"Internal Governance Mechanisms and their Impact on Corporate Policies and Performance: Evidence from the London Stock Exchange"

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CONTENTS

List of Tables

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ABSTRACT

The present thesis examines whether important corporate governance characteristics of British boards are related to corporate cash holdings/liquidity, firm performance and stock price crashes. By conducting this research, we examine the informational content for investors and policymakers of two important corporate governance characteristics: i) the number of directorships held by executive directors or directors' "busyness"; ii) the level of gap in compensation companies pay to their CEO and other executive directors, or CEO "pay slice".

Chapter 2 examines the effect of board busyness on corporate cash holdings. We offer new insights by evaluating two conflicting views regarding the quality of service that busy directors provide to corporate boards and their impact on decision making. One view is that directors who simultaneously serve on multiple boards improve board decision making ability as they have better experience and business connections (*reputational effect*).The opposite view is that directors with multiple seats are "too busy to mind the business", which creates serious agency problems and leads into suboptimal corporate decisions (*busyness effect*). We analyse a large sample of UK listed companies over the 1997 to 2009 period and document evidence supporting a non-linear relationship between our proxy for board busyness and corporate cash holdings. In line with the *reputational effect*, we find that companies with board members that hold seats in other companies maintain a higher level of cash, net cash and financial slack. This effect is present, however, only at low levels of board busyness. In line with the *busyness effect*, our findings suggest that as board busyness increases beyond a certain threshold, it negatively affects cash holdings, net cash and financial slack.

Chapter 3 examines a relationship between the CEO Pay Slice (CPS) – the fraction of the top five executive directors' total compensation that is captured by CEO - and firm value

in the UK. CPS reflects the relative importance of CEO as well as the extent to which the CEO is able to extract rents[1]. CPS may also alter effectiveness of board performance by influencing cooperation and cohesiveness among its members. Using a large sample of UK-listed companies over the 1997 to 2010 period, we document evidence supporting a negative relationship between CPS and firm value as measured by Tobin's Q. Our results are consistent with the hypothesis that high CPS is associated with agency problems, and is likely to impact negatively on the executive team's spirit and motivation. Our results have major implications for the on-going debate on how to reform executive remuneration, and highlight the importance of considering remuneration issues at the board level, supporting the principles of UK Corporate Governance Code (2010).

Chapter 4 examines the relationship between corporate governance characteristics and risk of stock price crash in UK firms. We use CEO Pay Slice (CPS) – the fraction of the maximum top-five executives' total compensation that goes to the CEO, and board 'busyness' – the proportion of board level directors who have three or more directorships , to evaluate the effect of these two important aspects of corporate governance on stock price crash risk. The CPS reflects relative importance of the CEO as well as the extent to which the CEO is able to extract rents and expropriate shareholders wealth (expropriation effect). Board busyness may create a serious agency problem because directors are "too busy to mind the business", allowing for executives' short-termism and bad news hoarding (busyness effect). Stock price crash risk captures asymmetry in risk, especially downside risk, and is important for investment decisions and risk management (Kim et al., 2014). Using a large sample of UK listed companies over the 1997 to 2010 period, we document evidence supporting a positive relationship between CPS, board busyness and stock price crash risk. In line with the

[1] Term "rent extraction" is often used in the corporate finance literature to denote the possibility of shareholders' wealth expropriation by top managers including CEO (Bebchuk et al., 2003, Frydman and Saks, 2010 among others). This term has been introduced by economists to describe the increase in one's wealth without actual wealth creation (Krueger, 1974).

expropriation and busyness effects, we find that companies with high CPS and high levels of board busyness are exposed to higher level of stock price crash risk. The fact that CPS positively impacts on stock price crash risk has a strong implication for the on-going debate on how to reform executive remuneration so that it provides the right incentives to directors. There is also a direct implication for the public debate on limitation of the number of directorships held by executives from our findings, as we argue that board effectiveness depends on the overall level of board business.

Chapter 5 concludes this thesis, providing an overview of its contribution and empirical results and outlining their implications.

CHAPTER 1

Introduction

1.1. Motivation and structure of the thesis

The present thesis examines how corporate governance characteristics of British boards are related to corporate cash holdings/liquidity, firm performance and stock price crashes. Corporate governance arrangements and performance of corporate boards have been widely discussed by policy makers, regulators, practitioners and academics. By conducting this research, we examine the informational content for investors and policymakers of two important corporate governance characteristics: i) the number of directorships held by executive directors or directors' "busyness"; ii) the level of gap in compensation companies pay to their CEOs and other executive directors, or CEO "pay slice". Despite the fact that these two issues attract significant attention from academics and practitioners, the research examining British companies is very limited. Most of the existing empirical literature addresses these issues in the US context examining almost exclusively US-based companies. This thesis contributes significantly to the literature and has direct implication for the public debate by examining the importance of board busyness and CEO pay slice for investors, policy makers and regulators. There are only a few studies, that we are aware of, which constructs and utilizes comprehensive corporate governance dataset of companies listed on the London Stock Exchange.

Chapter 2 examines a relationship between corporate cash holdings/liquidity and board "busyness". To this end, Chapter 2 offers new insights by evaluating two conflicting views on the quality of service that busy directors provide to corporate boards and their impact on board effectiveness. One view claims that directors who serve on multiple boards improve board decision making ability as they have better experience and business

connections (reputational effect).The opposite view is that directors with multiple seats are "too busy to mind the business", which creates serious agency problems (busyness effect). By analysing a large sample of UK listed companies over the 1997 to 2009 period, we document evidence supporting a non-linear relationship between our proxy for board busyness and corporate cash holdings/liquidity. In line with the reputational effect, we find that companies with board members that hold seats in other companies maintain a higher level of cash/liquidity. This effect is present, however, only at low levels of board busyness. In line with the busyness effect, our findings suggest that as board busyness increases further to a certain threshold, it negatively affects cash holdings/liquidity.

Chapter 3 examines a relationship between CEO Pay Slice (CPS), the fraction of maximum top-five executive directors' total compensation captured by CEO, and firm value in the UK. CPS could reflect the relative importance of CEO as well as the extent to which the CEO is able to extract rents. CPS could also alter effectiveness of board performance by influencing cooperation and cohesiveness among its members. Using a large sample of UK listed companies over the 1997 to 2010 period, Chapter 3 documents evidence supporting a negative relationship between CPS and firm value as measured by Tobin's Q. The results from this chapter are consistent with the hypothesis that high CPS is associated with agency problems and impacts negatively on the executive team's spirit and motivation. Chapter's 3 results have a strong implication for the on-going debate on how to reform executive remuneration and highlight the importance of considering remuneration issues at the board level supporting the UK Corporate Governance Code (2010) principles.

Chapter 4 examines a relationship between corporate governance characteristics and stock price crash risk. We use CEO Pay Slice (CPS) and board busyness to evaluate the effect of corporate governance on stock crash risk. The CPS could reflect the relative importance of CEO as well as the extent to which CEO is able to extract rents and expropriate shareholder

wealth (expropriation effect). Board busyness creates serious agency problems because directors are "too busy to mind the business" allowing for the executives' short-termism and bad news hoarding (busyness effect). Using a large sample of UK listed companies over the 1997 to 2010 period, Chapter 4 documents evidence supporting a positive relationship between CPS, board busyness and stock price crash risk. In line with the expropriation and busyness effect, we find that companies with high CPS and high level of board busyness are exposed to higher stock price crash risk. The fact that CPS positively impacts on stock price crash risk has a strong implication for the on-going debate on how to reform executive remuneration so that it provides the right incentives. There is also a direct implication for the public debate limiting the number of directorships held by executives from our findings, as we argue that board effectiveness depends on the overall level of board busyness.

Chapter 5 concludes the thesis by summarising main empirical results and outlining contribution to the existing literature. The rest of Chapter 1 reviews the theoretical arguments and corresponding empirical results from the prevailing literature and positions this thesis relative to the most recent studies.

1.2. Busy boards, corporate cash holdings and corporate liquidity

In this study, we attempt to provide insights into how multiple directorships impact corporate cash holdings/liquidity. Recent theoretical and empirical research highlights the importance of busy directors for board process. Mace (1986), Rosenstein and Wyatt (1990), Loderer and Peyer (2002) among others show that busy directors are especially valuable in enhancing a board advisory and monitoring functions. Harris and Shimizu (2004) found that such directors are important source of knowledge and can, in particular, enhance acquisition performance. Field et al. (2013) demonstrate that directors with multiple board seats (due to their experience and contacts) are excellent advisors. Haunschild and Beckman (1998) argue

that directors with multiple directorships have positive effect on entire corporate system due to the innovation dissemination throughout a corporate network.

There are several reasons why the presence of busy directors at the board level may positively affect corporate cash holdings/liquidity. Busy directors can use their external contacts for the advantage of the firm they serve and secure firm's access to required external funds (Means, 1939; Pfeffer and Salancik, 1978; Zahra and Pearce, 1989). Second, they manage corporate cash holdings/liquidity carefully because the external labour market evaluates directors by their "home" company performance, which is directly linked to cash/liquidity management. Third, executive directors with outside directorships, due to their experience and knowledge, represent competitive threat for the current CEO and, consequently, increase CEO performance incentives. Fourth, they are less dependent on their "home" CEO for career progression, and do not fear to provide information required for the board's decision-making.

To the contrary, Core et al. (1999), and Shivdasani and Yermack (1999) suggest that directors can become overcommitted when serving on multiple boards. Fich and Shivdasani (2006), Jiraporn et al. (2008) demonstrate that boards with busy directors are associated with lax corporate governance. The main reasons why holding of multiple directorships might negatively affect corporate cash holdings/liquidity are extensively discussed in the literature. It was found that directors with multiple seats cater for CEOs and multiple appointments correlate with excess CEO compensation (Shivdasani and Yermack, 1999; Core et al., (1999). Busy directors are often absent from board meetings neglecting their duties by not taking part in the strategic decisions-making processes (Jiraporn et al., 2008). Number of board seats held by supervisory directors exhibits positive correlation with accounting fraud (Beasley, 1996). Busy directors take care of their own reputation and depart from underperforming

companies. These findings imply that there is an inadequate monitoring and lack of attention paid to key corporate issues.

We attempt to provide insights into how multiple directorships impact corporate cash holdings/liquidity. We use cash, net cash and financial slack to proxy for cash holdings/liquidity and measure board busyness as a proportion of directors with three or more directorships on the board. In our tests, we control for the important corporate governance characteristics (independence, board size, board tenure, proportion of "imported" CEOs, directors' age, and gender diversity) and for various firm characteristics (size, performance, dividends paid, and profitability). Throughout our analysis, we find consistent support for the proposition that relationship between busy boards and firm cash holdings/liquidity is non-linear. Companies with board members that hold seats on other companies' boards, maintain a high level of cash, net cash, and financial slack, in line with reputational effect. However, when board busyness reaches a certain threshold, a further increase in board busyness has a negative effect on cash, net cash and slack, implying a higher level of financial risk.

Our findings contribute to the literature in four key ways. First, this study supplements existing research by expanding the understanding of relationship between firms' cash holdings/liquidity and board busyness. Second, while many scholars explore the role of busy directors and their contribution to the different aspects of business, we are unaware of any published research that investigates these issues using a UK-based sample. Third, previous research almost exclusively focuses on impact of busy boards on firm performance and reputation. We add to this body of literature by arguing that multiple directorships affect company's cash holdings/liquidity in a complex non-linear manner. Finally, it has a direct implication for the public debate on limitation of the number of directorships held by executives. National Association of Corporate Directors (1996) put forward a threshold of three directorships, and the Council of Institutional Investors (2002) argues that directors

with full-time jobs should not seat on more than two other boards in order to serve effectively. We argue that board effectiveness also depends on board busyness, i.e. on the proportion of the busy directors on the company board.

1.3. CEO pay slice and firm value

Executive compensation has been widely discussed by economics, psychology, sociology, and management scholars (see Gomez-Mejia and Balkin, 1992; Gerhart and Rynes, 2003, among others). Prior research in this area addresses issues related to executive pay level (differences between companies), pay structure (differences within a company) and payment delivery systems (different forms of payment). Considerable academic attention is given to the relationship between CEO pay and firm performance (Jensen and Murphy, 1990; Hall and Leibman, 1998; Bebchul and Fried, 2004, among others). The most recent academic research explores inequality in remuneration among top executives and its effect on a company's outcomes. Academics identify interesting aspects of compensation inequality, such as executives' remuneration dispersion and CEO pay slice (a proportion of total compensation paid to top-five executives received by a CEO) and argue that they can affect corporate performance (see Lee et al., 2008; Fredrickson et al., 2010; Zalewska, 2014a; Frydman and Saks, 2010; Bebchuk et al., 2011). However, results from the analysis of the pay inequality – firm performance relationship are ambiguous. Lee et al. (2008) and Frydman and Saks (2010) argue that higher level of pay disparity improves performance and firm growth prospective, but Zalewska (2014a) and Bebchuk et al. (2011) find that pay disparity can be detrimental to the board effectiveness and firm performance.

The wake of corporate scandals around "fat cats" compensation packages in Britain[2] is a timely reminder that pay-performance problem in the UK context requires further

[2] See BBC News-Business: "High Pay of UK executives corrosive, report says", 22nd November 2011, http://www.bbc.co.uk/news/business-15827683

attention. Executive pay has become a major issue in recent years in the UK, with shareholders questioning high salaries received by directors[3]. British government has been very proactive in tackling compensation-related problems. Thus, in 2002, the UK was the first country to mandate an annual non-binding shareholder vote on directors' remuneration ("say on pay") to improve the "accountability, transparency, and performance linkage of executive pay" (Baird and Stowasser, 2002). In September, 2013, the government has gone one step further and introduced a mandatory "say on pay". Shortcomings in regulation of compensation-related issues have been also addressed by the Corporate Governance Code 2010 (The Code), with the particular attention being paid to the importance of establishing connection between director's remuneration and firm performance[4].

Despite the fact that a body of literature on executives' remuneration grows, there is only a handful of studies examining the effect of different aspects of directors' compensation on firm performance using UK data. Thus, Main et al. (1996) consider cash and equity-based components of executive compensation for a sample of sixty UK-based companies over the 1983 – 1989 time period. Conyon and Sadler (2001) analyse a small sample of UK companies and find a weak evidence of the positive relationship between executives' pay inequality and firm performance. Gregg et al. (2005) find an asymmetric link between cash compensation and performance using sample of large UK companies and argue that a relationship between executives' total compensation and share performance is weak. Ozkan (2009) examines the link between CEO pay and firm performance using a sample of 390 companies from FTSE All Shares Index for the period 1999-2005. She reports positive and

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[3] See The Wall Street Journal – Business: "U.K. Unveils Plan on Executive Pay", 20th June, 2012, available at http://online.wsj.com/news/articles/SB10001424052702304765304577478172485959522

[4] Section D: Remuneration. Main Principle: "levels of remuneration should be sufficient to attract, retain, and motivate directors of the quality required to run the company successfully, but a company should avoid paying more than is necessary for this purpose. A significant proportion of executive directors' remuneration should be structured so as to link rewards to corporate and individual performance." (The UK Corporate Governance Code, June 2010: p.22).

significant relationship between CEO's cash compensation and performance but lack of connection between total compensation and firm performance.

There are two most recent studies focusing on pay inequality using UK-based data that are of particular interest and relevance to our research. Correa and Lel (2014) investigate the effect of "say on pay" law on the executives' compensation, CPS and firm value using a large cross-country sample from 39 countries including UK. The authors find that CEO pay – firm performance link becomes stronger, and that companies with high CPS, experience significant improvement in performance upon implementation of the law. Zalewska (2014a) analyses the link between remuneration dispersion at executive board level and firm performance using a large sample of British companies. She unveils a negative relationship between remuneration dispersion and performance [5] contrary to the findings from the American studies. Zalewska (2014a) urges that findings based on American data are not always universal and must be treated with extreme caution in cases when researches' and policy makers' advice is to be applied to companies outside the US boundaries.

Motivated by The Code and the discussion around the "say on pay" law, we aim to shed additional light on the link between executives' compensation and a firm performance in the UK context. In our analysis, we control for important corporate governance characteristics (board composition, board size, CEO duality, CEO tenure, and board busyness) and for various firm characteristics (company age, company size, ratio of capital expenditures to total assets, and leverage). Throughout our analysis, we find consistent support for the proposition that higher CPS is associated with lower firm value measured by Tobin's Q. Our results indicate that CPS can provide a useful tool for research on firm

[5] This is the first study that documents a negative relationship between the remuneration dispersion and performance. All previous studies were in agreement that the higher pay dispersion improves firm outcomes (see Kale et al., 2009; Rankin and Sayre, 2011 among others).

performance, and that its relation with the value of firms is an important issue to be considered in the UK context.

Our work is related to different streams in literature. First, there is a clear evidence from the literature that proportion of compensation received by CEO has been trending up over time (Bebchuk and Grinstein, 2005; Frydman, 2005, Frydman and Saks, 2010 among others). We add to this literature by investigating the relationship between CPS and firm performance in the UK context. Second, we extend the literature analysing the association between different corporate governance characteristics and Tobin's Q. Academics discuss impact of large boards (Yermack, 1996), the presence of staggered boards (e.g., Bebchuk and Cohen, 2005), and the weakness of shareholder rights (Gompers et al., 2003; Bebchuk et al., 2009) on firm outcomes and find negative association between these corporate governance characteristics and Tobin's Q. We contribute to this literature by considering another aspect of governance arrangement, CPS, and its impact on firm performance. Finally, our work enhances the literature that analyses different CEO qualities and characteristics and their effect on firm outcomes. We highlight CPS as an important feature, which can provide additional insight into understanding of CEO compensation – firm performance link. This is one of the first studies that we are aware of, that discusses the above mentioned aspects in the UK context and investigates CPS – performance relationship using a broad UK-based sample.

1.4. Corporate governance and stock price crash risk

Within the rapidly developing research area on corporate governance, a significant proportion of the relevant theoretical and empirical literature has concentrated on studying the specificities of the relationship between governance characteristics and stock price crash risk. Stock price crash risk reduces the chance that shareholders will receive proceeds from the firm's future investments and affects manager through the part of their wealth that is tied to the value of firm (Gormley et al., 2013). When cash flow falls below investors'

expectations, managers tend to hide bad news in order to protect their own wealth, human capital, and jobs (Amihud and Lev, 1981; Holmstrom, 1979; Benmelech et al., 2010; Gormley and Matsa, 2011). However, when the negative firm-specific information (suddenly) becomes publicly available, the stock price drops dramatically (Jin and Myers, 2006) and stock price crash risk increases. A considerable body of literature suggests that corporate governance mechanisms can help to prevent such a suboptimal managerial behaviour (Shleifer and Vishny, 1989; Healy et al., 1999) and significantly reduce stock price crashes by disciplining investments (Masulis et al., 2007), preventing earnings management (Xie et al., 2003), improving information disclosure process (Armstrong et al., 2012; Karamanou and Vafeas, 2005), and by aligning interests of managers and shareholders using carefully structured incentive compensation packages (Benmelech et al., 2010 among others).

Benmelech et al. (2010) demonstrate that CEO's stock-based compensation can cause a stock price crash. They argue that CEOs of medium – to high-growth firms initially have to invest intensively in order to make a best use of growth opportunities. As soon as growth rate slows down, CEO could camouflage growth decline by making suboptimal investment decisions, resulting in undercapitalisation and subsequent stock price collapse. An and Zhang (2013) in their empirical study exploit the relationship between institutional investors' ownership and stock price crash risk, and conclude that strong monitoring by dedicated institutional investors attenuates managerial bad-news hoarding and prevents rapid stock price drop. Andreou et al. (2013) consider several corporate governance characteristics and their effect on firm-specific stock price crashes. They find that future stock price crashes are positively related to the institutional ownership, percentage of directors who hold company's shares, and opacity of financial reports. Gormley et al. (2013) find that structure of managerial compensation has an important effect on managerial motivation to induce firm's

level of risk and on how firm responds to stock price crash risk[6]. Still, research on corporate governance and stock price crash risk outside the US is very limited.

In this study, we attempt to shed additional light on the link between corporate governance and stock price crashes in the UK context. In particular, we investigate whether a pay inequality between CEO and other top executives, measured by CPS, as well as board busyness affect stock price crash risk of British companies. In our analysis we use a large sample of non-financial companies listed on the London Stock Exchange. We control for important corporate governance characteristics, such as board composition, board size, CEO duality, and CEO tenure; we also control for various firm characteristics, such as company size, ratio of capital expenditures to total assets, and leverage.

Throughout our analysis, we find consistent support for the proposition that high CPS and board busyness are associated with high stock price crash risk. High CPS level could be due to agency problems in a firm with powerful and influential CEO, who is able to stockpile negative information from the market for financial (expropriation of rents through the compensation arrangements)[7] or non-financial reasons (e.g., empire building with the view to expropriate rents in future)[8]. Upon realisation of this (negative) information by the market, company's stock price crashes (Jin and Myers, 2006; Hutton et al., 2009). In addition, high CPS could demotivate managers next to the CEO, destroy team cooperation within the board room, and lead to poor board and firm performance (*social comparison* effect, which is especially pronounced on the British boards[9]). In turn, busy boards are associated with weak corporate governance and also contribute to the agency problem[10]. Therefore, companies with

[6] Gormley et al. (2013) recommend that boards, when they design managerial compensation packages, should consider the potential changes in companies' risk environment and how the executives will respond given their compensation.
[7] See Kothari et al., 2009.
[8] See Ball, 2001.
[9] See Zalewska (2014a,b) for detailed discussion of the UK board mechanisms and structures.
[10] See Gilson (1990), Lipton and Lorsch (1992), National Association of Corporate Directors (NACD) (1996), Beasly (1996), Cotter et al. (1997), Core et al. (1999), Brown and Maloney (1999), Shivdasni and Yermack

busy corporate boards experience high stock price crash risk. Our findings indicate that CPS and board busyness can provide a useful tool for research on stock price crash risk, and is an important issue to be considered in the UK context.

Our work is related to several streams in literature. First, literature provides an evidence that proportion of compensation received by CEOs has been trending up over time (Bebchuk and Grinstein, 2005; Frydman, 2005, Frydman and Saks, 2010 among others). We add to this literature by investigating the relationship between CPS and stock price crash risk in the UK context. Second, we extend the literature analysing the association between different corporate governance characteristics and crash risk. Thus, academics discuss the impact of large shareholders and institutional investors (An and Zhang, 2013), the opacity of financial reports (Hutton et al., 2009), and CEO incentives and power (Kim et al., 2011a) on stock price crash risk. We contribute to this literature by considering other aspects of governance, such as CPS and board busyness, and their impact on stock price crash risk. Finally, our work enhances the literature that analyses different CEO qualities and characteristics and their effect on firm outcomes. We highlight CPS and board busyness as important features, which can provide additional insight into governance - stock price crash risk dynamics. The study in Chapter 4 is the first study that we are aware of, highlighting the above mentioned aspects using the UK-based sample.

(1999), Miwa and Ramseyer (2000), Bohren and Strom (2010), Ferris et al. (2003), Fich and Shivdasani (2006), Cooper and Uzun (2012).

CHAPTER 2

Busy boards, cash holdings and corporate liquidity: Evidence from UK panel data

2.1. Introduction

A large body of literature focuses on the role of boards of directors in corporate governance (see Adams et al., 2010; Hermalin and Weisbach, 2003 for comprehensive reviews of the literature). Recent theoretical and empirical research highlights the importance of directors with multiple directorships ("busy" directors) for board process: Mace (1986), Rosenstein and Wyatt (1990), and Loderer and Peyer (2002), among others, argue that their presence improves board advisory and monitoring functions; Harris and Shimizu (2004) find that these directors are important source of knowledge and can, in particular, enhance acquisition performance; Field et al. (2013) argue that directors with multiple board seats are excellent advisors (due to their experience and contacts) and are on demand by IPO firms. Haunschild and Beckman (1998) argue that busy directors positively contribute to the entire corporate system by the disseminating of innovations throughout corporate networks.

