



CORPORATE GOVERNANCE INDICATORS AND RISK-TAKING

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Abstract

This paper analyzes the relationship between risk-taking and corporate governance indicators, in terms of board characteristics, financial information quality and ownership structure. Unlike previous studies, we apply a broad range of corporate governance indicators and use a suitable econometric model to solve for possible endogeneity issues. The empirical framework is applied to an industry-wide sample of UK firms during the period 2002-2009. We find that board size and more executives positively affect firm risk-taking, while independence in audit committees has a negative impact. Finally, introducing firm specific characteristics does not affect the robustness of the results.

Keywords: Board structure, Risk-taking, Audit Committee, Ownership

JEL classification: G34, D81, G38, M41

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1. Introduction

Separation of ownership and control in organizations creates information asymmetry problems (moral hazard and adverse selection) between stakeholders and managers that expose stakeholders to agency risk (Jensen and Meckling, 1976; Ashbaugh-Skaife et al., 2004). Corporate governance is defined as “the range of control mechanisms that protect and enhance the interests of shareholders of business enterprises” (Fama and Jensen, 1983a). In recent years, several important initiatives have been taken in the European Union

(EU), the United States (US) and at the international level aiming at the establishment of sound corporate governance practices. This augmented interest can be explained through a variety of factors related primarily to the transformation and globalization of financial markets and the wider economic and financial implications of corporate governance. Spurred by a wave of corporate scandals mainly owed to self-dealing, fraud and poor quality management decision-making, corporate governance has attracted international attention as a means to address the “separation of ownership and control”

(or “agency”) problem in public companies, thus promoting corporate efficiency and reduce risk-taking (Williamson, 1963; Jensen and Meckling, 1976; Fama and Jensen, 1983a).

Corporate governance is generally considered to be the set of complementary mechanisms that help align the actions and choices of managers with the interests of shareholders (Core et al., 2003). Keasey and Wright (1993) define corporate governance as “the structures, process, cultures and systems that prompt the successful operation of the organisations.”¹ As a result, by eliminating or mitigating the agency problem, a sound system of corporate governance also contributes to improved corporate performance.² Essentially, by establishing internal mechanisms inciting corporate management to promote company’s interests and facilitating effective monitoring, corporate governance systems enhance investors’ protection and confidence, thus contributing to the proper functioning of the market economy and the improvement of economic efficiency and growth (OECD, 2004).

An effective framework for corporate governance is based on three main pillars: internal corporate governance, external corporate governance and transparency and disclosure. More specifically, internal corporate governance refers to the mechanisms that enable shareholders to exercise management control. These include the adequate organisation of the board of directors, effective arrangements for the exercise of shareholder rights, and a well-developed internal audit function. As regards the role of the board, the competence and efficiency of management should be promoted and monitored by an independent body within the board.

The shareholders’ role in governance is to appoint the directors and the auditors and to satisfy themselves that an appropriate governance structure is in place. The responsibilities of the board include setting the company’s strategic aims, providing the leadership to put them into effect, supervising the management of the business and reporting to shareholders on their stewardship. Boards

contribute to organizational performance when they fulfil five major responsibilities: (a) approve the strategic direction of an enterprise; (b) oversee the financial actions of an organization; (c) play an essential role in counselling and advising the CEO; (d) select and motivate executives; and (e) reassure the compliance and surveil the uncompensated risk (Jensen, 1993; Staikouras et al., 2007).

The present paper assesses the relationship between corporate governance mechanisms and risk-taking in UK firms. The empirical analysis is carried in a large dataset of UK listed firms over the period 2002-2009. Also, to account for the fact that static econometric frameworks may be insufficient to capture the dynamics of risk, we apply a dynamic framework. Despite the renowned interest in the role of corporate governance, a full review of the relevant literature reveals that empirical findings are concentrated on its relationship with performance. Two final distinguishing characteristics of this study are worth noting. In particular, and given the fact that the choice on the corporate governance mechanisms may be made on the basis of better risk management, we are very much interested to control for risk-taking policies. We examine corporate governance attributes along three dimensions: (1) board characteristics, (2) financial information quality, (3) ownership structure. In addition, we account for the possible endogeneity between corporate governance indicators and risk, which is an issue of significant debate in the recent literature.

The present study comprises five sections. The following section provides a concise theoretical basis of the increased regulatory and academic interest on corporate governance systems, while also reviewing the relevant literature concerning corporate governance mechanisms. Section 3 explains the empirical model and discusses the dataset used in the present study. Section 4 presents the empirical results. Section 5 concludes the paper.

2. Literature review

Existing agency theory proposes a series of mechanisms that seek to reconcile the interests of stakeholders and managers. The board of directors is considered pivotal in a company’s corporate governance architecture, however, is just one of several governance mechanisms. Some of the corporate governance mechanisms that are used to reduce the extent of agency conflicts are besides the board of directors and its effective structure, insider ownership, the presence of large shareholders and auditing committees. Internal corporate governance mechanisms (e.g., appointing non-executive, independent directors, introducing internal control systems, establishing board committees, monitoring directors’ remuneration) present themselves as one of the most popular devices to discipline corporate

¹ The other control mechanisms encompass the conclusion of contracts between managers and investors-shareholders, the capital market/market for corporate control, the legal/political/regulatory system and the product/factor market. See Jensen (1993), Shleifer and Vishny (1997), Denis (2001).

² See, for example, La Porta et al. (2002): better protection of minority shareholders is positively associated with firm’s valuation; Dahya et al. (2002): increased sensitivity of turnover to performance following the adoption of the UK corporate governance code; Gompers et al. (2003): positive correlation between corporate governance and stock returns; Klapper and Love (2004): better corporate governance is highly correlated with better operating performance and market valuation.

management and curtail firms' increased risk-taking appetite (Jensen and Meckling, 1976; Fama and Jensen, 1983a).³ A good corporate governance system should ensure that the corporate governance of the companies could create and maintain a business environment that motivates managers and owners to maximise firm's operational efficiency and reduce risk-taking. These mechanisms should ensure corporate conformance with investors' and society's interests by limiting power abuse, and moral hazard as well as combining the economic objectives with the wider social responsibility (Oman, 2001).

