



## The Corporate Governance–Risk Taking Nexus: Evidence from Insurance Companies

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# The Corporate Governance–Risk Taking Nexus: Evidence from Insurance Companies

## Abstract

This study examines the impact of internal corporate governance mechanisms on insurance companies' risk-taking in the UK context. The study uses a panel data of all listed insurance companies on FTSE 350 over the 2005-2014 period. The results show that the board size and board meetings are significantly and negatively related to risk-taking. In contrast, the results show that board independence and audit committee size are statistically insignificant, but negatively related to risk-taking. The findings are robust to alternative measures and endogeneities. Our findings have important implications for investors, managers, regulators of financial institutions and effectiveness of corporate governance reforms that have been pursued.

**Keywords:** Agency Theory; Corporate Governance; Insurance Companies; Risk-Taking; UK.

## 1. Introduction

This study examines the impact of internal corporate governance mechanism on risk-taking during the period 2005 to 2014 in UK insurance companies. Insurance companies' activities are opaque and complex, since they depend on complex assumptions, including mortality rates, upcoming expenses, and interval and discontinuance percentages, in addition to impending investment yields (Adams & Jiang, 2016; Boubakri, 2011). As a result, insurance companies need strong governance, as well as effective accounting and financial reporting standards, to enable proper insights into the company's financial position. However, the World Bank and IMF highlight corporate governance (CG) as a major defence in the insurance sector (Cheng et al., 2011; Eling & Marek, 2014). In addition, the EU introduced and approved Solvency II in 2009. Solvency II ensures that a firm's governance and risk management method is acceptable (Boubakri, 2011). We focus on insurance companies because the ownership construction of different insurers offers an interesting setting in which to investigate the effect of CG on insurer's risk-taking (Cheng et al., 2011; Maffei et al., 2014; Mayers & Smith, 2010). Insurance companies were not protected from the recent crisis, and the turmoil of the American Insurance Group (AIG) was blamed on weak CG, as well as extreme risk-taking. The financial crisis revealed weaknesses in executive compensation, board of directors' responsibilities and the significance of risk management, leading to an enormous consideration of the different categories of current CG mechanisms that could reduce risk-taking (Adams & Jiang, 2016; Boubakri, 2011; Mokhtar & Mellett, 2013; Nahar, 2004; Laeven & Levine, 2009; Calomiris & Carlson, 2016).

Despite the fact that the insurance sector in the UK is smaller than the UK banking sector, the insurance sector is large with regard to the overall economy. The UK has about 600 insurance firms, whose total investments were estimated to be around £1.9 trillion as at December 2014. This equates to 40% of the assets of UK banks and is equal to the total value of UK GDP. Furthermore, the insurance sector in the UK is one of the world leaders, since it is the third largest insurance market worldwide, and UK insurance firms also gain a third of their revenue from overseas (French, Vital & Minot, 2015; Adams & Jiang, 2016). Insurance firms also play a great role in stabilising the financial system of the economy. Although insurance firms were to some extent more successful in facing the financial crisis than several other sectors, strong governance and high standards of accounting and financial reporting are essential to enabling an open and robust financial system, which can assist and support the economy's needs. By enhancing CG, insurers can safeguard their companies and individuals

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3 from risks and increase the economy's resilience (Adams & Jiang, 2016; Afrifa &  
4 Tauringana, 2015; Boubakri, 2011). Overall, these major roles performed by the insurance  
5 sector in the UK are accompanied by many governance reforms, and statutory modifications  
6 that challenge its business models (Elmagrhi et al., 2016, 2017), and these factors have  
7 motivated this study.  
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11 Debatably, there have been substantial improvements to the UK CG Code nearly every  
12 year. The latest worldwide financial crisis places greater emphasis on the need for effective  
13 CG structures and systems towards ensuring a firm's continued existence. Accordingly, the  
14 UK CG Codes of 2010, 2012, 2014, 2016 and 2018 (forthcoming) have clarified the role of  
15 the board of directors in adding value to the firm. The FRC (2012) indicated that an active  
16 board should work towards increasing and improving the firm's values, behaviours and  
17 culture. The latest UK CG Code, launched in October 2016, is based on the 'comply or  
18 explain' approach (FRC, 2014). It aims to simplify effective, innovative and prudent  
19 management to achieve long-term growth for companies (FRC, 2014). Given the significance  
20 of CG, some may assume that the sound risk-taking of insurance companies is connected to  
21 sound CG. However, as a result of the complexity and opacity of such companies, this does  
22 not directly answer the question of which components of CG will increase (or shrink) risk-  
23 taking.  
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27 Thus, this study contributes to current research by analysing the effects of insurers'  
28 corporate governance environment on their risk-taking behaviour in the UK context,  
29 especially after the introduction of Solvency II and CG reforms. A considerable quantity of  
30 literature has been published on CG and risk-taking, but empirical evidence for the insurance  
31 sector, especially in the UK context, remains limited. Therefore, this study will shed light on  
32 CG practices and their impact on UK insurance companies' risk-taking. Specifically, the  
33 study contributes to the existing literature by providing evidence on the effect of board  
34 structures, such as audit committee, board independence and board size, on risk-taking.  
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38 The remainder of the study is structured as follows. Section 2 3 presents the theoretical  
39 framework. Section 3 reviews the literature on CG and risk-taking. Section 4 outlines the  
40 research design. Section 5 reports and discusses the empirical results. Section 6 concludes.  
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## 43 44 45 46 47 48 49 50 51 **2. Theoretical framework**

