, that boards are passive and do not provide much discipline. This view was confirmed by a study by Demb and Neubauer (1992) whose survey found that only 23% of the directors said that their job included serving as a 'watchdog for the shareholders dividends'. Only 45% believed that the job included 'overseeing, monitoring top management, and CEO' and 26% thought that 'succession, hiring/firing CEO and top management' was part of their job. 70% of the directors surveyed agreed that setting the strategic direction was one of the main jobs besides setting and reviewing corporate policies and giving the company direction, mission and vision (Demb and Neubauer, 1992). However, MacAvoy and Millstein (1999) studied the board procedures and firm performance in US firms and find that boards are active and independent monitors. In addition, a recent study by Schwartz-Ziv and Weisbach (2012) examined the minutes of board meetings from eleven sample companies and found that most of the boards play a supervisory role where the board monitors the top management rather than having a managerial role where board members have a direct role in managing the firm. 66% of the issues discussed were supervisory in nature and the board disagreed with the CEO only 2.5% of all the

issues brought up for discussion. The results from these studies show that the boards play a small role in challenging managerial plans.

The role of the chief executive officer, the chairperson, non-executive directors and the subcommittees of the board are discussed next.

3.3.1. Chief Executive Officer

The chief executive officer (CEO) of a firm is the highest ranking executive and has the responsibility of running the company. The CEO is appointed by the board of directors and has to report to the board on the progress that the firm is making (Companies Act, 2006). The CEO most often has a position on the board and is one of the main members. He/she is the main point of communication between what is happening in the corporation and the board of directors. Along with the top management of the firm, the CEO strategizes on the goals and objectives of the firm and manages the overall operations, resources and financial matters of the firm (Mallin, 2013). The plans and strategies are presented at board meetings for approval from the board. Though CEOs delegate work to the management, they are ultimately responsible for all the decisions made. CEOs at the top of the firm can wield power over the board but since boards have the ability to remove CEOs there is a check on the power (Mallin, 2013).

3.3.2. Chairperson

This study uses the word chairperson of the board, as opposed to chairman of the board which is used by the Code (2012). The chairperson, elected by the directors, provides leadership to the board and as recommended by the regulators, the chairperson should be a NED (Code, 2012). The chairperson ensures the effectiveness of the board on all aspects of its role and sets the board's agenda. They

have to ensure that adequate time is available for discussion of all agenda items, in particular the strategic issues. The chairperson also promotes a culture of openness and debate by facilitating the effective contribution of NEDs in particular and ensuring constructive relations between executives and NEDs (Code, 2012). For directors to be effective, the chairperson is responsible for ensuring that the directors receive accurate, timely and clear information. The chairperson also ensures effective communication with shareholders and acts as a conciliatory element when board members have opposing views (Code, 2012). The chairperson of the board is also the chair at the shareholders meeting where he/she can cast the deciding vote if the members' vote is undecided. The chairperson is obliged to use this power appropriately and not to influence the outcome of the board meetings towards a specific agenda (Code, 2012).

The chairperson is the head of the board which has the authority to make decisions for the firm, whereas the role of the CEO is to carry out the authority that is delegated to them by the board. In some firms, the same person performs both roles and this duality of position can make the CEO powerful and can enable him/her to override the views of the non-executive directors (Adams, Almeida and Ferreira, 2005). The sample used in this study, between the years 2005-2010, found firms such as Homeserve PLC and Headlam PLC, among others, having Chairpersons who are executives of the firm. In addition, firms such as Carpetright PLC and Carnival PLC, among others, were found to have duality of CEO-Chairperson position.

3.3.3. Non-executive directors

The NED is nominated and the appointment is approved by majority of the board or by a vote by the shareholders. The legal duties of the NED are the same as those of an executive director (Mallin, 2013). NEDs are not employees of the firm but receive fees as payment and not salary for being a director and attending board meetings together with additional fees for each committee they serve on (Code, 2012). The Code (2012) does approve partial payment of NEDs in firm equity. This study finds that there are a few firms such as Burren Energy PLC and Robert Wiseman PLC among others that have NEDs with large equity holdings. NEDs are not usually subject to post-termination restrictions on their activities because they do not carry out a fulltime managerial role. Under the Companies Act (2006), the NEDs duty is such that they are expected to have and exercise their knowledge, skill and experience. The role of the NED is as follows,

- Strategic role – As an outsider (not from within the firm) the NED may have a wider view of the external factors that affect the firm than the executive directors. They can make informed contribution and constructively critique the plans and objectives presented by the CEO and executive directors (Code, 2012).
- Monitoring role – NEDs have the responsibility to monitor the performance of the management when the companies goals and objectives are not progressing as planned. NEDs are also responsible for remuneration of executive directors and have a main role in appointing or removing executive directors and are involved in succession planning (Code, 2012).
- Resources and communication – The board and firm can be more effective with the contacts that the NEDs have. The NEDs can help with the networks

that they have made previously which could potentially be useful for the firm (Code, 2012). Larcker, So and Wang (2013) explain that networks provide access to resources such as shared contracts, best management practices, and improved terms of contracts.

- Risk – NEDs should satisfy themselves on the integrity of financial information that the firm reports and that the financial controls and systems of risk management are robust (Code, 2012).

The NED brings independence, impartiality, wide experience, special knowledge, contacts and their personal qualities to the board. The Combined code (2003) recommends the NED to be independent, and an independent NED should not be the following:

- an employee of the firm or group within the last five years;
- had a material business relationship with the company either directly, or as a partner in the last three years;
- be a shareholder, director or senior employee of a body that has such a relationship with the company;
- have received or receives additional remuneration from the company apart from a director's fee, participates in the company's share option or a performance-related pay scheme, or is a member of the company's pension scheme;
- have close family ties with any of the company's advisers, directors or senior employees;
- hold cross-directorships or has significant links with other directors through involvement in other companies or bodies;
- represent a significant shareholder; or

- Have served on the board for more than nine years from the date of their first election (Code, 2012).

NEDs have a particular duty to monitor the performance of the board as a whole, and should report to the shareholders if unsatisfied with any matters after having made reasonable efforts to remedy any causes of dissatisfaction. In particular, the function of a NED is considered to be the exercise of independent judgement on the company's strategy, performance, resources, key appointments and standard of conduct; bringing objectivity and independence of view as a result of their experience and independence (Code, 2012).

The Combined code (2003) recommends at least half of the board excluding the chairperson to be made up of NEDs. It also recommends that a senior NED be elected so that NEDs can communicate their issues to them in the case that the chairperson and/or CEO fail to address their concerns. It also recommends that annual reports make transparent to the shareholder if NEDs are independent or not, though many firms do not comply with this recommendation. A majority of the firms in the sample used in this study (82%) comply with the guidelines to have at least 50% NEDs on the board.

3.3.4. Sub committees

According to best practice, listed companies are required to have boards that have at least three sub committees: the nominations committee which nominates new directors, the compensation committee which provides advice on directors pay and contracts, and the audit committee which oversees and monitors the financial accounting and the internal and external audit. The guidelines recommend that the committees be primarily or exclusively staffed by NEDs with the leading committee

member being an NED (Code, 2012). This recommendation is such that the NED can provide an independent opinion and be able to challenge the executives.

The board appoints the committees and is ultimately responsible for decisions made by the sub-committees. The sub-committees have to follow certain guidelines set by each firm known as the 'terms of reference', which guides the sub-committee, in terms of its composition, purpose, powers and how it should report to the board (Code, 2012). Sub-committees focus on a narrow area of expertise, and therefore, more time can be spent on it. The board is kept up to date with the proposals made in the sub-committee or of any decisions that were ratified (Code, 2012).

The nominations committee oversees the proposing, appointment or dismissing of board members. It reviews the composition of the board and when there is a need for a certain skill on the board, a suitable candidate who is best suited for the job is proposed and nominated. Firms also nominate new directors on the board to comply with regulatory guidelines to increase NEDs or increase the number of women on the board. Another important role of the committee is to have adequate succession planning for directors so as to have members to propose when directors retire (Code, 2012).

The remuneration committee makes decisions on the compensation of executive members of the board. The committee members are expected to have knowledge of the remuneration levels in the industry it operates. The remuneration should not be over-generous in the interest of the shareholder and at the same time be good enough to attract the best candidate for the job (Code, 2012).

The audit committee is appointed by the board and the guidance on audit committees is that it should consist of a minimum of three NEDs who work independent of the

executives and the audit committee should be chaired by a non-executive independent director (Code, 2012). The guidelines also recommend that the audit committee meets at least three times a year. The committee has the core functions of oversight, assessment and review of the firm's financial statements, the firm's internal financial controls, the effectiveness of the company's internal audit function in the context of the company's overall risk management system and the effectiveness of the external auditors (FRC, 2012).

According to the FRC (2012), the main roles of the audit committee can be summarized as follows:

- To monitor the integrity of the company's financial statements and announcements;
- To review internal financial controls and (unless there is a separate risk committee) risk management systems;
- To monitor and review the effectiveness of the company's internal audit function;
- To recommend the appointment or replacement of external auditors and to review the effectiveness of their work. The committee ensures the independence of the external auditors to maintain confidence in the financial statements of the firm;
- To develop and implement policy on the use of the auditors for non-audit services;
- To report to the board on how it has discharged its responsibilities (FRC (2012)).

If there is any disagreement between the external auditors and internal audit team, then the committee resolves this issue. It is recommended by the Combined Code (2003) that the committee be headed by an independent NED with expertise in accounting or finance.

This study focuses on the audit committee, since it is an important governance mechanism in the firm. Frequency of audit committee meetings is one of the board attributes examined in this study, since it is the reflection of the amount of time the audit committee directors spend on auditing duties and can be related to effective governance.

Many studies show that the role of internal auditing is changing to encompass risk management (Selim and McNamee, 1999; Spira and Page, 2003). Some firms have opted for a separate risk management committee whose role is to identify, measure, and manage the risks facing the firm and this function is viewed by shareholders as good governance. If some firms have a risk committee, then, some of the internal audit function in terms of risk management is handled by them. Less than 25% of the FTSE 350 firms in this study have a separate risk committee. The difference between the functions of risk and audit committees is that while audit involves oversight and reporting of internal control, accounting policies and compliance, and is essentially backward looking, the risk function is forward looking and in real time, of possible risks facing the firm, risk tolerance and risk appetite (FRC, 2011).

The way that the shareholder can assess the board and the performance of the company is through a system of disclosure. The firms have to, by company law, produce and make available to the shareholders before the annual general meeting independently audited financial statements. The firms have to report how they are

complying with the corporate governance guidelines in their annual report (Companies Act, 2006). At the annual general meeting, the shareholders have the right to dismiss the board, if they are unhappy about how the board is handling the company's performance.

In the following section, the theories of the board that have developed over the last twenty years are discussed. In different firms corporate governance may be applied differently depending on whether the focus that the firm applies is to the shareholder, or all stakeholders of the firm. The review of the literature on the theories of the boards gives an overall understanding of how the role of the board is viewed in the literature.

3.4. Theories of boards

In the previous sections the legal and regulatory perspective of the role of the board were discussed. The review of the theories of the board helped in providing an academic perspective on the role of the board. This review also helped in choosing the theory that relates closely to the underlying argument of this study.

The role of the board is guided by five distinct theoretical perspectives, according to Stiles and Taylor (2002). The theories include stewardship theory, resource dependence theory, class hegemony theory, managerial hegemony theory and agency theory. Mallin (2013) adds the transaction cost theory and stakeholder theory as other theoretical perspectives on corporate governance; also discussed in this section is the legalistic perspective of boards as discussed by Zahra and Pearce (1989).

Agency theory is discussed in detail since this theory forms the foundation of the arguments made in this study. This theory argues that one of the board's duties is to

monitor management on behalf of shareholders and this view is also held by both regulators and shareholders alike in the UK.

3.4.1. Agency theory

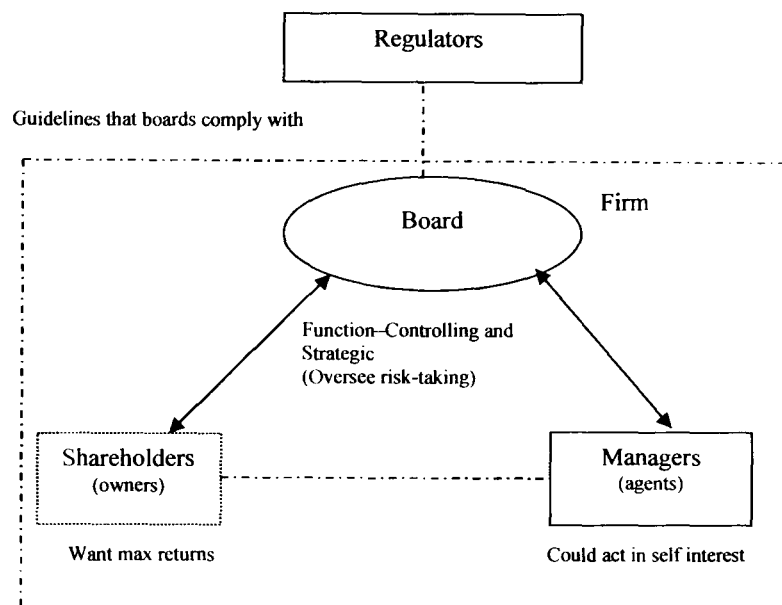
Agency theory has its roots in the field of economics and finance. Most of the literature on corporate governance has been based on agency theory (Dalton *et al.*, 1998). Agency theory revolves round the conflict between shareholders and managers of the firm.

The investing public is a major source of funds for new public firms or expanding operations of firms. As companies grow, their need for funds grows, with the consequence that legal ownership of companies has become widely dispersed. For example, in large corporations, shareholders may run into the hundreds of thousands in numbers or even more. Although, large blocks of shares may be held by wealthy individuals or institutions, the total amount of stock in these companies is so large that even a very wealthy person is not likely to own more than a small fraction of it (Stiles and Taylor, 2002).

The chief effect of this stock dispersion is to give effective control of the companies to their salaried managers. The key idea of agency theory is that the shareholders who are the owners or principals of the company hire the managers (agents) to perform the work (Eisenhardt, 1989, Clarke, 2004). Managers have autonomy and they have the discretion and authority to decide what products and services they will put on the market, where they will locate plants and offices, how they will deal with employees, and whether and in what directions they will expand operations (Stiles and Taylor, 2002).

Agency theorists see the board as the ultimate mechanism of corporate control to monitor the power held by salaried managers, on behalf of the owners (Eisenhardt, 1989). Figure 3.1 shows the traditional model for agency theory with the core of the firm being the shareholders and managers. Agency theory is concerned with resolving two problems that arise due to this relationship between the shareholder and the managers.

Figure 3.1 - Model for Agency theory



The first problem is that the shareholders' interest lies in better performance of the firm leading to better share price. The expectation in agency theory is that agents or managers will act in their own self-interest and not in the interest of the shareholders by excessive use of managerial perquisites (Jensen and Meckling, 1976) or pursuing strategies to increase the size of the company and hence their prestige (Kosnik, 1987). The strategies can take several forms including insufficient effort, unnecessary or extravagant investment (e.g. engagement in pet projects and build of empires to the detriment of shareholders), entrenchment strategies (e. g. investing in

lines of activities that makes managers indispensable and consistently resisting hostile takeovers) and self-dealing (e. g. increasing managerial private benefits through consuming perks) (Shleifer and Vishny, 1997 and Tirole, 2006).

It is difficult to monitor the behaviour of the employees constantly since it is expensive to implement this. These are known as agency costs and are a part of the owner and management relationship in a firm (Jensen and Meckling, 1976).

The second, and more relevant, problem is that of risk sharing, that comes about because the shareholder and the agent have different attitudes towards risk. The problem, according to agency theory, is that the agents and the shareholder may prefer different actions because they have different risk preferences (Eisenhardt, 1989). Shareholders of a firm are interested in maximum returns on their investment and therefore have a preference for high risk (Galai and Masulis, 1976; Jensen and Meckling, 1976). Whereas, executives prefer less risk due to the fact that the executive's wealth is made up of a portfolio of tangible and financial assets as well as human capital (skills, work experience), which is usually concentrated in the firm that the executive works (Galai and Masulis, 1976; Amihud and Lev, 1981). The manager's concentrated wealth and human capital is non-diversible unlike for other investors who can have a diversified portfolio. If the firm fails due to risky projects that were undertaken, then the executives stand to lose their jobs and their human capital investments. Therefore, risk-averse executives may reject risky but value increasing projects (Amihud and Lev, 1981).

Much of the literature that uses agency theory as a theoretical framework for their study has this common concern of agency costs and its resolution. According to Daily and Dalton (1993), the reason for this may be the fact that agency theory is

simple, where a firm is reduced to two participants: managers and shareholders, whose interests are clear. Another reason is that there is a notion, introduced by Adam Smith in 1776, that humans are self-interested and unwilling to sacrifice self-interests. It was Adam Smith who said, 'The directors of such companies, however, being the managers rather of other people's money than of their own, it cannot well be expected that they should watch over it with . . . anxious vigilance . . . negligence and profusion, therefore, must always prevail, more or less, in the management of the affairs of such companies' (Adam Smith, 1776). Most of the existing governance literature since Jensen and Meckling (1976), who relate agency costs to managerial behaviour, has followed this framework to base their study on (Dalton *et al.*, 1999; Hermalin and Weisbach, 2003).

Agency theorists also focus on the board's strategic contribution, specifically the board's involvement in and contribution to the articulation of the firm's mission, the development of the firm's strategy, and the setting of guidelines for implementation and effective control of the chosen strategy (Zahra and Pearce, 1989). The strategic choices that the board makes include critical choices such as acquiring a new firm, divesting a division, or negotiating a takeover bid (Baysinger & Butler, 1985; Kosnik, 1987). Agency theorists also assert that control is another important role performed by the board and this involves the ability of the board to hire and fire managers and their control on the manager's compensation. Agency theorists that have considered the influence of corporate governance design on managerial risk preferences include Saunders, Strock and Travlos (1990); Wright *et al.* (1996), Laeven and Levine (2009), and Pathan (2009).

As shown in Figure 3.1, the board of directors of the company have to liaise with both the shareholders and the managers in an attempt to reduce agency costs and

maximise shareholder interest (Fama and Jensen, 1983a) with appropriate level of risk-taking. They are able to control the managers by having the ability of hiring and firing them and also motivating them by the use of compensation (Jensen and Meckling, 1976). In this perspective, the board has a controlling as well as a strategic role (Zahra and Pearce, 1989).

The limitations of agency theory are addressed next.

- With agency theory the first assumption is that executives are driven by self-interests and will deviate from the shareholders' interest. Some studies, based on other contemporary theories, show that CEOs are also socially responsible and this could be in line with the shareholders' long-term interest (Goodrich, 1987).
- Another assumption is that the board in their controlling role of the management do a credible job. The strategic role of the board is also emphasized. Zahra and Pearce (1989) mention that board strategic contribution can be too infrequent to make a significant difference in company performance.
- The theory restricts risk-taking behaviour of agents either to risk aversion (preferring lower risk options at the expense of returns) to protect their jobs or neutrality (seeking options where risk is compensated), and therefore, tending to neglect the possibility of risk-seeking behaviour (Fiegenbaum, 1990; Wiseman & Bromiley, 1996).
- Normative and positivist agency theorists typically assume stable risk preferences in models explaining changes in organization wealth (e.g., Holmstrom, 1979). For example whatever the performance of the organisation the risk taken is the same. This premise contradicts behavioural decision theory (Kahneman & Tversky, 1979; March & Shapira, 1992; Bazerman, 1994) and strategic

management research (Fiegenbaum, 1990; Bromiley, 1991) and this limits agency theory's contribution to explaining managerial risk-taking.

- Many agency theorists such as Fama (1980) and Eisenhardt (1989) assume that the shareholders' risk preference is risk-seeking to attain maximum returns. Shapira (1994), on the other hand argues that shareholders seek steady growth for the firm leading to better share price with little or no volatility in the share price.
- Another aspect which agency theorists do not take account of is that the board of director's tasks go well beyond simply mitigating agency costs (Dalton *et al.*, 1998).

This study takes into consideration the drawbacks of agency theory with respect to how risk-taking of executives is viewed and therefore, uses the behavioural theory of the firm in conjunction with agency theory to formulate a framework for the study. The behavioural theory of the firm is discussed later in this chapter.

The following section provides a review of the other theories of the board in the literature. The review gave a complete understanding of how academics have previously viewed the role of the board in the past.

3.4.2. Other theories of the board

3.4.2.1. Stewardship theory

Stewardship theory has its roots in psychology and sociology. In this perspective, the stewards are company executives working for the shareholders who protect the firm and make profits for the shareholders. The expectation with this theory is that more executives on the board will lead to better decisions made, and therefore, a more stable company (Mallin, 2013). The theory suggests that the stewards i.e. the top management of a company, are satisfied and motivated when the firm succeeds. If

the stewards are empowered and have the autonomy to act, they will maximise returns for the shareholder (Donaldson and Davis, 1991). This implies that the risk preference of the executives is aligned to that of the shareholder who seeks maximum returns. This theory has an opposing stance to that of agency theory.

This theory supports the idea of duality of the roles of a CEO and chairperson of the board, since, according to stewardship theory, the manager with the dual role would further the interest of the shareholder (Donaldson and Davis, 1991). This theory also supports the idea that a high proportion of NEDs are not required to challenge executive decision making, since it assumes that the managers will not be self-serving and are motivated to act as stewards of the company for their own and the shareholders benefit (Donaldson and Davis, 1991).

The guidelines provided by the FRC (Code, 2012), such as, avoiding duality of the CEO-Chairperson position and having a Chairperson as a non-executive director, shows that the regulators have an agency perspective, in that the executives may act in their own self-interest; the regulatory perspective and agency perspective is the opposite of what stewardship theory proposes.

3.4.2.2. Resource dependency theory

Resource dependency theory comes from research in economics and sociology concerning distribution of power in firms (Zahra and Pearce, 1989). It focuses on the role that directors play in providing or securing essential resources to an organization through their links to the external environment (Pfeffer and Salancik, 1978). The provision of resources enhances organizational functioning of a firm and its chances for survival (Daily, Dalton and Rajagopalan, 2003). According to Hillman, Canella and Paetzold (2000), directors bring resources such as information, skills and access

to key constituents such as suppliers, buyers, public policy makers, social groups. Studies' using the resource dependence perspective, view the role of the board is to expand the boundaries of the firm by tapping into outside resources to improve firm performance. The net effect of increased coordination between organisations would reduce transaction costs and improve access to vital information and resources (Bazerman and Schoorman, 1983). The directors are seen to provide strategic input to the top management.

This theory supports the view that the internal structure of an organisation matches the environmental demands (Pfeffer, 1972). Therefore, the size and composition of the board depends on the conditions of the external environment (Pfeffer, 1972). This perspective believes in the open nature of organisations, transacting with environments in the form of mergers, joint ventures and interlocking directorates (director in more than one company). According to resource dependence theory, the directors help to link up competitors as well as other environmental constituents (Zahra and Pearce, 1989) and the role of the directors is to provide information to reduce environmental uncertainty and get resources for the company to use.

A variable often used in studies, based on resource dependence theory, is the number of interlocking directorships on the board (Jiraporn, Singh, and Lee, 2009). Other variables used in this approach are board composition (such as number of outside directors) and board characteristics such as (age and tenure) and how they may relate to changes in funding or firm performance (Dalton *et al.*, 1998).

This perspective links the role of the board to its environment and has a few limitations. First, it does not discuss processes followed by the board; and secondly, the theory does not provide a good test to relate the influence of the board to firm

risk or firm performance. The resource dependence theory is not used for this study, since this study examines the role of the board in context of the conflict between the shareholders and managers.

3.4.2.3. Class-hegemony theory

Class-hegemony theory was developed from research in sociology with origins in Marxism (Stiles and Taylor, 2002). According to this perspective, power is shared by an elite group which is the board of directors. This group usually shares among themselves similar views of reality (Stiles and Taylor, 2002). In this view, the board of directors look to perpetuate elitism and encourage interlocking directorships (the board of directors of one corporation also serves as a member of the board of directors of another corporation) (Bazerman and Schoorman, 1983). This view focuses on relationships between companies similar to resource dependence theory except that class-hegemony theorists believe that organisations are agents of individuals, families or social class instead of agents of organisations (Pfeffer, 1987).

The directors, according to this theory, are chosen for their social class and influence. They represent the capitalist elite (Zahra and Pearce, 1989) and they use their networks to favour their business and discourage competition (Bazerman and Schoorman, 1983). The studies that use class hegemony perspective view the role of the board as promoting the elite on the board. The view is that an elite set of ruling capitalists exclude other individuals to control social and economic institution and the wealth this brings (Ratcliff, 1980). The variables CEO ownership and CEO power (such as tenure) are used in studies that base their framework on class hegemony theory (Zahra and Pearce, 1989). In this perspective the CEO represents the elite and is all powerful. The power of the CEO will determine the board

involvement. The CEOs perspective is aligned with the shareholder (Pfeffer, 1987). The empirical evidence for this theory is limited.

The limitation of this perspective is that it is not clear how class hegemony can influence firm performance. Also, variables such as large ownership (institutional ownership) which can be powerful influence on the board are ignored (Zahra and Pearce, 1989).

3.4.2.4. Managerial-hegemony theory

Managerial-hegemony theory perceives the board of directors as a non-entity and believes the actual responsibility of the company lies with the managers of the company (Kosnick, 1987). This theory is derived from the work done by Berle and Means (1932), regarding separation of ownership and control in companies. They argued that as the company grows and increases share capital, the shares held by the institutional shareholders would reduce in value, reducing their power. This would transfer the power to the managers who could misuse it (Parkinson, 1993). Managers are in control of daily operation of the company and have a better knowledge of the business than the board of directors. In some companies managers pick the board members (Pfeffer, 1972). This has led to the belief that in some companies the boards work for the management and they do not challenge the management.

The managerial-hegemony perspective is that the board is dominated by the management and does not make any contribution in the decision-making process. It does not have any control on the performance of the chief executive of the company (Stiles and Taylor, 2002). On the other hand, this study argues that one of the important roles of the board is to monitor management and therefore this perspective is not used.

3.4.2.5. Transaction cost economics

Transaction cost economics is seen to be closely related to agency theory. This theory views the firm as a governance structure, while in agency theory the firm is viewed as a 'nexus of contracts' (Mallin, 2013). The choice of the most appropriate governance structure helps align the interests of management and shareholders.

Williamson (1975, 1984) based his work on Coase's (1937) work on the nature of the firm, which introduced the concept of transaction costs to explain the nature and limits of firms. Williamson (1996, p.5) explained that, "the study of governance is concerned with the identification, explication, and mitigation of all forms of contractual hazards". For Williamson (1996), firms and markets were alternative modes of governance and the allocation of activity between firms and markets are not taken as a given but as something to be derived. He proposed that governance regimes consisted of both formal and informal structures and rules. The corporate governance problem of transaction-cost economics is, therefore, not the protection of ownership rights of shareholders; rather it is the effective and efficient accomplishment of transactions by firms in their cultural and political environment (Williamson, 1996). Similar to agency theory, transaction costs economics makes the assumption that managers are opportunistic by nature. The theory assumes that individuals are opportunistic, some of the time, bounded by rationality and therefore, firms 'should organise transactions so as to economise on bounded rationality while simultaneously safeguarding the transactions in question against the hazards of opportunism' (Williamson, 1996, p.48). Bounded rationality refers to the fact that in decision-making due to limited information, resources, and time, a satisfactory solution to a problem is made instead of an optimal one.

The difference between agency theory and transaction cost economics is the unit of analysis. In agency theory the unit of analysis is the agent while in transaction cost economics it is the transaction. Instead of aligning the interest of the management to those of the shareholders with incentives it could be done by the right choice of transaction structure. For example, firms can get some of their production done at a lower cost externally therefore saving scarce resources. Both agency theory and transaction cost economics tackle the same problem of aligning the interest of shareholders and managers in profit maximisation and reducing self-interested behaviour of managers.

This study focuses on the role of the board and the conflict between shareholder and agent which involve agency costs and does not examine the transaction costs of the firm; therefore this perspective is not used.

3.4.2.6. Stakeholder theory

Stakeholder theory was initially proposed by Freeman in 1984. He proposed a general theory of the firm incorporating corporate accountability to a broad range of stakeholders other than shareholders including employees, providers of credit, customers, suppliers, government, and the local community. The board is looked upon as the governance structure that provides direct representation of the stakeholder groups (Freeman, 1984). In some European countries unlike the Anglo American model, the corporate governance structure includes by law a representative of a stakeholder group such as the employees to sit on the supervisory board (Mallin, 2013). According to this theory, the relationship between the stakeholders and managers is controlled by the board of directors (Freeman, 1984). The interests of all the stakeholders are different and balancing their needs is difficult. While agency theory focuses on the self-interested behaviour of managers, stakeholder theory

focuses on duty and social responsibility of managers; i.e. Managers should take the path of moral social responsibility in order to maximise shareholder wealth. This ethical behaviour would lead to maximising value for local communities, employees and other stakeholders of the firm as well (Quinn and Jones, 1995).

In this theory, there are no set objectives for managers in how to deal with the interest of the shareholders, and since these objectives are not defined or measureable, the manager's cannot be made accountable for their actions (Jensen, 2001). This study examines the role of the board in the context of controlling the self-interested behaviour of executives; therefore the stakeholder theory is not used.

3.4.2.7. Legalistic perspective

The legalistic approach refers to the fact that boards contribute to the performance of a firm by carrying out their legal duties. Their duty is to protect shareholder interest and not interfere in the day to day operations of the firm. The studies that use this perspective examine board ownership concentration to see if this aligns the interest of the board members to the shareholder interest. These directors will have a vested interest in the effectiveness and survival of the firm (Chaganti, Magajan and Sharma, 1985; Daft, 1989). Other studies using the legalistic approach argue that powerful CEOs do not want a strong board which will challenge their decisions (Williamson, 1964; Mace, 1971). Powerful CEOs may also assume dual roles of CEO and chairperson. With powerful CEOs the flow of information to the board from the management will be inadequate, and makes the CEO more powerful (Zahra and Pearce, 1989). The studies using the legalistic approach find that directors do not always abide by the legal duties they are mandated with (Williamson, 1964; Mace, 1971). The directors are failing to evaluate the firm goals and performance, not examining CEO performance thoroughly, and are not investigating the consequences

of mergers as proposed by the management (Loevinger, 1986; Fleischer, Hazard and Klipper, 1988).

This perspective has some drawbacks: first, it ignores the contribution of the board, in terms of strategic activity; secondly, it ignores the role of the board in the structure it has and processes it follows; thirdly, it assumes that the CEO by default will dominate the board (Zahra and Pearce, 1989).

In the theories of boards that were discussed above there are some common purposes. All theories start from the idea that firms that raise capital from investors should be accountable to them and boards provide the governance to protect the interest of the investor. From among the theories discussed, agency theory is chosen for this study since it supports the argument that one of the roles of the board is to monitor management as well as provide strategic advice. The agency theory view is widely held by shareholders, stakeholders (Zahra and Pearce, 1989) as well as by governance regulators as evidenced from the issued guidelines.

Other literature that influences this study is discussed next.

3.5. Other perspectives that influence the study

In the following section, Zahra and Pearce's (1989) model on board attributes, which is adapted for this study, is discussed. This is followed by a discussion of the behavioural theory of the firm proposed by Cyert and March (1963), which is used along with agency theory to form the conceptual framework for this study.

3.5.1. The agency model on board attributes

The agency model is based on agency theory which deals with the conflict of interest between owners of the firm and the managers. Zahra and Pearce (1989) developed

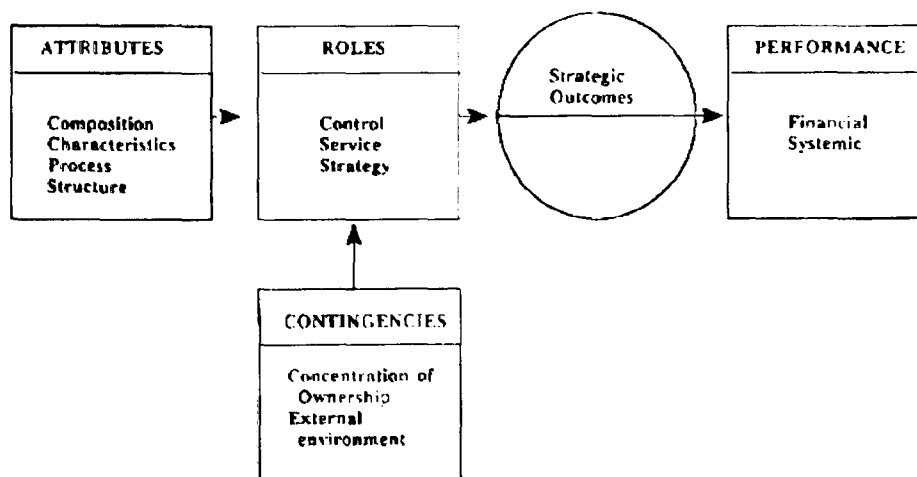
the agency model based on the existing literature they reviewed on board attributes.

They classified the board attributes as follows:

- 1) Board composition – variables such as board size, proportion of non-executive directors, gender diversity
- 2) Board leadership structure – variables such as duality of position of CEO-chairperson and number of board committees
- 3) Board characteristics – variables such as, board members age and tenure
- 4) Board process – variables used are board meeting attendance and frequency of audit committee meetings (Zahra and Pearce, 1989).

The model is presented in Figure 3.2 and it shows that the board attributes affect the strategic outcomes of the firm and hence the financial or systemic performance of the firm through the roles played by the board.

Figure 3.2 - An agency theory model that links board variables and company performance



The roles of the board include those of control, service and strategy. They report that the most important role performed by the directors, according to agency theorists, is that of internal control (Zahra and Pearce, 1989). The control function refers to the board's ability to reduce agency costs that may arise from non-compliant executives in their management of the firm (Mizruchi, 1983). According to Vancil (1987) and Naveen (2006), the control role of the directors involves assessing and monitoring management. The ability of the board to control management depends on its composition, structure, characteristics and processes that the board follows. The monitoring or control role of the board members is assessed by most empirical studies by finding the effect of the proportion of NEDs on the board (Hermalin and Weisbach, 1998; Boone *et al.*, 2007).

The service role of the board pertains to the vital links that outside directors bring from other industries as well as the knowledge and expertise that they bring. These resources can help the firm in achieving its goals (Pfeffer and Salancik, 1978). Vance (1983) explains that another service role of the board is to be effective in the meetings. Agency theorists have used frequency of board meeting attendance (Vafeas, 1999), and business of the directors (Ferris, Jagannathan, and Pritchard, 2003) to assess the service role of the directors. According to Zahra and Pearce (1989), effective processes will help the board to identify any issues that are of concern to the firm and plan for eventualities. By performing service and control roles the directors can shape the managerial strategic choices (Zahra and Pearce, 1989).

Agency theorists place a premium on a board's strategic contribution, specifically the board's involvement in and contribution to the articulation of the firm's mission, the development of the firm's strategy, and the setting of guidelines for implementation

and effective control of the chosen strategy (Zahra and Pearce, 1989). Important strategic choices that the board makes include mergers, takeovers, using new technology, and spending on innovation (Hitt, Hoskisson, and Ireland, 1990; Griffiths and Wall (2007). The strategic outcomes directly affect the performance of the firm (Zahra and Pearce, 1989).

Figure 3.2 shows that there are contingencies that influence how the board attributes affect firm performance. Concentration of equity ownership is one such internal contingency while the regulatory environment acts as an external contingency. The model discussed above forms the basis of the theoretical model discussed in Chapter 5.

The next section discusses the behavioural theory of the firm which is used in conjunction with agency theory to conceptualise the framework for this study.

3.5.2. Behavioural theory of the firm

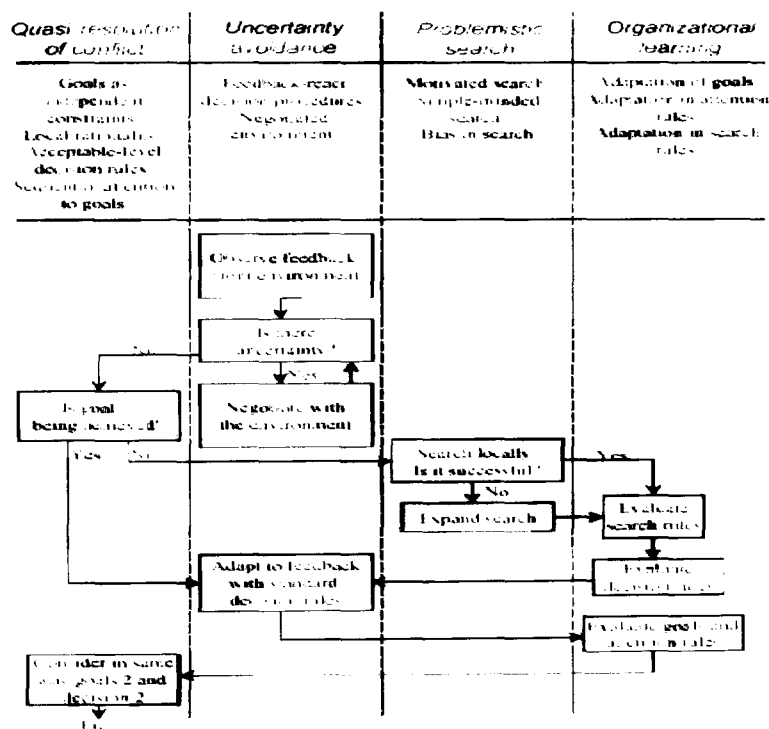
Cyert and March (1963) in their book on the behavioural theory of the firm revised concepts used by the economic theory of the firm¹⁶ to predict and explain the behaviour of firms in relation with economic decisions such as price, output, capital investment and internal resource allocation. They mention that there are four basic concepts that are fundamental to understanding decision-making process in a large organization. These concepts are shown in Figure 3.3 which describes the decision-making process of a firm in abstract form.

The concepts are the quasi resolution of conflict, uncertainty avoidance, problemistic search and organizational learning. The first basic concept is that in an organisation,

¹⁶ The economic theory of the firm was first put forward by Coase (1937) who defined the firm in relation to the market. The theory was developed based on internal and external transaction costs to the firm.

which is a coalition of many individuals, there are underlying conflicts of goals that need to be resolved. The second concept is that organizations avoid uncertainty by anticipating events and future reactions from the environment. The third concept, problemistic search, refers to the fact that organizations look for a strategy to solve a problem. The fourth concept refers to the belief that organizations are adaptive over time. They assume that organizations change their goals or revise procedures based on previous experience. The decision-making process starts from feedback from previous decisions that were made.

Figure 3.3 – Organisational decision process in abstract form



Source: Cyert and March, 1963

These concepts have since been used by other authors in organization theory. Using the concept of problemistic search where companies adapt to past experience, many studies have shown that performance below the aspiration levels affects outcomes

such as the overall strategy (Lant Milliken and Batra, 1992; Miller and Chen 1994; Audia, Locke and Smith, 2000) as well as specific actions such as market entry (Greve, 1998), investments (Greve 2003b), research and development (Bolton 1993), and inter-firm collaborations (Baum *et al.*, 2005). These studies have shown that risk-taking is goal oriented and the actions of decision makers depends on their aspiration level in relation with the previous performance of the firm or performance of peer firms. Lant, Milliken and Batra (1992) and Audia, Locke and Smith (2000) show that decision makers are ready to engage in risky behaviour and make risky decisions that have uncertain outcomes when their performance differs from their goal or aspiration level.

This study uses the proposition, made by the behavioural theory of the firm, that decision-making of managers may be aspirational and can depend on previous firm performance or peer industry performance. The behavioural theory of the firm is used in conjunction with the agency theory to formulate the theoretical framework for this study.

3.6. Summary

This chapter first examined the statutory duties of the board from the legal perspective and went on to discuss the role of the board from the regulatory perspective. The role of the main members of the board, particularly the chairperson, CEO and NEDs as well as the role of the sub-committees was discussed.

The role of the board from the academic perspective was next examined. The theories of the board have developed from various academic disciplines - from accounting and economics to law and psychology. Some of the main theories that have influenced the development of corporate governance, according to Mallin

(2013), are agency theory, stewardship theory, stakeholder theory and transaction cost economics. The most often used theory for research studies in corporate governance has been agency theory. This study also uses agency theory in the theoretical framework, since it argues that the boards of directors are responsible for monitoring the managers, who run the firm on behalf of the shareholders. Although, the other theories of the board explain the responsibility of the board within a different context, agency theory is closest fit for the hypotheses development for this study.

A systematic literature review of articles on corporate governance revealed that many studies in the literature recommend for future studies on boards to use multiple theories to get a broader and more complete perspective of the complex nature of corporate governance (Eisenhardt, 1989; Zahra and Pearce, 1989; Daily, Dalton and Rajagopalan, 2003). This study extends agency theory which proposes that executives are risk-averse, by using the behavioural theory of the firm that proposes that executives may be either risk-averse or risk-seeking depending on their aspiration.

The model for board attributes developed by Zahra and Pearce (1989), based on agency theory was also discussed; this model is used in the development of the theoretical framework for this study.

In the next chapter, the concept of risk and risk-taking are discussed.

Chapter 4

Risk and managerial risk-taking

4.1. Introduction

This study examines the influence of board attributes on managerial risk-taking and therefore, this chapter is devoted to understanding the meaning of risk, managerial risk-taking, and firm risk. The models on risk-taking in the literature are also discussed in this chapter.

Risk in ordinary terms has negative connotations, for example the Oxford English Dictionary defines risk as, 'Exposure to the possibility of loss, injury, or other adverse or unwelcome circumstance'. But, risk also has a positive side, the chance of getting back more than one invested in (Shapira, 1994). The most intelligent risks taken are those where the potential downside is limited, but the potential upside is virtually unlimited. Risk is inherent in making decisions involving new ventures, acquisition, diversification or mergers (Wright *et al.*, 1996). Successful managers are able to limit their exposure to the downside of risks they take. Risk management is a way for managers to make decisions based on risks that have been identified (Crouhy, Galai and Mark, 2006). But in spite of the risk management tools that decision makers have to control risks; there have been scandals in the management of risk in some high profile companies.

After the Enron scandal, regulation was tightened in the US, by passing the Sarbanes-Oxley Act¹⁷ in 2003, which covers areas of corporate governance and risk management. Some of the rules, in relation to the board, that were introduced as a result of this Act, included the following: the board must have a majority of independent directors; have a corporate governance committee that evaluated the board and management, and the duties of the compensation and audit committee were clearly defined.

In the UK, the Royal Bank of Scotland was brought to its knees in 2008 by multiple poor decisions and its £50bn “gamble” on buying Dutch bank ABN Amro (Guardian, 2011). The CEO of Royal Bank of Scotland, Fred Goodwin, aggressively expanded the bank over his eight-year tenure (Guardian, 2011). It is believed that there was inadequate research conducted on the takeover. Such scandals have put pressure on boards to carry out corporate governance and risk management responsibilities in a more effective manner. In the UK, the regulators tightened the risk management and corporate governance guidelines by revising the UK Corporate Governance Code (2010). It states that, ‘the board is responsible for determining the nature and extent of the significant risks it is willing to take in achieving its strategic objectives...(and) should maintain sound risk management and internal control systems’. In 2011, a report titled ‘Boards and Risk’¹⁸, published by the FRC (FRC, 2011), found that in the FTSE 350 firms, there was a change in the board’s focus on risk since the Turnbull report (2005). As recommended by the Turnbull report (2005), more boards

¹⁷ As a result of Sarbanes-Oxley Act, the oversight role of boards of directors was increased. Top management has to individually certify the accuracy of financial information of the firm. Also, it increased the independence of the outside auditors who review the accuracy of corporate financial statements, and the penalties for fraudulent financial activity are more severe.

¹⁸ This was a report produced after consultation with executive directors and NEDs of several large FTSE firms as well as investors and advisors on the issue of assessing, managing and reporting risk.

were identifying, assessing, managing and reporting risks facing the firm (FRC, 2011). The report on 'Boards and risk' (FRC, 2011) recommended that the Turnbull report (2005) was still fit for purpose.

The risk report as recommended by the Turnbull report (2005) is not being produced by many FTSE 350 firms and many of the reports (in the year 2010) are generic and the content could apply to risk management of any firm. Some exceptions were firms such as Arm Holdings and Fresnillo where the risk reporting is detailed, and firms such as Tullow Oil and BAE systems where the risk reporting is adequate¹⁹. Future studies could examine risk reporting by firms and their effect on firm performance.

The board of directors are seen by the regulators as the control mechanism that can oversee risk-taking in firms (Turnbull report, 2005). This study examines the topic of boards and risk-taking which is of interest amongst regulators, firms and investors since it can affect firm performance.

Risk-taking literature in relation with boards is very scant. Most of the research topics on corporate governance examine board attributes and how they may be associated with the performance of the firm using accounting based measures such as return on assets or market based criteria such as return on equity (Coles, Daniel and Naveen, 2006). Some studies evaluate the board in relation with systemic performance criteria such as the company's survival and growth (Daft, 1989) and bankruptcies (Chaganti, Mahajan, and Sharma, 1985 and Hambrick and D'Aveni, 1992).

¹⁹ The risk reports were examined between the years 2005 and 2010.