2.1. Board size

A number of studies have documented the effect of board size on the efficiency and performance of firms. It is widely believed that companies with small board of directors are more effective and profitable since they have a better monitoring role and decision-making processes (Jensen and Meckling, 1976; Lipton and Lorsch, 1992). Several researchers add evidence to the hypothesis that the problems of coordination, control, decision-making, and excessive control of the CEO increase dramatically in oversized boards. Jensen (1993) argued that large corporate boards are less effective and CEOs find it easier to control them. It has also been suggested that directors on smaller boards are less risk averse and that they react more quickly to changing market conditions. Jensen (1993) further added that the decision-making power of the board becomes slower with the involvement of more people. He explained that even if boards' capacities for monitoring increases with board size, the benefits are outweighed by such costs as slower decision-making, less-candid discussions of managerial performance, and biases against risk-taking.

Yermack (1996) confirmed the negative relationship with several accounting measures of performance and operating efficiency. The association between board size and the variability of corporate performance potentially arises because larger boards have the communication/coordination problems and the agency problems. It takes more effort for a larger group to reach consensus, and thus the final decisions of larger groups reflect more compromises and are less extreme than those of smaller groups (Sah and Stiglitz, 1986, 1991). It is therefore likely that by making less extreme decisions, larger boards are associated with less variable corporate performance. However, because

agency problems (such as directors' free-riding) become more severe as a board becomes larger, and hence it is easier for the CEO to influence and control the board, CEO power in decision-making increases with board size (Jensen 1993). Cheng (2008) documents that the coordination/communication problems of a large board moderate the extremity of board decisions, as it takes more negotiation and compromise for a larger board to reach a final decision, leading to less extreme corporate performance.

However, several researchers argue that larger boards may be beneficial because, for example, they increase the pool of expertise and resources available to the organization. Changanti et al. (1985) suggest that smaller boards might be easier influenced by CEOs and will not have the depth of experience that the larger boards offer. Dehaene et al. (2001) find that board size is positively related to the performance of Belgian firms, while Uzum et al. (2004) found that board size had no association with corporate fraud.

2.2. Board composition

Many studies have examined the effect board composition⁴ may have on firm performance, obtaining mixed conclusions. These studies either examine the direct impact of board composition on firm performance in a regression framework, or, alternatively, test for an indirect effect by examining the relation between board composition and announcement returns to particular corporate events that are presumed to affect firm performance. Agency theorists suggest that the board of directors is in place to monitor the decisions of managers and possibly intervene on behalf of shareholders. The composition of the board of directors, particularly the presence of outside directors and their proportion to inside directors, has often been identified as an important element to realign shareholders' and managers' interests and improve the agency problem (Fama, 1980; Fama and Jensen, 1983a; Brickley and James, 1987; Weisbach, 1988; Byrd and Hickman, 1992; Lee et al., 1992).

Executive directors are responsible for the day-to-day affairs of the company. However executive directors are not usually in a strong position to monitor or discipline the CEO (Daily and Dalton, 1993). It is therefore important that there is a mechanism to monitor the actions of the CEO and executive directors and to ensure that they pursue shareholder's interest (Fama, 1980; Daily and Dalton, 1993). The rational of having independent

³ The term "internal corporate governance" is employed to distinguish from "external disciplinary devices", including the market for corporate control. Literature has made and elaborated several other proposals to deal with the moral hazard problem, which, however, lie beyond the scope of the present analysis.

⁴ The standard view in empirical finance, and in practice, is that the degree of board independence is closely related to its composition. The board is presumed to be more independent as the number of outside directors increases proportionately.

directors is to reduce agency cost, to gain access to the capital market as well as to ensure accountability in executive remuneration (Lawrence and Stapledon, 1999). The positive aspect of having board independence is evidenced in a study by Cook et al. (2002), highlighting that the survival of firms in the thrift crisis is due to greater proportion of independent directors in the board.

Independent or outside directors are generally thought to be more effective monitors than inside directors since they have no employment or ownership affiliation with management (Weisbach, 1988; Lehn et al., 2003). Fama (1980) and Fama and Jensen (1983a) argue that non-executive directors add value to firms by providing expert knowledge and monitoring services. They argue that outside board members have incentives to develop reputations as decision control experts in order to signal their value. Additionally, outside directors provide additional resources to the firm in terms of expertise or external contacts beyond those associated with their management roles (Hambrick and D'Aveni, 1992; Stearns and Mizruchi, 1993). Presumably these directors would be able to provide a higher degree of objectivity in their assessment of the firm's situation and their recommendations for dealing with crises.

A number of studies, indicate that non-executive directors have been effective in monitoring managers and protecting the interests of shareholders, resulting in a positive impact on performance, stock returns, credit ratings, auditing, etc. Singh and Davidson (2003) claim that board composition may significantly influence corporate performance by reducing agency costs. Fama and Jensen (1983b) argue that outside directors have an incentive to act as monitors of management because they want to protect their reputation as effective and independent decision-makers. Moreover, outside directors may contribute to the value of firms through their evaluation of strategic decisions (Brickley and James, 1987; Byrd and Hickman, 1992; Lee et al., 1992) and through their role in the dismissal of inefficient and poorly performing management (Weisbach, 1988). Schellenger et al. (1989) observe a positive relationship between outside director representation and higher risk-adjusted corporate financial performance. Connelly and Limpaphayom (2004) find that board composition has a positive relation with profitability and a negative relation with the risk-taking behaviour of life insurance firms in Thailand.

