ASSESSING THE RISK-TAKING, AND PERFORMANCE OF SELECTED BANKS IN GHANA AMIDST THE CURRENT ECONOMIC CRISIS

Bc Bright Baffoe

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Tomas Bata University in Zlín
Faculty of Management and Economics

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I dedicate this work to my parents for their unwavering support since I was a child, as well as to my wife and kids, my sisters, and brothers, and then to all of my loved ones.

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ABSTRAKT

Banky podstupují rizika tím, že kontrolují portfolia aktiv svých klientů tak, aby odpovídala jejich výkonnosti, a snaží se tak vytvářet značné marže a zůstat konkurenceschopné na trhu v podmínkách přetrvávajících hospodářských problémů. Čelí také dalším nebezpečím, mimo jiné v oblasti úvěrů, likvidity, operací a deviz. V tomto ohledu se studie zabývala faktory, které přispěly k rizikovému chování několika konkrétních ghanských bank. Makroekonomické informace pokrývající období devíti let (2014-2022) byly získány od Bank of Ghana, zatímco statistické údaje týkající se jednotlivých bank a bankovního sektoru byly získány z finančních výkazů deseti vybraných bank v Ghaně. Ke zkoumání faktorů, které ovlivňují bankovní rizika, byl ve studii použit panelový regresní rámec. Analýza trendů ukázala, že tři banky s největším rizikem nad rámec průměrného celkového rizika jsou GCB Bank, BBGL a FBL. Jako ukazatel rizika banky bylo použito z-skóre. Podle něj bankovní sektor a makroekonomické faktory významně ovlivňují bankovní riziko. Bylo zjištěno, že růst finančního sektoru významně ovlivňuje bankovní riziko při zohlednění charakteristik bankovního sektoru. překvapivě se ukázalo, že studie využívá všechny faktory na makroúrovni, které mají významný vliv na bankovní riziko. Podle zprávy by tvůrci měnové politiky a vládní agentury měli vytvářet výhodné makroekonomické politiky a přísná pravidla upravující mimo jiné i držení bankovního rizika.

Klíčová slova: Bankovní riziko, Z-skóre, růst HDP, manažerská efektivnost, konkurence v odvětví, rozvoj finančního sektoru, výkonnost.

ABSTRACT

Banks incur risks by controlling the asset portfolios of their clients to match their performances in an effort to generate significant margins and remain competitive in the market amid the ongoing economic problems. They also confront additional dangers, including those related to credit, liquidity, operations, and foreign exchange, among others. In this respect, the study looked at the factors that contributed to the risk-taking behaviour of a few particular Ghanaian banks. Macroeconomic information covering the course of nine years (2014-2022) was gathered from the Bank of Ghana, while bank-specific and banking industry statistics were obtained from the financial statements of 10 sampling banks in Ghana. The panel regression framework was used in the study to investigate the factors that

influence bank risks. The trend analysis showed that the three banks with the greatest risk beyond the average overall risk were GCB Bank, BBGL, and FBL. The z-score was utilized as an indicator of bank risk. According to the report, the banking sector and macroeconomic factors significantly influence bank risk. The growth of the financial sector was discovered to considerably affect bank risk when accounting for banking industry characteristics. Surprisingly, the study's usage of all macro-level factors revealed that they had a considerable impact on bank risk. According to the report, monetary policymakers and government agencies should create advantageous macroeconomic policies and strict rules governing, amid other things, bank risk holdings.

Keywords: Bank risk, Z-scores, GDP growth, managerial efficiency, industry competition, financial sector development, Performance.

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I want to sincerely thank everyone who helped our initiative succeed in a variety of ways. First, I would like to thank prof. Dr. Ing. Drahomira Pavelková for Her advice and support, as well as my parents and my dear wife for their support.

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INTRODUCTION

In the opening part, the study's history is discussed. As a result of the current global economic crises, the banking industry is confronting numerous difficulties on a global scale (Mugane, 2020). Included in this are non-performing and above banking due to unneeded competition and declining profits. Banks constantly take risks in their operations and the delivery of their products or services in an effort to increase performance (Lawrence, 2020). Risk-taking has evolved into a crucial tool for financial institutions in the recent global economy. Banks make up a significant portion of the top corporations in the world and are vital to the economies of each nation as well as the global economy as a whole.

Following the 2018 global financial crisis, financial stability has become a major concern on a global scale. The topic of Risk-taking and risk management has become crucial in the majority of economies, particularly those on the African continent, which are characterized by financially unstable systems and unpredictable macroeconomic systems (Folawewo and Tennant, 2020). As a result, the banking industry's stability is crucial for the growth of an economy. Undoubtedly one of the most dangerous endeavours in an economy is the banking industry. The global financial crisis has had an impact on the financial systems of the majority of economies, both developed and developing. It has also highlighted the need for regulatory and structural policies to strengthen the resilience of the banking industry globally (Borio and Zlu, 2012). As a result, there have been numerous discussions about the subject, which has increased the importance of favourable policies for the banking industry, particularly in developing nations (Beck, 2008; De Jonghe, and Schepens, 2019). Taking risks in an uncertain environment is essentially the core business of financial institutions. Due to the daily emergence of new banks in the global financial sector and the ongoing global financial crises, it is crucial to assess the risk exposure of banks as well as how this affects their performance. Risk-taking is part of the banking business, which also makes sure that the effects of deposits, loan approvals, and trading portfolios are minimized (Jaiye, 2017). Universal banking licenses were introduced by the new Banking Act of 2004, Act 673, allowing banks to provide a range of banking services in Ghana. Ten of the 32 banks in Ghana that are currently registered are listed on the Ghana Stock Exchange (GSE) (Bank of Ghana, 2020). Accordingly, the definition given by Bloom and Milkovich (1998) is the potential for an adverse event to occur and have a negative impact on businesses. According to Bessis (2002), uncertainty can result in negative variations in profitability or losses. The core problem implied in both definitions is that risk has two possible outcomes, but managers

are primarily focused on the unfavourable one. The goal of risk management is to make sure that risks are taken fully aware, with knowledge of the potential, and with a purpose that is clear and understood to improve measuring and reducing. Nevertheless, it doesn't include restricting or discouraging risk-taking behaviour. With proper risk management, the majority of financial crises around the world could have been avoided; as a result, banks must manage risk effectively. Managers take part in risk management activities for at least three reasons. The manager's self-interest in maintaining their status and wealth within the company comes first. The cost of potential financial distress is the second consideration. As a result, significant earnings losses may occur, which may cause stakeholders to lose faith in the company's operations, lose its competitive strategic position in the market, withdraw its license, or even result in bankruptcy. Ultimately, one of the justifications for risk management is the capital market's flaws (Oldfield and Santomero, 1995). Building stakeholder confidence by going public on the stock market is one way to deal with this. This forges enduring ties with foreign banks, which provide economic financial intermediation benefits over the long to medium term. A suitable risk management strategy is required in order to manage risk in this way. Risks are a subset of risks that affect the financial performance of businesses by contributing to insolvency, causing bankruptcy or failure, or both. Therefore, risk taking has gained importance and turned into a strategic focus area among Ghanaian financial institutions (Ghana Business & Finance, 2018). According to Gestel and Baesens (2009), a party incurs a loss when it doesn't fulfil its obligation under a financial contract by the due date. Along with loans, other financial products like trade financing, acceptances, foreign exchange, interbank transactions, bonds, swaps, financial futures, and equity options all increase the risk that banks face. When a bank extends credit or loans to a customer, it is required to record a provision in its books for possible loan default.

The bank runs a significant risk when the amount of provisions made exceeds the total loans granted. Therefore, a rise in the size of loan losses as a percentage of total credit indicates that the bank's core trading assets are on the verge of becoming non-performing, which could eventually have an impact on bank profitability.

Profitability of a bank is crucial for stakeholders, investors, and the economy at large. The returns on their investments are what investors are most interested in. Performance is the capacity of a bank to achieve its objectives using the assets at its disposal (Adams, 2013). An evaluation of a bank's performance is carried out routinely and systematically to ascertain whether the company's goals have been met (Amelia, 2015).

In order to achieve increased profitability, financial institutions—particularly banks—must build efficient and effective risk-taking procedures to eliminate or minimize risk by utilizing various managerial resources (Haneef, Riaz, Ramzan, Rana, Hafiz & Karim, 2012). As a result, risk management now plays a key role in determining financial institutions' excellent performance.

Risk is typically correlated with a high degree of financial leverage. This is clearly evident when unfavourable rumours whether true or false cause financial panic, which in turn leads to a bank run. Few banks can survive a protracted run, even in the presence of an excellent lender of last resort, according to Umoh (2002) and Ferguson (2003). The bank experiences losses as depositors withdraw their funds, and in the lack of liquidity support, the bank is ultimately forced to close its doors. Some risks that banks face are endogenous, or inherent to the banking business, while others are exogenous, or external to the banking system. The success of banks' operations depends more than any other risk on the accurate measurement and efficient management of risk (Giesecke, Dixon, & Rimmer, 2017). Risk is by far the biggest risk that banks face. This study tries to evaluate the risk-taking and performance of a few Ghanaian banks in light of this.

I. THEORY

1 PROBLEM STATEMENT

This part presents the problem statement, which concisely describes the study's objective. This part also discusses the importance of the study, the goals of the research, and the research questions. In the final section of the introductory section, which provides the readers with the essential guidance, the right structure of this work is illustrated.

Bank failures have a large effect on the real economy. The bank failures of 1930–1933 in the US had an effect on the actual economy due to a reduction in loan availability (Bernanke, 2016). Ashcraft (2018) agrees with him that there is still a concern with bank collapse in particular. As a result, comprehension of banks' risk-taking actions is highly valued in banking literature. This includes information on bank risk-taking behaviour, factors that affect bank risk-taking, and the effects of some non-financial variables on bank risk and performance, including CEO attitudes, board size, and market competitiveness. Numerous studies have looked at the factors that influence banks' risk-taking behaviour in different economies. For instance, Asamoah (2015) looked at the factors influencing commercial banks' credit risk in Ghana. Other earlier studies included those by Badu, Daniels, and Amagoh (2002), Adusei (2010), Asare-Bekoe (2010), and Adusei, Akomea, and Nyadu Addo (2014), among others. These studies, however, either concentrated only on macroeconomic factors or bank- or industry-specific factors, such as bank size, leverage, management effectiveness, profit, board structure, and market competitiveness. The majority of these studies also used various credit risk measures to gauge bank risk. Additionally, they gave only a weak statistical justification for their model selection, or in some cases none at all. However, this study's analytical focus goes beyond just using a standard regression analysis. To choose the best model from a range of potential panel data analysis approaches and analyse the factors that influence banks' willingness to take risks in Ghana, model specification tests are used.

Similar research was done by Garr (2013), using two of the three groupings of variables: macroeconomic level variables and bank-specific variables. Nevertheless, the study's main focus was credit risk, and it also used a panel regression analysis without considering the choice of an appropriate analysis by using the Hausman and Breusch Pagan test for model appropriateness. This would have provided a much clearer understanding of the suitability of the estimation technique and greatly enhanced the analysis therein. It will also be crucial to consider the factors that determine or predict bank risk-taking behaviour using variables

from the macroeconomy and the banking sector in addition to bank-specific predictors. The reasons why the majority of banks fail in their risk-taking behaviours will become more widely understood as a result, going beyond the bank-specific instigators. It goes further to reveal potential shocks to the system that might influence Ghanaian banks' decisions to take risks. Depositors and shareholders are impacted when banks fail. Equity investors also unquestionably suffer significant losses, losing any money that is not protected by insurance. This explains why investors and depositors have a stake in the financial stability of banking institutions (Salkeld, 2011). In order to avoid the negative effects of bank failure, it is crucial to look at the risk behaviour of universal banks in this context. A cursory review of relevant literature has revealed the relevance of bank risk-taking behaviour. Numerous studies on bank risk behaviour have revealed little evidence of Ghanaian research in the field with an ostensibly limited scope of analysis. For example, Bokpin (2015) studied the risk behaviour of 27 banks over a 4-year period (2010-2013). Garr (2013) focused on industry-specific variables and macroeconomic factors in his investigation of bank risk-taking behaviour in Ghana, whereas Asamoah and Adjare (2015) only used bank-specific determinants.

The Central Bank of Ghana (CBG) has had to suspend the licenses of many troubled banks since the economy crisis first emerged around 2019 and returned in 2020. Additionally, some banks have been consolidated, and recently some banks have needed bailouts. In light of this, it is necessary to take calculated risks. It is against this backdrop that the study seeks to assess how risk-taking affects the financial performance of particular Ghanaian banks.

In this study, risk-taking and performance of banks are assess using a set of bank-specific, banking industry-specific, and macroeconomic factors. Appropriate methods of analysis were developed through the use of appropriateness tests.

1.1 Research Objectives

The primary goal of the study was to evaluate the performance and risk-taking of a few chosen banks in Ghana using macro-level, bank-specific, and industry-specific data.

The study specifically aimed to evaluate:

i. Selected Ghanaian banks' risk-taking behaviour and performance.

ii. The impact of bank-specific characteristics on Ghanaian banks' willingness to take risks.

iii. The impact of banking industry variables on the performance and risk-taking of particular banks in Ghana.

iv. The impact of macro level determinants on the performance and risk-taking of certain Ghanaian banks.

1.2 Research Questions

The current study responds to the following queries in accordance with the primary and specific research objectives mentioned above:

i. What are the performance and risk-taking trends of particular Ghanaian banks?
ii. How do bank-specific characteristics affect the performance and risk-taking of particular banks in Ghana?
iii. What is the impact of banking industry variables on the performance and risk-taking of particular banks in Ghana?
iv. How do macroeconomic level variables affect the performance and risk-taking of particular Ghanaian banks?

1.3 Significance of Study

Filling in knowledge gaps and enhancing existing knowledge are the main objectives of any study.

All stakeholders in the financial and banking industries should take note of this study, which evaluates the risk-taking and performance of a few selected banks in Ghana. It is crucial for banking organizations, financial regulatory bodies like the Central Bank of Ghana, common investors, financial researchers or analysts, and the general reading public. Government, government ministries, state agencies, such as the Bank of Ghana (BOG) and the Ministry of Finance (MOF), as well as other financial system regulatory bodies, have a significant stake in the development and growth of banks. Their shared goal is to make sure the nation's financial institutions run smoothly and effectively. The more profitable banks are, the more money the government can raise through taxes for development. These policy makers will be able to develop strategies to ensure a stable banking and financial system with the aid of an understanding of banks' risk-taking behaviour and the key factors that affect these choices.