Other scholars are more sceptical about positive contribution of busy directors to a firm value. Core et al. (1999), Shivdasani and Yermack (1999) and Falato et al. (2014) suggest that directors serving on multiple boards can become overcommitted and are unable to provide meaningful managerial monitoring. Fich and Shivdasani (2006) and Jiraporn et al. (2008) find that boards with busy directors are positively associated with lax corporate governance; and Jiraporn et al. (2006) argue that boards with busy directors lead to a weak corporate performance and low firm valuation.

The link between board busyness and corporate cash holdings/liquidity remains largely unexplored in empirical literature. This paper is based on the notion that firms' boards of directors play important roles in their corporate cash/liquidity management. One of the corporate boards' main responsibilities is to ensure the effective cash management by designating the range of cash reserves that should be held under the managerial control. Non-operational cash holding is a hedging mechanism against "future cash flow shocks in bad times" (Lins et al., 2010) and acts as a general corporate insurance policy[11]. Busy directors can assist companies with cash holdings/liquidity management in the following ways. First, directors with multiple directorships and good business connections can secure a competitive advantage of the company in access to financing when required (Means, 1939; Pfeffer and Salancik, 1978; Zahra and Pearce, 1989). Second, they represent potential competitive substitutes for their current CEOs due to their experience and knowledge, which can motivate CEOs to achieve more effective cash management and improved liquidity[12]. Third, busy directors depend less on the 'home' CEO for their career progression and can enhance board effectiveness by not being inhibited from providing their board of directors with all important information[13].

However, holding multiple directorships might negatively affect board members' monitoring and advisory capacities for the following reasons. First, directors with multiple seats may be inclined to serve CEO's interests. Shivdasani and Yermack (1999), Core et al. (1999), and Falato et al. (2014) argue that the number of board members' additional directorships is positively correlated with excess CEO rent extraction. Second, busy directors

[11] Lins et al. (2010) found that companies hold excess cash "as a buffer against future cash flow shortfalls"; this is seen as a general reason that CFOs rank as a very important, and "does not refer to any particular outcome stemming from future cash flows that might worry a firm" (p.166).

[12] Fich (2005) and Masulis and Mobbs (2011) advise that CEOs tend to perform better if subject to internal competition.

[13] Fich (2005) and Masulis and Mobbs (2011) stress that directors with outside directorships tend to provide good quality information to the board regardless of a CEO's will; this results in boards being better informed and thus better able to assess and advise on effective cash management.

often fail to attend board meetings, and so neglect their duties by not taking part in the important strategic decision-making process (Jiraporn et al., 2009a, Falato et al., 2014). Third, Beasley (1996) finds that the number of board seats held by supervisory directors is positively correlated with accounting fraud, which appears to indicate a lack of attention from these directors. Fourth, busy directors tend to defend their own reputations by leaving underperforming companies, suggesting that the presence of overstretched directors on boards depends on firm performance (Brown and Maloney, 1999; Fich and Shivdasani, 2006).

In this study, we attempt to provide insights into how board busyness affects firms' cash holdings and liquidity. We measure board busyness as proportion of directors who hold three or more directorships (who we term "busy" directors). We control for such important corporate governance characteristics as independence, board size, and board tenure, the presence of directors who are (or have previously been) CEOs in other companies ('imported' CEOs), directors' age, and gender diversity. We also control for various firm characteristics (size, performance, dividends paid, and profitability). We use a large sample of 1,275 companies listed on the London Stock Exchange between 1997 and 2009. Our empirical methodology includes estimation of panel data using pooled OLS model, fixed effects model with robust standard errors, fixed effects model with robust standard errors clustered by industry affiliation, Fama-MacBeth model, and fixed effects model with Driscoll and Kraay (1998) standard errors, which are robust to the general forms of cross-sectional and temporal dependence (Hoechle, 2007). Our analysis gives consistent support for the proposition that the relationship between busy boards and firm cash holdings/liquidity is non-linear. In particular, companies with board members that hold seats on other companies' boards maintain high levels of cash holdings/liquidity, in line with a *reputational effect*. However, after a certain threshold, a further increase in board busyness affects cash holdings/liquidity in a negative way.

This study contributes to the literature in the following key ways. First, our findings corroborate earlier research establishing a link between board busyness and firm cash holdings/liquidity. Second, while many scholars have explored the role of busy directors and their contributions to different aspects of business, we are unaware of any published research that investigates this link using the UK-based sample. The recent financial crisis revealed shortcomings in businesses' typical approaches to corporate risk management which have now been addressed by the UK Corporate Governance Code 2010, which defined boards' responsibilities in relation to their oversight of firms' risk. Companies with well managed cash reserves are associated with lower cash flow volatility (see Froot et al., 1994; Lins et al., 2010 among others), which implies that these companies are less exposed to the risk of underinvestment. Third, extant research has focused almost exclusively on the impact of busy directors on firm performance and reputation: we add to this body of literature by showing that multiple directorships also affect company's cash holdings and liquidity. Finally, our study has direct implications for the public debate on limiting the number of directorships. The National Association of Corporate Directors (1996) has suggested a threshold of three directorships, while the Council of Institutional Investors (2002) argues that directors with full-time jobs should not hold seats on more than two other boards. We add to this debate by finding that overall level of board busyness affects board functioning and performance in a non-linear manner.

The reminder of this chapter is organised as follows. We provide a theoretical background and develop our hypotheses in Section 2.2. Section 2.3 contains the sample description and summary statistics. Section 2.4 outlines our findings on the relationships between board busyness and corporate cash holdings and liquidity. Section 2.5 concludes.

2.2. Literature review and hypothesis development

We consider two alternative views on the role that busy directors play in their companies. First, referred to as the *reputational effect* (Jiraporn et al., 2009a), originates from the resource dependence theory, and reflects the view that companies prefer to employ busy directors due to their greater advisory and monitoring experience and useful networks of business contacts. Cook and Wang (2011) argue that multiple directorships signal a director's exceptional abilities[14]. External labour market acknowledges superior managerial skills and talent, so it allows us to take the number of external board seats a director holds as a proxy for the reputation (Fama and Jensen, 1983; Shivdasani, 1993; Brown and Maloney, 1999; Masulis and Mobbs, 2011). Directors with multiple directorships can benefit firms by helping executives to develop expertise, learn about different management styles and strategies, and build up their professional networks (Bacon and Brown, 1974; Booth and Deli, 1996). Busy directors can use their external contacts to enhance the firm's reputation (Pfeffer and Salancik, 1978), to open new markets (Means, 1939), and to secure a competitive advantage in accessing funds (Zahra and Pearce, 1989).

Fama (1980) and Fama and Jensen (1983) argue that the *reputational effect* can also be an important incentive for directors themselves. Ferris et al. (2003) find a positive relationship between the number of directorships board members hold and firm performance. Masulis and Mobbs (2011) find that directors with outside directorships lead to the superior board decision making ability and thus better company performance. They argue that directors with multiple directorships play a special role on their boards. First, busy directors have valuable experience and knowledge and so represent a competitive threat to a current CEO. Second, additional directorships broaden executives' career opportunities and lessen

[14] Cook and Wang (2011) argue that by participating on the multiple boards, directors become better informed, which allows them to use information they gain from wider contacts to make better trading decisions. They examine whether superior performance depends on "informativeness" or on their personal abilities, and find that performance depends on the individual abilities.

their dependence on the 'home' CEO for the progression, so making them freer to express views that challenge those of the CEO. Third, the labour market opportunities motivates directors to perform better within their 'home' companies, as poor performance will tend to limit their access to additional directorships, career and reputational benefits. By using their experience gained at other companies, busy directors can recognise problems faster, minimise preparation time, and enhance performance in important corporate decisions, such as acquisitions (Harris and Shimizu, 2004). Field et al. (2013) give evidence that new public firms prefer directors with established reputations, as they generally lack market navigating experience, and so rely heavily on busy directors' expertise and contacts. Busy directors can also positively influence entire corporate systems by disseminating innovations through their networks (Haunschild and Beckman, 1998). Considering the above arguments, we can put forward the following hypothesis:

Hypothesis 1: Companies with busy boards maintain higher levels of cash holdings and corporate liquidity, ceteris paribus.

The second view, referred to as *busyness effect*, on the role of busy directors comes from agency theory literature. Directors who overstretch themselves and take on additional directorships, are likely to spend less time on each individual board, so risking compromising their responsibilities and neglecting their duties (Ferris et al., 2003)[15]. Core et al. (1999), Shivdasani and Yermack (1999), Fich and Shivdasani (2006) criticise firms for appointing board members who hold multiple directorships, arguing that such individuals are likely to become overcommitted and so unable to monitor management effectively. Fich and Shivdasani (2006) find negative association between a company's performance and board

[15] See also Gilson (1990), Lipton and Lorsch (1992), National Association of Corporate Directors (1996), Beasley (1996), Cotter et al. (1997), Core et.al. (1999), Brown and Maloney (1999), Shivdasni and Yermack (1999), Miwa and Ramseyer (2000), Bohren and Strom (2010), Ferris et al. (2003), Fich and Shivdasani (2006), Cooper and Uzun (2012), and Falato et al. (2014) who challenge the wisdom of holding too many directorships by examining busy boards' effectiveness.

busyness[16]. Falato et al. (2014) examine the implication of director busyness on shareholder wealth, and find the evidence that independent director busyness is detrimental to board monitoring ability and shareholder value. Shivdasani and Yermack (1999) argue that lax monitoring by busy directors can allow CEOs to increase agency costs, and find that busy directors are most likely to be chosen if the CEO is involved in the board selection process. Core et al. (1999) argue that busy directors are more likely to set high compensation for the CEO. Perry and Peyer (2005) and Ferris et al. (2003) find that directors see additional directorships as good opportunities to improve their incomes before retirement. If the service busy directors provide, is of poor quality, they are not usually penalised, due to their close proximity to retirement. Beasley (1996) identifies a positive relationship between accounting fraud and the number of directorships held by outside board members. Jiraporn et al. (2009 a,b) find that firms with busy boards are, on average, more diversified and so may suffer from diversification discount. They argue that busy directors serve on fewer board committees, and that this lack of full involvement in board business can cause firms values to decline. Cooper and Uzun (2012) provide consistent evidence showing the positive relationship between busy directors and bank's riskiness. Christy et al. (2013) find a negative relationship between market risk of equity and multiple directorships held by non-executive board members. Fich and Shivdasani (2006) report high cumulative abnormal returns around days when the departures of busy directors are announced, interpreting these results as evidence that investors welcome such departures[17].

Kaczmarek et al. (2012) adapt the notion of 'faultlines'[18] from social identity

[16] Fich and Shivdasani (2006) argue that increasing number of busy directors leads to board distraction and subsequent decline in monitoring intensity. They also find that company's share price drops when executive directors overstretch themselves by accepting additional board seats.

[17] The study uses a resignation of Elaine L. Chao (who served as an outside director on boards of six companies) as an example.

[18] Group faultlines are defined as hypothetical dividing lines that split a group into relatively homogeneous sub-groups based on group members' alignment according to various attributes (Bezrukova et al., 2009; Lau &

theory to their analyses of board effectiveness. They find that faultlines can deteriorate board performance, and that deterioration effect magnifies in the presence of boards with large number of busy directors. Kaczmarek et al. (2012: 341) note that busy directors pay less attention and have less time to spend on important board issues, increasing "salience of divisions based on task-related attributes ... Such a course of events is therefore detrimental for the cohesiveness and communication of the board as a whole". Based on the above arguments we can hypothesise that:

Hypothesis 2: Companies with busy boards of directors maintain lower levels of cash/liquidity, ceteris paribus.

By considering *reputational effect* and *busyness effect* simultaneously, we argue that the link between board busyness and level of cash holdings/liquidity may not be fully captured by a simple linear relationship. We expect *reputational effect* to dominate when the level of board busyness is low but, in line with the *busyness effect*, as board's busyness increases beyond a certain threshold, it will affect corporate cash holdings and liquidity negatively. This leads us to the following hypothesis:

Hypothesis 3: There is an inverted U-shaped relationship between board busyness and corporate cash holdings/liquidity.

2.3. Sample selection and data description

2.3.1. Sample selection

Our analysis is based on a large sample of non-financial companies listed on the London Stock Exchange. We collect firms' financial and market information from Thomson Datastream, and directors' information from *BoardEx* database. The sample period is from 1997 to 2009, and includes all firms whose information is available from these two databases.

Murnighan, 1998, 2005), and are most likely to emerge when group diversity is moderate (Earley & Mosakokowski, 2000; Lau & Murninghan, 1998; Webber & Donahue, 2001), Kaczmarek et al. (2012: 338).

We collect information about the following financial and market items at the end of each year: earnings before interest and taxes (EBIT), earnings before interest, taxes, depreciation and amortisation (EBITDA), cash, cash and marketable securities, accounts receivable, accounts payables, inventories, cash dividends paid (total), dividends provided/paid (common), preferred dividend requirement, deferred taxes, total assets, market value, and value of common shareholders equity. Information about directors include: director's name, age, gender, role title and role description, indication of whether they are executive or supervisory directors, and number of other directorships held. We obtain 98,315 director-year observations covering approximately 1,500 firms, or 12,432 firm-years, over our 13-years sample. We use companies' ISIN identifiers to merge data from Thomson Datastream and BoardEx[19]. We then excluded financial firms (Thomson Datastream ICBIC code 8000), which are highly regulated, and so ended up with an unbalanced panel of 1,275 firms and 8,296 firm-year observations over the 1997 to 2009 period.

We use cash, net cash, and financial slack, all normalised by book value of total assets, to test the impact of board busyness on corporate cash holdings/liquidity. Specifically, cash is the value of cash and short-term investments; net cash is a difference between value of cash and short-term investments and total company debt, and the financial slack measure is based on traditional credit line arrangements that enable firms to access operating loans up to the value of fifty per cent of their inventories and seventy per cent of their accounts receivable (Cleary, 1999). We follow Ferris et al. (2003) in our definition of busy boards, and consider board as *"*busy*"* if the percentage of directors with three or more directorships ("busy directors") is greater than or equal to the sample median. We also control for firm size, dividend, profitability, and Tobin's Q in our analysis. We collect information about the

[19] We used company names as identifiers to collect ISINs from Thomson Datastream, and carefully consider all available relevant company information (market, stock exchange, delisting date, etc.) with a high level of discretion to assign correct ISIN.

governance structure of firms, such as a proportion of supervisory directors on the board, CEO/Chairman duality, board size, average board tenure, and proportion of 'imported' CEOs, gender diversity, and average directors' ages to use as control variables in our study. We provide all variable definitions in Table 2.1. Table 1 in the Appendix gives a sample calculation example for *Board Busyness*.

2.3.2. Data description and summary statistics

Table 2.2 reports summary statistics, separating data according to variables describing corporate cash holdings/liquidity (Panel A), director characteristics and board structure (Panel B), and firm characteristics (Panel C). Cash and short-term investments represent 17.37 percent of average firms' total assets, although some firms hold the equivalent of 100 percent of company value in cash, and some have no cash at all. In the average firm, net cash figure is a negative 0.88 percent, and financial slack is 24 percent of total firm assets. Directorships per director range from 1 to a maximum of 6.33 - but, on average, directors in our sample have board responsibilities at 1.87 firms. The mean (median) proportion of directors holding three or more directorships per board is approximately 21.73 percent (18.18 percent) of all board members, ranging from zero to 100 percent. The average number of directors on the boards of our sample firms is 7.90, with a minimum of 4 and a maximum of 16. The average board tenure is 5.47 years, with a maximum of 17 years and minimum of 0.3 years. On average, 58.17 percent of our sample boards' members are supervisory directors. "Imported" CEOs represent 4% of directors on the average board. Some boards have as many as 67 percent of imported CEOs, and others have none at all. 6 percent of directors are female, a proportion which varies from 0 to 60 percent. Average director's age is 54.23 years, with a minimum age of 34 and a maximum of 69.80 years old. The CEOs and Chairs were the same person on the 13.22 percent of our sample firms' boards.

Firm size is, on average, 12.52; average firm profitability is 0.09 (i.e., EBITDA is 9

percent of total asset values). The average sample company pays dividends representing 2.1 percent of the value of total assets, and has a Tobin's Q of 2.15.

2.3.3. Univariate results

Table 2.3 presents univariate comparisons of key descriptive variables by cash/net cash/slack quartiles. We are interested in the difference between firms in first and fourth quartiles of cash/net cash/slack, and use a *t*-test to test the hypothesis that the fourth-quartile firms are significantly different from the first quartile firms.

Panels A, B, and C report results of key corporate governance and firm variables by *Cash* (Panel A), *Net Cash* (Panel B), and *Slack* (Panel C) quartiles. Firms with less cash/net cash/financial slack, i.e. in the first quartile, differ significantly from the firms with the most cash/net cash/ financial slack, i.e., firms in the fourth quartile. *Board Busyness* declines monotonically from the first quartile to the fourth quartile of *Net Cash* and *Slack.* Firms with the most *Net Cash* and *Slack* have the least busy boards. However, firms with the most *Cash* have boards that are only marginally busier than firms with the least *Cash* in Panel A, as both reputational theory and agency theory would predict. These findings point to a negative relation between board busyness and corporate cash holdings, but do not rule out the possibility of a non-linear relationship.

Board size changes in line with the company size from the first to the fourth quartiles of cash holdings, but this change is not monotonic. Companies in the first quartile of *Cash, Net Cash* and *Slack* measures have boards that are substantially larger than those of companies in the fourth quartile. *Board tenure* declines monotonically from the first to the fourth quartile of cash holdings in Panel A, but is not monotonic in Panels B (*Net Cash),* and C (*Slack*). The *Proportion of Supervisory directors* on boards increases monotonically from the first to the fourth quartile of cash holdings in Panel A, which is consistent with the view that board independence (the higher proportion of supervisory directors on the board) could

reduce agency costs of cash expropriation. However, it is a case only in Panel A. Panels B and C show mixed results. *Board tenure* declines from the first to the fourth quartile in Panel A, and remains nearly the same in Panel C (Panel B provides mixed results). The proportion of "imported" CEOs increases gradually from the first to the fourth quartile in Panel A, suggesting that more experienced directors can help to reduce the agency costs associated with higher levels of cash holdings; although this proportion remains constant over the four quartiles in Panels B and C. The difference in director's age between firms in the first and fourth quartiles is marginal but statistically significant at the 10% level in Panel A and at the 5% level in Panel B, but is insignificant in Panel C.

Firms with the most cash (net cash and slack) are generally smaller than those with the least cash (net cash and slack). Firm size decreases gradually from the first to the fourth quartile of *Net Cash* (in Panel B). However, the univariate relation between cash and slack and firm size is not monotonic in Panels A or C, with firms in the fourth quartile of cash and slack measures representing the smallest companies in the sample. Firms in the first quartile of *Cash* pay larger dividends than the firms in the fourth quartile, but firms pay approximately same dividends in all the quartiles of *Net Cash* and *Slack* measures. *Tobin's Q* measure increases monotonically but only in Panel A (*Cash*). Companies in the fourth quartiles have significantly lower profitability than companies in the first quartiles over all three liquidity measures.

2.4. Methodology and results

In this section we examine whether company cash holdings and liquidity are affected by the board busyness. We use three proxies to measure cash holdings/liquidity - *Cash, Net Cash, and Financial Slack*[20]. *Board Busyness* is measured as the proportion of company directors who hold seats on three or more company boards (including the focal board). We

[20] We use annually industry-adjusted variables in our analysis (we compute each industry's mean per year and subtract it from the corresponding firm-level variable in each case).

include a quadratic term of board busyness, *Board Busyness*^{2} to capture the potential non-linear relationship between board busyness and corporate cash holdings/liquidity. We follow Fich and Shivdasani (2006), Bohren and Strom (2010), Masulis and Mobbs (2011) and Cooper and Uzun (2012) in taking account of a range of control variables. Thus, we include *Proportion of SD* - the proportion of supervisory directors on a firm's board. Boards with higher proportion of supervisory directors are better monitors; consequently, they and so may better monitor and advise on a firm's accumulation and utilisation of vital cash recourses more effectively. We include the natural logarithm of board size (*Ln [Board Size]*) to control for board size. Resource dependence theory suggests that larger boards have more valuable connections and larger pools of expertise to draw on (Van den Berghe and Levrau, 2004). However, scholars have provided conflicting evidence on the relations between board size and company performance, with some (Pearce and Zahra, 1992; Dalton et al., 1998; Jackling and Johl, 2009) documenting positive, and others (Yermack, 1996; Van den Berghe and Levrau, 2004) negative associations. We also include a variable indicating whether CEO and Board Chair is the same person (*Duality*), which is often used in the corporate governance literature. Masulis and Mobbs (2011) suggest that *Board Tenure* negatively impacts firm performance, so we consider this variable as a determinant of cash holdings and liquidity. We also consider *Imported CEO* variable in line with Bohren and Strom (2010). *Directors' Age* is included as it might approximate the experience as well as the useful networks directors can bring to their companies (Ferris et al., 2003). Older directors might be better monitors, but directors near retirement age are inclined to accept additional directorships at the expense of their monitoring quality (Perry and Peyer (2005), Ferris et al. (2003)). Board diversity *(Gender)* measures the proportion of female directors on the board. Carter et al. (2003) suggest that diversity at the board room increases independence and improves decision

making process.[21]

We also include the natural logarithm of total assets (*Ln[Total Assets]*) to control for firm size. Lins et al. (2010) argue that smaller firms might require higher levels of cash reserves due to their comparatively larger transaction costs, higher levels of information asymmetry, and poorer access to capital markets. We also include *Dividend Payout* and two measures of profitability, *Tobin's Q* and *Profitability* (a ratio of EBITDA to total assets), to control for the difference in management quality across firms, since high volatility in profitability may signal poor management skills and competence (Faccio et al., 2001). We include industry dummy variables using FTAG3 industry codes: their inclusion is appropriate given the inherent variability in cash/liquidity attributes across different industries.

2.4.1. Methodology

We use different estimation models in our analysis: a pooled OLS model, a fixed effects model, a Fama-MacBeth model, and a fixed effects model with Driscoll and Kraay (1998) standard errors. The pooled OLS model (Model 1) can be expressed in the following form:

$$
\begin{aligned}
Cash/Liquid_{it} &= \beta_0 + \beta_1 BoardBusyness_{it} + \beta_2 BoardBusyness^2{}_{it} \\
&+ \beta_3 Proportion\ of\ SD_{it} + \beta_4 BoardSize_{it} + \beta_5 Board\ Tenure_{it} \\
&+ \beta_6 Director\ Age_{it} + \beta_7 Gender_{it} + \beta_8 Imported\ CEO_{it} + \beta_9 Duality_{it} \\
&+ \beta_{10} Company\ Size_{it} \\
&+ \beta_{11} Tobin'sQ_{it} + \beta_{12} Profitability_{it} + \beta_{13} Dividend_{it}
\end{aligned}
$$

[21] The Higgs Report (2003), commissioned by the British Department of Trade and Industry, suggests that demographic diversity increases board effectiveness and recommends that more women should be included on boards. The UK Corporate Governance Code (2010) advises that "the search for board candidates should be conducted, and appointments made, on merit, against objective criteria and with due regard for the benefits of diversity on the board, including gender" (Principle B.2).

$$+\sum_{j=2}^{13}\beta_j YearDummy_t + \sum_{k=2}^{15}\beta_k Industry\ Dummy_i\ + \varepsilon_{it} \quad (1)$$

We include a quadratic term of board busyness, *Board Busyness*^{2}, to capture the potential non-linear relationship between board busyness and corporate cash holdings/liquidity.