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53 CG in insurance companies differs from that of non-financial companies because of the  
54 complexity and size of insurers, as well as the wide range of stakeholders (e.g., shareholders,  
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3 customers, employees, regulators and tax authorities) (Adams & Jiang, 2016; Bhimani,  
4 2009). Additionally, it can be argued that financial authorities, the government, investors and  
5 academics tend to worry about a firm's performance if directors become self-interested  
6 instead of creating value for shareholders (Pass, 2008). Agency theory expects that strong CG  
7 systems have a controlling role over directors' behaviour, particularly if the board of directors  
8 is large, and if its members assign appropriate time for the companies that they are  
9 independent directors of (Adams & Jiang, 2016; Boubakri, 2011; Fama & Jensen, 1985).  
10 Agency theory suggests that strong CG mechanisms offer regular controls that ensure  
11 dependable and true performance; and therefore, strong CG systems can increase value to  
12 agents by periodically confirming and appraising insurance companies' management plans  
13 and strategies (Bhimani, 2009; Jensen & Meckling, 1976). To decrease unprincipled  
14 managerial performance and diminish agency charges, agency theory suggests that a large  
15 board of directors, appropriate time for control, the presence of independent members and the  
16 existence of an audit committee can all enhance the monitoring and, consequently,  
17 performance of a firm and contribute to stockholder wealth (Adams & Jiang, 2016; Hardwick  
18 et al., 2011; Hines et al., 2015). Eisenhardt (1989) argues that managers have different  
19 interests and goals compared to shareholders with regard to profit maximization. Even if their  
20 goals are not different, managers and shareholders may have differing opportunistic  
21 behaviour. As a result, with the aim of protecting shareholders' interests, it is necessary for an  
22 appropriate and a suitable CG structure to be recognised (Haniffa & Hudaib, 2006).

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35 The purpose of CG mechanisms, therefore, is to moderate agency problems and confirm  
36 that managers' performance is in line with shareholders' interests (e.g., Nahar et al., 2016;  
37 Rashid & Islam, 2014). The Cadbury Code in the UK recommends a set of significant  
38 methods for bringing the actions of managers into line with shareholders' interests. These  
39 include, for example, improving the responsibility and transparency of companies. The active  
40 construction of CG codes for the UK was designed to support the involvement of non-  
41 executive directors and encourage audit committees to embrace their responsibilities because  
42 of their outside knowledge and skills (Fama & Jensen, 1983). Similarly, agency theory  
43 argues that the board of directors has a monitoring function; it is able to provide active  
44 observation of executive directors and to launch strategies which will accordingly be capable  
45 of benefitting the shareholders. Therefore, a board is regarded as a key tool which can  
46 indicate the success of a firm. Hence, CG best practices are organised to safeguard the  
47 boards' actions and tasks from any unregulated influence, and to consequently decrease  
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agency costs associated with these tasks by reducing information asymmetry (Spira & Page, 2003).

### 3. Empirical literature and hypotheses development

Regardless of the large number of previous studies on various aspects of CG, evidence about the connection between CG and risk-taking is rare. In the next sections, this study will evaluate the previous empirical and theoretical literature regarding relationship between CG structures and risk-taking in order to clarify the gap in knowledge regarding this connection and develop a number of hypotheses.

#### 3.1 Board size and risk-taking

Board size plays a major role in the relationship between CG and risk-taking (Adams & Jiang, 2016; Bozec & Dia, 2017). Adams and Jiang (2016) argue that having a stronger board of directors can have a moderating role on managerial behaviour if the board of directors is large, especially where they consist of highly qualified and knowledgeable members. Therefore, a strong board of directors can increase value to agents by periodically reviewing and appraising insurance companies' management plans and strategies (Bhimani, 2009; Jensen & Meckling, 1976; Laas & Siegel, 2013). However, some previous studies have argued that a large board may lead to delays in decision-making, as well as conflicts and time-wasting for the board (Fama & Jensen, 1985; Jensen, 2001). In particular, Fama and Jensen (1983) propose that the board of directors should accept responsibility for monitoring management choices and performance, as well as agency problems between managers and stockholders. Cadbury (2002) claims that the most effective board size is between six and eight members, not including the chairman. However, Pathan and Faff (2013) have a different viewpoint; they suggest that a large board may face many problems, including poor communication and co-ordination, and thus impact negatively on their ability to monitor managers.