Again, the study's findings will assist banking institutions in better comprehending the dynamics of risk-taking and in determining how to adjust their resource allocation to maintain efficiency. They will be better equipped to make choices that take Ghana's macroeconomic shocks into account if they are aware of the key factors influencing their

risk-taking choices, which include industry and macroeconomic variables. The management of Ghanaian banks will be assisted in improving risk management in their operations by the findings. Investors and financial market experts will find the study's findings to be enlightening as well. Professionals in the financial markets are better able to forecast the financial markets and make educated decisions, which puts them in a reliable position to advise their clients and other market participants. Investors can anticipate how their money is managed within the financial system thanks to the study's findings, which also help them understand how risky banks are and how to respond to changes in financial and macro-level variables. The study's conclusions will also be useful to readers in general. The study's findings will be made available to the public as a body of knowledge that will aid in their understanding of the financial market's dynamics, particularly with regard to the nature of bank risk-taking decisions and how they are influenced by various macroeconomic and financial factors. The research adds to the wealth of knowledge already known about the banking and financial sectors. It will serve as a starting point for more investigation. The study's findings may spark more interest in the topic among financial experts and analysts. This will help with the implementation of an existing risk-management system or the development of a new one for the financial system, and banking in particular.

1.4 Scope of the Study

The focus of the current study was on the variables influencing the performance of a select few Ghanaian banks and the acceptance of bank risks. It focused on universal banks in Ghana and how bank-specific, banking sector, and macroeconomic variables or factors affect those banks' risk decisions. It looked at 10 universal banks' circumstances throughout a nine-year period, from 2014 to 2022. Both the number of banks utilized as the analytic unit and the number of years covered were included in the study. It would have been ideal to conduct a larger, more thorough study with access to all of Ghana's universal banks. Due to data availability, the study was sought to use 10 universal banks for a duration of nine (9) years. Most banks lack data for the time period under consideration (2014-2022), and data for other banks were difficult to access.

1.5 Organization of Study

There are four parts or chapters to this study. This chapter provided background information for the study and reviewed the study's problem. The study's literature is reviewed in the following chapter, chapter two. Key terms and concepts are defined in the chapter three. The

objective area of the study also includes an empirical review of previous literature and a theoretical literature review on bank risk behaviour. The study's methodology is examined in Chapter three of this work. This chapter covers issues like the data source, data collection methods, study sample, and data type. Along with considering the study's variables, model specifications, and data analysis techniques, it also looked at the theoretical underpinnings of the research. Data analysis, result presentation, and discussion are covered in the fourth chapter. The study's findings are presented in accordance with its research questions, and they are also discussed in light of the reviewed literature. The study was concluded in the fourth and final chapter, which gave a summary of the results, discussed their implications, and made helpful suggestions in light of the research.

2 LITERATURE REVIEW

2.1 Introduction

The previous chapter addressed the study's background information, including the research subject and study goals. The purpose of this chapter is to discuss theoretical and empirical issues relating to the elements that influence risk-taking and bank performance. The concepts of bank risk-taking, determinants of risk behaviour of banks, and the knowledge gap in the research area are also discussed. The issue of bank risk-taking has been debated extensively in theory and with empirical investigation, producing varying conclusions and recommendations. The unique features of the universal banking sector and the highly risky nature of their operation especially in terms of credit put them at a very critical situation that requires a well-structured and efficient management. Credit advancement and lending is one major activity of the banking institutions. This involves the risk of default on loan repayment. The likelihood of borrowers not paying back loan is a major risk that banks face in their businesses. Banks also face the risks of payment of fixed rate of interest on term deposits (Garr, 2013). The riskiness of banks' lending and fixed interest rate payment arrangement of term deposit becomes most evident in the event of decreases in the interest rate. A drop in the interest rate would mean that banks will be earning less in investments from loan advancement than it will be paying out on the term deposits. This makes risk management a crucial area of concern for most financial institutions like the banking system.

2.2 Overview of the Banking Sector in Ghana

Since the Gold Coast era, banking has existed in Ghana. The goal of the banking industry at the time was to provide financial services to British businesses and the colonial government. The first to be founded was the Bank of British West Africa, which was renamed the Standard Chartered Bank in 1985 after opening its first branch in Accra. The success of the bank drew other foreign banks, who opened operations in the then-Gold Coast. Operation of the Colonial Bank began in 1918, and the institution later merged with the Anglo-Egyptian Bank, Barclays Bank, and the National Bank of South Africa to become the Barclays Bank. Between 1920 and 1950, these two banks were the only ones operating on the Gold Coast (source: website of the Bank of Ghana). In order to lessen foreign influence on local banking operations, the Ghana Commercial Bank, the first indigenous bank, was founded in 1953. Following this, the Bank of Ghana was founded in 1957, right after Ghana gained

independence, with the goal of assuming management and control of the nation's currency. By 1974, the country had seen the establishment of state-owned banks, and Financial Development Institutions (FDI). They included the Merchant Bank, National Investment Bank, Social Security Bank, and Bank for Housing and Construction. They also included the Agricultural Development Bank (ADB). The banking sector changes and the passage of the banking law in 1989 (PNDC Law 225) led to the operationalization of numerous domestically established banks, including The Trust Bank, Allied and Metropolitan Bank, CAL Merchant Bank, Meridain (BIAO), and Ecobank.

With the financial freedom under the Financial Sector Strategic Plan (FINSSIP) and the Financial Sector Adjustment Programme (FINSAP), the operation and performance of Ghana's financial sector were improved. Additionally, the new Universal Banking License was introduced during that time. The number of foreign-owned (16) and Ghanaian-own (11) totalled 27 in 2015. Clearly, the banking sector in Ghana has genesis of upside and downside changes. One major downside within the banking sector over the years is the high interest rate spread. This meant higher lending rates against low deposit rates. The low interest rates tend to be a disincentive to saving by the general public or public institutions. The high lending rates also, does not only limit access to credits and other advances but also increases default rate. The financial systems in Ghana have undergone various economic challenges, both on the domestic front and triggers form the international market. The macro environment and the movement of key financial indicators for the Ghanaian economy have not been impressive for some period, especially the Treasury bill rate and the exchange rate. The 91-day Treasury bill rate for instance dipped from about 22.5% in November 7, 2016 to approximately 15.7% in February, 17, 2017 (Bank of Ghana database). The degree of loan defaults in Ghana and the current under-performance of the financial sector have called for a critical review of the risk-taking behaviour of universal banks in Ghana. High interest rate spreads of banks continue to be a major challenge within the financial sector and the escalating inflation rates tend to worsen the plight. The situation has aroused much interest in the risk-taking behaviour of firms which require empirical investigation within the financial sector.

2.3 Conceptual Review

2.3.1 Risk

Risk is a situation that entails exposure to danger (Garr, 2013; Geng and Zhai, 2015). Any activity that exposes an individual, group of persons and/or something valued into harm, loss, or danger is termed risk. Risk has been defined in different settings and fields of study to portray different meanings. In the field of operational safety and hazard, it has been defined to imply possibility of danger or hazard. In insurance, it refers to the situation where the probability of occurrence of a variable is known (for example fire outbreaks) but its mode of occurrence is not. Risk in the trading of securities is the likelihood of a loss or decrease in asset value. Risk in finance can be defined as the possibility that an investment's actual returns will differ from those anticipated (Geng and Zhai, 2015). It calculates the risk of forfeiture or loss of all or a portion of the initial investment.

2.3.2 Banking risks

Koch and MacDonald (2000) defined credit risk as the chance of a counterparty defaulting on a loan or derivative deal. This agrees with the perspective put out by Fabozzi et al. (2010), who defined credit risk as a sort of risk when it is likely that a debtor of a financial instrument won't be able to timely fulfil the associated obligation. Credit risk is the most pervasive and important risk affecting how effectively banks operate in the financial sector. Company-specific or systemic credit risk are both possible. The danger of a firm defaulting on a loan secured by a specific project that the bank is working on is known as company-specific credit risk. Defaults connected to macroeconomic variables, on the other hand, have an impact on all borrowers and are associated with systemic credit risk (Saunders and Cornett, 2006). According to Saunders and Cornett (2006), market risk is the degree of ambiguity surrounding the financial institutions' ability to profit from their asset portfolio. Market factors, including volatility in the markets, rates of interest, and liquidity in the market, in addition to changes in asset prices, can all affect market risk. Pyle (1997) defined market risk as the movement in an asset's value resulting from changes in other economic factors such as stock and commodity prices, currency exchange rates, and interest rates. These losses are a result of price changes that are unfavourable for holdings held by banks that are either on or off their balance sheets. The three key market risk factors that financial institutions must manage in the banking sector are interest rates, liquidity, and exchange rates (Bank of Tanzania, 2010). This is the possibility that banks with open positions in the same foreign

currency, whether forward, spot, or both, will lose money as a result of unfavourable exchange rate movements (Raghavan, 2003). All financial markets are dominated by the foreign currency market, generally speaking. Bessis (2010) asserts that there is a chance of suffering losses as a result of fluctuating exchange rates. These losses are a consequence of the disparity among the values of assets, capital, and obligations expressed in local currencies and those expressed in foreign cash or foreign claims. According to Wood and Kellman (2013), there are four main operations that take place in foreign exchange markets: purchasing and offering foreign currencies to give customers a better investment position; purchasing and offering foreign currencies for hedging purposes; purchasing and offering foreign currencies for speculative purposes. According to Gup and Kolari (2005), liquidity risk is the potential that a bank won't be able to fulfil its obligations to its depositors and satisfy the needs of borrowers by converting resources into cash quickly and with little loss, while also having the ability to borrow money and having enough cash on hand to engage in profitable securities transactions. Financial organizations require liquidity, according to van Greuning and Brajovic Bratanovic (2009), to tame anticipated and unanticipated changes in their balance sheets and maintain growth. However, some financial institutions have come to terms with the need to plan ahead in order to be prepared for expansion and unforeseen credit. Here, the risk should be viewed as the potential for a financial disaster (Santomero, and Babbel, 1997). According to the Basel Committee on Banking Supervision (2019), banks are inherently vulnerable to liquidity risk of the bank as an organization and of the market as a whole (systemic) because of their critical role in converting short-term deposits into long-term deposits.

There are primarily two situations that lead to liquidity risk. First, bank depositors could attempt to promptly withdraw their financial claims. In this respect, the bank might be forced to borrow money or sell assets in order to meet this sudden requirement. Liquidity risk is a potential second issue. Off-balance sheet debt securities are sold by banks. The need for cash arises whenever a borrower chooses to minimise their loan commitments because they need quick financing and instant liquidity. Interest rate risk is primarily caused by the imbalance between the assets and obligations in the bank's portfolio. This is frequently the case since interest rates have a big effect on the financial health of banks. There are two types of interest rate risk: reinvestment risk and refinancing risk. The latter risk is the potential for the cost of raising capital to exceed the current returns on the assets invested. But the first is the likelihood that fund expenses may exceed anticipated fund returns (Saunders and Cornett, 2006). Interest rate risk, defined by Kanchu and Kumar (2013) as the sensitivity of financial

institutions to changes in interest rates, may have a negative effect on net interest revenue. Revenues, asset valuations, off-balance sheet liabilities, and cash flow are all impacted by these movements. Based on the standpoint of income, the emphasis is on examining how fluctuations in interest rates affect accruing or stated short-term income. Kanchu and Kumar (2013) claim that the difference between total interest revenue and total interest expenses can be used to calculate net interest income. The four main sources of interest rate risk that financial firms are subject to are yield curve risk, basis risk, revaluation risk, and optionality. When fixed interest rate maturities on liabilities, assets, and off-balance sheet items are dated differently than variable interest rates, concerns regarding interest rate risk often arise. Institutions of banking (van Greuning and Bratanovic Bratanovic, 2009).

2.3.3 Risk management

Risk management's main objective is to boost shareholder returns while incorporating the performance of banks. Poor performance is the driving force behind banks' risk management. The fundamentals of putting in place a risk management programme are outlined by Cebenoyan and Strahan (2004). They point out that risk management improves banks' reputations and their chances of attracting customers who are looking to diversify their portfolio of financial resources. Additionally, the bank becomes more profitable and efficient. Moreno (2006) contends that the efficiency and effectiveness of the market for interbank loans play a role in how well banks are able to manage their risk. Particularly concerning are banking system weaknesses that could be impacted by shocks and result in less liquidity on the interbank market. This might be a major factor in the propagation of a financial crisis. Some banks can decide to remove liquidity from the interbank market in order to reduce shocks. According to Turner (2006), the present discussion surrounding risk management in banks leads to two broad conclusions. First, the character of macroeconomic risk has undergone a significant transformation. External vulnerabilities that frequently prompted hasty macroeconomic decisions and exacerbated prior banking crises have mostly vanished. Other perspectives contend that certain domestic macroeconomic concerns have suddenly become more serious than they had been a decade ago. Second, banks used a better method of managing risk assessment in their lending activities. Modern technology has also produced new risks that are challenging to assess (Moreno, 2006). Banks have greatly increased their use of quantitative risk management strategies in emerging markets. The practise of basing valuations on market pricing is becoming more common; VaR models are mostly used to quantify risk; and risk scoring systems are employed to determine the credit

risk of borrowers in the consumer and small business sectors. Banking accounts are stress evaluated for various negative scenarios, and pricing and credit line disbursement are growing determined by quantitative evaluations.

2.3.4 Risk-Taking

The act of pursuing an event, activity or investment that entails running into the danger of loss or some foreseen occurrences. In finance, specifically banking, the daily activities or operations are subject to different kinds of risk and different probabilities of occurrence. Therefore, banking itself is a risk-taking or management activity. When a bank advances loan to its clients in the wake of loan defaults, the bank is said to have taken a risk (Das and Ghosh, 2007; Garr, 2013). Similarly, a bank engages in a risky venture when it invests in assets portfolios that have some varying probability of loss of money or asset value. The higher the probability of occurrence or of loss/damage, the higher the risk a bank or any given entity is said to assume.

2.3.5 Types of Bank Risks

Banking activities involve majorly, deposit mobilization and credit and loan advancing. The management of customer deposit and investment coupled with the profit-seeking and/or returns maximizing target of banks presents them with risk portfolios to manage. The occurrence of risk is inevitable in every investment undertaking. Thus, all investments are subject to some form of risks, with varying degrees (Kasana and Naveed, 2016). Some risks are predictable, hence controllable. Others are not easier to see, hence require expert analysis while some are also not eliminable through investment diversification but rather lessened by hedging. There are some types of risks that require great consideration in making investments or risk-taking decisions. These include credit risk, market risk, interest rate risk, foreign exchange risk solvency risk, operational risk, liquidity risk, business risk, reputational risk, and inflation risk among others.

2.3.5.1 Credit Risk

The chance that a borrower won't be able to pay back a loan is known as credit risk, often referred to as default risk. Thus, the risk of default arises from a borrower's failure to make the needed loan payments by the agreed-upon date (Asamoah and Adjare, 2015). The issuer of the loan, also referred to as the lender, bank in this case, risk loss of principal of the loan

and/or the associated loan interest. This risk is assumed by the lender (bank) and the associated loan interest is the lender's reward for assuming such risk.

