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Board Characteristics, Ownership Structures and Gender Diversity on Bank Risk-taking Behavior of Banks in Ghana

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Alhassan Musah
Takoradi Technical University,
P. O.Box 256, Takoradi. Ghana
Email: alhassan.musah@ttu.edu.gh

Bismark Okyere
Ho Technical University Business School,
P. O. Box HP217. Ho, Ghana
Email: bokyere@htu.edu.gh

Gertrude Naa Adoley Boye
University of Ghana Business school,
P.O. Box LG78, Legon Accra, Ghana
Email: boye.gertrude@yahoo.com

&

Christian Thywill Dodor
Ho Technical University Business School,
P. O. Box HP217. Ho, Ghana
Email: cdodor@htu.edu.gh

Abstract

The study examined the effect of board characteristics, ownership structure and gender diversity on bank risk taking behaviour in Ghana. The study sampled 15 commercial banks in Ghana over a 10-year period, where data was analysed using descriptive statistics, correlation analysis and regression analysis. The analysis showed that board characteristics such as board size, the proportion of non-executive directors on the board, board chairperson independence as well as female representation on the board of banks in Ghana are significant determinants of bank risk taking behaviour. The result shows that while board size, the proportion of non-executive directors on the board and female representation are associated with higher risk-taking behaviour, board chairperson independence is associated with lower bank risk-taking behaviour. On the ownership variables the study found that foreign ownership and government ownership were significant determinants of bank risk taking behavior while managerial ownership was statistically insignificant. On the significant ownership structure variables, foreign ownership reduces bank risk-taking whiles government ownership increases bank risk-taking level. Female CEO was statistically insignificant even though it is positively associated with bank risk-taking level. The results show that corporate governance variables and ownership structures are significant determinants of bank risk-taking behaviour.

Keywords: *Risk-taking behavior, Board Characteristics, Gender diversity, Ownership structures, Banks, Ghana*

Introduction

Banks play a significant role in driving economic activities in a country, especially in developing and emerging markets where their stock markets are not well-developed (Arouri *et al.* 2014). Banks' behaviour in terms of their risk appetite is largely dependent on the governance system in place at the bank, the industry and the risk appetite of its key management officials (Abdi *et al.* 2021; Felicio *et al.* 2018; Faccio *et al.* 2016; Pathan, 2010). Decisions about how a bank manages its risk are linked to the quality of management and the quality of the bank's board in monitoring management behaviour (Srivastav & Hagendoff, 2016). Bopkin (2016) argues that excessive risk-taking by banks could spell doom for any economy especially, for a developing country like Ghana. Banks' failure negatively affects other parts of the economy because of their fiduciary roles and the need to take an interest in their risk-taking behaviour. Previous studies have shown that bank risk-taking behavior has serious

consequence on other sectors of the economy and as such, worth investigating (Srivastav & Hagendoff, 2016). The excessive risk-taking behaviour of banks is believed to have partly contributed to the financial crisis of 2008 and have since attracted much attention from researchers and policymakers (De Young *et al.* 2013; Abdi *et al.* 2021). As a result, a new strand of literature focused on how corporate governance systems could have contributed to bank risk exposure or risk-taking behaviour (Srivastav & Hagendoff, 2016). A significant part of these studies has focused on the bank board's role in either controlling bank risk-taking or promoting bank risk-taking (Kashyap *et al.* 2008; Kirkpatrick, 2009; Bebchuk & Spamann, 2009; Srivastav & Hagendoff, 2016). It is important to note that commercial banks in most jurisdictions are heavily regulated, extending their governance structures and systems (Bopkin, 2016; Mehran *et al.*, 2011).

The ownership structure is another important dimension in studying bank risk-taking behaviour in recent times (Bopkin, 2016; Kusi *et al.* 2018; Dong *et al.,* 2014). The theoretical and empirical literature has shown that bank performance and their risk-taking behaviour have a significant association with controlling shareholders (John *et al.,* 2008; Barry *et al.,* 2011). Banks in Ghana have varying ownership structures comprising foreign ownership, managerial ownership, government ownership among others. The literature has not established the extent to which ownership structures can influence bank risk-taking behaviour among commercial banks in Ghana.

Several studies have examined the effect of various corporate governance structures, especially board characteristics on bank risk-taking behaviour (Faccio *et al.* 2016; Srivastav & Hagendorff, 2016; Stulz, 2015; Silla *et al.* 2016; Sullivan & Spong, 2007; John *et al.,* 2008; Fakhrumas & Ramly, 2017; Wang, 2012; Suu & Liu, 2014; Felicio et al., 2018). The results of these studies have been inconclusive in terms of which board characteristics affect bank risk-taking behaviour positively or negatively. Moreover, these studies have focused on developed and emerging economies with little from Africa or even the Ghanaian context. Since corporate governance structures are influenced by regulation in the country, it is important to examine this relationship in the Ghanaian context. This is especially more important as the Bank of Ghana report on the collapsed financial institutions blamed poor corporate governance and poor risk management as contributing factors in the financial sector crisis.