Previous empirical studies have examined the relationship between board size and risk taking, although they have in the main yielded mixed results. For example, Adams and Jiang (2016) explore the impact of board structure on insurance companies' risk-taking by selecting 92 insurance firms in the UK, and presenting 1,168 observations over 13 years from 1999–2012. The study finds a positive relationship between board size and risk taking. The positive relationship implies that larger boards with qualified and knowledgeable members have an enhanced moderating effect on managerial behaviour and decisions. Conversely, in a study of

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3 the performance of Bahraini insurance companies by Najjar (2012) over the 2005-2010  
4 period, they reported statistically insignificant relationship between board size and risk-  
5 taking. Additionally, Brick and Chidambaran (2010) examined the relationship between  
6 board size and risk-taking based on yearly observations of 5,228 firms in the USA during the  
7 1999–2005 period. The regression results indicate that there is no significant negative  
8 relationship between board size and risk-taking. Consequently, based on the above  
9 discussion, the first hypothesis for this study is:

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15 *H<sub>1</sub>: There is a negative relationship between board size and risk-taking.*

### 17 **3.2 Board meetings and risk-taking**

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19 The number of board meetings can affect a board's effectiveness (Vafeas, 1999),  
20 particularly when directors discuss the firms' difficulties and improve procedures and plans  
21 for the forthcoming year during board meetings, in addition to making strategic decisions  
22 (Barros et al., 2013). Theoretically, the frequency of board meetings can signify the extent of  
23 a board's accomplishments and the quality of its monitoring in detecting managers'  
24 misbehaviour, for instance risk-taking (Vafeas, 1999; Conger et al., 1998). Thus, it may be  
25 expected that increasing the number of board meetings will give rise to greater managerial  
26 monitoring by offering board members more opportunities to discuss corporate strategy and  
27 risks, which may ultimately influence a firm's performance positively (Vafeas 1999). On the  
28 other hand, increased board meeting frequency may not be necessarily useful to shareholders.  
29 Specifically, Vafeas (1999) argues that most board meetings are spent on routine tasks. For  
30 example, board meetings and management report presentations, which affect the extent and  
31 effectiveness of managerial monitoring are often costly to organise in terms of time, meetings  
32 fees, allowances and other expenses. Accordingly, Jensen (1993) recommends that the firm's  
33 operating context should be considered when determining board meeting frequency. From  
34 this discussion, the second hypothesis of the study is:

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45 *H<sub>2</sub>: There is a negative relationship between board meetings and risk-taking.*

### 48 **3.3 Board independence and risk-taking**

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50 Independent directors, with improved qualifications and competence, signals to  
51 stakeholders that firm's risk-taking properly reflects management choices, and that this  
52 performance is a trustworthy source for making investment judgments (Clarke, 2007). In  
53 contrast, organisations which are weak in terms of independent directors are likely to raise  
54 investors' doubts and result in more agency costs, and hence, reduce performance (Connelly  
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3 et al., 2011; Core, 2000; Tanda, 2015). Hence, agency theory highlights the importance of  
4 independent directors to mitigate the effects of various inconsistent interests (Adams & Jiang,  
5 2016; Li & Wearing, 2012; Solomon, 2010; Vafeas & Theodorou, 1998). More specifically,  
6 independent directors safeguard the interests of shareholders by employing CG principles  
7 (Bhagat & Jefferris, 2002). However, some scholars argue that boards consisting of a  
8 majority of independent directors may influence firms' performance negatively (Baysinger &  
9 Hookisson, 1990; Weir & Laing, 2000). Weir and Laing (2000) argue that independent  
10 directors often have less knowledge about the company and have limited time to offer in  
11 terms of monitoring managers, as well as difficulties in understanding the firm's  
12 complexities. Based on the above, the third hypothesis of this study is:

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20 *H<sub>3</sub>: There is a positive relationship between board independence and risk-taking.*

### 21 22 **3.4 Audit committee size and risk-taking**

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24 Previous literature suggests that the establishment of an audit committee in a specific  
25 company is an indication of increased board effectiveness and efficiency (Adams & Jiang,  
26 2016). Agency theory assumes that a strong audit committee with regular meetings of  
27 qualified and knowledgeable members can have a controlling role over directors' behaviour  
28 (Jermias & Gani, 2014). This can increase value to agents by periodically evaluating and  
29 appraising insurance companies' management plans and strategies (Adams & Jiang, 2016;  
30 Jensen & Meckling, 1976). Furthermore, agency theory suggests that an improved and strong  
31 audit committee can assist organisations to distinguish themselves from others through  
32 enhanced risk-taking behaviour (Connelly et al., 2011). Previous studies provide inconsistent  
33 results. For example, Jermias and Gani (2014) find a significant negative relationship  
34 between audit committee and risk-taking. On the other hand, Adams and Jiang (2016) find  
35 no significant relationship between audit committee and risk-taking. Hsu and  
36 Petchsakulwong (2010) show a significant negative relationship between audit committee and  
37 risk-taking. Accordingly, the final hypothesis is:

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47 *H<sub>4</sub>: There is a positive relationship between audit committee size and risk-taking.*



## 4. Research design

### 4.1 Sample and data considerations

The sample is the FTSE 350 insurance firms registered on the LSE as at April 2016. The FTSE 350 registered insurance firms have been selected as a sampling population for a number of reasons. Firstly, the UK insurance sector is the third biggest insurance sector in the world and the biggest in the whole of Europe (PWC, 2010). Secondly, the Royal Bank of Scotland faced a huge scandal during the financial crisis, which impaired its insurance subsidiary unit as result of weaknesses in CG (Adams & Jiang, 2016; Ho, Lai & Lee, 2013; Yeoh, 2010). Finally, this study uses all listed insurance companies. Table 1 presents the steps followed towards selecting the final sample of UK insurance companies.