While the board's capacity for monitoring increases as more directors are added, the benefit may be outweighed by the incremental cost of poorer communication and decision-making associated with larger groups. Management-friendly boards (less independent) could be in a better position to advise, and even monitor, the

CEO, and thereby, increasing shareholder value (Adams and Ferreira, 2007). On the other hand, one potential drawback resides in the fact that outside directors may lack the necessary specific knowledge and experience of the firms' processes compared to the inside directors, who actively participate in the operations of the company. Moreover, since outside directors usually spend only a limited amount of time at the company serving on the board, and lack the necessary information to understand the business in depth, it is also likely that they favour objective financial criteria in evaluating and rewarding top management decisions or emphasize short-term performance (Keasey and Wright, 1997; Calderini et al., 2003).

Agrawal and Knoeber (1996) surmise that boards may be expanded for political reasons (politicians, environmental activists, etc.) and that these "outsiders" either reduce performance directly or proxy for the underlying political constraints that led to their receiving board seats. Haniffa and Hudaib (2006) summarize a number of views expressed in the literature which may justify this non-positive relationship, such as that high proportion of non-executive directors may engulf the company in excessive monitoring, be harmful to companies as they may stifle strategic actions, lack real independence, and lack the business knowledge to be truly effective. Beasley (1996) provide US evidence that outside board members are effective in constraining earnings frauds. Furthermore, O'Sullivan (2000) examines a sample of 402 UK quoted companies and suggests that non-executive directors encourage more intensive audits as a complement to their own monitoring role while the reduction in agency costs expected.

Bhojraj and Sengupta (2003) and Ashbaugh-Skaife et al. (2006) also find that firms with greater proportion of independent outside directors on the board are assigned higher bond and credit ratings respectively. Simpson and Gleason (1999) found that enhancing the participation of inside directors (i.e., corporate officers also serving as board directors) does not have a bearing on the banks' probability to become financial distressed. Uzun et al. (2004) found that firms with a high percentage of outside directors had less financial fraud. They argued that outside directors have fewer incentives for firms to commit fraud and so the greater their number, the more likely they can prevent or reduce the fraudulent behavior of the executive directors.

2.3. Audit committee

Although boards of directors are responsible for oversight of the financial accounting process, this task is often delegated to a subcommittee of the full board, the audit committee. The failure of a number of large companies in the early 1990s, without

auditor warning, raised serious questions about the quality and reliability of audited information (Cadbury, 1992; Humphrey et al., 1993). The functions of an audit committee include ensuring the quality of financial accounting and control system (Collier, 1993). Agency theory predicts the establishment of audit committees as a means of attenuating agency costs.

The audit committee plays an important role because it is concerned with establishing and monitoring the accounting processes to provide relevant and credible information to the firm's stakeholders (Anderson et al., 2004; Apostolou and Nanopoulos, 2009a). In this context, firms with larger audit committees are willing to devote greater resources to overseeing the financial accounting process. A firm with an audit committee composed of only a couple of members would, on average, have less time to devote to overseeing the hiring of auditors, questioning management, and meeting with internal control system personnel (Anderson et al., 2004). Cohen and Hanno (2000) examined how auditors take corporate governance into consideration when planning an audit, finding that auditors of companies with independent boards of directors and audit committees were perceived by auditors to have lower audit risk.

Forker (1992) argued that the existence of audit committees may improve internal control and thus regarded it as an effective monitoring device for improving disclosure quality. The audit committee's duties were to include the appointment of external auditors, reviewing the company's financial statements and advising on any significant findings of internal audit investigations. Prior empirical evidence by Klein (2002), Beasley (1996), and Peasnell et al. (2000) support the conventional wisdom that audit committees more effectively carry out their oversight of the financial reporting process if they include a strong base of independent outside directors.

2.4. CEO duality/CEO tenure

Duality occurs when the same person undertakes both of the roles of chief executive officer and chairman. The potential advantage of having the same person filling both posts is that they should exhibit a greater understanding and knowledge of the company's operating environment. Forker (1992) asserts that a dominant personality in both roles poses a threat to monitoring quality and is detrimental to the quality of disclosure. The person who occupies both roles would tend to withhold unfavorable information to outsiders.

The presence of CEO/chairman duality is generally perceived as compromising the independence of the board since one individual possesses a great amount of power and authority (Cadbury, 1992; Jensen, 1993; Apostolou and

Nanopoulos, 2009b). In the presence of a dominant CEO/chairman, non-executives are expected to have reduced influence in seeking an intensive control. In the Anglo-Saxon model of corporate governance, the dual appointment of chairman and CEO is seen to give too much power to the individual (Jensen, 1993) and this can make it easier to reach a decision that results in fraudulent actions and decisions that are not in the best interests of the minority shareholders. However, an alternative view of corporate governance argues that separating the roles of chairman and CEO can create paralysis if the two powerful positions do not agree on decisions and strategies.

Beasley (1996) and Uzun et al. (2004) found that the duality of CEO and chairman positions does not have an impact on fraud in the U.S., while Dechow et al. (1996) found the opposite. Imhoff (2003) argues that board governance is severely compromised when the current or former CEO of the company also serves as chairman of the board. This is because the board chairman frequently sets the board's agenda and, therefore, controls issues brought before the board.

The CEO's bargaining power derives from his/her perceived ability, for which CEO tenure becomes a good proxy (Linck et al., 2008). It is presumed that a top manager with long tenure will be more likely to influence the monitoring function of the corporate board. In contrast, a newly appointed top manager is more likely in the short term to have a company board with a high proportion of outsider directors, given his weak influence on the director appointment process and/or his strategy to ask for managerial advice and counseling from outsiders until the company management is on track under his leadership (Weisbach, 1988).