Furthermore, studies on corporate governance and the risk-taking behaviour of firms argue that gender diversity plays an important role as gender define the risk appetite of people (Faccio *et al.* 2016). Even though gender diversity is considered part of corporate governance, it is usually analysed separately because of its importance in modern corporate governance (Musah *et al.,* 2019; Faccio *et al.,* 2016). These studies separate gender diversity on boards and female CEOs; they argue that female CEOs are believed to have a significant impact and hence must be included in gender diversity variables (Sila *et al.* 2016; Berger et al. 2014). Faccio et al. (2016) argue that female leadership roles like the CEO or even the board rooms have a different orientation on risk-taking and are likely to affect the banks' risk-taking behaviour. Female representation in the banking sector at the board room and CEO level in Ghana remains very low (Musah et al. 2019). The inclusion of gender in the analysis of bank risk-taking behaviour is based on evidence that there are differences in risk aversion among gender (Faccio *et al*., 2016; Bertrand & Pan, 2013; Gneezy *et al*., 2009). Evidence of gender diversity on bank risk-taking behaviour shows contradicting results with almost all the studies concentrated in western countries and recently on emerging markets like China and South Korea.

Also, studies have shown that ownership structures of various forms affect firms' risk appetite of in different countries (Torku & Laryea, 2021; Bopkin, 2016; Dong *et al*., 2014; Laevan & Levine, 2009). Dong et al. (2014) argue that ownership structure and bank risk-taking are among the least researched areas but admit that the few studies in the area have produced mixed results. The recent banking crisis in Ghana had an aspect of ownership control that resulted in alleged breaches of good and sound credit management policies which exposed some banks to significant risk (Kusi *et al*., 2018; Torku & Laryea, 2021). For instance, the Bank of Ghana report on the insolvent banks argued that the poor corporate governance result from owners and directors circumventing governance structures and credit policy of the banks (BoG, 2017; Benson, 2019). This means that even where corporate governance structures exist, ownership can affect the effective running of the governance structures, resulting in unnecessary risk-taking behaviour by the banks. This development makes the conduct of this study very timely amid the ongoing debate on how ownership influence in bank governance could contribute to its risk-taking behaviour. It can be established that corporate governance studies have not focused on how board characteristics, gender diversity and ownership structure influence

bank risk-taking behaviour in Ghana. This study is conducted to address these discrepancies in the literature using a sample of Ghanaian Banks.
The study makes significant contributions to literature, policy and practice. In the area of literature, the study extends previous studies on corporate governance and firm outcome in Ghana to include bank risk-taking behaviour. The study further extends the literature on how gender diversity and ownership structure influence firm outcomes in Ghana, focusing on bank risk-taking behaviour that has received little attention in our context. The study extends the work of Bopkin (2016), which focused on general governance and bank regulation on bank risk-taking to include board structures, ownership structures and gender diversity and bank risk-taking behaviour in Ghana. The study will inform policy-makers like the Bank of Ghana on which governance structures, ownership structures and gender diversities are associated with higher or lower bank risk-taking behaviour. The result could significantly contribute towards the Central bank's periodic corporate governance reforms in the banking sector to reduce excessive bank risk-taking. The result will also be useful to stakeholders in the banking sector on which variable influences bank risk-taking behaviour which should influence their future appointments into boards and gender diversity policy.

Empirical Review and Hypothesis Development

Board Size and Bank-Risk Taking Behaviour

The monitoring power of a bank's board has a significant influence on the risk-taking behaviour of the bank, even though there is no consensus in the literature whether this can be achieved using a smaller board or larger boards (Moussa, 2019; Aslam & Haron, 2021). The study by Pathan (2009) found evidence of a positive relationship between stronger boards and bank risk-taking where stronger boards were measured as smaller board size and less restrictive board using a sample of 212 large banks in the United States. On the other hand, in their study, Brick and Chidambaran (2008 found a negative association between strong boards and bank risk-taking behaviour. Arouri et al. (2014) found a positive and significant association between board size and higher z-scores or bank risk-taking behaviour using a sample of Banks from Gulf Cooperative Council countries. Himaj (2014), in a review paper on corporate governance of banks and its impact on risk and performance concluded the conflicting result of the effect of board size on bank risk and

performance suggest that board size does not matter. However, it can be argued that a larger board will have stronger monitoring power over management, reducing management's ability to take a certain risk. Also, Rachdi and Ameur (2011) argued that banks with larger board sizes increase the use of sophisticated financial instruments to protect against risk, which justifies excessive risk-taking by management while maintaining stability. In a related study, Erkens *et al.* (2012) found a statistically insignificant association between board size and bank risk-taking based on a sample of banks in the United States.

Similarly, Berger *et al.* (2014) also reported a statistically insignificant association between board structure and bank risk-taking in the United States of America. Finally, Kusi *et al.* (2018) found a negative association between board size and bank risk-taking among commercial banks in Africa. In line with the above evidence, the study hypothesises that;

H1: There is a negative relationship between board size and bank-risk taking behaviour in Ghana.