The *fixed effects* or *within estimator* technique, is based on a deviation from firm's mean transformations (means for the sample intervals are subtracted from each observation) and estimates all coefficients without estimating individual effects (Model 2). Since we are interested only in slope coefficients, this transformation is a very convenient one.

$$\widetilde{Cash/Liquid}_{it} = \beta_0 + \beta_1 \widetilde{Board\ Busyness}_{it} + \beta_2 \widetilde{Board\ Busyness^2}_{it} + \beta_3 \widetilde{Proportion\ os\ SD}_{it} + \ + \beta_4 \widetilde{Board\ Size}_{it} + \ \beta_5 \widetilde{Board\ \ Tenure}_{it} + \beta_6 \widetilde{Dir\ Age}_{it} + \beta_7 \widetilde{Gender}_{it} + \beta_8 \widetilde{Imported\ CEO}_{it} + \beta_9 \widetilde{Duality}_{it} + \ \beta_{10} \widetilde{Company\ Size}_{it} + \ \beta_{11} \widetilde{Tobin's Q}_{it} + \beta_{12} \widetilde{Profitability}_{it} + \beta_{13} \widetilde{Dividend}_{it} + \sum_{j=2}^{13}\beta_j YearDummy_t + \varepsilon_{it} \quad (2)$$

where the '~' (tilde) notation is used to define demeaned variables, and *Cash/Liquid*$_{it}$ is one of our proxies, i.e. *Cash/Net Cash/Slack.* (All other variable definitions are given in Table 2.1)

An important issue when dealing with the panel data sets is the estimation of robust standard errors. Ignoring correlations between residuals in the estimation process can result in bias and inconsistent conclusions. For example, if the standard errors of the estimated coefficients are downward biased, they (standard errors) will be low, and the statistical significance of the results may be overestimated (Petersen, 2009; Oikonomou, Brooks and Pavelin, 2012). To account for this, we use pooled OLS and fixed effects models with robust

standard errors, robust standard errors clustered by industry, as well as Driscoll and Kraay (1998) standard errors. We also use a Fama-MacBeth (1973) model that estimates cross-sectional regression each year and gives the average of the time-series of coefficients from annual cross-sectional regressions. This method eliminates the problem of serial correlations in the residuals of time-series cross-sectional regressions.

2.4.2. Results

The results are reported in Tables 2.4, 2.5, and 2.6. Columns 1 through 5 report estimates from: Model 1, the pooled OLS model with robust standard errors; Model 2, the fixed effects model with robust standard errors; Model 3, the fixed effects model with robust standard errors clustered by industry; Model 4, the Fama-MacBeth model; and Model 5, the fixed effects model with Driscoll and Kraay (1998) standard errors. Looking at the results reported in Table 2.4, we observe that the coefficients of the linear term of board busyness are positive and highly statistically significant (at the 1% level), their magnitudes ranging from 0.087 to 0.127. These results are consistent with the univariate results in Table 2.3 and support the claim that board busyness improves cash holdings in line with the *reputational hypothesis* (and thus providing support for the Hypothesis 1). However, the quadratic terms of board busyness variables have negative coefficient estimates (in the range from -0.192 to -0.146) and are statistically significant (at the 1% level), suggesting that impact of board busyness on corporate cash holdings is negative when board busyness reaches a certain threshold level[22]. Thus, the *reputation hypothesis* is supported as far as the proportion of busy directors on a firm's board does not exceed a certain threshold level; beyond that, the *busyness hypothesis* comes into effect. This evidence supports Hypothesis 3. In terms of economic significance, the coefficients from Models 1 – 5 suggest that one standard deviation

[22] The differentiation w.r.t. *Board Busyness* results in the following first derivative: $\beta_1 + 2 * \beta_2 Board\ Busyness$. The corresponding threshold level of *Board Busyness* is computed by setting this derivative equals to zero. The threshold level of *Board Busyness* in our sample ranges from 25% to 34% depending on the model (i.e., Models 1-5) and dependent variable (i.e., *Cash, Nest Cash* and *Financial Slack*).

change in board busyness results in a 0.11 standard deviations change in corporate cash holdings[23].

Table 2.5 reports the results of the analyses of the relationship between firms' *Net Cash* (the difference between cash holdings and total debt) and board busyness. We find that the coefficients of the linear term of board busyness are positive (ranging from 0.084, 0.136, 0.136, 0.175 and 0.135 in Models 1, 2, 3, 4, and 5 respectively) and are significant at the 1% level. These results are consistent with the claim that board busyness improves firms' net cash levels, supporting the *reputation hypothesis*. However, the coefficients of the quadratic term of board busyness are negative (-0.165, -0.232, -0.232, -0.272, and -0.219 in Models 1, 2, 3, 4, and 5 respectively) and are statistically significant at the 1% level. These results are similar to those in Table 2.4, and suggest that *Net Cash* initially increases with board busyness, but after a threshold is reached, further increases in its busyness results in lower net cash level. We find that the turnaround values of the proportion of busy directors on the board do not differ much from our results from Table 2.4, ranging from 0.25 to 0.32. In other words, companies are likely to increase their net cash levels until the proportion of busy directors on their boards reaches a threshold level at the range of 25% - 32%, after which, further increases in board busyness are associated with decline in firms' net cash positions. This evidence once again, demonstrates a non-linear relationship between board busyness and *Net Cash*, supporting Hypothesis 3. In terms of economic significance, based on the coefficients from the Models 1, 2, 3, 4, and 5, one standard deviation change in board busyness results in changes of 0.06, 0.10, 0.10, 0.12, and 0.09 standard deviations in net cash levels respectively.

Table 2.6 reports results of the analyses of the relationship between firms' financial slack and board busyness. The results are similar to the results from Tables 2.4 and 2.5, and

[23] We calculate the change in standard deviation of cash holdings in the following way: (regression coefficient for *Board Busyness* variable x standard deviation of *Board Busyness*)/standard deviation of the cash holdings.

provide clear indication of the existence of a non-linear relationship between board busyness and corporate liquidity. The coefficient estimates of board busyness are positive and statistically significant (at the 1% and at the 10% levels in different models), while those of the quadratic term of board busyness are negative, and statistically significant at the 1% level. We find that the turnaround points for the proportions of busy directors on the board differ marginally from our previous findings, being 0.25, 0.35, 0.35, 0.39, and 0.35 in the Models 1, 2, 3, 4 and 5 respectively. Once again, this evidence supports the Hypothesis 3. In terms of economic significance, the coefficients from the Models 1, 2, 3, 4, and 5 indicate that one standard deviation change in board busyness results in 0.06, 0.10, 0.10, 0.17, and 0.08 standard deviations change in financial slack levels respectively.

Proportion of supervisory directors on company board, enters the Models 1-5 with a positive sign and is statistically significant, supporting the view that higher levels of board independence are beneficial to companies. *Board Size*, measured as a natural logarithm of the total number of directors on the company board, has negative coefficient estimates, supporting the view that bigger boards adversely affect company cash holdings and liquidity. *Board tenure* has negative coefficient estimates, but is only statistically significant in the Models 1, 2, 3, and 5, indicating that companies with longer tenured boards hold less *Cash and Net Cash*, and have lower *Financial Slack*. We find a positive relationship between CEO-Chair *Duality* and all three measures of corporate liquidity: duality results in higher levels of power being concentrated in the hands of one person, who can have greater influence on board of directors. We suggest that this positive relation can be explained by the fact that duality results in CEOs having greater knowledge and expertise, which might affect their level of risk aversion. More powerful CEOs may prefer the safeguards of higher levels of corporate cash holdings to protect the company (and themselves) from future possible financial difficulties. Our results also show a positive relation between *Imported CEOs* and

firms' *Cash, Net Cash* and *Slack*. *Imported CEOs* may bring both good connections and greater expertise to the company, and help to secure higher cash balances to both safeguard future profitable investments and protect their own reputational capital. Directors' age - a proxy for their experience and reputation - is positive in all models, but it is not statistically significant in the *Cash* Model 4, the *Net Cash* Models 2, 3, and 4, and the *Slack* Models 3 and 4. Board diversity measure - the proportion of female directors on the board - exhibits positive coefficients, and is statistically significant in the *Cash* Model 4 and all *Net Cash* models, suggesting that the presence of female directors is likely to improve firms' positions on these two measures.

With respect to firm characteristics, firm *Size* (measured as natural logarithm of total assets) is negatively related to *Cash, Net Cash,* and *Financial Slack,* with all coefficients being statistically significant at the 1% level. It might be difficult for large firms to accumulate substantial levels of cash, net cash and financial slack given their financial commitment levels. There is a positive relation between the *Tobin's Q* measure of performance and corporate cash holdings and liquidity, suggesting that better performing companies can accumulate higher levels of cash reserves, manage their debts more efficiently, and generate healthier financial slack. The coefficient estimates for *Profitability* (measured as EBITDA/Total Assets) are mixed - the variable has positive (negative) coefficient estimates in the Models 2, 3, and 5 (Models 1 and 4) which are statistically significant at the 1% level. The negative relation can be explained by the need to invest more in order to generate higher profits, which will make it difficult for them to accumulate high cash and net cash balances, and keep high level of financial slack. These results complement results from the univariate analysis in the Table 2.3, which provide strong indications of a negative relation between *Profitability* and *Cash, Net Cash* and *Slack,* with a statistically significant difference in the *Profitability* associated with first (firms with least *Cash/Net Cash/Slack*) and fourth (firms

with most *Cash/Net Cash/Slack*) quartiles of our cash holding/liquidity proxies (*Profitability* is higher in the first quartile of *Cash, Net Cash* and *Slack* than in the fourth quartile). The relation between *Dividends* and our cash holdings/liquidity proxies is positive and statistically significant in all models except Models 1 (*Cash* regressions), and Model 4 (*Net Cash* regressions). Our findings with respect to the effects of firm and governance characteristics on corporate cash holdings/liquidity are consistent with those in previous literature (see, for example, Opler et al., 1999).

Our results clearly indicate that the relationship between board busyness and corporate cash holdings/liquidity is non-linear. Corporate cash holdings/liquidity increases with greater corporate board busyness, but after board busyness reaches the certain threshold level, its effect on corporate cash holdings/liquidity becomes negative. Given that busier boards represent greater demands on directors' time, the effectiveness of their monitoring may weaken, which in turn results in lower levels of corporate cash holdings/liquidity.

2.5. Conclusions

We examine the relationship between board busyness and corporate cash holdings/liquidity. We offer new insights by evaluating two conflicting views regarding the role of busy directors in corporate decision making and by analysing a large sample of UK-listed companies over the 1997–2009 time period. One view claims that busy directors are good stewards and valuable assets for the companies due to their expertise, reputation and business contacts, and improve board decision making (reputational effect). The opposite view suggests that busy directors may be 'too busy to mind the business', which can create serious agency problems and leads to suboptimal corporate policies (busyness effect).

Our analysis reveals that the relationship between the level of directors' busyness and corporate cash holdings/liquidity is an inverted U-shaped. Companies with busy boards have, on average, higher levels of cash, net cash and financial slack, but the value of their cash

holdings/liquidity declines when board busyness increases beyond a certain threshold. We interpret these results as being consistent with both reputation and busyness effects, and as providing strong evidence that board busyness affects firms' cash holdings and cash management behaviours in complex non-linear way. To the extent that cash management is a key operational decision that affects firm's ability to hedge against "future cash flow shocks in bad times" (Lins et al., 2010), our findings suggest an important mechanism by which boards can affect firms' hedging strategies. Our results emphasize the importance of establishing an optimal level of board busyness to mitigate the agency costs associated with excessive cash holdings. Specifically, board busyness affects firms' cash holdings through the quality of directors' monitoring and advising abilities. Previous literature has solely focused on individual director's busyness: this paper augments the picture by considering overall board busyness levels.

We add to the literature that considers boards as important contributors to firms' health and competitiveness (Falato et al., 2014; McNulty et al., 2013). Our findings also have direct implications for the public debate on limiting the number of directorships executives should hold. While the National Association of Corporate Directors (1996) put forward a threshold of three directorships, and the Council of Institutional Investors (2002) argues that directors with full-time jobs should not participate in more than two other boards in order to guarantee adequate service, we argue that board effectiveness also depends on its overall level of busyness, i.e. on the proportion of its board members who have concurrent commitments to other businesses.

Table 2.1. Variable Definitions

Below, the data variables refer to the corresponding corporate governance variable identifiers in the BoardEx annual database and to the corresponding corporate cash holding, liquidity and firm characteristics variables identifiers in the Thomson Datastream.

Variable	Definition
Corporate governance	
Board busyness	The proportion of board members holding three or more directorships on other quoted companies.
Supervisory directors	The proportion of supervisory directors on the board. Total number of supervisory directors divided by the total number of all directors on the board.
Board size	Natural logarithm of total number of directors on the board.
Board tenure	The average number of years directors have served on the board.
Duality	Indicator variable: equals one if CEO and Board Chair is the same person.
Imported CEO	The proportion of board members who are CEOs (present or retrospective) on other quoted companies. Total number of imported CEOs divided by the total number of all directors on the board.
Directors' age	The average age of board directors. The sum of all ages divided by the number of directors on the board.
Gender	The proportion of female directors on the board. Number of female directors divided by the total number of all directors.
Dependent variables	
Cash	Cash and short-term investments/ book value of total assets: *WC02001*/ *WC02999*
Net cash	(Cash and short-term investments – total debt)/book value of total assets: (*WC02001*– *WC03255*)/ *WC02999*
Slack	(Cash and marketable securities +0.7accounts receivable + 0.5inventories – accounts payable)/ book value of total assets: (*WC02001*+0.7**WC02051* + 0.5* *WC02101* – *WC03040*)/ *WC02999*. This measure is based on traditional credit line arrangements that enable firms to access operating loans up to the value of fifty per cent of their inventories and seventy per cent of their accounts receivable (Cleary, 1999).

Firm characteristics	
Size	Natural logarithm of book value of total assets: Ln (*WC02999)*
Profitability	EBITDA/ book value of total assets : *WC18198*/ *WC02999*
Tobin's Q	(Book value of assets – book value of common equity – balance sheet deferred taxes + market value of equity)/book value of total assets: (*WC02999– WC03501 – WC03263 + MV*)/ *WC02999*
Dividend	(Dividends provided/paid-common + Preferred dividend requirement)/ book value of total assets: (*WC 18192+ WC 01701)*/ *WC02999*

Table 2.2. Summary Statistics

This table presents summary statistics for the sample of 1,275 firms' observations for 1997 – 2009 time period, excluding financial firms. Variable definitions are in the Appendix 1. Variables Size, Board Size, Board Tenure, Director's Age, Dividend, Profitability, and Tobin's Q are winsorised at 1% and 99%.

	Mean	Min	Max	Observations
Panel A: cash holding/Liquidity Characteristics				
Cash	0.17	0.00	1.00	8945
Net Cash	-0.01	-0.97	1.00	8920
Slack	0.24	-0.70	1.00	8751
Panel B: Director/board characteristics				
Directorships per director	1.87	1	6.33	8946
Board busyness	0.22	0.00	1.00	8946
Proportion of supervisory directors	0.58	0.00	1.00	8946
Board size	7.86	4.00	16.00	8946
Board tenure	5.47	0.30	16.69	8790
Director's age	54.23	34.00	71.09	8938
Panel C: Firm characteristics				
Size	12.51	7.00	19.43	8911
Profitability	0.09	-0.99	1.00	8753
Tobin's Q	2.15	0.04	24.95	8753
Dividend	0.02	0.00	0.81	8806

Table 2.3. Firm characteristics by cash/net cash

This table presents univariate comparison of means and medians of measures of corporate governance and firm characteristics of 1,275 UK-based publicly traded firms excluding financial companies for the 1997-2009 time period. The director and board data comes from the *BoardEx* database, firm data is from Thomson Datastream. Busy boards are the boards where the percentage of directors with three or more directorships is greater than or equal to the sample median. Other variables definitions are in the Table 2.1. This table displays the means and medians (in parentheses) of various director, board, and firm characteristics for first, second, third, and fourth quartiles of cash (Panel A), net cash (Panel B), and slack (Panel C). The *t*-statistics is for a difference of means test from the first to the forth quartile of cash/net cash/slack. Each quartile contains approximately 2230 firm years. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

Panel A: Cash Quartiles						**Panel B: Net Cash Quartiles**				
	First quartile	**Second quartile**	**Third quartile**	**Fourth quartile**	***t*-stat (*p*-val)**	**First quartile**	**Second quartile**	**Third quartile**	**Fourth quartile**	***t*-stat (*p*-val)**
Corporate Cash holding/liquidity										
Cash/Net Cash range	0.00to 0.04	0.04 to 0.10	0.10 to 0.24	0.24 to 1.00		-0.97to -0.22	-0.22 to -0.06	-0.06to 0.16	0.16 to 1.00	
Cash/Net Cash	0.018	0.069	0.158	0.450	111.32***	-0.30	-0.13	0.03	0.36	150.75***
	(0.018)	(0.067)	(0.152)	(0.394)	(0.000)	(-0.30)	(-0.16)	(0.01)	(0.34)	(0.000)
Director/board characteristics										
Board busyness	0.21	0.23	0.21	0.22	2.03**	0.24	0.23	0.21	0.19	-7.24***
	(0.17)	(0.2)	(0.18)	(0.20)	(0.042)	(0.23)	(0.2)	(0.17)	(0.17)	(0.000)
Proportion of supervisory directors	0.55	0.58	0.59	0.60	9.49***	0.60	0.59	0.57	0.56	-2.88***
	(0.55)	(0.57)	(0.57)	(0.60)	(0.000)	(0.60)	(0.58)	(0.57)	(0.57)	(0.004)
Board size	7.53	7.86	7.46	6.92	-8.75***	8.29	8.45	7.76	6.98	-20.62***
	(7.00)	(8.00)	(7.00)	(7.00)	(0.000)	(8.00)	(8.00)	(7.00)	(7.00)	(0.000)
Board tenure	5.94	5.46	5.36	5.12	-7.85***	5.53	5.63	5.60	5.13	-6.35***
	(5.30)	(4.88)	(4.84)	(4.44)	(0.000)	(4.96)	(5.03)	(5.00)	(4.39)	(0.000)
Director's age	54.18	54.62	54.18	54.94	-1.69*	54.47	54.66	54.25	54.57	-7.25***
	(54.34)	(54.77)	(54.25)	(54.00)	(0.091)	(54.64)	(54.88)	(54.33)	(53.67)	(0.000)
Firm characteristics										
Size	12.72	13.10	12.55	11.69	-14.12***	13.17	13.14	12.42	11.37	-30.48***
	(12.34)	(12.95)	(12.12)	(11.11)	(0.000)	(13.01)	(12.88)	(12.03)	(10.97)	(0.000)
Profitability	0.11	0.11	0.10	0.03	-13.01***	0.10	0.10	0.10	0.05	-12.48***
	(0.12)	(0.12)	(0.12)	(0.08)	(0.000)	(0.11)	(0.12)	(0.12)	(0.11)	(0.000)
Tobin's Q	1.55	1.66	2.13	3.28	23.40***	1.82	1.69	1.98	3.04	23.36***
	(1.23)	(1.38)	(1.63)	(2.33)	(0.000)	(1.42)	(1.36)	(1.48)	(2.11)	(0.000)
Dividend	0.021	0.023	0.023	0.015	-5.83***	0.02	0.02	0.02	0.02	-4.74***
	(0.017)	(0.019)	(0.014)	(0.00)	(0.000)	(0.014)	(0.017)	(0.016)	(0.00)	(0.000)

Table 2.3 (Continued)
Firm characteristics by slack quartiles

This table presents univariate comparison of means and medians of measures of corporate governance and firm characteristics of 1,275 UK-based publicly traded firms excluding financial companies for the 1997-2009 time period. The director and board data comes from the *BoardEx* database, firm data is from Thomson Datastream. Busy boards are the boards where the percentage of directors with three or more directorships is greater than or equal to the sample median. Other variables definitions are in the Table 2.1. This table displays the means and medians (in parentheses) of various director, board, and firm characteristics for first, second, third, and fourth quartiles of cash (Panel A), net cash (Panel B), and slack (Panel C). The *t*-statistics is for a difference of means test from the first to the forth quartile of cash/net cash/slack. Each quartile contains approximately 2230 firm years. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

Panel C: Slack Quartiles

	First quartile	**Second quartile**	**Third quartile**	**Fourth quartile**	***t*-statis (*p*-val)**
Corporate cash holdings/liquidity					
Slack range	-0.70to 0.09	0.09 to 0.20	0.20 to 0.34	0.34 to 1.00	
Slack	0.08	0.14	0.24	0.50	136.56***
	(0.08)	(0.14)	(0.23)	(0.43)	(0.000)
Director/board characteristics					
Board busyness	0.23	0.23	0.21	0.19	-3.99***
	(0.20)	(0.2)	(0.18)	(0.17)	(0.000)
Proportion of supervisory directors	0.58	0.59	0.58	0.58	1.78*
	(0.57)	(0.57)	(0.57)	(0.57)	(0.075)
Board size	7.95	8.32	8.05	7.24	-10.39***
	(7.00)	(8.00)	(8.00)	(7.00)	(0.000)
Board tenure	5.38	5.77	5.54	5.27	-2.00**
	(4.86)	(5.13)	(4.99)	(4.56)	(0.046)
Director's age	54.26	54.55	54.29	53.85	-2.42***
	(54.36)	(54.63)	(54.50)	(54.00)	(0.020)
Firm characteristics					
Size	12.81	13.01	12.72	11.66	-19.07***
	(12.37)	(12.71)	(12.48)	(11.30)	(0.000)
Profitability	0.08	0.10	0.11	0.06	-7.12***
	(0.11)	(0.12)	(0.12)	(0.12)	(0.000)
Tobin's Q	1.79	1.75	2.01	2.97	21.04***
	(1.41)	(1.35)	(1.51)	(2.03)	(0.000)
Dividend	0.02	0.02	0.02	0.02	0.85
	(0.01)	(0.02)	(0.024)	(0.00)	(0.395)

Table 2.4. Board Busyness and Cash Holdings

This table reports results from an analysis of cash holdings (dependent variables) in our sample of 1,275 firms from 1997 to 2009 time period. Model 1 is a pooled OLS model with year and industry dummy and robust standard errors. Model 2 is a fixed effects model with year dummy and robust standard errors. Model 3 is a fixed effects model with year dummy and robust standard errors clustered by industry (we use FTAG3 index for the industry affiliation). Model 4 is a Fama-MacBeth model. Model 5 is a fixed effects model with Driscoll and Kraay (1998) standard errors. All variable definitions are in Table 2.1. Standard errors are in parentheses beneath each coefficient estimate. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	Pooled OLS Model 1	**FE robust Model 2**	**FE robust clust Model 3**	**Fama-MacBeth Model 4**	**Driscoll-Kraay Model 5**
Board busyness	0.087***	0.101***	0.102**	0.127***	0.099***
	(0.024)	(0.030)	(0.044)	(0.034)	(0.032)
Board busyness^2	-0.156***	-0.152***	-0.152***	-0.192***	-0.146***
	(0.035)	(0.045)	(0.045)	(0.028)	(0.032)
Proportion of supervisory directors	0.122***	-0.005	-0.005	0.066***	-0.026
	(0.014)	(0.023)	(0.027)	(0.016)	(0.016)
Board size	0.015*	-0.029***	-0.029***	-0.008	-0.027***
	(0.008)	(0.114)	(0.011)	(0.013)	(0.005)
Board tenure	-0.002***	-0.002***	-0.002*	-0.000	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Duality	0.029***	0.002	0.002	0.018***	0.005
	(0.006)	(0.009)	(0.005)	(0.003)	(0.006)
Director's age	0.002***	0.001**	0.001*	0.001	0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Imported CEO	0.116***	0.024	0.024	0.079***	0.010
	(0.021)	(0.028)	(0.012)	(0.023)	(0.013)
Gender	0.023	0.025	0.025	0.034**	0.018
	(0.020)	(0.020)	(0.019)	(0.016)	(0.011)
Size	-0.019***	-0.035***	-0.035***	-0.012***	-0.039***
	(0.001)	(0.006)	(0.007)	(0.003)	(0.005)
Profitability	-0.158***	0.064***	0.0642***	-0.157***	0.057***
	(0.017)	(0.018)	(0.012)	(0.003)	(0.018)
Tobin's Q	0.023***	0.003*	0.003***	0.023***	0.002
	(0.002)	(0.002)	(0.001)	(0.003)	(0.001)
Dividend	0.116	0.161***	0.161***	0.138**	0.146***
	(0.085)	(0.056)	(0.035)	(0.0634)	(0.048)
Constant	0.036	0.436***	0.436***	0.021	0.484***
	(0.031)	(0.076)	(0.089)	(0.042)	0.068
Year dummy	Yes	Yes	Yes	No	No
Industry dummy	Yes	No	No	No	No
R^2	0.17	0.04	0.04	0.17	0.06
Number of observations	8296	8296	8296	8296	8296