INSERT TABLE 1 ABOUT HERE

### 4.2 Definition of variables and model specification

This study examines the influence of internal corporate governance mechanisms (CG), including board size, board meetings, board independence and audit committee on insurance firms' risk-taking (IRT) within the UK context. To achieve this aim, this study has collected data from two main sources. Firstly, all financial ratios and details regarding firm size were collected from the FAME database. Secondly, the corporate governance variables were collected from the companies' annual reports, which were obtained from the companies' websites. This study measures insurance firms' risk-taking by calculating the Z-score, which is the most frequently used ratio in prior studies (e.g., Boyd and Runkle, 1993; Fu et al., 2014; González et al., 2017; Laeven and Levine, 2009). Using return on assets and return on equity; the Z-score (*RT1*) is measured as follows:

$$z_{it} = \frac{ROA_{it} + \frac{EQ_{it}}{ITA_{it}}}{\sigma ROA_{it}} \quad (1)$$

While the Z-score (*RT2*) is measured as follows:

$$z_{it} = \frac{ROE_{it} + \frac{EQ_{it}}{ITA_{it}}}{\sigma ROE_{it}} \quad (2)$$

where  $ROA$  is the insurance firm return on assets,  $ROE$  is the insurance firm return on equity,  $\frac{EQ_{it}}{TA_{it}}$  is the ratio of total equity to total assets, and  $\sigma ROA_{it}$  is the insurance firm return on assets standard deviation. The  $Z$ -score is positively related to insurance firm stability and inversely related to risk taking. An insurance firm becomes “*insolvent when its asset value drops below its debt and the  $Z$ -score shows the number of standard deviations that a firm’s return has to fall below its expected value that can deplete equity and make the bank insolvent*” (Fu et al., 2014, p68)

To examine the influence of internal corporate governance mechanisms (CGMs), we gather data on risk-taking. For instance, risk-taking using  $ROA$  ( $RT1$ ) and/or risk-taking using return on equity ( $RT2$ ) are used as a proxy for risk taking. Internal corporate governance mechanisms ( $CGMs$ ) variables include board size ( $ICBS$ ), board of directors’ meetings ( $ICBM$ ), board independence ( $ICNEDs$ ), and audit committee size ( $ICACS$ ). Control variables include insurance firm’s size ( $ICTA$ ), and liquidity ( $ICL$ ). Thus, to examine the influence of CG on  $IRT$ , this study uses OLS regression as follows:

$$RT_{it} = \alpha_0 + \beta_1 ICBS + \beta_2 ICBM + \beta_3 ICNEDs + \beta_4 ICACS + \beta_5 ICTA + \beta_6 ICL + YEARS + \varepsilon_{it} \quad (3)$$

Where  $RT$  is used as a proxy for risk-taking.  $ICBS$  refers to board size,  $ICBM$  refers to board of directors’ meetings,  $ICNEDs$  refers to board independence,  $ICACS$  refers to audit committee size,  $ICTA$  refers to insurance firm’s size,  $ICL$  refers to liquidity,  $YEARS$  refers to dummies variables for each year from 2005 to 2014, and  $\varepsilon$  refers to random error.  $\alpha_0$  is the intercept, and  $\beta_i$  are the vectors of coefficient estimates. Table 2 summarizes the definition of variables.

INSERT TABLE 2 ABOUT HERE

## 5. Findings and discussion

### 5.1 Descriptive, univariate and bivariate analyses

Table 3 shows a summary of the descriptive statistics of the dependent and independent variables for each separate year over a ten year period from 2005 to 2014, with 117 firm-year observations. Table 3 shows that the average  $Z$ -score of the UK insurance companies