2.3.5.2 Market Risk

This is the risk connected to shifting market circumstances (García-Pérez et al; 2014). Market risk, also known as systemic risk, is the potential for loss for an investor or bank as a result of modifications in the overall performance of the financial market or its connecting markets. For instance, a decline in the price of a company's securities when neither the company's prospects nor its circumstances have significantly changed. It is very hard to completely avoid this kind of risk by investment diversification (Pyle, 1997; Van Greuning and Bratanovic, 2009). The only way banks or investors in general may reduce this is by hedging a portfolio before taking such risks. Among the hazards that have an impact on the entire market are interest rate risk, stock risk, and foreign exchange risk**.**

2.3.5.3 Interest Rate Risk

Interest rate risk is the risk that fluctuations in interest rates pose to the value of asset portfolios or investments (Badu et al., 2002). As an illustration, bonds and other fixed investments have fixed rates of return. As a result, the value of issued bonds will be impacted by changes in interest rates. Thus, the value of previously issued bonds will decline as interest rates rise. Interest rate risk is the decline in bond value brought on by an increase in interest rates. Different types of risk exposures, including option risk, repricing risk, term structure risk, and basis risk, can be brought on by changes in interest rates.

2.3.5.4 Equity Risk

This is the risk brought on by the fluctuation in security prices. Consequently, there is a potential risk that the value of a security or a portfolio could decrease (Van Greuning and Bratanovic, 2009). This risk can be systematic or unsystematic depending on the level of possible mitigation or aversion. Systemic risks are unable to mitigate, whilst unsystematic risks are mitigatable via portfolio diversification (Pyle, 1997; García- Perez et al; 2014).

2.3.5.5 Foreign Exchange Risk

Also referred to as currency risk, is the risk resulting from exchange rate volatility. Changes in exchange rate affect the prices of currency, hence the loss in asset values or investment returns pegged to foreign currencies resulting from changes in the price of currencies is

termed foreign exchange or currency risk (Pyle, 1997; Van Greuning and Bratanovic, 2009). This risk is usually experienced by firms that engage in foreign businesses or investments.

2.3.5.6 Liquidity Risk

The risk of a corporation not being able to satisfy short-term financial needs generally results from the inability to convert hard assets or securities into cash without suffering a loss of revenue or capital. This risk is known as liquidity risk. It is the risk connected with selling a security or investment. When an investment lacks marketability, thus, cannot be traded quickly enough to avoid loss of income in its sale, it is termed to bear liquidity risk (García-Pérez et al; 2014). Hence, when an asset is being able to only sell or trade security at a substantial discount, or the difficulty in selling, such asset is said to bare risk of liquidity.

2.3.5.7 Operational Risk

Operational risk, according to the Basel Committee on Banking Supervision, is the possibility of suffering a loss as a result of subpar or ineffective internal systems, procedures, and personnel, as well as outside events (García-Pérez, 2014). Operational risk, which exists in all business organizations regardless of size and/or growth, is best understood as the risk resulting from the performance of business functions in institutions. The Basel Committee on Banking's definition is based on the root causes of operational risk. To determine why a loss occurred, it breaks down the reasons into four categories: people, processes, systems, and external variables (Badu et al., 2002). Operational risk examples include the possibility of computer hacking, fraud (internal and external), catastrophic events, and disregard for established norms and procedures.

2.3.5.8 Business Risk

This is the risk tied to business performance and survival. Business risk is the risk of possibility of non-performance of the company in which an investment is made. When a bank invests its assets or deposits into some business ventures or invest in projects like real estate, the possibility that the real estate company or the company in which the bank has reinvested its customers' deposits or bank assets may not perform well and fail in business; a situation resulting in loss of money to the bank is termed business risk (Pyle, 1997; Van Greuning and Bratanovic, 2009; García-Pérez et al; 2014).

2.3.5.9 Reputational Risk

Reputational risk is the risk of damage to a firm's reputation or goodwill in the event of some occurrences that are not necessarily directly linked to firm's performance. It could result directly due to a firm's own negligence, or indirectly from the actions or inactions of employees, or other third parties (García-Pérez et al; 2014). The risk is linked to the loss of potential business by a company due to the questionability of its character or quality. The effects of reputational risk have the effect of trickling down to the various departments, operations, and other major stakeholders of the company. It could result in loss of revenue and/or capital, increased regulatory cost, operation cost, and in most cases destruction of shareholder value. Reputational risks are usually consequent to potential criminal or some adverse behavioural events. The effect of a reputational risk could be sometimes long lived even in the event of the company not found guilty of the said crime (Van Greuning and Bratanovic, 2009). It could tarnish a long-built and hard-earned reputation, reducing a brand or image of the company in question. Examples of events that could be damaging to a bank's reputation are the falsification of legal document by an employee, intentional evading of tax, imprisonment of a board member on criminal issues, etc.

2.3.6 Factors Affecting Bank Risk-Taking Decisions

Various factors have been argued and identified to influence risk-taking decisions of banks. Internal and external factors can be used to identify the causes of bank risk-taking behavior, claim Sandada and Kanhukamwe (2015). The external factors relate to macro-level determining factors like the policy rate, unemployment, economic growth, inflation, exchange rates, and money supply, among others, whereas the internal factors have been related to microeconomic factors including bank-specific and banking industry-specific variables or factors. According to Kasana and Naveed (2016), those activities and functions of banks that influences risk decision and upon which management and bank officials and authorities have control over and can manipulate using suitable measure are the internal factors whereas those beyond the internal control of bank officials and results from factors external to the banks such as government policies and inflation are termed as external factors. Following from the classification of determining factors of bank risk-taking by Garr (2013), the factors of bank risk-taking behaviour is discussed in this section of the study under the separate key factor categories.

2.3.6.1 Bank Specific Factors

Bank specific factors are the internal arrangements or factors of the various banking firms that influences management decisions on risk portfolios and their riskiness (levels of risk aversion or loving). Although banks perform similar roles or functions in the financial sector or industry, the internal arrangements of banks differ on various grounds. The internal arrangement of banks which range from level and quality of staff to top management efficiency; other balance sheet related variables like deposit composition, asset quality, etc. do influence or reflect their risk-taking behaviour (Garr, 2013). The ownership structure of banks, their size and growth, as well as their debt-to-equity ratio, all have a significant impact on their decision-making or risk-taking behaviour. A bank's internal operational and financial circumstances have a big impact on how it behaves while taking risks. The literature has empirically demonstrated that factors at the bank level, such as the bank's size, growth, management effectiveness, operational effectiveness, ownership structure, and balance sheet, affect how risky the bank is. Thus, their preferences on risky investments are reflective in their balance sheets and also influenced by internal structural, operational, and managerial factors. Wang and Lui (2014) also posit that a bank's financial condition, usually evident in its balance sheets can greatly affect its riskiness. The balance sheets of a bank can show at a glance the bank's preference for various risk portfolios or investments.

Bank ownership for instance has been argued to influence bank risk-taking, especially credit risk (Sandada & Kanhukamwe, 2015). The discussion of bank performance in relation to ownership has mostly favored banks with foreign ownership. Foreign banks outperform their domestic rivals on the risk matrix. In comparison to their local comparators, they are claimed to have higher margins (Demirguc-Kunt & Huizinga, 1998). Foreign banks perform better than local banks, particularly in emerging nations, although this cannot be stated for local banks in industrialized economies. Foreign owned banks are quite sophisticated, technologically endowed, and with high innovativeness which puts them ahead of the locally owned banks (Garcia-Herrero, 2006). They have the necessary leverage thanks to these and numerous other factors, such as their exposure, to manage risks more effectively. The foreign-owned banks appear to perform substantially better, even among Islamic banks (Bashir, 2001). However, Dietrich and Wanzenried (2009) make the counterclaim that Swiss-owned banks are more lucrative than foreign-owned banks in Switzerland. Another measure of banks' risk-taking behavior that has been identified in the research is management effectiveness. The efficiency of management reflects how best risk portfolios are managed

and also determines the level of bank risk decisions. The more efficient management are, the more prudent they are in making decisions on their risk portfolios. Efficient management are able to better forecast the market and undertake optimal risks. Mwaurah (2013) postulated that management competencies go a long way to influence bank risk decisions such that, inadequate management capabilities have resulted in commercial bank crisis. Implicitly, poor management practices result in bad risks-mix, especially bad lending, which subsequently result in high bank risks, and distended portfolio of unpaid loans in the case of bad loans.

2.3.6.2 Industry Specific factors

Other micro factors concerning the banking sector in general have an impact on the risk-taking decisions of banks in addition to the internal structure and characteristics of banks that define their riskiness. The two key industry-specific variables taken into consideration in the study are financial sector development and industry competitiveness. In order to reduce the effects of enforcement, information, and transaction costs, financial sector development comprises improvements to financial markets, intermediaries, and instruments (Chinn & Ito, 2006). This improves the financial sector's primary role in the economy. Development of the financial sector is a key element to financial inclusion and economic growth through capital formation and technological advancement (Zagorchev, Vasconcellos, & Bae, 2011; Campos, Karanasos, & Tan, 2012). The growth of the financial sector aids in the expansion and development of small and medium-sized businesses (SMEs), as well as in lowering inequality through increasing access to capital. According to Bena and Ondko (2012), the development of the financial sector has supported the efficient use of resources. Implicitly, as a result of its contribution to efficient resource allocation, financial sector development has a decreasing impact on bank risk. On the other hand, banks become more comfortable and confident in undertaking certain high-rated risk with financial sector development. That is, with technological advancements, firms are able to track their investments and also better access borrowers (Islam & Mozumdar, 2007). In essence, the effect of financial sector development can be likened to that of economic growth where banks are expected to be better informed on the riskiness of their investments, hence, undertake optimal risk or invest in profitable portfolios, hence reduce decisions on risky investments.

2.3.6.3 Macroeconomic Factors

Banks' decisions to take risks may also be influenced by unexpected events with significant consequences brought on by elements outside the bank (De Graeve et al., 2008; Borio and Zhu, 2012; Gar, 2013). Usually bank investment and risk-portfolio analysis are made with due consideration to the business, political, social, and economic environment. Government policies at the macro level as well as other nation-wide indicators like inflation, national income, unemployment, and policy rate among others affect the nature of investments over time. Investors, bankers, and policy or economic analyst in general take cognizance of the economic and business environment in their investment and risk decisions. Economic growth is thought to have a significant impact on bank performance and, consequently, bank riskiness. Economic growth is often evaluated by growth in GDP or GDP per capita in most studies (Garr, 2013). During periods of economic growth, income levels are high, and individuals are in the position to honour their debt or loan obligations in terms of credit advances, hence the risk of banks are minimal. In recession however, income levels are constrained, and bankers undertake minimal risks due to the expectations on borrower's income and also on the yield from any risky venture or investment. Inflation is yet another key risk determining variable at the macro-level. Inflation is defined as the persistent rise in the general price level of goods and services. Changes in inflation can influence bank risk decisions positively or negatively. In periods of high inflation, lenders are said to generally lose whilst borrowers gain. This is because the real amount paid back by borrowers reduces. Thus, inflation affects the real capital value of banks, and via two channels (Santoni, 1986). When the rate of inflation exceeds the anticipated rate and when the anticipated rate of inflation is revised upward, there is a decline in capital value due to unexpected inflation. According to Boyd and Champ (2004), the reduction in the quantity of credit accessible to firms due to inflation has an impact on the banking industry and the broader economy. Additionally, inflation lowers the real rate of return on assets, which discourages saving and promotes borrowing. In other words, the likelihood of loan default rises with increased personal and bank lending. In an effort to respond to the reduced real returns on their loans, banks may increase lending rates in an effort to limit credit, hence increasing the risk of loan default. Thus, with higher lending rates, the likelihood of loan default increases all things being equal. Monetary policy rates define the interest charge by the Central Bank in advancing credit to the commercial banks. The key rate for monetary policy in an economy is the rate at which commercial banks borrow money from the central bank. Commercial

bank interest rates in an economy are directly impacted by changes in the monetary policy rate, which in turn affects the ability and willingness of banks to advance loans and make other risky portfolio investments. As a result of their direct relationship, the impact of interest rates on bank risk can be connected to that of the policy rate. This is so because advanced economies employ the policy interest rate as a tool for monetary policy (Geng & Zhai, 2015).

2.4 Theoretical Review

Various theoretical models have been used by other studies to explain the risk-taking behaviour of banks in various contexts. They include the asset valuation model which explains the relationship between interest rates and bank risks, modern portfolio theory, agency theory, the competition fragility theory by Marcus (1984) and Keely (1990), the search for yield model, asset substitution, competition-stability theory by Boyd and De' Nicolo (2005), the constant leverage, asset-liability mismatch, habit formation, and the central bank communication among others (Geng & Zhai, 2015).

2.4.1 The Asset Valuation Model

The asset valuation model posits that interest rate reduction increases asset and collateral values, with subsequent effect of possible modification of the estimation of default probabilities of banks. This situation can incent a bank to take on greater risks. Likewise, in the search for yield model of interest rate changes, a reduction in the interest rate will imply a decline in the target revenue of banks. This situation can force banks into taking risky investments or venture into high-risk areas in order to bridge the potential revenue loss gap.

2.4.2 Modern portfolio theory

In 1952, Harry Markovich put forth his Modern Portfolio Theory (MPT). He argues that by diversifying assets, which have varying price trajectories over time, an investor can increase expected return while also minimizing or reducing volatility. The fact that portfolio risk can now be quantified and tracked for the first time is crucial. Systematic risk and unsystematic risk are the two ways that MPT differentiates risk. Market risk is also known as systemic risk. Unsystematic risk refers to the distinctive risk associated with a certain security investment. The reduction of unsystematic risk by diversity is a key finding of MPT. According to research, a minimum of 20 securities are required to obtain significant MPT believes that whether it is possible to diversify credit risk depends on its determining factors.

This suggests that by diversifying the domestic portfolio, the management structure of commercial banks is unable to prevent the credit risk defined by macroeconomic determinants. As a result, lending to the industry can effectively disperse the risks resulting from unsystematic factors (factors unique to the bank in this study).

2.4.3 Theory of agency

The conflict of interest between shareholders, thus referred to as principals, and managers and debt holders, hereby referred to as agents, is explained by the agency theory, also known as principal-agent theory (Jensen and Mecling, 2019). According to the notion, an agency association is a contract in which the principal hires the agent to carry out specific responsibilities on his behalf; on occasion, the principal may also authorize the agent to carry out specific tasks. On the basis of this agency relationship tenet, an agency conflict may develop because the agent may be prevented from acting in the principal's best interests while carrying out the principal's duties by his own welfare interests. Once bank executives have received generous compensation from shareholders, they are no longer motivated to exercise due diligence because they already have all they need. They might take part in actions that are inconsistent with maximizing shareholder profit. Loans are occasionally authorized without adequate inspection and credit scores, or even by authorizing projects with a negative NPV, in order to maintain their social influence (Rajan, 1994). However, theoretical and empirical research has demonstrated that the key factors contributing to agency conflict in commercial banks are moral hazards, risk aversion, time horizon, and profit retention. The degree to which credit quality is likely to be harmed as a result of an agency conflict is thus determined by these considerations. In order to implement balance sheet performance incentives for managers, commercial banks must have an efficient governance structure. To reduce conflict between the principal and agent, some employers permit employee co-ownership (Fenn & Liang, 2001).