Table 2.5. Board Busyness and Net Cash

This table reports results from an analysis of net cash (dependent variable measured by the difference between firm's cash holdings and firm's total debt) in our sample of 1,275 firms from 1997 to 2009. Model 1 is a pooled OLS model with year and industry dummy and robust standard errors. Model 2 is a fixed effects model with year dummy and robust standard errors. Model 3 is a fixed effects model with year dummy and robust standard errors clustered by industry (we use FTAG3 index for the industry affiliation). Model 4 is Fama-MacBeth model. Model 5 is a fixed effects model with Driscoll and Kraay (1998) standard errors. All variable definitions are in Table 2.1. Standard errors are in parenthesises beneath each coefficient estimate. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	Pooled OLS	**FE robust**	**FE robust clust**	**Fama-MacBeth**	**Driscoll-Kraay**
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Board busyness	0.0847***	0.136***	0.136***	0.175***	0.135***
	(0.036)	(0.045)	(0.055)	(0.065)	(0.046)
Board busyness^2	-0.165***	-0.232***	-0.232***	-0.272***	-0.219***
	(0.050)	(0.072)	(0.080)	(0.072)	(0.047)
Proportion of supervisory directors	0.106***	0.027	0.027	0.052*	-0.020
	(0.021)	(0.033)	(0.029)	(0.028)	(0.026)
Board size	0.027**	-0.046***	-0.046***	-0.007	-0.038***
	(0.012)	(0.017)	(0.019)	(0.021)	(0.010)
Board tenure	-0.002**	-0.003***	-0.003*	-0.000	-0.003***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Duality	0.046***	0.017	0.017	0.040***	0.022**
	(0.009)	(0.014)	(0.013)	(0.009)	(0.010)
Director's age	0.002**	0.001	0.001	0.002	0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Imported CEO	0.192***	-0.017	-0.017	0.065	-0.047
	(0.034)	(0.052)	(0.041)	(0.055)	(0.031)
Gender	0.081***	0.055*	0.055*	0.154***	0.038***
	(0.031)	(0.030)	(0.029)	(0.042)	(0.012)
Size	-0.043***	-0.055***	-0.055***	-0.036***	-0.066***
	(0.002)	(0.009)	(0.007)	(0.002)	(0.012)
Profitability	-0.146***	0.172***	0.172***	-0.100***	0.164***
	(0.024)	(0.026)	(0.029)	(0.024)	(0.029)
Tobin's Q	0.028***	0.003***	0.003**	0.023***	0.002
	(0.002)	(0.002)	(0.001)	(0.005)	(0.002)
Dividend	0.461***	0.273***	0.273***	0.294	0.253**
	(0.110)	(0.101)	(0.098)	(0.201)	(0.112)
Constant	0.322***	0.757***	0.757***	0.284***	0.835***
	(0.049)	(0.116)	(0.083)	(0.071)	(0.106)
Year dummy	Yes	Yes	Yes	No	No
Industry dummy	Yes	No	No	No	No
R^2	0.18	0.09	0.09	0.17	0.09
Number of observations	8290	8290	8290	8290	8290

Table 2.6. Board Busyness and Financial Slack

This table reports results from an analysis of financial slack (dependent variable) in our sample of 1,275 firms from 1997 to 2009. Model 1 is a pooled OLS model with year and industry dummy and robust standard errors. Model 2 is a fixed effects model with year dummy and robust standard errors. Model 3 is a fixed effects model with year dummy and robust standard errors clustered by industry (we use FTAG3 index for the industry affiliation). Model 4 is Fama-MacBeth model. Model 5 is a fixed effects model with Driscoll and Kraay (1998) standard errors. All variable definitions are in Table 2.1. Standard errors are in parenthesises beneath each coefficient estimate. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	Pooled OLS	**FE robust**	**FE robust clust**	**Fama-MacBeth**	**Driscoll-Kraay**
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Board busyness	0.060**	0.092***	0.092*	0.138***	0.089***
	(0.026)	(0.031)	(0.049)	(0.052)	(0.028)
Board busyness^2	-0.121***	-0.131***	-0.131***	-0.176***	-0.126***
	(0.036)	(0.046)	(0.055)	(0.037)	(0.030)
Proportion of supervisory	0.113***	0.008	-0.008	0.062***	-0.007
directors	(0.015)	(0.024)	(0.031)	(0.014)	(0.013)
Board size	0.040***	-0.019*	-0.019*	0.013	-0.019***
	(0.008)	(0.012)	(0.010)	(0.014)	(0.004)
Board tenure	-0.001	-0.002***	-0.002***	-0.001	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Duality	0.017***	0.002	0.002	0.012***	0.004
	(0.006)	(0.009)	(0.005)	(0.004)	(0.006)
Director's age	0.001***	0.001*	0.001	0.001	0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Imported CEO	0.115***	0.032	0.032*	0.075***	0.020
	(0.022)	(0.028)	(0.020)	(0.025)	(0.012)
Gender	0.018	0.021	0.021	0.031	0.017
	(0.022)	(0.021)	(0.023)	(0.022)	(0.011)
Size	-0.0250***	-0.0396***	-0.0396***	-0.0183***	-0.042***
	(0.015)	(0.0058)	(0.0107)	(0.0030)	(0.004)
Profitability	-0.078***	0.098***	0.098***	-0.073***	0.090***
	(0.017)	(0.019)	(0.015)	(0.014)	(0.018)
Tobin's Q	0.021***	0.003*	0.003***	0.021***	0.002
	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)
Dividend	0.380***	0.192***	0.192***	0.404***	0.176***
	(0.084)	(0.066)	(0.041)	(0.060)	(0.067)
Constant	0.072**	0.471***	0.471***	0.043	0.507***
	(0.035)	(0.075)	(0.115)	(0.033)	(0.057)
Year Dummy	Yes	Yes	Yes	No	No
Industry Dummy	Yes	No	No	No	No
R^2	0.14	0.06	0.05	0.16	0.07
Number of observations	8151	8151	8151	8151	8151

CHAPTER 3

CEO pay slice and firm value: Evidence from UK panel data

3.1. Introduction

Executive compensation has been widely discussed by economics, psychology, sociology, and management scholars (Gomez-Mejia and Balkin, 1992; Gerhart and Rynes, 2003, among others). Prior research in this area addresses issues related to executive pay levels (considering differences between companies), pay structures (considering differences within companies), or payment delivery systems (considering different forms of payment)[24]. Considerable academic attention is given to the relationship between CEO pay and firm performance (Jensen and Murphy, 1990; Hall and Leibman, 1998; Bebchul and Fried, 2004, among others). The most recent academic work investigates inequality in remuneration among top executives and its effect on company outcomes. Lee et al. (2008), Fredrickson et al. (2010), Zalewska, (2014a), Forbes et al. (2014) identify an interesting aspect of compensation inequality - the dispersion of executives' remuneration - and find that it affects company performance. Bebchuk and Grinstein (2005), Murphy and Zabojnik (2007), Frydman and Saks (2010), Bebchuk et al. (2011) show that the proportion of the total compensation paid to a company's top five executives received by its CEO - otherwise known as 'CEO pay slice' (CPS) increases over time and also affects firm performance.

In this paper we extend research on pay inequality by providing UK evidence. The corporate scandals about 'fat cats' compensation packages in Britain are a timely reminder that the pay-performance problem in the UK context requires further attention[25]. Executive

[24] Tournament, labour market, resource dependence, agency, equity, relative deprivation, distributive justice, contingency, expectancy, social comparison, marginal productivity, human capital, and managerial power are just some of the alternative theories that have been developed by academics in order to examine different executive compensation issues (see Fredrickson et al., 2010).

[25] See BBC News-Business: "High pay of UK executives corrosive, report says", 22nd November 2011, http://www.bbc.co.uk/news/business-15827683

pay has become a major issue in the UK in recent years, with shareholders questioning high salaries directors receive while their companies underperform[26]. "There is compelling evidence of a disconnect between pay and performance in large UK listed companies." UK Business Secretary Vince Cable told the UK Parliament[27]. David Cameron, the Prime Minister of the UK criticised boardroom cronies who helped each other "fill their boots" while the country was forced to tighten its belt[28]. The British government has been very proactive in tackling compensation-related problems: in 2002, the UK was the first country to mandate an annual non-binding shareholder vote on directors' remuneration ("say on pay") to improve the "accountability, transparency, and performance linkage of executive pay" (Baird and Stowasser, 2002). Ferri and Maber (2013) analysing the effect of this legislation on compensation practices in British companies, find that it has a negligible effect on the levels of CEO compensation and, in fact, is conditional on poor performance. The UK government also questioned the effectiveness of this "say on pay", on the basis that it is only advisory, and did not oblige companies to address shareholders concerns. In September 2013, the Government has gone one step further and introduced a mandatory "say on pay". Shortcomings in regulation of compensation-related issues have been also addressed by the Corporate Governance Code 2010 (The Code), with the particular attention being paid to the importance of establishing definite connections between director's remuneration and firm performance[29].

[26] See the Wall Street Journal – Business: "U.K. Unveils Plan on Executive Pay", 20th June, 2012, available at http://online.wsj.com/news/articles/SB10001424052702304765304577478172485959522

[27] See the Guardian: "David Cameron to curb 'fat cat' pay with people power"`, 7th January, 2012, http://www.theguardian.com/business/2012/jan/07/david-cameron-fat-cat-pay

[28] See the Guardian: "David Cameron to curb 'fat cat' pay with people power", 7th January, 2012, available at http://www.theguardian.com/business/2012/jan/07/david-cameron-fat-cat-pay: "We've got to deal with the merry-go-round where there are too many cases of remuneration committee members sitting on each other's boards, patting each other's backs and handing out each other's pay rises," he said. "We need to redefine the word 'fair'. We need to try to give people a sense that we have a vision at the end of this, of a fairer, better economy, a fairer, better society, where if you work hard and do the right thing you get rewarded"

[29] Section D: Remuneration. Main Principle: "levels of remuneration should be sufficient to attract, retain, and motivate directors of the quality required to run the company successfully, but a company should avoid paying more than is necessary for this purpose. A significant proportion of executive directors' remuneration should be

In this study, we aim to shed additional light on the link between executives' compensation and a firm performance in the UK context. In particular, we investigate whether pay inequality between CEO and top executives affects performance of British companies. We hypothesize that fraction of aggregate compensation of top-five managers captured by the CEO personally (the CPS) impacts board effectiveness, which in turn affects firm outcomes. In our analysis, we controls for several corporate governance characteristics (board composition, board size, CEO duality, CEO tenure, and board busyness) and for various firm characteristics (company age, company size, ratio of capital expenditures to total assets, and leverage). We use a large sample of non-financial companies listed on the London Stock Exchange, comprising 1,401 firms and 6,959 firm-year observations over the 1997 to 2010 time period. Our empirical methodology includes estimation of panel data by using various fixed effects models.

We find consistent support for the proposition that higher CPS is associated with lower firm value as measured by Tobin's Q. Our results rule out the *optimal contracting* hypothesis, which suggests that high CPS is determined deliberately by a company as the motivation incentive (to motivate CEO as well as top executive directors) with the view to improve firm outcomes. However, the results strongly support *agency perspective*[30],suggesting that high CPS level could be due to the agency problem in firm with powerful and influential CEO, who rules out the decision making processes and enforces board members and compensation committee to set up favourable remuneration packages regardless of his/her (and company) performance. In addition, high CPS could demotivate those managers nearest to the CEO, destroy team cooperation within the board room, and lead to poor board and thus firm performance (via the *social comparison* effect, inherent to

structured so as to link rewards to corporate and individual performance." (The UK Corporate Governance Code, June 2010: p.22).

[30] See Section 3.2 for detailed discussion of theories.

British boards[31]). Our results indicate that CPS can provide a useful tool for research on firm performance, and that its relation with the value of firms is an important issue to be considered in the UK context.

Our study relates to different bodies of literature. First, there is clear evidence from the literature that proportion of compensation received by CEO has been trending up over time (see Bebchuk and Grinstein, 2005; Frydman, 2005, Frydman and Saks, 2010 among others). We add to this stream by investigating the relationship between CPS and firm performance in the UK context. Second, we extend the literature analysing the association between different corporate governance characteristics and Tobin's Q. Thus, academics discuss the impact of large boards (Yermack, 1996), the presence of staggered boards (e.g., Bebchuk and Cohen, 2005), and the weakness of shareholder rights (Gompers et al., 2003; Bebchuk et al., 2009) on firm outcomes and find negative associations between these corporate governance characteristics and Tobin's Q. We contribute to this literature by considering another aspect of governance arrangements, the CPS, and its impact on firm performance. Finally, our work enhances the literature that analyses different CEO qualities and characteristics and their effects on firm outcomes. We highlight CPS as an important feature, which can provide additional insights into understanding of CEO compensation – firm performance link. This is the first study that we are aware of, that discusses the above mentioned aspects in the UK context and investigates the CPS –performance relationship using a broad UK-based sample.

The reminder of this chapter is organised as follows. We provide a theoretical background and develop our hypotheses in Section 3.2. Section 3.3 contains the sample description and summary statistics. Section 3.4 outlines the methodology. Section 3.5 examines the relationship between CPS and firm value. Section 3.6 concludes.

[31] See Zalewska (2014a,b) for detailed discussion of the UK board mechanisms and structures.

3.2. Theoretical background and hypothesis development

3.2.1. Governance, remuneration incentives, and firm performance

Executive directors' compensation and CEO compensation, in particular, are among the most important corporate governance arrangements that have been widely discussed by academics and practitioners (e.g., Core et al., 2003; Jensen, 2004; Bebchuk and Weisbach, 2010). Prior research on executive compensation has mainly focused on the structure and level of compensation packages, and their interrelations with firm performance (Lambert and Larcker, 1987; Jensen and Murphy, 1990; Yermack, 1995; Baber et al., 1996; Hall and Liebman, 1998; Lee et al., 2008; Fredrickson et al., 2010; Bebchuk et al., 2011; Zalewska, 2014a among others). Early compensation studies focused on CEO, subsequently expanding the scope of analysis to the entire managerial team. For example, Aggarwal and Samwick (2003) find that pay-performance sensitivity depends on the nature of director's responsibilities, and increases with executive's rank. Barron and Waddell (2003) argue that higher ranked executives receive greater levels of incentive-based compensation than their lower ranked colleagues. Academic literature suggests that pay difference within top management has important consequences for functional efficiency of the team and, subsequently, on firm performance. Even though researchers confirm existence of the relationship between pay inequality and firm performance, there is a disagreement regarding the nature of this relationship. Lazear and Roshen (1981), Rosen (1986), Eriksson (1999), Henderson and Fredrickson (2001), DeVaro (2006a, 2006b), Lee et al. (2008), Kale et al. (2009), Rankin and Sayre (2011) find that pay disparity has a positive effect on company performance. Pay inequality encourages managers next to CEO, to work better in order to secure next step on the management hierarchy ladder. On the other side, Bloom and Michel (2002), Carpenter and Sanders (2002), Fredrickson et al. (2010), Bebchuk et al.(2011), Zalewska (2014a), report that a wide remuneration gap among executives affects firm

outcomes in a negative way.

Bebchuk et al. (2011) introduce a new measure defining the relationship between CEO compensation and compensation of other members of the top executive team, the CEO pay slice (CPS). CPS is defined as a fraction of total compensation received by firm's top five executive officers (including the CEO), which goes to the CEO. Bebchuk et al. (2011) find that high levels of CPS have negative effect on firm outcomes, and argue that CPS can be used as a valuable tool for examining firm performance and behaviour. Correa and Lel (2014) use CPS in their study investigating the effect of "say on pay" legislation on executives' compensation level and corporate performance. Their findings are in line with those in Bebchuk et al. (2011) and reveal negative correlation between CPS and firm value. In particular, Correa and Lel (2014) demonstrate that companies with high CPS experience greater increase in firm value following enactment of the "say on pay" law, and argue that high CPS is an indicator of CEO entrenchment.

Despite the growing body of literature on executives' remuneration, there are only a handful of studies examining the effect of different aspects of directors' compensation on firm performance using UK data. Conyon and Sadler (2001) examine a small sample of UK companies, and find a weak evidence of the positive relationship between executives' pay inequality and firm performance. Gregg et al. (2005) find a weak link between cash compensation and performance using a sample of large UK companies, and argue that a relationship between executives' total compensation and share performance is weak. Ozkan (2009) examines the link between CEO pay and firm performance using a sample of 390 companies from the FTSE All Shares Index for the 1999-2005 time period. She reports a positive and significant relationship between CEO cash compensation and performance, but no connection between total compensation and performance.

There are few most recent studies discussing the pay inequality using UK-based data

that are of particular interest and relevant to our research. Correa and Lel (2014) investigate the effect of "say on pay" law on executive compensation, CPS and firm value using a large cross-country sample from 39 countries including the UK. They find that CEO pay – firm performance links become stronger when "say on pay" laws are implemented, and that companies that previously had greater CPS, experience significant performance improvements. These findings imply a negative correlation between CEO compensation and firm outcomes, and are consistent with results from previous research (e.g., Bebchuk et al., 2011). Forbes *et al.* (2014) criticise CPS as a valuable measure to be used in the analyses of pay disparity –corporate performance relationship, and introduces a Gini coefficient as an alternative. Zalewska (2014a) analyses the link between remuneration dispersion at executive board level and firm performance using a large sample of British companies. She unveils a negative relationship between remuneration dispersion and performance,[32] contrary to findings from studies on American firms. She argues that this inconsistency is due to substantial differences between American and British boards attributable to "individuals' culturally shaped attitudes" (Zalewska, 2014a: p.5). Zalewska (2014a,b) urges that findings on American data are not always universal and must be treated with extreme caution in cases where applied to companies outside the US.

3.2.2. Optimal contracting versus social comparison perspective

Under the optimal contracting perspective, there is a very strong negative view on the effects that high remuneration disparity between CEO and other executive board members has on a firm value. Fong et al. (2010) argue that compensation should reflect the manager's ability, but at the same time should not lay the foundation for strong feelings of inequality/injustice among peers on the labour market. Milgrom and Roberts (1992)

[32] This is the one of the first studies (and only one analysing the dispersion-performance link using a sample of British companies) that documents a negative relationship between the remuneration dispersion and performance. All previous studies agreed that greater pay dispersion improves firm outcomes (see Kale et al., 2009; Rankin and Sayre, 2011 among others.

demonstrate that tournament mechanisms within the executive team can produce negative incentives for top executives other than CEO. It is very unlikely that the company will benefit from the tournament framework if top executives who are competing for the CEO position refuse to cooperate with and even might undermine their rivals. A wide gap between CEO compensation and compensation of top executives (the "prize size") emphasises on the importance of the CEO as a "dominant player" (Bebchuk et al., 2011). On one side, it is beneficial to have a dominant player as he/she can guarantee clarity, steadiness and reduction in the cost of decision making process (Bebchuk et al., 2011). On the other side, a large body of literature, starting with Shaw (1932), suggests that group decision making is superior to the individual decision making. Moreover, the dominant player approach can lead to resentment on the part of other members of the top executive team (Brill, 1993; Cook, 1990). Hicks (1963) introduced the notion that large pay differences may have a negative impact on employees through feelings of inequity and leads to a weaker dedication increasing a dysfunctional conflict, which, in turn, "diminish the efficiency of the team" (Hicks, 1963:p. 334). Akerlof and Yellen (1988, 1990), Milgrom and Roberts (1988) and Levine (1991) build up on the earlier work of Hicks (1963) and argue that low pay differences may have a positive effect on employees' diligence and productiveness by creating well-balanced and efficient labour relations leading thereby to better outputs. Levine (1991) also demonstrates that lower level of pay dispersion leads into better employee cohesiveness and productivity[33]. Considering that UK boards are not strongly hierarchical and CEOs are not so powerful in Britain compared to their American colleagues (Tom and Wright, 2005; Aguilera et al., 2006), a high CPS can impact negatively on team spirit and motivation, weakening board effectiveness. This can attenuate firm performance in accordance with the social comparison

[33] This argument is also consistent with research on cooperation in general economic situation (Milgrom and Roberts, 1988; Lazear, 1989; van den Assem et al., 2012).

view[34].

High CPS also could indicate the extent to which a CEO uses his/her power and influence to serve his/her own interests rather than the interests of shareholders[35]. The recent financial crisis, and the scandals around senior executives' compensation, brought forward the following question: "How much difference can a CEO make…" (Collingwood, 2009: p.1). Bebchuk and Fried (2004) find that a CEO can be very influential, easy captures the board and sets up his/her own pay. Goergen and Renneboog (2011) reach the same conclusion and argue that weak corporate boards are beneficial for CEO's self-dealing. Bebchuk et al. (2011) find that CEO pay slice (CPS) negatively affects firm performance, especially in firms with entrenched managers. Thus, a high level of CPS can be viewed as a reflection of significant governance problems.

In contrast to the social comparison view, the optimal contracting theory states that CEO compensation is determined by a complex set of factors and reflects CEO talent, ability, experience, and career concerns. Optimal compensation reflects the extent to which companies are willing to offer 'tournament' incentives to top executives other than a CEO. Optimal contracting arguments[36] suggest that high CEO pay - relative to pay of other top executives - is determined deliberately by companies as motivation incentive with the view to improve firm outcomes. In a typical rank order tournament framework, the best performer is promoted to the next level in the managerial hierarchy. The promotion to the next level in the managerial hierarchy guarantees a higher pay level, so the framework motivates executive directors to exert greater efforts and perform better. Earlier empirical research on labour economics (e.g., Bognanno, 2001), and the most recent research in corporate finance (e.g., Kale et al., 2009) use the compensation gap between CEO and lower-rung executives as the

[34] The social comparison theory was introduced by Festinger (1957), and underlines equity theory oriented concerns (Adams, 1965).
[35] See, for example, Bebchuk et al. (2011) who use CPS as a measure of CEO dominance.
[36] See Edmans and Gabaix (2011) for review.

measure of tournament incentives. Lee et al. (2008) and Kale et al. (2009), among others, find tournament incentives to be an important mechanism in motivating managers.

High CEO pay slice (CPS) could be a good indicator of superior CEO capability[37]. Fama and Jensen (1983), Fich (2005), and Masulis and Mobbs (2011) argue that labour market incentives motivate directors to perform better, because poor performance can result in decreased access to additional directorships, career, and reputational benefits. CEOs are inspired by the labour market incentives to act as good stewards on behalf of their companies in order to gain and build good reputations and improve their career prospects (Gibbons and Murphy, 1992).

Based on the above arguments, we hypothesize that companies intentionally decide to set high CPSs to motivate their CEOs and top executives other than CEO. CEO is motivated to be a good steward and make every effort to ensure successful company performance levels, because they take care about their own reputation; in turn, top executives, other than CEO, are also motivated to perform better while competing for the CEO position. This leads us to the following hypothesis:

Hypothesis: CPS is positively associated with firm value.

3.3. Sample selection and data description

3.3.1. Sample selection

For this study, we use a large sample of non-financial companies listed on the London Stock Exchange. We obtain firms' financial and market information from Thompson Datastream, and corporate governance and directors' compensation information from BoardEx. The sample period is from 1997 to 2010, and it includes all firms whose information is available from these two sources.

[37] Bebchuk et al. (2011) state that optimal CPS depends also on the pool of available candidates from the labour market

The BoardEx database consists of director's information, including director's name, role title and description, indication of whether he/she is an executive or supervisory director, the number of years each director has served on the board and in his/her current role, director's total, cash (direct) and equity compensation, number of quoted companies' boards currently set by each director. From this database, we obtained data for non-financial firms for which there is information available for at least two executive board members and a company has a CEO.