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3 decreased from 2008 onwards. For example, insurance company Z-score measured by return  
4 on assets (*RTI*) decreased from 1.08 percent in 2007 to an average of 0.82 percent in 2008.  
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6 This implies that financial stability decreased and risk-taking increased during this period.  
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8 Table 3 also reports the same pattern regarding insurance company risk-taking  
9 measured by return on equity (*RT2*). This result implies that the financial crisis that happened  
10 in 2007 affected the UK insurance sector.  
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16 With regard to internal corporate governance mechanisms, Table 3 reports that for the  
17 size of the insurance companies' board of directors, on average, the mean board size ranged  
18 from 11.33 to 12.58 members, which indicates that it was not affected by the 2007 crisis,  
19 apart from a slight increase in 2009. In addition, it can be noted that other internal corporate  
20 governance mechanisms, such as insurance company board meetings, insurance company  
21 board independence, and insurance company audit committee size follow the same pattern.  
22 For instance, the mean number of board meetings ranged from 8.00 to 9.55. Generally, the  
23 average number of board meetings was 8.50 over the ten years, with a slight increase to 9.55  
24 in 2007 due to the financial crisis. Similarly, the mean size of audit committee ranged from  
25 4.00 to 4.58 members; however, it can be noticed that the minimum mean during the ten  
26 years occurred in 2007. This could have been one of the reasons for the increase in risk-  
27 taking during that year; the observable decrease in audit committee size may reflect the  
28 monitoring level of those companies.  
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40 Table 4 reports the descriptive statistics for all variables included in the analysis. The  
41 mean value of *RTI* for the sample of UK insurers is 0.71. With respect to board size, the  
42 average board size was about 12 members (mean = 11.80), which is similar to a study carried  
43 out by Jermias and Gani (2014). Regarding board independence (*ICNEDs*), it can be seen that  
44 the mean value is 0.63 and ranges from 0.10 to 0.85 percent. These findings are consistent  
45 with Adams and Jiang (2016).  
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53 The Pearson parametric correlation has been used to explore the trend and significance  
54 of relationships between each two variables. Table 5 shows the Pearson correlation matrix.  
55 Notably, all correlation coefficients are below 0.65. This indicates that no series  
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3 multicollinearity are exist (Gujarati & Porter, 2009; Pallant, 2013). Table 5 shows that *RT1* is  
4 correlated positively and significantly with *ICBS* and *ICBM*. It can also be noted from Table  
5 5 that there is a negative relationship between control variable *ICL* and *RT*. Table 5 also  
6 shows that the relationships between *RT2* and independent variables *ICBS*, *ICFM*, *ICNEDs*  
7 and *ICACS* are correlated positively.  
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## 11 **5.2 Regression analyses**

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14 OLS regression has been used to examine the impact of internal CG mechanisms  
15 including board size of directors, number of board meetings, board independence and audit  
16 committee size on risk-taking calculated by *RT1* and *RT2*. The first hypothesis examines the  
17 relationship between board size and insurance company risk-taking. Table 6 shows that there  
18 is a positive and statistically significant relationship between insurance company board size  
19 (*ICBS*) and *Z*-score. In other words, the results indicate that there is a significant positive  
20 relationship between *ICBS* and the *Z*-score of UK insurance companies. This relationship  
21 suggests that bigger boards are associated with lower risk-taking than smaller boards. This is  
22 consistent with prior literature (e.g., Jermias & Gani, 2014; Brick & Chidambaran, 2010). For  
23 instance, the findings of Jermias and Gani (2014) also found a negative relationship between  
24 board size and risk-taking. The relationship between board size and risk-taking is, moreover,  
25 consistent with the view that due to greater expertise, a bigger board size offers extra effort in  
26 monitoring management (Cheng, 2008) compared with a smaller board size. Hence, based on  
27 this evidence, the first hypothesis is accepted, which indicates that larger boards are more  
28 effective in constraining managerial risk-taking.  
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39 The second hypothesis examines the relationship between the frequency of directors'  
40 board meetings and insurance company risk-taking. Table 6 shows there is a positive and  
41 statistically significant relationship between insurance company board meetings (*ICBM*) and  
42 insurance company *Z*-score measured by *ROA* and *ROE* (*t* of 6.561, *t* of 4.876, respectively).  
43 This implies that board meetings are positively related to financial stability measured by *Z*-  
44 score. In other words, the results show a significant negative relationship between *ICBM* and  
45 the risk-taking of UK insurance companies. This negative relationship suggests that an  
46 increased number of board meetings is associated with lower risk-taking than for boards that  
47 meet less frequently. This result is consistent with the findings of Priya and Nimalathasan  
48 (2013), who also found a negative relationship between board meetings and risk taking. By  
49 contrast, this result is inconsistent with the findings of Jermias and Gani (2014) and Hsu and  
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3 Petchsakulwong (2010), who document a statistically significant and positive relationship  
4 between board meetings and risk taking. Based on the evidence of this study, the second  
5 hypothesis is accepted, which indicates that increased number of board meetings is more  
6 effective.  
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10 The third hypothesis examines the relationship between board independence and risk  
11 taking. Table 6 shows there is a positive but statistically insignificant relationship between  
12 insurance company board independence (*ICNEDs*) and *Z*-score. Hence, based on this  
13 evidence, the third hypothesis is not supported. These results are consistent with previous  
14 literature from Vafeas and Theodorou (1998), Tornyeva and Wereko (2012), and Boyer and  
15 Stern (2012). For example, Vafeas and Theodorou (1998) explored the association between  
16 board structure and the risk-taking of UK firms. Based on 250 firms in 1994, they found a  
17 positive but insignificant relationship between *ICNEDs* and risk taking.  
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24 The fourth hypothesis examines the relationship between audit committee size  
25 (*ICACS*) and risk taking. Table 6 shows there is a negative relationship between the size of  
26 insurance companies' audit committees (*ICACS*) and risk taking, however such relationship is  
27 not significant. Hence, based on this evidence, the fourth hypothesis is not accepted, which  
28 indicates that insurance company audit committee size (*ICACS*) not affect risk-taking. This  
29 result is also consistent with previous literature from Adams and Jiang (2016), Hardwick et  
30 al. (2011), Tornyeva and Wereko (2012), and Vefeas and Theodorou (1998). For example,  
31 Hardwick et al. (2011) explored the impact of CG on insurance companies' efficiency  
32 performance in 744 UK insurance companies from 1994 to 2004 and found a positive though  
33 insignificant relationship between audit committee size and risk taking. Similarly, Adams and  
34 Jiang (2016) explored the impact of board structure on insurance companies' performance in  
35 1168 UK companies over 13 years from 1999–2012 and also found a positive but  
36 insignificant relationship between audit committee and risk taking. Finally, regarding the  
37 control variables, Table 6 shows there is a positive and statistically significant relationship  
38 between insurance company size (*ICTA*) and *Z*-score. This result is inconsistent with prior  
39 research. For example, Jermias and Gani (2014) examined the impact of firm size on  
40 insurance companies' risk-taking by collecting data from 1332 USA insurance companies  
41 over seven years from 1997 to 2004. They found a negative relationship between firm size  
42 and risk taking. Table 6 shows a negative and statistically significant relationship between  
43 insurance company liquidity (*ICL*) and risk taking. Thus, this indicates that an increase of  
44 liquidity value leads to a decrease of risk-taking for insurance companies.  
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### 5.3 Additional analyses