2.5. Ownership structure

Agency theory argues that in a diffused ownership environment, firms will disclose more information to reduce agency costs and information asymmetry. One possible solution to the agency problem is to provide senior management with incentives to pursue wealth maximising policies. Jensen and Meckling (1976) indicate that since managers pursue their own interest, higher management shareholding would imply a larger sharing of the loss, and ultimately, a lower possibility that management would lower corporate value. When ownership control is high enough to ensure its position, management has the incentive to behave against the interests of other smaller shareholders (Morck et al., 1988).

A number of recent studies have suggested that large shareholders may behave differently in monitoring managers compared individual shareholders. According to Shleifer and Vishny

(1988) large shareholders have incentives to collect information and monitor the management while they can elect their representatives to the board of directors and gain managerial control of the board of directors. On the other hand, concentrated ownership can affect the governance of the firm since it provides the largest shareholders with too much discretionary power over using firm resources in ways that serve their own interest at the expense of other shareholders (Mehran, 1995). The identity of owners is also likely to influence the performance of banks. Foreign investors require high information disclosure standards and maintain a strict control of managers' actions (Dyck, 2001).

As Jensen and Meckling (1976) argue, dispersed shareholders also anticipate increased opportunity for managers to pursue their own interests at shareholders' expense and thereby anticipate greater agency costs. In the case of companies with more concentrated ownership, block shareholders possess a greater incentive to actively monitor managerial behaviour due to the size of their equity holdings and the likely cost to them of any non-value-maximizing behaviour by managers. Furthermore, when managers own a significant portion of equity they have less incentive to issue misleading information to shareholders. Consistent with these arguments, Chow (1982) suggests that when managers own smaller equity stakes in their firms they have an increased incentive to falsify financial disclosures, since such disclosures are likely to be utilized by shareholders in setting managers' remuneration.

2.6. Endogeneity issues

Wintoki et al. (2008) argue that current actions of a firm affect future corporate governance, which will in turn affect the firms' future actions. Given this potential endogeneity, it would appear that modeling corporate governance indicators in the fashion of most of the previous literature may not be appropriate (see also Agoraki et al., 2010). The risk practices of a firm may be affected by existing corporate governance mechanisms, but the risk-taking policies may influence subsequent corporate governance practices. Hence, the results on the relation between risk-taking and corporate governance mechanisms may be difficult to interpret. Therefore, we opt for augmenting the estimation technique to account for the aforementioned potential endogeneity.

Corporate governance studies often neglect this issue and thus obtain results that are hard to interpret. In this vein, ordinary least squares (OLS) coefficient estimates can be biased. Simultaneous equations methods can address endogeneity but are often more sensitive than OLS to model misspecification (see Barnhart and Rosenstein, 1998). We use a two-step Generalized Method of

Moments (GMM) to solve endogeneity bias. Consequently, we will proceed with the estimation of our model using the GMM estimator in the Arellano and Bond paradigm.⁵ The estimation controls for unobserved heterogeneity and eliminates a potential omitted variables bias. Using lagged governance indices as instruments for the present values of these variables controls for potential simultaneity and reverse causality (Ammann et al., 2011).

3. Empirical specification and data

3.1. Methodology

In this paper we identify key governance attributes related to the quality of firms' financial information, ownership structure and board structure that are intended to reduce moral hazard and adverse selection problems present in publicly traded firms. We posit that since the governance attributes are intended to reduce agency risks faced by equity stakeholders, governance attributes should have measurable effects on firms' risk-taking. The following parameters of corporate governance have been considered: size of the board; independence of directors; frequency of the board meetings; audit quality; independence of audit committee; the chairman/CEO duality; CEO tenure and concentration of corporate ownership.

To measure firm risk we employ a comprehensive measure, which encompasses decisions concerning liquidity, credit, interest rates and operational risk. The distance to default is defined as: $(\text{Capital-to-assets ratio} + \text{return on assets}) / \text{standard deviation of return on assets}$ (Spong and Sullivan, 2007). This ratio represents the number of standard deviations below the mean that return on assets would have to fall in order to eliminate capital and force the firm to default. The higher the value of this distance to default, the lower a firm's risk. An advantage of this risk measure is that it incorporates three elements of risk: fluctuations in income, the overall level of profitability, and capitalization (Spong and Sullivan, 2007). In order to control for the determinants of risk-taking our analysis consist of three different spectrums (corporate governance, organizational and country level) each includes a number of different variables.

⁵ Actually, Arellano and Bond proposed one-step and two-step estimators. We apply the two-step GMM estimator since it is better applied in models that impose non-linear restrictions. One-step GMM estimators use weight matrices that are independent of estimated parameters, whereas the efficient two-step GMM estimator weighs the moment conditions by a consistent estimate of their covariance matrix (Windmeijer, 2005). For a thorough description of the various GMM estimators, see Baltagi (2001), Bond (2002) and Hsiao et al. (2002).

3.1.1 Corporate Governance Variables

Boards with many directors would be able to assign more people to supervise and advise managers' decisions, thus reducing managers' discretionary power or at least making it easier to detect managers' opportunistic behavior and increasing strategic capabilities to complement that of the CEO.

We utilize a number of variables to represent board characteristics. We use a dummy variable to indicate companies where the same individual occupies the positions of company chairman and CEO (*duality*). We construct a dummy variable, which takes a value of 1 if the positions of chairman and CEO are split, 0 otherwise. Following the corporate governance literature we apply board size and board composition (Staikouras et al., 2007). The number of board meetings per year (*Meeting*) can be used as an admittedly rough proxy for board activity and vigilance. Frequent board meetings may be a signal of increased vigilance and oversight of the top management of the firm. Alternatively, the frequency of board meetings may increase in times of financial distress or in times of controversial decisions that may involve illegal or questionable activities (Chen et al., 2006). Vafeas (1999) found that more frequent board meetings followed poor performance and they heralded improvements in profitability. CEO Tenure is the number of years the CEO has been with the firm. The tenure of the company chairman or CEO (*CEO Tenure*) may have an impact on corporate fraud (Beasley, 1996). On the one hand, a new chairman may have limited knowledge of the firm and so fraud perpetrated by others may be easier to accomplish. On the other hand, long tenure may lead to entrenchment and over-confidence.