We collected the accounting and stock market data necessary to calculate a performance proxy and to control for firm characteristics from Thomson Datastream. The following variables were collected at the end of each year: book value of assets, book value of common equity, balance sheet deferred taxes, market value of equity, value of total debt, and company age.

We merged the data from BoardEx and Thomson Datastream and ended up with unbalanced panel of 1,401 firms and 6,959 observations over the 1997 – 2010 time period[38]. Our definition of CPS is marginally different from definition in Bebchuk et al. (2011). British corporate boards are, on average smaller than American boards (Zalewska, 2014a,b). Only 16% of our sample companies have five or more executive directors at the board level. We compute CPS as the fraction of the total compensation paid to a group of minimum two and maximum five top executives, that is received by the CEO. We use Tobin's Q as a key measure of corporate performance. We control for other potential determinants of firm value, found to be important in the previous studies (see Bebchuk et al., 2011; McNulty et al., 2013; Zalewska, 2014a) and include firm size, company age, capital expenditures, and leverage in our model. We also collect information about the governance structure of each firm, such as board size, board composition, board busyness, CEO tenure, CEO duality, whether the CEO

[38] The number of observations in Chapter 3 is different from those in Chapter 2. The difference is due to the data availability for the CPS computation. Data required for the CPS computation was not always available for all sample companies used in Chapter 2.

is insider or outsider, i.e. was/was not an employee of the firm before his/her appointment to the CEO position, and information on the compensation of executive directors other than CEO. All variable definitions are provided in Table 3.1. Tables 1 and 2 in the Appendix give sample calculation examples for Board Busyness and CPS respectively.

3.3.2. Data description and summary statistics

We report summary statistics in Table 3.2[39]. We separate data into variables describing firm performance (Panel A); compensation, director characteristics and board structure (Panel B); and other firm characteristics (Panel C). The average CEO pay slice (CPS) based on the total compensation of up to top five executives including CEO is 45.22%, with minimum 0 and maximum 100%. The boards in our sample have on average 7 directors with minimum 3 directors and maximum 14 directors. The average proportion of executive directors at the board level (*Board Composition*) is 48.44% with a minimum of 13.51% and a maximum 80% of executives at the board. The average CEO tenure is 4.44 years in our sample companies, with minimum 0 and maximum 24.70 years. 57.81% of companies in our sample have CEOs, who were not employees of the company before (*Outside CEO).*

Firm size is, on average 4.35. The leverage level is 17.70% in the average company, with maximum leverage standing at 95%, and minimum leverage equals to 0%. Company age is, on average, 13.78 years, with the oldest company being in existence for 45 years, and the youngest company in our sample just 0.34 years old. The maximum (minimum) ratio of capital expenditures to total assets is 0.34 (0), with the average being 0.05. The average Tobin's Q is 2.55, with maximum (minimum) Q equals to 20 (1.50).

Table 3.3 reports CPS descriptive statistics. The statistics are presented for each year separately, along with statistics for two sub-samples, before and after year 2002[40]. On

[39] All variables are winzorized to the 1st/99th percentiles.
[40] In 2002, the UK was the forerunner in mandating that shareholders be allowed a non-binding, or advisory vote on executives' pay ("say on pay").

average, CPS has been growing over the 1997-2010 period. This is consistent with the evidence from the literature that proportion of compensation received by CEO has been on an upwards trend over time (see Bebchuk and Grinstein, 2005; Frydman, 2005; Frydman and Saks, 2010). Introduction of advisory "say on pay" law in 2002 has not changed this increasing trend. In particular, mean CPS has been increasing gradually, from 32% in the year 1997 to 50% in the year 2010, with an average CPS around 40% before the introduction of "say on pay", i.e. before 2002, and average CPS around 47% upon implementation of this law, i.e. from year 2003 onwards. This is in agreement with results in Ferri and Maber (2013) who find that introduction of "say on pay" has a limited effect on the levels of CEO compensation.

3.4. Methodology

In this section, we examine the effect of CPS on company performance. We follow the literature that relates firm performance to various corporate governance characteristics and use Tobin's Q as a measure of firm performance (see Demsetz and Lehn, 1985; Morck et al., 1988; Lang and Stulz, 1994; Gompers et al., 2003). The CPS definition is adopted from Bebchuk et al. (2011) with a minor modification, which was necessary due to the difference in board sizes in the UK and US[41].

We include control variables that have been considered important in the previous literature[42]. We include *Board Composition*, which is a proportion of executive directors at the board level. Considering the nature of data available and difficulties with identifying independent directors, we use *Board Composition* measure as a proxy for board independence (a lower proportion of executive directors at the board level is associated with higher level of board independence). Previous academic research finds board independence important in designing a CEO's compensation plan. Mehran (1995) argues that with

[41] See Section 3.3.1 for the definition of CPS.
[42] See, for example, Bebchuk et al. (2011), McNulty et al. (2013), and Zalewska (2014 a,b).

increasing proportion of executive directors at the board level, the board grants CEO less incentive-based pay. Ozerturk (2005) develops a theoretical model, which supports a positive relationship between board independence and performance sensitivity of CEO pay. We also control for board size and include natural logarithm of a total number of directors at the board level (*Board Size).* Academics provide controversial evidence on the relation between board size and company performance, with some documenting positive (Pearce and Zahra, 1992; Dalton et al., 1998; Jackling and Johl, 2009) while others reporting negative association (Yermack, 1996; Van den Berghe and Levrau, 2004). In addition, we control for board busyness and include *Busy Board* variable, defined as a proportion of busy directors (directors with three or more directorships) at the board level. Core et al. (1999) and Shivdasani and Yermack (1999) suggest that directors can become overcommitted when serving on multiple boards, rendering them unable to provide meaningful managerial monitoring. Fich and Shivdasani (2006), Jiraporn et al. (2008) argue that boards with busy directors are associated with lax corporate governance. Jiraporn et al. (2006) associate busy boards with weaker performance and lower firm value. We also include a variable indicating that CEO and Chairman is the same person (*Duality*), which is often used in corporate governance literature. We consider *CEO Tenure* as explanatory variable in our models. Bebchuk et al. (2011) suggest that CEO tenure impacts on firm performance. Hermalin and Weisbach (1998) argue that CEO propensity to employ more allies to the board will increase with his/her tenure, thereby increasing the CEO bargaining power. In line with Bebchuk et al. (2011), and Murphy and Zabojnik (2007) we also consider a *CEO outsider* variable. Murphy and Zabojnik (2007) document that CEO-outsider receives higher compensation resulting in higher level of CPS, which could be an indication of his/her unique skills and not necessarily agency problems.

It is important to recognise that CPS could be endogenously determined, i.e. affected

by the factors that are also affect firm performance. To account for this, we use fixed effects models, which consider how changes in CPS are associated with changes in firm value. In case, if individual heterogeneity is time invariant, the individual effects are considered as unknown coefficients and are jointly estimated with independent variables' coefficients[43] as a potential solution. A *fixed effects* model is based on a deviation from companies' mean transformation (firm's mean for the sample interval is subtracted from each observation) and estimates all coefficients without estimating individual effects (Model 1). Since we are interested only in slope coefficients, this transformation is very convenient for our analysis.

$$\widetilde{Performance}_{it} = \beta_0 + \beta_1 \widetilde{CPS}_{it} + \beta_2 \widetilde{CEO\ Tenure}_{it} + \beta_3 \widetilde{CEO\ Outsider}_{it} + \beta_4 \widetilde{Duality}_{it} + \beta_5 \widetilde{Board\ Composition}_{it} + \beta_6 \widetilde{Company\ Size} + \beta_7 \widetilde{Company\ Age}_{it} + \beta_8 \widetilde{Capex}_{it} + \beta_9 \widetilde{Leverage}_{it} + \beta_{10} \widetilde{Busy\_Board}_{it} + + \sum_{j=2}^{13} \beta_j YearDummy_t + \varepsilon_{it} \quad \textbf{(1)}$$

where the ~ (tilde) defines demeaned variables, and $Performance_{it}$ is our performance measure, i.e. Tobin's Q. All other variable definitions are in Table 3.1.

An important issue when dealing with panel data is the estimation of robust standard errors. Ignoring correlation between residuals in the estimation process, results in bias and inconsistent conclusion. For example, if standard errors of the estimated coefficients are downward biased, the standard errors will be low, and statistical significance of the results may be overestimated (Petersen, 2009; Oikonomou, Brooks and Pavelin, 2012). To account

[43] Another possible method to use is a random effects model. The important difference between these two approaches (fixed effects vs. random effects) is that in the fixed effects models, the unobserved heterogeneity is treated as individual intercept parameter, which will be "eliminated" from the model during the estimation, so that any endogeneity (correlation between explanatory variables and unobserved heterogeneity) will be dealt with. Whereas, using random effects approach, allows us to treat unobserved heterogeneity as composite error term and hence, the assumption of independence between independent variables and individual effects is crucial for the random effects estimators to be consistent. Considering that unobserved effects such as managerial ability, corporate culture, and CEO's style could affect the random effects model's assumption of independence between individual heterogeneity and explanatory variables could be too strong in our case. Moreover, estimating Model (2) using random effects and performing a Hausman tests produces results that strongly support the use of fixed effects estimation. (Results of the Hausman test are not reported but are available from the author upon request.)

for this, we ran fixed effects models with robust standard errors and robust standard errors clustered by industry. We also use fixed effects models with Driscoll-Kraay (1988) standard errors, which are robust to general forms of cross-sectional and temporal dependence. We also use industry-adjusted CPS in each firm's industry at the FTAG3 level in the same year. In addition, we examine whether our results are robust to alternative specification of CPS based on the total compensation of maximum three (rather than five) executive directors (*CPS 3 directors*).

3.5. Results

3.5.1. Univariate analysis

Table 3.4 presents univariate comparison of key descriptive variables by CPS quartiles. We are interested particularly in whether the characteristics of companies and companies' boards with high CPS, i.e. companies in the fourth quartile, differ from those with low CPS, i.e. companies in the first quartile. We test the hypothesis that the fourth-quartile firms are different from the first quartile firms using a *t*-test

Firms with high CPS appear to differ significantly from those with low CPS. Tobin's Q declines as CPS increases. It declines in the second and third quartiles (as predicted by the agency and social comparison arguments) and then increases in the fourth quartile again. The firms with highest CPS are smaller than those with the lowest CPS, although the univariate relation between CPS and firm size is not monotonic. Firms in the second quartile are larger than firms in the first quartile, whereas firms in the third quartile are smaller than those in the first and second quartiles, with firms in the fourth quartile representing the smallest companies in the sample. Firms in the first CPS quartile are younger than firms in the fourth quartile. The univariate relation between CPS and *Capex* is not monotonic. Firms in the first three CPS quartiles have similar *Capex*, but firms in the fourth quartile have lower *Capex.* Leverage increases from the first to the fourth quartile of CPS, but it is the same in the second, third and fourth quartiles. *Board Busyness* increases monotonically from the first to the fourth

quartile of CPS. The firms with the highest CPS have the busiest boards. *Board size* declines monotonically from the first to the fourth quartile of CPS. Companies in the first quartile of CPS have boards that are substantially larger than boards of companies in the fourth quartile. *Board composition* changes in line with the board size and declining monotonically from the first to the fourth quartile, which is consistent with the view that CEO can entrench, extract rents and increase agency costs, if board is less independent. Proportion of 'outside' CEOs increases gradually from the first to the fourth quartile suggesting that such directors are more valuable assets for companies, and receive relatively higher compensation than other executives.

3.5.2. Multivariate analysis

In this section we discuss our empirical results concerning the association between CPS and firm value measured by Tobin's Q. The regression results are reported in Table 3.5. We separately report estimation results using fixed effects models with White (Panel A), robust clustered by industry (Panel B), and Driscoll–Kraay (Panel C) standard errors correction methods. Our results are consistent and robust to the use of different CPS specifications.[44] The results show a negative relationship between CPS and firm value. Our main model is Model 1, with Tobin's Q being regressed against CPS and our selected firm and governance control variables. We find that CPS coefficients are negative in Panels A, B, and C and are significant (at the 1% level in Panel A and Panel B, and at the 10% in Panel C). In terms of economic significance, one standard deviation change in CPS (equals to 19.21%) is associated with a reduction in Tobin's Q by 11.91% (=19.21 x -0.62).

In subsequent models, Models 2 and 3 we use alternative specifications of CPS. We consider industry-adjusted CPS[45] (Model 2) and CPS computed using total compensation of

[44] We use industry adjusted CPS and CPS based on top-three executives' compensation.
[45] The industry adjustment is made by subtracting industry mean CPS (at the same FTAG3 level) from firm CPS in the same year

maximum three executive directors (Model 3). The results remain robust to these alternative specifications with negative and statistically significant CPS coefficients. These results are consistent with the view that high CPS adversely affects firm performance, supporting social comparison argument. Our results are in line with results reported in the literature starting with Hicks (1963), who introduced the notion that large pay disparity may have a negative impact on employees through feeling of inequality and leads to a weaker dedication, diminishing efficiency of a team. Our results are in agreement with findings in Bebchuk et al. (2011), Correa and Lel (2014), and Zalewska (2014a), who argue that a wide remuneration gap among executives affects firm outcomes in a negative way. Throughout our analysis we were not able to find support for the optimal selection argument. Considering that UK boards are not strongly hierarchical, our results suggest that "tournament incentives" are irrelevant to British companies.

Examining control variables in the regressions, we find some interesting results. One of our corporate governance characteristics, *Board size*, has coefficients that are negative and statistically significant (at the 1% level), supporting the view that small boards are more efficient and perform better than their large counterparts when it comes to managing company performance. Both company size and capital expenditure coefficients are positive and statistically significant (at the 1% level), suggesting that bigger companies and those with higher capital expenditure levels perform better. We also find positive relationship between leverage and Tobin's Q. These findings are in line with findings in previous literature (see Bebchuk et al., 2011; McNulty et al., 2013; Zalewska, 2014a).

3.6. Conclusions

In this paper, we investigate how CPS, the proportion of maximum top-five executive directors' aggregate compensation captured by CEO, affects firm performance. We offer new insights into the pay inequality - performance relationship by evaluating three different

arguments that are prevalent in the finance and management literature. One view claims that CPS level is optimally selected by companies and is a reflection of director's personal abilities, skills and talent (optimal selection argument). Optimally selected high CPS distinguishes a company's CEO and helps to create a good competition spirit within the board room resulting in better corporate performance. However, two other views suggest exactly opposite: high CPS can be an indicator of agency problems in a company in which a powerful CEO extracts unjustified rents (agency argument), and could harm board effectiveness by impairing team cohesiveness and motivation (social comparison argument), in either case resulting in poor corporate performance

Our analysis reveals a negative association between CPS and corporate performance measured by Tobin's Q. This evidence supports both the agency and social comparison arguments. The results of our study are robust for controlling for various firm, board and CEO characteristics, including board busyness, board composition, board size, CEO – Chairman duality, CEO tenure and whether CEO was an employee in the company before, firm size, firm age, value of capital expenditures, and leverage. Our results are also robust to the different specifications of CPS. Our findings are in line with Bebchuk et al. (2011), Zalewska (2014a), and Correa and Lel (2014). However, this is the first study that we are aware of, which investigates the CPS – performance relationship using the broad sample of UK-based companies[46]. Even though US and UK are considered to be core representatives of the Anglo-Saxon corporate world with identical approach to the corporate governance, there are some substantial differences in terms of board structure, culture and cohesiveness (see Zalewska, 2014a,b). We find that results from the UK sample are similar to those from studies on US companies. However, the underlying reason for the negative relationship between CPS and firm performance could differ between the UK and US contexts.

[46] Forbes et al. (2014) use UK FTSE 100 companies in their study of CPS-performance relationship.

Considering the specificity of UK corporate boards (see Zalewska, 2014b), it is natural to put forward the social comparison argument as an important reason for the negative associations between CPS and firm performance, which we find in this study[47].

Given the changes in remuneration practices introduced by the UK Corporate Governance Code (2010) and the "say on pay" legislation (2013), we argue that CPS is an important aspect of firm governance and management that deserves attention of researchers and policy makers. The fact that high CPS negatively impacts on firm performance has strong implications for the on-going debate on how to reform executive remuneration so that it provides the right incentives. It highlights the importance of considering remuneration issues at the board rather than at the CEO or at the sectoral or industry levels, and supports the UK Corporate Governance Code (2010) principles[48]. UK corporate governance reforms move towards increasing board's responsibilities for company's performance, and it is important to consider board-wide remuneration issues without narrowing them down simply to the details of CEO compensation.

[47] UK companies are generally characterised by high corporate governance standards, but agency problems may still exist in some companies. However, considering the attention the business community has given to the issue, and the recommendations provided by the most recent UK Corporate Governance Code (2010), it is natural to assume that agency conflicts would be minimal, and that the social comparison argument is more likely to explain the negative CPS – performance relationship.

[48] "The performance-related elem5ents of executive remuneration… should be sensitive to pay and employment conditions elsewhere in the group" (Supporting principle, Section D: Remuneration, The UK Corporate Governance Code, 2010: p. 22).

Table 3.1. Variable Definitions

The data variables refer to the corresponding compensation and corporate governance variable identifiers in the BoardEx annual database and to the corresponding performance and firm characteristics variables identifiers in the Thomson Datastream database.

Variable	Definition
Compensation	
CEO pay slice (CPS)	The fraction of the total compensation to the group of minimum top-two and maximum top-five executives, including CEO that is received by the CEO.
CEO pay slice (CPS), 3 directors	The fraction of the total compensation to the group of minimum top-two and maximum top-three executives, including CEO that is received by the CEO.
Corporate Governance	
Board busyness	The proportion of busy directors at the board level. Busy directors are defined as directors holding three or more directorships, including the "home" company, in the public companies at the same time.
Board composition	The proportion of executive directors on the board. Total number of supervisory directors divided by the total number of all directors on the board.
Board size	The natural logarithm of the total number of all directors on the board.
CEO tenure	The number of years directors have served on the board
Duality	Indicator variable: equals one if CEO and Chairman is the same person
CEO outsider	CEO Outsider is a dummy equal to one, if CEO was working at the firm for less than one year before becoming CEO.
Performance measure	
Tobin's Q	(Book value of assets – book value of common equity – balance sheet deferred taxes + market value of equity)/book value of total assets: (*WC02999– WC03501 – WC03263 + MV*)/ *WC02999*
Firm characteristics	
Size	Natural logarithm of market value: Ln (*MV)*
Leverage	Total debt/total assets *WC03255*/ *WC02999*
Capital expenditures	Capital expenditures/ total assets: *WC04601*/ *WC02999*
Company age	Number of years since company's information is available on Thomson Datastream: *BDATE*

Table 3.2. Summary Statistics

This table presents summary statistics for the sample of 1401firms over the 1997-2010 period, excluding financial firms. All variables are winzorized to the 1st /99th percentiles. All variable definitions are in the Table 3.1.

	Mean	**Min**	**Max**	**Obser**
Panel A: Performance Measure				
Tobin's Q	2.55	0.00	20.00	7649
Panel B: Compensation/Director/Board characteristics				
CPS	0.45	0.00	1.00	7028
Board composition	0.48	0.20	0.80	7649
Board busyness	0.17	0.00	0.67	7649
Board size	1.90	1.10	2.64	7649
CEO tenure	4.44	0.00	24.40	7649
Panel C: Firm characteristics				
Size	4.36	-0.22	9.83	7576
Company Age	13.78	0.34	45.03	7579
Capex/Total Assets	0.05	0.00	0.34	7631
Leverage	0.18	0.00	0.95	7648

Table 3.3. Descriptive statistics on CEO pay slice (CPS) compensation

This table presents descriptive statistics (mean, median, maximum and minimum CPS for our sample firms over the period 1997-2010.

CPS Descriptive Statistics																	
YEAR																	
	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Before SoP (1997 -2002)**	**After SoP (2003 -2010)**	***t-stat (p-val)***
Mean	0.32	0.36	0.38	0.40	0.40	0.42	0.43	0.44	0.45	0.46	0.48	0.48	0.48	0.50	0.40	0.47	
Median	0.31	0.34	0.36	0.37	0.37	0.39	0.41	0.42	0.43	0.44	0.47	0.47	0.50	0.50	0.37	0.46	
Maximum	0.87	0.87	0.93	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Observations	37	50	230	351	440	494	560	641	733	819	769	674	612	618	1602	5426	
Difference of CPS means (before and after SoP)																	12.03 (0.00)

Table 3.4. Firm characteristics by CPS quartiles

This table presents univariate comparison of means and medians of measures of corporate governance and firm characteristics of 1401 firms from the 1997-2010 sample of UK-based publicly traded firms, excluding financial firms. The director and board data is from the *BoardEx* database, firm data is from Thomson Datastream. CEO pay slice (CPS) is the fraction of total compensation to the group of minimum top-two and maximum top-five executive directors including CEO that is received by CEO. Other variables definitions are in the Table 3.1. The table displays the means and medians (in parentheses) of various director, board, and firm characteristics for first, second, third, and fourth quartiles of CPS. The *t*-statistics is for a difference of means test from the first to the forth quartile of CPS. Each quartile contains approximately 1780 firm -years. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	First quartile	**Second quartile**	**Third quartile**	**Fourth quartile**	***t*-statistic (*p*-value)**
CPS characteristics					
CPS range	0.00 to 0.0.32	0.32 to 0.44	0.44 to 0.0.58	0.58 to 1.00	
CPS	0.22	0.37	0.50	0.70	127.94***
	(0.25)	(0.37)	(0.50)	(0.65)	(0.000)
CPS, 3 directors	0.22	0.42	0.52	0.70	104.64***
	(0.30)	(0.43)	(0.52)	(0.66)	(0.000)
Performance					
Tobin's Q[49]	2.55	2.49	2.41	2.47	-0.72***
	(1.51)	(1.50)	(1.47)	(1.50)	(0.469)
Director/board characteristics					
Board busyness	0.15	0.16	0.18	0.19	7.48***
	(0.13)	(0.14)	(0.17)	(0.17)	(0.000)
Board composition	0.56	0.51	0.45	0.39	-41.00***
	(0.57)	(0.50)	(0.43)	(0.40)	(0.075)
Board size	8.00	7.62	6.69	6.25	-23.67***
	(8.00)	(7.00)	(6.00)	(6.00)	(0.000)
CEO tenure	4.44	4.94	4.58	3.91	-3.43***
	(2.90)	(3.30)	(2.90)	(2.80)	(0.001)
Firm characteristics					
Size	4.60	4.83	4.33	4.28	-4.04***
	(4.50)	(4.76)	(4.14)	(4.13)	(0.000)
Company age	13.75	14.36	14.27	14.87	2.41**
	(8.69)	(9.82)	(9.46)	(8.65)	(0.016)
Capex	0.05	0.05	0.05	0.04	-5.11***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.000)
Leverage	0.17	0.18	0.18	0.18	1.62
	(0.13)	(0.14)	(0.14)	(0.13)	(0.1063)

[49] The univariate analysis suggests a potential nonlinearity in Tobin's Q. Tobin's Q declines gradually from the first to the third quartile but increases again from the third to the fourth quartile. This suggests that at the highest CPS level, there is a possibility that companies performance might improve.