We carried out a number of further analyses to confirm the robustness of our findings. First, to test for the existence of any possible endogeneity, which has been argued to be a widespread problem in CG studies (Larcker & Rusticus, 2010), this study uses fixed effect regression model. Therefore, the model to be assessed is identified as:

$$RT_{it} = \alpha_0 + \beta_1 ICBS + \beta_2 ICBM + \beta_3 ICNEDs + \beta_4 ICACS + \beta_5 ICTA + \beta_6 ICL + \delta_{it} + \varepsilon_{it} \quad (4)$$

where, everything remains unaffected as identified in equations (1& 2) except that, we use  $\delta$  to refer to fixed effect. The results for Models 1 and 2 are reported in Table 7. These results are mostly similar to those reported in Table 6, suggesting that our findings are robust to possible endogeneity problems that may arise from omitted factors.

INSERT TABLE 7 ABOUT HERE

This study further implemented the 2SLS (two-stage-least-squares random-effects within estimator) to fitting panel data model (Baltagi & Deng, 2015). The results for Models 3 and 4 are reported in Table 7 are mostly similar to those reported in Table 6, suggesting that our results are robust to possible endogeneity problems. The minor increase in some coefficients' value of CG variables in Models 3 and 4 of Table 7 compared with those of Tables 6 are in line with previous studies which indicate that instrumented variables of CG variables are likely to predict risk-taking more powerfully than their un-instrumented variables (Larcker & Rusticus, 2010). This examination reinforces the need for CG reforms for financial firms, especially in the insurance industry.

## 6. Conclusion

This study examines the impact of internal corporate governance mechanisms on insurance companies' risk-taking during the period 2005 to 2014 in the UK. The results show a negative and statistically significant relationship among insurance company board size, frequency of board meetings and insurance company risk taking. The result is consistent with those of prior literature (e.g., Jermias & Gani, 2014; Brick & Chidambaran, 2010; Boyer & Stern, 2012). This study has contributed to existing research by investigating the relationship

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3 between corporate governance mechanisms and insurance companies' risk-taking, which has  
4 rarely been addressed by previous studies. In addition, the research has been undertaken in  
5 the UK setting, where despite having one of the largest insurance markets in the world, but  
6 has rarely been examined by past researchers. Despite the contributions presented above, this  
7 research has potential limitations that should be taken into consideration. The first possible  
8 limitation is associated with the sample. This research depends only on insurance companies  
9 listed in the 350 FTSE index.  
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15 Similarly, the results suggest that there is a negative relationship between corporate  
16 governance mechanisms (i.e., insurance company board size, insurance company board  
17 meetings, insurance company board independence and audit committee size) and risk-taking.  
18 Thus, this study suggests that corporate governance mechanisms reduce risk-taking by  
19 reducing *Z*-score measured by ROA and ROE. This study offers new possibilities for future  
20 research in a number of ways. First, future research may study or compare insurance  
21 companies' risk-taking in UK listed firms with those of other markets like the USA, Germany  
22 and China. In addition, it could be beneficial if future research were to take a sample from the  
23 European Union in order to determine what the factors that affect risk-taking are. Another  
24 avenue for future research would be to use other and broader measures for risk-taking. Also,  
25 examination of other corporate governance mechanisms is recommended (e.g., remuneration  
26 committee, risk committee and ownership concentration). Finally, despite the importance of  
27 secondary data, the utilisation of primary data, such as interviews may enrich future research.  
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**Tables****Table 1: Sample choice process**