Board Independence and Bank Risk Taking Behaviour

Corporate governance studies have found a significant relationship between board composition and firm outcomes (Bopkin, 2016; Musah et al. 2019). A high proportion of independent directors improve the quality of board monitoring, enhancing the quality of corporate governance for banks (Musah et al. 2019). Akhigbe and Martin (2008) examined the effect of the passage of the Sarbanes-Oxley Act on financial institutions and found that firms with independent boards experience a decline in the volatility of their stocks in the long term. In a related study, Erkens et al. (2012) found no significant association between board independence and bank risk-taking during the financial crisis. Pathan (2009) found that banks with more independent directors pursue less risky policies and hence are less risky with lower z-scores. Fortin *et al.* (2010) argued that corporate governance especially a stronger board structure might result in higher risk taking by commercial banks. Wang and Hsu (2013) found no significant association between the proportion of independent directors on the board of a bank and its risk-taking. Elyasiani and Zhang (2015) found evidence to the effect that banks with a high proportion of independent directors take higher risk contrary to most of the previous findings discussed above. It is important to add that independent directors reduce opportunistic management behaviour translating into

improved financial performance (Musah *et al*., 2019). This study argues that more independent directors improve monitoring and reduce the firm returns and stock price variability, hence reducing the risk-taking behaviour of commercial banks in Ghana. In line with the above arguments, the study hypothesises that;

H2: There is a negative relationship between board independence and bank risk-taking behaviour of commercial banks in Ghana

Board Chairperson Independence and bank risk-taking

The chairman of the board of directors has an influential role in board meeting and could significantly influence a bank's critical decision-making process and policies (Musah *et al.,* 2019; Aslam & Haron, 2021). The extent to which this influence affect risk will depend on the independence of the board chairperson as measured by whether the chairperson has shares in the bank or not. First of all, the chairperson of the board having shares helps to reduce agency problems by aligning the board's interest to that of shareholders (Kusi *et al,*. 2018). Many studies on board characteristics in corporate governance have ignored this important variable, especially in the Ghanaian context where power is mostly concentrated at the top (Musah *et al.,* 2019). This study contends that banks with board chairpersons without shares in the bank will increase their independence and ability to monitor management behaviour.

On the other hand, not having shares could discourage them from exercising strong oversight since they do not stand to lose much when the bank goes down. This means that the effect of board chairperson independence on bank risk-taking is not known in literature hence the need to examine it within the Ghanaian context. Based on lack of evidence linking board chairperson independence and bank risk-taking in Ghana and the arguments put forward, the study hypothesises that;

H3: There is a negative relationship between board chairperson independence and bank risk taking behaviour.

Government Ownership and Risk-Taking behaviour of Banks

Government ownership in most countries is associated with inefficiency and lower-level financial performance (Bopkin, 2016). Arouri *et al.* (2014) argued that government ownership in the banking sector is very

predominant in developing countries. Their study further argued that the extent to which government ownership influences firm outcome depends on the socio-economic objectives of the government of the day and the type of governance system being practised in the particular country. This means that the effect of government ownership on bank risk-taking will vary from country to country hence the need to examine this variable in the Ghanaian context. Moreover, using the market perspective, government ownership is associated with inefficiencies and poor performance (Arouri *et al.,* 2014). Bopkin. (2013) and Musah et al. (2020) argued that managers of government-owned banks are usually under pressure to do the government's bidding rather than taking prudent and effective risk management measures. In a similar argument, Martinez-Peria (2000) found that banks with greater government ownership are at a higher risk of bankruptcy, especially during the financial crisis. Berger *et al.,* (2005) found that government owned banks have low assets quality, poor loan quality and higher risk than private-owned banks. In a related study, Solanko & Fungacova (2008) found evidence of a positive relationship between government ownership and high risk of insolvency among Russian Banks. Their findings were corroborated by Zribi and Boujelbene (2011) who also reported a positive association between high government ownership of banks and the risk of insolvency based on the Z-scores of the banks. On the contrary, Kwan (2004) found that government owned banks are rather associated with lower risk-taking. Given that government-owned entities in developing countries like Ghana are associated with inefficiencies and the increased political pressure to do the bidding of government, it is likely that management of these banks will take higher risk in terms of lending to government entities and the government a whole. To this end, the study hypothesises that;

H4: There is a positive association between government ownership and bank risk-taking behaviour