Table 3.5. CEO Pay Slice (CPS) and Firm Performance

This table reports results from an analysis of corporate performance measured by Tobin's Q in our sample of 1401 firms from 1997 to 2010. Panel A shows the regression results obtained by using fixed effects models with year dummy variables (not shown) and *t*-statistic based on White's standard errors. Panel B shows the regression results obtained by using fixed effects models with year dummy variables (not shown) and *t*-statistics based on the robust standard errors clustered by industry (we use FTAG3 index as an industry identifier). Panel C shows the regression results obtained by using fixed effects models with *t*-statistics based on Driscoll-Kraay (1998) robust standard errors. The dependent variable is Tobin's Q. CPS is the ratio of CEO total compensation to the sum of maximum top five executives' total compensation and is expressed as decimals. CPS 3 directors is the ratio of CEO total compensation to the sum of maximum top three executives' total compensation and is expressed as decimals. CPS adjusted is industry-adjusted CPS. The industry adjustment is made by subtracting industry mean CPS (at the same FTAG3 level) from firm CPS in the same year. All other variable definitions are in Table 3.1. Standard errors are in parentheses beneath each coefficient estimate. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

Panel A: Fixed effects model with White's corrected standard errors

	Model 1	**Model 2**	**Model 3**
CEO Pay Slice (CPS)	-0.6182***		
	(0.2052)		
CPS adjusted		-0.6533***	
		(0.2043)	
CPS, 3 directors			-0.5308***
			(0.1780)
Board busyness	-0.4887	-0.4890	-0.5139
	(0.2758)	(0.2758)	(0.2770)
Board composition	-0.0740	-0.0816	-0.0601
	(0.3934)	(0.3914)	(0.3826)
Board size	-1.6531***	-1.6562***	-1.5946***
	(0.1879)	(0.1871)	(0.1839)
Duality	-0.1126	-0.1131	-0.1168
	(0.1603)	(0.1603)	(0.1613)
CEO tenure	-0.0102	-0.0103	-0.0090
	(0.0098)	(0.0098)	(0.0010)
CEO outsider	0.1036	0.1032	0.0923
	(0.0928)	(0.0928)	(0.0933)
Size	1.0090***	1.0090***	1.0200***
	(0.0422)	(0.0422)	(0.0424)
Company age	-0.1729	-0.1647	-0.2059
	(0.3178)	(0.3178)	(0.3187)
Capex	2.3249***	1.3160***	2.4900***
	(0.6901)	(0.6901)	(0.6922)
Leverage	1.6539***	1.1655***	1.7047***
	(0.2558)	(0.2526)	(0.2565)
Constant	3.4210	3.4210	3.3691
	(2.0519)	(2.0048)	(2.0319)
Year dummy	Yes	Yes	Yes
R^2	0.16	0.16	0.16
Number of observations	6959	6959	6959

Table 3.5 (cont)

Panel B: Fixed effects model with robust standard errors clustered by industry FTAG3 code			
	Model 1	**Model 2**	**Model 3**
CEO Pay Slice (CPS)	-0.6182***		
	(0.2161)		
CPS adjusted		-0.6533***	
		(0.2043)	
CPS, 3 directors			-0.5308***
			(0.1783)
Board busyness	-0.4887	-0.4890	-0.5139
	(0.4485)	(0.24472)	(0.4523)
Board composition	-0.0740	-0.0103	-0.0601
	(0.4060)	(0.0116)	(0.3997)
Board size	-1.6531***	-1.6562***	-1.5946***
	(0.3478)	(0.3522)	(0.3427)
Duality	-0.1126	-0.1131	-0.1168
	(0.2364)	(0.2371)	(0.2359)
CEO tenure	-0.0102	-0.0103	-0.0090
	(0.0116)	(0.0116)	(0.0117)
CEO outsider	0.1036	0.1032	0.0923
	(0.1305)	(0.1307)	(0.1260)
Size	1.0090***	1.0090***	1.0200***
	(0.1361)	(0.1363)	(0.1352)
Company age	-0.1729	-0.1647	-0.2059
	(0.2990)	(0.2942)	(0.3083)
Capex	2.3249	2.3160	2.4900
	(1.4852)	(1.4854)	(1.4715)
Leverage	1.6539*	1.6582*	1.7047*
	(0.8179)	(0.8164)	(0.8095)
Constant	3.4210	3.1849	3.3691
	(2.0048)	(1.9676)	(2.0701)
Year dummy	Yes	Yes	Yes
R^2	0.16	0.16	0.16
Number of observations	6959	6959	6959

Table 3.5 (cont)

Panel C: Fixed effects model with Driscoll-Kraay standard errors			
	Model 1	**Model 2**	**Model 3**
CEO Pay Slice (CPS)	-0.6244*		
	(0.3204)		
CPS adjusted		-0.6703*	
		(0.3211)	
CPS, 3 directors			-0.5939**
			(0.2634)
Board busyness	-0.5411	-0.5411	-0.5615
	(0.4922)	(0.4932)	(0.5055)
Board composition	-0.0929	-0.1071	-0.0163
	(0.3481)	(0.3414)	(0.3044)
Board size	-1.7414***	-1.7458***	-1.6928***
	(0.2964)	(0.2952)	(0.2853)
Duality	-0.1250	-0.1261	-0.1303
	(0.1808)	(0.1808)	(0.1768)
CEO tenure	-0.0058	-0.0059	-0.0045
	(0.0049)	(0.0049)	(0.0047)
CEO outsider	0.1042	0.1036	0.0923
	(0.0800)	(0.0800)	(0.0776)
Size	1.0508***	1.0497***	1.0606***
	(0.1421)	(0.1422)	(0.1410)
Company age	-0.1341	-0.1427	-0.1355
	(0.0244)	(0.0263)	(0.0244)
Capex	2.2312***	2.2229***	2.3976***
	(0.7026)	(0.6984)	(0.7371)
Leverage	1.5692***	1.5725***	1.6175***
	(0.3487)	(0.3478)	(0.3349)
Constant	2.8560	2.7248	2.6701
	(0.8542)	(0.7756)	(0.7773)
Year dummy	No	No	No
R^2	0.15	0.15	0.15
Number of observations	6959	6959	6959

CHAPTER 4

Corporate governance and stock price crash risk: Evidence from UK panel data

4.1. Introduction

The finance literature has long examined corporate governance characteristics. Within the rapidly developing research on corporate governance, a significant proportion of the relevant theoretical and empirical literature has concentrated on studying the relationship between governance characteristics and stock price crash risk that is of key importance to many managers, investors, and academics. Changes in regulations, asset expropriation, disruptive product innovations, market crashes can all provoke stock price crashes. Increases in stock price crash risk can result in the decline of expected cash flows and NPVs. When cash flows fall below investors' expectations, managers tend to hide the bad news in order to protect their own wealth, human capital, and jobs (Amihud and Lev, 1981; Holmstrom, 1979; Benmelech et al., 2010; Gormley and Matsa, 2011). Once negative firm-specific information becomes generally realized, stock price drops dramatically (Jin and Myers, 2006), increasing stock price crash risk. A considerable body of literature suggests that corporate governance mechanisms can help to prevent suboptimal managerial behaviors and so significantly reduce the risk of the firm's stock price crashing. Still, evidence on the impact of corporate governance characteristics on stock price crash risk outside the US is limited.

In this study, we attempt to throw additional light on the links between corporate governance characteristics and stock price crashes in the UK. In particular, we investigate whether pay inequality between a company's CEO and the other top executives, as well as board 'busyness' affect stock price crash risk of British companies. We define pay inequality as the proportion of top executives' total compensation that goes to the CEO – which has

been labeled the CEO Pay Slice (CPS); and we measure corporate board busyness by the proportion of busy directors (directors with three or more directorships) represented at the board level. Our main hypothesis is that companies with high CPS and 'busy' boards (which are both characteristics of weak corporate governance) are more exposed to stock price crash risk, all else equal. Explanations of positive relationship between CPS, board busyness and stock price crash risk conform to one of the following theoretical frames. First, high CPS may be an indication of CEO centrality. Powerful CEO can influence decision making process within the board room according to his/her own managerial style and risk preferences. CEO managerial style (whether conservative or aggressive) has been shown to influence important corporate decisions (Malmendier et al., 2011). CPS, as a measure of CEO power connected directly to stock price crash risk emerging from the implementation of certain corporate policies. Second, high-powered compensation packages, combined with information asymmetry, in the situations where boards are busy, magnify agency problems, and can also incentivize CEO and top executives to take on decisions that may enhance short term performance and so increase exposure to the stock price crash risk. Third, due to information asymmetry, it is difficult for outsiders to differentiate between managerial actions that generate true positive returns from those that generate high returns in order to help managers to camouflage the real situation in their companies and protect their jobs, at least for some time. Therefore, carefully considered structures of CEO and top executives' compensation packages, coupled with low pay disparity between top executive team members and good quality monitoring from non-busy corporate board may be necessary to control stock price crash risk exposures.

The corporate scandals around "fat cats" compensation packages in Britain[50] are a reminder that this problem requires further attention. Executive pay has become a major issue

[50] See BBC News-Business: "High Pay of UK executives corrosive, report says", 22 November 2011, http://www.bbc.co.uk/news/business-15827683

in recent years in the UK, with shareholders questioning high salaries directors receive[51,52]. The British government has been very proactive in tackling compensation-related problems. Thus, in 2002, the UK became the first country to mandate an annual non-binding shareholder vote on directors' remuneration ("say on pay") to improve the "accountability, transparency, and performance linkage of executive pay" (Baird and Stowasser, 2002). In September 2013, the government went one step further and introduced mandatory 'say on pay'. Shortcomings in regulation of compensation-related issues have been also addressed by the UK Corporate Governance Code 2010 (The Code), with particular attention being paid to the importance of establishing a strong link between directors' remuneration and firm performance[53], as well as responsibilities of directors for risk oversight and management[54]. In our analysis we use a large sample of non-financial companies listed on the London Stock Exchange, comprising 692 firms over the 1997 to 2010 period. We control for important corporate governance characteristics, such as board composition, board size, CEO- Chairman duality, and CEO tenure; we also control for various firm-specific characteristics, which are company size, ratio of capital expenditures to total assets, and leverage. Our empirical methodology includes the use of panel data and a system GMM estimator. By using this estimator, we avoid problems associated with unobserved heterogeneity and potential

[51] See The Wall Street Journal – Business: "U.K. Unveils Plan on Executive Pay", 20 June, 2012, available at http://online.wsj.com/news/articles/SB10001424052702304765304577478172485959522

[52] "There is compelling evidence of a disconnect between pay and performance in large UK listed companies", UK Business Secretary Vince Cable told Parliament; David Cameron, the UK Prime Minister, also criticised boardroom cronies who helped each other "fill their boots" while the country was forced to tighten its belt. "We've got to deal with the merry-go-round where there are too many cases of remuneration committee members sitting on each other's boards, patting each other's backs and handing out each other's pay rises," he said. "We need to redefine the word 'fair'. We need to try to give people a sense that we have a vision at the end of this, of a fairer, better economy, a fairer, better society, where if you work hard and do the right thing you get rewarded" , 7 January, 2012, http://www.theguardian.com/business/2012/jan/07/david-cameron-fat-cat-pay

[53] Section D: Remuneration. Main Principle: "Levels of remuneration should be sufficient to attract, retain, and motivate directors of the quality required to run the company successfully, but a company should avoid paying more than is necessary for this purpose. A significant proportion of executive directors' remuneration should be structured so as to link rewards to corporate and individual performance." (The UK Corporate Governance Code, June 2010: p.22).

[54] Section C2: Risk Management and Internal Control. Main Principle: "The board is responsible for determining the nature and extent of the significant risks it is willing to take in achieving its strategic objectives. The board should maintain sound risk management and internal control systems."

endogeneity of regressors. The system GMM estimator is also considered as more efficient than other instrumental variable techniques in controlling for the possible endogeneity of explanatory variables (see Almeida et al., 2010).

Throughout our analysis, we find consistent support for the proposition that higher CPS and board busyness are associated with higher stock price crash risk. Our results strongly support the *expropriation* and *busyness* arguments[55]. Thus, a high CPS level could be due to an agency problem in firms with powerful and influential CEO[56], who is able to stockpile negative information from the market for financial (expropriation of rents through the compensation arrangements)[57] or non-financial reasons (e.g., empire building with a view to expropriating future rents)[58]. However, upon the realization of this (negative) information by the market, company's stock price crashes (Jin and Myers, 2006; Hutton et al., 2009). In addition, high CPS could demotivate other executive directors, destroy team cooperation within the boardroom, and lead to poor board and firm performance (the so-called *social comparison* effect, which is especially pronounced on the British boards[59]). In turn, busy boards are associated with weak corporate governance and also contribute to high agency problems.[60] Therefore, companies with busy corporate boards are likely to experience high stock price crash risk. Our results indicate that CPS and board busyness can provide a useful tool for research on stock price crash risk, which is an important issue to be considered in the UK context.

Our study is related to different streams of the literature. First, extent research shows

[55] See Section 4.2 of this chapter for detailed discussion of theories.
[56] High CPS as a form of rent extraction by a dominant CEO, might incentivize a CEO to prioritize short-term goals in order to secure his/her own private benefits and expropriate wealth from shareholders. CEO's short-termism combined with bad news hoarding, increases company's exposure to stock price crash risk.
[57] See Kothari et al., 2009.
[58] See Ball, 2001.
[59] See Zalewska (2014a,b) for detailed discussion of UK board mechanisms and structures.
[60] See Gilson (1990); Lipton and Lorsch (1992); National Association of Corporate Directors (NACD) (1996); Beasly (1996); Cotter et al. (1997); Core et al. (1999); Brown and Maloney (1999); Shivdasni and Yermack (1999); Miwa and Ramseyer (2000); Bohren and Strom (2010); Ferris et al. (2003); Fich and Shivdasani (2006); and Cooper and Uzun (2012).

that proportion of compensation received by CEOs has been trending up over time (Bebchuk and Grinstein, 2005; Frydman, 2005, Frydman and Saks, 2010 among others). We add to this literature stream by investigating the relationship between CPS and stock price crash risk in the UK. Second, we contribute by analyzing the association between different corporate governance characteristics and stock price crash risk. Thus, scholars discuss the impact of large shareholders and institutional investors (An and Zhang, 2013), the opacity of financial reports (Hutton et al., 2009), and CEO incentives and power (Kim et al., 2011a). We contribute to this literature by considering other aspects of governance arrangement, the CPS and board busyness, and their impact on stock price crash risk. Finally, our work enhances the literature that analyzes different CEO qualities and characteristics and their effect on firm outcomes. We highlight CPS and board busyness as important features which can provide additional insight into understanding the link between corporate governance characteristics and stock price crash risk. This is the first study that we are aware of, highlighting the above mentioned aspects using the UK-based sample.

The reminder of this chapter is organized as follows. We provide theoretical background and develop the hypothesis in Section 4.2. Section 4.3 contains the sample description and summary statistics. Section 4.4 outlines the methodology used for the analysis. Section 4.5 examines the relationship between CPS, board busyness and stock price crash risk. Section 4.6 provides results of additional tests. Section 4.7 concludes.

4.2. Related literature and hypothesis development

4.2.1. Corporate governance and stock price crashes: The existing evidence

An extensive body of literature suggests that corporate governance mechanisms can help to prevent sub-optimal managerial behavior (Shleifer and Vishny, 1989; Healy et al., 1999). Good corporate governance practices discipline investments (Masulis et al., 2007),

prevent earnings management (Xie et al., 2003), improve the information disclosure process (Armstrong et al., 2012; Karamanou and Vafeas, 2005), and align the interests of managers and shareholders (Benmelech et al., 2010 among others). Ironically, the structure of executives' compensation - which is supposed to align interests of managers and shareholders - may also trigger agency problems. Accordingly, Healy (1985), Beneish (1999), Ke (2005), Burns and Kedia (2006), Johnson et al. (2009), Kedia and Philippon (2010) argue that stock-based compensation leads to accounting fraud, misreporting, and earnings mismanagement, followed by the stock price overvaluation and collapse.

Benmelech et al. (2010) demonstrate that stock-based CEO compensation can cause stock price crashes. They identify conditions under which stock-based compensation leads to suboptimal investment, misreporting, and a subsequent sharp decline in equity prices. Benmelech et al. (2010) argue that CEOs of medium – to high-growth firms initially have to invest intensively in order to make a better use of growth opportunities. When growth rates slow down, CEOs can camouflage growth decline by making suboptimal investment decisions, resulting in subsequent stock price collapse. Kim et al. (2011b) provide empirical evidence supporting results of Benmelech et al. (2010).

An and Zhang (2013) explore the relationship between institutional investors' ownership and stock price crash risk, and conclude that strong monitoring by dedicated institutional investors attenuates managers' bad-news hoarding, and so prevents rapid stock price drop. Andreou et al. (2013) consider several corporate governance characteristics and their effects on firm-specific future stock price crashes. They find that future stock price crashes are positively related to institutional ownership, percentage of directors who hold company's shares, and opacity of financial reports. Conversely, the percentage of independent directors on the audit committee and auditor's industry experience are negatively related to stock price crashes.

Gormley et al. (2013) consider unanticipated changes in firm's business environments, which lead to increased stock price crash risks. Gormley et al. (2013) examine managers' reaction to increases in business risks as a function of their pre-existing equity-based incentives. They find that the structure of managerial compensation has an important effect on managerial motivation to induce firm's level of risk and firm's response to stock price crash risks[61]. These findings are consistent with those in Gormley and Matsa (2011), who argue that agency conflicts can be mitigated by reducing managers' exposure to firm risk[62].

CEO's management style can also influence firm risk. Managerial style affects corporate risk management throughout the impact that personal CEO characteristics have on vital corporate decisions and policies. Bertrand and Schoar (2003) find that all investment, financing, and other organizational policies depend on specific managerial attributes. They argue that older managers are more conservative, while managers who hold an MBA degree are more aggressive. Malmendier et al. (2011) find that CEO's previous experience and his/her personal expertise gained over the prior crises (the "Depression baby" effect), influence companies' financing and investment policies. Malmendier et al. (2011) also state that overconfident CEOs believe that all their decisions are value maximizing, and boards have to use various tools in order to constrain such CEOs. They argue that executives' compensation packages need to account for the particular managerial style (conservative or aggressive) arising from managers' past experience to make financial incentives effective.

Ellul and Yerramilli (2013) investigate the importance of risk control for bank holding companies (BHC). They hypothesize that company's risk culture[63] determines both the risk

[61] Gormley et al. (2013) recommend that, in designing executives' compensation packages, boards should consider the potential changes in companies' risk environment and how executives will respond given their compensation levels.

[62] Gormley and Matsa (2011) advise that executives' exposure to firm risk can be reduced if the stock-based component in their compensation packages is reduced.

[63] Kimbrough and Componation (2009) argue that company's organisational culture plays an important role in areas such as implementation of new initiatives, its reaction to changes in the market and its ability to navigate major changes in its business environment.

appetite and the strength of the risk management system. Ellul and Yerramilli (2013) differentiate between risk cultures that follow "business model channel" or "hedging channel"[64]. Conservative (aggressive) companies with "business model channel" culture take lower (higher) risk and have stronger (weaker) risk management in place; in contrast, under the "hedging channel" culture, aggressive (conservative) companies undertake high (low) risk coupled with a strong (weak) risk management. By evaluating companies' response to unexpected losses during the 1998 Russian crisis, they find evidence supporting the business model channel culture, i.e., companies with high tail risk had a weaker risk management system in place. This result is consistent with findings in Fahlenbrach et al. (2012), who argue that financial institutions which performed worst during the 1998 crisis also demonstrated the worst performance during the 2007- 2008 crisis.

4.2.2. CPS and stock price crash risk.

Weak corporate governance can result in CEO-dominated firms (Jiraporn et al., 2006). The importance of a "dominant player" in corporate decision making cannot be underestimated (Bebchuk et al., 2011). However, there is a risk that influential CEO can hide problems from the board (Jiraporn et al., 2006; Walkling, 2010). If the board does not have all necessary information, the board becomes less effective and problems are likely to remain hidden until "revealed by a disaster" (Walkling, 2010: p.17). There is also an exposure to expropriation risk, which results from rent extractions by dominant CEOs (Walkling, 2010). Rent extraction by company insiders, including CEOs affects corporate investment, cost of funds, company growth, and stock returns (see Becht et al., 2003).

To identify CEO dominancy, Bebchuk et al. (2011) use 'CEO pay slice (CPS)' - the proportion of the aggregate salary of top five executive directors that goes to the CEO. High

[64] The latter so called because it is consistent with the main predictions of hedging theories in Smith and Stulz (1985);and in Froot et al. (1993) (see Ellul and Yerramilli, 2013).

CPS level signals agency problems in companies with dominant CEO and weak corporate governance. A powerful and authoritative CEO is able to influence the structure of his/her own compensation contract in a way that allows him/her to expropriate rents at the expense of shareholders (Bebchuk and Fried, 2004; Jiraporn et al., 2006). Studies by Yermack (1995) and Bertrand and Mullainathan (2001) determine that some features of compensation packages reflect rent-seeking by executives. Jiraporn et al. (2006) - investigate the relationship between CEO compensation and corporate governance[65], and also find evidence supporting the rent expropriation argument.

We follow Bebchuk et al. (2011) and interpret a high CPS as a sign of a CEO centrality. A dominant CEO could influence decision making processes within a board room according to his/her own managerial style and risk preferences. CEO managerial style (conservative or aggressive) influences important corporate decisions (Malmendier et al. 2011) and firm performance (Bertrand and Schoar, 2003). Hence, CPS might be connected directly to the stock price crash risk, which emerges as a result of implementation of certain corporate policies. High CPS magnifies agency problems, and might incentivize a CEO to take on decisions (e.g., financing, investment and dividend decision) that enable him/her to extract rents and so expropriate shareholders' wealth. Thus, for example, a dominant CEO could prioritize short-term price maximization to secure his/her own private benefits, and hide true information from the board of directors, so increasing company's exposure to stock price crash risk. These arguments lead us to the following (expropriation) hypothesis:

Hypothesis 1: CPS is positively associated with stock price crash risk.

4.2.3. Busy boards and stock price crash risk

The agency theory literature suggests that directors who overstretch themselves and accept additional seats on more boards due to the associated extra personal perquisites, tend

[65] Jiraporn et al. (2006) use shareholder rights as a measure of the corporate governance standard.

to spend less time on each individual board, so compromising their responsibilities and neglecting their duties (Ferris et al., 2003)[66]. Holding multiple directorships might negatively affect monitoring and advisory capacity of the board. Shivdasani and Yermack (1999) and Core et al. (1999) argue that directors with multiple seats "cater for CEOs", and that multiple board appointments correlate with excess CEO compensation, implying that such directors serve an inadequate check on management. Busy directors have a higher propensity to be absent from board meetings neglecting their duties by not taking part in the strategic decisions-making processes (Jiraporn et al., 2008). Beasley (1996) provides evidence that the number of board seats held by supervisory directors exhibits positive correlation with accounting fraud, and points to the lack of attention from these directors. Busy directors tend to take care of their own reputation and to leave underperforming companies, suggesting that the presence of overstretched directors may be endogenous to firm performance (Brown and Maloney, 1999; Fich and Shivdasani, 2006).

Despite the fact that busy directors are proficient and knowledgeable in their field, they are not able to use these skills to their full advantage, because their multiple responsibilities can create high levels of distraction. Cooper and Uzun (2012) find that directors who are less distracted in terms of other directorships and high-level corporate responsibilities tend to monitor banks better. Banks with less busy directors are less risky than banks with busy directors. Christy et al. (2013) also examine the links between corporate governance and equity risk, focusing on the board of directors, and find a negative relationship between the market risk of equity and multiple directorships held by independent board members.

[66] See also Gilson (1990); Lipton and Lorsch (1992); National Association of Corporate Directors (NACD) (1996); Beasly (1996); Cotter, Shivdasani and Zenner (1997); Core et al.(1999); Brown and Maloney (1999); Shivdasni and Yermack (1999); Miwa and Ramseyer (2000); Bohren and Strom (2010); Ferris et al. (2003); Fich and Shivdasani (2006); Cooper and Uzun (2012) who challenge the wisdom of holding too many directorships by examining busy boards' effectiveness.

Information asymmetry[67] might be especially pronounced in the presence of busy boards, due to the inability of busy directors to provide thorough monitoring and to identify problems in a timely manner. Busy boards with overcommitted directors could result in severe agency problems, due to poor monitoring. This might result in CEO's and top executives' short-termism and might increase company's exposure to stock price crash risk. A CEO with a busy board might be incentivized to camouflage real situation in the company in order to protect himself/herself from job loss and to secure private benefits, at least for a time. However, upon the release of negative firm-specific information, the company faces a shock, which leads to the increase in its stock price crash risk. Considering the above arguments and results from previous research, we hypothesize that in the presence of busy boards, firms are more exposed to the stock price crash risk and propose the following (busyness) hypothesis:

Hypothesis 2: Busy boards are positively associated with stock price crash risk.