Sample aspects on April 2016	No of firms	No of obs
Total firms in FTSE 350	350	3500
- Non-insurance firms in FTSE 350	335	3350
= Insurance firms in FTSE 350	15	150
- Exclude three insurance firms in FTSE 350 (because no data available for most of the years under study)	3	30
Final sample	12	120
Exclude three years of one insurance firm (because the company was established at the end of 2008)		3
Final number of observations		117

**Table 2: Definition of variables**

Variables	Abbrev	Measurement	Source of information
<b>Dependent variable: Insurance firms' risk taking</b>			
RT1	ZscoreROA	is the risk taking using ROA; The firm-level Z-score; a larger value means less overall firm risk and greater stability.	Annual report
RT2	ZscoreROE	is the risk taking using ROE.	Annual report
Return on assets	ICROA	Percentage of net income to total assets	FAME; Annual report
Return on equity	ICROE	Percentage of net income to total equity	FAME; Annual report
<b>Independent variables</b>			
Board size	ICBS	Total number of directors on the board	Annual report (CG section)
Board meetings	ICBM	Total number of board of directors' meetings	Annual report (CG section)
Board independence	ICNEDs	Percentage of non-executive directors to the total number of board of directors	Annual report (CG section)
Audit committee size	ICACs	Total number of audit committee members	Annual report (CG section)
<b>Control variables</b>			
Insurance company size	ICTA	Natural logarithm of total assets	FAME-Osiris
Liquidity ratio	ICI	Percentage of current assets to current liabilities	FAME-Osiris

**Table 3: Descriptive statistics for each year separately**

<b>Variables</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
<b>RT1</b>										
Mean	0.83	0.87	1.08	0.82	0.65	0.72	0.45	0.64	0.55	0.53
Std. Deviation	1.11	1.20	1.46	1.37	1.08	1.03	0.76	0.87	0.71	0.61
Minimum	0.10	0.12	0.06	-0.16	0.03	0.01	0.01	-0.15	-0.19	0.06
Maximum	3.61	3.92	4.12	4.00	3.67	3.01	2.29	2.54	2.14	1.82
<b>RT2</b>										
Mean	1.40	1.35	1.21	0.24	0.90	1.07	0.72	1.05	1.17	1.05
Std. Deviation	0.83	0.84	0.89	1.50	0.92	0.91	0.98	1.08	0.97	0.68
Minimum	0.20	0.29	0.27	-2.88	0.14	0.02	-0.01	-1.23	-0.40	0.33
Maximum	3.17	3.24	3.69	3.54	3.46	3.65	3.65	3.62	3.45	2.97
<b>ICBS</b>										
Mean	11.45	11.36	11.55	11.33	11.75	12.08	12.58	12.42	11.92	11.50
Std. Deviation	1.92	2.06	2.02	1.92	1.86	2.54	2.15	1.38	1.56	2.24
Minimum	9.00	7.00	9.00	9.00	9.00	9.00	9.00	11.00	10.00	8.00
Maximum	14.00	14.00	16.00	15.00	14.00	17.00	17.00	16.00	16.00	16.00
<b>ICBM</b>										
Mean	9.00	8.27	9.55	8.58	8.42	8.92	9.00	8.42	8.00	8.58
Std. Deviation	3.63	2.80	3.96	4.03	3.82	3.87	4.57	3.06	2.22	2.78
Minimum	4.00	4.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Maximum	14.00	11.00	18.00	17.00	15.00	19.00	19.00	15.00	11.00	14.00
<b>ICNEDs%</b>										
Mean	0.59	0.58	0.60	0.64	0.64	0.65	0.67	0.67	0.68	0.61
Std. Deviation	0.10	0.11	0.10	0.11	0.09	0.09	0.08	0.08	0.10	0.18
Minimum	0.45	0.41	0.46	0.45	0.50	0.53	0.54	0.53	0.50	0.10
Maximum	0.81	0.75	0.75	0.85	0.78	0.78	0.78	0.78	0.81	0.77
<b>ICACS</b>										
Mean	4.09	4.09	4.00	4.25	4.25	4.50	4.58	4.58	4.42	4.58
Std. Deviation	0.83	0.83	1.00	1.06	1.14	1.51	1.24	1.38	1.44	1.38
Minimum	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Maximum	6.00	6.00	6.00	6.00	6.00	7.00	7.00	8.00	8.00	8.00

**Table 4: Descriptive statistics for all variables**

<b>Variables</b>	<b>Mean</b>	<b>Median</b>	<b>Std. Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
RT1	0.71	0.21	1.02	-0.19	4.12
RT2	1.01	0.91	1.00	-2.88	3.69
ICBS	11.80	12.00	1.96	7.00	17.00
ICBM	8.67	9.00	3.43	4.00	19.00
ICNEDs (%)	0.63	0.63	0.11	0.10	0.85
ICACS	4.34	4.00	1.18	3.00	8.00
ICTA (000)	133541.41	35183.60	311761.57	593.00	3213260.00
ICL%	1.14	0.78	1.20	0.01	6.88

Notes: Variables are defined as follows: Risk taking using ROA (RT1), Risk taking using ROE (RT2), insurance company return on assets (ICROA); insurance company return on equity (ICROE); insurance company board size (ICBS); insurance company board meetings (ICBM); insurance company board independence (ICNEDs); insurance company audit committee size (ICACS); insurance company size (ICTA); and insurance company liquidity (ICL). Full definitions of these variables are presented above in Table 2.

**Table 5: Pearson correlation among all variables**

	RT1	RT2	ICBS	ICBM	ICNEDs	ICACS	ICTA	ICL
RT1	1							
RT2	0.65**	1						
ICBS	0.33**	0.06	1					
ICBM	0.38**	0.15	0.068	1				
ICNEDs	0.05	0.11	-0.074	0.098	1			
ICACS	0.21*	0.20*	0.081	0.090	0.272**	1		
ICTA	0.25**	0.13	0.197*	0.519**	0.021	0.132	1	
ICL	-0.18*	-0.21*	-0.026	0.107	0.149	0.123	0.099	1
	0.00	0.55	0.463	0.003	0.294	0.158	0.290	0.005

Notes: Variables are defined as follows: Risk taking using ROA (RT1); risk taking using ROE (RT2); insurance company board size (ICBS); insurance company board meetings (ICBM); insurance company board independence (ICNEDs); insurance company audit committee size (ICACS); insurance company size (ICTA); and insurance company liquidity (ICL). Full definitions of these variables are presented above in Table 2.

\*\* Significant at the 0.01 level.

\* Significant at the 0.05 level.



**Table 6: The impact of internal corporate governance mechanisms on risk taking**

OLS regression Variables	Dependent variable: RT1			Dependent variable: RT2		
	t	P> t	VIF	t	P> t	VIF
<b>Panel A: Independent : Internal Corporate Governance Mechanisms</b>						
ICBS	3.927***	0.000	1.057	1.701*	.092	1.057
ICBM	6.561***	0.000	1.388	4.876***	.000	1.388
ICNEDs	0.662	0.510	1.111	0.879	.381	1.111
ICACS	0.092	0.927	1.108	1.760*	.081	1.108
<b>Panel B: Control variables</b>						
ICTA	4.216***	0.000	1.439	7.285***	.000	1.439
ICL	-2.181**	0.031	1.041	-1.343	.182	1.041
Constant	6.307***	0.000	-	5.511***	.000	-
D.Year	Included			Included		
F value	10.770***			10.231***		
R <sup>2</sup>	0.372			0.360		
Adjusted R <sup>2</sup>	0.338			0.325		
Durbin-Watson	2.120			2.348		

Notes: Variables are defined as follows: Risk taking using ROA (RT1), risk taking using ROE (RT2), insurance company board size (ICBS); insurance company board meetings (ICBM); insurance company board independence (ICNEDs); insurance company audit committee size (ICACS); insurance company size (ICTA); insurance company liquidity (ICL); and dummy variable for each year from 2005 to 2014 (D.Year). Full definitions of these variables are presented above in Table 2.

\*\*\* Significant at the 0.01 level.

\*\* Significant at the 0.05 level.

\* Significant at the 0.10 level.

**Table 7: The impact of internal corporate governance mechanisms on risk taking**

Variables	Fixed effects				2SLS			
	(1) RT1		(2) RT2		(3) RT1		(4) RT2	
	t	P> t	t	P> t	z	P> z	z	P> z
<b>Panel A: Independent : Internal Corporate Governance Mechanisms</b>								
ICBS	4.359***	0.000	3.463***	0.000	4.025***	0.000	4.589***	0.000
ICBM	3.615***	0.000	0.82	0.414	4.713***	0.000	1.49	0.136
ICNEDs	0.64	0.524	0.26	0.796	0.55	0.580	0.30	0.762
ICACS	0.38	0.705	0.36	0.719	0.32	0.748	0.50	0.618
<b>Panel B: Control variables</b>								
ICTA	11.39***	0.000	11.99***	0.000	10.32***	0.000	11.74***	0.000
ICL	-1.02	0.310	-0.87	0.386	-1.19	0.234	-0.99	0.322
Constant	2.40**	0.019	2.04**	0.044	2.39**	0.017	2.17**	0.030
Fixed effect	Year		Year		Year		Year	
clustering	Firm		Firm		Firm		Firm	
F value	23.24		25.42		115.37		145.76	
$(\chi^2)$								
R <sup>2</sup>	0.5872***		0.6088***		0.5829***		0.6069***	

Notes: Variables are defined as follows: Risk taking using ROA (RT1); risk taking using ROE (RT2); insurance company board size (ICBS); insurance company board meetings (ICBM); insurance company board independence (ICNEDs); insurance company audit committee size (ICACS); insurance company size (ICTA); insurance company liquidity (ICL); and dummy variable for each year from 2005 to 2014 (D.Year). Full definitions of these variables are presented above in Table 2.

\*\*\* Significant at the 0.01 level.

\*\* Significant at the 0.05 level.

\* Significant at the 0.10 level.