2.4.4 The Competition-Fragility Theory

According to this view, increased competition in the banking sector breeds bank fragility. With the charter value framework as its theoretical basis, the bank-fragility view, banks compete for customer deposits which are invested at different financial claims at varying degrees of risk. The theory posits that the more competitive the banking industry is, couple with increased pressure on profit, the greater the incentives of banks to take undue risks with high possibility of fragility. The reverse applies in an imperfect competitive market where

banks are under no pressure to undertake undue risk due to the greater opportunities for banks to earn profit, hence have fewer risk incentives (Dushku, 2016; Allen & Gale, 2004).

2.4.5 The Asset Substitution Model

Asset substitution channel deals with the attempt by banks to substitute safe assets for risky assets in the event of interest rate decline. Thus, when the amount of safe assets in the bank asset portfolio declines due to interest rate reductions (Geng & Zhai, 2015), risk-neutral banks will become more interested in risky assets. This will continue until the portfolio's safe assets and risky assets have reached a new balance.

2.4.6 The Constant Leverage Theory

The constant leverage hypothesis holds that commercial banks usually aim at some target level of leverage ratio where any reduction in interest rate boost asset prices, resulting in an increase in bank equity. Banks' demand for riskier assets rises in response to the decrease in leverage. This response of the commercial bank to the interest rate cut strengthens asset values, increasing the risk to the banking system (Geng & Zhai, 2015). When interest rates drop, banks may only accept short-term deposits, which causes the financing of long-term projects against the short-term deposits mismatch to tend toward high leverage. This is the justification for the Asset-Liability mismatch channel to interest rate changes on bank risk. This situation gradually results in high leverage which increases a banks probability of failure due to high-risk exposure.

2.4.7 The Habit Formation Theory

The habit formation channel also explains that consumers develop some habit of high consumption in periods of low interest rates(Geng & Zhai, 2015).. Thus, in the wake of declining interest rates, consumers are willing to consume more. The declining interest rate induces borrowing by investor or investment in high-risk instruments. The increased borrowing and/or investment into high-risk financial instruments by investors increase banks risks all things being equal.

2.4.8 The Central Bank Communication Theory

The central bank communication hypothesis to interest rate changes and bank risk postulates that the transparency and commitment of the central banks as well as the credibility of their communication influences habit formation. In the face of central bank transparency and

credible commitment, an announcement of low interest rate induces collective moral hazard. According to Geng and Zhai (2015), the low interest rate suggests a lax monetary and regulatory environment, encouraging banks to take on more risk. Other studies, including De' Nicolo, Dell'Ariccia, Laeven, & Valencia (2010), also supported the idea that there is no clear relationship between interest rates and bank risk. They suggested that this relationship may change over time and depend on changes to the characteristics of individual banks as well as the overall banking system (Dell'Ariccia, Laeven, & Marquez, 2014).

2.4.9 The competition-stability

According to the competition-stability theory, there is a link between competition and bank stability. Boyd and De' Nicolo (2005) contend that increased competition in the banking sector will lead to lower lending rates, which will ultimately lower borrowing costs. This increases the level of effective investment, hence reducing bank risk. Martinez Miera (2008) further developed this model, adding to the argument with a more erratic connection of non-defaulting loans across different enterprises, and discovered a bowl-shaped (U-shaped) relationship between competition and risk.

2.5 Empirical Review

The factors that influence bank risk behaviour have been the subject of several research over the years. According to Jimenez, Lopez, and Saurina (2013), some research concentrates on a specific risk within the banking or financial industry, while others examine bank risk as a whole. The ratio of non-performing loans to total loans was used by Wang and Lui (2014) to gauge bank risk-taking. Numerous studies have identified various variables that influence commercial bank risk-taking behaviour. Various studies use different variables or determining factors which can be grouped under bank specific, banking-industry specific and macro-level factors. Whilst some studies use single level factors in examining the risk decision of banks, others have employed multiple factors. The empirical review for this study is divided into three, focusing on the main categories of bank risk-taking determining factors and the empirical results from previous studies. The findings from previous studies are separated for the various factors and reviewed. Various studies have also examined the determinant of bank risks, particularly credit risk proxied by non-performing loans and other indicators. Others have also employed total risk in examining bank risk behaviour. The standard deviation of returns on assets, standard deviation of returns on equity, the z-score, the Tobin's q, and the ratio of non-performing loans to total advance are among the variables

employed in the measure of bank risk (credit and total risk) that have been documented in the literature. For instance, Louzis (2010) examined the impact of macroeconomic and bank-specific variables on credit risk using six years of quarterly data, from 2003 to 2009. Messiah and Jouini (2013) found similar results, with a negative impact on GDP growth and a favorable impact on interest rates. In contrast, Fainstein and Novikov (2011) found positive, negative, and mix results for GDP and interest rate for different time periods. A similar study conducted by Aemiro and Rafisa (2014) employed quantitative approach in ten commercial banks for 4 years (2007-2011) to investigate the effect of bank specific variables on credit risk. In a panel data analysis, the study employed Hausman specification test to select between fixed effect and random effect models, checking the results with an OLS technique. Operating efficiency and bank ownership showed significant positive relationship with credit risk, whilst profitability, bank liquidity, and capital adequacy showed negative relationship, albeit insignificant. Wang and Lui (2014) combined macroeconomic and bank-specific variables to analyse how China's interest rates affect banks' willingness to take risks. The study discovered a negative link between bank size and bank risk after controlling for some bank-specific factors like leverage and bank size. Large banks typically have less riskier investments than smaller banks, which reduces their exposure to risk. Salkeld (2011) conducted a study to try and determine how accounting ratios and macroeconomic data affected the overall risk of US banks. Bank size, equity asset, liquidity, loan asset, and divided payout were used as bank-specific risk determinants in the study. GDP growth, money supply growth (M2+), and interest rate gap were used as macro-level risk determinants. The study made use of information from Wharton Research Data Services (WRDS), which provided quarterly data for a sample of 326 US banks between 1978 and 2010. Apart from dividend payout which was found not to be significant for all the 4 models of analysis for both standard deviations of ROA and ROA as dependent variables, all the other determining variables were found be statistically significant in one model or another. In an early study of 59 U.S banks from 1986-1990, the significance of some variables are dependent on the time period; a situation where some variables are found significant in a time period but insignificant in another. This is also explained as Mansur and Zitz (1993) posits, to the differences in the banks employed as well as the use of different ratios. For instance, Mansur and Zitz (1993) found only cash and receivables from the liquidity ratios of banks to significantly affect total risk. Studies of bank risk-taking behaviour and banking industry specific factors have also been examined in literature. There is evidence of extant literature that focused on different levels of bank competitiveness, focusing more on bank

deposit market competition, share of industry total asset, and bank risk-taking (Keely, 1990; Jimenez et al., 2013). One set of studies on the competition-risk nexus focuses on bank level data for countries (Boyd, De Nicolo, & Al.Jalal, 2006; Jimenez et al., 2007; Beck, 2008; Turik-Ariss, 2009; Fungacova and Well, 2009; Iskenderoglu and Tomak, 2013); the other is based on a large, cross-country aggregated dataset (Beck et al. Keely (1990) used the Tobin's q to calculate the bank's competitiveness based on its market power. Using two alternative measures of bank risk to relate his measure of market power while controlling for both macroeconomic factors and bank characteristics, he came to two fascinating conclusions. The first measure of banks risk, bank solvency ratio, was found to positively relate to market power, whilst the second measure, funding cost of certificates of deposit showed negative relationship. Both result on average supported the charter value paradigm. Using the common panel logit models using cross-country data for 69 countries over a 20-year period, Beck et al. (2012) discovered that bank concentration improved bank stability. They discovered that having a lot of banks ensures bank stability by making them less likely to experience a bank crisis. Similar to this, Levy-Yeyati and Micco (2007) used the H-statistic to gauge bank competitiveness and discovered a favourable correlation between bank competition and bank risk for eight Latin American nations. This result came from Claessens and Laeven (2004) who also used H-statistics as a gauge of bank competitiveness and C5 (the top 5 banks) as a measure of bank concentration and found a substantial positive correlation between the two. Dick (2006) produced similar relationship using loans losses as a measure of bank risk.

In an empirical examination of competition-bank risk nexus, Jimenez et al. (2013) controlled for bank characteristics and macroeconomic conditions and employed market power as an inverse measure of firm competitiveness. For three different models that used the Lerner's measure for bank competitiveness, they found no association between competition and bank risk using data from the Spanish Banking System. The competition-fragility theory or the charter value paradigm were backed by the model that used Herfindahl-Hirschman indexes (HHI) as a measure of market power or concentration, as it generated significantly negative results for market power on bank risk. Schaeck et al. (2009) published research on the competition-risk relationship for banks in 38 developed nations for the years 1980 to 2003, and they found evidence in favor of the competition-stability theory. They found increased competition in the banking industry to be negatively related to systemic crunch. Berger (2009) also employed bank-level data for 23 industrial states and found high degree of market power for banks to be relatively exposed to lower risk. This finding is in accordance

with the competition-fragility view. Turik-Ariss (2009) made similar findings for a study on developing countries. In line with the competition-fragility theory, Fungacova and Well (2009) discovered that bank rivalry affects the financial stability of Russian banks. Iskenderoglu and Tomak's 2013 analysis of the Turkish banking industry, however, found no evidence of a connection between competition and bank risk (stability). The competition-bank risk nexus has also been supported by recent research by Beck et al. (2012) and Liu, Molyneux, and Wilson (2013). While Liu et al. (2013) discovered an inverted U-shaped association for bank stability and regional completeness for 10 European banks countries over the 2000-2008 timeframe, Beck et al. (2012) showed fierce competition to have an impact on bank risk-taking incentives in stricter countries. Generally, extant literature exists in support of the charter value paradigm. Numerous academics have discovered empirically that macroeconomic factors have a major impact on banks' risk appetite and risk-taking decisions. According to the literature, macroeconomic factors have an impact on the level and direction of risks in the banking industry (Sandada & Kanhukamwe, 2015). Athanasoglou, Brissimis, and Delis (2009), Ioannidou, Ongena, and Peydro (2009), Salkeld (2011), and Jimenez et al. (2013) are a few of the research that fall under this category. There are divergent results from empirical research on the relationship between interest rates and bank risk. In 2014, Wang and Lui looked at how interest rates affected bank risk-taking in China. Their research sought to determine whether there is evidence supporting the negative relationship between interest rates and bank risk-taking behaviour that has been established by the majority of studies undertaken in western nations. In their examination of the study, they used the legal and market interests as the primary determining factors. They used some control variables, which they divided into internal and external variables, to analyze data from about 800 observations on Chinese banks between 2003 and 2012, and they discovered, similarly to other western studies, a negative relationship between interest rates and bank risk-taking behavior. Among other research, Jimenez et al. (2008), Athanasoglou et al. (2009), and Ioannidou et al. (2009) revealed outcomes that were congruent with those of Wang and Lui (2014). These studies looked at how banks' risk-taking decisions were impacted by monetary policy. They discovered an adverse association between the two, which is consistent with many previous investigations. Thus, an expansionary monetary policy influences banks into bearing more risks. Studies employing bank-level data also found evidence of lower policy rates resulting in increased bank risk (Altunbas, Gambacorta, & Marqués Ibañez, 2009; Gambacorta, 2009; Jimenez et al., 2007). In a time series research for the U.S., Angeloni, Faia, and Duca (2010) and Eickmeier and Hofmann (2010) similarly

discovered that balance sheet risk and credit risk spreads increased after a favorable monetary policy shock. In contrast, De Graeve et al. (2008) discovered that following a contractionary monetary policy, the probability of bank distress decreased in Germany. But according to Jimenez, Ongena, Peydro, and Saurina (2014), Lopez et al. (2007), and Thakor (1996), the impact of interest rates on bank risk is still unclear. Lopez et al. (2007) also found growth to have increasing effect on bank risks. According to their study's findings, bank risk-taking rises as the economy grows. This suggests that banks become more confident in the economy during periods of strong economic growth, which heightens their level of optimism and drives them to engage in riskier transactions by taking more risks. Using annual time series data for the years 1990 to 2010, Garr (2013) studied the effects of macroeconomic, industry-specific, and bank-specific factors on the credit risk of commercial banks in Ghana. The three categories of bank risk determining criteria were taken into account for the first time in Ghana in this study. The Ghana Statistical Service (GSS) database and the online financial time series database of the Bank of Ghana (BOG) were the sources of the study's data. The study discovered a considerable negative impact of financial sector development on bank risk and a favourable impact of management effectiveness on bank risk. The expansion of the GDP was also discovered to have a statistically significant positive impact on bank credit risk, whereas inflation, as measured by changes in the consumer price index, tends to be negatively associated to bank risk, notwithstanding prior knowledge. Using non-performing loans as a measure of loan default, Fofack (2005) used both macro-level and bank-level variables in an analysis of the factors that influence the probability of loan default in Sub-Saharan Africa (SSA). In order to determine the relationship between the dependent and independent variables, the study used data from a sample of sixteen SSA nations. Real GDP per capita and non-performing loans had a negative association, according to the examination of correlations. In a study of Guyana Commercial Bank utilizing data for the years 1994 to 2004, Khemraj and Pasha (2009) discovered that real GDP growth, real interest rates, and real effective exchange rates had a substantial impact on non-performing loans (credit risk). While inflation was shown to have no significant link with NPLs, Dash and Kabra (2010), using the same measure of credit risk, found that bank size, real interest rate, and real GDP had a substantial impact on NPLs.

2.6 Summary and Knowledge Gap

The current review of literature has shown the plausible determining factors of bank risk-taking decisions with supporting empirical evidence. Many factors that can be divided into

bank-level, banking industry-specific, and macro-level elements have been suggested to have an impact on banks' riskiness or their judgments towards different risk portfolios. Reviews of empirical studies on banks' risk-taking behaviour, however, have shown scant support for thorough investigations using bank- and banking industry-specific datasets or factors. When examining the factors that influence bank risk-taking decisions, some studies only use bank-level variables (Kishan and Opiela, 2000; Haldane, 2009; De Nicolo, Dell'Ariccia, Laeven, & Valencia, 2010; Delis and Kouretas, 2011); others also use macroeconomic factors (Jimenez et al., 2008; Atnanasoglou et al., 2009; Ioannidou, et al. These studies have also employed different measures of bank risk. Plethora of studies used credit risk whilst a few made use of total risk in their analysis. This current study makes use of total bank risk, measured by the z-scores, and combines all three determining factors of bank risk and relates the variables to the risk-taking and performance of banks in Ghana.