4.2.4. The effect of industry competition and financial crisis on the relationship between CPS, board busyness and stock price crash risk

Giroud and Mueller (2010) argue that effect of corporate governance on agency problem depends on industry competition. When competition is high, 'bad' managers are penalized by the market and the importance of the monitoring element of corporate governance is reduced.

Johnson et al. (2000), and Lemmon and Lins (2003) among others, advise that stock prices of companies with weak corporate governance drop more when the economy contracts because the extraction of private benefits by executives may be greater during recessions, when the expected rate of return on investment falls. Companies with higher CPS and busier

[67] By hiding bad information from shareholders and prospective investors, CEO magnifies information asymmetry.

boards might be exposed to higher stock price crash risk during periods of market instability.

Considering the above arguments, we hypothesize that effect of CPS and board busyness on stock price crash risk might be stronger in the industries with low competition and especially pronounced when markets are turbulent.

Hypothesis 3a: The impact of CPS and board busyness on stock price crash risk is stronger in industries with lower level of competition.

Hypothesis 3b: The effect of CPS and board busyness on stock price crash risk is more pronounced during the recession periods.

4.3. Sample selection and data description

4.3.1. The Sample

We use a large sample of non-financial companies listed on the London Stock Exchange. We collect firms' financial and market information from the Thompson Datastream, whereas corporate governance and directors' compensation information is from the BoardEx database. The sample period is from 1997 to 2010 and includes all firms whose information is available from these two sources.

The BoardEx database consists of directors' information, including name, role title and description, indication of whether director is executive or supervisory director, the number of years each director served on the board and in his/her current role, director's total, cash/direct and equity compensation, and the number of quoted companies' boards on which each director currently sits. From this database, we obtain data for non-financial firms for which there is information available for at least two executive board members and a company has a CEO.

We collect accounting and stock market data necessary to calculate risk measures and to control for firm characteristics from the Thompson Datastream, including weekly prices,[68]

[68] We use weekly prices for the computation of our risk proxies.

book value of assets, market value of equity, and value of total debt at the end of each year. We merge data from BoardEx and Datastream, and select companies with at least five consecutive years of data[69]. After all, we have an unbalanced panel of 692 firms over the 1997 – 2010 time period.

4.3.2. Variable definition

We use three proxies for stock price crash risk in our study: *Tail Risk, Negative Conditional Skewness*, and *Extreme Sigma.* We follow Andreou et al. (2013), and Ellul and Yerramilli (2013) in our definitions of crash risk proxies. Our first measure is *Tail Risk*. In a given year *Tail Risk* is defined as the negative of the average return on the company's stock over the 5% of its worst return weeks (Ellul and Yerramilli, 2013).

Our second measure is the *Extreme Sigma.* It is defined as a negative of the worst deviation of firm-specific weekly returns from the average firm-specific weekly returns divided by the standard deviation of firm-specific weekly returns (see Andreou et al., 2013). Stock price crash is a stochastic process. To evaluate the jumpiness of any stochastic process, it is necessary to evaluate movements relevant to the standard deviation of that particular process. Thus, crash episodes for each firm are defined relative to the return volatility of that particular firm (Hutton et al., 2009). For a given firm *i* in a year *t*, the extreme sigma is computed as:

$$EXTR\_SIGMA_{i,T} = -Min\left[\frac{W_{i,t}-\overline{W}_{i,T}}{\sigma_{Wi,T}}\right] \qquad (7)$$

Where $W_{i,t}$is the firm-specific weekly return; $\overline{W}_{i,t}$ is the average firm-specific weekly return in the fiscal year, and $\sigma_{Wi,T}$ is the standard deviation of firm-specific weekly returns. The firm-specific weekly return for firm *i* in the week *t* defined as $W_{i,t=}$ ln(1+$\varepsilon_{i,t}$), where $\varepsilon_{i,t}$ represents the residuals from the expanded index model regression (8):

[69] We use system GMM estimator for our analysis, which requires having at least five consecutive years of data.

$$r_{i,t} = \alpha_i + \beta_{1,i} r_{m,t-2} + \beta_{2,i} r_{m,t-1} + \beta_{3,i} r_{m,t} + \beta_{4,i} r_{m,t+1} + \beta_{5,i} r_{m,t+2} + \varepsilon_{i,t} \qquad (8)$$

Where $r_{i,}t$ is the return on stock *i* in the week *t*, and $r_{m,t}$ is the return on the FTSE All-share index in the week *t*. We follow Andreou et al. (2013) and include lead and lag variables for the market index in a regression which separates market-wide return movements from firm returns, so that residuals capture weekly firm-specific returns.

The third measure is the *Negative conditional skewness (NCSKEW).* Following Kim (2011a, 2011b), An and Zhang (2013) and Andreou (2013) we calculate *NCSKEW* by taking the negative of the third central moment of firm-specific deviations of weekly returns from the company's annual mean return, scaled by the sample variance of firm-specific weekly return raised to the power of 3/2. Specifically, we compute *NCSKEW* for the firm *i* in fiscal year *t* as:

$$NCSKEW_{I,T} = -\frac{\left[n(n-1)^{\frac{3}{2}} \sum_{T=1}^{n} \left(W_{i,t} - \bar{W}_{i,T}\right)^3\right]}{\left[(n-1)(n-2)\left(\sum_{T=1}^{n} \left(W_{i,t} - \bar{W}_{i,T}\right)^2\right)^{\frac{3}{2}}\right]} \qquad \textbf{(9)}$$

where $W_{i,t}$ is the firm-specific weekly return, $\bar{W}_{i,T}$ is the average firm-specific weekly return in the fiscal year, and *n* is the number of observations in the year *t*.

Scaling the raw third moment by cubed standard deviation is a standard normalization employed for skewness in statistics that allows for a comparison across returns with different variances. We follow the literature by putting a minus sign in front of the skewness so that an increase in *NCSKEW* corresponds to more crash risk, i.e., a more negatively-skewed stock return distribution.

Our definition of CPS is marginally different from that in Bebchuk et al. (2011). We compute CPS as a fraction of the total compensation of a group of top executives (minimum two and maximum five), that is received by the CEO[70]. We follow Ferris et al. (2003) in our

[70]British corporate boards are, on average smaller than American boards. Only 16% of our sample companies have five or more executive directors at the board level.

definition of busy boards, and consider directors busy if they have seats on boards of three or more listed companies. We control for other influences on crash risk, found to be important in the previous studies (see Andreou et al., 2013; Ellul and Yerramilli, 2013 among others), and include firm size, capital expenditures, and leverage in our models. We also collect information about each firm's governance structure, such as board size, board composition, CEO tenure, CEO duality, whether the CEO is insider or outsider (i.e. was/was not a firm employee before being appointed to the CEO position). Variable definitions are provided in Table 4.1. Tables 1 and 2 in the Appendix give sample calculation examples for Board Busyness and CPS respectively.

4.3.3. Summary statistics

Summary statistics are reported in Table 4.2[71]. We separate our data into variables describing crash risk (Panel A); compensation, director characteristics and board structure (Panel B); and firm characteristics (Panel C). The mean value of *Tail Risk i*s 0.14, and of *Negative Conditional Skewness*, and *Extreme Sigma* are 0.12 and 2.88 respectively, which are in line with those reported in Andreou et al. (2013), Kim et al. (2011a) and Bradshaw et al. (2010). The average CEO pay slice (CPS) based on the total compensation of up to top five executives(including CEO) is 44.98% (minimum 0%, maximum 100%). The average board busyness is 17.11%, i.e. 17.11% of directors held seats on least two other boards at the same time. There are some companies that do not have busy directors at all and some with 66.67% busy directors at the board level. The average board in our sample has 7 directors. The average proportion of executive directors at the board level (*Board Composition*) was 47.89% with a minimum of 20% and a maximum 80% of executives represented at the board. The average CEO tenure is 5.16 years in our sample companies, with minimum 0 and maximum 24.70 years. 53.82% of the companies in our sample have CEOs, who had not previously

[71] All variables are winzorized to the 1st /99th percentiles.

been company employees (*Outside CEO*). 9% of our sample companies have CEOs who chair the board at the same time.

Firm size is, on average 4.65. Leverage level in the average company is 17.72%, with maximum leverage equals to 95%, and minimum leverage equals to 0%. The maximum (minimum) ratio of capital expenditures to total assets is 0.34 (0), with the average being equal to 0.05.

4.4. Research design

We use a dynamic generalized method of moments (GMM)[72] estimator in our analysis. The GMM estimator has the following advantages: (1) it allows to include firm fixed effects to account for the firm's unobserved heterogeneity; (2) it considers the impact of previous stock price crashes on the current state of corporate governance in a firm; (3) it accounts for simultaneity by using a combination of variables from a firm's history as valid instruments (Wintoki et al., 2012).

We estimate the effect of governance characteristics on risk, conditional on firm heterogeneity, by using the following empirical model[73]:

$$y_{it} = \alpha + \sum_s k_s y_{it-s} + \beta X_{it} + \gamma Z_{it} + \eta_i + \epsilon_i \qquad \text{s=1,…, p,} \qquad (1)$$

Where vectors ***X***, ***Z***, and ***y*** are corporate governance, firm and risk characteristics, respectively; β captures the effect of governance on firm's risk; η is an unobserved firm effect, and ϵ_i is a random error term.

The estimation procedure involves two important steps. First, we take the first differences of (1):

$$\Delta y_{it} = \alpha + k_p \sum_p \Delta y_{it-p} + \beta \Delta X_{it} + \gamma \Delta Z_{it} + \Delta \epsilon_{it}, \;\; p > 0 \qquad (2)$$

[72] The dynamic panel GMM estimator, which was developed in Holtz-Eakin et al. (1988); Arellano and Bond (1991); Arellano and Bover (1995); and Blundell and Bond (1998), improves on ordinary least squares estimates (OLS) and fixed effects estimates.

[73] We follow Ellul and Yerramilli (2013) and Wintoki et al. (2012) in this approach.

and eliminate all unobserved time invariant heterogeneity. We use GMM to estimate (2), and use lagged values of stock price crash risk, corporate governance and firm-specific variables as instruments for these variables. There are two important criteria defining the validity of these instruments: first, they must provide a source of variation for current governance, i.e.,

$X_t = f(y_{t-k}, X_{t-k}, Z_{t-k})$, where *k>p, and X, Z,* and *y* are corporate governance, firm, and risk characteristics, respectively. Second, lagged values must be exogenous in order to be valid instruments. For the exogeniety assumptions to be valid, we need the following orthogonality conditions to hold:

$$E(X_{it-s}\epsilon_{it}) = E(Z_{it-s}\epsilon_{it}) = E(y_{it-s}\epsilon_{it}) = 0, \forall s > p \quad (3)$$

We can then estimate (2) using GMM and considering orthogonality conditions (3). However, there are econometric shortcomings associated with this procedure. First, "if [the] original model is conceptually in levels" (Wintoki, 2012: p.588), differencing will reduce the variation in the explanatory variables and consequently, the power of the tests (Beck et al.. 2000). Second, variables in levels may be weak instruments for first-differenced equations (Arrelano and Bover, 1995). Third, first differencing may worsen the impact of measurement errors on the dependent variables (Griliches and Hausman, 1986).

Arrelano and Bover (1995) and Blundell and Bond (1998) argue that it is possible to mitigate these shortcomings and improve the GMM estimator by including the equations in levels in the estimation procedure. It is then possible to use first-differenced variables as instruments for the equations in levels in a "stacked" system of equations that includes equations in both levels and differences, resulting in a *system* GMM estimator that involves estimating the following system:

$$\begin{bmatrix} y_{it} \\ \Delta y_{it} \end{bmatrix} = \alpha + k \begin{bmatrix} y_{it-p} \\ \Delta y_{it-p} \end{bmatrix} + \beta \begin{bmatrix} X_{it} \\ \Delta X_{it} \end{bmatrix} + \gamma \begin{bmatrix} Z_{it} \\ \Delta Z_{it} \end{bmatrix} + \epsilon_{it} \quad (4)$$

To deal with unobserved heterogeneity in level equation, we make a reasonable

assumption that correlation between governance/firm characteristics and unobserved effects (such as, for example managerial ability, managerial productivity, etc.) will be constant over time. This assumption requires additional orthogonality conditions:

$$E[\Delta X_{it-s}(\eta_i + \epsilon_{it})] = E[\Delta Z_{it-s}(\eta_i + \epsilon_{it})] = E[\Delta y_{it-s}(\eta_i + \epsilon_{it})] = 0, \forall s > p \quad (5)$$

We carry out GMM panel estimation considering the orthogonality conditions of (3) and (5), and assume no serial correlation in the error term, ϵ. The orthogonality conditions imply that we can use lagged levels as instruments for the differenced equations and lagged differences as instruments for the level equations, respectively.

To verify a key exogeniety assumption that the firm's historical risk and characteristics are exogenous with respect to current shocks or innovations in risk, we also test for the second-order serial correlation[74] and over-identification[75], as suggested by Arellano and Bond (1991).

As a potential concern with our analysis could be that the relationship between corporate governance and stock price crash risk is dynamically endogenous, i.e. that company's past stock price crash risk determines both current corporate governance arrangements and current risk (see Wintoki et al.(2012) and Ellul and Erramilli (2013)). We follow Ellul and Erramilli (2013), and address this concern by analyzing a relationship between corporate governance and stock price crash risk using a dynamic panel GMM estimator in the following form:

[74] For the GMM estimates, if the assumptions of the specification are valid, by construction the residuals in first differences (AR(1)) should be correlated, but there should be no serial correlation in second differences (AR(2)).
[75] Multiple lags are used as instruments in the dynamic panel GMM model. Hence, the system is over-identified and test of over-identification has to be carried out. The Hansen test provides a J-statistic, which is distributed as $\chi 2$ under the null hypothesis of the validity of instruments.

$$Crash\ Risk_{it} = \beta_0 + \beta_1 Crash\ Risk_{i,t-1} + \beta_2 CPS_{it} + \beta_3 Board\_Busyness_{it}$$
$$+ \beta_4 BoardSize_{it} + \beta_5 Board\ Composition_{it} + \beta_6 Duality_{it}$$
$$+ \beta_7 CEO\ Tenure_{it} + \beta_8 CEO\ Outsider_{it} + \beta_9 Company\ Size_{it}$$
$$+ \beta_{10} Leverage_{it} + \beta_{11} CapEx_{it} + \sum_{j=2}^{14} \beta_j YearDummy_t + \varepsilon_{it} \quad (\mathbf{6})$$

Where *Crash Risk* is one of our three proxies for the stock price crash risk defined as *Tail Risk, Negative Conditional Skewness,* and *Extreme Sigma*. All variable definitions are provided in Table 4.1.

4.5. Results

In this section we discuss our empirical results concerning the association between corporate governance characteristics such as CPS and board busyness and *Crash Risk,* measured by three different proxies, i.e., *Tail Risk, Negative Conditional Skewness,* and *Extreme Sigma*. Our models include the standard controls used in the literature. Thus, we control for firm size (log of firm's market value), firm capital expenditures and leverage; we also control for the board size, board composition, CEO-Chairman duality, CEO tenure, whether the CEO is insider (i.e., was a company employee before being appointed CEO) or outsider, and year dummy. We run few tests to check for the potential misspecification of our estimation model. First, we use the Hansen J statistics of overidentification restrictions to check for the validity of our chosen instruments and, second, we use m_2 statistics, developed by Arellano and Bond (1991) to test for the lack of second-order serial correlation in the first-differenced residuals, and find no such problem in our model.

The results are displayed in Table 4.3, and provide consistent evidence that corporate governance mechanisms are significant and affect stock price crashes. Specifically, we find that coefficients on CPS are positive and statistically significant (at the 1% level) in all our

models, indicating that stock price crash risk is higher when CPS is high. High CPS is a form of rent extraction by a dominant CEO, who serves his own interests instead of interests of shareholders. High CPS might incentivize a CEO to prioritize short-term goals in order to secure his/her own private benefits and expropriate wealth from shareholders. In addition, an influential CEO can hide problems from the board for some time until bad news is "revealed by disaster" (Walkling, 2010: p.17). CEO's short-termism combined with bad news hoarding, increases company's exposure to stock price crash risk. These results support the *Expropriation Hypothesis* (H1), and are in line with results from existing theoretical and empirical literature (see Jiraporn et al., 2006; Ellul and Yerramilli, 2010; and Andreou et al., 2013 among others). There is also strong evidence that board busyness is positively related to stock price crashes. Multiple responsibilities of busy directors create a high level of distraction. Information asymmetry is especially pronounced in the presence of busy boards due to inability of busy directors to perform comprehensive monitoring and to identify problems. In the presence of busy boards, powerful CEO can hide bad news from shareholders due to the lack of monitoring from busy directors. As a result, a company's exposure to stock price crash risk increases. The coefficients on board busyness are positive and statistically significant (at the 1% level) supporting the *Busyness Hypothesis* (H2), and consistent with the view that companies with busy directors are more at risk of their stock price crashing (Cooper and Uzun, 2012; Christy et al., 2013).

Moving to control variables included in the regressions, we find some interesting results. *Board Composition*, our measure of board independence, has negative and statistically significant (at the 1% and 5% levels) coefficients. These results support the view that higher level of board independence is beneficial to the company, i.e., companies with such boards face lower *Stock price crash risk*. *Board size* has positive and statistically significant (at the 1% level) coefficients, supporting the view that small boards are more

efficient and perform better than their larger counterparts when it comes to managing company risks. *CEO tenure* is positive and statistically significant (at 1% and 5% levels) in all models, indicating that CEOs with longer tenure may be entrenched, and more likely to use their power to camouflage bad news, enhancing companies' *Stock price crash risk.* We find a negative relationship between the CEO - Chairman *Duality* and our proxies for the stock price crash risk. CEO-Chairman duality results in a higher level of power concentration in hands of one person, who can influence a board of directors. The reason for the negative relation between duality and stock price crash risk could be that such duality will result in better CEO knowledge and expertise, and might affect his/her level of risk aversion. More powerful CEOs may be more likely to protect the company and themselves from future possible financial inconveniences and make relatively safe investments, associated with lower risk levels. Our results reveal a negative relation between *Outside CEOs* and firms' crash risk. To protect their own reputational capital, outside CEOs may avoid opportunistic behavior and bad news hoarding, so minimizing stock price crash risk.

We also find firm *Size* (measured as natural logarithm of market value of equity) is negatively related to stock price crash risk with all coefficients being statistically significant at the 1% level. The reason for this negative relation might be that larger firms are more stable and less exposed to such a risk. Our analysis also reveals that leverage and capital expenditures positively affect crash risk. These results are in line with our expectations and are in agreement with findings from previous literature (see Kim et al., 2011a, An and Zhang, 2013).

4.6. Further tests

4.6.1. Effect of industry competition on the stock price crashes

In accordance with agency theory, effective corporate governance helps to alleviate managerial opportunism by reducing the information asymmetry that exists between

managers and shareholders (Jensen and Meckling, 1976). Effect of corporate governance on agency problem depends on industry competition (Giroud and Mueller, 2010). When competition is high, 'bad' managers are penalized by the market and the importance of the monitoring element of corporate governance is reduced. We follow Andreou et al. (2013) and measure industry competition by the Herfindahl-Hirschman Index (HHI). The HHI is calculated as the sum of squared market shares as follow:

$$HHI_{j,t} = \sum_{i=1}^{N_J} S_{i,j,t}^2$$

Where $S_{i,j,t}$ is the market share of firm *i* in industry *j* in year *t*. Market share is calculated using firm sales. We estimate industry competition for each of the 15 FTAG3 industry classifications. High values of HHI values indicate weaker industry competition.

We split our sample in two groups, high and low competition, based on the value of HHI at year t-1 (HHI value lower than the median identifies the high competition group, and HHI value higher than the median identifies the low competition group). We re-estimate our baseline models from Table 4.3 for the two subsamples separately to identify the impact of corporate governance on stock price crashes in the different regimes. The results are shown in Table 4.4. The results are consistent with the results from the baseline models from Table 4.3. However, we find that the influence of corporate governance on stock price crashes is stronger in industries with low competition. These findings are in line with findings of Giroid and Mueller (2010), who stress on the importance of effective corporate governance for companies in industries where competition is low.

4.6.2. The effect of corporate governance characteristics during the 2007/2008 financial crisis

Johnson et al. (2000) and Lemmon and Lins (2003) among others, argue that stock

prices of companies with weak corporate governance drop more when economy contracts. This is due to the extraction of private benefits by executives, which may be greater during recessions, when the expected rate of return on investment falls. We investigate the effect of corporate governance on stock price crashes during the recent financial crisis. We follow An and Zhang (2013) and Ellul and Yerramilli (2013) and identify years 2007 and 2008 as the crisis years. We use a dummy variable for the crisis years, and include it in our baseline model from Table 4.3. We also check whether CPS and board busyness have more pronounced effects on the stock price crashes during these years by including the interaction variables, *CPS* x *Crisis* and *Board_Busyness* x *Crisis.* The results are represented in Table 4.5.

When *Tail Risk* is used as a proxy for the stock price crash, the *Crisis* variable is positive and statistically significant (at the 1% level), indicating the increased stock price crash risk of firms during the financial crisis. Other variables of interest are the interaction variables *CPS* x *Crisis* and *Board_Busyness* x *Crisis*. The impact of *CPS* during the crisis becomes negative and statistically significant when *Tail risk* is used as a measure of stock price crash risk. A plausible explanation is that high CPS motivates CEO to perform better during turbulent periods, i.e., if CEO with high CPS can manage to reduce stock price crash risk during the crisis years, he/she continues to enjoy career benefits in form of high CPS. However, *Board_Busyness* x *Crisis* is not significant at the conventional level, which suggests that the association between board busyness and stock price crash risk is not significantly different during the financial crisis. When *Negative Conditional skewness* is used as a proxy for stock price crash risk, the *Crisis* variable is also positive and statistically significant (at the 10% level) indicating that stock price crash during the financial crisis increases. The impact of *CPS* during the crisis becomes negative, but is not statistically significant, while *Board_Busyness* x *Crisis* is positive and significant (at the 1% level), suggesting that firms with busy boards were more exposed to stock price crash risk during the

crisis years. When *Extreme Sigm*a is used as a proxy for stock price crash risk, the impact of CPS during the crisis becomes negative but is not statistically significant. *Board_Busyness* x *Crisis* is also positive and significant (at the 5% level), which suggests that firms with busy boards face higher stock price crash risks during the crisis years.

Overall, the results from Table 4.5 provide some indication that the financial crisis affects stock price crash risk in a positive way. The reason for this might be that higher market volatility results in a higher stock price crash risk during the financial crisis years (An and Zhang, 2013). The results also suggest that during the crisis years, CPS could have a negative impact on stock price crash risk of firms. The plausible explanation for this may be that high CPS motivates CEO to work hard and perform better during the crisis years. Good performance during the turbulent periods improves CEO reputation and guarantees career benefits in form of high CPS. Board busyness affects stock price crash risk in a positive way. Considering that board busyness is a proxy for weak corporate governance, our results are in agreement with Johnson et al. (2000) and Lemmon and Lins (2003), who argue that stock prices of companies with weak corporate governance contract more during the turbulent periods.

4.7. Conclusions

We investigate how governance characteristics affect firms' risk of experiencing a stock price crash. In our analysis, we use governance variables that capture board busyness and so-called CEO centrality. We use CEO pay slice (CPS) as a proxy for the CEO centrality and estimate board busyness as a proportion of busy directors on a firm's board. We offer new insights by evaluating the role of CPS and Board Busyness on the stock price crash risk by analyzing *Expropriation* and *Busyness Hypotheses.*

High CPS magnifies agency problems and might incentivize a CEO to take on decisions that enable to extract rents and expropriate shareholder wealth. A dominant CEO

could prioritize short-term price maximization to secure his/her own private benefits and hide true information from the board of directors increasing company's exposure to stock price crash risks. In turn, busy boards with overcommitted directors could result in the severe agency problem; they (busy boards) might be unable to monitor management effectively. Weak corporate boards encourage CEO's opportunistic behaviors and short-termism and company's exposure to stock price crash risks increases.