Foreign ownership and Bank risk-taking

Studies in Ghana have shown that foreign ownership influences the financial performance of commercial banks in Ghana (Bopkin, 2013; Musah, 2017; Musah *et al.,* 2020). This means that foreign ownership influences firms' outcomes among commercial banks in Ghana. Several studies have argued that foreign banks are more efficient and are usually

associated with strong performance than their local counterparts (Arouiri *et al.* 2014; Bopkin, 2016; Kusi *et al.* 2018). They argue that these foreign banks have more advanced technologies and innovative banking products to perform better. Other studies have found evidence of foreign banks being more technically efficient managing their cost and loan portfolios compared to local banks. Arouiri et al. (2014) further argued that investors in private banks prefer foreign investors to invest in their banks because they bring superior expertise and technology that helps drive the performance of the bank. Therefore, it can be implied that foreign ownership in banks will result in superior firm-level governance compared to local banks (Barry et al. 2011). In terms of empirical studies linking the two variables, Solanko & Fungacova (2008) found a positive relationship between foreign ownership and bank risk-taking behaviour. Arouiri *et al.*, (2014) on the other hand reported a negative relationship between foreign ownership and bank risk-taking behaviour. We believe that foreign banks in Ghana use sophisticated instruments and systems to manage risk that allow them to make reasonable profits without taking higher risk. Based on the above arguments, the study hypothesises that;

H5: There is a negative association between foreign ownership and bank risk-taking in Ghana

Managerial Ownership and Bank Risk-Taking Behaviour

Studies have shown that directors shareholding in firms influence their decisions and behaviours especially within agency theory (Moussa, 2019; Torku & Laryea, 2021). From the perspective of agency theory, a director's shareholding is one of the best ways to reduce agency problems that could affect the level of risk-taking by banks. Himaj (2014) in a review paper on corporate governance in banks and its impact on risks taking and performance argued that a number of research have found that managerial ownership helps to align management interest to that of shareholder's interest thereby allowing the company to take only calculated risk. The study argues that banks with higher director ownership are associated with low risk. The reverse could be true in the Ghanaian context as one of the major causes of the banking crisis in Ghana was attributed to directors abusing their powers to grant loans to their private businesses without following laid down credit management policies. This means that the higher the proportion of managerial

ownership of banks in Ghana, the higher the risk level of the bank and vice versa. Based on the above arguments, the study hypothesises that;
H6: Higher managerial ownership is associated with higher bank risk-taking in Ghana

Gender of CEO and Bank Risk-Taking

Even though gender diversity comes with much innovation to companies and different perspectives in terms of governance, previous studies argue that female CEOs have much more impact in effecting change than being on the board (Minicucci & Paolucci, 2021; Musah et al. 2019). Studies have shown that firms run and managed by female CEOs are associated with low volatility of earnings, lower leverage and lower risk of financial crisis or risk of bankruptcy (Faccio et al. 2016). Their study further found that the change of CEOs from male to female significantly reduces corporate risk-taking. A number of studies have found evidence of differences in risk aversion among genders with the majority arguing that females in charge of corporations are fewer risk-takers than their male counterparts (Bertrand & Pan 2013; Faccio *et al.* 2016). Faccio *et al.* (2016) further argued that despite these studies examining gender roles on corporate policies and decisions-making, a significant gap exists in the literature on the effect of gender or female top executives and firm outcomes, including risk-taking behaviour. Sila et al. (2016) found evidence of a reduction in risk-taking by firms when they accounted for the endogeneity of the gender selection choice. Huang & Kisgen (2013) argued that firms with female CEOs or female CFOs were less likely to engage in acquisitions based on a sample of 19 female CEOs and 97 female CFOs. The study seems to imply that female CEO and CFOs are more risk-averse and, as such, will not likely want to engage in inorganic growth through mergers and acquisitions. Cole (2013), in a related study, found evidence of lower leverage for female-owned firms compared to male-owned firms. Faccio et al. (2016) found that firms with female CEOs use less debt capital hence have less financing risk than firms run by male CEOs. This study contends that female CEO are more conservative than male CEOs in terms of taking risk and hence will likely be associated with less risk. Based on the above evidence and arguments, the study hypothesises that;

H7: There is a negative association between female CEO and bank risk-taking in Ghana

Board Gender diversity and bank risk-taking behaviour

Gender diversity on the board is one of the most important diversity considerations on boards in most corporate governance research in recent times (Minicucci & Paolucci, 2021; Musah et al. 2019; Faccio *et al.* 2016). This is because studies have shown that female representation on the board brings on different perspective, which helps improve the board's monitoring role and and reduce agency conflicts (Sila *et al.* 2016; Cole, 2013). Several studies have also argued that diversity on the board, especially gender diversity reduces bank risk (Minicucci & Paolucci, 2021; Moussa, 2019; Sila *et al.,* 2016; Cain & McKeon, 2016). On the other hand, Berger *et al.,* (2014) study on German banks found that banks with higher proportion of female directors have higher risk-taking behaviour. In a related study, Gregory-Smith et al. (2014 also found that higher female directors are associated with higher bank risk using a sample of banks from the United Kingdom. Bellucci et al. (2010) argued that their study did not find evidence of a reduction in risk level in banks with a high proportion of female directors. However, Farag and Mallin (2017) reported that where the proportion of female directors on the board exceeds 23.6%, there is less chance of the firm being vulnerable to a financial crisis. The analysis so far shows inconclusive evidence on the effect of female representation on the board and bank risk-taking behaviour. However, this study contends that women are generally more conservative than men and will take only very calculated risk. On the basis of the above evidence and arguments, the study hypothesises that;
H8: There is a negative association between female representation on the board and bank risk-taking in Ghana.

3. Research Methodology

Research Design and Sample frame

This study adopted the quantitative approach is line with the positivist world view for many reasons. First, the study is based on secondary data, which are numerical. Second, the study seeks to establish the relationship between corporate governance variables, gender diversity and ownership structures and bank risk-taking behaviour using predetermined variables in line with the literature and corporate governance theories. Finally, the study will rely on statistical tools such as descriptive statistics, correlation analysis and panel regression analysis which are associated with the

quantitative approach. The population for this study includes all commercial banks licensed by the bank of Ghana to carry out the business of banking in Ghana. After the banking sector clean-up exercise by the Bank of Ghana, there were only 23 solvent banks. However, Bank of Ghana also indicated that the GHL Bank and First National Bank are in the process of merging. So effectively, 22 commercial banks constitute the population of the study.

The following principles or rules guide the sample frame for this study.. First, the bank should have been operating for at least the past 10 years as a commercial bank in Ghana in line with previous studies on corporate governance in Ghana (Musah *et al.,* 2019; Bopkin, 2016; Bopkin, 2013). Second, the bank financial statement should be publicly available to allow for data collection of the variables needed to achieve the study's objectives. In the case of this study, there was readily available data for the variables under consideration for all the sample population of banks within the sample range of years. However, some banks were new and did not have the required financial statement.

In all, 15 banks met the sample criteria and had publicly available data. Some banks met the sample criteria but did not publicly have their annual report to enable data collection. The data was collected from an audited financial statement that has been filed with the Bank of Ghana. The audited financial statement filed with the regulator was to ensure the credibility of the data collected. The data was coded into excel by the researchers, but the actual analysis was done using STATA.

Empirical model estimation

The study adapted a panel regression model in line with the study's objectives and previous literature in the subject area (Moussa, 2019; Himaj, 2014; Otero et al. 2019; Bopkin, 2016). However, these studies did not incorporate key variables such as managerial ownership, board chairperson independence, etc. Therefore, this study is an extension of the above listed studies on the subject matter.

$$BRiskBH_{it} = \beta_0 + \beta_1 BDSize_{it} + \beta_2 NED_{it} + \beta_3 BDCInd_{it} + \beta_4 FOWN_{it} + \beta_5 GOWN_{it} + \beta_6 MANOWN_{it} + \beta_7 FRB_{it} + \beta_8 GDCEO_{it} + \beta_9 ROA_{it} + \beta_{10} BANKSIZE_{it} + \beta_{11} BANKLIQUID_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots (eqn\ 1)$$

$$Zscore = \frac{ROA+CAR}{\sigma ROA} \quad \ldots\ldots\ldots\ldots\ldots (2)$$

Where CAR represent capital adequacy ratio; ROA is return on Assets and ROE is return on equity.

Insert Table 1

Variable	Meaning	Measurement
BRiskBH	Bank Risk-Taking behavior	Z-scores
BDSize	Board Size	Number of directors on the Bank's board
NED	Non-executive Directors	Proportion of non-executive Directors on the Board
BDCind	Board Chairman independence	Dummy, 1 if board chairman does not hold shares in the company, 0 otherwise
FOWN	Foreign Ownership	Dummy, 1 if bank is foreign owned, 0 otherwise
GOWN	Government ownership	Dummy, 1 if bank is government owned, 0 otherwise
MANOWN	Managerial ownership	Percentage of shares held by directors
FBR	Female representation on Board	Proportion of women on the board of directors
GDCEO	Gender of CEO	Dummy, 1 if bank CEO is female, 0 otherwise
ROA	Bank profitability	Profit before tax divided by total assets
Banksize	The size of the bank	Natural logarithm of Total Assets
Bankliquid	Bank liquidity	Liquid assets divided by liquid liabilities

Definition of Dependent variable

The dependent variable for the study is bank risk or bank risk-taking behaviour. The z-score has been adopted as a proxy for bank risk-taking behaviour in line with previous studies on the subject matter (Bopkin, 2016; Otero *et al*., 2019). The z-score is a measure of bank risk of bankruptcy where a higher z-score suggest that the bank is at a lower risk of bankruptcy and a lower score shows otherwise. , As used in previous studies, the Z-score for commercial banks, is equal to the addition of return on assets and the capital assets ratio of a bank divided by the standard deviation of the return on assets (Bopkin, 2016).
Where ROA is calculated as:

$$ROA = \frac{Net\ Income}{Total\ Assets} \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

And CAR (Capital adequacy ratio is calculated as:

$$CAR = \frac{\text{Total Equity}}{\text{Total Assets}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Control Variables

Three variables that also affect bank risk-taking behaviour included as control variables are ban size, bank profitability and bank liquidity. These variables are significant determinants of bank risk-taking behaviour (Bopkin, 2016; Laeven & Levine, 2009).

4. Analysis and Discussion of Findings

The first section describe the variables collected using basic statistics such as their means, the standard deviation, the minimum and the maximum score for each variable. The descriptive statistics for the dependent variable, independent variables and control variables are summarised in Table 2 below.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev	Min	Max
Risk-Taking Behaviour	0.2061	0.1229	0.0133	0.757
Board size	8.8533	1.5167	7	16
Non-executive Directors	0.7199	0.1509	0.09	0.91
Board Chairman Independence	0.86	0.3481	0	1
Foreign Ownership	0.5533	0.4988	0	1
Government ownership	0.16	0.3678	0	1
Managerial ownership	0.035	0.0616	0	0.2482
Female Rep. on Boards	0.2003	0.1715	0	0.4285
Gender of CEO	0.06	0.2383	0	1
Return on Assets	0.036	0.03	-0.035	0.18
Bank size	9.1328	0.4502	7.6151	10.03
Bank Liquidity	0.6955	0.4735	0.3	5.96

The descriptive statistics from Table 2 show a means score of 0.2061 with a minimum score of 0.0133 and a maximum of 0.757. Even though

the z-scores do not necessarily tell us whether the bank is at risk of bankruptcy, higher z-scores suggest a lower risk of bankruptcy and vice versa. The result of the z-scores above is lower than those reported Bopkin (2016) and Pathan (20009). This implies that banks in Ghana have lower z-scores. The second variable board size shows an average board size of 9 board members. The bank with the minimum board size is 7, and the one with the highest board size is 16. The result further revealed that the proportion of non-executive directors on the board of commercial banks in Ghana is 72%. Another variable in table 2 measured the proportion of managerial ownership in the banks sampled for the study. Managerial ownership is one of the means to reduce agency conflict by ensuring that key management personnel own a share in the company. The analysis showed that shares owned by key management personnel constitute only 3.5%.

The next variable in table 2 measured the proportion of females on the board on the banks sampled for the study. The result of the descriptive analysis shows that the average percentage of females on banks' board is 20%. Some banks did not have any female on their board which explains why the minimum score is 0, and the bank with more females had 43% of its board members being females. The next variable measured the gender of the Chief Executive Officers of the banks focused on the percentage of banks that had female CEOs. The result shows that female CEOs constitute 6% of the total CEOs over the study period. The result shows low female appointments as bank CEOs over the last 10 years, which means men continue to dominate bank CEO positions. On the control variables, the average return on assets over the study period is 3.6%, with the minimum return on assets of negative 3.5% and a maximum return on assets of 18%. The size of banks measured by the natural logarithm of total assets averaged 9.13 with a minimum of 7.61 and a maximum of 10.03. Finally, the ratio of liquid assets to total assets, a measure of bank liquidity, averaged almost 70% over the study period.

Correlation Analysis

The study used correlation to examine the relationship between the dependent variable, and the independent variables as well as the control variables. The correlation analysis was also used to determine the presence of multicollinearity among the independent variables used for

the study. The result of the correlation analysis is presented in table 3 below.

	Z-score	Bdsize	NED	BDCInd	FOWN	GOWN	MANOWN	FRB	GDCEO	ROA	SIZE	LIQD
Z-score	1.0000											
Bdsize	-0.3169	1.0000										
NED	-0.3844	0.1405	1.0000									
BDCInd	0.3760	0.1642	-0.2020	1.0000								
FOWN	0.5070	-0.0872	0.0238	0.4104	1.0000							
GOWN	-0.3843	0.2468	-0.1669	0.1761	-0.4558	1.0000						
MANOWN	-0.4849	0.0239	-0.0789	-0.4769	-0.3226	-0.1308	1.0000					
FRB	-0.4421	0.1987	-0.0007	-0.1182	-0.2352	0.1108	0.0481	1.0000				
GDCEO	0.6205	-0.1612	-0.1798	0.1109	0.1705	0.1103	-0.1442	0.0539	1.0000			
ROA	0.5732	-0.0270	-0.1340	0.1791	0.1449	0.0073	0.1843	0.1310	0.2614	1.0000		
SIZE	0.4794	0.1670	-0.0753	0.1699	0.0141	0.2219	0.1415	0.1525	0.2507	0.2079	1.0000	
LIQD	0.4149	0.0574	0.1722	-0.1655	0.0233	-0.0533	0.1573	0.1195	0.0226	0.0243	-0.0120	1.0000

The correlation result in table 3 shows that all the corporate governance variables of BDsize, NED, BDCInd had a positive correlation with bank risk-taking behaviour even though the correlation coefficient for these variables showed a weak correlation. On the ownership variables, GOWN, FOWN and MANOWN all showed a positive correlation with bank risk-taking behaviour, with FOWN having a strong positive correlation and the rest weak positive correlation. On the gender diversity variables, both FRB and GDCEO positively correlated with bank-risk taking behaviour with GDCEO strongly correlated whiles the FRB coefficient showed a weak correlation. All the control variables also showed a positive correlation with bank risk-taking behaviour.

Methodological Issues

The study addressed some methodological issues before running the panel regression to achieve the study's objectives. The first issue

addressed is the problem of multicollinearity using both the correlation matrix and variance inflation factor. According to Kusi *et al.* (2018), two variables are linearly related when their correlation coefficient is 0.8 and above. The correlation matrix in Table 4.2 shows that none of the correlation coefficients was above 0.5, suggesting little evidence of multicollinearity. The variance inflation factor analysis also showed that none of the variables had a VIF less than 4, suggesting no problem with multicollinearity. However, the variable with the highest VIF is 2.18, which suggests no problem with multicollinearity as revealed by the correlation matrix earlier. The study used the Breush-pagan test to test the presence of heteroskedasticity.

The test result shows that the test statistic is significant, which means that there is the presence of heteroskedasticity in the model. The remedy for this problem is to use weighted least squares or heteroscedasticity-consistent standard errors. The study used the latter in running the regression analysis. Finally, the study conducted the Hausman test to determine the best model between fixed and random effects. The P-Value from the Hausman test is statistically insignificant at 0.4803; hence we fail to reject the null hypothesis that the random effect is the preferred model. For a better and more reliable result of the random effect regression, the robust random effect result is appropriate. This is because robustness filters out other statistical disturbance elements from the result. Thus, the robust random effect GLS regression result is presented below and used to test the study's hypothesis.

Regression Results

Table 4: Panel Regression Results

Variable	Coefficient	Std. Error	Z	P-Values
Board size	-0.0059**	0.0027	-2.18	0.029
Non-executive Directors	-0.1203***	0.0216	5.56	0.0000
Board Chairman Independence	0.0937***	0.031	3.02	0.003
Foreign Ownership	0.0309***	0.0102	3.02	0.003
Government ownership	-0.0495***	0.0113	-4.39	0.0000
Managerial ownership	-0.0174	0.2376	-0.07	0.942
Female Rep. on Boards	-0.0453**	-0.0207	-2.18	0.029
Gender of CEO	0.0277	0.0252	1.1	0.271
Return on Assets	0.7081***	0.156	4.54	0.0000

Bank size	0.0284***	0.0109	2.62	0.009
Bank Liquidity	0.06***	0.0099	6.05	0.0000
CONS	-0.074	0.0497	0.78	0.434
Wild Ch2 (11)	316.9			
Prob>Chi2	0.00000			

(Note: *** means significant at 1% significance level, ** significance at 5% significance level and * means significant at 10% significance level).

The study's first objective examined the effect of board characteristics on the risk-taking behaviour of commercial banks in Ghana. The first board characteristics (Board size) from table 4 had a negative association with banks' risk-taking behaviour and were s statistically significant at a 5% significance level which suggests that board size of banks is a significant determinant of bank risk-taking behaviour. The result suggests that the larger the board size, the lower the z-scores of the bank, which implies higher risk-taking behaviour. This result is consistent with the agency theory, which advocates for a smaller board size. The result is consistent with the prediction of the first hypothesis, which predicted a negative association between board size and bank risk-taking behaviour. The result of the study is consistent with the findings of Kusi *et al.* (2018), Pathan (2009) and Brick and Chidambaran (2008), who found a negative and significant association between board size and the level of bank risk-taking. However, the result is contrary to the findings of Arouri *et al.* (2014) who reported a positive association between aboard size and the level of bank risk taking and the findings of Rachdi and Ameur (2011) and Himaj (2014), who reported a statistically insignificant relationship between board size and the level of bank risk-taking. The second board characteristic from table 4 focused on the proportion of non-executive directors on the level of bank-risk taking behaviour.

The regression result in table 4 shows a negative and statistically significant association between the proportion of non-executive directors on the board and the level of bank risk-taking. The result means that banks with a higher proportion of non-executive directors on the board are associated with higher levels of risk. The result of the study is consistent with the prediction of H2 and the agency theory, which argued that there is a negative and significant association between the proportion of non-executive directors on the board and bank-risk taking behaviour. The result is consistent with the findings of Pathan (2009), who reported a negative and significant relationship between board independence and the level of bank risk-taking. However, the result is

contrary to the findings of Elyasiani and Zhang (2015), who reported a positive association between the two variables and Wang and Hsu (2013) and Erkens *et al.* (2012), who all reported an insignificant relationship between the proportion of non-executive directors and the level of bank risk-taking among commercial banks in Ghana. The next board characteristics focused on the effect of board independence and the level of bank risk taking behavior. The regression analysis showed a positive relationship between board chairperson independence and bank risk-taking behaviour.

The relationship between board chairperson independence and bank risk taking behaviour is also statistically significant at 1% significance level which suggests that board chairperson independence is a significant determinant of bank risk-taking behaviour. The result of the study is contrary to the prediction of the third hypothesis of the study which predicts a negative relationship between board chairperson independence and bank risk taking behaviour. The result implies that independent board chairperson has a lower risk appetite which implies a higher z-score for the bank. The last board characteristics examined the effect of female representation on the board and the level of bank risk-taking in Ghana. The regression analysis showed a negative relationship between the proportion of female representation on a bank's board and the level of bank risk-taking. The negative relationship between female representation on bank board and bank risk-taking behaviour is statistically significant at a 1% significance level, as shown in table 4. The result shows that banks with more females on their board have higher risk appetite which means that female representation on the bank board is a significant determinant of bank risk-taking behaviour in Ghana. The negative association between female representation on the board and bank risk-taking behaviour is consistent with the prediction of the 8th hypothesis of the study, which argued for a negative and statistically significant association between female representation and bank risk-taking behaviour. The result is contrary to the assertion that women are generally risk-averse and will like to take very calculated risk compared to their male counterparts. The result is also consistent with the findings of Moussa (2019); Sila *et al.* (2016) and Harjoto *et al.* (2018) who reported a negative relationship between female representation in bank and bank risk-taking behaviour. However, the result is contrary to the findings of Berger et al. (2014) and Gregory-Smith *et al.*, (2014) who reported a positive association between female representation and the risk-taking behaviour of banks.

The study's second objective examined the effect of ownership structure on bank risk-taking behaviour in Ghana. The study included three ownership structure; foreign ownership, government ownership and managerial ownership. The regression analysis in Table 4 showed a positive relationship between foreign ownership and the risk-taking behaviour of banks in Ghana. The relationship was also statistically significant at a 1% significance level suggesting that foreign ownership is a significant determinant of bank risk-taking behaviour in Ghana. The positive association between foreign ownership and bank risk taking behavior is contrary to the expectation of the 5th hypothesis which predicted a negative relationship between foreign ownership and bank risk taking behavior. The result is consistent with Solanko & Fungacova (2008) findings who also reported a positive association between foreign and bank risk-taking behaviour. The result is however contrary to the findings of Arouiri et al. (2014) who reported a negative association between foreign ownership and bank risk taking behavior. The second ownership structure variable examined the effect of government ownership on bank risk-taking behaviour. The regression results in table 4 showed a negative relationship between government ownership and bank risk-taking behavior in Ghana. The negative association between government ownership and bank risk-taking behaviour was statistically significant at 1% significance level and suggest that government ownership is a significant determinant of bank risk-taking behaviour. The result is contrary to the expectation of the 4th hypothesis which predicted a positive relationship between government ownership and bank risk-taking behaviour. The result implies that government ownership reduces bank z-scores and increases bank risk. The last ownership structure variable focused on the influence of managerial ownership on bank risk-taking behaviour. The regression analysis showed a negative relationship between managerial ownership and bank risk-taking behavior. The negative relationship between managerial ownership and bank risk-taking behaviour was statistically insignificant which suggest that managerial ownership is not a significant determinant of bank risk-taking behaviour. The result is contrary to the expectation of the 6th hypothesis of the study which predicted a positive relationship between managerial ownership and bank risk-taking behaviour.

The last aspect of the study examined the influence of managerial gender diversity and bank risk taking behavior. The study specifically examines the effect of the female gender as CEO on bank risk-taking behaviour. The regression result in table 4 shows that female CEO is

positively associated with bank risk. However, the positive relationship between female CEO and bank risk-taking behaviour is statistically insignificant which suggest that female CEO is not a significant determinant of bank risk-taking behavior. The result of the study is contrary to the predictions of the 7th hypothesis which argued for a negative association between female CEO and the risk-taking behaviour of banks.

5 Conclusion

From the study's results of the study, it can be concluded that board characteristics are significant determinants of bank risk-taking behaviour in Ghana. Specifically, the study revealed that board size and proportion of non-executive directors on the board of a bank are associated with a higher level of bank risk-taking, which reduced bank z-scores. On the other hand, the presence of an independent board chairperson is associated with reduced risk-taking by commercial banks in Ghana. The study further revealed that female representation on bank board's increase their risk appetite as female representation is negatively associated with bank z-scores. On the ownership structures, while foreign ownership is associated with lower risk-taking behaviour, government ownership is associated with higher risk-taking behaviour.

On the other hand, managerial ownership is not a significant determinant of bank risk taking behavior in Ghana. On the control variables, bank size, bank profitability and bank liquidity are all significant determinants of bank risk taking behavior as they were all positively associated with bank risk taking and statistically significant. The result has significant policy implications especially in the recent crisis in the sector and the Bank of Ghana's attempt to regulate bank risk-taking through new corporate governance measures. These results imply that the central bank can use board chairperson independence and foreign ownership to reduce risk-taking by banks in Ghana. Also, encouraging large assets size of banks, improved liquidity levels as well as profits reduce risk-taking behavior of banks. The study recommends that future study examine these variables in a cross-country study in Africa to test the reliability of the individual country studies. The result is largely consistent with the agency theory where smaller board size should reduce bank risk-taking. The major limitation of the study is the small sample size as a result of the few numbers of Banks in Ghana.

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