Only a few studies in corporate risk-taking literature relate board attributes to firm risk which is measured as the unpredictability of the firm's performance; they include topics of ownership structure (Wright *et al.*, 1996), board size and independence (Cheng, 2008; Pathan, 2009), and compensation (DeFusco, Johnson and Zorn, 1990; Rajgopal and Shevlin, 2002; Coles, Daniel, and Naveen, 2008; Low, 2009). The common firm risk measures used in these studies is the standard deviation of stock price which is known as total firm risk.

This chapter first discusses the concept of risk and managerial risk-taking; next, it discusses the two different approaches in the literature used to evaluate risk. The relationship between risk and return is also examined. Next, the types of risks that the board is responsible for, is discussed; this is followed by a brief discussion of risk management in firms. Lastly, the theories and models on risk-taking in the extant literature are examined.

4.2. What is risk?

Risk is the chance that an outcome of an action is different than expected. For an investment in a firm, the concept of risk includes the possibility of gaining returns or losing some or all of the original investment (Shapira, 1994).

In risk management, risk is defined as the chance of an unexpected loss (which was not budgeted for) occurring is known as risk (Crouhy, Galai and Mark, 2006). The firm sets aside funds for expected outlays but unexpected costs can eat into this fund. The risk lies in how variable the costs and revenues are for the firm (Crouhy, Galai and Mark, 2006). Risk can be defined as the volatility of returns; greater volatility would indicate higher risk (Crouhy, Galai and Mark, 2006).

In classic decision theory, risk is explained as follows: each action leads to a few known outcomes, each of which occurs with a specific probability, and a risky situation is one where the decision makers do not know which outcome will occur (Shapira, 1994). This uncertainty may lead the decision maker to make a wrong choice which could lead to a loss (Shapira, 1994). The firms' boards of directors often have to make strategic decisions regarding investments for which the risks can only be estimated. According to March (1994), the most conventional approach to predicting decision making, is to assume that a decision maker will choose the alternative that maximizes expected value; that is, the alternative that would produce the best outcome if a particular choice were to be made many times. For a decision maker, the risk involved in choosing a certain project (investment) is closely related to the expected returns. According to Shapira (1994), in managerial decision-making, risk is associated with above average return or below average returns. If managerial risk-taking is kept constant, there is a danger for the firm's long term future. Most managers tend to change the level of risk taken by their firm in relation with its performance (Shapira, 1994).

The directors of the firm make strategic decisions which are risk-bearing, and they are known in the risk literature as the *risk bearers*, which is to say that decision makers bear the risk of the choice they make. The decision makers may be risk-neutral, risk-seeking or risk-averse. *Risk seekers* make choices that involve a higher probability of loss but potential for higher gain, and at the evaluation stage, risk seekers tend to take information at face value (Mullen & Roth, 1991). Risk seekers typically tend to overestimate gains and underestimate losses (Mullen & Roth, 1991). A study by Mukherji, Desai and Wright (2008) explains that, when there is a substantial deviation from the expected performance for the firm and there is a

potentially greater loss or gain for the firm, then managers become risk-seeking. This has been explained in greater detail in section 4.4.4. On the other hand, people who are *risk-averse* typically overestimate losses and underestimate gains. March and Shapira (1992) have suggested that risk-averse managers are also expected to monitor closely the consequences of their decisions compared to risk seekers (Mullen & Roth, 1991). When managers focus on positive goal attainment, they become more aspiration-oriented (risk-seeking), otherwise their perceptions and behaviours may be more survival-oriented (risk-averse), focusing on losses when their resources are threatened by depletion (March and Shapira, 1992). Mukherji, Desai and Wright (2008) argue that when faced with the perception that losses or gains are limited, as when the actual performance of the firm has not deviated from the expected performance then, managers are likely to be risk-averse.

Managerial risk-taking relates to the proactive strategic choices or the type of investment decisions of the top decision-makers of a firm involving allocation of resources (Palmer and Wiseman, 1999). Strategic choices involve uncertainty, since they bring change in organisations. The manager's risk-taking behaviour, Wright *et al.* (1996) explain, has an impact on the firm's asset structure. An appetite for risk-taking will result in high variance in asset composition and hence high volatility of firm performance; whereas risk aversion will result in a low variance in asset structure or low volatility in firm performance (Wright *et al.*, 1996).

Previous studies argue that managers have all their wealth (human capital) invested in the firm, in terms of their job, salary, perquisites, pension and future cash flows, and to keep these secure, managers will be risk-averse (Jensen and Meckling, 1976; Amihud and Lev, 1981; Demsetz and Lehn, 1985). Also, in order to develop their

reputation for their future career prospects, managers will perform well in the present job and back projects that are not risky (Fama, 1980). Therefore, it can be argued that managers will be risk-averse in order to save their job and future prospects. Another factor that may induce the manager to be risk-averse is the threat of takeovers (Manne, 1965, Jensen, 1986); product competition from the market (Hart, 1983) and debt pressure (Jensen, 1986). This may make the managers opt for projects which are safe in order to keep their job.

On the other hand, shareholders are seen as risk-seeking in the literature. There is support for the idea that shareholder expectations is for maximum returns for the amount they have invested in the firm since they can spread their risk by diversifying their investments (Eisenhardt, 1989). Also, in a limited liability firm, investors and executives, benefit from the full upside benefit of their risk-taking, while limiting their downside exposure (Galai and Masulis, 1976). Due to these reasons, the shareholder is seen as risk-seeking. Taking a slightly different view, Shapira (1994) argues that shareholders look for growth in the firms that they invest in, and expect managers to take calculated risks with minimum stock price volatility.

Markowitz (1959) suggests that in choosing risky alternatives, managers consider both the variance and return of the probability distribution over the possible outcomes. If there are two choices with the same variance and different expected return, then the choice would be to decide on the one with the greater expected return. But if the two choices have the same expected return and different variance, then the choice would depend on the risk preference of the person making the decision.

The basic characteristic of risk is volatility and a change in the value of an asset creates a distribution that implies risk (Crouhy, Galai and Mark, 2006). Volatility in the share price of a firm reflects an uncertainty in the future price of the firm. The risk measures that are most commonly used in previous literature, where firm risk is the dependent variable, are total risk, leverage, idiosyncratic risk, systematic risk, assets return risk, insolvency risk (z-score), and earnings volatility (Boyd, De Nicoló and Al Jalal, 2005, Coles, Daniel and Naveen, 2006; Laeven and Levine, 2009; Pathan, 2009). The firm risk measures used for this study are discussed in Chapter 6.

In the following section, the different approaches regarding how decision-makers make a choice given a certain level of risk, is discussed.

4.3. Approaches towards risk

There is a *normative approach*, whereby there are rules for how decision makers should make choices under risk, and the *descriptive approach*, which looks at ways people make choices in certain situations and come up with models that explain the choices (Shapira, 1994).

4.3.1. Normative approach

Firms use the normative approach as used in economics, mathematics and statistics to calculate the risk involved in their investments (Shapira, 1994), which involves using the probability loss distribution of the investment. The probability that the firm performance will deviate from the expected performance is firm risk. This deviation in performance could be due to the state of the economy or due to certain projects or assets not performing as estimated. This firm risk is measured using the probability distribution of firm performance.

The normative approach assumes that the decision makers are rational and will base their decision making on the stochastic measures. Firms may use the normative approach to measure risk of their investments but decision-making is not based entirely on rationality since there is a human element in it.

There are two main rules for making a choice of risk, and they are – the expected value rule and the expected utility rule. The expected value rule takes into account the pay-out of the choice made and the probability of occurrence, whereas expected utility rule also takes into consideration how risk-averse people are.

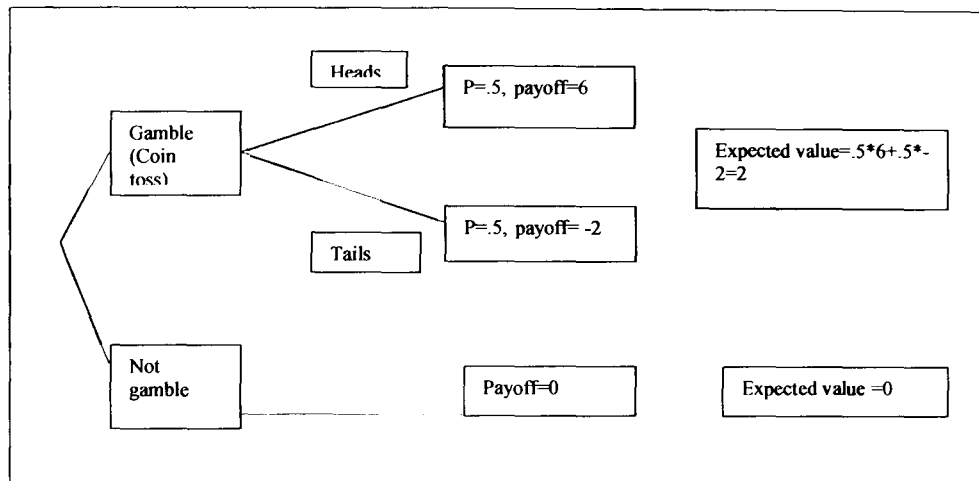
The expected value rule has been known from the 17th century and proposed by Blaise Pascal in the book *Pensees* in 1670 (Hájek, 2012)²⁰. The idea of this approach is that when faced with many options each of them can have different outcomes or pay-offs with differing probabilities. The method to choose the best option is to multiply the probability and the payoff and choose the one that has the highest expected value. For example, assume a decision has to be made of whether or not to gamble. The gamble is either to wager six pounds on getting heads in a coin toss, and losing two pounds if you get tails, or not gamble. The Figure 4.1 shows the options between which the decision has to be made and the expected value of each decision.

The probability of getting heads or tails is half (50%). The expected value of the option to gamble takes into account if heads or tails should fall. The expected value for the decision to gamble is higher in this case than not to gamble, therefore, decision to gamble is taken. The expected value rule does not take into consideration the risk preference of the decision maker and therefore, in 1738, the ‘Exposition of a

²⁰ Pascal used probability theory and decision theory for the first time in history when he wrote about how to decide on believing in God or not believing in God.

new theory on the measurement of risk' was published by Daniel Bernoulli, which proposed that the expected value theory was wrong (Sommer, 1954).

Figure 4.1 - Illustration of expected value of deciding on choosing to gamble



The expected utility theory took into consideration the preference of people in their choice of projects with different outcomes. The risk preferences are being risk-neutral, risk-averse or risk-seeking, as explained in the previous section. The difference from the expected value theory is that the payoffs are subjective and are called utilities.

An example of expected utility theory is a similar example as before of making a decision to gamble or not. Except that, if there is a direct certain payoff of £1 when the option of not to gamble is chosen, most people choose the certain payoff option of not to gamble and take the £1, even though the expected value of the gamble option is more. The option people choose depends on their risk-preference.

4.3.2. Descriptive approach

Descriptive approaches have been developed to simplify and explain decision-making situations (Shapira, 1994). These approaches are based in the fields of psychology and sociology and they look at how people make choices under situations of uncertainty. Descriptive approaches do not prescribe how decisions should be made but explain how they are made.

One of the earliest works, on a descriptive approach to decision-making on risky choices, was by Simon (1947). Many decisions require too much data to be acquired to make a rational choice. The satisficing principle was proposed by Simon in 1955. He explained that decision makers make choices by choosing from a subset of alternatives. They simplify the process of decision making by searching through a limited set of alternatives until they find a good enough alternative. They do not choose the optimal solution but a satisfactory one.

The most well-known descriptive decision-making approach is the Prospect theory developed by Kahneman and Tversky (1979). Prospect theory proposes that people overweigh outcomes that are considered certain, relative to outcomes which are merely probable and they called this the certainty effect. They establish that individuals had a risk aversion in the positive domain of gains and this accompanied risk-seeking preference in the negative domain of losses. This they called the reflection effect. The major finding in their experiments was that changes in the wealth (gains or losses) were more valuable than final asset positions including current wealth to the individual. Prospect theory helped to clarify the behaviour of people in how they make choices which are risk bearing.

Shapira (1994) conducted a study of 700 managers on the topic of risk-taking and he reports that in most firms, managers use the descriptive approach in decision-making using their risk preferences, rather than using the normative approach of evaluating probabilities and pay-offs. He proposes that in a dynamic process of decision-making, when each of these events is unique, decision making using statistics is not seen as important. Another important result from his study shows that the choice also depends on the size of the pay-off.

Recently, a third approach to understanding risk has emerged which combines the quantitative normative approach and the qualitative descriptive approach and is known as the Prescriptive approach (CDMRA, 2012). This approach tries to bring together the logical reasoning and the gut feel of the two approaches. This approach attempts to provide tangible solutions to decision makers using both approaches. Research in this field is on-going.

This study uses the descriptive approach to formulate the theoretical framework using findings from studies in group dynamics, decision making and strategic management and a normative approach to measure risk when testing the derived empirical model.

The relationship between risk and return is examined in the next section. The review of the literature shows how the relation between risk and return in decision making has evolved.

4.4. Relationship between risk and return in decision making

Since this study examines how board attributes relate to firm risk, it is essential to understand how firm risk and firm performance (returns) are related. Therefore the

following section examines the literature that examines risk-return relationship in decision making.

According to portfolio theory in finance, risk and return are positively correlated (Sharpe, 1964). Low risk is associated with low return and high risk is associated with high return. It is assumed that if a firm wants to achieve a high rate of return on average, the firm often would assume more risk (Crouhy, Galai and Mark, 2006). In financial markets it is clear that riskier bonds yield a higher rate of return, but the relationship between risk and return is not as transparent in most commercial ventures or projects. Firms take risks when faced with opportunities to grow, but high risk-taking (high volatility of stock price) also increases the probability of firm insolvency. The evolution of the risk-return relationship is discussed in the following subsections.

4.4.1. Positive relationship

Agency theory is based on assumptions of rational behaviour and economic utilitarianism, and it assumes that there is a linear positive relation between risk and return (Ross, 1973). Since risk behaviour is associated with assumptions of rational behaviour, outcome weighing and utility maximization, financial theorists such as Fisher & Hall (1969) and Schoemaker (1982) explain that risk-averse behaviour is manifest when low risk is associated with low return and high risk is associated with high return.

4.4.2. Negative relationship

Bowman (1980, 82, 84) examined risk return connections and found a paradox; using the capital markets analogy he predicted that risky projects and investments would need to offer higher earnings than other projects to be attractive, and by extension

this would mean that variable income flow will result in a higher income on average. He found instead a negative association between variance of returns and level of returns in certain industries. Bowman (1984) suggests that low performance leads to more risk-taking, but risk-taking does not influence future performance. Fiegenbaum and Thomas (1986) confirm the pattern found by Bowman (1982).

4.4.3. Curvilinear association

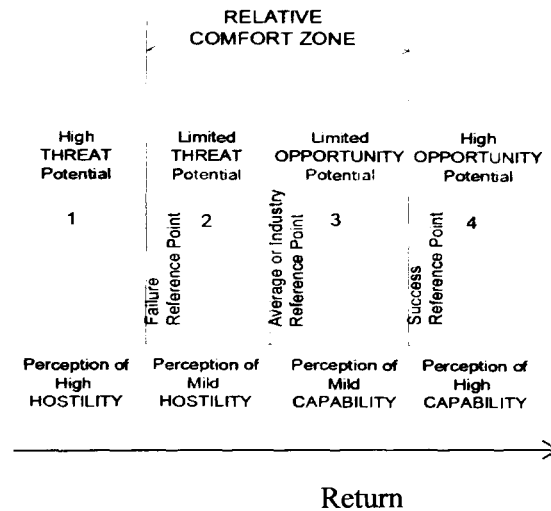
A curvilinear relationship between risk and return is predicted by Prospect theory (Kahneman and Taversky, 1979) which states that managers can be both risk-seeking and risk-averse. Managers tend to change the level of risk taken in relation with the performance of the firm. Managers whose firms returns are below average tend to take greater risks to attain average returns for the firm, whereas managers whose firms returns are above average tend to take less risk to keep the high returns (Kahneman and Taversky, 1979). Fiegenbaum and Thomas's (1986) study of US firms supported this theory.

4.4.4. Polynomial model

The different relationships between risk and return that resulted from previous studies were explained in a single model by Mukherji, Desai and Wright (2008). They developed the model shown in Figure 4.2 to explain when firms took more risky decisions or less risky decisions, and how it related with the returns of the firm.

They explain that when firms are at performance levels which are in line with the industry average (Zone 2 and Zone 3) then they are in a 'relative comfort zone'. In this state when the degree of threat or opportunity is limited and the perception of gains and losses are limited, the managers are risk-averse. Managers would prefer to stay in this comfort zone and would make decisions accordingly.

Figure 4.2 - Managerial Perceptions at different reference points



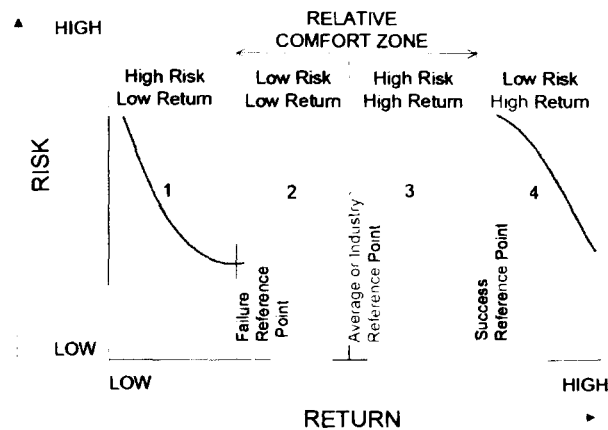
Source: Mukherji, Desai and Wright, 2008

If the firm performance was some way below the industry average (Zone 1), when managers are faced with the state of the firm where no recovery is possible, then managers may take drastic actions to bring the firm out of this state. In other words, they will make more risky decisions to bring the firm performance into the comfort zone. If the firm performance was some way above the industry average (Zone 4), then the managers have the perception of high capability and take the opportunity to invest in research and development, or open up to new markets, or introduce new products into the market, in other words, take more risk.

Mukherji, Desai and Wright (2008) use the Figure 4.3 to explain the risk return relationship for firms. There is risk-averse behaviour evident in the relative comfort zone when performance is close to the industry average. Firms in Zone 2 and 3 increase risk cautiously and there is corresponding increase in returns. In Zone 1 and 4 when the expected return has deviated from the average industry value (high risk), risk and return are not proportionate.

Firms performing below industry average (Zone 1) would want to increase the risk levels and move towards the industry average performance. In doing so managers have risk-seeking behaviour, for example, they could sell some assets of the firm to raise cash to pay debtors (Mukherji, Desai and Wright, 2008).

Figure 4.3 – A polynomial risk return relationship model



Source: Mukherji, Desai and Wright, 2008

Firms having above average performance (zone 4) have more than enough resources and have nothing to lose by making risky decisions. In this situation, managers face low risk but high returns and they can continue to be risk-seeking (Mukherji, Desai and Wright, 2008).

This model shows that there can be positive relationship and negative relationship between risk and return, depending on the situation the firm finds itself in. The important information that is taken from this model, for this study, is that when the firm has returns close to the average reference point or industry reference point then the decisions are risk-averse, and when the returns are far from the industry average then the decisions made are risk-seeking. It also informs the study regarding managers being risk-seeking when previous performance of the firm is poor.

In the next section, the different types of risk involved in firms, that board of directors have to oversee, are examined to have a complete understanding of risk in relation with firms.

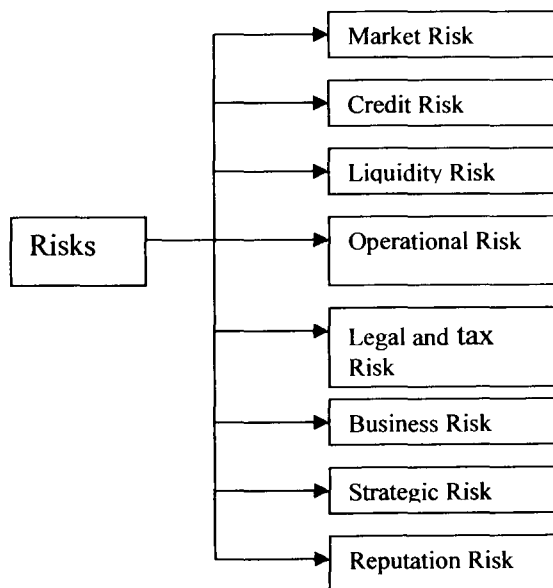
4.5. Risk factors

Recently, during a review of the Turnbull report (2005), directors who were interviewed made a clear distinction between risks such as operational risks and strategic risks (FRC, 2011). The board has the responsibility of identifying strategic risks that may result from geo-political change or regulatory change and these risks are categorised as *top-down risks*. While, certain risks such as operational risk are categorised as *bottom-up risks*, which are the responsibility of the management to identify and bring to the notice of the board (Shapira, 1994). But, both these categories of risk have to be managed by the board of directors (Turnbull, 2005). Bottom up risks that are identified by management are operational risk, market risk, liquidity risk and credit risk. The top down risks that are identified by the board are legal and regulatory risk, business risk, strategic risk and reputation risk. The board is expected to manage all the risks facing the firm. The typology of various risk factors is shown in Figure 4.4.

Market risk is due to the adverse movement of market prices, most common being, risk of changes in the price of shares and bonds during the period when they have to be liquidated. The potential worst-case loss is high when the period gets longer; this is because market volatility tends to increase over the longer period. It is possible to hedge against future changes in value to mitigate market risk (Crouhy, Galai and Mark, 2006).

Credit risk is the risk of losing the principal due to a borrower's inability or failure to repay a loan or otherwise meet a contractual obligation (Crouhy, Galai and Mark, 2006). Credit risk arises whenever a borrower is expecting to use future cash flows to pay a current debt. If the perceived credit risk is high, then the rate of interest that the investors will demand for lending their capital will be high. Credit risks are calculated based on the borrowers' overall ability to repay. This calculation includes the borrowers' collateral assets, revenue-generating ability and taxing authority (for government and municipal bonds) (Crouhy, Galai and Mark, 2006).

Fig. 4.4 – Typology of Risks



Source: Crouhy, Galai and Mark, (2006)

Liquidity risk is the risk of facing an unexpected shortage of cash (Crouhy, Galai and Mark, 2006). Usually the cost of funding depends on the credit rating of the institution since most investors follow the minimum rating guidelines for investing or lending. To mitigate liquidity risk firms hold assets as an alternate source of funds

other than the market. The size of these liquidity buffers (usually held in short term bonds) should be related to cash flows and liquidity commitments of the firm (Crouhy, Galai and Mark, 2006).

Legal and tax risk can occur when the counterparty lacks the legal authority to engage in a risky transaction. There is also a potential of this risk to occur if tax laws change in the country where the firm operates (Crouhy, Galai and Mark, 2006).

Business risk can occur when there is uncertainty regarding demand for the product, cost of raw materials, and cost of production (Crouhy, Galai and Mark, 2006).

Strategic risk is the risk of making significant investments when there is high uncertainty about its success or profitability (Crouhy, Galai and Mark, 2006). Nokia is an example, where they invested millions of dollars in research to develop software for a smart phone which was like a mini computer, but it proved to be bulky and expensive. The demand for these phones was low, resulting in poor sales. Nokia's market share dropped, giving Samsung and Motorola the chance to fill the gap in the market.

Reputation risk is the type of risk which is related to the trustworthiness of business (Crouhy, Galai and Mark, 2006). Damage to a firm's reputation can result in lost revenue or destruction of shareholder value and can lead to bankruptcy as in the case of Arthur Anderson which was a large accounting consultancy guilty of criminal charges relating to fraud committed in auditing Enron's accounting (BBC, 2002).

Besides, other risks associated with environmental claims, insurance, financial instruments and complex transactions have also to be considered. The main risks are continually assessed by firms using **enterprise risk management** systems which

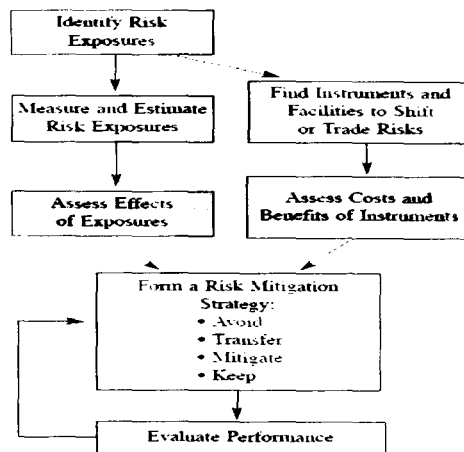
identify risks, measure the risks and manage the risks for the various departments of the firm. Risk management includes setting aside capital for potential losses. The board members are supposed to know the major risks involved in the firm's business in order to make the right decisions in safeguarding shareholder interests. Boards are updated of the risks involved in the firm's business by the Chief Risk Officer. The next section, discusses the process of risk management and its importance.

4.6. Importance of risk management

The financial crisis of 2007-2008 has shown the need for risk management not only in banks but also corporations. The Turnbull report (2005) is an initiative by the regulators to ensure that corporate boards are responsible for the risks that they take to achieve strategic objectives. The report also recommends that large firms should make the process of risk management transparent to the shareholders by reporting in the annual report of the risks facing the firm, how they are measuring these risks and how they will be managing them. In the following Figure 4.5 a generic model of the process of risk management is shown. Firms first identify risks facing the firm, measure the risk and then decide if the risk can be avoided, can be transferred, mitigated or keep the risk. Lastly, the performance of the decision made has to be continuously evaluated.

Crouhy, Galai and Mark, (2006) explain that risk management is not about continuous corporate risk reduction but about how firms select the type of risk and the level of risk that is appropriate to them. They explain that risk management and risk-taking are the 'two sides of the same coin'. Successful companies take risk in relation to the reward and manage the risk.

Figure 4.5 – Process of Risk Management



Source: Crouhy, Galai and Mark, (2006)

In September 2011, there was a review of the role that boards play in relation with risk. The review (FRC, 2011) found that boards of the large FTSE firms recognised that,

- Risk identification and oversight of risk management was part of their role. Taking risk is essential to entrepreneurial activity but firms need to be aware of excessive risk-taking.
- The boards need to focus on avoiding those risks that would undermine the strategy of the firm and jeopardize the long term viability of the firm or damage its reputation.
- New approaches were being used to make decisions (identifying risks in scales of probability) and make sure of keeping track of changes in risk exposure.
- Boards should assess gross risk (combination of various risks) instead of net risk.

- the board should decide its appetite or tolerance for individual risks (by articulating what type of risks are acceptable or unacceptable) and be aware of the changes to the exposure of this risk in relation with the operating environment and the firm's strategy. They recognized that the risk tolerance and risk exposure would always be changing depending on the firm strategy and the firm's operating environment.
- Senior executives carry the responsibility of reporting the risks to the board.
- Transparency and accountability in the firm was important and so were the functions of the audit committee and risk management.
- There should be in depth reporting of risks facing the firm and the changes on the exposure to risk.
- Crisis management planning was important (FRC, 2011).

The review discussed risk management with 40 listed firms in the FTSE and agreed that the day to day oversight of individual risks was the responsibility of the management and the board was to be updated regarding key risks facing the organisation.

The next section discusses the theories and models related to risk and risk-taking in the existing literature.

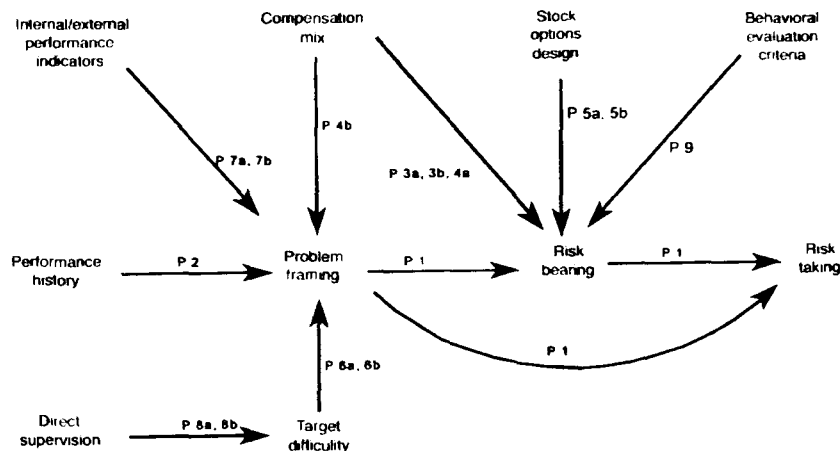
4.7. Theories and models relating to risk-taking

A review of the literature on risk-taking reveals two models namely the behavioural agency model for managerial risk-taking, and the holistic model of risk. The models are examined in relation to the theories they are based on, the variables that influence managerial risk-taking, and the estimation methods used in the development of the models.

4.7.1. Behavioural agency model for managerial risk-taking

Wiseman and Gomez (1998) proposed a behavioural agency model for managerial risk-taking where they combined agency theory with prospect theory. Agency theorists propose that managers are consistently risk-averse or risk-neutral (Eisenhardt, 1989), this is due to the fact that backing risky projects (investments) may jeopardise their job. Using Prospect theory enabled them to relax the assumption that agents hold consistent risk preferences and utilized a contingency based view from behavioural research on risk-taking to allow for the possibility of varied risk preferences by the agent in a corporate governance context. Their model suggests agents may exhibit risk-seeking as well as risk-averse behaviours. Their propositions enhance and extend the agency-based corporate governance literature on managerial risk-taking. The model they proposed is shown in Figure 4.6.

Figure 4.6 – Behavioural agency model of managerial risk-taking



Source: Wiseman and Gomez (1998)

According to prospect theory, prior performance influences choice behaviour and this determines the risk taken by the manager. Unlike traditional agency models where risk preferences are set, in the behavioural model the risk taken can change

depending on how the problem is framed. Problem framing can be influenced by the difficulty of the task, compensation, performance of peer industry besides previous performance (Tversky & Kahneman, 1986; Wiseman and Gomez, 1998). The managers are the risk bearers and their risk preference is influenced by the problem situation, design of compensation and how they are evaluated by the performance reports. The decisions made by the managers can be risky or not based on the factors discussed and how they view the problem (Wiseman and Gomez, 1998).

The behavioural agency model for managerial risk-taking has been used by Larrazza-Kintana, *et al.* (2007) to empirically study the relation between compensation and risk-taking and their results support the behavioural agency model predictions.

The behavioural agency model for managerial risk-taking does not take into consideration all the other board attributes which may be affecting risk-taking, therefore this model is not chosen for this study. This theory provides evidence that amongst other factors, risk-taking depends on the performance history of the firm, and that managers can be risk-seeking or risk-averse depending on frames of reference.

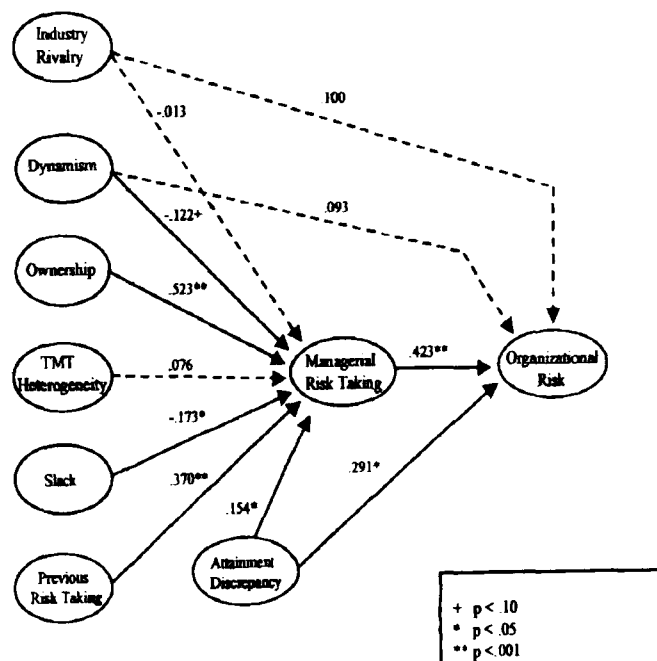
4.7.2. Holistic model of risk

The holistic model of risk was developed by Palmer and Wiseman (1999) and provided evidence that the attributes of the management team and the performance of peer industry (and other variables) significantly influence managerial risk-taking. In turn, managerial risk-taking is found to be significantly and positively related to firm risk.

The holistic model of risk is based on previous studies by Bromiley (1991) and Wiseman and Bromiley (1996). Bromiley (1991) used the behavioural theory of the

firm to develop a model to find how previous risk, performance, performance expectations, aspirations, slack (resources in an organisation that are not fully or adequately utilised), and industry performance, influenced risk-taking and how risk-taking and other factors affect future firm performance. He found that previous poor performance of the firm increased risk-taking, and further, high risk-taking seemed to result in future poor performance. Wiseman and Bromiley (1996) used a similar model on low performing firms to find the risk affecting factors. Their model included six variables: performance, slack, aspirations, expectations, risk, and organization size, which they related to risk-taking. They found that poor performance and potential slack (measured as debt/equity ratio) were positively and significantly associated with risk-taking.

Figure 4.7 – Structural model showing factors affecting managerial risk-taking and organisational risk.



Source: Palmer and Wiseman (1999)

Using Bromiley's (1996) model as a starting point, Palmer and Wiseman (1999) develop a holistic model of risk by combining agency theory, upper echelons theory and the behavioural theory of the firm, to propose a model which includes environmental factors and organisational factors. The organisational factors include share ownership, heterogeneity of the top management team (TMT) and slack. The environmental factors include industry rivalry (complexity of the industry) and dynamism (changes in the industry). They use factor analysis methodology to analyse their data and their results show that the complexity of business contexts including organisational and environmental factors as well as managerial risk-taking affect firm risk.

Figure 4.7 shows that previous risk-taking and ownership of equity has significant influence on managerial risk-taking. It also finds that managerial risk-taking is positively and significantly related to organisational risk.

The holistic model of risk provides a useful finding that managerial risk-taking is significantly related to firm risk; as this study uses firm risk as a proxy for managerial risk-taking. Even though this model relates some board attributes to managerial risk-taking, it is not used for this study since the current study examines a variety of board attributes.

4.8. Summary

The objective of the shareholders of a firm, and therefore the board, is for stable growth of the firm. High volatility in the performance of a firm (high firm risk) is not favoured by the shareholder due to the fact that it increases the probability of bankruptcy (Shapira, 1994). This study aims to find how board attributes relate to managerial risk-taking in a sample of FTSE 350 companies in the UK.

This chapter focused on clarifying the definition of risk and managerial risk-taking. It also discussed the relationship between risk and return, types of risk faced by firms and risk management. Theories related to risk-taking were also discussed.

The theoretical framework is discussed in the next chapter. The chapter reviews the literature on board attributes and how they relate to managerial risk-taking, based on which hypotheses are developed.

Chapter 5

Literature review and development of hypotheses

5.1. Introduction

This chapter discusses the theoretical framework which makes logical sense of the relationships between the various board attributes that have been identified for this study and firm risk. A conceptual framework is formulated based on the theories and models discussed in the previous chapters. Existing literature that relates board characteristics to managerial risk-taking are reviewed and this helped to find the gaps in the literature. Based on both, the theories on boards and findings from existing studies on boards, the hypotheses are developed.

The most important internal governance control mechanism which drives firm performance is recognised to be the board of directors (Lipton and Lorsch, 1993). They have the responsibility of monitoring the management on behalf of the shareholders such that the managers do not misuse the shareholders' capital. They also have the information and power to provide oversight of the management's performance. An effective board is one that is well informed, provides good advice and is able to make sound investment decisions (Code, 2012). The strategic direction that a firm takes depends on the decisions made at board level which in turn depends on the group dynamics within the board, the power struggle among board members, the presence of independent views, expertise and experience of board members as well as the processes the board follows. This study argues that such attributes of the board are associated with firm risk.

The Combined code (2003) requires at least 50% of the board to be made up of independent directors with the expectation that it will improve the monitoring ability of the board. The Davies report (2011) recommends top UK firms to increase the number of women on boards, which will enable boards to have a diversity of opinions, making them more effective. It is not clear if these regulatory guidelines will improve the effectiveness of the board. This study provides empirical evidence as to how the presence of women on the board influences firm risk.

The FRC is encouraging boards to recognise risks facing the firm and wants corporate boards to be transparent on these risks, by reporting it in the annual report (Turnbull report, 2005). The results of this study will help investors to recognise how certain board attributes associate with firm risk.

This study is grounded in agency theory and uses concepts from the behavioural theory of the firm, strategic management and social psychology to conceptualise the theoretical framework. The study has adapted the integrated model of board attributes which was formulated by Zahra and Pearce (1989) as the theoretical model, which classifies the board attributes into four broad categories, namely board composition, board leadership structure, board characteristics and board process. The hypotheses are developed for individual variables within each of these categories and the combination of variables that form the category and how they associate with firm risk (volatility in firm performance). The premise of this study is based on the concept that high equity volatility is not desirable for any firm, since previous studies show that asset prices fall when there is an increase in equity volatility (Campbell, Lo, and MacKinlay, 1997, p.497).

Many studies have explored board attributes in relation with firm performance but very few studies have related board attributes to variability of firm performance or firm risk. The existing literature that relate board attributes to firm risk use non-UK data samples and they include Amihud and Lev (1981); Saunders Strock and Travlos (1990), Houston and James (1995), Wright et al. (1996), Adams, Almeida, and Ferreira (2005); Cheng, (2008); Pathan (2009); Adams and Funk (2011); Berger, Kick and Schaeck (2012). There were no studies found that examined board attributes and how they relate to firm risk using a UK data sample.

In the first section of this chapter, the conceptual framework is developed based on agency theory and the behavioural theory of the firm. Zahra and Pearce's (1989) model on board attributes is adapted to develop the theoretical model for the study. This is followed by a review of the literature on each of the board attributes. Based on the literature review the hypotheses are developed as to how the board attributes affect risk-taking. Hypotheses on how a combination of board attributes affects firm risk are also formulated.

5.2. Conceptual framework

A majority of the literature reviewed for this study has used agency theory as a foundation for their conceptual framework. These studies view the role of the board as having a control function of monitoring management or agents, to ensure the shareholders' interests are protected. This study also uses agency theory, but combines it with the behavioural theory of the firm to conceptualise the framework. The reason for combining the behavioural theory of the firm with agency theory is discussed in the following section. The influence of other models in the conceptualisation of the framework is also discussed.

5.2.1. Influence of agency theory and behavioural theory of the firm

Agency theory assumes that managers of a firm will behave in their own self-interest with the shareholders' money (Jensen and Meckling, 1976). The responsibility for the oversight of the management in the shareholders' interest lies with the board. The shareholders' interest is for maximum returns (with appropriate risk taken) on their investment in the firm (Shapira, 1994). Since, shareholders are faced with the loss of only their invested money in case of firm insolvency, due to limited liability; shareholders are typically seen as risk-seeking (Galai and Masulis, 1976). Agency theorists view the behaviour of agents to be always risk-averse (preferring lower risk options at the expense of returns) to protect their jobs, or risk-neutral (seeking options where risk is compensated), tending to neglect the possibility of risk-seeking (Fiegenbaum, 1990; Wiseman & Bromiley, 1996). The behavioural theory of the firm is used in this study to extend this assumption of agency theory. The behavioural theory of the firm proposes that managers make decisions depending on their level of aspiration, and can be risk-seeking depending on the previous and current performance levels of the firm and performance of peer industries (Cyert and March, 1963). The risk preference of the managers (either being risk-averse, risk-neutral or risk-seeking) has an effect on their choice of the investment opportunities for the firm. The choice of investment can result in unpredictability in the firm's income stream (firm risk) (Wright *et al.*, 1996). This study argues that the risk-taking behaviour of management results in unpredictability in income stream (firm risk). External factors that may be influencing firm risk are controlled for in the empirical model, using appropriate control variables²¹.

²¹ The empirical model and control variables used in the study are discussed in Chapter 6.

5.2.2. Other perspectives influencing the framework

The polynomial model of risk-taking proposed by Mukherji, Desai, and Wright (2008) explains the risk-taking behaviour of managers. They explain that when the performance of the firm is close to the expected target (low firm risk), then the firm is not facing problems and the managers are in the comfort zone and are risk-averse. When the firm performance deviates highly from the expected outcome, then the managers tend to be risk-seeking (Mukherji, Desai, and Wright, 2008). They propose that high volatility of performance (high firm risk) is linked to risk-seeking behaviour, and low volatility of performance (low firm risk) to risk-averse behaviour. High volatility of firm equity is linked to firm instability and leads to a high probability of firm insolvency (Crouhy, Galai and Mark, 2006).

Firm risk is used as a proxy for managerial risk taking based on the evidence provided by Palmer and Wiseman (1999), using the holistic model of risk.

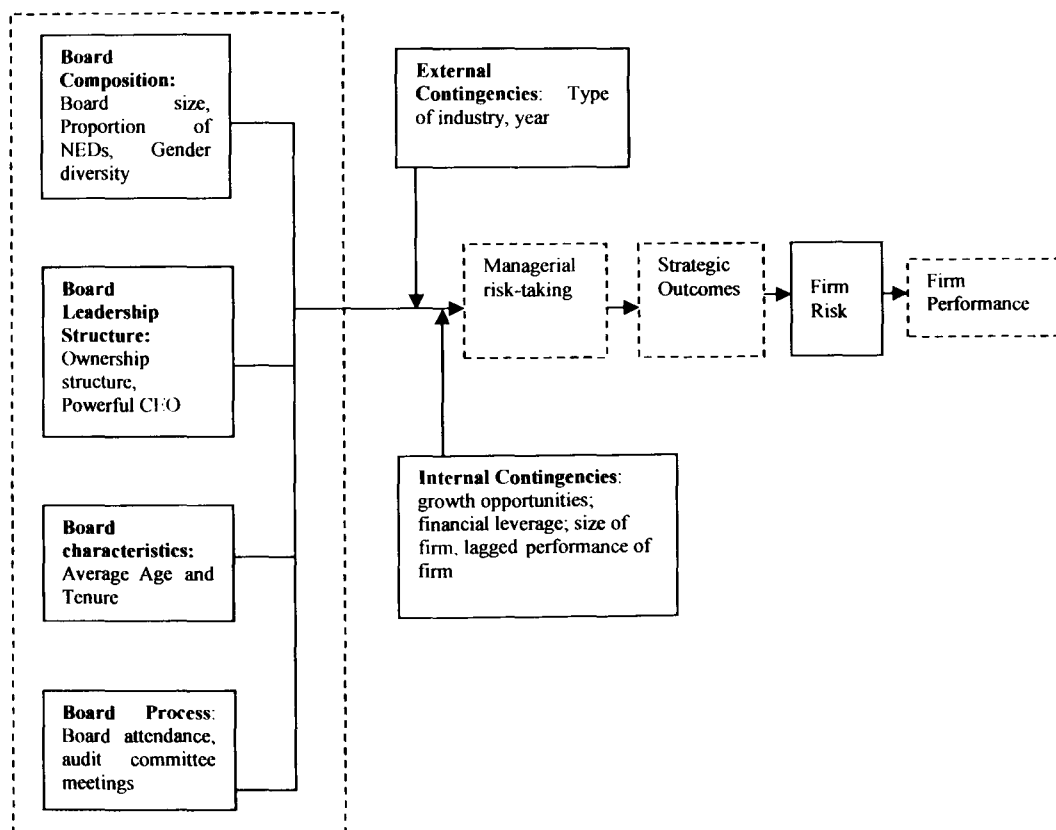
5.2.3. The theoretical model

The theoretical model used for this study, is adapted from the model²² developed by Zahra and Pearce (1989) on board attributes, and is shown in Figure 5.1. The strategic direction that a firm takes (firm performance) depends on the decisions made at board level which in turn depends on the group dynamics within the board, the power struggle among board members, the presence of independent views, expertise and experience of board members as well as the processes the board follows. This study argues that such attributes of the board are associated with firm risk.

²² Zahra and Pearce's (1989) model on board attributes is discussed previously in Chapter 3.

The board attributes are grouped into four categories - board composition, board leadership structure, board characteristics and board process. Board composition is made up of the attributes: board size, proportion of non-executive directors, and gender diversity. Board leadership structure is composed of the variables: ownership structure and powerful CEO. The category of board characteristics consists of the board attributes: average board age and average board tenure. Board process consists of the variables: board meeting attendance and frequency of audit committee meetings.

Figure 5.1 - Theoretical Model for this study



Source: adapted from Zahra and Pearce (1989)

Strategies for the firm's long term growth are developed by executives and the board makes the decision on these plans based on its viability and riskiness. Therefore,

decisions made by board members can determine the strategic outcome of the firm. Wright *et al.*, (1996, p.442) in their study explain that corporate risk-taking can be defined as the analysis and selection of projects that have varying uncertainties associated with their expected outcomes and corresponding cash flows. The unpredictability in the firm's income stream is the result of its risk-taking behaviour which can influence the firm's asset structure. Risk-seeking behaviour is associated with high variance of asset composition and risk aversion is associated with lower variance of asset structure (Mukherji, Desai, and Wright, 2008).

Palmer and Wiseman (1999) developed a holistic model of risk (discussed previously in Chapter 4), where they showed that managerial risk-taking was significantly related to firm risk. Therefore, in this study the proxy for managerial risk-taking is firm risk, where firm risk is measured as the volatility of the firm's stock price. The model also proposes that high firm risk results in lower firm performance based on finding from previous studies that show asset prices fall when there is an increase in equity volatility (Campbell, Lo, and MacKinlay, 1997, p.497).

External contingencies such as type of industry and year of operation are used in this study, similar to previous studies that relate board attributes to firm risk (Pathan, 2009 and Lewellyn and Muller-Kahle, 2012). Internal contingency control variables such as growth opportunities, financial leverage and firm size previously used by Pathan (2009) are also used in this study as control variables. Previous performance of the firm is found to affect managerial risk-taking (Cyert and March, 1963; Mukherji, Desai, and Wright, 2008; Cheng, 2008); therefore, lagged performance is used in this study to control for previous firm performance.