Our analysis reveals a positive association between CPS, board busyness and stock price crash risk. Companies with high CPS and busy boards tend to be more exposed to stock price crash risks. The results of our study are robust when controlling for various firm, board and CEO characteristics, including board composition, board size, CEO/Chairman duality, CEO tenure and whether CEO was previously a company employee, as well as firm size, value of capital expenditures, and leverage; and to different regime specifications, including different levels of industry competition. Our findings are in line with findings in Andreou et al. (2013), An and Zhang (2013), and Ellul and Yerramilli (2013). However, this is the first study that we are aware of which investigates the governance – stock price crash risk relationship using the UK-based sample.

Motivated by the changes in remuneration practices introduced by the UK Corporate Governance Code (2010) and the "say on pay" law (2013), we find that CPS is an important aspect of firm governance and management that deserves attention of both researches and policy makers. The fact that CPS positively impacts on stock price crash risk has a strong implication for the on-going debate about how to reform executive remuneration so that it provides the right incentives. Our findings highlight the importance of considering remuneration issues at the board, rather than just at the CEO level, and support The UK Corporate Governance Code (2010) principles[76]. Even if a CEO compensation package is

[76] "The performance-related elements of executive remuneration… should be sensitive to pay and employment

perfectly structured and implemented, it does not guarantee that it will lead to improvements in the firm riskiness, as it may provoke resistance of other board members. As corporate governance reforms move towards increasing boards' responsibilities for risk and performance, it is important to consider board-wide remuneration issues without narrowing them to the CEO's compensation.

There is also a direct implication for the public debate on limitation of the number of directorships held by executives from our findings. While the National Association of Corporate Directors (1996) put forward a threshold of three directorships, and the Council of Institutional Investors (2002) argues that directors with full-time jobs should not participate in more than two other boards in order to guarantee that they can give adequate service, we argue that board effectiveness depends also on its overall level of busyness, i.e. on the proportion of busy directors at the board level.

conditions elsewhere in the group" (Supporting principle, Section D: Remuneration, The UK Corporate Governance Code, 2010: p. 22).

Table 4.1. Variable Definitions

All data variables in this table refer to the corresponding compensation and corporate governance variable identifiers in the BoardEx annual database and to the corresponding risk and firm characteristics variables identifiers in the Thomson Datastream database.

Variable	Definition
Crash Risk	
Tail Risk	The negative of the average return on the company's stock over the 5% worst return weeks for the company's stock
Extreme Sigma	The negative of the worst deviation of firm-specific weekly returns from the average firm-specific weekly returns divided by the standard deviation of firm-specific weekly returns $$EXTR\_SIGMA_{i,T} = -Min\left[\frac{W_{i,t} - \bar{W}_{i,T}}{\sigma_{Wi,T}}\right]$$
Negative conditional skewness	The negative conditional skewness. we calculate negative conditional skewness by taking the negative of the third central moment of firm-specific deviations of weekly returns from the company's annual mean return scaled by the sample variance of the same raised to the power of 3/2. $$NCSKEW_{l,T} = -\left[n(n-1)^{3/2}\sum_{T=1}^{n}(W_{i,t} - \bar{W}_{i,T})^3\right] / \left[(n-1)(n-2)\left(\sum_{T=1}^{n}(W_{i,t} - \bar{W}_{i,T})^2\right)^{3/2}\right]$$
Corporate Governance	
CEO pay slice (CPS)	The fraction of the total compensation to the group of minimum top-two and maximum top-five executives, including CEO that is received by the CEO.
Board busyness	The proportion of busy directors at the board level. Busy directors are defined as directors holding three or more directorships, including the "home" company, in the public companies at the same time.
Board composition	The proportion of executive directors on the board. Total number of supervisory directors divided by the total number of all directors on the board.
Board size	The natural logarithm of the total number of all directors on the board.
CEO tenure	The number of years directors have served on the board

Duality	Indicator variable: equals one if CEO and Chairman is the same person
CEO outsider	CEO Outsider is a dummy equal to one, if CEO was working at the firm for less than one year before becoming CEO.
Firm characteristics	
Size	Natural logarithm of market value: Ln (*MV)*
Leverage	Total debt/total assets *WC03255*/ *WC02999*
Capital expenditures	Capital expenditures/ total assets: *WC04601*/ *WC02999*

Table 4.2. Summary Statistics

This table presents summary statistics for the sample of 692 firms for 1997- 2010 time period, excluding financial firms. All companies for which data was available from Thomson Datastream and BoardEx databases are included in the analysis. Delisted and/or bankrupt companies have been excluded as soon as these companies have been delisted and/or declared bankruptcy. All variables are winzorized to the 1st /99th percentiles. All variable definitions are in the Table 4.1.

	Mean	Min	Max	Observation
Panel A: Crash Risk				
Tail risk	0.14	0.01	2.24	5312
Negative conditional skewness	0.12	-7.15	7.18	5312
Extreme sigma	2.88	0.37	6.97	5312
Panel B: Compensation/Director/ Board characteristics				
CPS	0.45	0.00	1.00	5038
Board busyness	0.17	0.00	0.67	5312
Board composition	0.48	0.20	0.80	5312
Board size	1.93	1.10	2.71	5312
CEO tenure	5.16	0.00	24.70	5312
Panel C: Firm characteristics				
Size	4.65	-1.90	11.97	5310
Capex/Total Assets	0.05	0.00	0.34	5302
Leverage	0.18	0.00	0.95	5311

Table 4.3. Corporate Governance Characteristics and Stock price crash risk

This table reports results from an analysis of crash risk measured by tail risk, negative conditional skewness and extreme sigma in our sample of 692 firms (4374 observations) for which corporate governance and financial data are available for at least five consecutive years between 1997 and 2010. All companies for which data was available from Thomson Datastream and BoardEx databases are included in the analysis. Delisted and/or bankrupt companies have been excluded as soon as these companies have been delisted and/or declared bankruptcy. All variable definitions are in Table 4.1. m_i is a serial correlation test of order *i* using residuals in first differences, asymptotically distributed as N(0,1) under the null hypothesis of no serial correlation. Hansen *J* is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null hypothesis of no correlation between the instruments and the error term. Standard errors are in parentheses beneath each coefficient estimate. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	Tail Risk	**Neg.Cond Skewness**	**Extreme Sigma**
Crash Risk$_{t-1}$	0.1515***	0.0760***	0.0547***
	(0.0064)	(0.0092)	(0.0096)
CEO Pay Slice (CPS)	0.0585***	0.3576***	0.3150***
	(0.0058)	(0.1001)	(0.0826)
Board busyness	0.0922***	0.5389***	0.6166***
	(0.0118)	(0.1563)	(0.1256)
Board composition	-0.0577***	-1.1851***	-0.3803**
	(0.0158)	(0.2453)	(0.1850)
Board size	0.1469***	1.6762***	1.1753***
	(0.0058)	(0.0991)	(0.0834)
Duality	-0.0019***	-0.0524***	-0.0332***
	(0.0006)	(0.0089)	(0.0078)
CEO tenure	-0.0017***	0.0107**	0.0156***
	(0.0003)	(0.0049)	(0.0038)
CEO outsider	-0.0019***	-0.0211***	-0.0215***
	(0.0004)	(0.0053)	(0.0042)
Size	-0.0618***	-0.4682***	1.0200***
	(0.0014)	(0.0184)	(0.0424)
Capex	0.0900***	1.5913***	1.1100***
	(0.0305)	(0.3893)	(0.2700)
Leverage	0.0565***	0.6342***	0.4718***
	(0.0113)	(0.1389)	(0.1101)
Constant	0.1986***	-0.2751	2.3460***
	(0.0187)	(0.2854)	(0.2225)
m1	0.000	0.000	0.000
m2	0.561	0.163	0.849
Hansen *J*	0.149	0.208	0.270
Year dummy	Yes	Yes	Yes
Number of observations	4374	4374	4374

Table 4.4. Corporate Governance and Stock Price Crashes: The effect of Industry Competition

This table reports results from an analysis of crash risk measured by tail risk, negative conditional skewness and extreme sigma in our sample of 692 firms (4374 observations) for which corporate governance and financial data are available for at least five consecutive years between 1997 and 2010. All companies for which data was available from Thomson Datastream and BoardEx databases are included in the analysis. Delisted and/or bankrupt companies have been excluded as soon as these companies have been delisted and/or declared bankruptcy. All variable definitions are in Table 4.1. m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as N(0,1) under the null hypothesis of no serial correlation. Hansen J is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null hypothesis of no correlation between the instruments and the error term. Standard errors are in parentheses beneath each coefficient estimate. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	Tail Risk		**Neg.Cond. Skewness**		**Extreme Sigma**	
Industry competition	**Low**	**High**	**Low**	**High**	**Low**	**High**
Information asymmetry	**High**	**Low**	**High**	**Low**	**High**	**Low**
Crash Risk$_{t-1}$	0.1782***	0.0583***	0.0886***	0.0166***	0.0599***	-0.0327***
	(0.0032)	(0.0035)	(0.0048)	(0.0092)	(0.0051)	(0.00536)
CEO Pay Slice (CPS)	0.0625***	0.0218***	0.6400***	0.0826	0.4107***	0.0329***
	(0.0041)	(0.0030)	(0.0455)	(0.0564)	(0.0348)	(0.0495)
Board busyness	0.0970***	0.0807***	0.8334***	0.4435***	0.5200***	0.6478***
	(0.0054)	(0.0053)	(0.0508)	(0.1019)	(0.0557)	(0.0741)
Board composition	0.0060	-0.0416***	-0.6668***	-0.1813	-0.6788***	0.1566
	(0.0066)	(0.0050)	(0.1011)	(0.2453)	(0.0793)	(0.0962)
Board size	0.1163***	0.1271***	1.6667***	1.6249***	1.1538***	1.1511***
	(0.0026)	(0.0033)	(0.0448)	(0.0618)	(0.0272)	(0.0561)
Duality	0.0019***	-0.0042***	-0.0177***	-0.0792***	-0.0038	-0.0460***
	(0.0003)	(0.0003)	(0.0035)	(0.0048)	(0.0031)	(0.0043)
CEO tenure	0.0022***	-0.0025***	0.0321**	-0.0212**	0.0332***	-0.0125***
	(0.0001)	(0.0002)	(0.0020)	(0.0033)	(0.0018)	(0.0024)
CEO outsider	-0.0016***	-0.0014***	-0.0319***	-0.0267***	-0.0264***	-0.0199***
	(0.0002)	(0.0002)	(0.0022)	(0.0026)	(0.0018)	(0.0022)
Size	-0.0638***	-0.0638***	-0.3830***	-0.4851***	-0.3377***	-0.4226***
	(0.0007)	(0.0007)	(0.0068)	(0.0112)	(0.0065)	(0.0092)
Capex	0.1798***	0.1282***	0.7245***	3.3722***	1.0732***	1.9189***
	(0.0109)	(0.0118)	(0.1194)	(0.1872)	(0.0846)	(0.1800)
Leverage	0.0364***	0.0752***	0.1733***	0.5840***	0.0171***	0.2194***
	(0.0042)	(0.0054)	(0.0740)	(0.0850)	(0.0500)	(0.0734)
Constant	0.2479***	0.2528***	-1.1722	-0.3828*	2.2268***	2.8838***
	(0.0068)	(0.0086)	(0.1120)	(0.1966)	(0.0611)	(0.1581)
m1	0.000	0.000	0.000	0.000	0.000	0.000
m2	0.539	0.226	0.100	0.194	0.376	0.256
Hansen J	0.882	0.766	0.868	0.708	0.866	0.602
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1989	2019	1989	2019	1989	2019

Table 4.5. Corporate Governance and Stock Price Crashes: The effect of the Financial Crisis 2007/2008

This table reports results from an analysis of crash risk measured by tail risk, negative conditional skewness and extreme sigma in our sample of 692 firms (4374 observations) for which corporate governance and financial data are available for at least five consecutive years between 1997 and 2010. All companies for which data was available from Thomson Datastream and BoardEx databases are included in the analysis. Delisted and/or bankrupt companies have been excluded as soon as these companies have been delisted and/or declared bankruptcy. Crisis is a dummy variable, which is equal to one for years 2007 and 2008, and zero otherwise. All other variable definitions are in Table 4.1. m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as N(0,1) under the null hypothesis of no serial correlation. Hansen J is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null hypothesis of no correlation between the instruments and the error term. Standard errors are in parentheses beneath each coefficient estimate. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	Tail Risk		**Neg.Cond.Skewness**		**Extreme Sigma**	
Crash Risk$_{t-1}$	0.1518***	0.1532***	0.0753***	0.0729***	0.0553***	0.0579***
	(0.0063)	(0.0063)	(0.0092)	(0.0088)	(0.0094)	(0.0536)
CEO Pay Slice (CPS)	0.0650***	0.0568***	0.4651***	0.3634***	0.4003***	0.3323***
	(0.0062)	(0.0063)	(0.1024)	(0.0973)	(0.1006)	(0.0851)
Crisis	0.0316***	0.0532***	0.1034	0.1182*	0.1508	0.0170
	(0.0068)	(0.0039)	(0.1288)	(0.0653)	(0.0966)	(0.0517)
CPS x Crisis	-0.0385***		-0.1770		0.1766	
	(0.0130)		(0.2558)		(0.1955)	
Board busyness	0.0834***	0.1592***	0.5638***	1.2173***	0.6401***	0.9006***
	(0.0054)	(0.0107)	(0.1570)	(0.1207)	(0.1323)	(0.1127)
Board Busyness x Crisis		0.0091		-0.4796*		-0.3373**
		(0.0126)		(0.2574)		(0.1843)
Board composition	-0.0710	-0.0654***	-1.2638***	-1.2055***	-0.4636	-0.3428*
	(0.0145)	(0.0142)	(0.2410)	(0.2257)	(0.1879)	(0.1956)
Board size	0.1474***	0.1453***	1.6700***	1.7064***	1.1864***	1.1648***
	(0.0058)	(0.0059)	(0.0964)	(0.0965)	(0.0739)	(0.0759)
Duality	-0.0018***	-0.0016***	-0.0527***	-0.0439***	-0.0309	-0.0290***
	(0.0006)	(0.0006)	(0.0089)	(0.0085)	(0.0077)	(0.0074)
CEO tenure	-0.0019***	-0.0021***	0.0107**	0.0097**	0.0158***	0.0149***
	(0.0003)	(0.0003)	(0.0048)	(0.0048)	(0.0037)	(0.0038)
CEO outsider	-0.0019***	-0.0016***	-0.0206***	-0.0202***	-0.0220***	-0.0216***
	(0.0004)	(0.0004)	(0.0052)	(0.0052)	(0.0041)	(0.0041)
Size	-0.0614***	-0.0602***	-0.4674***	-0.4737***	-0.3927***	-0.4226***
	(0.0058)	(0.0014)	(0.0183)	(0.0151)	(0.0077)	(0.0092)
Capex	0.0815***	0.0814***	1.5624***	1.8559***	1.1087***	1.1770***
	(0.0303)	(0.0304)	(0.3883)	(0.3348)	(0.2718)	(0.2544)
Leverage	0.0615***	0.0577***	0.6429***	0.4965***	0.0503***	0.4555***
	(0.0115)	(0.0110)	(0.1406)	(0.1476)	(0.1292)	(0.1306)
Constant	0.2027***	0.1767***	-0.2744	-0.4972*	2.3411***	2.1834***
	(0.0180)	(0.0172)	(0.2764)	(0.2854)	(0.2274)	(0.2189)
m1	0.000	0.000	0.000	0.000	0.000	0.000
m2	0.568	0.519	0.161	0.194	0.817	0.856
Hansen J	0.151	0.100	0.208	0.708	0.278	0.311
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	4374	4374	4374	4374	4374	4374

CHAPTER 5

Conclusions

The present thesis has examined how corporate governance characteristics that have been widely discussed by policy makers, regulators, practitioners and academics are related to firms' cash holdings/liquidity, performance and stock price crashes. In particular, we have investigated the impact on corporate liquidity, performance and stock price crash risk of two governance characteristics that recently emerged from the literature: i) the number of directorships held by executive directors or directors' "busyness"; and ii) the compensation inequality between CEO and other executive directors, or CEO "pay slice".

Chapter 2 has presented, for the first time in the literature, comprehensive evidence on the relationship between board busyness and corporate cash holdings/liquidity and shed additional light on the topics of board effectiveness using UK-based sample. In this study we offer new insights by evaluating two conflicting views on the role of busy directors in corporate boards' effectiveness by analysing a large sample of UK-listed companies over the period 1997 – 2009. One view claims that busy directors are good stewards and valuable assets for the companies due to their expertise, reputation and business contacts, and improve board decision making ability (*reputational effect*). The opposite view suggests that busy directors are "too busy to mind the business", and create a serious agency problem (*busyness effect*).

Throughout our analysis, a series of proxies has been used to measure the level of corporate cash holdings/liquidity for each firm in our sample. We have used cash, net cash and financial slack, and measured board busyness as a proportion of directors with three or more directorships on board. In our tests, we have controlled for the important corporate governance characteristics (independence, board size, board tenure, proportion of "imported"

CEOs, directors' age, and gender diversity) and for various firm characteristics (size, performance, dividends paid, and profitability).

Our analysis has revealed that the level of directors' busyness affects corporate cash holdings/liquidity in a complex non-linear manner. Specifically, it is non-linear inverted U-shaped relationship. This implies that companies with busy boards are likely to have higher levels of *cash, net cash* and *financial slack*, until the proportion of busy directors on the firm board reaches a threshold level; and when the proportion of busy directors goes beyond the threshold level, the corporate cash holdings/liquidity decreases.

Chapter 3 has contributed to the literature by investigating the relationship between CPS, the proportion of maximum top-five executive directors' aggregate compensation captured by CEO, and firm's performance during the 1997 – 2010 time period. Chapter 3 offers new insights into pay inequality – performance relationship by evaluating three different arguments that are prevalent in the corporate finance and management literature. One view claims that CPS level is optimally selected by companies and is a reflection of director's personal abilities, skills and talent (*optimal selection argument*). Optimally selected high CPS distinguishes company's CEO and helps to create a good competition spirit within the board room resulting in better corporate performance. Two other views suggest exactly opposite: high CPS can be a sign of agency problems in a company and even could harm board effectiveness by destroying team cohesiveness and motivation resulting in a poor corporate performance.

Our analysis reveals a negative association between CPS and corporate performance as measured by Tobin's Q. Companies with high CPSs tend to have lower values in our sample. This evidence supports both *agency and social comparison arguments*. The results of our study are robust for controlling for various firm, board and CEO characteristics, including

board busyness, board composition, board size, CEO – Chairman duality, CEO tenure and whether the CEO was an employee in the company before, firm size, firm age, value of capital expenditures, and leverage; and to different specifications of the CPS. Our findings are similar to those in Bebchuk et al. (2011), Zalewska (2014a), and Correa and Lel (2014). However, this is the first study that we are aware of, which investigates CPS – performance relationship using the broad UK-based sample. Considering the specificity of UK corporate boards, it is natural to put forward the social comparison argument as an important reason for the existence of negative association between the CPS and firm performance.

Chapter 4 has investigated how governance characteristics affect propensity of firms to experience a stock price crash risk. In our analysis we have used governance variables that capture board busyness and CEO centrality. We have used CEO pay slice (CPS) as a proxy for CEO centrality and estimate board busyness as a proportion of busy directors at the board level. We have offered new insights by evaluating the effect of *CPS* and *Board Busyness* on stock price crash risk by analysing *expropriation* and *busyness hypotheses*.

Chapter 4 has highlighted that CPS magnifies agency problems and might incentivise CEO to take on decisions that enable to extract rents and expropriate shareholder wealth. A dominant CEO could prioritise short-term price maximisation to secure his/her own private benefits and hide true information from the board of directors increasing company's exposure to the stock crash risk. In turn, busy boards with overcommitted directors could result in the severe agency problems, because they might not be able to monitor management effectively. Weak corporate boards encourage CEO's opportunistic behaviour and short-termism and company's exposure to the stock price crash risk increases.

Our analysis has revealed a positive association between CPS, board busyness and stock price crash risk. Companies with high CPS and busy boards tend to be more exposed to

stock price crash risk. The results of our study are robust for controlling for various firm, board and CEO characteristics, including board composition, board size, CEO – Chairman duality, CEO tenure, whether CEO was an employee in the company before, firm size, value of capital expenditures, and leverage; and to different regime specifications, including different levels of industry competition. Our findings are in line with findings in Andreou et al. (2013), An and Zhang (2013), and Ellul and Yerramilli (2013). However, this is the first study that we are aware of, which investigates governance – stock price crash risk relationship using the UK-based sample.

Motivated by the changes in remuneration practices introduced by The UK Corporate Governance Code (2010) and "say on pay" law (2013), we find that CPS and board busyness are important aspects of corporate governance which deserve attention of researches and policy makers. The fact that CPS negatively impact on firm performance and positively impacts on stock crash risk has a strong implication for the on-going debate on how to reform executive remuneration so that it provides the right incentives. It highlights the importance of considering remuneration issues at a board level, and not at a CEO level. It also supports The UK Corporate Governance Code (2010) principles[77]. Even if CEO compensation package is perfectly structured and implemented, it does not guarantee that it will lead to improvements in the firm performance and riskiness, as it may provoke resistance of other board members in British companies. As corporate governance reforms move towards increasing boards' responsibilities for risk and performance, it is important to consider board-wide remuneration issues without narrowing them to CEO's compensation.

There is also a direct implication for the public debate on limitation of the number of directorships held by executives from our findings. While the National Association of

[77] "The performance-related elements of executive remuneration… should be sensitive to pay and employment conditions elsewhere in the group" (Supporting principle, Section D: Remuneration, The UK Corporate Governance Code, 2010: p. 22).

Corporate Directors (1996) put forward a threshold of three directorships and the Council of Institutional Investors (2002) argues that directors with full-time jobs should not participate in more than two other boards in order to guarantee an adequate service, we argue that board effectiveness depends also on its overall level of busyness, i.e. on the proportion of the busy directors at the board level.

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Appendix

Table 1. Calculation of Board Busyness variables

This is an example calculation for our measures of director busyness using BoardEx database data for the SAFEWAY PLC (ISIN GB0000492412) for the year 1997. Total number of directorships counts the number of directorships (total number of current quoted boards including the "home" company) held by all directors serving on the board. Directorships per director are estimated as the total number of directorships held by the directors of the board divided by board size. Board Busyness is the number of directors holding three or more board seats divided by the board size.

Director	**Total Directorships**
Colin Deverell Smith	1
David Gordon Webster	3
Gordon Wotherspoon	1
Patricia (Pat) Anne O'Driscoll	1
Robert George Charters	1
Simon Timothy Laffin	1
Sir Alistair Grant	4
Doctor Neville Clifford Bain	4
Julia Ann Burdus	4
Michael John Allen	2
Total Directorships	22
Directorships per Director	22/10 = 2.2
Board Busyness	4/10 = 0.4 (40%)

Table 2. Calculation of CPS variables

This is an example calculation for our measures of CEO pay slice (CPS) using BoardEx database data for the AEGIS GROUP PLC (ISIN GB00B4JV1B90) for the year 1997. Total compensation is a total compensation including salary, bonuses, and equity-based compensation per executive director. The Rank is an executives' rank by total compensation. The proportion of CEO compensation to the total compensation of total five executives including CEO (CPS) is the total compensation of CEO to the sum of total compensations of top five executives.

Director	**Rank**	**Total Compensation**
Sir Crispin Henry Davis (CEO)	1	971
Kai Hiemstra	2	793
Eryck Rebbouh	3	483
Bruno Kemoun	4	476
Colin Richard Day	5	432
Raymond (Ray) F Kelly	6	341
Total Compensation of top five executives		3,155
Total CEO Compensation		971
CPS		971/3,155=0.3078