3 METHODOLOGY

3.1 Introduction

The methodological ideas used for the investigation are covered in Chapter 3 of the current study. This examined the entire research design, including sampling, data collection, and data analysis techniques. The study design is the main topic covered in this section first. The study population, sample and sampling criteria, an overview of the banks that were sampled, instrumentation, data collecting, and the method of data analysis are then covered.

3.2 Research Design

For this study's objectives, a longitudinal research design similar to those utilized in studies by Klein (2013), Tomak (2013), and Swamy (2012) was adopted. The explanatory research design is appropriate in this situation since this study will explore the impacts of a group of variables on an interest variable (Kothari, 2004). The research is termed explanatory in nature since it evaluates the impact of a few chosen variables on bank risk-taking; as a result, the explanatory research design, which has been used by several researchers in related studies, is used in the current study. The research problem under study and the process employed in addressing the problem served as the rationale for the research design adopted for the study (Masson, 2002).

3.3 Target Population

The focus of this study is the commercial banks in Ghana that operate currently in Ghana. As at June 2023, the total population of registered commercial banks in Ghana stood at 32. All 32 banks engage in commercial activities and advance credit to individuals and institutions as one of its functions. This constituted the target population for the study.

3.4 Study Sample

The study's sample was made up of 10 specifically chosen Ghanaian banks. This makes up about 31% of the entire population. The study's banks were chosen using the convenience sampling methodology. The sampling criteria were based on data availability and hence the banks chosen were financial institutions that have been operating since the year 2020 and have been authorised under the universal banking licence.

The period of analysis is justified on the basis of data availability. Many banks in Ghana become operational in 2020 and the published annual financial reports for these banks are available from 2023. Table 1 presents the 10 banks employed in the study as well as their respective denotations.

Table 1 Sampled Universal Banks

Banks	Abbreviation	Data Type	Years Covered
Agricultural Development Bank	ADB	Annual	9 years (2014-2022)
Barclays Ghana Limited	BBGL	Annual	9 years (2014-2022)
CAL Bank	CBGL	Annual	9 years (2014-2022)
Ecobank Ghana Limited	EGL	Annual	9 years (2014-2022)
Fidelity Bank Limited	FBL	Annual	9 years (2014-2022)
GCB Bank Limited	GCB	Annual	9 years (2014-2022)
HFC	HFC	Annual	9 years (2014-2022)
Prudential Bank	PBL	Annual	9 years (2014-2022)
Standard Chartered Bank	SCB	Annual	9 years (2014-2022)
Société General Bank Ghana	SG-SSB	Annual	9 years (2014-2022)

3.5 Sources of Data and Method of Data Collection

The annual financial reports of the appropriate banks were used to obtain data specific to banks. Data relevant to the banking sector was also acquired from the Bank of Ghana (BoG) database's monetary time series data. Both the BoG database and the World Development Indicator (WDI) database were used to collect certain macroeconomic data. The data gathered included all the necessary variables that were needed for computing the relevant variables of the model. The model variables were computed when necessary, using the formulas presented below.

3.6 Model Formulation

3.6.1 Methodological Framework

Several variables have been identified in empirical literature to impact on risk of banks and performance within the financial industry (Garr, 2013). Bank risk-taking, particularly risk has been identified in literature to be influenced by a number of factors including interest

rate spread, bank size, bank efficiency, bank capitalization and ownership, inflation, GDP, interest rate, competition and general development of the financial sector among many others (Das & Ghosh, 2007; Folawewo & Tennant, 2008; Navneet, Boopen, Sawkut, Shalini, & Binesh, 2009; Sarpong, Winful, & Ntiamoah, 2011). However, according to Garr (2013), these factors can be divided into three main groups: macroeconomic factors, banking industry factors, and indicators or factors peculiar to individual banks. Following from this categorization, this current study develops a framework that links these three broad factors to bank risk-taking and performance.

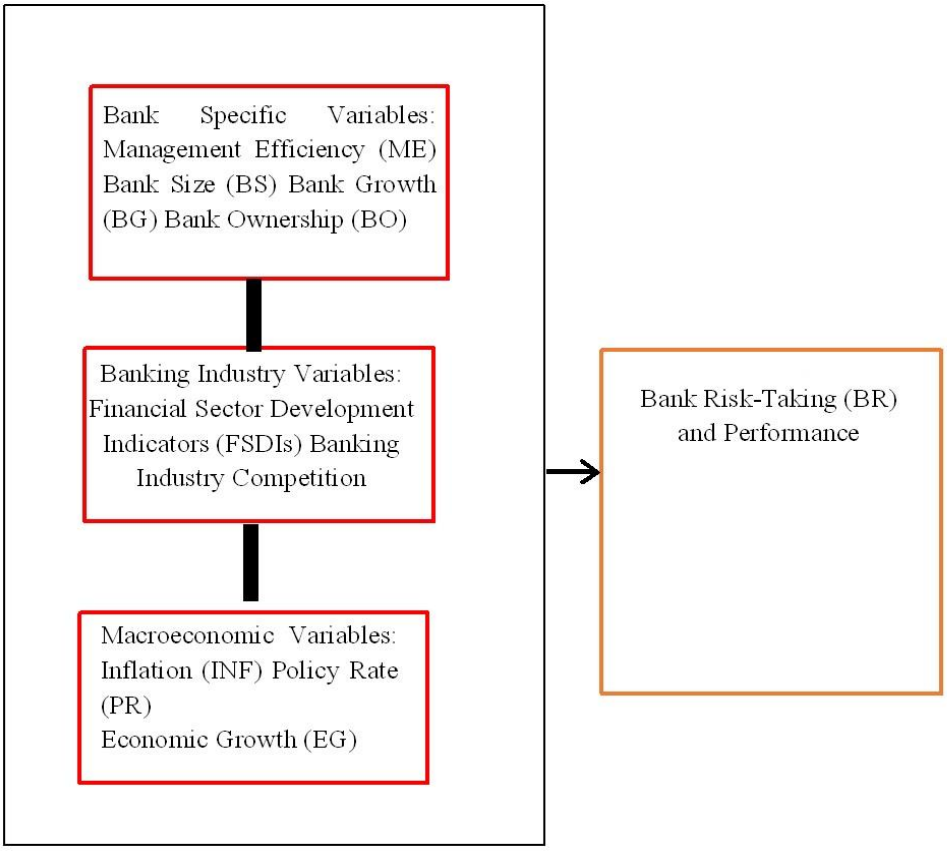

Figure 1 Conceptual Framework Source: Author's Construction, 2023

3.6.2 Model Specification

This current study makes use of bank specific, banking industry specific for 10 universal banks in Ghana as well as some macroeconomic level data in a panel data form to examine the determinants of bank risk-taking. Plethora of studies have examined the risk-taking behaviour of banks (Rajaraman, 1999; Das and Ghosh, 2007; Borio & Zlu, 2012; Gar, 2013; Garr, 2013; Bokpin, 2015) focusing on various determining factors which can be grouped into three key areas – bank-specific factors, industry-specific, and macroeconomic factors

(Garr, 2013). To undertake this analysis, a general regression function of "i" banks for "t" years is specified in equation 1 following a model adoption from Gar (2013).

$BR = f\ (X^B, X^I, X^M) + \varepsilon$..... (1)

where:

BR is the bank risk,

X^B is the banks specific variables,

X^I is the banking industry specific variables,

X^M is the macroeconomic variables,

and ε is the residual term.

Equation (1) can be expanded to the form as shown in equation (2) below.

$BR_{it} = \alpha_i + X'\beta + \mu_t + \varepsilon_{it}$……. (2)

where:

αi represents bank specific unobserved heterogeneity,

μ_t is the time invariant heterogeneity,

ε_{it} represents the residual error term,

$\mathbb{R}^{10x1} \in X$ is a vector of explanatory variables,

$\mathbb{R}^{10x1} \in X$ is a vector of explanatory variables,

$\mathbb{R}^{10x1} \in \beta$ is a vector of parameters to be determined,

i= Banks (Cross-sectional observations),

t= time dimension (in years. 2014-2022).

and t= time dimension (in years. 2014-2022).

Equation (2) can also be expressed in a more expansive form as;

$BRit = \alpha i + \sum 4j{=}1\ \varphi j\ XjitB + \sum 3j{=}1\ \gamma j\ XjtI + \sum j{=}13\ \rho j\ XjtM + \mu t + \varepsilon it$……..… (3)

Where:

BR, X^B, X^I, and X^M are as defined in equation (1) above.

The empirical model of estimation was based on the model derived in equation (3) where bank risk-taking is shown to be influenced by bank specific variables, banking industry variables, and macro level variables.

3.7 Variables Definition and Measurement

The three broad categories of factors that influence bank risk-taking are defined and the method of computation if any are all outlined. These variables under the three categories are employed in the model of the study.

3.7.1 Dependent Variable

3.7.1.1 Bank Risk-Taking (BR)

The activities of banks in general are associated with some foreseen or unforeseen occurrences that are detrimental to the smooth operation of the bank and also limits or reduces its margins. The occurrences which usually affect their margins and asset values as well as its general operations are termed bank risks. The risks of banks are defined on the event leading to the damage or loss, and also by the object of effect. **They involve credit risk, market risk, liquidity risk, interest rate risk, and exchange rate risk among others**. In measuring bank risk, various studies employed different risks; particular among them is credit risk. The z-scores created by Hannan and Hanweck (1998) were used in this study to quantify bank risk-taking, following previous studies by Dushku (2016) and Tarraf and Majeske (2013). The research Chen (2011), Laeven and Levin (2009), Magalhaes, Gutierrez, and Tribo (2008), Spong and Sullivan (2007), and Demirguc-Kunt and Detragiache (2002) all utilized this measure. The z-score, according to Boyd and De'Nicolo (2005), is the total of capital asset ratio and return on assets, weighted by the return on assets' standard deviation. Therefore, the study's measure of bank risk is the ratio of the capital asset ratio to the four-year moving standard deviation of return on assets, as illustrated below;

$$\text{Z-score} = \frac{ROA+CAR}{\sigma_{ROA}}$$

Where ROA is the four-year moving standard deviation of return on assets, CAR is capital asset ratio, and ROA is return on assets.

The z-scores, according to Laeven and Levine (2009), gauge how distant a bank is from being able to pay its loans in full based on how far income would have to decline. The z-scores represent for the standard deviations below the mean for which return on asset would have to decline in order to offset capital, according to Spong and Sullivan (2007). The z-score and bank risk have an inverse connection. A higher z-score, thus, indicates reduced bank risk, and vice versa. The z-score rises with rising ROA and/or CAR (rising equity and/or falling assets), and it falls with rising return on asset standard deviation.

3.7.2 Independent Variables

The independent variables of the model for this current study are categorized into three. They are macroeconomic factors, bank-specific factors, and banking industry-specific ones. Management effectiveness, bank size, bank growth, and bank ownership are among the bank-specific characteristics. Financial sector development indicators (FSDI1 & FSDI2) and industry competition are the variables that are specific to the banking sector. The macroeconomic factors are monetary policy rate, economic growth, and inflation.

3.7.2.1 Bank Specific Variables

3.7.2.1.1 Management Efficiency (ME)

The ability of management to effectively coordinate the activities of the bank in achieving its stated objectives or aims is described as management efficiency in this study. The function of bank officials and management is examined. In this study, managerial efficiency is determined by dividing the bank's annual operating expenses by its annual gross income.

$$ME = \frac{Operating\ Expenses}{Total\ Income}$$

A lower value for ME indicates that management is highly efficient and a high value shows management inefficiency. All things being equal effective management ensure effective and efficient operation of the bank. Implicitly, effective management results in optimal use of bank resources with greater organizational outcome, hence reduction in bank risk. Therefore, an inverse relationship is expected between the measure of management efficiency (ME) and the measure of bank risk (z-score).

3.7.2.1.2 Bank Size (BS)

In essence, bank size examines the size of a specific bank in terms of the value of its assets. As a result, it gauges a bank's size. The total amount of deposits made by customers can be used to calculate a bank's size. However, the size of a bank in this study is determined by the log of its total assets. The bank size formula is BS = lnta.

Where:

ta represents the bank's total asset.

Uncertainty surrounds how bank size affects bank risk. Depending on the bank's primary objective as an institution, size may have a beneficial or negative impact on its risk. If a smaller bank aims more at making higher margins and growing in the industry, it is expected

to engage in high-risk investment all things being equal. However, if the aim is to maintain relevance and survive through time, it will be prudent enough to only assume risks whose returns are quite certain over time. Again, a larger firm is assumed to have the resource capacity to be able to assume greater and higher risks. However, it is also plausible for a bigger firm to be comfortable enough not to assume unnecessarily high risks with the aim of making higher margins. Because of this, it is unclear how bank size affects bank risk. In other words, the relationship between bank size and bank risk cannot be determined with absolute certainty.

3.7.2.1.3 Bank Growth (BG)

In the current study, changes in a bank's total asset's percentage over time are used to gauge the growth of the institution. Growth of bank assets is anticipated to have a positive or negative impact on bank risk, similar to how bank size affects bank risk. As a result, the outcome is uncertain.

That is:

$$BGit = tait - tai(t-1)/\ tai(t-1) * 100$$

3.7.2.1.4 Bank Ownership (BO)

Ownership in this study is classified into foreign and local. Bank ownership looks at whether the bank is locally owned or owned by foreign investors. When all other factors are equal, it is anticipated that foreign banks will report lower risk than domestically held banks (Garr, 2013). A binary variable called "bank ownership" (BO) is used to represent this information, with the value 1 for locally owned banks and 0 otherwise.

3.7.2.2 Banking Industry Variable

3.7.2.2.1 Financial Sector Development (FSD)

Financial sector development is a measure of how the financial sector has improved in terms of its contribution to the economy. Similar to Garr (2013), two key indicators of financial sector development (FSDIs) are employed. These are;

$$FSDI_1 = \frac{M2 +}{GDP}$$

Which is the share of broad money supply in GDP and

$$FSDI_2 = \frac{TA}{GDP}$$

Which is the share of banks' total assets in GDP.

They are both ratios of financial industry variables to GDP. Development of the financial sector will mean that the financial system is quite developed such that banks are easily able to monitor their clients. Development of the financial sector generally would mean that banks can now afford to take on even greater risk than before because they are in a comfortable financial situation to do so. On the other hand, development of the sector also means those firms are better positioned to be able to identify a profitable venture and also be able to predict fairly the possible cost benefit analysis associated with an investment, hence, are able to minimize risk. The effect of financial sector development on bank risk-taking and performance is therefore indeterminate.