Financial transparency and the accessibility of information is measured by the quality and content of the information disclosed by the company and independence and the status of the auditor. In this study we use the amount of the audit fee to proxy for audit quality (*AF*) since the quality of a company's audit is not observable. More investigation will require more audit hours and/or the use of more specialized audit staff—resulting in higher fees (O'Sullivan, 2000). In respect of the audit process, it is anticipated that increased non-executive representation is capable of improving the quality of the audit process in a number of respects.

This is especially important if auditors seek to question certain aspects of the way in which the financial statements have been prepared by management, or require further (more costly) testing in order to reach an opinion on the quality of the financial statements. Furthermore, non-executives are expected to favour more extensive

auditing in order to complement their own monitoring responsibilities (O'Sullivan, 2000). We use the independence of the audit committee to proxy for the quality of firms' financial information (*IAC*). Finally, we apply the percentage of independence (*OI*) as an ownership structure variable.

3.1.2 Firm Level Variables

We employ the logarithm of total assets (*SIZE*) to capture the effect of firm size. This variable controls for cost differences as well as product and risk diversification according to the size of the firm. Furthermore, in order to control for the possibility that knowledge-based companies may be more complex than other companies, we include a measure of each company's reported expenditure on research and development as an additional complexity variable (O'Sullivan, 2000; Iwasaki, 2008). Poor liquidity is a major cause of business failure. Liquidity risk is measured by the ratio of liquid assets to total assets.

3.1.3 Country Level Variables

To capture the effect of the macroeconomic environment we use GDP growth (*GDP*) and inflation (*INF*). GDP per capita serves as a general indicator of economic development by reflecting differences in technology, the mix of firm opportunities and any aspects of regulations omitted from the regression. High inflation rates are generally associated with reduced consumption. However, high inflation may also be viewed as a proxy for poor macroeconomic performance and stability, which makes the accurate assessment of credit and market risks more difficult.

This empirical model involves the estimation of the following dynamic specification which includes a lagged dependent variable among the regressors and/or treats some explanatory variables as predetermined⁶:

$$RISK_{it} = c + \alpha RISK_{it-1} + \beta_1 BS_{it} + \beta_2 BC_{it} + \beta_3 BM_{it} + \beta_4 CD_{it} + \beta_5 CT_{it} + \beta_6 AF_{it} + \beta_7 IAC_{it} + \beta_8 FO_{it} + \beta_9 OI_{it} + \beta_{10} SIZE_{it} + \beta_{11} BI_{it} + \beta_{12} LIQ_{it} + \beta_{13} GDP_{it} + \beta_{14} INF_{it} + \beta_{15} D_{year} + \delta D_{IND} + \varepsilon_{it} \quad (1)$$

where risk ($RISK_{it}$) of the firm i at year t is written as a function of a vector of individual-level variables reflecting board size BS and board composition BC of each firm; the number of board meetings per year BM ; dummy variable taking the value one (1) if the chairman and CEO positions are held by the same person for the CEO duality CD ; as well as the CEO tenure CT ; financial transparency

⁶ The validity of the instruments applied is tested with the Sargan test. We use the system GMM estimator proposed by Blundell and Bond (1998).

of information is captured by audit fees AF and the independence of audit committee IAC ; variable that reflects the ownership structure of the market, OI ; firm size, $SIZE$; Business Innovation BI ; Liquidity LIQ ; macroeconomic conditions, GDP and INF ; and the error term u . D_{IND} is a set of industry dummies, and D_{year} are the yearly dummy variables. A value of α between 0 and 1 implies a persistence of the dependent variable, but it will eventually return to its normal (average) level. A value close to 0 means that the industry is characterized by high speed of adjustment, while a value of α close to 1 implies very slow adjustment. All variables are expressed in natural logarithms to improve the regression's goodness of fit and to reduce possible simultaneity bias.

3.2. Data

Having defined the methodological approach to be followed, we focus on the selection of variables. We construct a balanced sample of 557 listed firms operating in UK over the period 2002-2009. All data were manually collected from Fame Database and annual reports. We define board size (BS) as the natural logarithm of the number of directors. Turning our attention to the board composition (BC) measure, we use the ratio of non-executive⁷ directors over the total number of directors. Directors that are currently employed by the firm, retired employees of the firm, related company officers or immediate family members of firm employees are classified as executives. Non-executive directors are members other than executives. These directors have no substantial business interest in the firm with their only observable connection to the firm being their appointment as a director.

Ownership Independence OI variable takes numeric values between 1 and 4, defined according to the notation levels of the Independence Indicator, using a linear transformation. (A=1- No shareholder with more than 25% of direct or total ownership="Independent companies"; B=2- No shareholder recorded with more than 50% of direct, indirect or total ownership, one or more

shareholders recorded with more than 25% of direct or total ownership; C=3- No shareholder recorded with more than 50% of direct ownership, one shareholder recorded with more than 50% of total ownership = indirectly majority owned; One shareholder recorded with more than 50% of direct ownership = directly majority owned). Business innovation (BI) is proxied by R&D expenses. Liquidity risk is proxied by the liquid to total assets ratio. Liquidity risk is the variation in net income and market value of equity caused by a firm's difficulty in obtaining cash at reasonable cost from the sale of assets. The size variable controls for cost differences and product and risk diversification. We use the firm's total assets (in a logarithmic form) (TA). Data for the macroeconomic variables are collected from the World Bank's World Development Indicators. Table 1 provides descriptive statistics of our sample.

⁷ For a non-executive director to be considered as independent, the individual should have no connection with the company either as a past employee or as an advisor such as management consultant, investment banker, auditor, and lawyer or as supplier or customer of the firm's products. In the present thesis we will apply only the definition of non-executives, as in some cases, the independence of non-executive directors is difficult to be observed. However, we find that most of the companies declare that non-executive directors have no interests in other companies and are independent. Therefore, we do not intend to make difference between non-executive directors and independent directors in our subsequent analysis (Staikouras et al., 2007; Agoraki et al., 2010).