The next section discusses the four categories of board attributes: board composition, board leadership structure, board characteristics and board processes, wherein hypotheses are developed for all the individual board attributes and the categories. The theories that are discussed in the previous chapters and empirical findings from the fields of decision making, group dynamics and social psychology are used in developing the hypotheses. The points that are discussed for each board attribute are as follows. First, why the board attribute is important. Secondly, the policy or regulation linked with the attribute. Next, there is a discussion of the theory related to the board attribute and a review of literature on the topic to identify the gap in the literature. Lastly, based on the theory and previous literature, the hypothesis is developed.

5.3. Composition of the board

Board composition is the most often researched topic in governance literature and systematic reviews on the extant literature on boards confirms this (Adams, Hermalin and Weisbach, 2008). This is due to the fact that the board members are the top decision makers for a firm and it is at this level of decision making, that a challenge to the management decisions is required so that the interests of the shareholders is protected. This challenge can be provided by a diverse group of board members, NEDs or women on the board. This study examines board composition using the variables board size, proportion of non-executive directors, and gender diversity.

5.3.1. Size of the board

One of the roles of the board of directors is to monitor the managers of the firm who are in charge of the day to day running of the business. Since all important decisions are approved by the board, the performance of the firm depends on the quality of

monitoring and decision-making by the board of directors (Yermack, 1996). The number of board members represents the breadth of expertise, experience and knowledge of the board (Chaganti, Mahajan and Sharma, 1985). Also, a larger number of board members can better represent shareholders in monitoring management (Yermack, 1996). Due to these reasons, board size becomes an important determinant of how the firm performs.

The size of the board is calculated as the total number of board members. The Combined code (2003)²³ does not stipulate what the board size should be and this is reflected in how companies form the board – usually the board size is proportionate to the size and complexity of the firm. Adams and Mehran (2003) and Lehn, Patro, and Zhao (2009) find that organizational structure has an important influence on board size. They explain that board size changes when there are mergers or acquisitions; for example when an acquisition takes place, directors of the acquired firm are added to the board; or if the firm has many subsidiaries then a director representing each subsidiary are present on the board. Raheja (2005) finds that an optimal board size is a function of the directors' and the firm's characteristics. Adams, Hermalin and Weisbach (2010) also find that every firm has an optimal size for the board depending on its own characteristics and complexity. Controlling for firm complexity and firm size, most of the previous literature has found that larger board size relates to lower firm risk (Cheng, 2008; Pathan, 2009).

A few studies such as Jewell and Reitz (1981), O'Reilly, Caldwell and Barnett (1989), Goodstein and Boeker, (1991), Lipton and Lorsch (1992), and Jensen (1993)

²³ The Combined code (2003) is quoted in this section, since it is the relevant guideline for the sample period of the study which is between 2005 and 2010.

argue, that within large boards, communication and coordination can become difficult, allowing the chief executive to free ride; therefore reducing the effectiveness of the board.

However, large boards can provide an increased pool of expertise and resources for the organisation (Pfeffer, 1972; Dalton, Daily, Ellstrand and Johnson, 1998); large boards can provide the inclusion of a wide variety of perspectives (Zahra and Pearce, 1992); and, firms that require more advice derive greater value from having larger boards (Coles, Daniel, and Naveen, 2006).

In decision theory, it is suggested that diversified opinions within large groups could lead to a compromise in the final decision (Sah and Stiglitz, 1986, 1991). Experimental research findings show that a group judgement represents the average of the prior individual judgements when a consensus is reached through group discussions of the prior judgements (Kogan and Wallach, 1966). There is a greater likelihood that a risky project is rejected, since the investment has to be considered good by many directors, before it is accepted by the group.

Cheng (2008) reports an inverse relationship between board size and variability of firm performance (firm risk), using a data sample of 2980 US corporations between 1996 and 2004. The results show that board size is negatively associated with the variability of firm performance measured as monthly stock returns, annual accounting return on assets and Tobin's Q ²⁴. The results are the same when variability of firm performance is replaced by the level of research and development expenditures and the frequency of acquisition and restructuring activities. In other

²⁴ Tobin's Q is a measure of firm performance and is calculated as the book value of assets minus the book value of equity, plus the market value of equity, scaled by the book value of assets (Cheng, 2008)

words, a larger board is related to less firm risk. Pathan (2009) also finds a significant negative relationship between board size and firm risk using a sample of 212 large US bank holding companies over the period 1997–2004. These studies argue that within larger boards, due to varied opinions and influence of a large number of individuals less extreme decisions would be made leading to less risky decisions (Cheng, 2008; Pathan, 2009). A more recent study by Nakano and Nguyen (2012) used a Japanese data sample of corporations to find that larger boards are related to lower performance volatility as well as lower bankruptcy risk. They also find that the effect of board size is less significant when firms have many investment opportunities and more significant when firms have fewer growth opportunities. No studies were found that associated board size to firm risk using a UK data sample.

The existing literature supports an inverse relation between board size and firm risk. If firms want to reduce high managerial risk-taking, then larger boards will result in less risk-taking. Therefore, it can be hypothesized that a larger board size will lead to less risk taken.

III A: Board size is negatively related to firm risk.

5.3.2. Proportion of non-executive directors

A board of directors consists of executive members of the firm and non-executive members; and, the Combined Code (2012) recommends that the NED should be independent²⁵. The Combined Code (2012) recommends that at least half the board, excluding the chairperson, should comprise of NEDs. Most firms in the FTSE 350 follow these guidelines.

²⁵ The definition of an independent NED was discussed previously in Chapter 3.

The argument for the need of non-executive directors is based on agency theory. Shareholders do not have control over managing the day to day operations of the firm (Mizruchi, 1983) while managers are seen to have firm specific knowledge and managerial expertise. This can result in the appointed managers behaving in a self-interested manner, instead of maximising the shareholders' investment (Jensen and Meckling, 1976; Eisenhardt, 1989). Agency theorists argue that the management could make decisions which misuse the shareholders' capital (Jensen and Meckling, 1976; Eisenhardt, 1989). The potential for this conflict of interest requires monitoring mechanisms which are designed to protect the shareholders who are the owners of the company (Jensen and Meckling, 1976; Fama and Jensen, 1983a; Williamson, 1985). One of the primary duties of the board of directors is this monitoring role (Hambrick and Finkelstein, 1987; Fleischer, Hazard, and Klipper, 1988). Prior literature generally argues that a high proportion of non-executive directors on the board provide effective monitoring and control of firm activities leading to better performance of the firm (Jensen and Meckling, 1976; Fama and Jensen, 1983a; Williamson, 1985; Dalton, Daily, Ellstrand and Johnson, 1998). In the literature, there is consensus that effective boards will be comprised of greater proportions of outside directors (Mizruchi, 1983; Lorsch and MacIver, 1989; Zahra and Pearce, 1989). Regulators, institutional investors and shareholder activists also hold the same view.

Some NEDs are appointed to the board because they had some pre-existing business connection with the firm (e.g. former executives or suppliers or customers), and other NEDs have no other contractual relationship with the business other than their fees and their ownership of shares (Keasey, Thompson, and Wright, 2005). NEDs could be chosen to be on the board because they can provide access to valued resources and

information that is in the interest of the firm (Pfeffer and Salancik, 1978). In their task of monitoring and controlling firm activities NEDs may make decisions that include - replacing the CEO, responding to takeover bids, acquiring another company, providing takeover defences to protect the firm, deciding on diversification, establishing executive compensation, reporting financial fraud, and providing capital for research and development, among other duties.

There is an assumption in the literature that the NED will behave differently from the executive director. The motivation for the NED to monitor the executives is to build a reputation for themselves as being expert monitors (Fama, 1980; Fama and Jensen, 1983a). If they do not monitor the managers effectively, then they risk not finding employment again. Also, the NED may have more expertise than the executive director, and therefore, be able to better monitor the top management team.

On the other hand, NEDs may not have the incentive to monitor management due to the following reasons. First, the reputation of an NED who does not make trouble for the CEO can be seen as valuable (Holmstrom, 1999). Secondly, NEDs are part time directors and spend a minimum amount of time in the firm compared to the executives who are at the firm full time. Due to the part time nature of the job, NEDs may find it difficult to gather firm-related information from the executives; and the executives may not divulge all the financial and strategic information (McNulty and Pettigrew, 1999). Lastly, the NEDs may not have the incentive to question the CEO in order to protect their job and collect the director fees (Ezzamel and Watson, 1993).

Most of the literature argues that NEDs make the boards more effective. NEDs are not homogeneous and can contribute in terms of expertise, function or affiliation (Keasey, Thompson, and Wright, 2005). Kosnik (1990) argues that the diverse

backgrounds of the NEDs can bring different perspectives to the table and reduce complacency and narrow mindedness in approving executive proposals. Byrd and Hickman (1992) suggest that non-executive independent directors contribute expertise and objectivity that minimizes managerial entrenchment and expropriation of firm resources. McNulty and Pettigrew (1999) interviewed 108 UK directors and their results show that NEDs have an influence on decision making. The study finds that NEDS have the ability not only to shape ideas but to change methods and processes in how these ideas take shape. They note that the influence of NEDs depends upon the history of the organisation and its performance, how good the communication is between directors, and evolving governance regulation. Their results show that outsider board members enhance the monitoring ability of the board over the management, therefore reducing agency costs.

Additionally, Dahya and Connell (2005) analyse data from 914 UK firms for the period 1988 to 1999, and find that NEDs influence board decisions such as the appointment of an external CEO and this decision is viewed favourably by investors. They suggest that a greater number of outside directors will lead to different and better board decisions. Hardwick, Phillip and Hong Zou, (2011) in a sample of UK insurers also, find that the proportion of NEDs on the board exhibits a significant effect on the profit efficiency. Linck, Netter and Yang (2008) argue that by adding an NED to the board, firms incur costs as well as benefits. They propose that NEDs bring benefits in terms of skill, knowledge and expertise, but there is a direct cost of compensation as well as the cost of co-ordination and communication. There can be a failure of communication, since firm specific information may not be passed on to NEDs by the executives.

A few studies have shown that there may not be an association between proportion of non-executive directors and risk of firm insolvency. Chaganti, Mahajan, and Sharma (1985) compare 21 matched pairs of US firms that failed between 1970 and 1976 and match them with non-failed firms. They find no significant difference in board composition between failed and non-failed firms, and no significant tendency for failed firms to increase their proportion of outside directors in the five years before failure. Cheng (2008) in a study of US corporations, also, does not find a significant relationship between non-executive independent directors and firm risk.

One study found a positive relation between proportion of non-executive directors on the board and firm risk. Pathan (2009) in a study of US bank holding firms finds that having more NEDs on the board positively affected risk-taking. He explains that shareholders in wanting to maximise their returns on their investment would like the NEDs to be risk-seekers. He argues that more non-executive independent directors on the board would act in the interest of the shareholder and make investment decisions in line with the firm's contracting environment. His study finds that strong boards consisting of more non-executive independent directors positively affected bank risk-taking.

No studies were found that examined the effect of the proportion of non-executive directors on the board on firm risk using a UK data sample. Most of the literature argues that more non-executives on the board facilitates better decision making, leading to effective monitoring of management (Kosnik, 1990; Byrd and Hickman, 1992; McNulty and Pettigrew, 1999). This argument is supported by Dalton and Daily (1994) in their study of matched bankrupt firms and survivor firms. They find that bankrupt firms have a higher proportion of affiliated directors (NEDs with some

affiliation to the firm) than survivor firms; which is to say that boards with fewer non-executives are associated with higher risk of insolvency. Linck, Netter and Yang (2008) find that in large firms high stock return volatility is associated with smaller boards with fewer NEDs on the board. Most recently, Christy *et al.* (2013) in their study of 800 Australian firms, between 2001 and 2007, find that in large firms, a board with a higher proportion of NEDs generates positive net benefits in the form of lower equity risk.

Even though previous findings are mixed in relating the proportion of NEDs to firm risk, agency theory argues that a higher proportion of NEDs on the board can reduce self-interested behaviour of executives, leading to fewer agency costs (Eisenhardt, 1989; McNulty and Pettigrew, 1999; Hermalin and Weisbach, 2003) and less firm risk. NEDs bring their knowledge to the board and are able to provide an independent opinion which enables better decision making (Dalton, Daily, Ellstrand and Johnson, 1998). Based on this theory, this study predicts that a higher proportion of NEDs will be more effective monitors and reduce high risk-taking.

H1B: The percentage of non-executive directors on the board is negatively related to firm risk.

5.3.3. Gender diversity

Most boards in the UK have board members, with similar backgrounds, education and networks. This homogeneity among directors is seen to produce similar thinking. In February 2011, the Davies report found that even though women had a long record of achieving the highest qualifications and leadership positions in many walks of life, there was poor representation of women on boards in FTSE companies relative to their male counterparts. They found that in FTSE 100 boards the representation of

women is only 12.5%. According to the Davies report (2011), gender diversity at board level matters because 'inclusive and diverse boards are more likely to be effective boards, better able to understand their customers and stakeholders and to benefit from fresh perspectives, new ideas, vigorous challenge and broad experience. This in turn leads to better decision making.'

In Norway and France, there is legislation as to female board representation, where 40% of board places are to be filled by women. The Netherlands and Belgium have passed laws requiring large firms to have females in at least 30% of executive positions in a firm. Recently, the European Parliament passed a non-legislative resolution that required 40% of supervisory and executive positions of large European firms to be filled by women. The Davies Report (2011) recommends that FTSE 350 companies should target for achieving 25% female representation on the board by 2015. Gender diversity is being approached as a value driver in corporate governance (Davies Report, 2011). The regulatory movement towards gender quotas is based on the desire to establish a higher proportion of women in the top management team. Even though this report was published after the time period of the sample which is between 2005 and 2010, this study can indicate if women on the board are effective. How this legislation may affect firm performance or managerial risk-taking is not known.

Most of the existing literature in this field generally argues that gender diversity provides better governance. Izraeli (2000) and Huse and Solberg (2006) explain that women take their NED roles more seriously and prepare more conscientiously for meetings. They find that women ask the awkward questions more often, decisions are less likely to be nodded through and so are likely to be better. They find that

gender diversity is effective in changing the group dynamics when there is at least 30% female representation. Adams and Ferreira (2009) find that the attendance records for meeting are better for females leading to better monitoring. They find that the likelihood that a female director has attendance problems is lower than for a male director; furthermore, male directors have fewer attendance problems the greater the fraction of female directors on the board. They also find that firms with more diverse boards provide their directors with more pay performance incentives, and firms with more diverse boards have more board meetings. This suggests that gender diversity brings strengthened governance (Adams and Ferreira, 2009).

In addition, Brennan and McCafferty (1997) explain that female directors may have a better understanding of consumer behaviour, the needs of the customers, and the opportunities for companies in meeting those needs. A survey commissioned by recruitment consultancy Heidrick & Struggles (2012) finds that women appear to be more assertive on certain important governance issues such as evaluating the board's own performance and supporting greater supervision on boards. Erhardt, Werbel and Shrader (2003) suggest that women bring a new perspective on the board that is value enhancing. The literature generally argues that stronger governance would increase shareholder value (Adler, 2001; Hermalin and Weisbach, 2003; Carter, Simkins, and Simpson, 2003; Erhardt, Werbel and Shrader, 2003; Lückerath-Rovers, 2013). On the other hand, Adams and Ferreira (2003, 2009) and Ahern and Dittmar (2010) find that the average effect of gender diversity on both market valuation and operating performance is negative which they suggest is due to tougher monitoring. They argue that when there is gender diversity on the board, directors (both male and female) attend more meetings, and schedule more meetings leading to tougher monitoring.

A review of gender studies shows that women can have a different risk preference in financial decisions they make. Powell and Ansic (1997) in their experimental study on gender differences in risk preferences, find that females are less risk-seeking than males in financial decision making. Two reviews conducted by Croson and Gneezy (2009) and Eckel and Grossman (2008) on experimental work on risk attitudes show that published findings are broadly consistent with women being more risk-averse than men. Studies in the field of decision making literature have also found that risk-taking behaviour of women with respect to investment decisions is more risk-averse than men (Barsky, Juster, Kimball, and Shapiro, 1997; Jianakoplos and Bernasek, 1998; Sunden and Surette, 1998 and Agnew, Balduzzi, and Sunden, 2003). The risk-averse behaviour could be due to the fact that women are less overconfident than men (Barber and Odean, 2001 and Niederle and Vesterlund, 2007). It can also be due to the fact that women invest more in information acquisition (Goel and Thakor, 2008) and therefore have a better knowledge of the risks involved in making a particular decision.

On the other hand, other studies show that women on the board may be risk-seeking, and have associated women on boards positively with firm risk. Adams and Funk (2011) show in their survey of Swedish women, who have risen through the ranks and are, now on boards, are more prone to take risks than men. But women who are on the board to fulfil regulation needs decrease the level of firm risk. They suggest that having women on the board need not lead to more risk-averse decision-making. Berger, Kick and Schaeck, (2012) find in a sample of German banks, the proportion of female board members and risk-taking are positively and significantly related. They explain that women are not marginalised by male dominated board culture and they have a significant impact on governance of banks.

The existing risk-related literature mostly supports the argument that gender diversity on the board is related to better monitoring of management. Adams and Ferreira (2003) find a significant negative relation between variability in stock returns and the proportion of women on the board. A recent study by an asset management firm in conjunction with the Observer newspaper (TCAM, 2009) has shown that female directors exercise strong oversight and are more likely to pay attention to managing and controlling risk. An unpublished study conducted in Leeds University recently, and quoted by the Davies report (2011), used a sample of UK firms over the period 2007-09. Their study shows that having at least one female director on the board, cut a company's chances of going bankrupt by 20%, and that having two or three female directors lowers the chances of bankruptcy even further (Wilson and Altanlar, 2009). They argue this association can be the result of the difference in risk preference and attitudes towards debt management between genders. They find that companies with female directors take on less debt and have a better cash flow.

No published studies were found that associated presence of women on the board to firm risk using a UK data sample. The empirical literature that relates gender diversity to firm risk is mixed, but the literature based on experiments, consistently shows that women are risk-averse in financial decision making. Based on the arguments presented in this section that women will provide more effective governance - due to the fresh perspectives they bring to the table, the vigorous challenge they provide, better understanding of customer needs, better attendance record, investing time in acquiring more information - it can be hypothesized that the presence of a woman on the board will lower firm risk.

H1C: The presence of women on the board is negatively related to firm risk.

The composition of the board is represented by board size, proportion of non-executive directors and presence of women on the board. A large board size, with a high percentage of NEDs, and having at least one woman on board (as individual variables) is predicted to reduce firm risk. Therefore, a measure that combines these variables would be negatively related to firm risk.

H1: Board composition comprising of board size, proportion of non-executive directors and presence of women on the board is negatively related to firm risk

5.4. Board leadership structure

In this study, the category of board leadership structure is composed of two variables. The first is a variable that represents the presence of a powerful Chief Executive Officer (CEO) on the board and the second variable is the percentage of firm equity held by executive directors on the board.

5.4.1. Powerful CEO

The CEO is the highest ranked officer in the firm and is in charge of the management of the whole firm. The position of CEO is at the apex of power, having the expertise, ownership of the firm, and status, to exert control over strategic decisions (Finkelstein, 1992). A CEO holds firm-relevant information and by sharing this information can enhance or reduce board involvement. A powerful CEO can withhold information and not allow active involvement of board directors.

The Combined Code (2003) recommends that there is a clear division of responsibilities at the head of the company and that the roles of chairperson of the board and chief executive of the firm are separate. The reason for the separation of the position of CEO and chairperson is that there will be increased oversight from an

independent chair of the board. A powerful CEO can hold dual position of CEO and chairperson of the board and prefer a weak board that does not offer a challenge to the decisions made by the management.

The Combined Code (2003) also recommends that the chairperson of the board be a non-executive. If the chairperson of the board is an executive, then management strategies may not be as well monitored as when a chairperson is independent; making the CEO more powerful. If the board is chaired by a firm executive, then that firm's CEO does not get challenged by the independent chairperson and makes the board less independent. A powerful CEO could also be a founder of the firm. Founders of firms are seen as controlling and difficult to challenge. Therefore, if there is duality of the CEO-chairperson position or the CEO is the founder of the firm or if the chairperson is an executive, it can make the CEO powerful which can influence the board's decisions towards management's policies and ideas.

A powerful CEO in this study is one who holds duality in the top position as CEO as well as Chairperson of the board or if the board has a Chairperson who is a firm executive or if the CEO is a founder of the firm.

The board is required in its control function to evaluate the CEO's performance to ensure corporate growth and protection of shareholder interest (Louden, 1982; Chapin, 1986). Hermalin and Weisbach (1998) explain in their study that the board chooses to hire or fire CEOs and that a powerful CEO with bargaining power would prefer fewer NEDS on the board so as to put his/her strategy through. This result is confirmed by Boone *et al.*, (2007) who use the CEO tenure and CEO ownership as the variables to denote the bargaining power of the CEO and find that they are negatively related to the proportion of non-executive directors on the board. These

studies suggest that a powerful CEO would like to use their power for their own self-interest (Adams, Hermalin and Weisbach, 2010).

A powerful person in an organisation is defined by Pfeffer (1997) as one that can demonstrate influence and control and includes the idea of overcoming resistance, to exert their own will (Finkelstein, 1992). Adams, Almeida and Ferreira (2005) define a powerful CEO as one who can consistently influence key decisions in their firms, in spite of potential opposition from other executives. Finkelstein (1992, p508) explain that CEOs who can control board activities and 'reduce the uncertainty that arises when boards have the power to influence strategy can gain power within a firm's dominant coalition'.

The separation of the roles of CEO and Chairperson is grounded in agency theory which is concerned with the potential that the management will dominate the board. According to Finkelstein and D'Aveni (1994), duality promotes CEO entrenchment by reducing the monitoring ability of the board. It can also restrict the information flow to other board directors and reduce the independent oversight of directors (Fama and Jensen, 1983a; Jensen, 1993). A study by Rechner and Dalton (1991) find that firms with the separate leadership positions for CEO and chairperson outperformed those firms with the dual role when relating this leadership structure to return on equity, return on investment, and profit margin. On the other hand, some studies have reported that firms that rely on duality of position, benefited from the joint structure, since it could remove conflicting views and remove ambiguity on who is responsible for decisions and outcomes (Donaldson and Davis, 1991). This view is grounded in stewardship theory.

The review of the risk-related literature shows that some studies find powerful CEOs to be related to less firm risk; Amihud and Lev (1981) using a sample of US firms and Pathan (2009) using a sample of US banks, have shown that powerful CEOs engage in risk reducing activities. They argue that employment income of the CEO is closely related to a firm's performance due to profit sharing schemes, bonuses and value of stock options. Poor performance of the firm or bankruptcy can result in managers losing their employment. Due to this 'employment risk', top executives of the firm will back safe projects (less risky) so as not to risk losing their job (Amihud and Lev, 1981). Also, costs of bankruptcy can contribute to managers in levered firms to select less risky projects (Parrino, Poteshman and Weisbach, 2005). Therefore, a powerful CEO may take less risk.

However, other studies find that powerful CEOs are related to higher firm risk. Adams, Almeida, and Ferreira (2005) provided evidence in their study that firms with more powerful CEOs are associated with high firm risk since the decisions with extreme consequences are likely to be taken by a powerful CEO. Adams Almeida and Ferreira (2005) measure a powerful CEO as one, who is either the founder, is the only executive on the board, or there is duality of chairperson-CEO position. CEOs who are founders have a long term involvement with the firm and will be powerful and influential. They find that the variable representing founder CEO is significantly positively related to stock return variability and two other measures representing a powerful CEO, namely, only executive on board and duality of CEO-Chairperson position, are also positively associated with stock return variability. Lewellyn and Muller-Kahle (2012), using a sample of sub-prime lending firms in the US, also find that powerful CEOs are related to high firm risk.

As evidenced from the governance guidelines, regarding avoidance of duality of CEO-Chairperson position as well as avoiding the appointment of a non-executive director as the Chairperson, regulators believe that a powerful CEO may act in their own self-interest (Combined Code, 2012). Agency theory also supports the view that a powerful CEO could withhold information from the non-executive directors and this could hinder the boards' ability of monitoring management strategies and plans (Hermalin and Weisbach, 2003). From this perspective and finding from the existing literature, it can be hypothesised that, a powerful CEO is positively related to firm risk.

H2A: A powerful CEO is positively related to firm risk.

5.4.2. Executive directors ownership

In this study, the executive directors' ownership is measured as the percentage of equity (which represents both capital and voting rights) held by all the executive directors of the firm. The voting rights that come with holding equity in the firm make these directors powerful. Board members with large ownership cannot be easily discharged because they have voting rights and this influence can keep them in their jobs (Wright *et al.*, 1996). The Combined Code (2003), does not specify the maximum limit of equity that director/s can hold of the company equity.

Executive directors are compensated in terms of equity, as well as salary, whereas NEDs are compensated with director fees for their work and may be compensated with firm equity. The Combined Code (2003) does not recommend independent NEDs to hold firm equity.

To align the interests of the executive directors with the shareholders (who want maximum returns) they are compensated with firm equity. Agency theorists believe that directors having ownership in the firm can influence them to maximize returns on shares and reduce agency costs (Jensen and Meckling, 1976). Ownership in the firm makes the wealth of executives dependent on firm performance and can encourage executives to invest in value enhancing initiatives (Jenkins and Seiler, 1990). Compensating managers with firm equity would help them to invest in initiatives that increase the long term value of the firm (Hitt, Hoskisson, and Ireland, 1994).

Wright *et al.*, (1996) find in a cross sectional study of US firms, that when executives hold low equity stakes, then the relationship between equity ownership and corporate risk-taking is positive and when executive holding is high, the relationship is negative. They explain that usually shareholders prefer growth oriented risk-taking but may want to reduce risk in certain situations. The board of directors approve or reject risky plans depending on a number of reasons: their wealth portfolio, the benefits and costs due to their position, and the potential for entrenchment. If the board members wealth portfolio consists mainly of the investment in the firm, then they may try to minimise risk by backing non-value maximising projects (Wright *et al.*, 1996). They may want to reduce personal costs in terms of employment and benefits by avoiding uncertainties involved in new ventures.

Many previous studies find a positive relation between managerial ownership and managerial risk-taking. Laeven and Levine (2009) find in their study of banks across countries, that banks with more powerful owners tend to take greater risks. In their analysis, they use a dummy variable to indicate a large shareholder on the board

(>10% equity) to find the effect managerial ownership on the board has on risk-taking. They find that large equity holders have stronger incentives to increase risk than non-shareholding managers and debt holders. Large owners with substantial cash flows have the power and incentives to induce the bank's managers to increase risk-taking.

In addition, Sanders and Hambrick (2007) find that firms whose CEOs have a high percentage of equity exhibit extreme performance (i.e., very large gains as well as very large losses). While, Rajgopal and Shevlin (2002) propose that managers of Oil & Gas companies whose compensation is more sensitive to stock return volatility, take more exploration risk and maintain lower hedge ratios. Greater sensitivity to stock return volatility in relation with compensation tends to induce riskier investment policies and higher financial leverage (Coles, Daniel and Naveen, 2006).

No studies were found that associated board executive equity ownership to firm risk using a UK-based data sample. The literature mostly supports the notion that equity ownership by executive directors will be positively related to risk-taking. Therefore, it can be hypothesized that high percentage of stock held by executives on the board is related to high firm risk.

H2B: Executive directors' shareholding is positively related to firm risk.

Board leadership structure is represented by the variables: powerful CEO and executive stockholding. From the hypothesis obtained in the section above, it is predicted that a board with a powerful CEO and high executive stockholding will be related to high firm risk. Therefore, a prediction can be made that board leadership

structure index, which is a combination of these variables, is positively related to firm risk.

H2: Board leadership structure represented by a powerful CEO and executive ownership is positively related to firm risk.

5.5. Board characteristics

The category of board characteristics consists of the variables - age and tenure of board members that reflect the experience, skill and knowledge of the board. Average age and average tenure of board members are demographic characteristics of the board that have been used in previous studies as proxy for risk aversion, openness to change, commitment or entrenchment (Hambrick, 1994). Age and tenure seem to be correlated, but according to Pfeffer (1983), they are not conceptually similar and explanations can differ as to how they associate with the effectiveness of the directors.

5.5.1. Age of board members

Paul Myners, a former fund manager who has been a non-executive chairperson of several large companies, said that most boards of directors resemble “a retirement home for the great and the good” (FT, 2008). It raises the question of directors’ age being an issue and how it relates to the effectiveness of the board.

Boards are usually comprised of experienced, skilled and knowledgeable directors and these attributes come with age. There is no regulatory guidance regarding the age limit for board of directors. Firms employ directors depending on their unique requirements.

Lower managerial age is associated with risk-taking and strategic change (Child, 1974; Wiersema and Bantel, 1992) while, older executives are likely to be more conservative (Stevens, Bayer and Trice, 1978). This proposition is confirmed in an unpublished study by Berger, Kick and Schaeck (2012), who find that in German banks lower mean age of board members significantly increased firm risk. Maturity is associated with moral development (Daboub *et al.*, 1995) and their reasoning is that older decision makers seek greater amount of information to make a decision, take enough time to make a good judgment and are able to diagnose the value of information more accurately. Older board members also want more financial security and have the security of keeping their job. If they back risky projects, then they may disrupt this security (Carlsson and Karlsson, 1970). Extending these arguments, older board members will arguably make better decisions; they will be able to think more independently, and therefore, will be able to monitor managers more effectively. It can be argued that high average age of board members will increase the level of board independence and improve monitoring capability, thereby reducing high firm risk.

No published studies were found that examined board member's age to firm risk.

From the arguments discussed above, the following hypothesis can be made.

H3A: Average age of board members is negatively related to firm risk.

5.5.2. Tenure of board members

Until recently board members stayed on the board until there was a reason to leave, for instance a change in management, a change in the corporate structure or a change in personal situation. The recommended tenure for non-executive directors is

approximately three terms (nine years) (Code, 2012) and there is no tenure recommendation for executive directors.

According to Pfeffer (1983:324), in an organisation, 'for change or adaptation to occur, there must be some infusion of new blood into the organizational context.' This proposition is supported by Finkelstein and Hambrick, (1990) and Boeker (1997). They argue that long tenured board members may get entrenched and defend decisions and policies they supported in the past and not change with the business. They propose that long tenured members may lack the fresh insights to offer solutions to new challenges that the firm faces. These members would most likely not challenge decisions since they have made close relationship with other board members.

However, the benefit of staying for a long period serving as a board member is that the member has good organizational knowledge, has credibility in the market and better relations and communications with other board members (Golden and Zajac, 2001). With longer tenure, comes greater experience, which can lead to better functioning at the board level (Golden and Zajac, 2001). Term limits may result in the departure of board members who are making significant contributions and whose departure would be a significant loss to the company. Fiske and Taylor (1991) argue that greater experience would provide access to more information than novice members. It can be argued that longer tenured board members, who may be contributing significantly to the decision-making process due to their extensive experience and knowledge of the firm, will be better monitors of the management, hence, reduce firm risk.

No studies were found that associated tenure of board members with firm risk. From the argument discussed in the above section, there is support for the proposition that higher tenure (that represents higher experience and knowledge) is related to less firm risk. Therefore, the following hypothesis can be made.

H3B: Average tenure of board members is negatively related to firm risk.

The board characteristics category is represented by a combination of the variables; average age and average tenure. From the hypotheses deduced in the above section, both average age and average tenure are predicted to be negatively related to firm risk. Therefore, a combination of these variables will also be negatively related to firm risk.

H3: Board characteristics', representing a combination of board age and board tenure, is negatively related to firm risk.

5.6. Board process

Processes that boards follow have not been examined widely in the literature. In this study, board processes are examined using the variables board meeting attendance and frequency of audit committee meetings.

5.6.1. Board meeting attendance

The role of board directors is to exercise their judgment on various crucial issues during board meetings (Code, 2012). Decisions made at the board level determine the direction that the firm takes. Besides providing strategic advice, directors have to keep up with the monitoring intensity of the management (Code, 2012). Therefore, board meeting attendance is important in corporate governance and can have an effect on firm performance. The attendance of all the board members to the annual

meetings is important for the board to be effective in its role. Examining board meeting frequency does not capture the fact that board members may not be attending these meetings. Therefore, in this study board meeting attendance is examined.

Previous studies have examined board meeting frequency and how it relates to firm performance. When the firm is facing problems and the performance levels are variable, it is expected that the board meeting frequency increases (Vafeas, 1999). Brick and Chidambaran (2010) find in their study, that firm characteristics, regulatory characteristics and previous firm performance are an important determinant of board activity. They find that this activity is driven by corporate events such as acquisition or restatement of earnings. They find that board activity has a positive influence on firm value.

Previous studies find that multiple directorships can affect board meeting attendance. NEDs work on a part-time basis on the board of a firm and often hold multiple directorships. Fich and Shivdasani (2006) examine the relation between firm performance and multiple directorships in US firms, and they find that firms with boards where the majority of outside directors are busy (i.e., holding three or more directorships) are associated with weak corporate governance, lower market-to-book ratios, weaker profitability, and lower sensitivity of CEO turnover. These results are confirmed by Jiraporn, Singh and Lee (2009) who use meeting attendance as a proxy for director performance. They find that NEDs who hold multiple directorships are more likely to be absent.

Brown and Caylor (2006) construct a governance index for US firms, in which board attendance is a key internal governance control factor. They find that board

attendance has a significant influence on its effectiveness. According to Adams and Ferreira (2007), directors are rewarded with a modest fee for attending a board meeting. They find evidence in their study that directors are less likely to have attendance problems when the director fees for board meetings are high. They suggest that incentives may provide complements to the regulatory pressure in influencing behaviour.

There were no previous studies found in the corporate governance literature relating board attendance to firm risk. This is the first study to examine how board attendance is associated with firm risk. Based on the reviewed literature the prediction is that high board attendance will lead to more effective governance, and therefore, less firm performance volatility (firm risk).

H4A: Board attendance is negatively related to firm risk.

5.6.2. Frequency of audit committee meetings

The audit committee is a governance mechanism which is chaired by a non-executive board member and is appointed by the board and the guidance on audit committees is that it should consist of a minimum of three NEDs who work independent of the executives (Code, 2012). An independent director is recommended to chair this committee to critically review the audit function (Code, 2012). Even though the audit committee chairman can decide the frequency of audit committee meetings depending on the responsibilities of the committee; the regulatory guidelines recommend that there should be no fewer than three meeting during the year (Code, 2012).

The committee has the core functions of oversight, assessment, and review of the following: the firm's financial statements; the firm's internal financial controls; the effectiveness of the company's internal audit function in the context of the company's overall risk management system; the effectiveness of the external auditors and they have oversight of compliance with regulatory guidelines (FRC, 2012). When the audit committee is run effectively, it can improve the monitoring ability of the board. Previous literature has examined the effectiveness of audit committees by looking at the frequency of meetings of the committee; whether an independent director chairs the committee or not; and if the chairperson has a finance-related qualification or experience to be an effective leader (Vafeas, 2005). The diligence with which a committee works is hard to observe, therefore, one of the research measures used is the frequency of the committee meeting as a proxy for diligence (Raghunandan and Rama, 2007).

Carcello *et al.* (2002) find that boards that meet more frequently equate to more pay in terms of audit fees and conclude that board activity complements auditor oversight. Committees that meet more frequently allow directors more time, on average, to carry out their monitoring duties and are more likely to exercise effective control over the quality of financial information that is conveyed to shareholders (Menon and Williams, 1994). Vafeas (2005) finds that in firms with more frequent audit committee meetings, the managers are more accurate with earnings forecast, and therefore, get a favourable market response. De Zoort *et al.* (2002) also find that greater meeting frequency is associated with reduced incidence of financial reporting problems and greater audit quality.

There were no studies found which examine the frequency of audit committee meeting as a monitoring mechanism in relation with firm risk. The prediction based on the literature is that more audit committee meetings will lead to more effective monitoring and result in less firm level volatility.

H4B: Frequency of audit committee meetings is negatively related to firm risk.

The category of board process consists of the variables board attendance and frequency of audit committee meetings. Since both the frequency of audit committee meetings and board meeting attendance are predicted to be negatively related to firm risk, it can be predicted that board process, characterised by these variables, will also be negatively related to firm risk.

H4: Board processes comprising of frequency of audit meetings and board attendance is negatively related to firm risk.

5.7. Combined board attributes

The board attributes, discussed above, are not found in isolation but exist in conjunction with each other, to form the overall governance environment. The four categories of board attributes, namely board composition, board leadership structure, board characteristics and board process can be combined into a measure of corporate effectiveness that is expected to be related to firm risk. The combination of these categories which include board size, proportion of non-executive directors, gender diversity, powerful CEO, board executive ownership, the average age and tenure of the board members, attendance at board meetings, and the frequency of the audit committee meeting, is a useful indicator of the overall effect of the board attributes on firm risk. Some other well-known indices such as the FTSE-ISS corporate

governance index, Standard & Poor's corporate governance scores, Dow Jones Sustainability Index and Business in the Community Corporate Responsibility Index combine many board attributes that represent effective governance. For instance, the FTSE-ISS index combines the variables representing board composition and independence, compensation, ownership, audit process, shareholder rights/takeover defences (ISS, 2010). Previous studies in the US have created indices to rate effective corporate governance such as those by Gompers, Ishii, and Metrick's (2003) and Bebchuk, Cohen and Ferrell (2009); these indices represent governance more in terms of shareholders rights rather than board governance. This is the first study that has created a total board index which reflects the effectiveness of the board in association with firm risk.

A combination of the board attributes that takes into account the association of the individual attributes with firm risk is expected to have an overall association with firm risk. Therefore, the final hypothesis is stated as follows.

H5: The combination of all board attributes is related to firm risk.

5.8. Summary of the hypotheses

The hypotheses predicted in the section above are the alternate hypotheses which are tested using an empirical model and appropriate estimation methods which are discussed in the next chapter. For board composition the hypotheses derived are as follows:

H1A: Board size is negatively related firm risk

H1B: The percentage of NEDs on the board is negatively related to firm risk.

H1C: Presence of a woman on the board is negatively related to firm risk.

H1: Board composition comprising of variables representing board size, proportion of non-executive directors and gender diversity is negatively related to firm risk

The alternate hypothesis is paired with null hypothesis which corresponds to the opposing position. The null hypotheses are formulated such that it can be tested for possible rejection (Sekaran, 2003). If the tests return a significant result, then the alternate hypotheses are accepted and the null hypotheses are rejected. The null hypotheses that correspond to the alternate hypothesis H1A, H1B, H1C and H1 are denoted as H_{01A} , H_{01B} , H_{01C} , and H_{01} .

The hypotheses derived for board leadership structure are as follows:

H2A: A powerful CEO is positively related to firm risk

H2B: Executive directors' shareholding is positively related to firm risk.

H2: Board leadership structure represented by a powerful CEO and executive ownership is positively related to firm risk.

The corresponding null hypotheses are H_{02A} , H_{02B} , and H_{02} .

The hypotheses derived for board characteristics are as follows:

H3A: Average age of board members is negatively related to firm risk

H3B: Average tenure of board members is negatively related to firm risk.

H3: Board characteristics comprising of the variables board age and board tenure is negatively related to firm risk.

The corresponding null hypotheses are H_{03A} , H_{03B} , and H_{03} .

The hypotheses derived for board processes are as follows:

H4A: Board attendance is negatively related to less firm risk.

H4B: Frequency of audit meetings is negatively related to firm risk.

H4: Board processes comprising of the variables frequency of audit meetings and board attendance is negatively related to firm risk.

The corresponding null hypotheses are H_{04A} , H_{04B} , and H_{04} .

The hypothesis derived for the total board index is as follows:

H5: The combination of all board attributes is related to firm risk.

The corresponding null hypothesis is H_{05} .

5.9. Summary

This study extends agency theory with the use of the behavioural theory of the firm to examine board attributes and their association with firm risk. The conceptual framework is based on agency theory and the behavioural theory of the firm. Agency theorists perceive the risk preference of managers to be generally risk-averse (Eisenhardt, 1989), but by using it in conjunction with behavioural theory it allows this study to model the risk preference of the managers to have risk-seeking behaviour. The framework also borrows from risk literature which shows that when a firm has deviated a lot from the expected outcome, then the managers are risk-seeking and when the deviation is small then the managers are risk-averse (Mukherji, Desai, and Wright, 2008). A theoretical model is produced based on these concepts and Zahra and Pearce's (1989) model of board attributes.

Using empirical findings from social psychology, decision making, and governance literature hypotheses were developed for four categories of board attributes and for

individual board attributes. In the analysis and discussion chapter, the hypotheses are tested using statistical methods. These associations will help in understanding whether the policy driven control mechanisms of proportion of non-executive directors and gender diversity have an effect on risky decision making. The associations of board size, ownership, age, tenure, board attendance and frequency of audit committee meetings are not policy driven mechanisms but add to the knowledge of risk controlling mechanisms in governance. The Turnbull report (2005) has put the focus on risk management for UK firms which makes the discussion of risk controlling mechanisms in corporate governance very relevant.

Chapter 6

Research methodology

6.1. Introduction

The research methodology used in the study is explained in detail in this chapter. It sets out the research approach and strategy employed to investigate the relation between board attributes and firm risk. This study uses a positivistic philosophy in the research approach and a quantitative research strategy. Longitudinal research design is used and the data is analysed using panel data estimation methods. Previous literature on a similar topic has been deductive in nature and employed a quantitative strategy. Recent studies that use this strategy are Cheng (2008), Pathan (2009), and Lewellyn and Muller-Kahle (2012). The literature review on the topic, revealed no studies that used a qualitative strategy. This is due to the nature of the topic which is to find correlation and causal relationships between quantitative variables.

The thesis contributes to the internal governance literature in the following ways. First, this study is based on an original dataset from the year 2005 to 2010 in the UK. Secondly, it examines elements of the board attributes which have not been studied before in the UK. Thirdly, board attributes which have never been studied before in association with firm risk are examined. Lastly, this is the first study to examine a combination of variables that characterise the board in association with firm risk; specifically a corporate governance index is constructed, which aggregates all attributes of the board into one index.

The chapter is structured as follows. To start with, the research philosophy and research approach used in this study are discussed. This is followed by a discussion

on the research strategy used in the research design. The data sample is described next, followed by a discussion on the measures of the constructs used in the study. Next, the econometric models and estimation methods used to analyze the data are discussed. Lastly, additional tests which are used as tests of robustness are discussed.

6.2. Research philosophy

According to Saunders, Lewis and Thornhill (2009:119), research philosophy can be categorized into positivism, realism, interpretivism and pragmatism. The research philosophy encompasses the ontological orientation, epistemological orientation, the axiology, and the data collection technique used, and these are discussed below.

Ontological orientation refers to the researcher's perception of social entities; the ontological position for this study is objectivism where the organization is seen as having an objective reality with consistently real processes and structures (Saunders, Lewis and Thornhill, 2009).

The epistemological orientation of this study, which refers to what the researcher regards as acceptable knowledge, is positivistic. The study is positivistic since statistical methods are used for the analysis of a social reality - characteristics of a firms' board of directors (Saunders, Lewis and Thornhill, 2009).

Axiology refers to the researcher's view on the role of values in research, both the values of the researcher and its effect on how the research is conducted as well as the value of the results (Saunders, Lewis and Thornhill, 2009). The results of this study are of value to investors, firms, and policy makers and show how board elements associate with firm risk.

In this study, the data collection is quantitative in nature since archival data is collected. Based on the above discussion, this study uses a positivist philosophy to find the relationship between attributes of the board and firm risk in UK corporations.

6.3. Research approach

Traditionally the research approach can be either deductive, inductive or a combination of these approaches (Saunders, Lewis and Thornhill, 2009). The approach used in this study is deductive in nature since it develops a set of hypotheses from theory and empirical findings from existing literature. Hypotheses are tested by analysing the collected data using statistical methods. Rejecting the null hypothesis provides support for the proposition derived from the existing theory (Bryman and Bell, 2007).

Alternatively, an inductive approach would be to interview members of a board or a number of boards, to understand how their roles and the processes that governs the functioning of the board, can influence the risk-taking in corporations. The research strategy could be a case study or a series of case studies for a particular industry sector. The method of data collection can be to interview the board members or observe board meetings. An advantage of an inductive or interpretivist approach is that it is possible to get diverse information and understand the board dynamics in making decisions. It could bring to light new variables that influence risk-taking at the board level. The disadvantages are that an interviewee's responses may be biased towards their own agenda and the interviewer's interpretation may also be predisposed to their own thinking. An interpretivist approach is more suited to a situation where the researcher is trying to understand phenomena rather than, as in

this study, explain phenomena. An inductive approach involving the collection of qualitative data would enhance the governance literature but is not suitable for this study to answer the research questions. Therefore, a deductive approach is used to investigate the data.

6.4. Research strategy and research design

The research strategy used to conduct this research is quantitative in nature. The research begins with reviewing previous work in the field (both theory and empirical literature), following which, hypotheses are deduced. The hypotheses are confirmed or rejected based on statistical tests carried out on data collected. The research strategy is to use archival data on board attributes from a sample of 268 firms between 2005 and 2010.

The research design involves ‘a series of rational decision making choices’, (Sekaran, 2003, p.117) namely the purpose of study, type of investigation, extent of researcher interference, unit of analysis, time horizon, sampling design, measurement of variables and data collection method. The study can either be exploratory, descriptive or hypothesis testing (Bryman and Bell, 2007); this study employs hypotheses testing to explain the relationship between board attributes and firm risk. The type of investigation can be causal or correlational and this study establishes a cause and effect relationship rather than using a correlational type of investigation which identifies the most important factors associated with risk-taking. Archival data is collected and the unit of analysis is a large publicly held firm in the FTSE 350 index. The time horizon chosen for data collection is not cross-sectional but longitudinal in nature from the year 2005 to 2010. The sampling design and the measures and measurement of variables are explained in section 6.5 and 6.6. The

data collection method is discussed in more detail in the following section. This design is chosen since it allows for statistically testing the hypotheses to find if board attributes influence firm risk, and most appropriate to answer the research questions. The other possibilities for research design are of case study, comparative study, cross-sectional study, and experimental study (Bryman and Bell, 2007).

6.4.1. Longitudinal design

The research strategy employed is using longitudinal design. Longitudinal data has both cross-sectional and time-series properties (Brooks, 2008). The data collected are repeated measurements over time for each firm. The longitudinal design requires a minimum of two continuous observations for each firm and the sample time frame is such that there is a maximum of six continuous observations. Collecting longitudinal data offers some advantages over cross-sectional data; it allows one to capture the changes in an organization over a period of time which allows one to derive causal relations. Also, unlike cross-sectional data there are more points of observation which introduces more variability in the data and hence, inference of model parameters is more accurate.

There are two types of longitudinal studies, namely cohort study and panel study (Sekaran, 2003). Cohort study involves an entire cohort of organizations that share a certain characteristic in the sample while, in a panel study, the sample is a randomly selected number of organizations over more than one point in time (Sekaran, 2003). This study is a cohort study, since the sample data is from a cohort of companies in the FTSE 350 index. Such a panel data may be inherently unbalanced as there are some missing observations for some organisations in some of the time periods. This

can be due to the fact that a firm is created later in the sample period or could have become bankrupt sometime during the sample period.

The problems with longitudinal data are as follows. First, there is a possibility of sample attrition due to the fact that a firm may not be in the FTSE 350 index for all years due to poor performance, mergers or other reasons. The problem with attrition is that the organisations that have left the sample can differ in some important respect to those that remain (Bryman and Bell, 2007) which can cause a bias in the results. Survivorship bias is addressed in section 6.5.4. Secondly, the period chosen for the study is important such that external factors do not affect the results of the study. For example, the state of the economy can affect firm risk; therefore, it would be important to choose a time period that incorporates a full economic cycle. In this study the period 2005 to 2007, were the upward cycle of the economy and the years 2008 to 2010, were the downward cycle of the economy. This ensured that both upward and downward cycle of the economy is captured in the sample.

6.4.2. Archival research strategy

The research design strategy involves collecting secondary data available in databases. The archival research strategy uses historical information that represents actual observation at a point in time. Saunders, Lewis and Thornhill, (2007) explain that archival research can employ hard copy documents such as annual reports or commercial databases. Almost all of the previous literature in this field uses archival data. The advantage of archival data collection is that there is easy access to a large amount of data. This method is cost effective, since the data is already in a usable form and is available at a lower cost in comparison to collecting primary data (using surveys or interviews). The data is available publicly; therefore, this study is

replicable, which is an important concern in research design. The data is assumed to be accurate since it is downloaded from a commercial database and makes the finding of the research reliable.

6.5. Data

The scope of this study is national, encompassing only large UK firms and the unit of analysis is the board of these firms.

6.5.1. Data Source

Secondary data on board attributes is collected from existing databases for FTSE 350 firms. Accounting data and market data is collected from Bloomberg, a database offered at the Kingston University library. The data on the board of firms is hand collected from the Morningstar database, which is one of the leading providers of data on firms, in the UK. The option of using secondary data is chosen since directors of boards usually do not respond to questionnaires and are not available for interviews to enable new data to be extracted.

6.5.2. Sample period

The sample period chosen are the years 2005 to 2010. This six year period includes three years of growth in the economy and three years of contraction in the economy. Therefore, this sample period is balanced and includes both contraction and growth in sample firms which can reduce bias in the results. Six most recent years are chosen for this study and the period is limited to six years due to the fact that data collection is labour intensive.

6.5.3. Data sample

Publicly listed firms on the FTSE 350 index are chosen for the sample since they have boards whose responsibility is to protect shareholder interest. This choice is made since this study is based on the assumption that there exists an agency problem between the shareholders and the executives of the firm and this problem is most relevant in large UK listed firms where there is diffused ownership and executives manage the firm.

The population from which the data sample is selected is the FTSE 350 index. This is an index of the largest firms listed on the London stock exchange by market capitalization. It is a combination of the FTSE 100 index which is comprised of the 100 largest firms and the FTSE 250 index which is an index of the next largest 250 firms. Annual data is collected over the period of 2005 to 2010.

The firm with the highest market capitalisation and the smallest market capitalisation within the FTSE 350 index may have different board structures due to the size and complexity of the business; therefore in this study firm size is used as a control variable in the empirical model to control for firm size and complexity to find the relation between board attributes and firm risk.

The next subsection explains how the sample selection is made.

6.5.4. Sample selection

The sample selection began by drawing up lists of firms for each year of the sample period consisting of FTSE 350 companies. The list of firms consisted of $350 \times 6 = 2100$ firm-year observations over the six year period. These lists were merged to form one comprehensive list. The unique number of firms on this list is 599. To be

included in the data sample the firms need to be listed in the FTSE 350 for at least two consecutive years over the period 2005 to 2010. This ensured that the sample did not include firms which are in the FTSE 350 list as a one off case. Having at least two observations per firm would also ensure that the estimation methods for the analysis would work since the estimation methods use averaging and differencing techniques within groups. The number of firms that are on the list for at least two consecutive years is 424. Financial services, utilities, real estate and investment trusts are excluded from the sample because of the unique financial structure and governance regime of firms in these sectors (Barnhart and Rosenstein, 1998; McKnight and Weir, 2009). This reduced the number of firms to 271. Finally, the firms which had observations with missing data were deleted from the sample. The final data sample consists of 268 firms and 1,418 firm-year observations. The sample selection and exclusion criteria are summarised in Table 6.1.

Table 6.1: Sample selection and exclusion criteria

Criteria	Number of firms
Unique number of firms in the list	599
Exclude firms that appeared in the FTSE only once in the sample period	175
Exclude firms in the financial services, investment trusts and utilities sector	153
Exclude firms with missing data	3
Final number of firms in sample	268

Once all exclusions are considered, the final dataset comprised of an unbalanced panel of 268 companies from 2005 to 2010. The sample includes firms from 8 industry sectors. Industries were determined using the Industry Classification Benchmark (ICB). The ICB classification is used globally to enable investors to

compare industry trends and replaced the older classification system for the FTSE in 2006.

The full list of sample companies is shown in Appendix I. The sample is unbalanced (not all firms have data over the whole sample period) since some firms went out of business, or were acquired or merged with other firms.

Table 6.2 shows the industry wise distribution of the data sample. By examining the number of firms in each industry, it is evident that the sample is heavily weighted towards the consumer services and industrials (the number of firms in consumer services and industrials is 74 and 80, respectively). Each of the remaining industries constitutes a small percentage of the overall sample. The distribution of the firms in the sample is similar to the distribution of firms in the FTSE 350 index.

Table 6.2: Industry distribution by number of firms

Industry	Number of firms	% of sample
Telecommunications	5	1.86
Health Care	9	3.35
Technology	18	6.71
Oil & Gas	23	8.58
Basic Materials	23	8.58
Consumer Goods	36	13.43
Industrials	74	27.61
Consumer Services	80	29.85
Total	268	100

Table 6.3 reports the distribution of the observations by year and industry. The table indicates that the number of observations per year ranges from a minimum of 229 in

2005 to 243 in 2009. There is an average of 5.3 firm year observations per sample firm.

The type of data sample used in this study is not a random sample. The organisations chosen are all in the FTSE 350 index and this type of non-random sample is similar to judgement sampling. Judgement sampling is a form of purposive sampling, which ensures that the choice of the firms in the sample provide the information required for the study (Sekaran, 2003). In this study the sample reflects large, publicly held corporations in the UK, and therefore, limits generalisation to this group (Bryman and Bell, 2007).

Table 6.3: Industry distribution by year

Industry sector	2005	2006	2007	2008	2009	2010	Total
Oil & Gas	17	18	16	19	18	16	104
Basic materials	14	16	15	19	21	21	106
Industrials	70	72	72	70	70	66	420
Consumer goods	33	35	31	31	31	29	190
Healthcare	9	8	8	8	8	8	49
Consumer service	66	70	71	71	73	70	421
Telecommunications	4	5	5	5	5	5	29
Technology	16	16	17	17	17	16	99
Observations	229	240	235	240	243	231	1,418

In considering the size of the sample, it is important for it to be large enough for the finding to be generalised to all large UK firms in the FTSE 350 (Sekaran, 2003). Samples that are too large can cause weak relationships to become significant and results obtained from very small samples cannot be generalised. In this study the sample size of 268 boards of firms is not considered small but is large enough to be

generalised to similar firms. Another criterion for a right sample size is that the sample should be at least ten times more than the number of independent variables used (Sekeran, 2003). In this study, this criterion is also met.

6.5.5. Survivorship bias

Survivorship bias occurs when there is a selection of non-random data; for example, if a list of firms is compiled based on their existence in the FTSE 350 index on the last year of the sample period. This would mean that only firms that have survived over the sample period are included in the sample. This bias occurs when certain data is excluded which has the same characteristic as the chosen sample and this could lead to errors in the findings (Wooldridge, 2009). This bias is common in longitudinal research design when using balanced data panel. To a large extent this problem has been avoided by listing all firms that made an entry in the FTSE 350 over the sample period. Since some firms have joined the index for the first time or been acquired or become insolvent, the list is not the same year on year. From these lists of firms a final list is collated with a condition that firms needed to exist in the FTSE 350 list for two consecutive years at least.

6.6. Measures of explanatory or independent variables

Wooldridge (2009) recommends that, when analysing data, a natural log transformation should be used for certain measures that are always positive, such as board size, in order to reduce heteroskedasticity. However, Wooldridge (2009) recommends that variables such as age and tenure should remain in their original form. Also, log transformation cannot be applied to variables that have a value of zero or have a negative value. In estimating variables that are not normally distributed robust methods or bootstrapping can be used in the estimation

(Wooldridge, 2009, p163); this study used robust methods in the estimation of the empirical model.

The board attributes, which are the explanatory or independent variables, are categorised into four groups of board composition, board leadership structure, board characteristics and board processes based on the Zahra and Pearce's (1989) theoretical model. First, the measures of the individual board attributes are discussed and then the construction of the composite index is explained.

6.6.1. Board composition

A review of board literature by Adams, Hermalin and Weisbach (2010) revealed that most studies have used board size and percentage of NEDs in their discussion of board composition. This study uses board size, percentage of NEDs directors, as well as gender diversity since the requirement of women on boards is viewed as beneficial for boards (Davies report, 2011). The size of board is measured as the total number of board members and reflects the breadth of expertise on the board (Chaganti, Mahajan and Sharma, 1985). The percentage of NEDs on the board reflects the independence of the board from management (Bhagat and Black, 2002). Gender diversity is seen as a mechanism which provides a challenge and different view on decisions made (Davies report, 2011) and is measured using a dummy variable which takes the value 1 when there is at least one woman on the board. Therefore, the three variables comprising board composition are defined as follows:

Board size = total number of members on the board

Proportion of non-executive directors = percentage of non-executive directors on the board

Gender diversity = dummy variable that takes the value of 1 if there is at least one woman on the board, and 0 otherwise

It is hypothesised in Chapter 5 that board size, proportion of non-executive directors and gender diversity are negatively related to firm risk or it can be said that a large board, with a high percentage of NEDs, and presence of a woman on the board is related to less firm risk (Hypothesis 1). To test this hypothesis a new variable is constructed – composition index. This variable is constructed by combining the board size, proportion of non-executive directors and gender diversity variables. To take into account the effect of differences in board size and proportion of non-executive directors across the sample, each of the variables is standardised by the maximum in the sample. For example, consider an observation for a firm which has board size of 5, percentage of NEDs of 55% and has one woman on the board. Given that the maximum board size in the sample is 19, maximum percentage of NEDs on board is 92.30%, then the composition index is constructed as follows: $(5/19) + (.55/.923) + 1 = 1.859$. As mentioned above, gender diversity is an indicator variable that takes the value 1 if there is at least one woman on the board and 0 otherwise. Therefore, board composition index is defined as follows:

Board composition index = (board size/maximum value of board size) + (percentage of NEDs/maximum value of percentage of NEDs) + gender diversity

6.6.2. Board leadership structure

The category of leadership structure consists of two variables, one representing a powerful CEO and the other, is the percentage of equity held by executive board members. As in previous studies, a dummy variable is used to measure how powerful the CEO is (Adams, Almeida and Ferreira, 2005). The dummy variable takes on the value 1 if there is duality of the CEO-chairperson position or if the CEO is the

founder or if the chairperson is an executive of the firm. Board executive ownership is measured as the percentage of equity held by the executive members of the board. It is the ratio of the total number of shares held by the executive directors to the total outstanding shares. The two variables representing board leadership are defined as follows:

Powerful CEO = dummy variable that takes the value 1, if there is duality of the CEO-chairperson position or if the CEO is the founder, or if the chairperson is an executive of the firm, and 0 otherwise

Executive directors' ownership = ratio of the total number of shares held by the executive directors' to the outstanding shares

A board leadership structure index is constructed by combining the variables of powerful CEO and executive directors' shareholding to test Hypothesis 2. This variable is a proxy for board leadership and is constructed in a similar manner to the board composition index. For example, consider an observation for a firm where the powerful CEO dummy variable is 1 and the percentage of equity held by executive board members is 20%, given that the maximum value of board ownership in the sample is 75%, the index is constructed as follows: $1 + (.2/.75) = 1.266$. Therefore, the new board leadership index is defined as follows:

Board leadership index = powerful CEO + (executive directors' ownership/maximum value of executive directors' ownership)

6.6.3. Board characteristics

The board characteristics category consists of the two attributes, namely average age of board members in the firm and average tenure of board members in the firm. A similar measure of board age and tenure is used by Anderson *et al.* (2004). Therefore, the two variables in this category can be defined as follows:

Age = average age of board members in the firm

Tenure = average tenure of board members in the firm (in years)

A new variable board characteristics index is formed to test hypothesis 3. This variable is constructed by combining the variables of board age and tenure. For example, if the observation for a firm showed that the average board age is 55 and average tenure 6; given that the maximum value in the sample for board age is 70.52 and for board tenure is 17.54, the board characteristics index is $(55/70.52)+(6/17.54)=1.121$. Thus, the board characteristics index can be defined as follows:

Board characteristics index = (Age/maximum value for age) + (Tenure/maximum value for tenure)

6.6.4. Board process

In this study the category, board process, consists of the variables board attendance and frequency of audit committee meetings. Average board attendance is measured as follows:

Average board attendance

$$= \frac{(\text{sum of number of meetings attended by each board member})}{\text{number of board meetings} * \text{number of board members}}$$

For example, if there are three members on the board and the firm had four meeting during the year; if the first member attended three meetings, the second member attended all four meeting and the last member attended only one meeting; then using the formula described, the average board attendance is as follows: $(3+4+1) / (4*3) = 66.66\%$. The frequency of audit committee meetings is measured as the total number

of audit committee meetings in a year. Therefore, the variables in this category can be defined as follows:

Board meetings attendance = average attendance of board members for board meetings during the year

Frequency of audit meetings = total number of audit meetings in a year

Board process index is formed by combining the variables board attendance and frequency of audit committee meetings. This new variable is constructed to test Hypothesis 4 and is standardised in a similar way as the previous indices. For example, if board attendance for a particular firm-year observation is 89% and frequency of audit committee meetings in a year is 3; given that the maximum value in the sample for board attendance is 100% and maximum number of audit committee meetings is 15, the board process index will be: $(0.89/1)+(3/15)=1.09$. Thus, board process index can be defined as follows:

Board process index = (board attendance/maximum board attendance in sample) + (frequency of audit meetings/maximum frequency of audit meetings in sample)

6.6.5. Total board index

To test Hypothesis 5, the overall board governance index is constructed by combining all the four indices described above. Since the board composition, board characteristics and board process, are all predicted to be negatively related to firm risk but board leadership structure is predicted to be positively related to firm risk, the variable total board index is formed as follows:

Total board index = (board composition index + board characteristics index + board process index) – board leadership structure index

Board leadership structure index is subtracted due to the fact that it is the only index variable that is positively related to firm risk, whereas all the other indices are negatively related to firm risk. Using the values of the board indices discussed in the previous section the total board index is $(1.859+1.121+1.09)-1.266 = 2.804$. Total board index represents a governance index and can convey to stakeholders the effectiveness of the board.

6.7. Measures of dependent variable

The hypotheses established in chapter 5, all relate to how board attributes are associated with firm risk; therefore, the dependent variable in the econometric model is firm risk.

The risk measures that are most commonly used in the previous literature, where firm risk is the dependent variable, are total risk, idiosyncratic risk, systematic risk; assets return risk, insolvency risk (z-score), and earnings volatility (Boyd, De Nicoló and Al Jalal, 2005; Coles, Daniel and Naveen, 2006; Cheng, 2008; Laeven and Levine, 2009; and Pathan, 2009).

In this study four different measures of firm risk are employed and they are total risk, insolvency risk, asset return risk, and idiosyncratic risk. These risk measures were chosen such that there is both accounting data and market data used in the firm risk calculation. Each risk measure is used alternately in the econometric model as a test of robustness of the results. To calculate insolvency risk, accounting data is used while, total risk and idiosyncratic risk, use market data. Asset return risk uses both accounting and market data in its calculation. Incorporating the use market data as well as accounting data is valuable in terms of capturing all aspects of firm risk. Dalton *et al.* (1998) argue that accounting measures sometimes are not accurate

measures because they could be subject to manipulation, create distortion in measures due to depreciation policies elected, different treatment of certain revenues and expenditure items, and different methods used for consolidation of accounts. Therefore, using market data confirms the results using accounting data but the disadvantage of using market data is that the data related to a firm could be influenced by some exogenous shock to the industry.

The values for firm risk are transformed into natural log as recommended by Wooldridge (2009), such that it is normally distributed; but insolvency risk is not transformed since it has negative values.

6.7.1. Total firm risk

Many studies use total firm risk as a measure for firm risk. Pathan (2009) in his study on the effect of strong boards on risk-taking uses total risk as a measure for risk-taking. He defines total risk as the variability of equity returns and this is measured as the standard deviation of the firm's daily stock returns for each year. A high value denotes high risk taken by the firm denoting greater stock volatility or firm instability. Laeven and Levine (2009) also use total risk as a measure for risk-taking. This market based risk measure was also used by Saunders, Strock and Travlos (1990) and Demsetz and Lehn (1997) in their study of the influence of ownership structure on risk-taking. Equity risk is called the "all-in risk" measure which incorporates risks associated with all of the firms' assets, liabilities and off-balance sheet positions, reflects any diversification across those positions, and reflects leverage as well.

Total risk is the sum of systematic risk and unsystematic risk. Systematic risk is a risk carried by an entire class of assets and/or liabilities and is also known as market

risk and is associated with overall aggregate market returns. This risk cannot be reduced by diversification of the portfolio. Unsystematic risk is any risk which is unique to the investment and it is also known as idiosyncratic risk. This risk is not correlated to market risk and is firm specific and an investor usually reduces this risk by diversification through holding a portfolio of stocks.

Both regulators and firm executives frequently monitor total firm risk since it captures the overall variability in the firm's stock returns and reflects the market's perceptions about the risks inherent in the firm's assets and liabilities (Pathan, 2009).

To calculate total risk, the daily stock price for every firm over the sample period is downloaded from the Bloomberg database. Following Anderson and Fraser (2000) and Pathan (2009), total firm risk (TR) is calculated as the standard deviation of its daily stock returns (R_{it}) for each fiscal year for a firm. The daily stock return is calculated as the natural logarithmic of the ratio of equity return series, i.e. $R_{it} = \ln(\frac{P_{it}}{P_{it-1}})$, where P_{it} is the stock price (Pathan, 2009). The standard deviation of this ratio multiplied by the square root of the number of days of trade activity (260 days) gives the annualised volatility of equity return for each stock.

$$TR = SD(R_{it}) * \sqrt{260}$$

Where, TR = Total firm risk

$SD(R_{it})$ = Standard deviation of daily stock returns where i represents the firm and t is the time period.

6.7.2. Insolvency risk

This study brings up the issue of high risk-taking in relation with the investment choices and decisions made at board level. High risk-taking relates to the

proportionality of risk taken in terms of high risk activities approved at board level. High risk-taking increases stock volatility which in turn increases the probability of firm insolvency (Shapira, 1994), and therefore insolvency risk is calculated in the study.

Insolvency risk is the probability of a firm becoming insolvent and is measured by calculating the z-score which measures the distance from insolvency (Roy, 1952). Z-score is calculated using accounting data of the firm and indicates the overall health of the company.

The z-score formula was proposed by Altman (1968), but has been used previously by Roy (1952) in his study of risk involving holding of assets. The formula is used to predict the probability that a firm will go into bankruptcy within two years and is based on financial ratios of the firm. A higher z-score shows that the firm is more stable. The Altman (1968) z-score is calculated using various financial ratios of the firm and is used with different coefficients for non-manufacturing companies, private companies, railways, companies in emerging markets etc. Therefore, since the sample of this study has firms from various industries, this measure is not used for this study.

Recent studies (Laeven and Levine, 2009; Pathan, 2009) use a simpler method to calculate z-score. They propose that insolvency is defined as the state at which the firm's losses are more than its equity plus profits. Therefore, the probability of the firm becoming insolvent is $\text{Prob}(-ROA < CAR)$ where ROA is the return on assets and CAR is the Capital Asset Ratio (Laeven and Levine, 2009). If the profits are normally distributed, then the inverse of the probability of insolvency is as follows:

$$Z = ROA + \left(\frac{CAR}{SD(ROA)} \right)$$

Where Z = z-score indicates the number of standard deviations that a firm's ROA has to drop below its expected value before equity is depleted.

$SD(ROA)$ = standard deviation of return on assets

CAR = Capital asset ratio measured as (total equity/total assets)

A high z-score indicates that the firm is more stable and has less insolvency risk, whereas firms with a computed z-score of less than zero are at risk of failure (Agarwal, and Taffler, 2005). Therefore, z-score can be considered as a benchmark which can indicate high probability of insolvency (high firm risk), since a firm with a z-score of less than zero is at risk of failure.

To enable the comparison of z-score with the other measures of firm risk (where a high value is indicative of high firm risk, while z-score a low value is indicative of risk of failure) the inverse of z-score or insolvency risk is used in discussing the results.

6.7.3. Asset return risk

Asset return risk is the volatility of asset returns; whereas total firm risk is measured using only market data, asset return risk is measured using both accounting and market data. Following Flannery and Rangan, (2008) and Pathan (2009), volatility of asset returns or Asset Return Risk (ARR) is computed as shown below.

$$ARR = SD(R_{it}) * \left(\frac{Equity}{Assets} \right) * \sqrt{260}$$

Where ARR = Asset return risk

$SD(R_{it})$ = standard deviation of the daily stock returns where i represents the firm and t is the time period.

Equity = market value of equity

Assets = book value of total assets

6.7.4. Idiosyncratic risk

Idiosyncratic risk is the risk that arises due to unique circumstances of a particular firm and not the market. Total risk is a combination of market risk and idiosyncratic risk. The data for idiosyncratic risk is downloaded from Bloomberg database which is calculated using the single index model, shown below, that states that the return on an asset (SR_{it}) depends on the responsiveness of the equity to the market risk (β) and idiosyncratic risk (Adams, Almeida and Ferreira, 2005).

$$SR_{it} = \beta_i MR_t + u_{it}$$

Where SR_{it} = stock return for firm i at time t

β = Market risk

MR_{it} = Market return

u_{it} = residual returns that reflect idiosyncratic risk

Other risk measures such as systematic (market risk) was employed in the study though it is not reported since the results did not align with those of other risk measures; this may be because market risk is not firm specific and can vary depending on exogenous factors.

The next section discusses the control variables used in this study.

6.8. Measures of control variables

Control variables are used in the regression so as to control for factors other than the board attributes that could affect the dependent variable. The choice of control variables is important so that the estimation is accurate. Following Adams, Almeida

and Ferreira (2005) and Cheng (2008) the control variables used in this empirical model are firm size; lagged firm performance; growth opportunities; financial leverage; industry dummies and year dummies.

Firm size is measured as market capitalisation of the firm in billions of pounds; where market capitalisation is calculated as the total value of issued shares. Firm size captures the complexity, breadth and spread of the firm. Firm size is also a proxy for firm age, since older and larger firms tend to have higher book-to-market value ratio or higher market capitalisation (Durnev and Kim, 2005). Firm size is used as a control variable since large firms may have better access to capital markets and borrow at better conditions, (Ferri and Jones, 1979) and therefore, have a larger leverage ratio (Titman and Wessels, 1988). Due to this, larger firms would be able to diversify and invest more and build up assets. For firms with a large value of assets, a wrong choice of investment may not affect the volatility of its stock price. Also, large firms have a greater demand for shares (index investors) and perhaps have lower volatility of stock price. Therefore, it is predicted that larger firms are associated with less firm risk.

Lagged firm performance has been used by Cheng (2008) as a control variable, in his study, of how board size is associated with firm risk. Firm performance is measured as return on assets. If a firm did not meet the targeted firm performance in the prior year, managers in an attempt to meet targeted performance figures for the current year, take more risk (Cyert and March, 1963; Palmer and Wiseman, 1999; Mukherji, Desai and Wright, 2008). Therefore, it is predicted that low performance of the prior year is associated with high firm risk in the current year.

Firms which have large debts to service will be risk-averse in terms of the projects they choose to invest in. Pathan (2009) argues that firms with high financial leverage are associated with less firm risk due to the burden of repayment. Therefore financial leverage is used as another control variable. Financial leverage is calculated as total debt over total assets where total debt is the sum of short term debt and long term debt.

Growth opportunities are measured as capital expenditures over sales. Myers (1977) argues that high growth firms prefer relatively lower levels of debt in order to avoid the adverse effects of the under-investment problem. Such firms use equity instead to finance growth. If the firm has more growth opportunities, then it will take this opportunity to expand. Therefore, it is predicted that a firm with more growth opportunities is associated with more firm risk. Cheng (2008) uses growth opportunities and financial leverage as control variables in his study of the effect of board size on firm risk.

Industry dummies are used to control for industry specific fixed effects on corporate performance variability. Year dummies are used to control for year specific events that occur which may influence firm risk. A table showing the definition of all the variables used in the study is shown in Table 6.4.

In the next section, some of the problems facing estimation of corporate governance variables are discussed.

Table 6.4 - Measure of variables

Variables	Measures
<i>Independent Variables</i>	
Size of board	Total number of member on the board
Proportion of NEDs	Percentage of non-executive directors on the board
Gender Diversity	A dummy variable which takes the value 1 when there is at least one woman on board or 0 otherwise
Powerful CEO	A dummy variable which takes the value 1 if there is duality of the CEO-chairperson position, or if the CEO is founder or if the chairperson is an executive or 0 otherwise
Executive directors' ownership	Equity ownership of all the executive board members as a percentage of the outstanding shares
Board Age	Average age of the board members in the firm
Board Tenure	Average tenure of the board members in the firm in years
Board meeting attendance	Average board attendance of the board members
Audit Committee meeting	The total number of audit committee meeting during the year
<i>Board Indices</i>	
Board Composition Index	(board size/maximum value of board size) + (percentage of NEDs/maximum value of NEDs) + presence of women
Board Leadership structure index	powerful CEO + (board ownership/maximum value of board ownership in sample)
Board characteristics index	(Age/maximum value for age in sample) + (Tenure/maximum value for tenure in the sample)
Board process index	(board attendance/maximum board attendance in sample) + (frequency of audit meetings/maximum frequency of audit meetings in sample)
Total Board index	(Board Composition Index-Board Leadership Structure Index + Board Characteristic Index + Board Process Index)
<i>Dependent Variables</i>	
Total risk	The standard deviation of the daily stock returns (annualised)
Asset Return risk	The standard deviation of the daily stock returns times the ratio of the market value of equity to market value of total assets times square root of 260
Insolvency risk	Inverse of Z score= $-(\text{Return on Assets} + (\text{Equity}/\text{Total Assets})/(\text{Standard Deviation of Return on Assets}))$
Idiosyncratic risk	Risk specific to the firm, measured using the single index market model
<i>Control Variables</i>	
Lagged Performance	The return on assets for the firm for the previous year measured in millions
Firm Size	The market capitalisation of the firm in billions measured as the total value of issued shares
Growth opportunities	Capital expenditures over sales
Financial leverage	Total debt over assets (where total debt is equal to short term debt and long term debt)
Industry dummies	Dummy variable that takes the value 1 if observation belongs to a particular industry, otherwise 0. Eight dummy variable in all.
Year dummies	Dummy variable that takes the value 1 if the observation is in a particular year, otherwise 0. Six dummy variables for years between 2005 to 2010

6.9. Problems related to estimation of corporate governance variables

There are two problems with regards to the estimation of corporate governance variables. The first problem is the stickiness of the variables which refers to the fact that these variables do not change over time, and second, there is the problem of endogeneity in governance variables (Hermalin and Weisbach, 1998). These problems are explained below.

6.9.1. Stickiness of corporate governance variables

The structure and composition of a board are decided by the shareholders, when the firm shares are initially offered publicly, and consequently, changes are made to this structure in response to governance regulation or some major performance issues of the firm. Otherwise, the corporate governance variables do not change much; this is known as stickiness of governance variables. For example, the board size and the number of NEDs on the board may not change over a long period. Stickiness is an issue of concern as it results in loss of statistical power in governance research and requires considerable care in estimation methods. To counter this problem, the estimation method of generalised least squares random effects (GLS-RE) method is chosen. This method allows for the independent variables to be time invariant and provides unbiased results (Wooldridge, 2009).

6.9.2. Endogeneity problem

Recent studies on internal governance state that research in this area should consider that governance variables are endogenous to firm performance (Adams, Hermalin and Weisbach, 2010). Endogeneity occurs when an independent variable is determined by the dependent variable (reverse causality) or if there are explanatory variables that are omitted from the regressions or if there is any measurement error

(Wooldridge, 2009). This is a significant problem when examining the impact of board attributes on firm performance or firm risk. Many earlier studies on board characteristics treated the corporate governance attributes as exogenous variables where they did not consider that there could be reverse causality in the model (Morck, Shleifer and Vishny, 1988; Jensen and Murphy, 1990; Yermack, 1996; Vafeas, 1999). There is also the possibility that the model also suffered from the omission of unobserved factors (unobserved heterogeneity) and therefore, the relationship between observed variables may be due to the unobserved factors. In both these cases the explanatory variables would be endogenous and correlated with the residuals in the regression model, making the results biased and inconsistent.

The problem of endogeneity due to reverse causality is a concern when estimating the relationship between board attributes and firm performance. Boone *et al.* (2007) and Coles, Daniel and Naveen (2008) have shown that the structure of the boards are characterised by the complexity and size of the firm which is to say that some of the board attributes are endogenous. Kaplan and Minton (1994) and Morck and Nakamura (1999) in their study of governance in Japanese firms, find that following poor performance results of the firm, there are major changes in board composition. Coles, Daniel, and Naveen (2008) use 1500 large US companies from 1992 to 2001 in their study and find that the market-to-book ratio increases with board size for complex firms (large, diversified, and levered firms) and with the percentage of insiders on the board for firms in which firm-specific knowledge is important. Linck, Netter and Yang (2008) find that firms choose the structure of the board based on the costs and benefits of monitoring and advising. They hypothesise that the way boards are structured depends on the following factors. First, board structure depends on firm complexity which includes factors such as number of business segments of the

firm, firm debt, firm age and firm size. Secondly, board structure depends on growth opportunities measured as market to book ratio or spending on research and development. Thirdly, board structure depends on ownership incentives to the CEO and other board members. Lastly, board structure depends on having a powerful CEO which can be measured using CEO tenure, past performance, age and duality of chairperson-CEO position. They find that board size is significantly affected by firm performance, complexity of firm, growth opportunities and CEO ownership and the proportion of non-executive directors is affected by all the above factors as well as ownership of NEDs.

With regards to the endogeneity issue due to reverse causality flowing from firm risk to board attributes, different estimation methods are used that takes into consideration this problem. Pathan (2009) follows a simple method first to find if there is any reverse causality in the empirical model. The model is re-estimated using lagged independent variables. If the results remain the same as when the independent and dependent variables are contemporaneous then it is concluded that there is no reverse causality. This shows that the dependent variable does not affect the independent variables. This method is followed in this study to check for reverse causality.

Pathan (2009) also identifies two endogenous variables, board size and proportion of non-executive directors, based on previous governance research. As a test of robustness Pathan (2009) uses the three stage least squares estimation method to counter the problem of endogeneity. This estimation method is discussed in detail in section 6.12.

6.10. Econometric models

This section sets out the econometric models employed to estimate the association between firm risk and board attributes. The hypotheses discussed in Chapter 5 are tested using the econometric models shown below.

For testing the hypothesis H1A, H1B, H1C the following econometric model is used.

$$\begin{aligned} \text{Firm Risk}_{it} = & \alpha + \alpha_1 \text{ board size}_{it} + \alpha_2 \text{ proportion of NEDs}_{it} + \alpha_3 \text{ gender diversity}_{it} + \\ & \alpha_4 \text{ lagged firm performance}_{it} + \alpha_5 \text{ firm size}_{it} + \alpha_6 \text{ growth opportunities}_{it} + \\ & \alpha_7 \text{ financial leverage}_{it} + \alpha_8 \text{ industry dummies} + \alpha_9 \text{ year dummies} + \epsilon_{it} \end{aligned} \quad (1)$$

For testing the hypothesis H2A and H2B the following econometric model is used.

$$\begin{aligned} \text{Firm Risk}_{it} = & \alpha \\ & + \alpha_1 \text{ powerful ceo}_{it} + \alpha_2 \text{ executive directors ownership}_{it} + \\ & \alpha_3 \text{ lagged firm performance}_{it} + \alpha_4 \text{ firm size}_{it} + \alpha_5 \text{ growth opportunities}_{it} + \\ & \alpha_6 \text{ financial leverage}_{it} + \alpha_7 \text{ industry dummies} + \alpha_8 \text{ year dummies} + \epsilon_{it} \end{aligned} \quad (2)$$

For testing the hypothesis H3A and H3B the following econometric model is used.

$$\begin{aligned} \text{Firm Risk}_{it} = & \alpha \\ & + \alpha_1 \text{ average age}_{it} + \alpha_2 \text{ average tenure}_{it} + \alpha_3 \text{ lagged firm performance}_{it} + \\ & \alpha_4 \text{ firm size}_{it} + \alpha_5 \text{ growth opportunities}_{it} + \alpha_6 \text{ financial leverage}_{it} + \\ & \alpha_7 \text{ industry dummies} + \alpha_8 \text{ year dummies} + \epsilon_{it} \end{aligned} \quad (3)$$

For testing the hypothesis H4A and H4B the following econometric model is used.

$$\begin{aligned}
\text{Firm Risk}_{it} = & \alpha \\
& + \alpha_1 \text{ board meeting attendance}_{it} + \alpha_2 \text{ frequency of audit committee meetings}_{it} + \\
& \alpha_3 \text{ lagged firm performance}_{it} + \alpha_4 \text{ firm size}_{it} + \alpha_5 \text{ growth opportunities}_{it} + \\
& \alpha_6 \text{ financial leverage}_{it} + \alpha_7 \text{ industry dummies} + \alpha_8 \text{ year dummies} + \epsilon_{it}
\end{aligned} \tag{4}$$

Where,

- i refers to the firm and varies from 1 to 268
- t refers to the year of observation and varies from 2005 to 2010
- α is the constant that does not vary over time
- $\alpha_1 - \alpha_9$ are the coefficients in the regression
- ϵ_{it} is the residual variable that varies with time.

Four firm risk measures using both accounting and market data are used alternatively as the dependent variable. The first term α is a constant and refers to firm specific effects that capture all time-invariant unobserved firm specific effects. These are features that are idiosyncratic to a particular firm; since firms can be different due to factors which may be unobservable. Coefficient α_i shows the relationship between the independent variable (such as board size) and the dependent variable (firm risk).

Four indices representing the categories of board composition, board leadership structure, board characteristics, and board process are formed by combining the individual variables in each of these categories. The empirical models to test the association of these indices to firm risk are shown next.

To test the hypothesis H1 the following econometric model is used.

$$\begin{aligned}
\text{Firm Risk}_{it} = & \alpha + \alpha_1 \text{ board composition index}_{it} + \alpha_2 \text{ lagged firm performance}_{it} + \\
& \alpha_3 \text{ firm size}_{it} + \alpha_4 \text{ growth opportunities}_{it} + \alpha_5 \text{ financial leverage}_{it} + \\
& \alpha_6 \text{ industry dummies} + \alpha_7 \text{ year dummies} + \epsilon_{it}
\end{aligned} \tag{5}$$

To test the Hypothesis H2 the following econometric model is used.

$$\begin{aligned} \text{Firm Risk}_{it} = & \alpha + \alpha_1 \text{ board leadership index}_{it} + \alpha_2 \text{ lagged firm performance}_{it} + \\ & \alpha_3 \text{ firm size}_{it} + \alpha_4 \text{ growth opportunities}_{it} + \alpha_5 \text{ financial leverage}_{it} + \\ & \alpha_6 \text{ industry dummies} + \alpha_7 \text{ year dummies} + \epsilon_{it} \end{aligned} \quad (6)$$

To test the hypothesis H3 the following econometric model is used.

$$\begin{aligned} \text{Firm Risk}_{it} = & \alpha + \alpha_1 \text{ board characteristics index}_{it} + \alpha_2 \text{ lagged firm performance}_{it} + \\ & \alpha_3 \text{ firm size}_{it} + \alpha_4 \text{ growth opportunities}_{it} + \alpha_5 \text{ financial leverage}_{it} + \\ & \alpha_6 \text{ industry dummies} + \alpha_7 \text{ year dummies} + \epsilon_{it} \end{aligned} \quad (7)$$

To test the hypothesis H4 the following econometric model is used.

$$\begin{aligned} \text{Firm Risk}_{it} = & \alpha \\ & + \alpha_1 \text{ board process index}_{it} + \alpha_2 \text{ lagged firm performance}_{it} + \alpha_3 \text{ firm size}_{it} + \\ & \alpha_4 \text{ growth opportunities}_{it} + \alpha_5 \text{ financial leverage}_{it} + \alpha_6 \text{ industry dummies} + \\ & \alpha_7 \text{ year dummies} + \epsilon_{it} \end{aligned} \quad (8)$$

To test the hypothesis H5 the following econometric model is used.

$$\begin{aligned} \text{Firm Risk}_{it} = & \alpha + \alpha_1 \text{ total board index}_{it} + \alpha_2 \text{ lagged firm performance}_{it} + \alpha_3 \text{ firm size}_{it} + \\ & \alpha_4 \text{ growth opportunities}_{it} + \alpha_5 \text{ financial leverage}_{it} + \alpha_6 \text{ industry dummies} + \\ & \alpha_7 \text{ year dummies} + \epsilon_{it} \end{aligned} \quad (9)$$

The econometric models discussed above are similar to the model used by Adams, Almeida, and Ferreira (2005), Cheng (2008), Pathan (2009) and Nakano and Nguyen (2012), to examine performance variability/risk-taking in firms. In the next section, the estimation methods which are used to estimate these models are discussed.

6.11. Estimation methods

Panel data methods used for analysis of longitudinal data provides a powerful study of the governance attributes and their influence on risk-taking in UK firms. Panel

analysis allows for analysing the dynamics of change over the period chosen. It allows the regression analysis to have both spatial (cross-section of firms) and temporal (over a period of time) dimensions. The estimation methods that can be used to estimate this empirical model are either static models or dynamic models. Static models include estimation methods of pooled ordinary least squares, fixed effects, and random effects. Dynamic models include a lagged dependent variable on the right hand side of the equation. For dynamic models, the estimation method used is the instrumental variables method.

The pooled OLS estimation approach is restrictive and assumes the association between the independent and dependent variables to be constant over time and across units (Wooldridge, 2009). However, in this longitudinal sample design, each firm-year observation is not independent of the previous period observation and therefore there will be correlation over time within the firm-year observations, which is not permitted. Pooled OLS estimation does not fully exploit the longitudinal aspect of the data and therefore, is not be used in this study.

Fixed effects and random effects estimation methods provide valid results in the presence of unobserved heterogeneity. Unobserved heterogeneity refers to the existence of unobserved variables which may be correlated with the observed variables in the empirical model (Wooldridge, 2009). Therefore, these methods are considered for use in this study. This study uses both static and dynamic estimation methods for the analysis, as a test of robustness, to confirm results.

Pathan (2009) who examined board composition on risk-taking in bank holding firms in the US used the generalised least squares random effects (GLS-RE) method to estimate the empirical model. More recently Nakano and Nguyen (2012) also used

GLS-RE to estimate their empirical model to examine the effect of board composition on risk-taking in Japanese firms. This study also uses GLS-RE estimation method as the main method for analysing the data.

The statistical software used for analysing the data is STATA. This software in comparison to other statistical packages of SAS and SPSS has the advantages of having advanced statistical methods to analyse longitudinal data and the software is user friendly.

In the following section, the advantages and disadvantages of using the two main linear regression estimation methods of fixed and random effects method for analysing panel data are discussed.

6.11.1. Static estimation methods of fixed and random effects methods

Fixed effects method (within estimator) assumes that the explanatory variables are non-random. This method is used to control for bias due to omitted variables in explaining the dependent variable. Fixed effect estimation is usually suggested in the presence of unobserved firm fixed-effect (Wooldridge, 2009). If fixed effects are assumed, then it is assumed each firm has time independent effects that may be correlated to the explanatory variables. This model controls for unobserved heterogeneity which is constant over time and correlated with explanatory variables. Unobserved heterogeneity can arise if both the variability of firm performance and a board attribute are jointly determined by an unobservable firm-specific variable. One way to address this concern is with firm fixed-effects. This constant can be removed from the analysis through differencing, for example by taking a first difference which will remove any time invariant components of the model. There are two common assumptions made about the individual specific effect, the random effects assumption

and the fixed effects assumption. The fixed effect assumption is that the individual specific effect is correlated with the independent variables. One of the drawbacks of fixed effect approach is that it relies on within-firm variation to drive results (Hermalin and Weisbach, 1991; Zhou, 2001). On the other hand the random effects model assumes that variation across firms is random and uncorrelated with the independent variables. If the differences across firms have some influence on the dependent variable, then random effects is the method to use (Wooldridge, 2009). The advantage of random effects is that time invariant variables can be used, whereas in fixed effects these variables are absorbed by the intercept.

A Hausman test is usually conducted to determine whether to use fixed effects or random effects estimation method. The Hausman test is subject to statistical problems when the panel data does not have within firm variation, that is, if there is not much variation in the data for a firm over the sample period (Wooldridge, 2009). Since the data sample in this study does not have much variation over the sample period, the Hausman test cannot be used to determine if fixed or random effects methods should be used for estimating the models. The following section gives the reasons for choosing random effects method over fixed effects method for estimating the empirical models.

6.11.2. Why random effects method

In random effects models either all or some of the explanatory variables are treated as if they arise from random causes. The random effects assumption (made in a random effects model) is that the firm specific effects are uncorrelated with the independent variables. If this assumption holds, the random effects model is more efficient than the fixed effects model. If the differences across firms have some

influence on the dependent variable, then it is recommended to use random effects estimation (Baltagi, 2005).

This study uses GLS random effects estimation due to the following reasons:

- Board attributes which are time invariant, such as board size, powerful CEO, women on board, cannot be estimated with fixed effect regression as these variables would be wiped out in 'within transformation' process of the variables in this estimation method.
- Fixed effect estimation requires significant within firm variation for the board variables values so as to produce consistent and efficient results. According to Wooldridge (2009), if the independent variables do not vary much over time then estimates will not be precise.
- Fixed effects estimates can aggravate the problem of multicollinearity if it is solved with least squares dummy variables (Baltagi, 2005).
- This study has a sample period of six years (T) and 268 firms (N). Baltagi (2005) mentions that when N is large and T is small, in panel data set, fixed effect estimation will be more inconsistent. Also, fixed effect estimation would lead to a large loss of degrees of freedom.

Due to these reasons, the method of estimation, chosen for this study, is the generalised least squares random effects (GLS-RE). There is an option to use robust methods to control for heteroskedasticity when using GLS-RE estimation in STATA, which is employed in this study.

6.12. Robustness tests

The following section discusses the tests for robustness, which confirm the results of the study. Three tests are employed, the first is the test for reverse causality, second is a test of the empirical model using instrumental variables method and lastly, the results are confirmed with another proxy of firm risk – absolute firm risk, using Glejser's (1969) test of heteroskedasticity.

6.12.1. Test for reverse causality

To find if there is reverse causality in the empirical models an estimation method used by Pathan (2009) is employed. Pathan (2009) replaces the board attributes with lag values in the empirical model and shows that the results remain essentially the same, showing that there is no reverse causality. This method is followed in this study to find if there is reverse causality in any of the empirical models. The results and findings are discussed in Chapter 8.

6.12.2. Three stage least squares estimation method for endogenous variables

Another method which can be used to confirm the results from using GLS-RE is the instrumental variables method. This method is used to overcome the problems of endogeneity that exist in the model due to reverse causality.

Previous studies have attempted to overcome these problems by employing the instrumental variable estimation method (Eisenberg, Sundgren, and Wells, 1998; Adams and Mehran, 2003). Existing literature by Linck, Netter and Yang (2008); Guest (2009) and Pathan (2009) identify board size and proportion of non-executive independent directors as the endogenous variables. The endogenous variables are replaced by finding exogenous instruments that represent the endogenous variables. According to Wintoki (2007), the identification of strictly exogenous instrumental

variables is almost impossible in a corporate governance setting. Instrumental variable regressions can potentially eliminate endogeneity. Pathan (2009) uses the three stage least squares instrumental variable estimation method where board size and proportion of independent non-executive directors are endogenised. The variables that explain board size are shown in equation A and the variables that explain proportion of non-executive directors are shown in equation B. These instruments (board size and proportion of non-executive directors) are substituted in equation C; this estimation eliminates the problem of reverse causality. The three stage equations which are used in this study to estimate equation 1 are shown below.

Board Size =

$$\begin{aligned} & \text{firm risk} + \text{proportion of NEDs} + \text{presence of women} + \text{board executive ownership} + \\ & \text{firm size} + \text{lagged firm performance} + \text{growth opportunities} + \text{industry dummies} + \\ & \text{year dummies} \end{aligned} \quad (\text{A})$$

Proportion of NEDs =

$$\begin{aligned} & \text{firm risk} + \text{board size} + \text{presence of women} + \text{board executive ownership} + \text{firm size} + \\ & \text{lagged firm performance} + \text{growth opportunities} + \text{industry dummies} + \text{year dummies} \end{aligned} \quad (\text{B})$$

$$\begin{aligned} \text{Firm risk} = & \text{Board size} + \text{proportion of NEDs} + \text{presence of women} + \text{firm size} + \\ & \text{lagged firm performance} + \text{growth opportunities} + \text{industry dummies} + \text{year dummies} \end{aligned} \quad (\text{C})$$

The instrumental variables technique to solve these three equations is by using the command ‘reg3’ on STATA. Other endogenous variables (and how they may be instrumented) have not been discussed in the existing literature and therefore only board size and proportion of non-executive directors are instrumented in this study. The previous estimation (discussed in section 6.12.1) will reveal if there are any

endogenous variables in the empirical model. The results for the estimation are discussed in Chapter 8.

6.12.3. Heteroskedasticity tests

The analyses discussed in section 6.11 use the standard deviation of firm performance as the dependent variable. Standard deviation of firm performance is the weighted average deviation from the firm's average performance. Another method of calculating firm risk is to calculate the absolute deviation which is the divergence with respect to the firm's expected performance at a particular point in time. To this end, Glejser's (1969) heteroskedasticity test is used in this study, as used by Adams, Almeida, and Ferreira (2005).

Glejser's (1969) tests are done in two steps. In the first step, board attributes are regressed against firm performance which is measured as return on assets, using pooled OLS estimation method. This equation is shown below.

$$ROA = \Sigma \text{board attributes} + \text{firm size} + \text{financial leverage} + \text{growth opportunities} + \text{industry dummies} + \text{year dummies} + \text{errors} \quad (D)$$

The residuals of this equation represent the unexpected component of firm performance and are obtained using the 'predict' function in STATA. Consistent with Adams, Almeida and Ferreira (2005), Sanders and Hambrick (2007) and Cheng (2008), the board variables are included in the performance equations on the premise that they affect the level, as well as the volatility of a firm's performance.

In the second step, the absolute value of these residuals is used as the dependent variable, which represents the deviation from expected firm performance. The residuals from the first step are a proxy for firm risk (Glejser, 1969; Adams,

Almeida, and Ferreira, 2005, Cheng, 2008). The model is re-estimated using pooled-OLS estimation.

$$|residuals| = \sum board\ attributes + firm\ size + financial\ leverage + growth\ opportunities + industry\ dummies + year\ dummies + errors \quad (E)$$

Glejser's test is performed to find the association between board attributes and absolute deviation from firm performance (a proxy for firm risk) and the results are discussed in Chapter 8.

6.13. Validity and reliability

This chapter discussed the research design used in this study by describing the data, econometric models and estimation methods used. Research design is important since it enables one to answer the research questions well such that the findings are valid, generalisable and replicable. According to Bryman and Bell (2007), the important factors for producing valid results are measurement validity, internal validity, external validity, and replicability.

- Measurement validity or construct validity refers to whether the measures devised of a concept do actually reflect the concept. The measures used for the individual board attributes have been used by previous studies and reflect the concepts.
- Internal validity relates to whether there is causality between two or more variables; that is to say, if the independent variable is in fact responsible for the variation in the dependent variable. This study uses longitudinal design which allows the researcher to measure change in variables over time, and

therefore, this allows causal inferences to be made (Bryman and Bell, 2007).

Robustness tests are also used to verify the results.

- External validity refers to the ability of the research findings to be generalised beyond the study. In longitudinal study design, validity is usually strong (Bryman and Bell, 2007). The cohort category in this study is the FTSE 350 index, therefore, the results can be generalised for large UK companies.
- Replicability is the ability for any other researcher to reproduce the findings and for this study replicability is high since the data collected is secondary data which is publicly available.

6.14. Summary

The research philosophy for this study is positivistic in nature since it uses a deductive approach. The deductive approach involves hypotheses derived from previous literature and theory, following which these hypotheses are tested using statistical methods. This study uses a longitudinal research design by collecting data cross-sectionally on an annual basis over a period of six years. A panel data sample of 268 firms is selected from the FTSE 350 index between the years 2005 to 2010, and financial and utility firms are excluded from the sample since these sectors are highly regulated. Survivorship bias is avoided by choosing all firms in the FTSE 350 index of every year with the condition that each chosen firm needed to exist on the index for at least two consecutive years. The data is collected from the Bloomberg database and Morningstar database and the method chosen to estimate the empirical models is the GLS-RE method. Additional test for robustness is proposed to check for reverse causality in the empirical model. To allay the endogeneity concern, it is proposed that the model is re-estimated using the three stage least squares method.

Glejser's (1969) test for heteroskedasticity is also proposed to verify the results by using another measure for firm risk.

The next chapter presents the univariate and bivariate analysis of the data.

Chapter 7

Descriptive statistics

7.1. Introduction

This chapter presents the descriptive statistics of the data sample of 268 UK firms, drawn from the FTSE 350 index, over the period 2005 to 2010. The descriptive statistics show how the data is distributed and gives the researcher a feel for the data (Sekaran, 2003). It describes the main features of the data collected and summarizes the data sample.

The structure of the chapter is as follows. First, a univariate analysis, describing the distribution of the board attributes is conducted. The mean and median, and dispersion – in terms of range, quartiles, and standard deviation are presented. The distribution of independent variables, according to industrial sector and according to the year, is also presented. Next, the descriptive statistics and distribution (according to industry and year of observation) of dependent variables, control variables and indices are presented. Finally, the bivariate analysis of the variables, which describes how the variables correlate with each other, is presented.

7.2. Univariate analysis of board attributes

Univariate analysis gives a feel for the data and checks its reliability and validity (Sekaran, 2003). The feel for the data is acquired by checking the range, mean, variance, and standard deviation in the data. An extreme-values analysis is conducted for all the variables to check if all the data are in the range as expected, by examining the maximum and the minimum values. Two observations which had extreme values for a variable are replaced by next closest value for the variable. The out of range extreme value may have been caused by a mistake in data entry in the database. In

the following section, the univariate analysis of all the variables in the study is conducted.

7.2.1. Board composition

Table 7.1 presents the descriptive statistics for all the board attributes used in the study, showing the minimum, maximum, mean, median, standard deviation as well as the quartiles.

Table 7.1 – Descriptive of board attributes

	N	Min	25 percentile	Median	75 percentile	Max	Mean	SD
Board Size	1,418	5	7	9	10	19	8.98	2.38
Proportion of NEDs	1,418	28.57	55.56	62.50	71.43	92.30	62.58	11.75
Gender diversity	1,418	0	0	1	1	1	0.51	0.50
Powerful CEO	1,418	0	0	0	0	1	0.19	0.39
Executive directors' ownership (%)	1,418	0	0.07	0.22	1.13	75.00	4.13	12.20
Average tenure	1,418	0.26	3.68	4.92	6.60	17.54	5.47	2.63
Average age	1,418	45.24	53.67	56.12	58.30	70.52	55.99	3.43
Board attendance per year (%)	1,418	51.00	93.00	96.04	98.50	100	94.81	5.69
Frequency of audit committee meetings per year	1,418	1	3	4	4	15	4.04	1.53

The sample consists of 268 firms from the FTSE 350 index with 1,418 firm-year observations. The data is collected from the Morningstar database over the period 2005 to 2010. Board size is the number of directors on the board. Proportion of NEDs is the percentage of non-executive directors on the board as reported by the firm in the annual report. Gender diversity is a dummy variable that is 1 if there is at least one woman on the board and 0 otherwise. Powerful CEO is a dummy equal to 1 if the CEO holds a dual position as chairperson or is the founder of the firm or the chairperson of the board is an executive of the firm, and 0 otherwise. Executive directors' ownership is the percentage of firm equity held by executive directors as a ratio of outstanding shares. Average tenure is the mean tenure of all the board members. Average age is the mean age of all board members. Board meeting attendance is the average of board attendance over all the board meetings held by the firm per year. Frequency of audit committee meetings held by the firm in a year is the number of meetings held. N is the number of observations, Min is the minimum value, Max is the Maximum value and SD is the standard deviation.

7.2.1.1. Board size

Table 7.1 shows that the minimum board size is 5 and a maximum board size is 19 for the sample while the mean board size is about 9 over the sample period. The median is the same as the mean, showing that the data does not have too much variation. A previous study by Vafeas (1998) reported in his study of 250 large UK firms in 1994, a mean board size of 8, which shows that the mean board size has not changed much over time. In this study, the mean board size of firms decreased minimally (Figure 7.1.) from 9.1 to 8.85 over the sample period 2005 to 2010. The mean board size is similar in the US; Cheng (2008) reports a mean board size of 9 in a sample of 1,252 firms over the sample period of 1996-2004.

Figure 7.1 – Average board size over the sample period

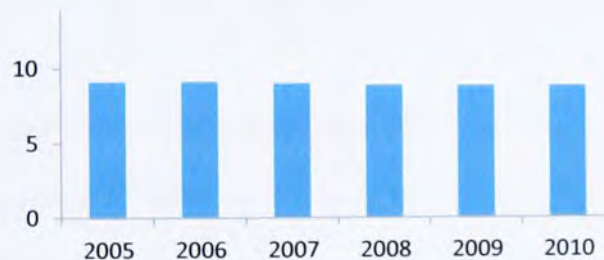
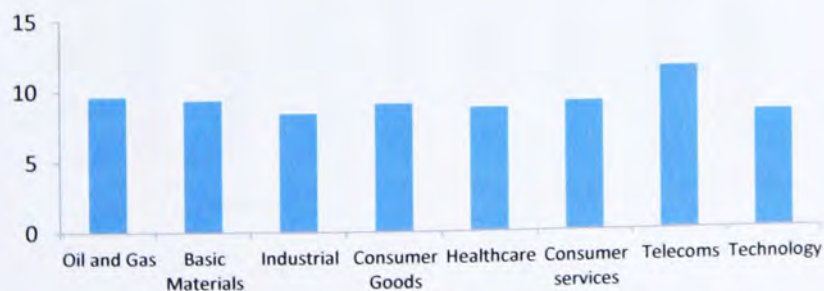


Figure 7.2 shows the average board size across industries; the telecommunications industry has the highest average board size while the industrial and technology firms have the smallest average board size.

Figure 7.2 – Average board size across industries



7.2.1.2. Proportion of non-executive directors

The descriptive statistics for proportion of non-executive directors is shown in Table 7.1. The mean percentage of NEDs on the board of UK firms in the sample is 62%, which is higher than the 50% as required by the Combined Code (2003). However, the percentage of NEDs on boards ranges from 23.57% to 93.33%, which shows that there is a lot of variation in the sample and that some firms are not complying with the Combined Code (2003).

Figure 7.3 – Average percentage of NEDs over the sample period

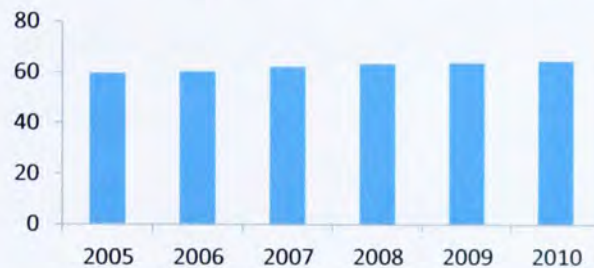


Figure 7.3 shows that the average proportion of NEDs has increased marginally year on year from an average of 60% in 2005 to above 65% in 2010. The percentage of outside directors has increased over the last 25 years, since it was 35% in 1989 in UK firms (Dahya *et al.*, 2005). This could be due to external factors such as governance regulation which recommend more NEDs on the board (Code, 2012).

Figure 7.4 – Average percentage of NEDs across industries

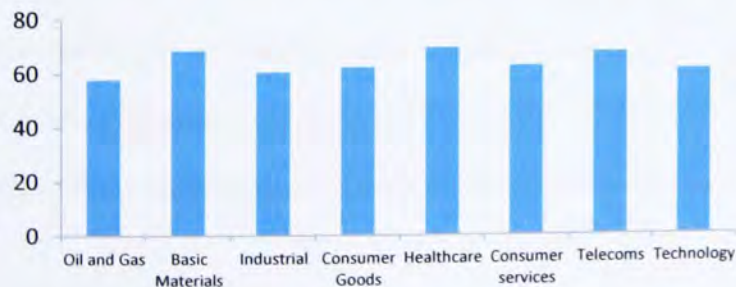
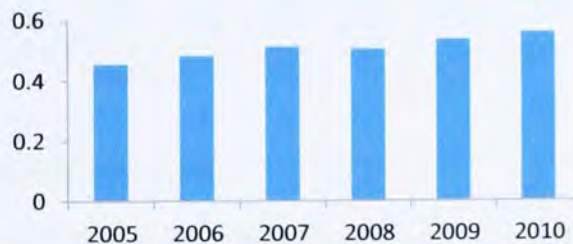


Figure 7.4 shows the average percentage of NEDs across UK industries; and it can be seen that the industries of basic materials, healthcare and telecoms have on average above 60 % NEDs.

7.2.1.3. Gender diversity

The presence or absence of women on the board is taken as the measure for gender diversity on boards. About 51% of the sample firms have women represented on the boards as shown in the Table 7.1. In comparison to the UK, the US has a better representation of women on boards. Adams and Ferriera (2009) found that in a sample of 1,939 US firms, during the period 1996-2003, 60% of the firms had at least one woman on the board.

Figure 7.5 - Presence of women on boards over the sample period



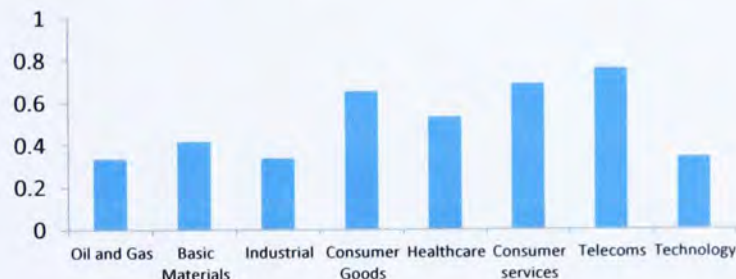
The mean percentage of women on boards in the data sample is about 8%²⁶. Over the sample period, only 8 firm-year observations had more than 30% women represented on the board. Figure 7.5 shows the number of firms in the sample which have at least one woman on board over the sample period. The number of firms with presence of a woman on the board increases from 45% in 2005 to 56% in 2010. The reason for the increase in more firms appointing women on the board can be due to the anticipated

²⁶ The percentage of women on boards in the data sample is not tabulated as this study uses the dummy variable representing the presence of women on boards.

governance regulation which requires an increase in the representation of women on FTSE 350 boards (Davies report, 2011).

Figure 7.6 shows the number of firms with presence of women directors on the board across industries in the sample. From the figure, it can be seen that gender diversity varies greatly across industries. The telecoms industry has more firms with women on board while firms in oil & gas, industrials, and technology sectors have the lowest number of firms with women on the board.

Figure 7.6 – Presence of women on boards across industries



7.2.2. Board leadership structure

The highest ranked official of the firm is the CEO, who wields a lot of influence and is in charge of overseeing the strategic direction that the firm takes; the CEO is aided by top executive directors of the firm, who may or may not own a share of the equity of the firm. A large equity holding give the directors larger voting rights which can influence decision making.

7.2.2.1. Powerful CEO

A powerful CEO, in this study, is defined as one who holds the dual position of CEO and chairperson, or is a founder, or that the chairperson of the board is an executive member. It is a dummy variable which takes the value of 1 when the CEO is

powerful and 0 otherwise. Powerful CEOs exist in about 20% of the sample firms as shown in Table 7.1.

Figure 7.7 shows that the mean of the powerful CEO over the sample period has reduced from about 25% of the firms in 2005 to less than 15% of the firms in 2010 on average. This is possibly due to firms following the recommended governance guideline to avoid duality of the top position and employing a NED as the chairperson of the firm (Code, 2012).

Figure 7.7 –Powerful CEO on board over the sample period

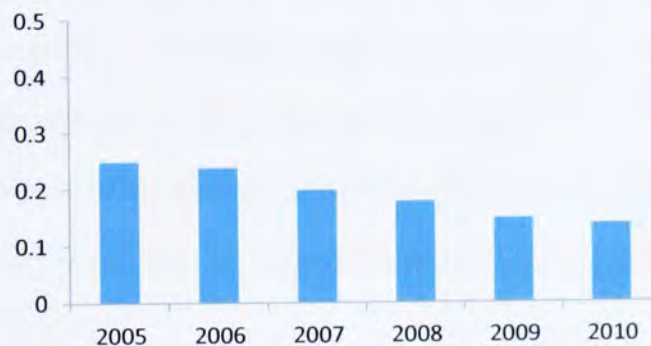
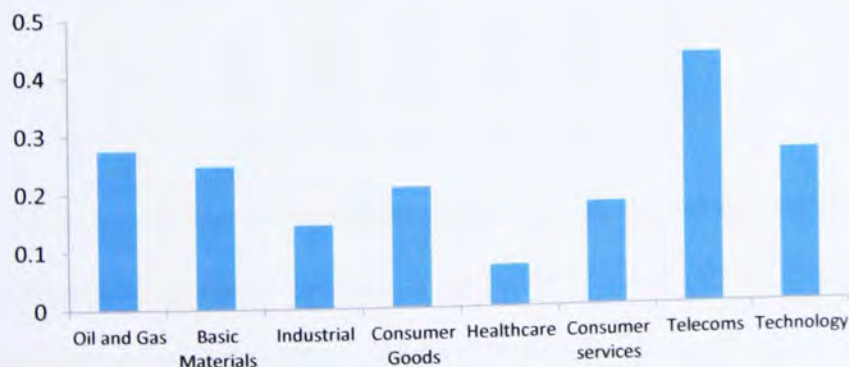


Figure 7.8 shows the number of firms with the presence of a powerful CEO across industries. The telecommunications industry has the highest representation of powerful CEOs while the healthcare industry has the least.

Figure 7.8 –Powerful CEO on boards across industries



7.2.2.2. Executive directors ownership

The descriptive statistics for equity ownership by executive directors is shown in Table 7.1 and reveals the mean percentage of shares held by executive directors is 4.25% of outstanding shares, whilst the median is 0.218%. The minimum amount of firm equity held by the executive directors is 0% and the maximum is 75% in the data sample; this shows that there is a large range in the amount of equity held in UK firms by executive directors. In 75% of the firms, executive directors hold less than 1.2% of equity in the firm. There are very few studies that have examined board executive equity ownership and have instead looked at either CEO share ownership, institutional ownership or block holder ownership (Demsetz and Lehn, 1995; Pathan, 2009). Filotchev and Bishop (2002) find, in their sample of 251 listed UK firms on the Alternative Investment Market (AIM), the average equity shareholding by top management is 25%, which is, as expected, comparatively higher than in large FTSE 350 firms.

Figure 7.9 – Average percentage of executive directors' ownership over the sample period

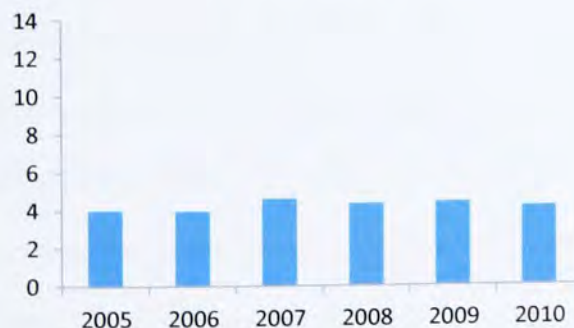


Figure 7.9 shows the average executive director equity ownership over the sample period. There is a marginal increase in executive director shareholding over the 2006-2007 period and then reduces marginally thereafter till 2010.

Figure 7.10 – Average percentage of executive directors' ownership across industries

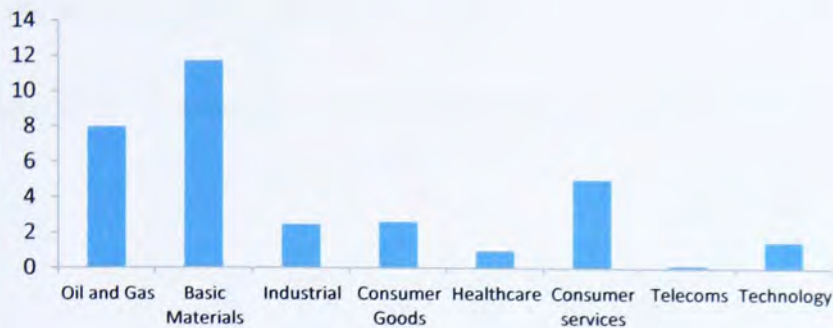


Figure 7.10 shows the average percentage of board executive equity ownership in firms across industries. The telecoms industry has the least equity ownership by board executives among the industries in the sample, while, the basic materials industry, and oil & gas firms have comparatively large equity ownership by board executives.

7.2.3. Board characteristics

Within the category of board characteristics, this study examines the tenure and age of board members.

7.2.3.1. Average tenure of board members

The descriptive statistics for the average tenure of board members is shown in Table 7.1. The mean tenure of the board members for the sample is 5.39 years with the minimum average tenure being about two years and the maximum average tenure being seventeen years. There has not been much change in the average tenure of board members over the sample period, as seen from Figure 7.11.

The average tenure of board members increased marginally year on year from 2007. After the financial crisis of 2007, it appears that firms have held on to experienced and skilled board members with longer tenures.

Figure 7.11– Average tenure of board members over the sample period

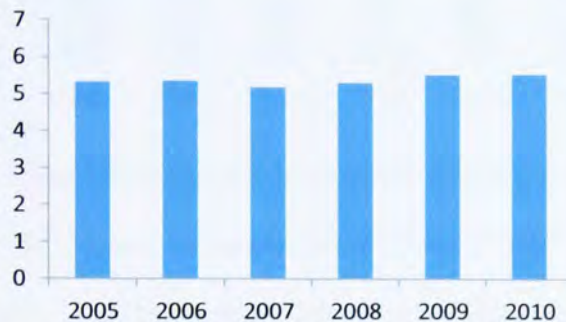
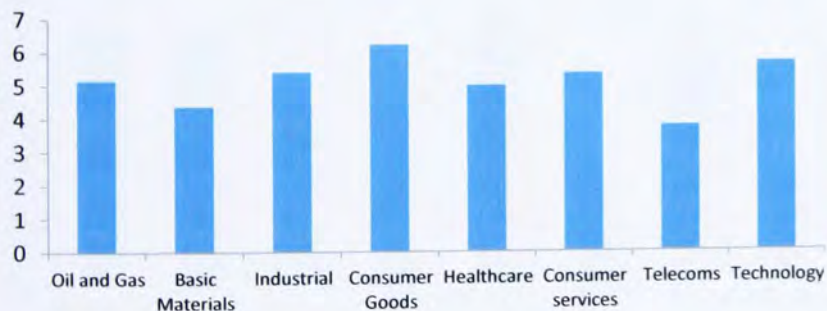


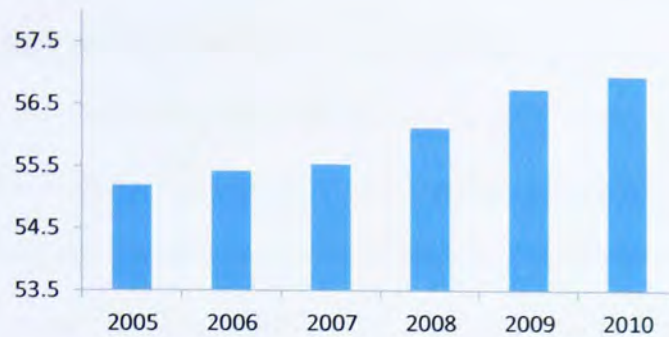
Figure 7.12 shows the average tenure of board members across industries. The average tenure is above five years in consumer goods and services, industrial, oil & gas, and technology sectors.

Figure 7.12 – Average tenure of board members across industries



7.2.3.2. Average age of board members

Table 7.1 shows the mean age of board members across firms in the sample to be 56 years while the minimum mean age of board members in the sample period is 46 years and maximum is 70 years.

Figure 7.13 – Average age of board members in the sample period

The average age of board members over the sample period does not change much as seen from the Figure 7.13; average age increases from 55 to 57 years over the sample period. This can also be interpreted as firms keeping the more experienced board members for a longer time to get the benefit of their knowledge. In comparison, Anderson, Mansi and Reeb (2004) find that during the years 1993-1998 for large US firms, the average age of board directors is higher at 60.3 years.

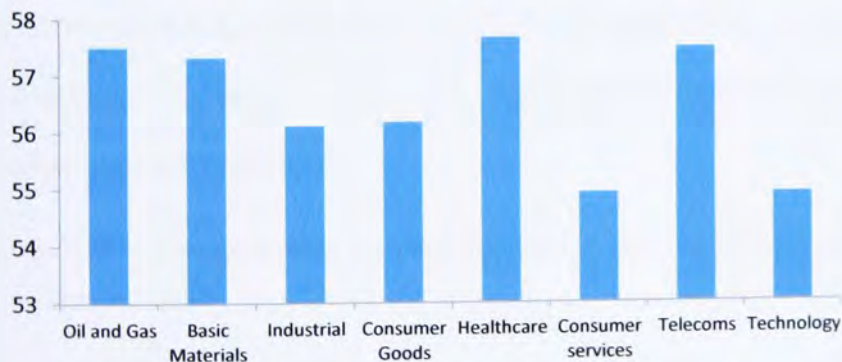
Figure 7.14 – Average age of board members across industries

Figure 7.14 shows the average age of board members of firms across industries. The industries of oil & gas, basic materials, healthcare, and telecoms have on average older board members than the other industry sectors.

7.2.4. Board process

The category of board process includes two variables: attendance of board members at board meetings and the frequency of audit committee meetings in a year. The processes of other committee meetings are not included in the study because the audit committee is likely to be the most important committee in the sphere of risk control. Recently, risk committees are recommended to be appointed as another sub-committee for large UK firms (Code, 2012) however, only 40% of the FTSE 350 firms have risk committees (Grant-Thornton, 2012).

7.2.4.1. Board meeting attendance

Board attendance is the average percentage of meetings attended by all board members of a firm in a year. The descriptive statistics in Table 7.1 shows that the average board meeting attendance is 94%, with minimum attendance of 51% to a maximum attendance of 100%.

Figure 7.15 shows the average board meeting attendance over the sample period. When the economy is in the upward economic cycle, during the period of 2005-2007, the board meeting attendance is lower, while, average board attendance increases in the period between 2007 and 2010.

Figure 7.15 – Average board meeting attendance over the sample period

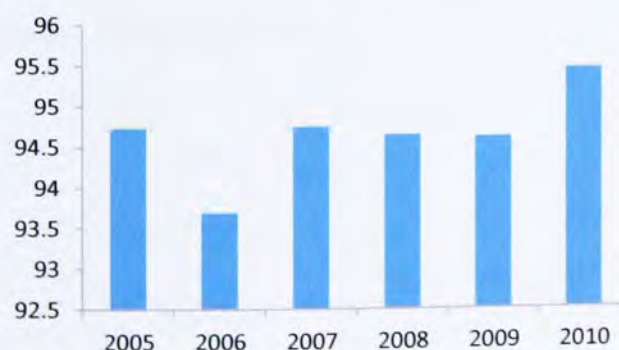
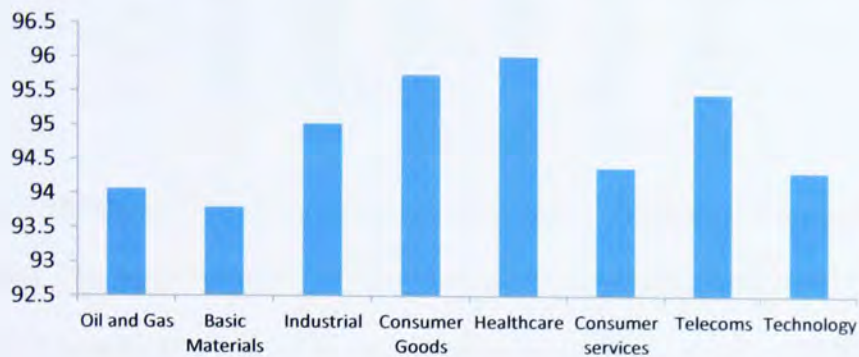


Figure 7.16 shows the board meeting attendance across industries. The healthcare industries have the best attendance records while firms in the basic materials industry have the worst board meeting attendance records.

Figure 7.16 – Average board meeting attendance across industries



7.2.4.2. Frequency of audit committee meetings

The mean number of audit committee meetings for the sample is 4 per year while the minimum is 1 and maximum is 15 meetings per year as shown in Table 7.1.

Figure 7.17 shows the average frequency of audit committee meetings per year over the sample period 2005-2010. As in the case of board attendance, the average frequency of board meeting increased year on year since 2007. This could be due to the fact that the financial crisis of 2007-2008 brought about increased uncertainties that the audit committee needed to address, and therefore, more audit committee meeting were arranged during this period.

Figure 7.17 – Average frequency of audit committee meeting over the sample period

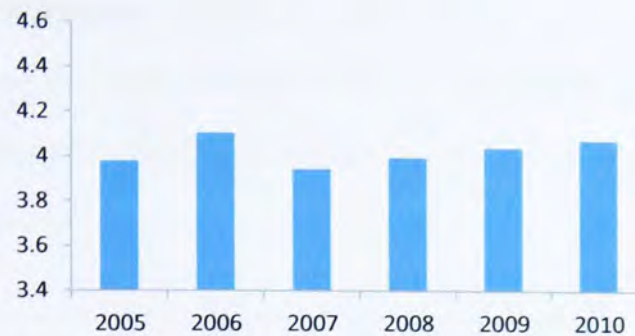
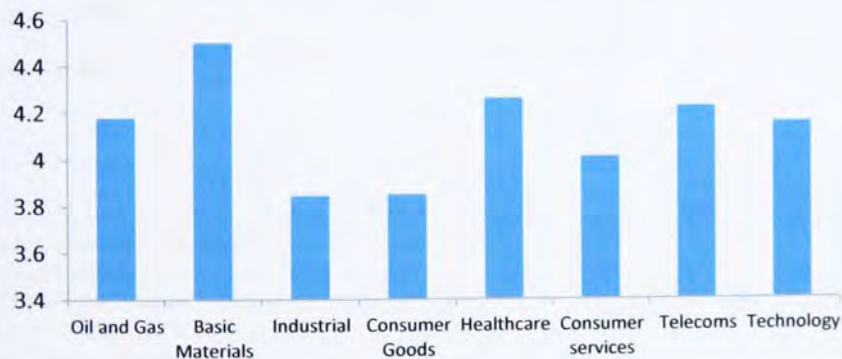


Figure 7.18 shows the mean frequency of audit committee meetings across industries. The basic materials industry has the highest average frequency of audit committee meetings of 4.5 while industrials and consumer goods have the lowest number of audit meetings compared to the other industry sectors.

Figure 7.18 – Average frequency of audit committee meetings across industries



In the next section, the descriptive statistics of the constructed indices are examined.

7.3. Univariate analysis of the indices

Board attributes are categorized into four groups: board composition, board leadership structure, board composition, and board process. For each of these categories an index is created by combining the variables that describe the category.

This is done so as to find if the combination of variables are associated with firm risk. These new variables are board composition index, board leadership structure index, board composition index, and board process index. These indices are combined to form total board index which represents the effectiveness of the board in relation with firm risk. The descriptive statistics for all the constructed indices are shown in Table 7.2.

Table 7.2 – Descriptive statistics for indices

	N	Min	25 percentile	Median	75 percentile	Max	Mean	Std. Deviation
Board Composition Index	1,418	0.26	1.03	1.77	2.13	2.67	1.58	0.60
Board Leadership structure Index	1,418	0	0	0	0.05	2.1	0.24	0.46
Board Characteristics Index	1,418	0.74	0.99	1.08	1.18	1.89	1.11	0.17
Board Process Index	1,418	0.71	1.16	1.21	1.27	1.93	1.22	0.11
Total Board Index	1,418	1.26	3.20	3.58	4.38	5.52	3.67	0.83

The sample consists of 268 firms from the FTSE 350 index, having 1,418 firm-year observations. Composition Index is constructed in this study as a combination of the variables board size, percentage of non-executive directors and gender diversity. Board Leadership structure index is the combination of the variable of powerful CEO and percentage of board executive shareholding. Board characteristics index is the combination of the variables of average board tenure and average board age. Board Process Index is the combination of the variables board attendance and frequency of audit committee meetings. Total Board Index is a combination of all the indices. These indices are created to examine how the variables interact with each other in influencing firm risk.

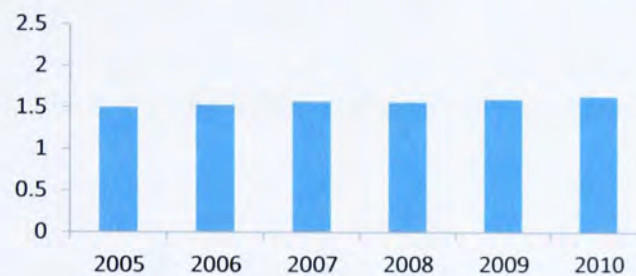
7.3.1. Board composition index

Board composition index varies between a minimum of 0.26 and a maximum of 2.67, as shown in Table 7.2. Figure 7.19 shows that on an average the board composition index for firms has increased marginally over the sample period which

is to say that the combination of composition variables has increased in terms of larger board size, more NEDs and women on the board.

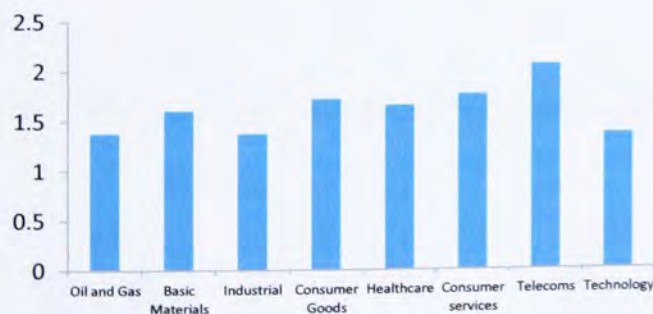
Figure 7.20 shows the average board composition index of the various industries in the sample. Firms with a high value of composition index (firms that have large boards, more NEDs, and presence of women on the board) are hypothesised to be associated with lower firm risk.

Figure 7.19 – Average composition index over the sample period



The telecoms industry has the highest composition index, while the industrial and technology sectors have a lower composition index compared to the other industry sectors.

Figure 7.20 – Average composition index across industries



7.3.2. Board leadership index

Board leadership index varies between a minimum of 0 and a maximum of 2.1 as shown in Table 7.2. It is hypothesised that a lower value of the board leadership index is associated with high firm risk and Figure 7.21 shows that over the sample period 2005-2010 the board leadership index decreased; i.e. over the sample period the combination of powerful CEOs and equity held by board executives has decreased for the sample firms. It is possible that firms are complying with the Code (2012) which aims at reducing duality of CEO-Chairperson position at the apex of the firm and requires the chairperson to be a NED.

Figure 7.21 – Average leadership index over the sample period

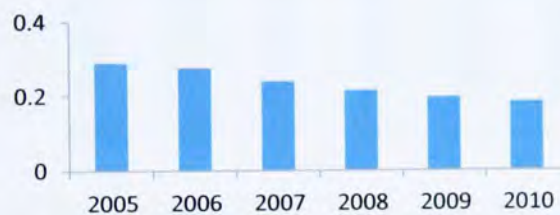
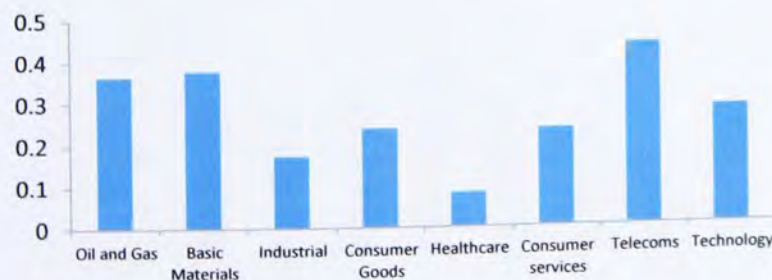


Figure 7.22 shows the average board leadership index of the sample firms across industries. The industry groups of telecoms, basic materials, and oil & gas have a high board leadership index while healthcare has the lowest compared to the other industry sectors.

Figure 7.22 – Average leadership index across industries



7.3.3. Board characteristics index

Board characteristics index (combination of average age and tenure of the board) varies between a minimum of 0.74 and a maximum of 1.89 as shown in Table 7.2.

The argument in this study is that high value for the characteristics index will relate to better monitoring ability of the board and will reduce high firm risk. Figure 7.23 displays the average board characteristics index which increases over the sample period. Firms, it may seem, are holding on to more experienced and skilful directors.

Figure 7.23 – Average characteristics index over the sample period

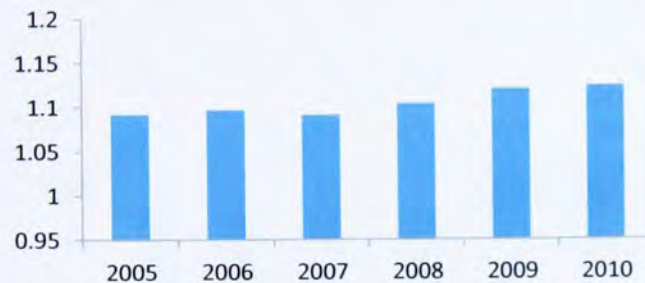
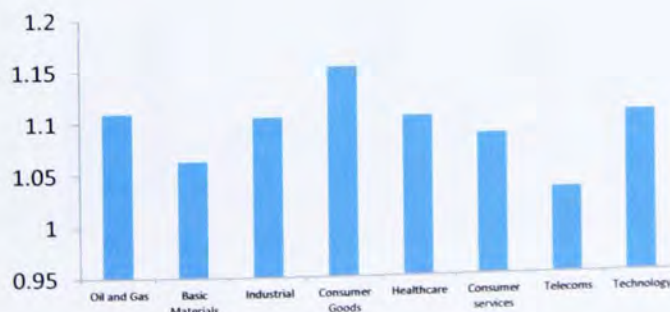


Figure 7.24 shows the average board characteristics index across industries. Consumer goods industry has a higher board characteristics index while the telecoms industry has the lowest board characteristics index compared to the other industry sectors.

Figure 7.24 – Average characteristics index across industries



7.3.4. Board process index

Board process index (combination of the average board attendance and frequency of audit committee meetings) varies between a minimum of 0.71 and a maximum of 1.93 as shown in Table 7.2. It is hypothesised that higher board activity or a higher value of the process index is associated with lower firm risk and Figure 7.25 shows that firms in the sample have marginally increased board activity over the sample period. This can be due to the fact that boards are trying to be more effective by increasing board activity in the uncertain economic period of 2008-2010.

Figure 7.25 – Average process index over the sample period

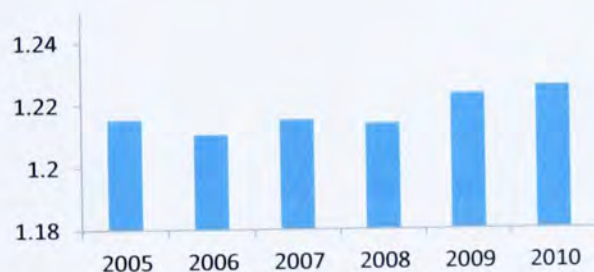


Figure 7.26 displays the average board process index across industries. It is found that the healthcare industry has the higher process index, while the industrials sector has the lowest process index compared to the other industry sectors.

Figure 7.26 – Average process index across industries



7.3.5. Total board index

Total board index (combination of board composition index, board leadership index, board characteristics index and board process index) varies from a minimum of 1.2 to a maximum of 5.5 as shown in Table 7.2. It is hypothesised that a higher value of the board index is associated with lower firm risk and Figure 7.27 shows that the total board index has increased between 2005 and 2010 except in year 2008. It appears that boards are improving board composition, leadership structure, characteristics and processes in order to be more effective.

Figure 7.27 – Average board index over the sample period

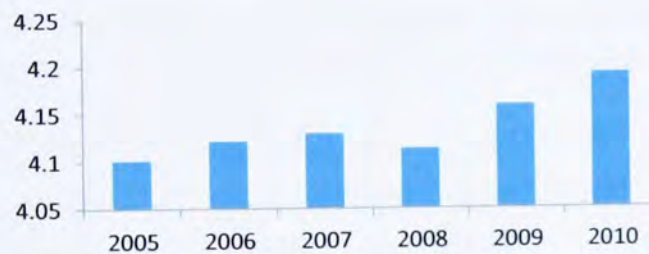
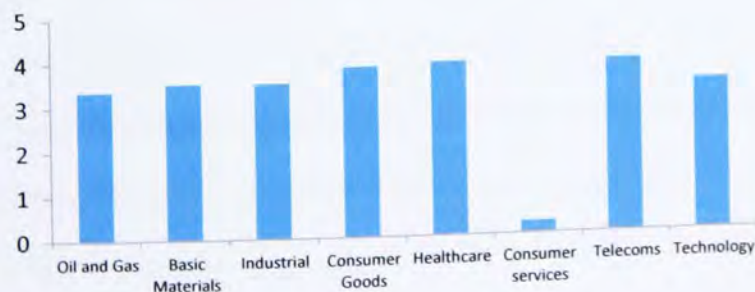


Figure 7.28 displays the average board index across industries; healthcare, and telecoms industry have a higher board index (more effective board) while the consumer services industry has the lowest board index compared to the other industry sectors.

Figure 7.28 – Average board index across industries



In the next section, the univariate analysis of the dependent and control variables is examined.

7.4. Univariate analysis of dependent variables

The descriptive statistics for the dependent variables that represent firm risk are shown in Table 7.3. Each dependent variable is used alternatively in the empirical model to make the findings more robust.

Table 7.3 – Descriptive statistics for dependent variables

	N	Minimum	25 percentile	Median	75 percentile	Maximum	Mean	Std. Deviation
Total Risk	1,418	0.14	0.26	0.35	0.47	1.62	0.40	0.20
Z-score	1,418	-2.27	0.77	2.22	3.89	122.96	3.90	23.45
Asset Return Risk	1,418	0.14	0.26	0.34	0.47	1.54	0.39	0.19
Idiosyncratic Risk	1,418	0.01	0.09	0.56	1.28	4.97	0.57	0.50

The sample consists of 268 firms from the FTSE 350 index with 1,418 firm-year observations. The data to calculate firm risk is collected from the Bloomberg database for the firms over the period 2005 to 2010. The dependent variables of total risk, asset return risk, insolvency risk (1/z-score) and idiosyncratic risk are used alternatively in the empirical model. Total risk is calculated as the standard deviation of the firms' daily stock returns over a year. Asset Return Risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to market value of total assets times square-root of 260 in a year. Z-score is measured as $(ROA + CAR / sdROA)$ where ROA is the Return on assets and CAR is the Capital Asset Ratio. Idiosyncratic Risk is downloaded for the firms from Bloomberg which is calculated using the single index market model. N is the Number of observations.

Total risk is measured as the volatility of the firm's equity and it is the main dependent variable representing firm risk since it encompasses both idiosyncratic risk as well as systematic risk. The mean value for total risk is 0.4 with a standard deviation of 0.2. Asset return risk had a mean of 0.39 and standard deviation of 0.19

while z-score has a mean of 0.39 and a standard deviation of 23.45. Idiosyncratic risk has a mean of 0.57 and a standard deviation of 0.50. Cheng (2008) is the only other study that has examined risk-taking in corporations but does not report the risk measure descriptive; therefore, the data described above cannot be compared to any other study.

Appendix II provides graphs of the risk measures used in the study, over the sample period. Total firm risk and asset return risk peaked in the year 2008 while insolvency risk ($1/z$ -score) peaked in the year 2009; this is as expected, since it was soon after the financial crisis of 2007-2008. Idiosyncratic risk is least in the year 2008 for the firms in the sample and increases again thereafter.

Appendix II also presents the graphs of firm risk measures across industries. Total risk is highest for the industries of basic materials, consumer services and technology and is the lowest for healthcare industries compared to the other industry sectors. Asset return risk is similar to total risk across industries. Insolvency risk is the highest for telecom industry and lowest for industrials, while idiosyncratic risk is the highest for basic materials and lowest for the healthcare industry.

In the following section, the descriptive analysis of the control variables is presented.

7.5. Univariate analysis of control variables

Control variables used in the multivariate analysis include firm size, lagged return on assets, financial leverage, growth opportunities, industry dummies and year dummies. These variables may affect firm risk-taking and have therefore been included in the empirical model. Previous studies that have included these variables

are Cheng (2008), Pathan (2009) and Nakano and Nguyen, (2012). The descriptive statistics for all the control variables is shown in Table 7.4.

Financial leverage is measured as a ratio of total debt to total assets and shows the degree to which the firm is utilizing borrowed money. Financial leverage can increase the shareholders return on investment, but the other hand if the firm is unable to pay back the debt then it is at risk of bankruptcy. A leverage of 3 or lower for non-financial firms is seen as a safe investment firm (Ingram and Albright, 2007). The mean leverage for the sample is 4.9, and the median is 2.57 with a standard deviation of 39.82 which shows that the variation in leverage across the sample is high. Appendix III displays the graph of financial leverage of firms across industries. The consumer services and consumer goods industry are more financially leveraged than other industries.

Table 7.4 – Descriptive statistics for control variables

	N	Minimum	25 percentile	Median	75 percentile	Maximum	Mean	Std. Deviation
Financial leverage (total debt /assets)	1,418	-217.86	1.88	2.57	3.69	1,010.33	4.90	39.82
Firm Size (Market cap in billions)	1,418	0.01	0.49	0.98	2.59	138.69	5.37	15.84
Growth Opportunities (capital expenditure to sales)	1,418	0.02	1.82	3.45	7.29	1,555.21	11.40	58.39
Lagged ROA (in millions)	1,418	-175.74	3.38	6.56	10.63	175.92	7.55	12.24

The sample consists of 268 firms in the FTSE 350 index with 1,418 firm-year observations. The data for the control variables is collected from the Bloomberg database for the firms over the period 2005 to 2010. Financial leverage is calculated as total debt over assets. Firm size is measured as market capitalisation of the firm in millions of pounds. Growth opportunities are measured as capital expenditures over sales. Lagged ROA is the previous year's performance and is measured as return on assets. N is the Number of observations.

Market capitalisation is a proxy for the market opinion of the worth of the firm; therefore, it is used to denote firm size in this study. Market capitalisation is the value of issued shares times the number of shares outstanding. The smallest firm is worth 10 million pounds and the largest is worth 138 billion pounds and the standard deviation is high showing that there is high variation in firm size in the sample. Appendix III presents the graphs for firm size across industries; it shows that firms in the telecoms industry are large on average while the smallest are technology firms.

The control variable, growth opportunity, is measured as the ratio of capital expenditure to total sales. This variable provides a value that shows the options the firm has to invest in. The firm with minimum growth opportunity has a value of 0.02 and a firm with maximum growth opportunity has a value of 1,555 while the median value is 3.47. Appendix III presents the graph of growth opportunities for firms across industries, which shows that the oil & gas industry and the basic materials industry have more growth opportunities than other industries.

Lagged return on assets is used as a control variable since previous year's performance can influence the amount of risk taken. It is argued in Chapter 6, that, if the firm had not performed as expected, then managerial risk-taking will increase to make up for the previous year's poor performance. This idea is supported by the behavioural theory of the firm and previous studies have also used this control variable (Pathan, 2009 and Cheng, 2008). Appendix III shows the graph of firm performance across industries, and it shows that oil & gas and the basic materials industry have higher performance than other industries.

Industry dummies are used to control for differences in industries and year dummies are used to control for the effect of differences in years.

7.6. Bivariate analysis

Bivariate analysis to find the statistical relationship involving dependence between two variables is conducted using Pearson Correlations. The correlation is a single number that describes the degree of relationship between two variables and also gives the direction of the relationship. A significance test is conducted to check if the observed correlation may have occurred by chance; the significant correlations are shown in bold in Table 7.5.

The explanatory variables and their correlations are shown in the first thirteen rows and in the next four rows the correlations between the explanatory variables and the dependent variables are shown.

The highest correlation is between firm size and board size which is 0.48; all the other correlations are below this value. Therefore, multicollinearity between the regressors is not of concern. Significant correlations above 0.30 are discussed below.

Board size is positively correlated with the presence of women on the board (correlation coefficient = 0.33, significant at the 5% level), previous performance of the firm (correlation coefficient = 0.32, significant at the 5% level) and frequency of audit meeting (correlation coefficient = 0.37, significant at the 5% level).

The proportion of non-executive directors is significantly and negatively correlated with powerful CEO with a coefficient of -0.43. Powerful CEO is correlated significantly and positively with board executive shareholding with a value of 0.36. Frequency of audit committee meetings is positively correlated with firm size (coefficient = 0.41), previous performance of the firm (coefficient = 0.34) and Board size (coefficient = 0.37).

Table 7.5 – Correlation matrix

No	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Board size	1	.12	.33	.01	-.02	.20	-.00	-.08	.37	-.00	.48	-.02	.32
2	Proportion of NEDs		1	.16	-.43	-.24	.29	-.24	-.05	.28	.02	.26	-.01	.15
3	Gender diversity			1	-.12	-.16	-.14	-.09	.00	.13	.03	.21	-.03	.14
4	Powerful CEO				1	.36	-.04	.16	-.06	-.10	-.04	-.09	.02	-.06
5	Executive directors' ownership					1	.01	.05	.01	-.06	-.02	-.07	.11	-.05
6	Average Age						1	.20	.03	.24	.01	.25	-.01	.18
7	Average tenure							1	.09	-.16	.04	-.08	-.05	-.04
8	Board meeting attendance %								1	-.05	.03	-.01	.01	-.01
9	Freq. of Audit committee meetings									1	-.01	.41	-.04	.34
10	Financial leverage										1	-.01	-.01	-.01
11	Firm Size											1	-.01	.17
12	Growth opportunities												1	-.01
13	Lagged performance													1
14	Total Risk	-.13	.03	-.11	.03	.11	.01	-.08	-.06	-.06	-.03	-.13	.09	-.08
15	Insolvency Risk	-.01	-.01	-.03	.01	.02	.06	.04	.01	-.02	.00	-.00	.01	-.01
16	Asset Return Risk	-.14	.03	-.11	.04	.12	.01	-.08	-.05	-.06	-.03	-.13	.1	-.08
17	Idiosyncratic risk	-.13	-.08	.03	.03	-.00	-.1	.06	.03	-.15	.01	-.1	-.03	-.05

Bold number denotes that correlation is significant at the 0.05 level (2-tailed).

The sample consists of 268 firms from the FTSE 350 index over the period 2005 to 2010 giving 1418 firm-year observations. The data is collected from Morningstar database for board attributes. Board size is the number of directors on the board. Proportion of NEDs is the percentage of non-executive directors on the board as reported by the firm in the annual report. Gender diversity represents the presence of a woman on the board and is a dummy variable that is 1 if there is at least one woman on the board. Powerful CEO is a dummy equal to one if the CEO holds a dual position as chairperson or is the founder of the firm or the chairperson of the board is an executive of the firm, and zero otherwise. Executive directors' ownership is the percentage of firm equity held by executive directors as a ratio of outstanding shares. Average tenure is the mean tenure of all the board members. Average age is the mean age of all board members. Board attendance is the average attendance of board meetings held by the firm per year. Frequency of audit committee meetings in a year is self-explanatory. The Bloomberg database is used to for collecting data on firm risk measures. Financial leverage is calculated as total debt over assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales. Lagged ROA is the previous year's performance for the firm and is measured as return on assets in millions. Total risk is calculated as the standard deviation of the firms' daily stock returns over a year. Asset Return Risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to market value of total assets times square-root of 260. Insolvency risk is the inverse of z-score; Z-score is measured as $(ROA + CAR / sdROA)$ where ROA is the Return on assets and CAR is the Capital Asset Ration. Idiosyncratic risk is downloaded for the firms from Bloomberg database which is calculated using the single index market model.

The correlation between the dependent variables and the explanatory variables are also shown and even though many are significantly related to the explanatory variables as expected, none are correlated by a value of 0.2 or over.

The correlations are consistent with the predictions except for the proportion of non-executive directors which is positively correlated with some of the risk measures though not significantly.

7.7. Summary

This chapter described the variables used in this study, using univariate and bivariate analyses. The univariate analysis revealed that there are no influential outliers in all the variables used. Overall, the distribution of the variables over time and over industries appears to be consistent with expectations. The descriptive statistics of the board attributes (board size and proportion of non-executive directors) are similar to prior studies in the corporate governance area (Cheng, 2008; Pathan, 2009). The descriptive statistics also indicate that the firms in the sample are trying to comply with regulatory guidelines, in terms of increasing the number of NEDs and women on the board and reducing the existence of a powerful CEO on the board (Code, 2012).

The descriptive statistics for the firm risk measures, namely total firm risk, asset return risk, idiosyncratic risk and insolvency risk are examined, as well as, how they vary across industries and over the sample period. These firm risk measures are used alternatively in the empirical model. The descriptive statistics of the control variables - firm size, firm performance, growth opportunities and financial leverage, are also examined.

Finally, Pearson correlations and the significance of dependence are reported. Based on the magnitude of the coefficients, there is no multicollinearity, which satisfies one of the assumptions of linear regression methods.

The next chapter presents the results of multivariate analysis of the empirical model and discusses the results.

Chapter 8

Analysis and discussion of findings

8.1. Introduction

This chapter presents the results of the tests conducted on the hypotheses discussed in Chapter 5, using the empirical models and estimation methods discussed in Chapter 6. The results are applicable to large listed firms in the UK, since the data used for this study are firms in the FTSE 350 index.

The panel data estimation methods used in this study controls for unobserved firm characteristics that may influence firm risk. The estimation method of GLS-RE is chosen over fixed effects estimation, due to the limited variation of governance variables over time. The merits of using this method are discussed in depth in Chapter 6.

In the first section of this chapter, the association between firm risk and firm performance is estimated. It is expected that firms take risks to grow; though, this study argues that high risk-taking increases the chance of the firm becoming insolvent which is not of interest to any of the stakeholders of the firm. The results of the estimation between risk and return show that current firm risk and lagged firm risk are both significantly negatively related to current firm performance. This is to say that high risk-taking in the current year and the previous year reduces firm performance in the current year.

In the next section, the results of the regressions of individual board attributes and indices are analysed. Each of the regressions is estimated using alternate dependent variables of total risk, asset return risk, insolvency risk and idiosyncratic risk. The results are discussed for the regression using total firm risk since this is an all-

inclusive risk measure that includes systematic and unsystematic risk, and is the measure used by firms and regulators to track firm risk (Pathan, 2009). The estimation using other risk measures are used as robustness tests and are expected to confirm the results of the regression which uses total firm risk as the dependent variable. It is also expected that there will be some differences in the results, using the other risk measures.

The results show that board size negatively influences firm risk as hypothesised and this association is significant, whereas a proportion of non-executive board members and presence of women on boards did not significantly influence total firm risk. As hypothesised, a powerful CEO and high proportion equity held by board executives, is found to be significantly and positively associated with total firm risk. Average age of the board of directors is found not be significantly related to risk-taking behaviour though longer tenure of board of directors significantly reduces firm risk. The results also show that higher board activity, in terms of higher board meeting attendance and more frequent audit committee meetings lowers firm risk.

Board attributes are combined to form a board composition index, board leadership index, board characteristics index and board process index as discussed in Chapter 5. The effect of these indices on firm risk is also analysed. The results show that as hypothesised, the board composition index, the board characteristics index and the board processes index are all significantly and negatively associated with firm risk while the board leadership structure index is significantly and positively related to firm risk. Total board index, which is the combination of all the board indices, is found to be significantly negatively related to firm risk.

Finally, robustness tests are conducted to check if reverse causality exists in the empirical model and the results show that reverse causality does not exist in the model. Previous studies show that board size and percentage of NEDs are two board attributes that are endogenous due to reverse causality (Pathan, 2009). Therefore, the empirical model for board composition is re-estimated using the instrumental variables estimation method to verify the results; which are found to be robust. As another test of robustness, the empirical model is tested using another proxy for firm risk, using Glejser's (1969) test of heteroskedasticity. The results and findings with reference to current governance literature are also discussed. The results were also validated qualitatively by interviewing five directors of firms in the sample.

8.2. Association between firm risk-taking and firm performance

It is assumed that for firms to grow they need to take risk; but high firm risk (high stock volatility) has been shown to increase the probability of firm insolvency (Shapira, 1994). Since the theoretical model developed for this study proposes that high managerial risk-taking (high firm risk) is related to poor firm performance, this proposition is empirically analysed in this section. In order to do this, contemporaneous firm risk and previous years firm risk is regressed on firm performance (measured as return on assets). The following regression (F) is used, with return of assets as the dependent variable and total firm risk for the current year and previous two years as independent variables along with control variables.

$$\begin{aligned} \text{Firm Performance} = & \text{constant} + \text{firm risk} + (\text{firm risk} - 1\text{year}) + (\text{firm risk} - 2\text{years}) + \\ & \text{firm size} + \text{financial leverage} + \text{growth opportunities} + \text{year dummies} + \\ & \text{industry dummies} + \text{residuals} \end{aligned} \quad (\text{F})$$

Where, firm performance = return on assets and

firm risk (total) = standard deviation of daily stock returns.

The control variables have been previously discussed in Chapter 6. The regression is estimated using the GLS-RE method and the results of the estimation are shown in the Table 8.1.

Table 8.1 – Results from the GLS-RE estimation of firm risk on firm performance

Explanatory variables	Pre-sign	ROA
Total firm risk	-	-.7321*** (-4.88)
Lagged total firm risk – 1year	-	-.4567* (-1.69)
Lagged total firm risk – 2 years	+/-	.0918 (.32)
Firm size	-	.0466 (1.39)
Financial leverage	-	-.0021 (-.33)
Growth opportunities	+	.0224*** (4.45)
Industry dummies		yes
Year dummies		yes
constant		14.207
No of observations		1185
Model fit:		
Within R2		0.0862
Between R2		0.0489
Overall R2		0.0684
Wald Chi2(19)		98.86***

$(\text{Firm Performance})_{it} = \text{constant} + \ln(\text{firm risk})_{it} + \ln(\text{lagged firm risk -1})_{it} + \ln(\text{lagged firm risk -2})_{it} + (\text{Firm size})_{it} + (\text{financial leverage})_{it} + (\text{growth opportunities})_{it} + \text{year dummies}_{it} + \text{industry dummies}_{it} + \text{residuals}$

This table presents the results of the GLS-RE estimation of the above equation. The dependent variable (firm performance) is the return on assets for the firm. Firm risk is the total firm risk for the current year which is measured as the standard deviation of its daily stock returns over a year. Lagged firm risk is the total firm risk for the previous year which is measured as the standard deviation of its daily stock returns over a year. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

The number of observations is reduced to 1185 from 1418 observations, due to the use of lagged variables. Firm performance is found to be significantly negatively related to total firm risk. This is to say that firms taking high risk in the previous year and in the current year show low firm performance in the current year. This is in line with the argument in this study that high firm risk leads to poor firm performance.

Contemporaneous risk-taking has a bigger negative impact on firm performance than previous year's risk-taking. For a one percentage increase in contemporaneous firm risk, firm performance decreases by 0.73% and for a one percentage increase in previous year's firm risk, firm performance decreases by 0.46%. For example, risky investment decisions taken in the current year or previous year can lead to high equity volatility which impacts firm performance negatively. The results also show that firm risk two years prior to the current year, does not have a significant impact on current firm performance. The control variable of growth opportunities has a significant positive impact on firm performance. This is as expected, since firms will take the opportunities they have to grow.

Therefore, the sample in this study exhibits a negative relationship between firm risk and firm performance. In other words, high firm risk leads to poor firm performance. This finding confirms the appropriateness of the extension of the theoretical model based on Zahra and Pearce (1989), since the original model included only firm performance and not firm risk. In this study, Zahra and Pearce's (1989) model is extended to find the effect of board attributes on firm risk, which is ultimately linked to firm performance. This direct link has been previously ignored in most prior literature, especially in the UK context.

8.3. Analysis and discussion

This section presents the results of the test on the hypotheses, developed in Chapter 5, related to individual board variables within each of the four categories of board composition, board leadership structure, board characteristics and board process. The results of the estimation of the empirical models that associate board composition index, board leadership structure index, board characteristics index, board processes index and total board index with firm risk are also discussed.

Boards are responsible for decision making which are risk bearing. The risk bearing decision-making can be influenced by the composition, leadership, characteristics and processes of the board. The board attributes are hypothesised to be associated contemporaneously with firm risk. Both the dependent and independent variables are contemporaneous except the explanatory variable of previous year's performance. Lagged firm performance is used, since according to the behavioural theory of the firm, if the targeted performance is not met in the previous year, then managers search for options to reach the targeted performance in the following year (Cyert and March, 1963).

The GLS-RE estimation method is used to estimate the empirical models. This estimation method is most appropriate since the explanatory variables do not vary much over time²⁷. The results are presented for each regression with four different dependent variables of total risk, asset return risk, insolvency risk, and idiosyncratic risk. Insolvency risk represents the risk of the firm becoming insolvent; the results in association with insolvency risk do not show significant results but confirms the direction of association between the board attributes and firm risk. One reason for

²⁷ The choice of estimation method was discussed previously in Chapter 6.

these insignificant results could be that the firms in the sample are established FTSE 350 firms and most of the firms in the sample are far from the risk of becoming insolvent.

To avoid repetition, the analysis and discussion of the results, is done using total risk since this is the risk measure which encompasses different types of firm risk, both systematic and firm specific. The estimations with other risk measures as dependent variables are robustness tests. It is expected that there will be some difference in the relationship of the explanatory variables with the different risk measures.

8.3.1. Board composition

The category of board composition includes the variables of board size, proportion of non-executive directors and gender diversity on the board. Board size is the total number of board members, the proportion of non-executive directors is the percentage of NEDs on the board, and gender diversity is a dummy variable, which takes the value of one when there is a woman on the board.

Hypotheses 1A developed in Chapter 5, predicts that board size is inversely related to firm risk; hypothesis 1B predicts that percentage of NEDs is inversely related to firm risk, and hypothesis 1C predicts that the presence of women on the board is inversely related to firm risk. The estimation model used to test these hypotheses is equation 1 (discussed in Chapter 6). Table 8.2 shows the results of the linear regression of board composition variables on firm risk using the GLS-RE estimation method.

Table 8.2 – Results from the GLS-RE estimation of board composition variables on firm risk

Explanatory variables	Pre sign	Total Risk	Asset Return risk	Insolvency risk	Idiosyncratic risk
Board Size (No)	-	-0.0899** (-2.10)	-.0958** (-2.26)	-.3202 (-.57)	-.2898*** (-4.33)
Proportion of NEDs (%)	-	-.001 (-1.17)	-.0009 (-1.14)	-.0148 (-1.02)	-.0033** (-2.51)
Gender diversity	-	-.0216 (-1.08)	-.0191 (-.98)	-.5506 (-1.25)	.0253 (.79)
Lagged performance	-	-.0013** (-2.07)	-.0009* (-1.69)	-.0139 (-1.19)	-.0000 (-.02)
Firm size (billions)	-	-.0042*** (-4.95)	-.0041*** (-5.03)	-.0087 (-1.26)	.0013 (1.10)
Financial leverage	-	-.0002 (-1.41)	-.0002 (-1.48)	-.0007 (-.33)	-.0001 (-.33)
Growth opportunities	+	.0001 (.71)	.0001 (.79)	.0001 (0.03)	.0001 (.34)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		-.9396*** (-8.28)	-.9315*** (-6.46)	1.662 (1.19)	-.1274 (-0.73)
No of observations		1418	1418	1418	1418
Model fit:					
Within R ²		.6826	.6800	.0066	.1092
Between R ²		.4778	.4969	.0034	.3387
Overall R ²		.5816	.5856	.0053	.1903
Wald Chi ² (19)		2653.61***	2640.86***	19.55	263.89***

$\ln(\text{Firm Risk})_{it} = \text{constant} + \ln(\text{board size})_{it} + (\text{proportion of non-executive directors})_{it} + (\text{presence of women})_{it} + (\text{lagged performance})_{it} + (\text{firm size})_{it} + (\text{financial leverage})_{it} + (\text{growth opportunities})_{it} + \text{year dummies}_{it} + \text{industry dummies}_{it} + \text{residuals}$

This table presents the results of the GLS-RE estimation of equation 1. The dependent variable of firm risk is either total risk, asset return risk, insolvency risk (1/z), or idiosyncratic risk. Total risk is the standard deviation of its daily stock returns over a year. Asset return risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to book value of total assets times square-root of 260. Insolvency risk is the inverse of z-score; this is done such that the measures are comparable to the other dependent variables. (Higher z shows less insolvency risk, whereas with all the other dependent variables the higher value denotes higher risk). Z-score is measured as $(\text{ROA} + \text{CAR}) / \text{sdROA}$. Natural log for insolvency risk is not used since it has negative values. Board size is the total number of board members, natural log is used. Proportion of NEDs is the percentage of non-executive directors on the board. Gender diversity refers to the presence of women on the board and is represented by a dummy variable which is given the value 1 when there is at least one woman on the board. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. The constant value in the regression is also reported. The model fit is also reported. Along with the coefficient, the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

The chi square test results when the dependent variable is total risk, asset return risk and idiosyncratic risk, show that the model fit is good by its significant result, meaning that there is a significant relationship between the explanatory variables in the model and firm risk. The overall R squared shows the model is a good fit with a value of 58.16%. With regards to the chi square results when the dependent variable is insolvency risk, the goodness of fit of the estimated model is not as good as expected, but the direction of association between the explanatory variables and insolvency risk are similar to other risk measures. In the following section, each of the explanatory variables that constitute board composition are analysed and discussed separately.

8.3.1.1. Analysis and discussion of board size

As discussed in Chapter 5, hypothesis H1A predicts that board size is inversely related to total firm risk. Therefore, it is expected that a board of directors with more members is associated with lower firm risk. The results of the estimation of equation 1 show that board size is significantly and inversely related to all measures of firm risk except insolvency risk. Therefore, the null hypothesis H1₀A is rejected and hypothesis H1A is accepted. The results show that for one percentage increase in board size there is a 0.09% reduction in total firm risk²⁸. In other words, if the board size increases by one standard deviation i.e. 2.38 from Table 7.1, then total firm risk decreases by $(\ln 2.38 * 0.09 / \ln 0.40 = -0.085)$ 8.5% (where 0.40 is the mean of total risk from Table 7.3).

It is proposed that large boards provide an increased pool of expertise and resources for the organisation (Pfeffer, 1972; Dalton, Daily, Ellstrand and Johnson, 1998) and a

²⁸ Calculated as $[(1.01)^{0.09} - 1] * 100 \approx 0.09\%$

wide variety of perspectives (Zahra and Pearce, 1992) that are useful in providing good advice and better monitoring of management, resulting in lower firm risk.

Some previous studies have argued that large boards can reduce the effectiveness of the board and can affect firm performance negatively (Yermack, 1996) and that in large decision-making groups there is a decreased level of motivation and satisfaction because of the lack of participation (Jewell and Reitz, 1981). Also, large groups are shown to have an increased possibility of factions and coalitions that develop which increase the difficulty of reaching a consensus (O'Reilly, Caldwell and Barnett, 1989).

On the other hand, the results of this study show that large boards in UK firms may not be facing the problem of communication and coordination amongst members which can allow the chief executive to free ride. Large boards are shown, in this study, to reduce firm risk. It can be argued that judgements made by a large group would be the average of individual prior judgements (Kogan and Wallach, 1966). Therefore, extreme decisions which may be risky will not easily be voted through in a large board. Large boards will be better at monitoring management and reducing agency costs, leading to lower firm risk.

The negative relation between board size and firm risk is similar to results of Cheng (2008), Pathan (2009) and Nakano and Nguyen (2012). Cheng (2008) uses a sample of 2,980 US corporations over the period 1996 to 2004, to find that board size is inversely related to firm risk. Cheng (2008) reports that firm risk is reduced by 0.04% for a one percentage increase in board size. He argues that a large board makes less extreme decisions, since there would be more compromises made by individual directors in a large board, while a small board offers less opposition to

risky managerial plans, which increases firm risk. Pathan (2009) uses a sample of 212 bank holding companies in the US, over the period 1997 to 2004, and reports that firm risk reduces by 0.07%, for one percentage increase in board size. Nakano and Nguyen (2012) find a similar relation between firm risk and board size, in a sample of 1,324 Japanese firms, over the period of 2003-2007. Nakano and Nguyen (2012) report that firm risk reduces by 0.003%, for a one percentage increase in board size. In comparison, this study finds a larger coefficient (0.09) for board size in relation to total firm risk. The reason for a stronger effect of the association between board size and firm risk may be due to the fact that the monitoring ability of boards is better in large UK firms, compared to those in US and Japan. This result can inform large UK firms in the use of board size as an internal risk control mechanism.

8.3.1.2. Analysis and discussion of the proportion of non-executive directors

Hypothesis H1B predicts that the proportion of non-executive directors on the board will be negatively related to total firm risk. From the estimation of the empirical model, the results in Table 8.2 show that the percentage of NEDs is related negatively to firm risk, but, this relationship is not significant with total firm risk, asset return risk or insolvency risk and is significant with idiosyncratic risk. This shows that firm specific risks and not market risk is associated with proportion of non-executive directors. Since the association between the proportion of non-executive directors and firm risk is not significant across most measures, particularly total firm risk, the null hypothesis (H_{10B}) of no association is not rejected.

Prior literature generally argues that a higher proportion of non-executive directors on the board can provide effective monitoring and control of firm activities leading to better performance of the firm (Jensen and Meckling, 1976; Fama and Jensen, 1983a; Williamson, 1985; Dalton *et al.*, 1998). There is consensus in the literature

that effective boards will be comprised of greater proportions of outside directors (Mizruchi, 1983; Lorsch and MacIver, 1989; Zahra and Pearce, 1989). Regulators, institutional investors and shareholder activists also hold the same view. This study shows that a high proportion of NEDs on the board does not significantly influence firm risk. The reason for the association between NEDs and firm risk, not being significant, may be due to the following reasons: First, the NEDs may want to build their reputation by not causing any trouble for the CEO. Such NEDs may be seen as valuable by management (Hölmstrom, 1999), since they do not challenge management plans. Secondly, NEDs are part time directors and spend minimum amount of time in the firm compared to the executive who are at the firm full time. The NEDs depend on the executives to acquire information about the firm. The executives may not divulge all the financial and strategic information (McNulty and Pettigrew, 1999). Thirdly, there is a cost associated with a high number of NEDs on the board which is not only the direct cost of compensation but also the cost of coordination and communication (Linck, Netter and Yang, 2008). Lastly, NEDs may not have the incentive to question the CEO in order to protect their job and collect the director fees (Ezzamel and Watson, 1993). These reasons may make the NEDs less effective in their role as monitors and therefore risky projects proposed by management may not get challenged.

Lewellyn and Muller-Kahle (2012) use a US-based data sample of the sub-prime lending industry, and found that NEDs did not significantly influence risk-taking. Cheng (2008) in a study of US corporations also did not find a significant relationship between the proportion of independent directors and firm risk.

Pathan (2009) finds in a study of US bank holding firms, that a higher proportion of NEDs on the board is significantly and positively associated with risk-taking. Pathan

(2009) proposes that NEDs represent the shareholders aim of maximising returns and therefore backed risky projects.

Even though previous studies such as Hardwick, Phillip and Hong Zou (2011), show that in the UK firms, NEDs exhibit a significant effect on profit efficiency, this study shows that the proportion of NEDs on the board does not significantly affect managerial risk-taking. Despite the fact that the average board in the UK has more than 50% NEDs, they do not have a significant effect on managerial risk-taking. It is proposed that the monitoring role of NEDs to provide a challenge to the executive decisions made at board level is not significant. This may be because the part time NEDs do not have enough relevant firm-related information to mount a challenge to managerial plans, or the NEDs are building and protecting their reputation in the employment market as 'yes-men' to management.

8.3.1.3. Analysis and discussion of gender diversity

Diverse boards are seen by regulators as providing fresh perspectives, new ideas, providing vigorous challenge and broader experience (Davies report, 2011) and such boards provide better decision making and effective leadership. An effective board is seen as one which is better at monitoring management and reduces insolvency risk. Therefore, presence of women on the board is predicted, by alternate hypothesis H1C, to be negatively related to firm risk. The results from in Table 8.2 show a negative association between presence of women on the board and firm risk but this relationship is not significant in association with total risk as well as with all the other risk measures. Therefore, the null hypothesis (H1₀C) is not rejected.

Previous studies have shown mixed results in the association between gender diversity on the board and firm risk. In countries where there is high representation

of women on the board, studies show that women positively affect firm risk. Berger, Kick and Schaeck (2012), in their unpublished study, that examines the association between women on boards of German banks and risk-taking, find that a high proportion of women on boards increase risk-taking. They explain that women are not marginalised by male dominated board culture, and women significantly determine the governance of German banks. Adams and Funk (2011), in their survey of Swedish women, explain that women who are on the board to fulfil regulation needs decrease the level of firm risk, whereas those who have risen through the ranks and are now on boards, are prone to take more risks than men.

Previous experimental studies (Powell and Ansic, 1997; Eckel and Grossman, 2008; Croson and Gneezy, 2009) and studies on decision making (Barsky *et al.*, 1997; Jianakoplos and Bernasek, 1998; Sunden and Surette, 1998 and Agnew, Balduzzi, and Sunden, 2003) that examine gender differences, show women to be less risk-seeking than males in financial decision making; this may be due to the fact that samples used by these studies are not representative of the women in top management positions, who may have a different approach to risk-taking.

Wilson and Altanlar (2009) in their unpublished paper found that in newly formed firms in the UK, a higher proportion of women on the board reduced the risk of bankruptcy. This study cannot support the findings of Wilson and Altanlar (2009), since it shows no significant association between presence of women on boards and risk-taking.

In the sample used in this study, only 50% of the firms have at least one woman on the board and most of the women on boards are NEDs. It is proposed that since there is strength in numbers, it may be that, for women to provide a challenge at board

level, there needs to be higher proportion of women on boards to have any significant effect on monitoring of managers. However, given the limited number of firms with a significant number of women on the board, this cannot be explored in this study.

8.3.1.4. Analysis and discussion of control variables

The control variables, such as lagged firm performance and firm size, are significantly associated with firm risk while others are not. Lagged performance of the firm is related negatively to firm risk and is significant with most measures of firm risk. For a one percentage decrease in previous firm performance, total firm risk increases by 0.13% in the current year. This result confirms the prediction that if the firm performed poorly in the prior year, then, it is possible that in an attempt to meet targeted performance, management increase firm risk by backing riskier projects.

Large firms have better access to capital markets and can borrow at better conditions (Ferri and Jones, 1979), enabling them to diversify, invest more and have large assets. Due to the large value of assets, even a wrong choice of investment may not affect the volatility of its stock price. Therefore, it is predicted that larger firms are associated with less firm risk. This prediction is confirmed from the results in Table 8.2, which shows that when firm size increases by one percentage point, then it is associated with 0.42% less of total firm risk. This relationship is significant across most measures of firm risk.

The other control variables used in the empirical model were financial leverage and growth opportunities, which did not show significant association with firm risk. High financial leverage is expected to be associated with low firm risk. Firms will be cautious in taking risk since they have the burden of repayment, therefore, firms with high financial leverage will take less risk. The estimation shows that financial

leverage is consistently related negatively to all measures of firm risk. The relation is not significant with any measures of firm risk.

It is predicted that a firm that has more growth opportunities would be associated with more firm risk. If the firm has more growth opportunities, then it would take the opportunity to grow by investing in new businesses. The relation between growth opportunities and firm risk is positive across all measures of firm risk but the relationship is not significant.

The industry dummies and year dummies are included in the regressions as control variables to capture the effect of the years and industries. These controls do not contribute directly to this study and the estimation results for these control variables are therefore not discussed here.

8.3.1.5. Analysis and discussion of board composition index

Hypothesis H1 predicts that board composition index, which is formed by combining the variables board size, percentage of NEDs and presence of women on the board is negatively related to firm risk. The empirical model for associating board composition index to firm risk, developed as equation 5, is estimated using the GLS-RE method and Table 8.3 shows the results of the estimation. The results show that composition index is significantly negatively related to all measures of firm risk; therefore, the hypothesis H1 is accepted.

The coefficient of board composition is hard to interpret quantitatively since the independent variable is a mix of three separate variables, namely board size, percentage of NEDs, and presence of women on the board. However, it is clear that the effect of larger boards coupled with more independent directors and women on the board is associated with less firm risk. The results show that a one unit increase

in the composition index reduces firm risk by 2.9%²⁹. Board composition is found to have a significant effect on firm risk and is a significant factor in explaining managerial risk-taking.

Table 8.3 – Results from the GLS-RE estimation of composition index on firm risk

Explanatory variables	Pre-sign	Total Risk	Asset Return risk	Insolvency risk	Idiosyncratic risk
Composition Index	-	-.029* (-1.7)	-.0286** (-2.45)	-.725* (-1.69)	-.0537** (-1.96)
Lagged performance	-	-.001* (-1.86)	-.0004 (-1.61)	-.0143 (-.77)	-.0001 (-.12)
Firm size (billions)	-	-.0045*** (-5.74)	-.0016*** (-5.86)	.0091 (.56)	-.0005 (-.4)
Financial leverage	-	-.0002 (-1.40)	-.0001 (-1.46)	.0006 (.12)	-.0001 (-.32)
Growth opportunities	+	-.0001 (-.74)	.0001 (1.08)	.0001 (0.01)	.0002 (1.18)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		-1.15*** (-22.34)	-1.16*** (-23.11)	.9141 (.78)	-.8657*** (-11.37)
No of observations		1418	1418	1418	1418
Model fit:					
Within R ²		0.6823	.6797	.0059	.1034
Between R ²		0.4694	.4875	.0064	.3060
Overall R ²		0.5779	.5814	.0059	.1716
Wald Chi ² (17)		2643.6***	2629.98***	8.24	227.08***

$\ln(\text{firm risk})_{it} = \text{constant} + (\text{board composition index})_{it} + (\text{lagged performance})_{it} + (\text{firm size})_{it} + (\text{financial leverage})_{it} + (\text{growth opportunities})_{it} + \text{year dummies}_{it} + \text{industry dummies}_{it} + \text{residuals}$

This table presents the results of the GLS-RE estimation of equation 5, also shown above. The dependent variable of firm risk is either total risk, asset return risk, insolvency risk (1/z), or idiosyncratic risk. Total risk is the standard deviation of its daily stock returns over a year. Asset return risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to book value of total assets times square-root of 260. Insolvency risk is the inverse of z-score; this is done such that the measures are comparable to the other dependent variables. (Higher z shows less insolvency risk, whereas with all the other dependent variables the higher value denotes higher risk). Z-score is measured as (ROA+CAR/sdROA). Natural log for insolvency risk is not used since it has negative values. Board composition is the combination of the variables board size, percentage of non-executive directors and presence of women on the board. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

²⁹ Calculated as $(e^{0.029} - 1) * 100 \approx 2.9\%$

No previous study has found how a combination of variables that characterize board composition associates with firm risk. The results will inform investors that firms with a small composition index (small boards, low proportion of NEDs and no women on the board) are associated with high managerial risk-taking. The signs of the coefficients of the control variables are as expected and similar to the regressions for the separate board composition variables.

8.3.2. Board leadership structure

The category of board leadership structure is represented by the variables: presence of a powerful CEO on the board and the proportion of equity held by executive directors. The empirical model used is equation 2, and the results of the multivariate data estimation, using the GLS-RE method, are shown in Table 8.4.

When the dependent variable is total risk, the overall R squared shows the model is a good fit with a value of 57.5%, also the Chi square is a significant value which shows that the independent variables explain total risk in the estimation model. The results in relation to insolvency risk do not show significant results but confirms the direction of association between the board attributes and firm risk.

8.3.2.1. Analysis and discussion of powerful CEO

The position of the CEO is at the apex of the firm with oversight on the strategic direction that the firm takes and this position has inherent power. More power is assumed if the CEO holds duality in the top position as CEO as well as chairperson of the board, or if the board has a chairperson who is a firm executive, or if the CEO is a founder of the firm. The Combined Code (2003) provides guidelines that discourages duality of the CEO-chairperson position and recommends the chairperson to be a NED.

Table 8.4 – Results from the GLS-RE estimation of board leadership structure on firm risk

Explanatory variables	Pre sign	Total Risk	Asset Return risk	Insolvency risk	Idiosyncratic Risk
Powerful CEO	+	.0444* (1.89)	.0482** (2.11)	.3678 (.57)	.0423 (1.09)
Executive directors' ownership (%)	+	.0018** (2.04)	.0018** (2.12)	.015 (.71)	.0016 (1.16)
Lagged performance	-	-.0013** (-2.11)	-.0011* (-1.88)	-.0146 (-.77)	-.0002 (-.17)
Firm size (billions)	-	-.0046*** (-5.8)	-.0045*** (-5.88)	.0023 (.14)	-.0007 (-.59)
Financial leverage	-	-.0002 (1.36)	-.0002 (-1.41)	.0007 (.12)	-.0001 (-.31)
Growth opportunities	+	-.0001 (-.57)	.0001 (.65)	-.0002 (-.05)	.0003 (1.18)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		-1.224*** (-14.46)	-1.227*** (-15.35)	-.1780 (-0.16)	-.957 (-13.42)
No of observations		1418	1418	1418	1418
Model fit:					
Within R ²		.6859	.6837	.0060	.1022
Between R ²		.4586	.4776	.0017	.3085
Overall R ²		.5750	.5791	.0047	.1722
Wald Chi ² (18)		2685.09***	2675.23***	6.65	236.95***

$\ln(\text{Firm Risk})_{it} = \text{constant} + (\text{Powerful CEO})_{it} + (\text{Board executive ownership})_{it} + (\text{lagged performance})_{it} + (\text{Firm size})_{it} + (\text{financial leverage})_{it} + (\text{growth opportunities})_{it} + \text{year dummies}_{it} + \text{industry dummies}_{it} + \text{residuals}$

This table presents the results of the GLS-RE estimation of equation 2. The dependent variable of firm risk is either total risk, asset return risk, insolvency risk (1/z), or idiosyncratic risk. Total risk is the standard deviation of its daily stock returns over a year. Asset return risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to book value of total assets times square-root of 260. Insolvency risk is the inverse of z-score; this is done such that the measures are comparable to the other dependent variables. (Higher z shows less insolvency risk, whereas with all the other dependent variables the higher value denotes higher risk). Z-score is measured as $(\text{ROA} + \text{CAR}) / \text{sdROA}$. Natural log for insolvency risk is not used since it has negative values. Powerful CEO is a dummy variable which takes the value 1 if there duality of the CEO-chairperson position, the CEO is founder or the chairperson is an executive. Executive directors' ownership is the equity ownership of all the executive board members as a percentage of the outstanding shares. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

It is argued that a powerful person in an organisation demonstrates influence and control (Pfeffer, 1997) and they would overcome resistance to exert their own will (Finkelstein, 1992). A powerful CEO would be one who can consistently influence key decisions in their firms, in spite of potential opposition from other executives (Adams, Almeida and Ferreira, 2005). Therefore, this study hypothesises that a powerful CEO would be associated with more risk-taking.

As predicted in hypothesis H2A, the results from Table 8.4 show that the presence of a powerful CEO on the board increases total firm risk by 4.4%³⁰. The association between powerful CEO and all measures of firm risk is consistent. Therefore, the alternate hypothesis H2A is accepted.

The governance literature that associates powerful CEO to firm risk is scarce and the existing studies use different US-based industries to examine the relationship between powerful CEOs and firm risk. This can be the reason why they show mixed results.

Cheng (2008) finds that in US corporations there is no significant relation between a powerful CEO and firm risk, whereas in US bank holding firms, Pathan (2009) finds that a powerful CEO is related to less firm risk. He explains that this result is in accordance with agency theory, which proposes that executives opt for less risky projects to protect their wealth in terms of job, salary, and other perquisites. In their study of sub-prime lending firms in the US, Lewellyn and Muller-Kahle (2012) find that powerful CEOs increase firm risk. They propose that powerful CEOs of sub-prime lending firms in the US contributed to the global financial crisis by engaging in risky lending practices. Adams, Almeida, and Ferreira (2005) also found that firms

³⁰ Calculated as $(1 * 0.0444 / \ln 0.40) \approx 4.4\%$

with more powerful CEOs are associated with high firm risk since decisions with extreme consequences are likely to be taken by a powerful CEO.

The results of this study show that in large UK firms, powerful CEOs increase firm risk. This significant relation can be explained by the behavioural theory of the firm, which proposes that actions taken by the executives can depend on their aspiration levels (Cyert and March, 1963). This result rejects the explanation of agency theorists that executives may only be risk-averse.

Governance guidelines (Combined Code, 2012) already encourage firms to comply with avoiding duality of the CEO-chairperson position at the helm of the firm as well as not having executives holding the position of chairperson; the finding of this study reinforces the fact that these guidelines should be followed by firms to avoid having a powerful CEO at the helm who are associated with increased firm risk.

8.3.2.2. Analysis and discussion of executive directors' ownership

In this study, board ownership is measured as the percentage of equity held by executive board members to the firm's outstanding shares. A high proportion of firm equity held by executives is considered to encourage them to take greater risk due to their convex pay-off structure, that is, executive board members get a greater increment of shares when returns are high, as opposed to moderate when returns are low (Wright *et al.*, 1996). Hypothesis H2B predicts that equity ownership by managerial directors will be positively related to firm risk. The results of the estimation (Table 8.4) show that a high percentage of board executive equity ownership increases firm risk across all measures of firm risk. The relationship is significant with total risk and asset return risk, and therefore, hypothesis H2B is accepted. A one unit increase in stock ownership by executive directors on the board

increases total firm risk by 0.18%³¹ or for a 100 unit increase in executive directors' stock ownership, total firm risk increases by 18%. Larger equity ownership by executive directors' can influence greater risk-taking due to the following possible explanations: First, board members with large ownership are powerful, since they can use their voting rights to influence decisions (Wright *et al.*, 1996) and secondly, large owners with substantial cash flows have the power and incentives to induce the managers to increase risk-taking in the expectation of gaining better returns on their equity (Laeven and Levine, 2009).

In governance literature, Demsetz and Lehn (1985) did not find any significant relationship between ownership concentration and instability in firm performance among US firms, but Saunders *et al.* (1990) find that during the period 1979-1982 in US banks, where managers held a high proportion of equity, there is significantly high risk-taking behaviour. Sanders and Hambrick (2007) find in their study of 950 US firms, in the year 1998, that firms whose CEOs have a high percentage of equity, exhibit extreme performance (i.e., very large gains as well as very large losses). Therefore, the literature mostly supports the notion that equity ownership by board executives is positively associated with risk-taking.

This study is the first to have examined the effect of board executive ownership on risk-taking in UK firms. The results show that a high proportion of equity held by board executives is associated with high firm risk. It is proposed that executive directors with a high proportion of equity holding have the incentive to increase firm risk, with the belief that by increasing firm risk they may be able to maximise returns for themselves. But studies have shown that high risk-taking has extreme

³¹ Calculated as $(e^{0.0018} - 1) * 100 \approx 0.18\%$

consequences and many powerful executives are blind to the potential dangerous downside to taking extreme risks (Sanders and Hambrick, 2007).

This result can inform firms and regulators that a high proportion of firm equity held by executive directors' increases firm risk.

8.3.2.3. Analysis and discussion of control variables

As predicted, lagged performance of the firm is related negatively to firm risk and is significant with total firm risk and asset return risk. When previous performance falls by one unit, then it relates to an increase in total firm risk by 0.13%.

It is predicted that firm size is negatively associated with firm risk. The estimation confirms this prediction that when firm size increases by one unit then it causes a 0.46% reduction in total firm risk. The relationship is significant with total firm risk and asset return risk.

Firms will be cautious in taking risk since they have the burden of repayment, therefore, firms with high financial leverage will take less risk. It is predicted that high financial leverage is associated with less firm risk and the estimation shows, that financial leverage is consistently related negatively to all measures of firm risk except insolvency risk, though, the relationship is not significant with any measures of firm risk. It is predicted that a firm that has more growth opportunities is associated with more firm risk; but, the results show that the relation between growth opportunities and firm risk is not significant.

8.3.2.4. Analysis and discussion of board leadership structure index

The board leadership structure index is represented by the combination of the variables denoting a powerful CEO and executive directors' equity ownership.

Hypothesis H2 predicts that the board leadership structure index is positively related to firm risk. The empirical model, equation 6, is estimated using the GLS-RE estimation method and the results are shown in Table 8.5.

Table 8.5 – Results from the GLS-RE estimation of board leadership structure index on firm risk

Explanatory variables	Pre-sign	Total Risk	Asset Return risk	Insolvency risk	Idiosyncratic risk
Leadership Index	+	.0595*** (2.87)	.0631*** (3.13)	.540 (1.04)	.0551* (1.75)
Lagged performance	-	-.0012** (-2.01)	-.001 (-1.78)	-.0144 (-.77)	-.0001 (-.12)
Firm size (billions)	-	-.0046*** (-5.87)	-.0045*** (-5.97)	.002 (.12)	-.0007 (-.63)
Financial leverage	-	-.0002 (-1.37)	-.0001 (-1.42)	.0008 (.13)	-.0001 (-.31)
Growth opportunities	+	.0002 (.65)	.0001 (.98)	-.0001 (-.03)	.0003 (1.23)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		-1.220*** (-24.44)	-1.223*** (-25.31)	-.173 (.16)	-.9548*** (-13.41)
No of observations		1418	1418	1418	1418
Model fit:					
Within R ²		.6855	.6834	.0066	.1016
Between R ²		.4580	.4762	.0007	.3083
Overall R ²		.5745	.5784	.0046	.1724
Wald Chi2(17)		2680.67***	2671.22***	6.47	236.69***

$$\ln(\text{firm risk})_{it} = \text{constant} + (\text{board leadership structure index})_{it} + (\text{lagged performance})_{it} + (\text{firm size})_{it} + (\text{financial leverage})_{it} + (\text{growth opportunities})_{it} + \text{year dummies}_{it} + \text{industry dummies}_{it} + \text{residuals}$$

This table presents the results of the GLS-RE estimation of equation 6 also shown above. The dependent variable of firm risk (measured as natural log) is either total risk, asset return risk, insolvency risk (1/z), or idiosyncratic risk. Total risk is the standard deviation of its daily stock returns over a year. Asset return risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to book value of total assets times square-root of 260. Insolvency risk is the inverse of z-score; this is done such that the measures are comparable to the other dependent variables. (Higher z shows less insolvency risk, whereas with all the other dependent variables the higher value denotes higher risk). Z-score is measured as (ROA+CAR/sdROA). Natural log for insolvency risk is not used since it has negative values. Board leadership structure index consists of the combination of the variables Powerful CEO and executive directors' equity ownership. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

The results show that the board leadership structure index is significantly positively related to total firm risk, asset return risk and idiosyncratic risk. Therefore, the hypothesis H2 is accepted. The coefficient of board leadership structure is hard to interpret quantitatively since the independent variable is a mix of two separate variables, namely powerful CEO and executive board director's equity ownership, though the results show that the combination of having a powerful CEO and executive directors holding a high proportion of equity significantly increases firm risk. For a one unit increase in the board leadership structure index there is an increase of firm risk by 5.95%³².

This is a first study that finds the association of a combination of variables that typify board leadership to firm risk. The index can be used by investors to determine firms that have influential and powerful boards and are associated with high firm risk - a high value of the index indicates the presence of a powerful CEO and higher proportion of executive director equity holding. The signs of the coefficients of the control variables are as expected and similar to the regressions that include the separate board leadership structure variables.

8.3.3. Board characteristics

The category of board characteristics is comprised of the following variables: average age and average tenure of board members. To find the association of board characteristics with firm risk, the empirical model, developed as equation 3, is estimated using the GLS-RE estimation method. The results are shown below in Table 8.6.

³² Calculated as $(e^{0.0595} - 1) * 100 \approx 5.95\%$

The overall R squared with respect to the dependent variable of total firm risk, shows the model is a good fit with a value of 57.4%, also the chi square is a significant value showing that the independent variables explain total firm risk in the estimation model. Again, the results in association with insolvency risk do not show significant results but confirms the direction of association between the board attributes and risk of the firm becoming insolvent.

8.3.3.1. Analysis and discussion of average age of board members

Hypothesis H3A, predicts that the average age of the board members is negatively related to firm risk. The argument is that, with age come the attributes of experience, skill, and knowledge, which are essential for having a board that is effective in monitoring management.

Also, on average young board members are associated with risk-seeking and strategic change (Child, 1974; Wiersema and Bantel, 1992) while older executives are likely to be more conservative and risk-averse (Stevens, Bayer and Trice, 1978). This result is confirmed by a recent unpublished study by Berger, Kick and Schaeck (2012), who find that in German banks lower mean age of board members significantly increases firm risk.

The results from estimating equation 3 are shown in Table 8.6. It shows that average age of board members is not associated with total risk, asset return risk or insolvency risk significantly. The average age of board members is significantly related to idiosyncratic risk and the results show that an increase in the average board age by one year decreases idiosyncratic risk by about 0.9%. Firm specific risk seems to be significantly negatively associated with mean board age. The null hypothesis H3₀A is not rejected with respect to total firm risk.

**Table 8.6 – Results from the GLS-RE estimation of board characteristics on
firm risk**

Explanatory variables	Pre sign	Total Risk	Asset Return risk	Insolvency risk	Idiosyncratic risk
Average Board Age	-	-.0014 (-.44)	-.0019 (-.64)	.01332 (1.61)	-.0088* (-1.81)
Average Board Tenure	-	-.0109*** (-2.70)	-.0098** (-2.52)	-.0317** (-2.09)	.0099 (1.63)
Lagged performance	-	-.0011* (-1.85)	-.0011* (-1.86)	-.0131*** (-5.93)	-.0002 (-.23)
Firm size (billions)	-	-.0048*** (-6.06)	-.0048*** (-6.26)	-.0059* (-1.86)	-.0007 (-.63)
Financial leverage	-	-.0002 (-1.36)	-.0002 (-1.43)	-.0000 (-0.00)	-.0001 (-.36)
Growth opportunities	+	.0001 (.64)	.0001 (.71)	.0016* (1.69)	.0002 (1.08)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		-1.057*** (-5.84)	-1.032*** (-5.87)	-7.95* (-1.86)	-.4811* (-1.74)
No of observations		1418	1418	1418	1418
Model fit: Within R ²		.6858	.6832	.0056	.1000
Between R ²		.4568	.4744	.0141	.3168
Overall R ²		.5740	.5774	.0079	.1760
Wald Chi ² (19)		2682.96***	2667.31***	10.99	238.61***

$\ln(\text{firm risk})_{it} = \text{constant} + (\text{average board age})_{it} + (\text{average board tenure})_{it} + (\text{lagged performance})_{it} + (\text{firm size})_{it} + (\text{financial leverage})_{it} + (\text{growth opportunities})_{it} + \text{year dummies}_{it} + \text{industry dummies}_{it} + \text{residuals}$

This table presents the results of the GLS-RE estimation of equation 3. The dependent variable of firm risk is either total risk, asset return risk, insolvency risk (1/z), or idiosyncratic risk. Total risk is the standard deviation of its daily stock returns over a year. Asset return risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to book value of total assets times square-root of 260. Insolvency risk is the inverse of z-score; this is done such that the measures are comparable to the other dependent variables. (Higher z shows less insolvency risk, whereas with all the other dependent variables the higher value denotes higher risk). Z-score is measured as (ROA+CAR/sdROA). Natural log for insolvency risk is not used since it has negative values. Average board age is the mean age of all the members of the board. Average board tenure is the mean tenure of all the board members. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

Previous studies have examined the association between board member's age in relation to cost of debt or company performance or restatement of financial statements. Anderson *et al.* (2004) find that the age of board members of 252 US firms from 1993 to 1998 is not significantly related to cost of debt. These results are supported by Muth and Donaldson (1998) who studied a sample of 1173 Australian firms in 1994. This is the first study to examine age of board members to firm risk in the UK. The results show that the direction of the association between idiosyncratic risk and mean board age is negative and this relationship is significant.

With respect to total firm risk, this study found that board members age and total firm risk are not significantly related. It is proposed that age of board members, which is related to maturity of the decision makers, does not significantly influence the risk bearing decisions made at board level.

8.3.3.2. Analysis and discussion of average tenure of board members

Hypothesis H3B, predicts that average board tenure and firm risk has a negative relation. The results from estimating equation 3 show, that average tenure of board members is significantly and negatively related to total risk, asset return risk and insolvency risk and not idiosyncratic risk. Hypothesis H3B is retained in relation with all risk measures except idiosyncratic risk. The results show that for a one year increase in average board tenure the total firm risk reduces by 1.09%³³.

The benefit of long tenure for board members is that the member has good organizational knowledge, has credibility in the market, and better relations and communications with other board members. With longer tenure comes greater experience, which can lead to better functioning at the board level (Golden and

³³ Calculated as $(e^{0.0109} - 1) * 100 \approx 1.09\%$

Zajac, 2001). Fiske and Taylor (1991) argue that greater experience would provide access to more information than novice members. Pfeffer (1983), Finkelstein and Hambrick, (1990) and Boeker (1997) in their study of US firms argued that long tenure of board members is associated with strategic persistence to a course of action (being risk-averse). Term limits may result in the departure of board members who are making significant contributions and whose departure would be a significant loss to the company. This study proposes that longer tenured board members may be contributing significantly to the decision-making process due to their extensive experience and knowledge of the firm and therefore will be better monitors of the firm, hence, reducing firm risk.

The results confirm that longer tenure at board level reduces managerial risk-taking.

8.3.3.3. Analysis and discussion of control variables

Lagged performance of the firm is related negatively to firm risk and is significant with total firm risk, asset return risk and insolvency risk. When previous performance is reduced by one unit, then it causes a 0.11% increase in total firm risk.

It is predicted that large firms are associated with less firm risk and the results of the estimation show that, when firm size increases by one unit, then it causes a 0.48% reduction in total firm risk. The relationship is significant with total firm risk, asset return risk and insolvency risk.

High level of financial leverage is predicted to be associated with less firm risk and the results show that financial leverage is consistently related negatively to all measures of firm risk though the relation is not significant with any measures of firm risk.

It is predicted that a firm that has more growth opportunities is associated with more firm risk and the results show that the relation between growth opportunities and firm risk is not significant with most measures of firm risk except insolvency risk.

8.3.3.4. Analysis and discussion of board characteristics index

It is predicted in hypothesis H3, that board characteristics comprising of a combination of mean board age and mean board tenure is significantly and negatively associated with firm risk. To test these hypotheses, the empirical model is developed as equation 7, and estimated using the GLS-RE method. The results are shown in Table 8.7.

The results show that board characteristics index is significantly related to total firm risk, asset return risk and insolvency risk. Therefore, the hypothesis H3 is accepted. The results make it clear that the effect of higher average age and tenure is associated with less firm risk. The results show that a one unit increase in the board characteristics index decreases firm risk by 17.78%³⁴. This index forms a significant factor in explaining firm risk.

This is the first study to find that the combination of average board age and tenure, significantly relates to firm risk. The results can inform investors that firms with a high value for the board characteristics index (older board members and longer tenured board members) are associated with less firm risk. The signs of the coefficients of the control variables are as expected and similar to the regressions including the separate board characteristics variables.

³⁴ Calculated as $(e^{0.1778} - 1) * 100 \approx 17.78\%$

**Table 8.7 – Results from the GLS-RE estimation of board characteristics on
firm risk**

Explanatory variables	Pre-sign	Total Risk	Asset Return risk	Insolvency risk	Idiosyncratic risk
Characteristics Index	-	-.1778*** (-2.97)	-.1682** (-2.89)	-.276** (-1.97)	.0335 (.36)
Lagged performance	-	-.0011** (-1.87)	-.0010 (-1.62)	-.0141*** (-5.94)	-.0001 (-.12)
Firm size (billions)	-	-.0048*** (-6.09)	-.0047*** (-6.20)	-.0004* (-1.66)	-.0011 (-1.02)
Financial leverage	-	-.0002 (-1.37)	-.0002 (-1.43)	-.0000 (-.03)	-.0001 (-.36)
Growth opportunities	+	.0001 (.63)	.0001 (.71)	.0016* (1.66)	.0003 (1.17)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		-.9993*** (-12.35)	-1.01*** (-12.87)	-2.970 (-1.57)	-.9928*** (-7.41)
No of observations		1418	1418	1418	1418
Model fit:					
Within R ²		.6857	.6831	.0052	.1023
Between R ²		.4572	.4746	.0108	.2988
Overall R ²		.5743	.5775	.0066	.1689
Wald Chi ² (17)		2683.47***	2668.31***	19.29	374.04***

$$\text{Ln}(\text{firm risk})_{it} = \text{constant} + (\text{board characteristics Index})_{it} + (\text{lagged performance})_{it} + (\text{firm size})_{it} + (\text{financial leverage})_{it} + (\text{growth opportunities})_{it} + \text{year dummies}_{it} + \text{industry dummies}_{it} + \text{residuals}$$

This table presents the results of the GLS-RE estimation of equation 7, also shown above. The dependent variable of Firm Risk (measured as natural log) is either total risk, asset return risk, insolvency risk (1/z), or idiosyncratic risk. Total risk is the standard deviation of its daily stock returns over a year. Asset return risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to book value of total assets times square-root of 260. Insolvency risk is the inverse of z-score; this is done such that the measures are comparable to the other dependent variables. (Higher z shows less insolvency risk, whereas with all the other dependent variables the higher value denotes higher risk). Z-score is measured as (ROA+CAR/sdROA). Natural log for insolvency risk is not used since it has negative values. Board characteristics index is the combination of the variables average board age and average board tenure. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

8.3.4. Board process

The category of board process is represented by the variables of board attendance and frequency of audit committee meetings. To find out how board processes relate

with firm risk, the empirical model - equation 4, is developed. The results of the multivariate data estimation of this equation, using the GLS-RE method, are shown in Table 8.8.

Table 8.8 – Results from the GLS-RE estimation of board process variables on firm risk

Explanatory variables	Pre sign	Total Risk	Asset Return risk	Insolvency risk	Idiosyncratic risk
Board meeting attendance	-	-.0019 (-1.59)	-.0017 (-1.45)	-.0021 (-.05)	-.0005 (-.24)
Freq. of audit meetings	-	-.0082 (-1.31)	-.0076 (-1.25)	-.158 (-.95)	-.0448*** (-4.41)
Lagged performance	-	-.0011* (-1.81)	-.0009 (-1.58)	-.0131*** (-5.89)	-.0002 (-.23)
Firm size (billions)	-	-.0045*** (-5.64)	-.0045*** (-5.76)	-.0060 (-0.35)	.0006 (.55)
Financial leverage	-	-.0002 (-1.39)	-.0002 (-1.43)	-.0005 (-.09)	-.0001 (-.30)
Growth opportunities	+	-.0001 (-.64)	-.0001 (-.72)	.0002 (0.64)	.0002 (.92)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		-.9799*** (-7.80)	-1.002*** (-8.19)	.4994 (.12)	-.708*** (-3.26)
No of observations		1418	1418	1418	1418
Model fit:					
Within R ²		.6847	.6821	.0066	.1120
Between R ²		.4545	.4720	.0005	.3184
Overall R ²		.5731	.5764	.0044	.1812
Wald Chi ² (18)		2665.99***	2650.73***	6.29	255.91***

$\ln(\text{firm risk})_{it} = \text{constant} + (\text{board meeting attendance})_{it} + (\text{frequency of audit committee meetings})_{it} + (\text{lagged performance})_{it} + (\text{firm size})_{it} + (\text{financial leverage})_{it} + (\text{growth opportunities})_{it} + \text{year dummies}_{it} + \text{industry dummies}_{it} + \text{residuals}$

This table presents the results of the GLS-RE estimation of equation 4. The dependent variable of firm risk is either total risk, asset return risk, insolvency risk (1/z), or idiosyncratic risk. Total risk is the standard deviation of its daily stock returns over a year. Asset return risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to book value of total assets times square-root of 260. Insolvency risk is the inverse of z-score; this is done such that the measures are comparable to the other dependent variables. (Higher z shows less insolvency risk, whereas with all the other dependent variables the higher value denotes higher risk). Z-score is measured as (ROA+CAR/sdROA). Natural log for insolvency risk is not used since it has negative values. Board meeting attendance is the average attendance of board members for the annual board meetings. The frequency of audit committee meetings is the total number of audit committee meeting in a year. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

The estimation model is a good fit with an overall R square of 57.31% with dependent variable of total firm risk. The chi square is significant showing that the independent variables explain total firm risk in the estimation model. The results in association with insolvency risk do not show significant results but confirms the direction of association between the board attributes and risk of the firm becoming insolvent.

8.3.4.1. Analysis and discussion of board attendance

Hypothesis H4A predicts that board attendance is negatively related to firm risk. The results in Table 8.8, confirm the direction of the association between board attendance and firm risk. The relation is not significant with all the risk measures; therefore, the null hypothesis H₄₀A is not rejected.

Board of directors have regular meetings to decide on the strategic direction that the firm takes and approve various decisions that are brought to the table by management. If the board meetings are not attended, then the monitoring function of the board is diluted. Therefore, board attendance is an important governance mechanism. When board meetings have full attendance, the board can be seen as more effective.

Brick and Chidambaran (2010) find in their study of US firms, that board activity had a positive influence on firm value. Brown and Caylor (2006) construct a governance index for US firms, in which board attendance is a key internal governance control factor. They find that board attendance has a significant positive influence on firm value. The results of this study show that a high level of board attendance is associated with less firm risk, which is to say that better board

attendance lowers managerial risk-taking and reduces the probability of the firm becoming insolvent.

The reasoning behind the negative association between board attendance and total firm risk can be argued as follows. Previous studies have explained that many NEDs did not attend board meetings because of lack of time, since they had multiple directorships (Fich and Shivdasani, 2006). They find that firms with boards where the majority of outside directors are busy (i.e., holding three or more directorships) are associated with weak corporate governance, low market-to-book ratios, weak profitability, and low sensitivity of CEO turnover. These results are confirmed by Jiraporn, Singh and Lee (2009) who use meeting attendance as a proxy for director performance. They suggest that multiple directorships affect board meeting attendance. They find that NEDs who hold multiple directorships are more likely to be absent from board meetings. Poor attendance at board meetings relates to poor monitoring of management activities and plans, which can increase firm risk.

This is the first study in governance literature that associates board activity to firm risk. The results of the estimation confirm the prediction that greater board activity, in terms of attending board meetings, relates to low firm risk but this relation is not significant. Even though the measure of board attendance includes the frequency of board meeting in its calculation, it is possible that the insignificant result is due to the lack of variation in board attendance in the sample. It is suggested that, as Adams and Ferreira (2007) propose, if director fees for board meetings are higher instead of the modest amount paid, attendance for the board meetings will be better.

8.3.4.2. Analysis and discussion of frequency of audit committee meetings

Hypothesis H4B predicts that the frequency of audit committee meetings is negatively related to firm risk. The audit committee is a governance mechanism, which has oversight of the firm's financial statements, internal financial controls, internal audit function, the external auditors and the compliance with regulatory guidelines. It is argued that an effective audit committee would meet more frequently to be better able to monitor firm activities and reduce firm risk.

The results of the estimation of equation 4 show that the frequency of audit committee meetings is negatively related to all risk measures. The association is significant in relation with idiosyncratic risk. For every additional audit committee meeting that takes place, the firm specific risk reduces by 4.5%. Hypothesis H4B is retained in relation with idiosyncratic risk. However, the null hypothesis H4₀B is not rejected with regards to total firm risk.

This result is supported by other studies that associate frequency of audit meetings to earnings quality, market response and financial reporting problems. Carcello *et al.* (2002) find that audit committees that meet more frequently equate to more pay, in terms of audit fees, and conclude that board activity complements auditor oversight. Committees that meet more frequently allow directors more time, on average, to carry out their monitoring duties and are more likely to exercise effective control over the quality of financial information that is conveyed to shareholders (Menon and Williams, 1994). Vafeas (2005) finds that in firms with more frequent audit committee meetings, the managers are more accurate with earnings forecasts, and therefore, get a favourable market response. De Zoort *et al.* (2002) also find that greater meeting frequency is associated with reduced incidence of financial reporting problems and greater audit quality.

There were no previous studies in the governance literature that associated frequency of audit committee meetings with firm risk. With more audit committee meetings, the monitoring and reviewing process of the firm's internal audit function is arguably much better, leading to low firm volatility. This study finds that more frequent audit committee meetings leads to less overall firm risk, though this association is not significant. The reason why the result is not significant may be due to the fact that there is not much variation in the frequency of audit committee meetings held per year in the sample.

8.3.4.3. Analysis and discussion of control variables

Lagged performance of the firm is related negatively to firm risk and is significant with total firm risk, asset return risk and insolvency risk. When previous performance is reduced by one unit, then there is a 1.1% increase in total firm risk.

It is predicted that large firms are associated with less firm risk and the results show that when firm size increases by one unit then it causes a 0.45% reduction in total firm risk. The relationship is significant with total firm risk and asset return risk.

High financial leverage is predicted to be associated with less firm risk; and the results show that financial leverage is consistently negatively related to all measures of firm risk. The relation is not significant with any measures of firm risk. The relation between growth opportunities and firm risk is also not significant.

8.3.4.4. Analysis and discussion of board process index

Hypothesis H4 predicts that board process index, which is a combination of the variables - board attendance and audit committee meetings, is significantly and inversely associated with firm risk. The results of the estimation of equation 8 are shown in Table 8.9.

Table 8.9 – Results from the GLS-RE estimation of board process index on firm risk

Explanatory variables	Pre-sign	Total Risk	Asset Return risk	Insolvency risk	Idiosyncratic risk
Process Index	-	-.1493** (-1.98)	-.1356* (-1.85)	-1.681 (-.78)	-.4691*** (-3.70)
Lagged performance	-	-.0011* (-1.84)	-.001 (-1.6)	-.0139 (-0.74)	-.0001 (-.05)
Firm size (billions)	-	-.0045*** (-5.61)	-.0045*** (-5.75)	-.0040 (-0.24)	.0002 (.21)
Financial leverage	-	-.0002 (-1.37)	-.0002 (-1.43)	-.0006 (-.10)	-.0001 (-.30)
Growth opportunities	+	.0001 (.61)	.0001 (.70)	.0001 (0.02)	.0002 (1.14)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		-1.013*** (-9.92)	-1.030*** (-10.37)	2.09 (.75)	-.3700** (-2.23)
No of observations		1418	1418	1418	1418
Model fit:					
Within R ²		.6848	.6822	.0055	.1110
Between R ²		.4530	.4709	.0011	.3031
Overall R ²		.5728	.5762	.0042	.1765
Wald Chi ² (17)		2671.05***	2655.38***	5.99	248.06***

$\text{Ln}(\text{firm risk})_{it} = \text{constant} + (\text{board process index})_{it} + (\text{lagged performance})_{it} + (\text{firm size})_{it} + (\text{financial leverage})_{it} + (\text{growth opportunities})_{it} + \text{year dummies}_{it} + \text{industry dummies}_{it} + \text{residuals}$

This table presents the results of the GLS-RE estimation of equation 8, also shown above. The dependent variable of firm risk (measured as natural log) is either total risk, asset return risk, insolvency risk (1/z), or idiosyncratic risk. Total risk is the standard deviation of its daily stock returns over a year. Asset return risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to book value of total assets times square-root of 260. Insolvency risk is the inverse of z-score; this is done such that the measures are comparable to the other dependent variables. (Higher z shows less insolvency risk, whereas with all the other dependent variables the higher value denotes higher risk). Z-score is measured as $(\text{ROA} + \text{CAR}) / \text{sdROA}$. Natural log for insolvency risk is not used since it has negative values. Board process index consists of the combination of the variables board attendance and frequency of board meetings. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

The result confirms that board process index is negatively related to all measures of firm risk. The relation is significant with all measures of firm risk except insolvency risk therefore, hypothesis H4 is accepted in relation with all measures of firm risk

except insolvency risk. The coefficient of board process is hard to interpret quantitatively since the independent variable is a mix of two separate variables, namely board meeting attendance and frequency of audit committee meetings. However, the effect of better attendance and more audit committee meetings is associated with less firm risk, and this association is significant. The results show that a one unit increase in the board process index, relates to 14.93%³⁵ decrease in total firm risk.

This is the first study that has related board activity to firm risk and findings show that board activity is a significant factor in monitoring managerial risk-taking. The signs of the coefficients of the control variables are as expected and similar to the regressions including the separate board composition variables. It is proposed that more board activity will lower firm level performance volatility.

8.3.5. Total board index

This is the first study that combines all board attributes to find how they all interact and associate with firm risk. The four categories of board composition, board leadership structure, board characteristics and board process are combined to form a total board index. Hypothesis H5 predicts that total board index is significantly related to firm risk. The combined board attributes represents the effectiveness of the board as an internal control mechanism for a firm. The results of estimating equation 9 are shown in the Table 8.10.

The results show that total board index is negatively related to all measures of firm risk. The relation is significant with all measures of firm risk except insolvency risk.

³⁵ Calculated as $(e^{0.1493} - 1) * 100 \approx 14.93\%$

Therefore, hypothesis H5 is accepted in relation with all measures of firm risk except insolvency risk.

Table 8.10 – Results from the GLS-RE estimation of total board index on firm risk

Explanatory variables	Pre-sign	Total Risk	Asset Return risk	Insolvency risk	Idiosyncratic risk
Total Index		-.0493*** (-3.98)	-.0495*** (-4.12)	-.4666 (-1.51)	-.0570*** (-2.90)
Lagged performance	-	-.0011** (-1.96)	-.0010* (-1.71)	-.0145 (-0.77)	-.0001 (-.12)
Firm size (billions)	-	-.0040*** (-5.09)	-.0039*** (-5.18)	-.0092 (-0.54)	-.00015 (-.14)
Financial leverage	-	-.00021 (-1.33)	-.0002 (-1.39)	-.0008 (-.15)	-.0001 (-.27)
Growth opportunities	+	.0001 (.68)	.0001 (.76)	.0001 (0.02)	.0003 (1.22)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		-1.047*** (-17.58)	-1.047*** (-18.17)	1.460 (1.04)	-.7601*** (-8.47)
No of observations		1418	1418	1418	1418
Model fit:					
Within R ²		.6830	.6805	.0077	.1043
Between R ²		.4905	.5097	.0020	.3149
Overall R ²		.5858	.5898	.0054	.1758
Wald Chi2(17)		2673.70***	2662.61***	7.66	243.11***

$$\ln(\text{firm risk})_{it} = \text{constant} + (\text{total board index})_{it} + (\text{lagged performance})_{it} + (\text{firm size})_{it} + (\text{financial leverage})_{it} + (\text{growth opportunities})_{it} + \text{year dummies}_{it} + \text{industry dummies}_{it} + \text{residuals}$$

This table presents the results of the GLS-RE estimation of equation 9, also shown above. The dependent variable of firm risk (measured as natural log) is either total risk, asset return risk, insolvency risk (1/z), or idiosyncratic risk. Total risk is the standard deviation of its daily stock returns over a year. Asset return risk (ARR) is computed as the standard deviation of the daily stock returns times the ratio of market value of equity to book value of total assets times square-root of 260. Insolvency risk is the inverse of z-score; this is done such that the measures are comparable to the other dependent variables. (Higher z shows less insolvency risk, whereas with all the other dependent variables the higher value denotes higher risk). Z-score is measured as (ROA+CAR/sdROA). Natural log for insolvency risk is not used since it has negative values. Total board index is the combination of the indices of board composition, board leadership structure, board characteristics and board processes. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

It is proposed that effective boards reduce high risk-taking and are composed of large boards, more NEDs, at least one woman on board. Furthermore, effective boards have a leadership structure that does not have powerful CEO and the equity held by executive board members is not large. Also, effective boards have members who are older and have longer tenure with the firm. Moreover, effective boards have more audit committee meetings and better board meeting attendance. Total board index is associated significantly with total firm risk, asset return risk and idiosyncratic risk.

The total board index varies from a value of 1.26 to 5.52 for the sample. If a firm has a low total board index, then it is associated with high firm risk. A one unit increase in total board index will decrease total firm risk by 4.93%³⁶. The total board index represents an effective governance index which can be used by investors and regulators to identify firms that have effective boards that lower firm risk. This index is similar to the FTSE/ISS Index which includes many of the board attributes used in this study (ISS, 2010). There were no other comparable board indices found in the literature.

It can be seen from all the results discussed above that the association of board attributes with insolvency risk is in the same direction as other risk measures but many of the results do not have a significant association. The reason for this can be due to the fact that the firms in the sample are top UK firms, and therefore, most firms may be far from showing signs of insolvency.

In the next section, robustness tests are carried out to confirm the results found in this section.

³⁶ Calculated as $(e^{0.0493} - 1) * 100 \approx 4.93\%$

8.4. Robustness tests

Hermalin and Weisbach (2003) and Adams and Ferreira (2007) in their study of board variables propose that board size and the proportion of NEDs are endogenously formed; for instance, they argue that when firm performance increases, board size and number of independent directors on the board decreases. This reverse causality where the dependent variable influences the explanatory variables causes a bias in the estimation. Therefore, robustness tests are conducted in this section. First, a test to check for reverse causality is conducted. Next, following the methods used by Pathan (2009), the instrumental variables technique, using the three stage least squares estimation method, is used to estimate the endogenous variables of board size and the percentage of NEDs. Lastly, Glejser's test for heteroskedasticity is used to find how the board attributes associate with another measure of firm risk which is the absolute deviation from firm performance (Pathan, 2009).

8.4.1. Test for reverse causality

In an empirical model, the independent variables explain or predict the dependent variable. But when the dependent variable predicts independent variables, then there is reverse causality. In the presence of reverse causality, estimations produce biased results. To check for the extent to which endogeneity (due to reverse causality) is a problem, the following test is conducted.

To confirm that causation runs from board attributes to firm risk, the board variables on the right hand side of equation 1, 2, 3, and 4 are replaced by their lagged values. The equations are re-estimated using ordinary least squares with lagged explanatory variables and dependent variable of total firm risk.

Table 8.11 – Results from the OLS estimation of lagged board variables on firm risk

Lagged explanatory variables	Pre-sign	Total Risk			
		1	2	3	4
Board Size (No)	-	-.108*** (-2.75)			
Proportion of NEDs (%)	-	-.0009 (-1.27)			
Gender diversity	-	-.0802*** (-4.15)			
Powerful CEO	+		.0208 (.87)		
Executive directors' ownership	+		.0011 (1.50)		
Age	-			-.0037 (-1.33)	
Tenure	-			-.0047 (-1.23)	
Board meeting attendance	-				-.0030** (-2.00)
Audit Committee meetings	-				-.010 (-1.64)
Lagged performance	-	-.0011* (-1.66)	-.0010 (-1.46)	-.001 (-1.40)	-.001 (-1.31)
Firm size (billions)	-	-.0034*** (-5.33)	-.0046*** (-7.84)	-.0047*** (-7.84)	-.0044*** (-6.88)
Financial leverage	-	-.0001 (-.49)	-.0001 (-0.43)	-.0001 (-.51)	-.0001 (-.41)
Growth opportunities	+	.00014 (.84)	.0001 (.70)	.0001 (.69)	.0001 (.76)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		-.785*** (-7.81)	-1.105*** (-27.22)	-.717*** (-4.46)	-.6309*** (-4.23)
No of observations		1146	1146	1146	1146
Model fit:		68.22***	68.63***	68.60***	68.87***
R2		.5215	.5084	.5083	.5093

This table presents the results of the GLS-RE estimation of equations 1, 2, 3, and 4 with lagged independent variables. The dependent variable is firm risk. Total firm risk is the standard deviation of its daily stock returns over a year. Board size is the total number of board members, natural log is used. Proportion of NEDs is the percentage of non-executive directors on the board. Gender diversity refers to the presence of women and is represented by a dummy variable which is given the value 1 when there is at least one woman on the board. Powerful CEO is a dummy variable which takes the value 1 if there duality of the CEO-chairperson position, the CEO is founder or the chairperson is an executive. Executive directors' ownership is the equity ownership of all the executive board members as a percentage of the outstanding shares. Average board age is the mean age of all the members of the board. Average board tenure is the mean tenure of all the board members. Board meeting attendance is the average attendance of board members for the annual board meetings. The frequency of audit committee meetings is the total number of audit committee meeting in a year. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

This test to check for reverse causality has been previously used by Pathan (2009) in his study of how board composition relates to bank risk. The argument for using lagged independent variables is that, current values may be endogenous but it is unlikely that past values are subject to the same problem.

The results are shown in Table 8.11. The results show that the estimations using lagged independent variables are similar to the estimation using contemporaneous independent variables.

Even though the significance of the relationship is not similar to the estimates using current independent variables, the direction of the relationships are the same. This shows that endogeneity is not a cause for concern in the empirical models used in this study.

Another test to check for endogeneity is conducted next using instrumental variables estimation method.

8.4.2. Testing endogenous variables using instrumental variables estimation

Instrumental variables estimation method is used to estimate the empirical model by finding exogenous instruments which replace the endogenous variables. Then the exogenous instruments are regressed on the dependent variables to find unbiased results.

From previous studies, board size and proportion of NEDs are the only known endogenous variables, therefore, only the first equation on board composition is re-estimated (Pathan, 2009). Instrumental variables estimation eliminates simultaneity bias (when two variables are co-determined), if there is any. Existing literature by Linck *et al.*, (2008) developed the variables that explain board size and NEDs on the

board, which are adapted for this study and are shown below. Equation A (shown below the results table) shows that the size of the board depends on firm size, the presence of women, equity ownership on board, firm risk, lagged firm performance and growth opportunities. Equation B shows that the percentage of NEDs on the board depends on firm size, board size, the presence of women, equity ownership on board, firm risk, lagged firm performance and growth opportunities.

Equation C is the same as equation 1 estimated earlier in the study except that in this estimation, board size and NEDs have been estimated using equation A and B.

The equations A, B and C are estimated using the three stage least squares (3SLS) estimation method and the equations are shown below the table. The 3SLS estimation method is used by employing the command 'reg3' in STATA statistical software. The results from the estimation are shown in table 8.12.

On examining the determinants of board size in Table 8.12 (equation A) it is found that board size is related significantly and positively to firm size. The results show that if the firm is large, the board will be large; it also shows that previous year's firm performance relates significantly and inversely to board size. It is proposed that more board members are appointed to the board if previous firm performance is poor.

Examining the significant determinants of percentage of NEDs on the board (equation B), it is found that only firm size is significantly and positively related with percentage of NEDs on the board, that is, larger firms have more NEDs. With regards to causality, the estimation shows that firm risk does not determine the variables of board size and the proportion of NEDs.

Table 8.12 – Results from the 3SLS estimation of equations A, B and C

	Board Size (A)	Proportion of NEDs (B)	Total Risk (C)
Board Size (No)	-	-9.3244 (-.58)	-.4289** (-2.17)
Firm risk (Total risk)	-.8743 (-1.06)	-15.322 (-.49)	-
Proportion of NEDs (%)	-.0563 (-1.38)	-	-.0079** (-2.42)
Gender diversity	.1170 (.77)	.0682 (1.19)	-.0207 (-.63)
Lagged performance	-.0012* (-1.71)	-.0036 (-.06)	-.0014** (-2.13)
Firm size (billions)	.0083*** (14.82)	.1463** (2.44)	-.0007 (-.42)
Financial leverage	-	-	-.0002 (-1.09)
Growth opportunities	.00049 (1.04)	.0075 (1.07)	.0002 (1.30)
Industry dummies	yes	yes	yes
Year dummies	yes	yes	yes
constant	4.1154	55.455	.1500
Model fit			
R squared	.1550	.0412	.5278
Chi square-stats	60.79***	287.72***	1770.39***
No of observations	1,418	1,418	1,418

Board size = Proportion of NEDs + gender diversity + executive director' ownership + firm risk + firm size + lagged performance + growth opportunities + industry dummies + year dummies (A)

Proportion of NEDs = board size + gender diversity + firm risk + firm size + lagged performance + executive equity holding + growth opportunities + industry dummies + year dummies (B)

Firm risk = Board size + Proportion of NEDs + gender diversity + lagged performance + firm size + financial leverage + growth opportunities + industry dummies + year dummies (C)

The table presents the results of 3SLS estimates of equation A, B and C shown above in Column 1, 2, and 3 respectively. Board size is the total number of board members. Proportion of NEDs is the percentage of non-executive directors on the board. Gender diversity refers to the presence of women on the board and is represented by a dummy variable which is given the value 1 when there is at least one woman on the board. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. The constant value in the regression is also reported. The model fit is also reported. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

The results of the estimation for equation C show that total firm risk is determined by three significant factors, namely board size, percentage of NEDs and lagged firm performance.

The results are similar to the estimation done using the GLS-RE method (in section 8.3.1) which showed that the variables, board size, percentage of NEDs, presence of women on the board, are all negatively related to firm risk. In this estimation, the relation of board size and percentage of NEDs to total firm risk is significant.

The results of the estimation of equation 1, by using the GLS-RE method or the instrumental variables method are similar and in the same direction. This confirms that after controlling for endogeneity, board size and the proportion of NEDs are associated with firm risk in the same direction.

Other board attributes used in this study could have been tested using instrumental variables method. The reason why this was not done is because, this method requires the construction of instruments for every board attribute that is considered endogenous and previous literature reveals only board size and proportion of non-executive directors as endogenous; and constructing instruments for all the other board attributes is beyond the scope of this study. Also, the previous robustness test on the existence of reverse causality indicates that there is no endogeneity due to reverse causality in the other board attributes.

8.4.3. Heteroskedasticity test and absolute value of firm risk

Previous studies such as Pathan (2009) and Lewellyn and Muller-Kahle (2012) have used Glejser's (1969) test for heteroskedasticity, as a robustness test, to show the

relation between board attributes and absolute firm risk. This test is performed using two step regressions.

The equation D is a generic equation that stands for equation 1, 2, 3 and 4. In the first step, board attributes are regressed on the dependent variable of firm performance using pooled OLS estimation.

Firm performance is measured as return on assets. Residuals are obtained from the first regression. Residuals are the difference between the actual value of a dependent variable and the value of variable that is predicted by the model. In the second step, the absolute value of the residuals obtained from the first step is used as a proxy for firm risk to re-estimate the equation using pooled OLS. This value gives the absolute deviation from firm performance as opposed to standard deviation (Pathan, 2009). The second step regression estimation, using pooled OLS, is shown in the Table 8.13.

The R square of the second equation is 39.59% for the composition board attributes; 40.92% for the board leadership structure attributes, 12.85% for the board characteristics and 40.96% for the board process attributes with statistically significant F statistics.

The significant results are as follows; board size is negatively related to absolute firm risk; board executive ownership is positively related to absolute firm risk; and average board tenure is negatively related to absolute firm risk.

Table 8.13 – Results from the pooled OLS estimation of board composition variables on absolute value of ROA residuals

Explanatory variables	Pre sign	Absolute value of ROA residuals			
		Equation 1	Equation 2	Equation 3	Equation 4
Board Size (No)	-	-1.3368** (-2.45)			
Proportion of NEDs (%)	-	.0121 (1.13)			
Gender diversity	-	.2535 (1.11)			
Powerful CEO	+		-.0466 (-.90)		
Executive directors' ownership	+		.043*** (4.96)		
Age	-			-.0150 (-0.25)	
Tenure	-			-.2238*** (-3.08)	
Board meeting attendance	-				-.0441 (-1.61)
Frequency of audit committee meetings	-				-.2882 (-3.41)
Firm size	-	.0268*** (2.96)	.020** (2.51)	.027** (2.15)	.0329*** (3.81)
Financial leverage	-	-.0029 (-1)	-.003 (-1.02)	-.005 (-1.13)	-.0029 (-1.01)
Growth opportunities	+	.0157*** (7.39)	.0151*** (7.16)	.0389*** (11.95)	.0155*** (7.40)
Industry dummies		yes	yes	yes	yes
Year dummies		yes	yes	yes	yes
constant		9.86*** (7.06)	8.171*** (.563)	7.07** (2.10)	4.871** (2.37)
No of observations		1,418	1,418	1,418	1,418
Model fit:					
Adjusted R2		.3959	.4092	.1419	.4096
F statistic (19, 1398)		50.46***	53.82***	12.85***	53.92***

Firm performance =
 $(\sum \text{board attributes}) + \text{firm size} + \text{financial leverage} + \text{growth opportunities} + \text{industry dummies} + \text{year dummies} + \text{residuals}$ (D)

Abs(residuals) =
 $(\sum \text{board attributes}) + \text{firm size} + \text{financial leverage} + \text{growth opportunities} + \text{industry dummies} + \text{year dummies} + \text{errors}$ (E)

This table represents the results of Glejser's (1969) heteroskedasticity tests for firm risk. To perform the tests, in the first step the residuals of the regression where the dependent variable is return on assets (ROA) is obtained first from pooled OLS estimation. In the second step the absolute value of the residuals obtained from the first step is used as a proxy for firm risk to re-estimate the equation using pooled OLS. This value gives the absolute deviation from firm performance as opposed to standard deviation. Board size is the total number of board members. Proportion of NEDs is the percentage of non-executive directors on the board. Gender diversity refers to the presence of women on the board and is represented by a dummy variable which is given the value 1 when there is at least one woman on the board. Lagged performance is the accounting profit for the firm in the previous year and is measured as return on assets. Firm size is measured as market capitalisation of the firm in billions of pounds. Growth opportunities are measured as capital expenditures over sales and financial leverage is calculated as total debt over assets. Industry and year dummies are included. Along with the coefficient the t-statistic is reported in parentheses. The superscripts of *, **, *** indicate statistical significance to 10%, 5% and 1% respectively.

Most of the board attributes associate with absolute deviation of firm performance in a similar way as with the standard deviation of firm performance (total firm risk), except for the variable that represents a powerful CEO. These results are akin to the results from the estimation using the GLS-RE method. Therefore, the effect of most board attributes on firm risk is also supported by Glejser's (1969) heteroskedasticity tests.

The results were also validated qualitatively by interviewing directors of firms from the data sample. The responses of the directors to the results of the study are discussed in the following section.

8.5. Validation of results

Directors from FTSE 350 firms in the greater London area were invited to provide their perspective on the results of the study. Contextualising the results of the study from their perspective and experience will enrich the study. Sixty four letters were sent to both executive and non-executive directors of FTSE 350 firms in the sample, requesting an interview. There were five positive responses for the request for interview; three of whom are executive directors and two are non-executive directors. A protocol for the interview was designed (shown in Appendix IV) and used as the template to ask questions. First, the responses to the significant and non-significant results are discussed separately and next, the response to the governance index is discussed.

8.5.1. Responses to significant results

The first significant result of this study is that a small board size increases firm risk. The interpretation of this result is that firms need the breadth of experience, expertise and skill of directors; lacking which can lead to less effective monitoring and

increase firm risk. All the directors agreed with the interpretation of this result. A non-executive director said that ‘an optimum board size is 10-12 members; too large could become inefficient and ineffective and run the risk of becoming dysfunctional’. He clarified that ten to twelve directors would provide the effective monitoring required in large firms and reduce firm risk. Another director mentioned that ‘every firm has an optimum board size; if there are too few members the board may lack the expertise and experience to provide advice’. This could lead to wrong decisions made thereby increasing firm risk. An executive director thought that ‘complex companies that deal in various industries and are spread geographically, need more directors, than companies which are less complex.’

The second significant result of the study is that powerful CEOs increase firm risk, which could be due to their risk-seeking nature and high level of aspiration. An executive director’s response was, ‘It is true that combining two roles places too much power into the hands of a single individual, and because that individual controls what information makes it to the board, the board is not able to fulfil its fiduciary duties to shareholders effectively.’ He pointed out that an example of such a powerful CEO was ‘Aubrey McClendon a cofounder, CEO and Chairman of Chesapeake’, a US based firm, who was ousted by shareholders. Another director’s response was that ‘there are examples across the spectrum: there are weak CEOs and there are competent CEOs. Competent CEOs can work towards reducing firm risk and weak CEOs can increase firm risk’. Another director said, ‘powerful CEOs can be aspirational and want to improve firm performance; it is important to look at firm risk in the current business climate. To counterbalance the presence of a powerful CEO, firms have independent NEDs, non-executive Chairperson, and a senior

independent director that provide a check and balance'. All the directors agreed that powerful CEOs had more opportunities to increase firm risk.

The third significant result of the study is that firm equity held by board executives relates positively with firm risk and the interpretation is that board executives with firm equity aspire to improve the worth of their equity in the firm and therefore increase firm risk. One director's response to this interpretation was 'Yes, this is certainly the case. Ownership in the firm was certainly linked to aspiration of the executive'. He mentions that at the moment in most FTSE 350 firms, 'the CEO receives three times their salary in equity and there is now pressure for five times'. This increased ownership in the firm can potentially increase the motivation of the board executive to increase firm risk. Another director said that 'it is important to consider not only equity compensation in relation to performance of the executive director but also in relation to firm risk'. The directors were in agreement that high firm equity ownership amongst directors can 'potentially increase firm risk'.

The fourth significant result is that a longer tenured board member is found to lower firm risk. The interpretation of this result is that longer tenured directors have a better understanding of the firm, have internal and external contacts, and more balanced and in-depth information that enable them to be better monitors of management, providing effective governance and thereby reducing firm risk. The directors agreed to this interpretation of the result. One non-executive director was of the opinion that 'it takes time for a new NED to really understand the business of the company; having climbed the learning curve, boards then want the director to serve for a reasonable period of time'. Another director mentioned that 'longer tenure would provide more effective governance'. An executive director mentioned that for non-

executive directors if the tenure is 'more than 10 years there is the risk of losing "independence" which is critical for an effective board'.

8.5.2. Responses to non-significant results

The study found no significant association between percentage of NEDs on the board and firm risk. The interpretation of this result is as follows: because the non-executive members work part time with the firm they may not have the in depth knowledge of the firm to influence a change to risky plans of the executives. One director clarified that NEDs needed to maintain independence from the firm so as to provide independent views and guidance which safeguarded shareholders' interests. Another director said that 'NEDs are appointed for their skill as required by the firm and are active participants on the board. They provide constructive input to improve the management plans as well as a different perspective to that of the management.' An executive director noted that 'A powerful CEO can get risky management plans approved, in spite of at least 50% of NEDs on the board'. He added that the non-significant result of no association between NEDs and firm risk could be due to the fact that 'every firm has different proportion of NEDs on the board with different ability and input'.

The presence of women on the board is found to be related negatively to firm risk but this association is not significant. The interpretation of this result was that due to a low level of women on boards (most of the firms in the sample had none or one woman on the board) there could be polarisation between the dominant group of men on the board and the women, leading to problems in their role as decision makers (Kanter, 1977). A higher proportion of women on the board - as recommended by the Davies report (2011) - will change group dynamics on the board and could improve the monitoring capacity of the board. One director mentioned that gender diversity

can 'enhance board independence by encouraging healthy debate among diverse perspectives and reducing the social similarities among homogeneous groups that can lead to groupthink and premature consensus.' Another director said that 'women react to crisis situation different to men, they might also evaluate information and consider risk and reward differently than men, and this diversity in thinking can improve decision making.' On the other hand, another director did not think that gender diversity is an issue, but diversity in the form of different backgrounds, nationalities, races, age, ethnicities as well as gender, was important and believed that greater diversity of this nature resulted in better decisions made.

A higher average age of board members is found to be related to lower firm risk though this association is not significant. The interpretation of this result was that older board members have more knowledge, skill and firm related information that results in improved monitoring ability, thereby leading to less firm risk. One director said that 'quality is more an aspect of age', meaning that older directors have the depth and breadth of experience to provide better advice. Another director's opinion was that there needs to be more variation in the age of board members and this was related to diversity on the board.

Higher board meeting attendance was found to lower firm risk but this association is not significant. One director said that 'some NEDs have poor attendance, and then the chances are he/she is not interested or has conflicting demands. This will result in the NED making less well informed decisions'. He said that better attendance can lead to more effective monitoring. An executive director mentioned that 'many things happen outside of a board meeting. It is the committee where all the work is done. The board meetings themselves are time-bound and choreographed'. This gave

the impression that the board meeting attendance in itself was not as significant as committee meeting attendance.

A higher frequency of audit meetings was shown to lower firm risk, though this association is not significant. The reasoning for the non-significant association was that there is not much variation across firms in the number of meetings held. One director mentioned that 'directors are committed to having 4 to 6 audit committee meetings a year. The frequency of the audit committee meetings is not as important as the quality of the meetings; in terms of the information, responsiveness, and follow-up'. Another director also was of the same opinion that 'the quality of the proceeding of the audit committee was important'. An executive director mentioned that, 'a well chaired audit committee is treated with great respect by the business, but it does not necessarily reduce risk of future 'bets'.'

8.5.3. Responses to the Governance Index

The final part of the study involved the construction of a board index which combines all the board attributes which can be used as a governance index that indicates effective governance in relation with firm risk. It was found that a board with a high total board index is significantly associated with lower firm risk. Firms with a higher board index have the following board attributes: Large boards, more NEDs, women on the board, no duality of CEO-chairperson position, low board executive equity ownership, high average age and tenure of board members, high frequency of audit committee meetings and higher board meeting attendance. One director mentioned that 'instinctively, these board attributes are the ones that provide more effective monitoring in the interest of the shareholder'. Another director said that boards of FTSE 350 firms are encouraged to evaluate their own performance

(Combined, code, 2012) and a tool to assess board effectiveness in relation to firm risk would be useful.

With regards to stipulating specific board attributes for having effective boards, a non-executive director said that he was 'not keen on pigeon holing. Requirements vary from industry to industry, country to country etc. But there are undoubtedly best practices and benchmarks'. Meaning that one could not be prescriptive with board attributes since different industries and firms have different requirements. Another director mentioned that it was 'a good idea to evaluate boards in relation with both firm performance and firm risk.' An executive director said that what differentiates boards is the quality of board members in terms of their 'previous experience, expertise, insights and the amount of time and focus they can bring to the table'. He mentioned that it would be difficult to measure quality of board members.

The directors that were interviewed thought that it is relevant to find the association of board attributes with firm risk and mentioned that these findings were important especially in the current economic climate. The directors' responses to the results of the study provided contextualisation from their experience in the board room. The directors concurred with the interpretation of significant results of this study and provided insights from their experience.

8.6. Summary

In the first section of this chapter, the relation between firm risk and firm performance is analysed. The results show that the previous year's firm risk and the current year's firm risk is significantly and negatively associated with firm performance. These results confirm the premise of this study that high firm risk (proxy for managerial risk-taking) leads to poorer firm performance.

This chapter tests the hypotheses developed in chapter five using the empirical models developed in chapter six. The empirical models are estimated using the GLS-RE method and the tests are conducted using four alternate risk measures of total firm risk, asset return risk, insolvency risk and idiosyncratic risk. Since total firm risk is the measure that encompasses both market risk and firm specific risk, and is a risk measure that is tracked by firms and regulators alike, the results are discussed in relation with total firm risk. Most of the results show insignificant results with insolvency risk, which may be due to the sample which consists of mostly very solvent firms; but the results show that the directional association of the board attributes with insolvency risk are mostly similar to the other risk measures.

The analysis of board composition attributes show that board size is significantly and negatively related to total firm risk. This findings show that a large board reduces firm risk. It is proposed that less extreme decisions are made by large groups that are an average of individual prior judgements (Kogan and Wallach, 1966). This result can inform large UK firms in using board size as an internal risk control mechanism. The percentage of NEDs on the board is not significantly associated with total firm risk. This may be because the part time NEDs do not have much relevant firm information to mount a challenge to decisions made, and therefore reduce firm risk. The presence of women on the board is also not significantly associated with total firm risk. It is proposed that a higher proportion of women on boards are needed for women to provide a challenge at board level to have any significant effect on monitoring of managers.

The analysis of the board leadership structure shows that both powerful CEOs and board equity owners are significantly and positively related to total firm risk. It is proposed that powerful CEOs can be risk-seeking and this behaviour can be

explained by the behavioural theory of the firm, which proposes that actions taken by the executives can depend on their aspiration levels (Cyert and March, 1963). Also, executive directors with a high proportion of firm equity have the incentive to increase firm risk to try and maximise returns for themselves.

The analysis shows that average board age is not significantly related to firm risk; however, average tenure of board members is significantly negatively related to total firm risk. It is proposed that the long tenured board members have good organizational knowledge, extensive experience and better relations with other board members and this works towards reducing firm risk. The analysis of board process attributes shows that high level of board activity reduces firm risk but these associations are not significant in relation to total firm risk.

All the board indices - board composition, board leadership structure, board characteristics, board processes, are found to significantly associate with firm risk. Board composition index, board characteristics index and board process are significantly negatively associated with total firm risk, while board leadership structure is significantly positively associated with total firm risk. Finally, a composite index, that encompasses all board attributes previously discussed, is found to be associated significantly and negatively with total firm risk.

Robustness tests are then conducted to check if there is a problem of endogeneity due to reverse causation. Tests are conducted with lagged explanatory variables using pooled OLS estimation and the dependent variable as total risk. Using explanatory variables from a different time period still produced results that are similar to the regressions using contemporaneous variables. This shows that there is no reverse causation in the model.

Another robustness test is conducted using a different estimation method for equation 1, which is identified as having possible endogenous variables in the model. Only the variables of board size and percentage of NEDs are seen to be endogenous in the previous literature, therefore, board size and percentage of NEDs are endogenised and three stage least squares estimation method is used to estimate equation 1. The results show that firm risk does not cause changes in board size or the number of NEDs on the board. This estimation confirms that the association between board attributes and total risk are similar to those using GLS-RE. In fact this estimation shows a significant inverse relation between NEDs and total risk. More NEDs on the board are associated with better monitoring of firm executives and lowering of firm risk.

Glejser's test for heteroskedasticity is another robustness test to find the association between board attributes and the absolute deviation from firm performance, and it shows that the results are similar for many of the board attributes when the dependent variable is the absolute value of firm performance residuals, which is a proxy for firm risk. These robustness tests confirm the results of this study as being valid and reliable.

Five directors were interviewed such that they could provide their opinion on the results of the study. Their views were insightful and helped to contextualise the results.

The next chapter provides a summary and conclusion to this study.

Chapter 9

Conclusion

9.1. Introduction

This chapter summarises the study and focuses on its contribution to the corporate governance literature. The chapter is organised as follows. First, an overall summary of the study discusses the gap in the governance literature, the theoretical model and research questions. Next, a summary of the findings is discussed, in terms of whether the research questions have been answered. This is followed by a discussion of the theoretical and empirical contribution of this study to knowledge in corporate governance. The implications and recommendations of the findings are also discussed. Finally, the limitations of the study are discussed along with recommendations for future research.

Corporate governance guidelines (Code, 2012) recommend FTSE 350 firms to have a board composition, which consists of at least 50% NEDs, no duality of the CEO-chairperson position, a chairperson who is not an executive, and to increase gender diversity. The results of this study will inform regulators on how the above mentioned board attributes that are used as control mechanisms relate to firm risk. It is relevant to study firm risk since the Turnbull report (2005) requires FTSE 350 firms to identify and manage risks facing the firm in the annual reports and boards are expected to monitor and manage risk facing the firm. After the financial crisis of 2007-2008, when many financial firms invested in risky investments, stakeholders are looking for more information as to how decisions are made at board level and what board attributes influence managerial risk-taking. The results of this study will

inform investors, firms and regulators on how board attributes associate with risk-taking and whether they can be used as internal risk controlling mechanisms.

9.2. Overall summary

In the continuing global financial crisis since 2007, firms face many risks that are complex and interconnected. Boards of directors have the critical risk oversight function regarding the challenges that face firms. Board composition, board leadership structure, board characteristics and board processes can affect how risk bearing decisions are made. Firms take risks to be able to grow, but risk-seeking managers can increase firm risk which can increase the probability of firm insolvency (Shapira, 1994). The relation between firm risk and firm performance is estimated and the results show that high risk-taking in the previous year and current year is related significantly to low firm performance in the current year. This shows that high firm risk is not beneficial to firm growth. Based on this argument, this study aimed to find how board attributes are associated with managerial risk-taking, using the proxy of firm risk, where firm risk is measured as the volatility of the firm's stock.

In the UK, the corporate governance empirical literature on board attributes is scarce and the few studies that exist have examined only a few board attributes in relation with firm performance. This is the first study that examines the proportion of non-executive directors on the board, board size, the presence of a powerful CEO, ownership structure and how these attributes associate with managerial risk-taking using a UK data sample. It is the first study that relates gender diversity on the board to risk-taking, since previous studies have only related gender diversity to firm performance (Carter, Simkins and Simpson, 2003; Adams and Ferreira, 2009;

Eklund, Palmberg and Wiberg, 2009). With regards to the board attributes of age and tenure, previous studies relate these attributes to strategic change (Golden and Zajac, 2001). No previous literature relates age and tenure of board members to risk-taking. Even though previous studies have examined board processes and how it associates with firm performance (Vafeas, 1999; Klein, 2002), this is the first study that examines board activity and how it relates to firm risk. This gap in the literature is identified after a systematic review of the literature.

A theoretical model formulated by Zahra and Pearce (1989) in their survey of literature on boards, integrated board attributes and grouped them into the four categories: board composition (consisting of board size, proportion of non-executive directors, gender diversity; board leadership structure (a powerful CEO and board executive ownership); board characteristics (board age and tenure); and board processes (board meeting attendance and frequency of audit committee meetings). They proposed that the role of board members included monitoring management and providing strategic advice; therefore, board attributes can influence decision making and hence how the firm performs. The research questions are derived based on this model as to how each of the categories and individual board attributes affect firm risk. The conceptual framework for the study is based on agency theory, which proposes that the board plays a controlling role on behalf of the shareholders in monitoring the executives of the firm, who may act in their own self-interest. This study extends agency theory, which proposes that firm executives are risk-averse and back only safe projects so as to keep their jobs (Eisenhardt, 1989), by incorporating the behavioural theory of the firm, which supports the view that executives may be risk-seeking or risk-averse based on their aspiration level (Cyert and March, 1963).

Based on these theories and findings from previous literature in governance, behavioural psychology and strategic management, hypotheses are formulated. These hypotheses are tested using a data sample of 268 firms in the FTSE 350 index for the period 2005 to 2010 and the empirical models are estimated using the GLS-RE method. The findings from the analysis are discussed, in the following section.

9.3. Summary of findings

The findings provided support for most hypotheses tested. The *significant* associations between board attributes and firm risk (particularly total firm risk) are discussed first.

- As in previous literature that used US-based data samples (Cheng, 2008; Pathan, 2009), board size is found to be negatively related to total firm risk. It is proposed that large boards have a breadth of experience, expertise and skill which contributes to better and less risky decisions, leading to low firm risk. Also, judgements made by a large group would be the average of individual prior judgements (Kogan and Wallach, 1966). Therefore, extreme decisions will not be made by large groups, thereby reducing firm risk.
- Powerful CEOs are found to be associated positively with total firm risk. This finding is different from existing literature that is US based. Pathan (2009) finds that a powerful CEO reduces firm risk and he proposed that firm executives are risk-averse in order to protect their job. However, in UK firms, this study finds that powerful CEOs increase firm risk. It is proposed that powerful CEOs are risk-seeking and this may be due to their level of aspiration. There is support found here for the behavioural theory of the firm instead of agency theory.

- Equity ownership by board executives is found to relate positively to total firm risk. Previous studies that related board executives' ownership to firm risk are scant. A previous study by Demsetz and Lehn (1985) did not find any significant relationship between ownership concentration and instability in firm performance among US firms but Saunders *et al.* (1990) find that during the period 1979-1982 in US banks, where managers held a high proportion of equity, there is significantly high risk-taking behaviour. It is proposed that board executives who hold a high proportion of firm equity, back riskier projects that increase firm risk.
- Tenure is found to be negatively related to firm risk. Longer tenured directors have the contacts, information and skills that enable them to be better monitors of management and it is proposed that this helps them to reduce firm risk.
- The board composition index, (formed by combining board size, proportion of non-executive directors and gender diversity), is found to be negatively related to firm risk and this association is significant. This result shows that an effective board that reduces high risk-taking will have a large board, with more NEDs and have women on the board.
- The board leadership structure index, (formed by combining the variables of powerful CEO and executive equity ownership), is found to be positively and significantly related to firm risk. A board that is associated with high risk-taking would have a powerful CEO and high board executive equity ownership.
- The board characteristics index, (formed by combining the variable of average age and tenure of the board members), is negatively related to firm

risk. To lower high risk-taking, the board would have older directors with longer tenures.

- Board process index, (formed of frequency of audit meetings and board meeting attendance), also shows a negative relation with firm risk. An effective board will have more frequent audit committee meetings and better board meeting attendance.
- All the indices are combined into one variable - the total board index, and it is found that the combined board attributes had a significant effect on firm risk. This can be interpreted as follows: firms that have a combination of the following board attributes, small boards, less NEDs, no women on the board, powerful CEO, high board executive equity ownership, low average age and tenure of board members, low frequency of audit committee meetings and less board meeting attendance, will be associated with high risk-taking. Firms with a high total board index have effective boards that reduce high firm risk.

The predictions made with regards to the other board attributes are also supported, but the association is *not significant*. These attributes are now discussed:

- The percentage of NEDs on the board is found to have a negative relation with firm risk. Lewellyn and Muller-Kahle (2012) and Cheng (2008) using a US-based data sample of sub-prime lending firms, and a sample of US corporations, respectively, also found an insignificant association between NEDs and firm risk. A board with at least 50% NEDs is seen by regulators as a monitoring mechanism that can mount a challenge to risky propositions from executives and reduce firm risk. Even though the sample has on average more than 60% NEDs on the board, the results show that the proportion of NEDs on the board are not associated significantly with firm risk. It may be

that NEDs who work only for a few hours a year for a firm may not have enough influence or insider knowledge to change the risky plans of executives. They become 'yes-men' to the executives on the board due to this.

- The presence of women on a board relates negatively to firm risk. Women on a board can provide a different perspective in the otherwise homogenous group. Women also have different perceptions with regards to risk-taking and have been known to be risk-averse in finance-related experiments (Croson and Gneezy, 2009). This study shows that the presence of women on the board is related negatively to firm risk but this association is not significant. It is proposed that the presence of a woman on the board represents tokenism and there could be a polarisation between the dominant group of men on the board and the women, leading to problems in their role as decision makers (Kanter, 1977). A higher proportion of women on the board - as recommended by the Davies report (2011) - will change group dynamics on the board and could improve the monitoring capacity of the board.
- Mean age of board members is found to be negatively related to firm risk. It is argued that older board members have more knowledge, skill and firm related information that results in improved monitoring ability of board members, thereby leading to less firm risk, but the results show that age of board members and firm risk are not significantly related.
- Board meeting attendance is found to be negatively related to firm risk. More board members that are present at board meeting results in decisions made that lower firm risk but the association between board attendance and firm risk is found to be insignificant. It is suggested that, if director fees for board

meetings are higher, instead of the modest amount paid, attendance for the board meetings may be better.

- Frequency of audit meetings is found to be negatively related to firm risk. Increased monitoring due to more frequent audit meeting lowers firm risk but this relationship is found to be insignificant. The reason for this association may be due to the fact that there is not much variation in the number of meetings held by firms in the sample.

Tests of robustness are conducted due to concern regarding endogeneity of some explanatory variables due to reverse causality. The results show that there is no reverse causality in the empirical model. Glejser's test for heteroskedasticity found similar results as the estimation using the GLS-RE method.

Five directors of FTSE 350 firms were interviewed to provide feedback on the results of the study. The directors concurred with most of the interpretations of the results of this study. They also provided topics for further research, for example, one mentioned that gender diversity was as important as other types of diversity on the board such as ethnicity, nationality, age, etc. and another mentioned that future research in corporate governance can examine the role of information, in terms of how it is communicated and acted upon by directors.

The research design used has enabled this study to address the research questions and ensure the results are valid, generalisable and replicable. Measurement validity or construct validity is high since the measures that are devised to denote a concept actually reflect the concept. The internal validity is strong since longitudinal design is used which allows for measurement of changes in variables over time, and therefore, allows causal inferences to be made (Bryman and Bell, 2007). In this

longitudinal study, the cohort category is the FTSE 350 index and hence, the results are generalisable to large UK companies. Replicability is high since the data collected is secondary data that is publicly available.

Future research recommendations from previous studies are utilised in this study. Reviewers of governance literature such as Zahra and Pearce (1989), mention that future research on boards should develop theories based on different perspectives, so as to test predictions of the association between board attributes and firm performance. This study made use of a combination of the agency theory and the behavioural theory of the firm, as a foundation for the arguments it put forward. This study also used findings from studies in group dynamics, decision making, strategic management and behavioural psychology, to examine and model board interactions. Hermalin and Weisbach (2008), in their review of governance literature, point to the need for modelling board interactions and recommend researchers to be aware of the problem of endogeneity due to reverse causality in governance variables. This study addressed the expressed concern by using test of robustness.

9.4. Theoretical and empirical contributions

This section discusses the theoretical and empirical contributions of this study to governance literature. Most of the existing literature on boards is based on agency theory and has concentrated on how boards relate to the performance of the firm; the reasoning of how boards influence firm performance has not been clear. This study aims to shed light on the board attributes that are associated with the control and decision-making process, particularly with reference to risk-taking. The results of this study show how board attributes are associated with risk-taking and hence the performance of the firm.

The existing risk-taking literature such as Cheng (2008) is not clear on the association between firm risk and firm performance, while Pathan (2009) develops hypothesis based on the notion that firm risk is positively related to firm performance. Unlike these earlier studies, this study makes a valuable theoretical contribution to the governance literature in basing its arguments on the perception that high firm risk is associated with poor firm performance.

This study extends agency theory by using the behavioural theory of the firm. Agency theorists propose that the executives are risk-averse and that they make safe, less risky decisions, in order to maintain job security (Eisenhardt, 1989). On the other hand, the behavioural theory of the firm proposes that management can be risk-seeking and back risky projects or they can be risk-averse based on their aspiration level. The findings of this study show, that powerful CEOs are associated positively and significantly with firm risk. This finding supports the behavioural theory of the firm in showing that powerful CEOs can be risk-seeking. The study also reveals that board executive's shareholding is positively related to firm risk, that is, top level management at board level are risk-seeking when they hold more of the firm's equity. This finding again supports the behavioural theory of the firm. Extending agency theory by the use of the behavioural theory of the firm and combining them to construct the theoretical framework is an important contribution of this study.

This study used an integrated model of boards proposed by Zahra and Pearce (1989), which they based on the then existing literature on boards, and this model has since been used by Stiles and Taylor (2002). This is the first study that has examined an integrated model of boards and how it associates with risk-taking.

With respect to the empirical contributions,

- This is the first study in the UK that examines the influence of board composition and powerful CEO on firm risk.
- This is the first study in governance literature that examines how board executives' equity ownership, board age, board tenure and board activity associates with firm risk.
- It is also the first study that has examined how the combination of variables that constitute the board composition index, the board leadership structure index, the board characteristics index, the board process index and the total board index associates with firm risk. The findings show that the combination of board attributes (total board index) is significantly associated with firm risk. This index can be used as a governance index to evaluate the performance of boards in relation to managerial risk-taking.

9.5. Recommendations and implications

Firms take a certain amount of risk in order to grow, but high risk-taking (as evidenced by high stock volatility) increases the probability of insolvency for a firm (Shapira, 1994). Firm risk is high when there is a focus on the upside possibilities of a project while ignoring the downside possibilities. This study shows which board attributes affect firm risk positively and which reduce firm risk. Therefore, the findings from this study will be of interest to firms, investors and governance regulators.

This study provides evidence as to how corporate governance guidelines prescribed by the Combined Code (2003) and Code (2012) are affecting firm risk. The results of the study show that a high proportion of NEDs is not significantly associated with firm risk. Regulators could consider increasing the amount of time that NEDs work

for the board of a firm. More time at the firm may give them more information on the project plans of executives, which they can then use to influence decisions.

The study provides evidence that the presence of a woman on the board reduces firm risk, but this relationship is not significant. A higher proportion of women on the board as recommended by the Davies report (2011) may change group dynamics and hence how decisions are made on the board.

The results show that powerful CEOs, (who hold the dual position of CEO and chairperson, or the chairperson is a firm executive or the CEO is a founder) tend to increase firm risk. If firms and regulators want to reduce high firm risk, then replacing a powerful CEO can help in reducing firm risk. Regulators have already recommended that firms should avoid duality at the apex of the firm and to have chairpersons who are independent (Code, 2012). This study has provided empirical support for these recommendations.

The results provide information to firms as to the use of board attributes as risk controlling mechanisms. The results show that a larger board size results in less firm risk and this can inform firms to increase board size if they want to lower firm risk. High firm equity held by executive directors is found to increase firm risk. If the firm wants to reduce firm risk, they can consider reducing the equity compensation to executive directors on the board.

Longer tenure of board members is found to lower firm risk. The Code (2012) has recommended not more than three year tenures for non-executive board members. The results of this study can inform regulators that longer tenure of board members

may be associated with gaining more firm specific knowledge which helps directors in making decisions that lowers firm risk.

This study has shown empirically that the combined board attributes have a significant effect on firm risk. Even though some of the board attributes are not significantly related to firm risk, when combined they interact such that they are associated significantly with firm risk. Board attributes may be regarded as risk control mechanisms and this can inform policy on board composition, board leadership structure, board characteristics and board processes. The total board index can be used as an effective governance index that rates firms according to firm risk in relation to the board attributes. The study also highlights the fact that firms should be aware of the upside as well as the downside of risk-taking.

9.6. Limitation of research and topics for future research

Large public UK firms are chosen as the sample for this study since in these firms there is a possible conflict of interest between the diffused shareholders who are not involved in running the firm and the executives of the firm who may act in their own self-interest. The results of this study can therefore be generalised only to other large publicly held firms. This is a limitation of the study since the results cannot be generalised to boards of firms in other countries or to small firms in the UK. This study can be replicated in other countries to examine the relation between board attributes and firm risk.

Regulators' guidelines recommend that NEDs should also be independent (Code, 2012). Independent NEDs are those who have no close family ties with other directors, who do not hold significant shareholding in the firm, do not get a salary

from the firm, have not been employed by the firm in the last five years and have had tenure of less than nine years. This study, measured the percentage of NEDs on the board as reported in the firms' annual report (and in the database), since the data to determine if an NED is independent according to the regulatory guidelines is difficult to gather and time consuming. Future research can gather more information on independent NEDs to examine their relation to firm risk.

Only a handful of firms in the sample have more than 25% women on the board and only about 50% of the firms have a woman on the board. In this study, a dummy variable is used to denote the presence of women on the board so as to have a sample of at least a hundred firms to test the association between the presence of women on boards and firm risk. If the sample contained a high proportion of women board members, then the proportion of women could have been used as a measure of gender diversity to find the association between women on the board and firm risk. However, such a study could be undertaken using a Norwegian data sample where the distribution of women on boards is high.

The tenure of the non-executive directors and executive directors can be very different, due to the fact that non-executive directors can only be appointed to a maximum of three terms, whereas for the executive directors there is no limit for their tenure. This study could not associate tenure and age of executive and non-executive directors with firm risk separately, since this data was not collected separately. Future studies can examine the age and tenure of executive and non-executive directors separately in association with firm risk.

This study followed a positivistic approach since it is difficult to get access to boards of directors to conduct interviews, or undertake case studies to gather data. Most of

the existing literature uses secondary data and conducts the research using quantitative methods. Very few studies have used qualitative methods to examine governance and firm risk. Mace (1971) interviewed 75 directors of firms to examine the role of directors and what they actually do on boards. It is one of the few studies that uses a qualitative methodology and provided important information on board processes. Shapira (1994) conducted an exploratory study where he interviewed 50 decision makers. He designed a questionnaire based on themes arising from these interviews and collected data from decision makers in the firm to examine how managers define and react to risks. His study provided a valuable contribution to the risk-taking literature. A qualitative study which examines board members' attitude towards risk would add to the governance literature and is a topic for future research. A qualitative element was added to this study to validate the results. This was done by interviewing five directors from firms in the sample. The response of the directors to the interpretation of the results provided views from their experience and has enriched the study. They validated the significant results of this study and this has strengthened the policy relevance of the results.

Board size and proportion of non-executive directors have been identified as endogenous variables in previous literature and established the variables that determine them (Lehn, Patro and Zhao, 2009). This enables researchers to formulate instruments for the endogenous variables. To examine if other board attributes (such as equity ownership and board attendance) may be endogenous, future studies can examine their determinants.

Future research could test the association between board attributes and firm risk during the recession period as well as the period of expansion in the economy, as a test of robustness.

High risk-taking in the financial sector has been an issue of concern since the financial crisis of 2007-2008. Extending this study to financial institutions would provide insight into the board attributes that contributed to high levels of risk-taking in UK banks. Since the sample of banks in the UK is very small, this study could not be done exclusively for these institutions. Future research could examine this topic with a sample of banks across countries in Europe.

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Appendix I

The UK FTSE 350 firms used in the sample

BURREN ENERGY	RANDGOLD RESOURCES	ATKINS (WS)
CAIRN ENERGY	AQUARIUS PLATINUM LTD	BABCOCK INTL GROUP
DANA PETROLEUM	FRESNILLO	BUNZL
HERITAGE OIL	LONMIN	BERENDSEN
IMPERIAL ENERGY CORP	HANSON	CARILLION
JKX OIL & GAS	MARSHALLS	CAPITA GROUP
MELROSE RESOURCES	BALFOUR BEATTY	DE LA RUE
PREMIER OIL	KIER GROUP	EXPERIAN
SOCO INTERNATIONAL	KELLER GROUP	G4S
SALAMANDER ENERGY	MORGAN SINDALL GROUP	HOMESERVE
TULLOW OIL	COBHAM	INTERSERVE
VENTURE PRODUCTION	MEGGITT	INTERTEK GROUP
BG GROUP	ROLLS-ROYCE HOLDINGS	ALFRED MCALPINE
BP	VT GROUP	MOUCHEL GROUP
ROYAL DUTCH SHELL	BAE SYSTEMS	MITIE GROUP
ABBOT GROUP	CHEMRING GROUP	NORTHGATE
AMEC	QINETIQ GROUP	REGUS
EXPRO INTERNATIONAL GRP	ULTRA ELECTRONICS HLDGS	RPS GROUP
HUNTING	REXAM	RENTOKIL INITIAL
LAMPRELL	DS SMITH	SPEEDY HIRE
PETROFAC LTD	COOKSON GROUP	SERCO GROUP
WOOD GROUP (JOHN)	FKI	XCHANGING
WELLSTREAM HOLDINGS	SMITHS GROUP	HAYS
PV CRYSTALOX SOLAR	TOMKINS LTD	MICHAEL PAGE
CRODA INTERNATIONAL	CHLORIDE GROUP LTD	STHREE
IMPERIAL CHEMICAL INDS	MORGAN CRUCIBLE	PAYPOINT
JOHNSON MATTHEY	SPECTRIS	ELECTROCOMPONENTS
VICTREX	DOMINO PRINTING SCIENCES	FILTRONA
MONDI	HALMA	HOWDEN JOINERY GROUP
TALVIVAARA MINING CO	RENISHAW	PREMIER FARNELL
CORUS GROUP	BODYCOTE	SIG
FERREXPO	CHARTER INTERNATIONAL	TRAVIS PERKINS
UK COAL	ENODIS	WOLSELEY
GEM DIAMONDS LTD	FENNER	SHANKS GROUP
ANGLO AMERICAN	IMI	GKN
ANTOFAGASTA	MELROSE	SABMILLER
BHP BILLITON	ROTORK	SCOTTISH & NEWCASTLE LTD
EURASIAN NATURAL	SPIRAX-SARCO ENGINEERING	DIAGEO
HOCHSCHILD MINING	WEIR GROUP /THE	BARR (A.G.)
KAZAKHMYS	ARRIVA	BRITVIC
RIO TINTO	BBA AVIATION	ASSOCIATED BRITISH FOODS
VEDANTA RESOURCES	FORTH PORTS	CADBURY
XSTRATA	WINCANTON	CRANSWICK
PETROPAVLOVSK	ASHTED GROUP	DAIRY CREST GROUP
TATE & LYLE	TESCO	BROWN (N) GROUP
UNILEVER	BROWN (N) GROUP	INFORMA
AGA RANGEMASTER GROUP	JJB SPORTS	JOHNSTON PRESS
MCBRIDE	NEXT	PEARSON
RECKITT BENCKISER GROUP	SIGNET JEWELERS	REED ELSEVIER
HEADLAM GROUP	SPORTS DIRECT	TRINITY MIRROR
BARRATT DEVELOPMENTS	DEBENHAMS	UBM
BERKELEY GROUP HOLDINGS	HOME RETAIL GROUP	YELL GROUP
BOVIS HOMES GROUP	MARKS & SPENCER GROUP	EASYJET
BELLWAY	MOTHERCARE	888 HOLDINGS
CREST NICHOLSON	WOOLWORTHS GROUP	BWIN.PARTY DIGITAL

PERSIMMON
REDROW
TAYLOR WIMPEY
WILSON BOWDEN
GEORGE WIMPEY LTD
BURBERRY GROUP
PZ CUSSONS
SSL INTERNATIONAL
BRITISH AMERICAN
GALLAHER GROUP LTD
IMPERIAL TOBACCO GROUP
SOUTHERN CROSS
SYNERGY HEALTH
GYRUS GROUP
SMITH & NEPHEW
GENUS
ASTRAZENECA
DECHRA PHARMACEUTICALS
GLAXOSMITHKLINE
HIKMA PHARMACEUTICALS
NORTHERN FOODS
PREMIER FOODS
ROBERT WISEMAN DAIRIES
SHIRE
ALLIANCE BOOTS HOLDINGS
BOOKER GROUP
GREGGS
WM MORRISON
SAINSBURY (J)
COMPUTACENTER
DIMENSION DATA HOLDINGS
LOGICA
NORTHGATE INFO
TELECITY GROUP

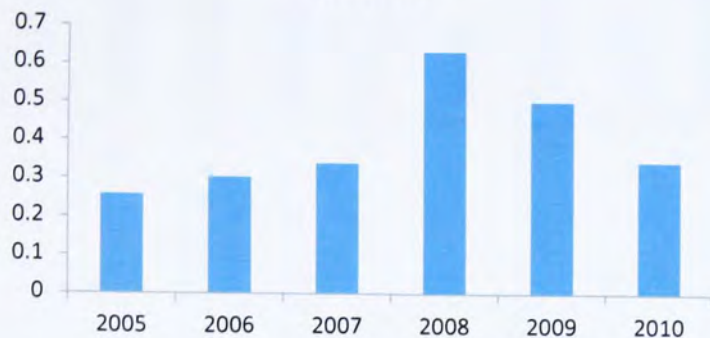
BSS GROUP
CARPETRIGHT
DUNELM GROUP
KINGFISHER
TOPPS TILES
CONNAUGHT
DIGNITY
CARPHONE WAREHOUSE
DIXONS RETAIL
FINDEL
GAME GROUP
HALFORDS GROUP
HMV GROUP
INCHCAPE
KESA ELECTRICALS
WH SMITH
BRITISH SKY BROADCASTING
EMI GROUP
ITV
THOMSON REUTERS UK
AEGIS GROUP
ITE GROUP
MONEYSUPERMARKET.COM
RIGHTMOVE
TAYLOR NELSON SOFRES
WPP
DAILY MAIL&GENERAL TST
EMAP INTERNATIONAL
EUROMONEY INSTL
MISYS
SAGE GROUP /THE
ARM HOLDINGS
IMAGINATION TECH GROUP
AUTONOMY CORP

LADBROKES
RANK GROUP
WILLIAM HILL
INTERCONTINENTAL HOTELS
MILLENNIUM & COPTHORNE
CARNIVAL
COMPASS GROUP
DOMINO'S PIZZA UK & IRL
ENTERPRISE INNS
GREENE KING
WETHERSPOON (J.D.)
LUMINAR GROUP HOLDINGS
MITCHELLS & BUTLERS
MARSTON'S
PUNCH TAVERNS
RESTAURANT GROUP
WHITBREAD
AVIS BUDGET EMEA LTD
FIRSTGROUP
GO-AHEAD GROUP
MYTRAVEL GROUP
NATIONAL EXPRESS GROUP
STAGECOACH GROUP
THOMAS COOK GROUP
TUI TRAVEL
BT GROUP
COLT GROUP SA
CABLE & WIRELESS
INMARSAT
VODAFONE GROUP
CSR
LAIRD
PACE
SPIRENT COMMUNICATIONS
AVEVA GROUP

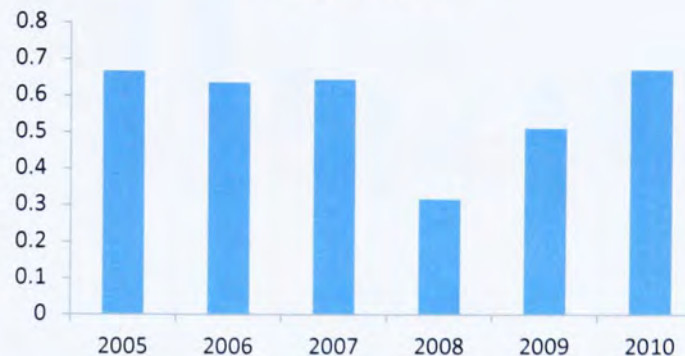
Appendix II

Descriptive statistics for firm risk measures over the sample period 2005-2010

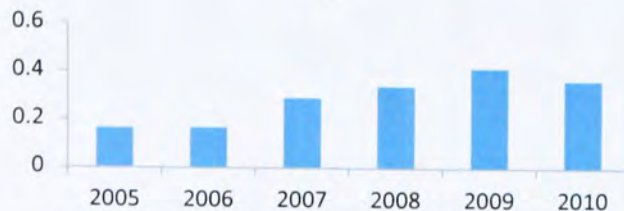
Total risk



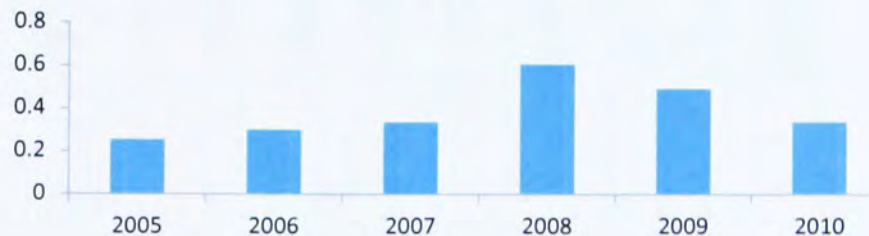
Idiosyncratic risk



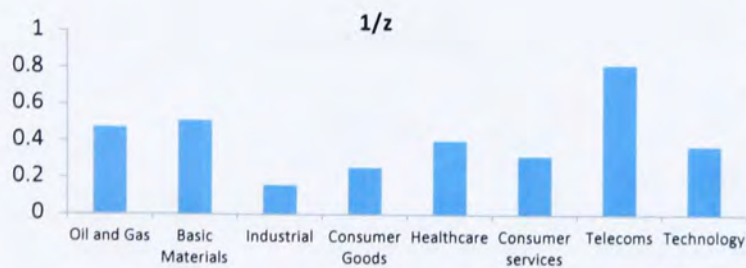
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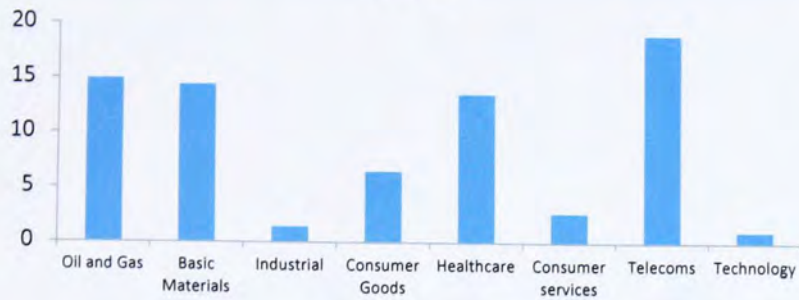
Descriptive statistics for firm risk measures across industries



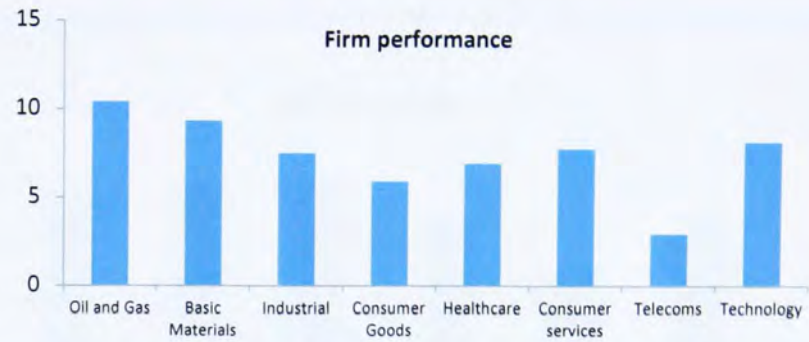
Appendix III

Descriptive statistics for control variables across industries

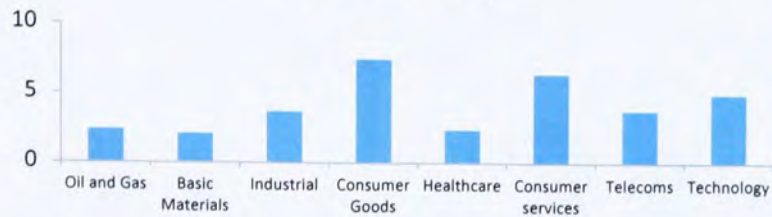
Firm size



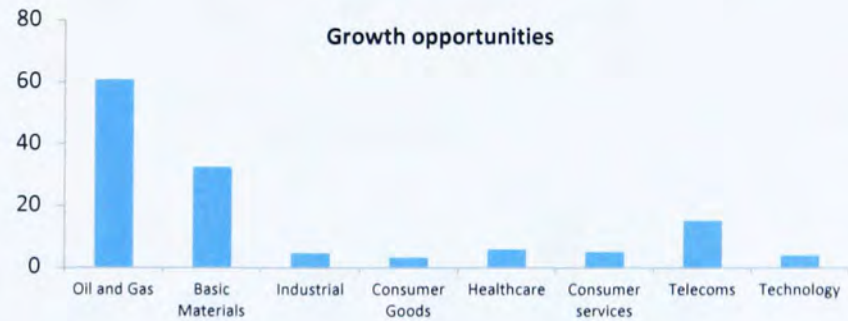
Firm performance



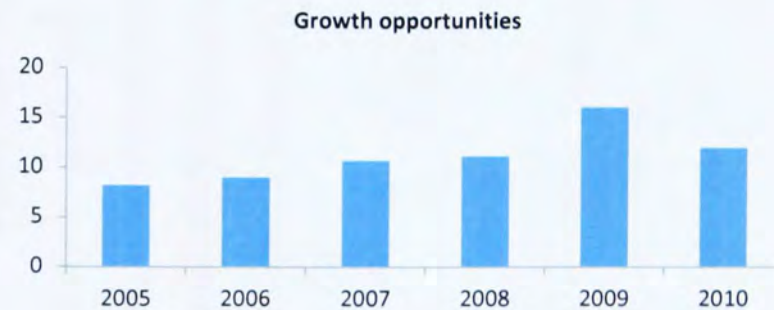
Financial leverage



Growth opportunities



Descriptive statistics for control variables over the sample period 2005-2010



Appendix IV

Protocol for the interview

The background of the study, the research methodology, the board variables investigated in relation with firm risk was first explained. Each result and its interpretation were then discussed, followed by the question ‘What is your opinion in your experience as to the interpretation of this result’.

Significant associations between board attributes and firm risk

Board size

It is found that a large board size decreases firm risk. Large boards have a breadth of experience, expertise and skill which contributes to better and less risky decisions, leading to low firm risk. Also, judgements made by a large group would be the average of individual prior judgements (Kogan and Wallach, 1966). Therefore, extreme decisions will not be made by large groups, thereby reducing firm risk.

From your experience, what is your opinion on the interpretation of the result?

Powerful CEOs

Powerful CEOs (duality of CEO-chairperson position, CEO is a founder or Chairman is an executive) increase firm risk. This finding is different from existing literature on the topic. Pathan (2009) uses a sample of US firms to find that a powerful CEO reduces firm risk and he proposes that firm executives are risk-averse in order to protect their job. This study finds that powerful CEOs increase firm risk. My interpretation is that powerful CEOs are risk-seeking due to their high level of aspiration.

From your experience, what is your opinion on the interpretation of the result?

Equity ownership

Firm equity held by board executives is found to relate positively with firm risk. It is proposed that board executives who hold a high proportion of firm equity, back riskier projects that increase firm risk. This may be due to their aspiration of improving the worth of their equity in the firm.

From your experience, what is your opinion on the interpretation of the result?

Average Tenure

Longer tenure on the board is found to lower firm risk. Longer tenured directors have a better understanding of the firm, have internal and external contacts, and more balanced and in-depth information that enable them to be better monitors of management, providing effective governance and thereby reducing firm risk.

From your experience, what is your opinion on the interpretation of the result?

Non-significant associations between board attributes and firm risk

Proportion of NEDs

A higher percentage of NEDs on the board is associated with lower firm risk, but this association is not significant. It may be that NEDs who work part-time for the firm may not have enough influence to change risky plans of executives and hence firm risk.

From your experience, what is your opinion on the interpretation of the result?

Gender diversity

The presence of women on the board is related negatively to firm risk but this association is not significant. Women on a board can provide a different perspective in the otherwise homogenous group. Women also have different perceptions with regards to risk-taking and have been known to be risk-averse in finance-related

experiments (Croson and Gneezy, 2009). However, with a low level of women (most of the firms in the sample had none or one woman on the board) there could be polarisation between the dominant group of men on the board and the women, leading to problems in their role as decision makers (Kanter, 1977). A higher proportion of women on the board - as recommended by the Davies report (2011) - will change group dynamics on the board and could improve the monitoring capacity of the board.

From your experience, what is your opinion on the interpretation of the result?

Average age

Higher average age of board members is related to lower firm risk though this association is not significant. It is argued that older board members have more knowledge, skill and firm related information that results in improved monitoring ability, thereby leading to less firm risk. The insignificant association may be because there is not much variation of average age of board members amongst firms in the sample, to provide any significant result.

From your experience, what is your opinion on the interpretation of the result?

Board meeting attendance

Higher board meeting attendance lowers firm risk but this association is not significant. Even though higher board attendance, representing effective governance, is related to lower firm risk, this association is not significant. This again may be because there is not much variation of average board meeting attendance of board members amongst firms in the sample.

From your experience, what is your opinion on the interpretation of the result?

Frequency of audit meetings

Higher frequency of audit meetings lowers firm risk, though this association is not significant. Higher frequency of audit meeting provides increased monitoring which can lower firm risk. The reason for the insignificant association may be due to the fact that there is not much variation in the number of meetings held by firms in the sample.

From your experience, what is your opinion on the interpretation of the result?

Board Index

The final part of the study involved the construction of a board index which combines all the board attributes which can be used as a governance index that indicates effective governance in relation with firm risk. A board with a high total board index is significantly associated with lower firm risk. The firms with higher board index have the following board attributes: Large boards, more NEDs, women on the board, no duality of CEO-chairperson position, low board executive equity ownership, high average age and tenure of board members, high frequency of audit committee meetings and higher board meeting attendance. This board index can be used as a board governance index to evaluate the effectiveness of the board in relation with firm risk.

From your experience, what is your opinion on the implication and use of the board index?