3.7.2.2.2 Industry Competition (IC)

Competition defines how firms within the same or a particular sector or industry strive to capture a portion of the total market demand. Competition measures the degree of rivalry between firms within a particular industry. As a result, a firm's competitiveness reflects its capacity to endure in the face of market forces. In the current study, the Hirschman-Herfindahl Index (HHI) is used to gauge industry competition. The market share of all companies in the industry at a particular moment is added up to get this figure. Implicitly, the market share sum of all the companies in industry j is equal to the square root of the industry competitiveness in year t. But a company's market share is calculated as the ratio of its total asset to the industry's.

Mathematically, industry competition is given in this study as:

$$HHI_t = \sum_{i=1}^{10} \left(\frac{ta_{it}}{TA_t}\right)^2$$

Where *ta* represents the total assets of each bank separately and TA represents the combined total assets of all banks. Due to its impact on financial service efficiency, product quality, and the level of financial sector innovation, industry competition is a very important factor for the financial market (Claessens, 2009). The more eager banks are to take a risk in order to get consumers, the more competitive the market will be. Therefore, the analysis anticipates a favourable correlation between bank risk-taking and industry competition. The argument made by Marcus (1984) and Keely (1990) regarding the connection between bank rivalry and bank risk leads to this expectation.

3.7.2.3 Macroeconomic Variables

3.7.2.3.1 Inflation (INF)

The steady rise in the general level of prices is referred to as inflation. The Consumer Price Index (CPI) is used in this study to calculate what is referred to as the cost of doing business. According to the analysis, bank risk and inflation should be positively correlated. In other words, if the cost of doing business (inflation) rises, so does the demand for bank loans (Boyd & Champ, 20004), and as a result, so does the risk that banks are willing to take on.

3.7.2.3.2 Economic Growth (EG)

Growth in GDP is employed as a measure of economic growth. It is measured as a percentage change in GDP over time. It is calculated in this study as;

$$EG_t = \left(\frac{GDP_t - GDP_{t-1}}{GDP_{t-1}}\right) * 100$$

Growth of GDP is expected to make people better off all things being equal, hence increasing their creditworthiness and ability to fulfil loan obligations. Bank risk can also increase with growth of the economy. That is, in period of high economic growth, banks become usually confident in the system and are willing to undertake risky investment and also willing to advance loans and credit to individuals and businesses. Therefore, growth of GDP is expected to result in an increase in bank risk-taking.

3.7.2.3.3 Monetary Policy Rate (MPR)

Monetary Policy Rate is the amount in rate charged by the central bank for advancing loans to the universal banks. In other words, it is the cost incurred by the universal banks in borrowing funds form the central bank. According to Garr (2013), this serves as the major indicator of the rate of interest rate in the economy. There are divergent views in literature on the effect of policy rate on bank risk-taking. However, most studies (Adrian & Shin, 2009; Borio & Zhu, 2012) explained this through the interest rate effect. An improvement on the policy rate means a reduction in banks' ability to borrow from the central bank in order to advance more loans or credit, hence, a reduction in credit risk. We therefore, expect a negative relationship between policy rate and bank risk.

Table 2 Summary of the variables used in the study, their notations and their expected signs.

Variables	Denotation	Unit	Expected Sign	Some Empirical Evidence
Bank Risk	BR	Ratio		
Management Efficiency	ME	Ratio	-	Tehulu & Olana (2014)
Bank Size	BS	Ghc	-/+	Garr (2013)
Bank Growth	BG	Percent	-/+	Garr (2013)
Bank Ownership Foreign or Local	BO	Dummy	-	Aemir & Rafisa (2014)
Financial Sector Development.	FSDI1 &FSDI2	Percent	-/+	Garr (2013)
Industry Competition	IC	Percent	+	Dushku, 2016
Inflation	INF		+	Boyd & Champ (2004)
Economic Growth	EG	Percent	+	Garr (2013)
Monetary Policy Rate Percent	MPR	Percent	-	Altunbas et al. (2009)

Source: Author's Construction, 2023

3.8 Empirical Model and Estimation Technique

In addressing the first objective of the study, the research makes use of a separate line graph showing the behaviour of bank risk-taking for the 10 banks over the 9-year period under consideration. The time is represented on the horizontal axis with the bank risks (Z- scores) shown on the vertical axis. Evident from the model, the study proposes to examine the effect of bank specific variables, banking industry variables and macro level variables on bank risk-taking (objectives 2 to 4) using the empirical model expressed in equation 4 below:

$$BRit = \beta 1 MEit + \beta 2 BSit + \beta 3 BGit + \beta 4 BOit + \beta 5 FSDIt1 + \beta 6 FSDIt2 + \beta 7 ICt + \beta 8 INFt + \beta_9 EG_t + \beta_{10} MPR_t + \alpha_i + \mu_t + \varepsilon_{it} \quad (4)$$

where ME, BS, BG, BO, FSDIs, IC, INF, EG, & MPR are defined as in Table 2 above,

β_i, i = 1, 2……,10 are the parameters to be determined, whereas α_i, μ_t and ε_{it} are as defined in Equation (2) above.

In this work, panel data analysis is used to estimate the empirical model that is provided. Utilising panel data estimation with the pooled OLS, fixed effect (FE) and random effect (RE) models. In order to examine the factors that influence bank risk-taking and performance in Ghana, the study used three different regression analyses: pooled ordinary least squares (Pooled OLS), random effects, and fixed effects models. The best or most appropriate regression analysis or approach must be used in this case, though. The study looked at model appropriateness to make sure that the optimal estimation approach was used while looking at the factors that influence bank risk-taking and perfromance. The Breusch Pagan Test (BPT) and the Hausman Test for Panel Model Selection are used to achieve this. The Hausman Test first looks at which of the FE and RE models is the better fit. The BPT then assesses if the RE and the Pooled OLS estimates are adequate.

3.8.1 Hausman Test (Fixed Effect versus Random Effect) for Model Selection

The Hausman specification test is a technique for testing whether a fixed effect or random effect framework is acceptable. The Hausman specification test examines whether a fixed-effects or random-effect framework is more appropriate in light of the null hypothesis that invisible specific consequences are uncorrelated to one or more of the factors that explain them. Fixed effect models are more acceptable whenever the null hypothesis is disregarded, according to Gujarati (2003), but random effect models are more suited when the null hypothesis is accepted. The following assertion serves as the foundation for the Hausman test (Hausman, 1998);

$H0$: A regression model with random effects (RE) is suitable.

$H1$: A regression model with fixed effects (FE) is adequate.

Rule of making choices:

Reject $H0$ (Reject RE) if probability of chi-squared (Prob. X2) is less than 0.05. In any other case, do not disregard $H0$.

If RE is disregarded, we use the FE estimations or findings to explain the factors that influence bank risk-taking and performance. But if the Hausman test findings show that RE is acceptable, we run a Breusch Pagan Test (BPT) to confirm that the RE model is indeed adequate.

3.8.2 Breusch Pagan Test (BPT)

The BPT is a test used in panel regression analysis to determine if the RE and Pooled OLS predictions are suitable. It is carried out upon the following hypothesis:

$H0$: Random Effects (RE) regression model is appropriate.

$H1$: Pooled OLS regression model is appropriate.

Decision Rule:

Reject $H0$ if probability of chi-squared (Prob. X2) < 0.05 Do not reject $H0$ if otherwise (i.e. probability of chi-squared (Prob. X2) > 0.05)

The econometric analytic software utilized to examine the study's data was Stata version 14.1. In order to build the graphs and run the empirical model, this software was used. In order to analyse all the study topics, Stata 14.1 was the sole econometric programme employed.

3.9 Model Justification

The panel regression analysis option depends on the type of data used. The fact that panel data were employed in the study made it suitable for a panel regression. Once more, the Breusch-Pagan and Hausman specification-based model selection tests support the choice of the Random Effect estimation model over the Panel Fixed Effect and the Pooled OLS models. While the latter makes no assumptions about the variance of the various classes of observations and does not take into account the bank consequences, the former is a multilevel or combined model analysis that allows the calculation of between and within effects in addition to assuming the normality of observations effects (in this case, bank effects). The main advantage of the RE over the FE in this study is its capacity to split the total residual variance into the between-bank variance and the within-bank variance. Panel data allow for fluctuation over time between different units because individual-specific aspects are taken into account. To more precisely identify and assess impacts that are challenging to perceive in pure time series or pure cross-sectional data, panel data may be employed (Gujarati, 2003). Furthermore, merging cross-sectional observations made throughout time results in more enlightening data.

II. ANALYSIS

4 INTRODUCTION

The results of data analysis are presented in the study's current chapter, which also includes a discussion of literature. Variables for 10 banks were used in the study's data during a 9-year period (2014-2022). For the time period under consideration, the variables included data at the macroeconomic, industry, and bank levels. There are 90 observations total in a balanced panel among 10 banks over 9 years. The data analysis is broken down into three sections: a brief summary of the variables or data using summary statistics; a trend analysis displaying the risk-taking and performance behaviour of chosen banks over the period; and a panel regression analysis looking at the factors influencing bank risk-taking and performance in Ghana.

4.1 Description of Data

This aspect of the analysis provides a description of the variables of the model (both dependent and independent variables) using summary statistics. This section is in two parts: the mean for bank-specific variables, and a summary statistics of study variables.

4.1.1 Descriptive Statistics of Bank-Specific Variables by Banks

The mean values of the bank-specific variables employed in the model (bank-risk, management efficiency, bank size and bank growth) are presented for all 10 banks in table 3 below. Higher values for BR indicate higher z-scores, hence lower bank risk and performance. A higher value for ME also indicates inefficiency while that of BS, and BG indicate higher performance. Evident from the table below, GCB Bank is seen to have the highest bank-risk with SG-SSB having the lowest bank risk for the 9year period (2014-2022).

Management efficiency (ME) shows a bank’s ability to turn its resources into revenue or generate greater income from its expenses. Values for ME reveal SCB to be more efficient in management over the period under study with PBL trailing in terms of management efficiency. GCB Bank emerged the highest in terms of bank size while HFC reported the lowest mean for bank size indicator. The growth of banks measured by percentage change in bank asset over the period show a mean of approximately 56.26% (highest) for FBL and the lowest of 12.78 for BBGL.

Table 3 Mean values of Bank-Specific Variables (2007-2015)

Banks	Study Variables			
	BR	**ME**	**BS**	**BG**
ADB	28.7944	0.57094	20.8326	20.6182
BBGL	5.95014	0.53211	21.2865	12.779
CAL Bank	23.6494	0.50416	20.5585	41.5823
EGL	36.6028	0.48451	21.5434	36.3426
FBL	8.80464	0.69151	20.5539	56.2582
GCB Bank	1.44585	0.51318	21.6364	24.756
HFC	30.3554	0.64739	20.0737	40.9054
PBL	39.5977	0.72031	20.1232	28.1576
SCB	68.6775	0.44158	21.3559	19.4844
SG-SSB	73.6508	0.62371	20.5786	21.1874

Source: Author's Computation from Data (Stata 14.1 Version)

4.1.2 Descriptive Statistics of Study Variables

Table 4 below provides a summary statistic of study variables showing average for all the banks under consideration. Evident from the table, all variables have 90 observations indicating that the panel data employed for the study is strongly balanced.

The standard deviation of return on asset reported values ranged from 0.99 to 406, and the bank risk (BR) was calculated as the product of these values. It recorded a standard deviation of about 52.40 and a mean value of about 31.02. A measure of how far apart from the mean value each individual bank risk is, the deviation shows this. Implicitly, the bank-risk (z-score) is high enough to elicit a lower risk-taking by banks in general even though a few banks were taking on high risks. "Bank risk-taking calculated in this manner (i.e., using z-scores) represents the number of standard deviations below the mean that return on asset would have to fall to eliminate capital and force the bank to default," according to Spong and Sullivan (2007), p.9. This means that bank income would have to fall by approximately 31 points before the banks in general will be forced to default on its debt. This could be explained by the strict procedures and prudent measures taken by banks to guide against its debts, as well as the policies governing the risk activities of the bank in general, especially those associated with their credit risks.

Managerial efficiency ratio of 0.56 on average for all the selected banks is an indication of some level of efficiency of banks. A ratio of 1.00 would imply that there is equal amount of income generated from bank expenses. However, a ratio of less than 1 and gravitates towards zero (0) imply increasing efficiency as banks are able to generate more than proportionate revenue or income from its resources or operating expenses. The natural log of bank total asset was used to calculate the bank size (BS), which also revealed a value range of 18.90 to 22.61 with an average value of 20.85. For the nine-year period, chosen banks' average annual bank growth was 30.21. Implicitly, the total assets of the chosen banks increased by an average of nearly 30%. The study used 10 banks, of which 7 (70%) were locally owned and the remaining 3 (30%) were held by foreign entities. The local banks include ADB, CAL Bank, FBL, GCB Bank, HFC, PBL, and SG-SSB. The remaining banks, BBGL, EGL, and SCB are foreign-owned banks in Ghana.

The summary statistics for the banking industry-specific variables like financial sector development indicators (FSDIs) as well as industry competition are shown in table 4. The $FSDI^1$ and $FSDI^2$ showed mean values of approximately 0.70 and 0.90 respectively with corresponding standard deviations and minimum and maximum values shown in the table. The mean values for the FSDIs which is greater than 0.50 is an indication of financial deepening. Industry competition (IC) also reported a mean of approximately 0.03, a minimum of 0.01 and a maximum of 0.15.

The table also includes the descriptive statistics for the macroeconomic factors. The consumer price index, which measures inflation, had a mean value of 13.44%, a standard deviation of 3.79%, a minimum value of 8.58%, and a maximum value of 18.1%. The findings for GDP growth (GDPG) indicate that over the study period, GDP growth averaged 8.10% approximately, with lows of 3.99% and highs of 14.05%. The policy rate (MPR) also had an average of 16.9% over the time period, with a peak of 26% and a low of 12.5%. The table shows the respective minimum and maximum values along with the corresponding standard deviations.

Table 4 Summary Descriptive Statistics of Study Variables

Variables.	Obs.	Mean	Std Div	Min	Max
BR	90	31.753	54.942	0.996	406.353
ME	90	0.573	0.163	0.141	0.883
BS	90	20.854	0.873	18.801	22.608
BG	90	30.207	30.958	-95.650	162.254
FSDI1	90	0.697	0.304	0.287	1.237
FSDI2	90	0.896	0.377	0.399	1.535
IC	90	0.034	0.036	0.001	0.145
INF	90	13.444	3.793	8.580	18.100
EG	90	8.096	3.271	3.986	14.046
MPR	90	16.944	4.074	12.500	26.000

Source: Author's Computation from Data (Stata Version 14.1)

4.2 Correlation Analysis

The correlation matrix is used to analyse the relationship between the model's explanatory variables. The correlation between the model's independent variables is shown in Table 5. As can be seen from the table, there is a strong negative correlation between FSDI1 and FSDI2, with a correlation coefficient of 0.99, almost perfect. The relationship between FSDIs could be explained by the fact that both variables are measures of financial deepening and comprise a common variable (GDP) in their measurement. Again, all the macroeconomic variables and the FSDIs are highly correlated with coefficient of at least 0.91. The macroeconomic variables also report high correlation coefficients; 0.81 for EG and INF, 0.98 for MPR and INF, and 0.85 for EG and MPR. Higher inflation is shown to be bad for economic growth. A tight monetary policy is also shown to be good for economic growth.