Table 1. Descriptive statistics (2002-2009)

Variables	Mean	Std. Dev.	Min	Max
<i>Dependent variable</i>				
Risk	19.23	3.78	13.85	23.69
Corporate Governance				
Board size (BS)	27.96	16.57	7.00	56.00
Board composition (BC)	67.45	27.30	35.00	85.00
Meeting (BM)	7.56	3.45	4	10
CEO Tenure (CT)	8.75	5.62	2	19
Audit fee (AF)	385,149	354,623	49,795	1,452,741
Independence of audit committee (IAC)	0.73	0.19	0.54	0.90
Ownership variables				
Independence Indicator (OI)	1.35	0.9	1.00	3.00
Firm variables				
Total assets	132,375,246	93,559,021	3,240,127	520,227,000
R&D expenses (BI)	23,167.02	19,990.90	15,00	46,000
Liquid assets/total assets (LIQ)	43.76	49.56	9.87	83.25
Macroeconomic variables				
GDP per capita (GDP)	40,785	2,810	30,438.75	42,352
Inflation (INF)	2.1	0.8	1.7	3.1

Source: Annual reports of the credit institutions; Fame Database; World Bank's World Development Indicators.

Note: RISK: (Capital-to-assets ratio + return on assets)/standard deviation of return on assets; Board size (BS): Number of directors; Board composition (BC): proportion of non-executives in the board of directors; Meeting (BM): Number of board meetings held in a year; CEO Tenure (CT): Number of years that the chairman has served in that position; Independence of audit committee (IAC): proportion of audit committee made up of independent directors; Independence Indicator (OI): Independence Indicator to signify the degree of independence of a company with regard to its shareholders. Figures are expressed in percentages for all variables (except of board size and GDP per capita) and in £ for GDP per capita. Figures other than ratios and indices are expressed in thousand £.

4. Empirical results

We explore the relationship between corporate governance mechanisms and risk-taking. A number of different versions of the models are estimated and the findings of the basic specifications are reported in Table 2. To take into account the possibility of endogeneity, following Arellano and Bond (1991) and Blundell and Bond (1998), we apply the system-GMM estimators.⁸ To determine

⁸ The drawback of the static model results is that the right-hand side variables maybe endogenous and, therefore, affected by the dependent variable. To account for persistence in the dependent variable and endogeneity of right-hand side variables, we resort to a dynamic model estimation that uses an instrumental variable approach to proxy for endogenous variables. The lagged dependent variable was also treated as endogenous, while the results remained unchanged. The additional variables are considered exogenous (their lags were used as

whether our instruments are valid in the system GMM approach, we use the specification tests proposed by Arellano and Bond (1991) and Arellano and Bover (1995). First, we apply the Sargan test over-identifying restrictions to examine the overall validity of the instruments. For an instrument to be valid there should be no correlation between the instrument and the error terms. Second, we test whether there is a second order serial correlation with the first differenced errors.

The second test examines the hypothesis of absence of second-order serial correlation in the first-difference residuals AR(1). Thus, failure to reject the null hypothesis could supply evidence that valid orthogonality conditions and instruments are used. In our models, this hypothesis of second-

instruments). To test the robustness of the results, different lag structures were estimated.

order serial correlation is always rejected. Even though the equations indicate that negative first-order autocorrelation is present, this does not imply that the estimates are inconsistent. Inconsistency would be implied if second-order autocorrelation was present (Arellano and Bond, 1991), but this case is rejected by the test for AR(2) errors.⁹ The models seem to fit the panel data reasonably well, having fairly stable coefficients, while the Wald test of the joint significance of the explanatory variables indicates fine goodness of fit and the Sargan test shows no evidence of over-identifying restrictions. The choice of the lagged levels and lagged first-differences as instruments is made in a way that guarantees validity of the resulting overidentifying restrictions.

The highly significant coefficient of the *lagged RISK* variable confirms the dynamic character of the model specification. In the present study, α is highly significant across all models, and takes a value of 0.45 on average, which means that *RISK* persists to a moderate extent, justifying the use of dynamic panel data modeling. In the following set of regressions we first include the individual level variables that have been shown to be instrumental in explaining firm risk and consecutively we control for the corporate governance, country level and industry indicators.

The two most important roles of a board of directors, monitoring and advising, have as an incentive to reduce risk (e.g., Adams and Ferreira, 2007; Linck et al., 2008). As a monitor of managers, the board supervises the management so as to refrain them from any self-serving behaviors. In its advising role, the board provides opinions and directions to managers for key strategic business decisions (Pathan and Skully, 2010). The size of the board is positively correlated to the risk-taking policies. Larger boards provide greater information and expertise (Lehn et al., 2003; Staikouras et al., 2007). However, larger boards are usually associated with more intense coordination, communication and process problems. In addition, larger boards not only entail less time for directors in expressing their opinions within board meetings but also constrain directors' incentives to acquire information and monitor executive management, which essentially increases free-rider problems (Lipton and Lorsch, 1992; Jensen, 1993; Yermack, 1996). Larger boards are also related with more compromises to reach consensus and, by extension, with less direct and instant decision-making (Cheng, 2008). In addition, large boards could have less motivation (to incur additional costs or efforts)

to acquire information due to 'free-riding' problems (Linck et al., 2008; Agoraki et al., 2010).