The negative sign for correlation coefficient between INF and MPR indicates that an expansionary monetary policy (reduced MPR) will result in increase in inflation. This is in line with theory as an expansionary policy leads to an increase in money supply, a situation that translates into excess demand in the goods market, hence, causing a demand pull-inflation.

Table 5 Correlation Matrix for Independent Variables

Variables	ME	BS	BG	BO	FSDI1	FSDI2	IC	INF	EG	MPR
ME	1.00									
BS	0.40	1.00								
BG	0.03	-0.02	1.00							
BO	-0.11	0.30	-0.03	1.00						
FSDI1	0.35	0.05	0.08	-0.08	1.00					
FSDI2	-0.35	-0.13	-0.08	0.04	-0.99	1.00				
IC	-0.16	-0.43	0.12	0.22	-0.04	0.04	1.00			
INF	0.36	0.09	0.04	-0.06	0.93	-0.91	-0.04	1.00		
EG	-0.39	-0.15	-0.02	0.04	-0.93	0.93	0.06	-0.81	1.00	
MPR	-0.37	-0.07	-0.03	0.07	-0.95	0.93	0.04	-0.98	0.85	1.00

Source: Author's Computation from Data (Stata 14.1 Version)

4.3 Trend Analysis of Bank Risk-Taking and Performance for period 2014-2022

This section presents and discusses the risk-taking behaviour of selected banks and also presents the mean values of Bank risk by the various banks over the period under consideration (2014-2022). A stacked graph showing bank risk behaviour (shown by the values for the z-scores over the period) is presented in figure 2 below.

Evident from the height of the trend line for PBL and SG-SSB, these two banks are found to have the highest z-scores in 2022, both picking with BR values of about 34.2 and 40.6 respectively. This implies low bank risk for PBL and SG-SSB in 2022 relative to the other eight banks. Inspection of data shows these dynamics to be accounted for by relatively lower standard deviations of ROA for both banks for 2021 and 2022. Thus, there was little deviation of the 2021 ROA from its values in 2022. Prior to the year 2022 where PBL and SG-SSB had higher z-scores, the banks had relatively smoother z-scores (Bank-risks) over the 9-year period. GCB bank reported the highest BR in 2019.

The year 2015 saw ADB with the lowest BR (z-score of 62.25), followed by SG-SSB (41.34) and PBL (32.57). Following from the figure 2 and the individual line-plots for the banks, GCB Bank reported the highest bank-risk (lowest z-scores) over the period. This was followed by BBGL with lowest z-scores after GCB bank. This was followed by FBL.

In terms of the yearly ranking of the banks that had or recorded the highest and lowest risk, 2014 saw SCB record the lowest with GCB bank being the highest risk-taking bank. SG-SSB recorded the lowest in 2022, while GCB bank again remained the highest risk-taking bank (lowest z-score of 1.96). SG-SSB recorded the lowest bank risk for 2020, 2021 through to 2022, whilst HFC dominated as the lowest risk-taking bank in 2017 and 2018. Over the years GCB was the highest risk-taking and performance bank on annual basis amongst the sampled banks in Ghana for this study.

Thus, on average, GCB Bank reported the highest bank risk (lowest z-score of 1.45). This was followed by BBGL (5.95), FBL (8.41), CAL (23.65), ADB (28.79), HFC (30.36), EGL (36.60), PBL (39.60), SCB (68.68), and SG-SSB (73.65). Implicitly, SC-SSB recorded the lowest bank risk on average for the entire period whilst GCB Bank saw the highest bank risk and performance over the years.

The high risk-taking behaviour of GCB Bank can be attributed to lower returns on assets or the relatively high levels of loan and other credits advanced to public sector workers.

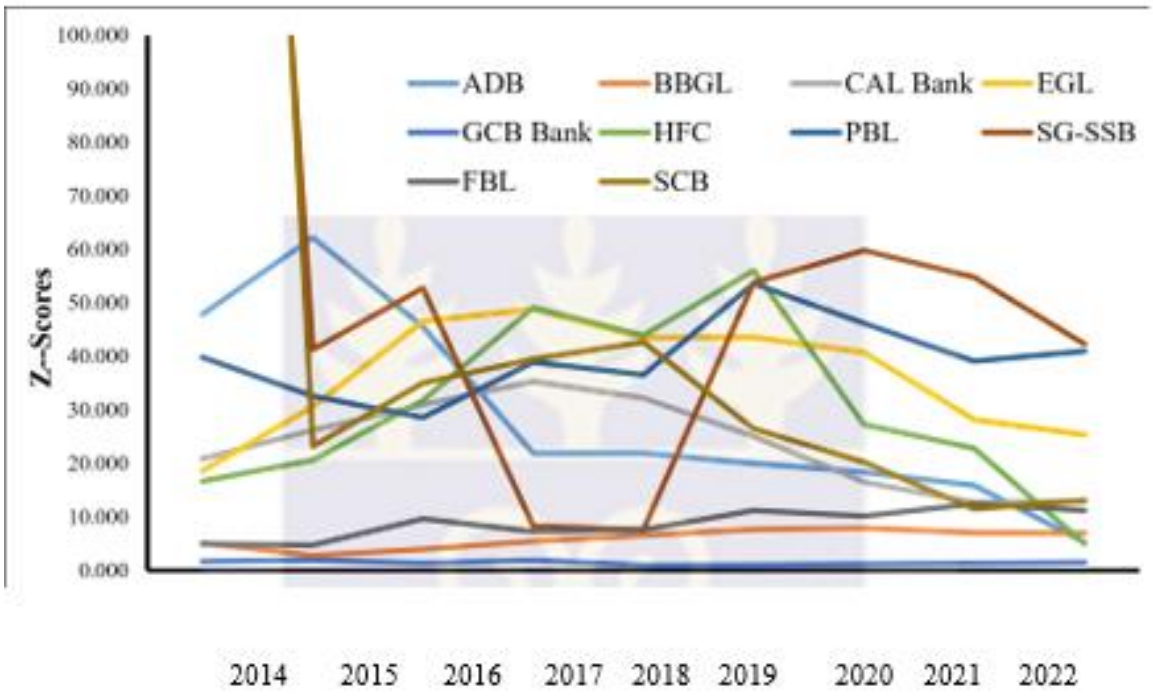

Figure 2 Bank Risk-Taking (Z-scores) of Selected Banks (2014-2022)

Source: ugspace.ug.edu.gh

Table 6 Mean Bank Risk and Performance over study period.

Banks	ADB	BBGL	CAL	EGL	FBL	GCB	HFC	PBL	SCB	SG-SSB
Mean BR	28.79	5.95	23.65	36.60	8.80	1.45	30.36	39.60	68.68	73.65

Source: Researcher's Computation from Data (Stata Version 14.1)

A separate graph is presented to show risk-taking behaviour for individual banks employed for the study. Evident from figure 2, BBGL, FBL, and GCB Bank have a much smoother but high-risk pattern (lower z-scores). ADB showed a lower risk pattern in the early years, experiencing a rising pattern (falling z-score) after 2015 through to 2018 with somewhat stable risk between 2017 and 2018. CAL Bank also had a relatively lower risk in the first three years relative to ADB, experience higher risk than ADB in the last six years, peaking at a z-score of 35.33 in 2018 which happen to be its lowest risk recorded in the nine years. EGL had a similar pattern as CAL Bank in its risk-taking over the period, also experiencing the lowest risk in 2017 with a z-score of 48.86.

Similarly, HFC also peaked at 49.10 (lowest risk) in 2020. GCB bank with the smoothest risk pattern experienced its lowest and highest risks in 2017 and 2019 with z-scores of approximately 1.97 and 1.00 respectively which both happen to be higher than all the banks over the years. SCB although experienced the lowest risk in 2014 experienced a sharp increase in risk in 2015, decreasing again in 2016 through to 2018 after which it began to increase again. SG-SSB also experienced a significantly lower risk in 2014 which increased sharply (reduced z-score) in 2015 and 2016, rising again in 2017, 2018, reducing in 2019 and 2020, and gradually picking up again in the last two year. After 2014, the risk pattern of SG-SSB is seen to fluctuate after every 2 years. Over the years, PBL experienced a relatively lower risk in the first 2 years, increased in 2016 and showed down and upward pattern every year for the remaining years, falling and increasing after every year. FBL also had higher risks in the first 2 years and begun to decrease in their risk pattern over the years until 2022 where the risk level experienced its lowest.

4.4 Empirical Analysis

4.4.1 Model Selection

The analysis first compared between pooled OLS, random effects, and fixed effect models of panel analysis to examine the relationship between bank risk-taking and its determining variables consisting of bank specific, banking-industry specific, and macro level variables. The Hausman specification test result was used in determining the appropriate model between the random effect and fixed effect model. Results from the test revealed the appropriateness of the random effects over the fixed effect model using the test hypothesis outline for section 3.8.1 in the previous chapter of this study. Evident from figure 2, BBGL, FBL, and GCB Bank have a much smoother but high-risk pattern (lower z-scores). ADB showed a lower risk pattern in the early years, experiencing a rising pattern (falling z-score) after 2014 through to 2022 with a somewhat stable risk between 2017 and 2018. CAL Bank also had a relatively lower risk in the first three years relative to ADB, experience higher risk than ADB in the last six years, peaking at a z-score of 35.33 in 2017 which happened to be its lowest risk recorded in the nine years. EGL had a similar pattern as CAL Bank in its risk-taking over the period, also experiencing the lowest risk in 2017 with a z-score of 48.86. Similarly, HFC also peaked at 49.10 (lowest risk) in 2017. GCB bank with the smoothest risk pattern experienced its lowest and highest risks in 2017 and 2019 with z-scores of approximately 1.97 and 1.00 respectively which both happened to be higher than all the banks over the years. SCB although experiencing the lowest risk in 2015 experienced a sharp increase in risk in 2016, decreasing again in 2017 through to 2018 after which it began to increase again. SG-SSB also experienced a significantly lower risk in 2015 which increased sharply (reduced z-score) in 2016, rising again in 2017, reducing in 2018 and 2019, and gradually picking up again in the last two years. After 2017, the risk pattern of SG-SSB is seen to fluctuate after every 2 years. Over the years, PBL experienced a relatively lower risk in the first 2 years, increased in 2016 and showed down and upward pattern every year for the remaining years, falling and increasing after every year. FBL also had lower risks in the first 2 years and begun to increase in their risk pattern over the years until 2021 where the risk level experienced a fall. 0.9998 which is greater than 0.05 (5%) justify the appropriateness of random effects model (RE) over the fixed effect (FE) model in this study. As a result, we are unable to reject H0, that the RE regression model is suitable. Following the acceptance of H0, which states that the RE model is the proper model for the current study, we move on to conducting the Breusch Pagan Test (BPT) to compare the RE model

and the Pooled OLS model for suitability. The decision rule for the BPT and the probability value led us to the conclusion that the Random Effects (RE) model is suitable for the study because we are unable to reject the null hypothesis (H0). Inferring that the RE model is more appropriate than the pooled OLS model is implied by a probability value of 0.0801, which is more than 0.05 (5%) in this case. The study then uses the RE panel analysis model to investigate the factors that influence bank risk-taking. The next section displays the outcome.

4.5 Interest Rate Risk

Utilizing an interest re-pricing schedule, simple measures of the sensitivity of earnings and economic value to changing interest rates are produced. A re-pricing "gap" for each time band is produced by subtracting interest rate-sensitive obligations from matching interest rate-sensitive assets. This gap can be used to determine how exposed the banks' earnings are to changes in interest rates. An examination of the banks' interest re-pricing schedule revealed a negative asset-sensitive gap of GHS (12,516) for the year 2022. The negative re-pricing gap was 13% smaller than it was the year before. It meant that a rise in the general average market interest rate would lead to a rise in interest income for the bank. Because more assets than liabilities were invested at rates below market throughout that period, this is the case.

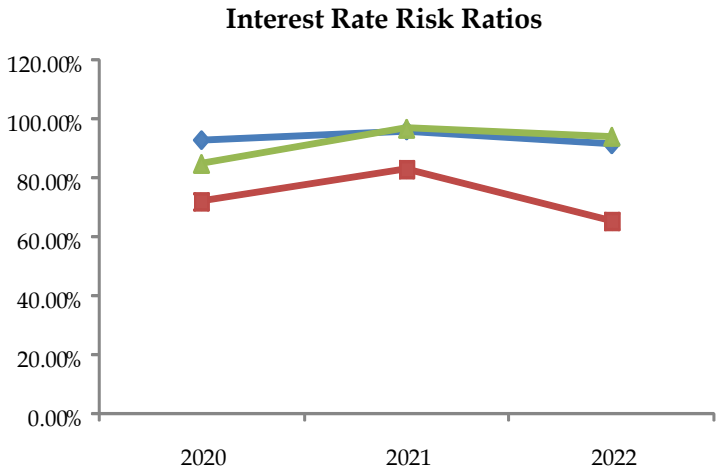

Figure 3 Interest rate risk ratios for GCB, BBGL and FBL for three years

Source: author construction from data

Interest rate risk is calculated as follows:

Interest rate sensitive assets/Interest rate sensitive liabilities

Total assets / assets that are susceptible to interest rates.

Total Liabilities / Liabilities that are interest rate sensitive.

Since more obligations would have been assumed at lower market rates as a result of falling average market interest rates, increasing the bank's interest income, having a negative interest repricing mismatch is a smart move on the bank's part. The assets of the bank and the owners' equity appeared to be particularly vulnerable to the risk of interest rate increases in general. Even though it increased from about 3.65% the year before, the Gap to Total Asset Ratio of 6.4% for 2020 was incredibly low given that generally accepted prudent limits range from -15% to 15%. The GAP to equity ratio decreased from a peak of 88.13% in 2020 to a low of 64.22% in 2022. Due to the declining market rates, there was a significant decrease in the ratio of interest rate-sensitive assets to liabilities, which went from approximately 95.76% in 2020 to 91.3% in 2022.

The bank, however, was unable to adequately respond to the mismatch situation in order to prevent losses in interest income, primarily due to the unpredictability of both domestic and international macroeconomic conditions. For the bank to be managed effectively, assets and liabilities must have matching or mismatching maturities and interest rates. Since business is frequently conducted under ambiguous conditions and in a variety of ways, it is uncommon for banks to ever be perfectly matched. Unmatched positions may increase profitability while also raising risk.