Non-executive directors have a fiduciary duty to monitor management with due care, diligence and vigilance, being a knowledgeable source of information independent of management to advise the company (Turnbull, 2005). We find that firms with high proportion of non-executive directors on the board are less risky. This evidence is consistent with outside directors monitoring the actions of managers and protecting shareholders' assets and stakeholders' interests. A fairly extensive literature exists which supports the notion that firms with more independent boards commit less financial statement fraud (Beasley, 1996) and have less earnings management (Peasnell et al., 2000; Xie et al., 2003; Jaggi et al., 2009). Besides, the result points to the relevance of the advisory role of boards. In particular, those non-executive directors that have been nominated as independent may have a positive bearing on the quality of corporate decision-making and strategy by (a) bringing new perspectives from other businesses, (b) constructively challenging and enriching company strategies and risk management and introducing significant sources of management experience and expertise, and (c) advancing the company's reputation and assisting in the creation of business affiliations (OECD, 2004; UK FRC Combined Code, 2008; Agoraki et al., 2010).¹⁰

Frequency of board meetings is negatively correlated to the risk-taking process. This may imply that a firm's questionable activities were discussed by the board over a number of meetings before reaching consensus, while frequent board meetings may be a signal of increased vigilance and oversight of the top management of the firm (Kostyuk, 2005; Chen et al., 2006; Brick and Chidambaran, 2010). On the other hand, frequent meetings address the board's role and ability to provide independent oversight of management performance and hold management accountable to stakeholders for its actions (Ashbaugh-Skaife et al., 2004).

The CEO's bargaining power derives from his/her perceived ability, for which CEO tenure becomes a good proxy (Iwasaki, 2008; Linck et al., 2008; Pathan and Skully, 2010). The influence of CEO is not significant. Short-tenure may imply the chairman lacks experience or knowledge of the firm, increasing the undertaken risk (Beasley, 1996). However, a CEO with long tenure will be more likely to influence the monitoring function of the corporate board and the firm strategy based on limited managerial advice and counseling (Weisbach, 1988).

⁹ We apply the adjustment for small samples proposed by Windmeijer's (2005). Since our sample size is not very large, the Windmeijer proposal improves the robustness of our results and avoids any potential downward bias in the estimated asymptotic standard errors.

¹⁰ On the advisory role of non-executive, independent directors see, inter alia, Daily and Schwenk (1996), Lawler et al. (2002), Fich (2005).

There is strong evidence that firms where one person occupies the positions of both the chairman and the CEO adopt higher risk-taking practices. This finding is consistent with the argument that handing one person a lot of power (chairman and CEO positions) makes it easier for that person to abuse their power and engage in riskier activities (O'Sullivan, 2000). CEO duality (when CEO chairs the board) restricts the information flow to other board directors and hence reduces board's independent oversight of manager (Fama and Jensen, 1983a; Jensen, 1993). In the Anglo-Saxon model of corporate governance, the dual appointment of chairman and CEO is seen to give too much power to the individual and this can make it easier to reach a decision that results in fraudulent actions and decisions that are not in the best interests of the minority shareholders (Jensen, 1993; Chen et al., 2006; Pathan, 2009). Forker (1992) asserts that a dominant personality in both roles poses a threat to monitoring quality and is detrimental to the quality of disclosure.

Concentrated ownership is negatively correlated to the risk-taking process. In the case of concentrated ownership, shareholder and manager interests become more aligned. These large shareholders should have both the incentive and the power to monitor the firm's operations and management effectively. Prior research provides evidence that managers, when left unmonitored, are more likely to manage earnings, commit fraud, or make suboptimal investment decisions (e.g., Biddle and Hillary 2006; Hope and Thomas 2008). Thus, shareholder monitoring is an important mechanism by which firm risk can be reduced. As the percentage of ownership by individual shareholders increases (concentration increases), their incentives for monitoring management increase as it is economically more feasible for any individual shareholder to incur significant monitoring costs (Hope et al., 2011). As managers do not bear the full costs of their decisions, it is assumed that managers try to carry out projects that maximize their private benefits which are not necessarily in the interest of the shareholders (risky, inefficient). This practice gets even worse with falling ownership concentration due to the well-known free rider problem. Moreover, small shareholders often lack the necessary knowledge and industrial expertise to control the management effectively (Hart, 2001).

The quality and integrity of the audit process is considered can also limit risk-taking practices. To proxy for the quality and integrity of the audit process we use the total audit fees charged to the firm divided by the total revenues of the firm and the percentage of the audit committee made up of outside independent directors. Independence in audit committees reduces risk-taking practices. Increasing the independence of audit committees

enhances the credibility of audited financial statements for the benefit of shareholders (Cohen et al., 2000). Quality financial information can be viewed as an element of corporate governance in that greater disclosure and financial transparency reduces information asymmetries between the firm and its shareholders than can reduce risk. The more independent the committee members, the better able it will be to monitor effectively the management. To the extent that better monitoring of the financial reporting process leads to less information risk or reduces management's tendencies to over invest, firm has lower risk (Pathan and Skully, 2010). We find that firms that have a high proportion of non-executive directors on the board are less engaged in risk. This evidence is consistent with outside directors monitoring the actions of managers and thus helping deter fraudulent acts.

Prior empirical evidence by Klein (2002), Beasley (1996), and Peasnell et al. (2000) support the conventional wisdom that audit committees more effectively carry out their oversight of the financial reporting process if they include a strong base of independent outside directors. Cadbury (1992) recommended the independence of audit committees to ensure that the relationship between auditors and management remains objective and that the auditors are able to put their views in the event of any difference of opinion with management. In this vein, external auditors are able to discuss matters arising from the audit process with non-executive board members and express their opinions on management policies, free from managerial influence while non-executives are expected to place a greater emphasis on the extent and quality of the audit (Turley and Zaman, 2004).

There is strong dependence between the auditing fees and the risk taking. Imperfect information on the quality of management and the value of the firm results in greater agency risk. The greater the agency problem, the more work the auditor must perform to ensure accurate financial statements and hence, the more the auditor charges. To the extent that companies in settings with high agency problems are able to signal more credible reporting, financing will be less costly and more accessible. Firms can signal this credibility with an audit. Combining the arguments that audit fees primarily reflect effort and that auditors consider agency conflicts in assessing the accuracy of financial statements, we predict that audit fees increase in settings where agency costs are higher. In capturing the extent of auditor investigation, it is reasonable to assume that more investigation will require more audit hours and/or the use of more specialized audit staff—resulting in higher fees. Moreover, higher quality auditors are expected to charge a premium for their expertise (Chan et al., 1993). On the other hand, effective audit

committees undertake more monitoring which (Zaman et al., 2011).
results in wider audit scope and higher audit fees

Table 2. Risk-taking and corporate governance

Dep var:RISK	I	II	III	IV
Lagged RISK	0.479***	0.462***	0.396***	0.478***
BS	-0.135**	-0.179**	-0.122***	-0.128***
BC	0.133***	0.127***	0.139***	0.145***
BM	0.109***	0.107***	0.148***	0.102***
CD	-0.123**	-0.129***	-0.113**	-0.127***
CT	0.089	0.096	-0.089	-0.063
AF	-0.107***	-0.123***	-0.112***	-0.132**
IAC	0.198**	0.185***	0.187**	0.201***
OI	0.155**	0.148***	0.129***	0.157***
SIZE	0.182***	0.184***	0.155***	0.179***
BI	-0.085**	-0.074***	-0.069***	-0.081**
LIQ		-0.055***	-0.065***	-0.049***
GDP		0.018**	0.013**	0.014**
INF		0.110	0.021	0.125
D _{year}			-0.131*	-0.142**
Food, beverages, tobacco				0.023*
Chemicals, plastics				-0.145***
Metals, metal products				0.008*
Gas, water, electricity				-0.178**
Construction				0.017**
Wholesale, retail trade				0.241**
Hotels, restaurants				0.103*
Technology, computers				-0.137***
Health, pharmaceuticals				-0.069***
Constant	-0.025*	-0.132**	-0.023***	0.077
AR(1)	<i>z</i> =-7.88	<i>z</i> =-7.89	<i>z</i> =-7.26	<i>z</i> =-7.27
p-value	0.000	0.000	0.000	0.000
AR(2)	<i>z</i> =0.56	<i>z</i> =0.35	<i>z</i> =0.43	<i>z</i> =0.66
p-value	0.575	0.725	0.667	0.510
Sargan	95.79	94.85	71.61	98.02
p-value	0.342	0.315	0.322	0.417
Wald test	131.47	133.01	120.17	139.21

Note: RISK: (Capital-to-assets ratio + return on assets)/standard deviation of return on assets; BS: board size; BC: board composition; BM: Board Meetings; CD: dummy variable for the CEO duality; CT: CEO tenure; AF: Audit fee; IAC: Independence of audit committee; OI: independence indicator; SIZE: natural logarithm (total assets); BI: business model innovation; LIQ: liquid assets/total assets; GDP: GDP per capita; INF: inflation rate; D_{year}: yearly dummy variable; D_{IND}: dummy variable for the industry sector. AR (1): Arellano-Bond test that average autocovariance in residuals of order 1 is 0 (H₀: No autocorrelation); AR (2): Arellano-Bond test that average autocovariance in residuals of order 2 is 0 (H₀: No autocorrelation); Sargan: The test for over-identifying restrictions in GMM dynamic model estimation. The ***, **, and * indicate 1 per cent, 5 per cent and 10 per cent significance levels, respectively.

Boards that exhibit a stronger monitoring focus will demand a higher quality audit resulting in greater audit effort by the auditor and in turn, higher fees. The other perspective treats audit fees as a by-product of a production function (Simunic,

1984). This implies that if governance mechanisms are strong, external auditors are likely to respond to the reduced risk with a decrease in audit effort which would in turn result in lower audit fees (Zaman et al., 2011). This suggests that auditors

charge a premium for auditing companies with greater stock market volatility, presumably due to the higher risk of such companies experiencing financial distress (and increasing the risk of subsequent investigation of the auditor's work).

As business-activity variables, we test the impact of business innovation (Iwasaki, 2008). Performing an intensive R&D/innovation strategy encourages companies to take more risk. Complex firms such as those that are diversified across industries, large in size, or have high leverage are likely to be more risky. Generally, information asymmetry is high for firms with high stock return volatility (Fama and Jensen, 1983a), high growth potential (Boone et al., 2007; Linck et al., 2008), and high R&D expenditures (Boone et al., 2007; Coles et al., 2008). Large firms face higher visibility and scrutiny (Beck et al., 2005). Our results show that GDP per capita has a negative impact in risk taking activities, implying that an increase in GDP lowers total costs. Finally, the results for industries vary significantly. Food industry, construction, retail trade, hotels and education seem to entail lower risk while chemicals, electricity, technology and pharmaceutical industries are associated with higher levels of risk. Such industries operate in extremely dynamic environments in which technological development is rapid and product life-cycle is quite often short. Measures of the scope and complexity of the firm's operations, including firm size is positively related to risky practices. High leverage as was expected increases risk. Turley and Zaman (2004) suggest that higher leverage increases debtholders' need to monitor managers.

5. Conclusions

Recent financial crisis has brought corporate governance at the forefront of academic and supervisory attention. Corporate governance mechanisms and their impact on firm risk-taking constitutes an indispensable and, at the same time, prevalent theme of the corporate governance discussion. Using a sample of industry-wide UK firms over 2002-2009, we specified an empirical framework to investigate the effect of corporate governance, organizational and country level determinants on firm risk-taking. Our results suggest that larger board systems with more executives increase risk-taking practices in a firm. After introducing industry dummies, we conclude that certain industries such as chemical, pharmaceutical and technology are associated with more intensive risk processes. We find that board meeting frequency as well as independence in audit committees reduce risk. Concentrated ownership seems to be another mechanism to reduce risk-

taking policies. Finally, CEO duality appears less able to control risk.

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