4.6 Discussion of Findings.

From table 7 below, the Random Effects regression reports a Wald chi-squared probability of 0.0747. The probability value is less than 0.10 (10%) which is an indication of a strong model. Implicitly, we reject the null hypothesis of zero coefficients, implying a strong model. This means that all the independent variables of the model jointly impact on bank risk-taking behaviour. Also evident is the number of observations and number of groups of 90 and 10 respectively. Thus, there are 10 banks (groups) and 90 observations (data of 10 banks for 9 years, producing 90 observations in the form of a panel data).

Table 7 Probability values banks risk-taking

Dep. Variables	Coeff.	Std. Err.	Values	Lower Bound.	Upper Bound
ME	-47.34201	48.0659	0.325	-46.8653	141.5494
BS	11.26334	18.2844	0.538	-24.5734	47.10008
BG	0.2719828	0.19391	0.161	-0.65204	0.108073
BO	16.28365	24.4371	0.505	-64.1794	31.61213
FSDI1	-1043.726	472.101	**0.027****	118.4254	1969.027
FSDI2	707.8015	306.159	**0.022****	-1307.86	-107.741
IC	408.1162	302.715	0.178	-1001.43	185.1947
INF	-15.31052	8.12022	**0.059***	-0.60482	31.22586
EG	14.47468	5.25592	**0.006*****	-24.7761	-4.173269
MPR	24.09015	11.707	**0.040****	-47.0354	-1.14491
_cons	28.78117	372.55	0.938	-701.404	758.9664
R-Squared: Within = 0.1788			# of Obs. = 90 (# Groups = 10)		
Between = 0.1495			Ward Chi-squared (10) = 16.98		
Overall = 0.1735			Prob. > Chi-squared = 0.0747		

Source: Author's Estimation in Stata (Version 14.1) *, **, & *** denotes significance at 10%, 5% & 1% respectively

To examine whether a variable in the model is a true determinant of the risk-taking decisions of banks, a focus on the probability values of the respective variables from table 7 above. The probability value reflects a variable's importance and the degree to which it influences the explained variable (Bank Risk). It is clear from the table that during the study period, neither managerial efficiency (ME), bank size (BS), bank growth (BG), bank ownership (BO), nor industry competition (IC), had a substantial impact on banks' risk-taking behaviour. However, the findings indicate that macroeconomic factors such as inflation (INF), economic growth (EG), and the monetary policy rate (MPR) have a considerable impact on the risk-taking behaviour of banks. The impact of multiple category factor categories (bank particular, banking industry specific, and macroeconomic factors) on bank

risk-taking behaviour is covered in the preceding section. Given that the z-scores were used in the study as a gauge of bank risk, the coefficients for the model are to be interpreted in the opposite way. A negative coefficient in the model is described as having a beneficial impact on bank risk since higher z-scores imply a reduced bank risk.

4.6.1 The Effect of Bank-Specific Factors on Bank Risk-Taking

From table 7 above, the bank-specific variables of the model are ME, BS, BG, and BO. Bank ownership was dummied, and the locally owned bank is employed as the reference category in the analysis. With probability values greater than 10%, it is evident from the table that ME, BS, and BG are not significant determinants of bank risk-taking. Results indicated that ME, and BS have reducing effect on bank risk, while BG have positive effect, albeit insignificant. The intuition is that a more efficient bank management translates into prudent operation, hence, lower risk-taking. The positive relationship between bank size and total risk is that as bank asset increases, relatively less is accounted for by risky assets. However, as size of a bank's asset grows over time (bank growth), it is able to leverage in taking risky investment decision, hence, the positive relation. Similarly, local banks turn to have risks that are much higher than foreign-owned banks. This is in line with Garr (2013) that foreign banks are expected to report lower bank risks than locally owned banks all things being equal. The plausible explanation for this is the differences in management efficiency, technological differences, and knowledge gap, or experience. Despite these directional effects, ME, BS, BG, and BO were all found to be insignificant in determining BR. Implicitly, the bank-specific variables do not significantly influence the behaviour of banks in their risk-taking.

4.6.2 The Effect of Banking Industry-Specific Factors on Bank Risk-Taking

The banking sector specific factors included financial sector development (FSDI1 & FSDI2) and banking industry competition. Coefficient of IC indicates a positive impact on risk-taking behaviour of banks, where competition forces banks to undertake risky ventures, they would otherwise not take, albeit insignificant. With a probability value of 0.027 and 0.022 for the financial sector development indicators; FSDI1 & FSDI2 respectively, both indicators are seen to significantly influence bank risk-taking behaviour at 5%. The negative coefficient for FSDI1 imply that development in the financial sector through the use of money supply (M2+) results in a reduction in bank risk. However, similar to growth in bank asset (bank growth), development in the sector resulting from total asset of banks will lead

to increased bank risk. These findings follow from Garr (2013) who found contrasting effects of the two financial sector development indicators on bank risk.

4.6.3 The Effect of Macroeconomic Factors on Bank Risk-Taking

The macroeconomic variables employed in this study included inflation (INF), GDP growth (EG), and monetary policy rate (MPR). Table 7 show significant results for all the three macroeconomic variables. With a p-value of 0.059 and a coefficient of approximately -15.31, inflation is significant at 10% and result in a reduction in bank risk. Implicitly, the findings on inflation points that banks are unwilling to undertake high or more risks in inflationary periods. This finding does not follow from a prior expectation as postulated by Boyd and Champ (2004). However, Garr (2013) found similar directional effect of inflation on bank risk (credit risk), albeit insignificant. Similarly, Dash and Kabra (2010) found insignificant but negative relationship between inflation and bank risk for Guyana Commercial bank. The growth of the economy (EG) shows a significant positive effect on bank risk at 1%. A probability value of 0.006 show significance at 1% while a coefficient of 14.26 shows that a percentage increase in EG increase bank risk by 14.48 points. The effect of growth on bank risk is in line with study expectations of a positive nexus between the two variables. The findings follow from Lopez et al. (2007) that bank risk-taking behaviour increases with economic growth. With economic growth, banks are confident with the financial system and the economy in general and are comfortable taking greater risks. Similarly, Garr (2013) found growth of the economy to instigate more risk-taking by banks who assume much confidence in the economy. Dash and Kabra (2010) also found significant positive effect of growth of the economy on banks risk-taking. The study findings therefore contradict Messiah and Jouini (2013) and Louzis, Vouldis, & Metaxas (2012) on the negative effect of growth on bank risk and confirm the positive economic growth-bank risk nexus by plethora of empirical literature. MPR also recorded a p-value of 0.040 and a coefficient of 24.09. This means MPR have a significant positive effect on bank risk; significantly, at 5%. Thus, a contractionary monetary policy (increases in policy rate) increases bank risk. Conversely, an expansionary monetary policy induces banks to undertake fewer risks. Interestingly, banks are found to rather undertake high-risk investment or increase their risk portfolios in the event of policy rate increases. The plausible explanation is that banks would want to make higher returns from their investments in the face of high interest rates as a result of the increase in the policy rate. They therefore would prefer to venture into high-risk portfolios in anticipation of increases in the rate of return. For instance, banks might want to

lend more in the period of higher policy rate (which transmits in higher lending rates) with the aim of optimizing returns from credit advance before the rate falls. This will usually happen when the bank anticipates a subsequent decline in the rate following an initial increase. Although this finding is in consonance with Angeloni et al. (2010) and Eickmeier and Hofmann (2010), it is in contrast with theory. It also contradicts findings from major studies such as Jimenez et al. (2007), Altunbas et al. (2009), and Gambacorta (2009) among others who found increases in policy rates (interest rates) to discourage risky undertakings by banks and their performance.

4.7 Summary

The World Development Indicator (WDI) database, the Bank of Ghana (BOG) financial time series database, and yearly financial reports were the sources for the analysis of bank-specific, banking industry-specific, and macroeconomic data in this section of the study. In this study, bank risk-taking behaviour for 10 banks was evaluated during a nine-year period (2014-2022). Analysis showed the trend in bank risk throughout the time period and how banking and macro-level factors had an impact. The study's conclusion and some helpful suggestions are provided in the next part, which is based on the study's findings.

CONCLUSION AND RECOMMENDATIONS

Summary of Findings

This part offers a summary of the study's findings, a concluding statement, and forward-looking constructive recommendations. There are four sections in this chapter. The study's results are summarized in the first part. The second portion provides a conclusion by inferring conclusions from the study, and the third and fourth sections discuss the study's suggestions, its limitations, and potential future research areas.

This study originally sought to assess how risk-taking and performance of a selected banks in Ghana of bank-specific, bank industry, and macro level variables:

The trend analysis from the study showed that apart from GCB Bank, and BBGL who had a relative smoother and negative trend in bank risk for greater part of the periods under study (particularly from 2015 to 2022, the remaining banks had fluctuations in their risk-taking over the years. GCB Bank, BBGL, and FBL recorded the highest bank risk (lowest z-scores) for the entire period under study.

However, the z-scores were found on average to be a little above 31% for selected banks in general. GCB Bank, BBGL, and FBL all reported z-scores below the average for all banks over the study period. Also, apart from SCB, SG-SSB, EGL, and PBL who recorded average z-scores above the bank average, all the other six banks reported a lower average. Implicitly, the former banks reported higher bank risks on average relative to the later banks.

The correlation analysis revealed that the two indicators of financial sector development (FSDI1 & FSDI2) are highly correlated with correlation coefficient of 0.99 and with negative relationship. The macroeconomic variables were also shown to have high correlation with a minimum magnitude of 0.81 in coefficient of correlation. The coefficient showed 0.81 for inflation and economic growth, 0.85 for economic growth and monetary policy rate, and 0.98 for inflation and monetary policy. The relationship shows positive for MPR and EG, and negative for EG and INF, and MPR and INF.

Bank-specific indicators were found not to significantly affect bank risk-taking. The variables, managerial efficiency, bank size, bank growth, and bank ownership proved insignificant in determining bank risk-taking and performance.

The two main variables used for the banking industry-specific indicators were the financial sector development index and industry competition. While the industry competitiveness

variable demonstrated the opposite, both measures of financial sector development indicators used were proven to have a considerable impact on bank risk-taking.

Significant results were obtained for the macroeconomic variables of inflation, economic expansion, and policy rate. While growth and the policy rate showed a favourable relationship with bank risk-taking decisions, inflation has a decreasing influence on bank risk-taking.

Financial sector development, inflation, economic growth, and monetary policy rate were the key determinants of bank risk-taking behaviour of chosen banks, which significantly influenced bank risk-taking at various levels. The FSDIs were both found to be significant in explaining bank risk-taking decisions at 1% but with different direction effects. Inflation showed significant negative effect at 10%. Economic growth was highly significant at 1% and showed increasing effect on bank risk. Monetary policy rate showed positive effect on bank risk, but at 5% significant level.

Implication of Findings

- The activities of banks entail management of asset and liability portfolios which are risk bound. Implicitly, banks are inevitably faced with different risks at varying degrees in their daily business operations. In other to make substantial margins, it is imperative that banks undertake certain risky investments and accept some varying amounts of risk-bearing deposits and liabilities. However, a considerable minimum level of bank risk is ideal for bank survival, operation, growth, and expansion in the long run. High bank risk vis-a-vis return on investments could model stakeholders' perception about bank operation and management.
- In general, studies have revealed Ghanaian banks to undertake considerable levels of risk. Banks tend to take advantage of growth of the economy to make higher margins by engaging in or undertaking higher risks. Banks in Ghana focus more on macroeconomic indicators in adjusting their risk decisions than on internal structure and/or arrangements, and outputs from the balance sheets.
- The implication is that banks upon making risk decisions basically focus on the macroeconomic shock (variables of which they have no or less control) in order to cushion themselves against possible loss in revenue or asset value in the event of changes in macro indicators. The insignificance of bank-specific variables could result from the fact that those are internal factors; factor for which banks have

relatively high control over and can alter in the event of internal shocks. Hence, they do not focus much on these variables.

Recommendations

The research, financial analysis, or risk management department of banks should be charged with the responsibility of ensuring a viable analysis of the financial market to make informed decision on banks' investment or risk undertakings. This will help the banks to invest in assets that are less affected by the macroeconomic factors discussed in this research. They can also plan a portfolio investment management that minimises risk and maximise returns.

Banks are also to ensure better forecast of macroeconomic shocks in order to avert possible loss to asset values in the event of shocks. In this way they can sell or keep an asset depending on the future forecast made by management.

Essentially, banks are advised to devise and keep operational strict and stringent policies on their risk portfolios in order to avert unnecessary risks. The type of savings account in the banking system is a common example. To deter holders of savings accounts from making immediate withdrawals, banks should enforce a tight regulation. Through the transfer of liquidity risk to the saver, this will improve bank stability. Even though the results of this research showed bank specific variables to be insignificant, management can still adopt a more efficient strategy to prevent unnecessary risk.

Additionally, credit or lending risks (i.e., non-performing loans) pose the biggest threat to banks. Therefore, it is advised that banks practice selective lending in order to lessen or do away with the moral hazard connected to loan defaults. That notwithstanding government policy like MPR can also lead to loan default since it has a correlation with forex. Customers who are involved in imports and exports may default their loans if the policy rate have a negative effect on forex.

Banks could also design proactive customer loan means or strategic measure of customer credit scores to ensure loan advancement to creditworthy borrowers at least. This could be done by designing customer due diligence (CDD) processes in order to better understand their customers. Even though this is also a bank specific factor which is shown to be

insignificant according to this research, proper customer due diligence can reduce the bank risk taking by identifying credit worthy customers through this mechanism.

4.8 Study Limitation

The current study examined to assess how risk-taking and performance of a selected banks in Ghana of bank-specific, bank industry, and macro level variables for some 10 selected banks for a 9- years period (2014-2022). The study was limited in data sample and scope. Future studies could attempt a cross-country study within Africa to investigate how the current findings agree for Africa. This will entail examining how the country averages of bank risk vary and how they are affected by some factors that are internal and external to the banking system.

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LIST OF ABBREVIATIONS

ADB: Agricultural Development Bank

BBGL: Barclays Bank Ghana Limited

BG: Bank Growth

BO: Bank Ownership

BOG: Bank of Ghana

BPT: Breusch Pagan Test

BR: Bank Risk

BS: Bank Size

CAR: Capital Asset Ratio

CDD: Customer Due Diligence

CPI: Consumer Price Index

EG: Economic Growth

EGL: Ecobank Ghana Limited

FBL: Fidelity Bank Limited

FE: Fixed Effect

FSDIs: Financial Sector Development Indicators

GDP: Gross Domestic Product GDPG GDP Growth

GSS: Ghana Statistical Service

HHI: Hirschman-Herfindahl Index

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Appendix P II: