**UNIVERSITY OF GHANA**

**COLLEGE OF HUMANITIES**

# BUSINESS CYCLES, BANK RISKS AND SPREAD IN GHANA

**BY**

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# DECLARATION

This is to certify that this thesis is the product of my own original research undertaken towards the award of a Master of Philosophy in Finance in the Department of Finance, College of Humanities, University of Ghana, Legon. This work has not been previously submitted for the award of a degree in this or any other university. All references used in this work have been accordingly acknowledged. I bear sole responsibility for any shortcomings.

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# CERTIFICATION

We hereby certify that this thesis was supervised in accordance with procedures laid down by the University.

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# DEDICATION

This piece of work is exclusively dedicated to my lovely wife REBECCA SERWA DZIWORNU.

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## ABSTRACT

The purpose of this study was to determine the relationship between liquidity and credit risks, and bank spread. It also sought to determine the cyclicality of the effects of liquidity and credit risks. Financial institutions play an important role in the Ghana's economy. Among other things, the intermediary role they play between entities with surplus funds and those who have a deficit. They do this by accepting surplus funds through savings and other deposits which they then give to deficit entities through loans, overdrafts and other means. Theories such as the theory of financial intermediation assign some activities, also known as qualitative assets transformation, as the fundamental functions of banks. These activities that banks undertake also have associated risks which include liquidity risks and credit risks. The risks affiliated with maturity transformation evolve partly as a result of ensuring a sustainable level of liquidity anytime short-term deposits are used to finance fixed-rate long-term loans. This results in liquidity risks. Also, as intermediaries, banks stand surety for borrowers, since they guarantee repayment to depositors (lenders). To obtain the goals of the study, data was obtained from the Ghana Stock Exchange for banks that had quarterly data from the year 2008 to 2017. Macroeconomic data was taken from the World Bank database and Ghana Statistical Service database. These were analysed using the Generalised Methods of Moments (GMM) estimation technique.

The findings of the study show firstly that, business cycles have a strong positive relationship with bank spread. This relationship is statistically significant, suggesting that there is a strong relationship and correlation between business cycle phases and the interest rate spread of banks, hence bank spread among the sampled banks is procyclical. Also, the findings indicate that credit risk is significant than liquidity risk in explaining bank spreads, but their relative effects differ over the business cycle phases. Credit risk is more significant on spreads in the period of

expansion in the economy, while liquidity risk is more significant on spreads in the period of recession in Ghana. It is recommended that banks should factor the cyclical feature of liquidity risk and credit risk in pricing loans. Future researchers should consider cross-country analysis in Sub Saharan Africa to determine whether our findings can be extended to include other countries in the region.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Study

The role of banks in any economy is, for the most part, financial intermediation between entities (households or firms) with surplus funds and entities with deficits (Werner, 2015). They accept surplus funds through vehicles such as savings and other short and long-term deposits and offer them to deficit entities through loans, overdrafts and other means (Beckmann, Hake, & Urvova, 2013; Jokipii & Milne, 2008; Werner, 2015). This fundamental role played by banks is also associated with some level of costs incurred by these financial institutions. The theory of financial intermediation features several activities, generally known as qualitative assets transformation and these activities are usually regarded as core functions of banks (Bhattacharya & Thakor, 1993). It must be however be noted that these activities come along with risks specifically liquidity risk, credit risk and other risks associated with the transformation of maturity.

Bhattacharya and Thakor (1993) opined that there is some level of risk related to maturity of assets and liabilities as a result of the arrangement of liquidity when short-term deposits are utilised to finance fixed-rate long-term credits. This creates a gap known as the "maturity gap", which can be attractive and desirable for banks especially when the associated term premia are lucrative. Term premium refers to the compensation that investors or banks require to bear risks that are associated with short-term treasury yields, since they usually do not evolve as expected. In this instance, banks have an incentive to increase income by being more aggressive in their intermediation role and in the process,

may assume more risks than usual. This is generally referred to as the "lure of interest rate risk" (Greenbaum & Anjan, 2004).

Almeida and Divino (2015) pointed out that credit concession is necessary in the financial sector in order to advance development, through the distribution of financial resources to different sectors of the economy. One of the significant pointers of productivity in financial institutions is the interest rate spread or the loan fee spreads. Interest rate spreads are the differences between the cost of acquiring savings and the profits on these assets from a bank's point of view; that is, the difference between the financing cost banks charge on advances to their customers and the financing cost that they pay to depositors.

Indeed, financial institutions are susceptible to diverse risks such as operational risks, credit and liquidity risks, because they serve as a risk dealer (Ho & Saunders, 1981) by creating liquidity from savers and investors and providing funds to borrowers, and they are always expected to provide funds to their savers and investors whenever the need arises. This becomes more perilous because the banks do not know the timing needs of their savers and also there is likelihood that their borrowers will also not be capable to fulfil their obligations when their repayment of funds is due. Hence, banks are more cautious about liquidity and credit risk. Arif and Nauman Anees (2012) defined liquidity risk as a situation where banks are not capable of fulfilling their financial obligations without mislaying assets or incurring unexpected expenditure. In order to have a sound financial stability to compact unforeseen withdrawals, banks need to have a sufficient liquidity buffer. If banks need to hold or maintain a sufficient buffer to avoid future occurrences of panic withdrawals as suggested by ( Arif and Nauman Anees, 2012), then

they would always be disadvantaged on the cost of holding too much money even when customers do not need their monies at that particular period. Following this conversation in the literature, we argue that, banks need to be aware of and understand the state of the economy in which they operate and what each state of the economy may demand. For instance, if the economy is at a boom period, the question of whether or not customers will need more money for consumption or the banks will invest customers' deposit needs to be asked. In a period where banks give funds to borrowers on the assumption that they will redeem repayments when due but the borrowers fail to repay the loans granted them, it results in credit risk. So, the timing for holding more liquidity and investing customers' savings is a crucial decision for the banks. The economy grows when the banks are able to give credit to borrowers to take risky ventures. It is for this reason that, banks need to have a comprehensive facts and understanding of the business cycle and know how liquidity and credit risks responds to a specific phase of the cycle and its effects. In order for banks to compensate all costs attributed to their financial intermediary roles, having considered all the necessary risks, they charge a rate of interest on loans and also pay a depositor rate of interest to depositors.

Market analysts consider bank spread (the difference between deposit rate and lending rate) to be an indication of banks' efficiency in their financial intermediation role. Aydemir and Guloglu (2017) indicated that when competition is weak in the financial institution sector, bank spreads are relatively to be high and this would be symptomatic of inefficiency in financial intermediation. High bank spreads will dampen investment in the economy as a consequence of high costs of borrowing. Moreover, if deposit rates are low,

relative to lending rates, savings level will decline and further distort the macro economy along various phases of the business cycle (Ndung'u & Ngugi, 2000).

When interest rates are countercyclical, that is, high during recessions, businesses will struggle to find cheap financing to make investments. This would lead to lower investments and production which will further deepen the recession. This cyclical impact of spreads is known as the financial accelerator principle or mechanism. Because of this accelerator effect, it is very necessary to examine the cyclical behaviour of spreads so as to understand how banking sector stability impacts on the real economy ( Bernanke, Gertler, & Gilchrist, 1996; Kasekende, 2010; Mlachila, Park, & Yabara, 2013). Studies on business cycles have spanned more than a century, and the concept has been variously defined. One of the important definitions is by Burns and Mitchell (1946) who defined business cycles as follows:

> *Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organise their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle (p. 3).*

Business cycle thus refers to the phases that an economy goes through over time with respect to fluctuations around its activities, often measured by the GDP. This study also determines "business cycle" as real GDP growth rate following (Gilchrist & Zakrajsek, 2012), and Hamiton, 1989). These phases of the economic cycles have implications for businesses and banks (Bernauer & Koubi, 2002; Diebold & Rudebusch, 1996; Goldberg, 2007; Machado, 2001). For instance, during periods of contractions, there is generally a

slowdown of activities and reduced income, this leads to higher unemployment rates and business losses. Banks are more likely to record higher non-performing loans during this period, thus higher credit risk. In order to accommodate this type of risk, banks may charge exorbitant interest on loans and widen the spread. By this conventional wisdom, it will be expected that bank spread would be wider during contractions and smaller during expansions, reaching its lowest and highest at the trough and peak, respectively ( Nikitin & Smith, 2009). Some studies have however suggested a countercyclical relationship between spreads and the business cycle (Hasan, Liu, & Zhang, 2015; Liu, 2013; Nikitin & Smith, 2009). Banks may also face other classifications of risks like liquidity risk during contractions and expansions in the economy ( Bernauer & Koubi, 2002; Guidara, Lai, Soumaré, & Tchana, 2013; Nikitin & Smith, 2009).

Notwithstanding the extant literature on bank risks, bank spreads and business cycles, very few studies have examined how these variables relate among themselves, and the direction of any such relationship. Different studies on bank spreads have likewise been focused on the prime determinants of financing costs (Ho & Saunders, 1981), causes of net interest margins (Maudos & De Guevara, 2004), the impact of maturity transformation (Drechsler, Savov, & Schnabl, 2017; Paligorova & Santos, 2014; Sher & Loiacono, 2013), comprehending the behaviour cycle of bank spreads (Angbazo, 1997), interest-rate risk, default risk and off-balance sheet banking (Angbazo, 1997). This current study seeks to investigate the effects of liquidity risk and credit risk on bank spreads amid the different phases of the business cycle.

This piece adds to literature in two ways. First and foremost, it is one of the initial studies that examine credit, liquidity risks, business cycle and bank spread in the Sub Saharan

African region. This study is important in this region because Africa is a growing continent aiming for development. As shown by Levine (1997) the fiscal development of a nation can be attributed to the efficacy of financial intermediation in the country. Moreover, a good understanding of the business cycle will help in making correct analysis of economic activities and anticipating future movement of the cycles because the behaviour of every economy is also described by an interaction between growth and cycles (Calderón & Fuentes, 2014; Machado, 2001). Secondly, many of the existing studies on bank spread have also been geared towards the determinants of bank spread without linking these determinants to the business cycles in which they operate to ascertain whether it has any effect. This study contributes to literature by linking bank risks with spread over business cycle. This will inform policy makers, financial institutions and other users as to how bank risk (credit and liquidity) affects their spread at various phases of the business cycle. These gaps in the literature are what the researcher seeks to fill.

The approach adapted for measuring bank spread in this study is the ex-post approach instead of the controversial ex-ante approach. Thus, our measure of bank spread is more forward looking. The ex-ante is computed from the expectation of financial institutions for granting credit, hitherto the realisation of its after-effect. The ex-ante spread is believed to be more responsive to changes in the economy because of its quick reaction to changes in the macroeconomic scenario, but this approach comes with some problems. Earlier researchers have argued that banks can give different loans to their customers at different rates depending on the risk assessment or level of the customer. Therefore, this may lead to ambiguity in determining the rates at which a particular bank offers a facility

to its customers over a period of time. However, ex-post spread has the tendency of being less responsive and hence more stable, given that it is a representation of the effective outcome of financial intermediation. The ex-post approach is believed to have captured all the various rates at which loans were given to customers, because it deals with the interest accrued from the loans. Also, the study investigates how liquidity risk and credit risk have various effects on bank spreads during business cycles in Ghana. This is important, given that the relationship between spreads and the cyclical behaviour of credit and liquidity risks has not been studied in the Sub-Saharan African (SSA) region to the best of our knowledge.

### 1.2 Statement of Problem

Currently, most studies have in the past found that interest rate spreads have persistently been high in Ghana and other developing countries in Africa, the Caribbean and Latin America compared to OECD countries (Chirwa & Mlachila, 2004; Brock & Rojas-Suárez, 2000; Crowley, 2007; Gelos, 2009; Randall, 1998). Notwithstanding its persistence, research on this problem is scanty though the problem has dominated economic discussions in these countries for many years. The few studies on this topic have focused mainly on the causes of interest margins. Ho and Saunders (1981) found that given certain assumptions, the pure spread could be identified empirically. Saunders and Schumacher (2000) results also shows that, there is a significant and positive direction between spreads and the variance on bond rates as has been predicted by theoretical models (Saunders & Schumacher, 2000).

Saunders and Schumacher (2000) examined the causes of bank interest margins in seven OECD countries and concluded that pure spreads are reacts to the structure of financial markets. Kansoy (2012) investigated interest margins and bank ownership in Turkey and found that operational bank size, diversity, market concentration, credit risk and inflation differ across foreign-owned, domestic private and state-owned banks priced their individual interest rate risk and associated expected excess holding period returns via the assets side into net interest margin.

Over the years, there are has been a growing concern amongst Ghanaians over the wide spread between the rates banks pay to depositors and interest rates that they charge on loans. Spread is an essential variable that needs to be investigated because it plays a major task in the efficacy of the financial system, and spread also measures the cost of financial intermediation. Bawumia, Belnye, and Ofori (2005) examined the determinants of bank interest spreads in Ghana and concluded that the presence of major structural weaknesses, such as the degree of contestability, and the market concentration among banking institutions, and other factors, avert the financial system from reaching its full efficiency level. Non-performing loans, high operating cost, non and the existence of liquidity reserves, also contribute to the increasing spreads, despite the influence of the latter, it is not as large as that of market share and operating costs (Brock & Franken, 2003; Folawewo & Tennant, 2008; Lahiri & Wang, 1996). Aboagye, Akoena, Antwi-Asare, and Gockel (2008) also researched into Ghana's interest rate and found that increases in some variables such as the rate of inflation, staff costs, bank size, administrative costs, staff costs, extent of bank risk aversion and bank market power (or concentration) also significantly increases net interest margins. Gockel and Mensah

(2006) concluded that Ghana's economy experienced high interest spreads that was approximately 15.79 percentage points from 1997 to 2004. These studies have all sought to do one thing: to determine the determinants of interest rate spreads adopting net interest margin which are deemed to be ex-post. Additionally, these studies attempted to establish the correlation and effects of liquidity and credit risks on bank spreads but mostly failed to address the cyclicality of these risks on spreads. Aydemir and Guloglu (2017) have pioneered a study on the cyclical effect of risks on bank spreads but limited their study to Turkey. The literature identifies the role of credit risk play in spread determination, but there has been what one can describe as a little attempt to link credit risk to business cycle explicitly. Such a link is very important to some recent business cycle theories. Especially, the seminal papers by Kiyotaki & Moore (1997) and Bernanke & Gertler (1989) show that business cycles are worsened by the cyclical behaviour of bank lending rates. This is resulting from the deterioration of borrowers' net worth (or collateral) during recessions – "financial accelerator"; thus, there is a direct link between borrower creditworthiness and the stage of business cycle. It is worth noting that if returns on borrowers' investment projects are procyclical then this link could be strengthened.

Accurate prediction of cycles in economic activity is one of the more challenging aspects of economic forecast. At the same time, it is very important for policy making, especially at this time that the country has already experienced the collapse of two commercial banks, UT bank and Capital bank, whilst Unibank is also under the administrative care of KPMG. In the modern macroeconomics, as indicated earlier, the analysis of growth in a country is dependent on two key issues: the interaction of the cycles and growth. The

right understanding of these phenomena is prudent for analysing and forecasting the macroeconomic fluctuations and movement. Figure 1.1 below demonstrates how the business cycle has behaved for the sample period. The goal of a macroeconomic policy is to create business cycle with much, less and tremendous peaks and troughs: recessions that are less severe and expansions that can last for a longer period. A business cycle with frequent high peaks and low troughs represents an economy that is highly unstable. It can be observed from the diagram that the country has been experiencing some low troughs and high peaks which could affect spread behaviour over the sample period.

As noted from the above exchanges, this examination looks at the relationship and the effects of liquidity and credit risk on bank spreads amid the different periods of the business cycle in Ghana. Credit and liquidity risks are by all account not the only bank risks that influence bank's solidness, yet these dangers are straightforwardly connected to why banks fizzle and what they do. Undeniably, as anecdotal evidence, one of the facts for bank failures that were clearly stated in the official reports of the office of the comptroller of the currency and the federal deposit insurance corporation for bank was that most of commercial bank failures during the recent crisis were partially caused by both credit risks and liquidity risks (Imbierowicz & Rauch, 2014). These risks are pertinent to some issues surrounding the banking sector in the Ghanaian economy. The recent Bank of Ghana (BoG) Monetary Policy Committee (MPC) report released in March 2018 showed that "the pace of growth in key monetary aggregates has continued to moderate consistently with contained aggregate demand pressures. Annual growth in total liquidity slowed to 12.5 per cent in January 2018 from 26.7 per cent a year ago (also partly reflecting the reduction in the number of banks in the monetary survey from 34 to

32)". It continued to report that "other financial soundness indicators recorded some improvements. Even though, the quality of loan portfolio has and continues to remain a concern, the Non-Performing Loans (NPLs) ratio remained unchanged at approximately 21.6 per cent since December 2017 as banks continued to clean up their balance sheets. (Bank of Ghana, 2018: 3).

Figure 1.1 shows credit, liquidity, spread and business cycle (proxied as real GDP growth rate) across banks over the sample period (2008 – 2017). Banks' credit risks, spread and business cycles can be seen to have some relationships which are inter-related and they all demonstrate downward trend, while liquidity risk is upward sloping.

Motivated by the observations indicated above, this study seeks to examines how liquidity and credit risks affect bank spreads during the various phases of the business cycle in Ghana.

**Fig 1 .1. Credit risk, GDP growth, Liquidity risk, and Bank spreads over the sample period**.

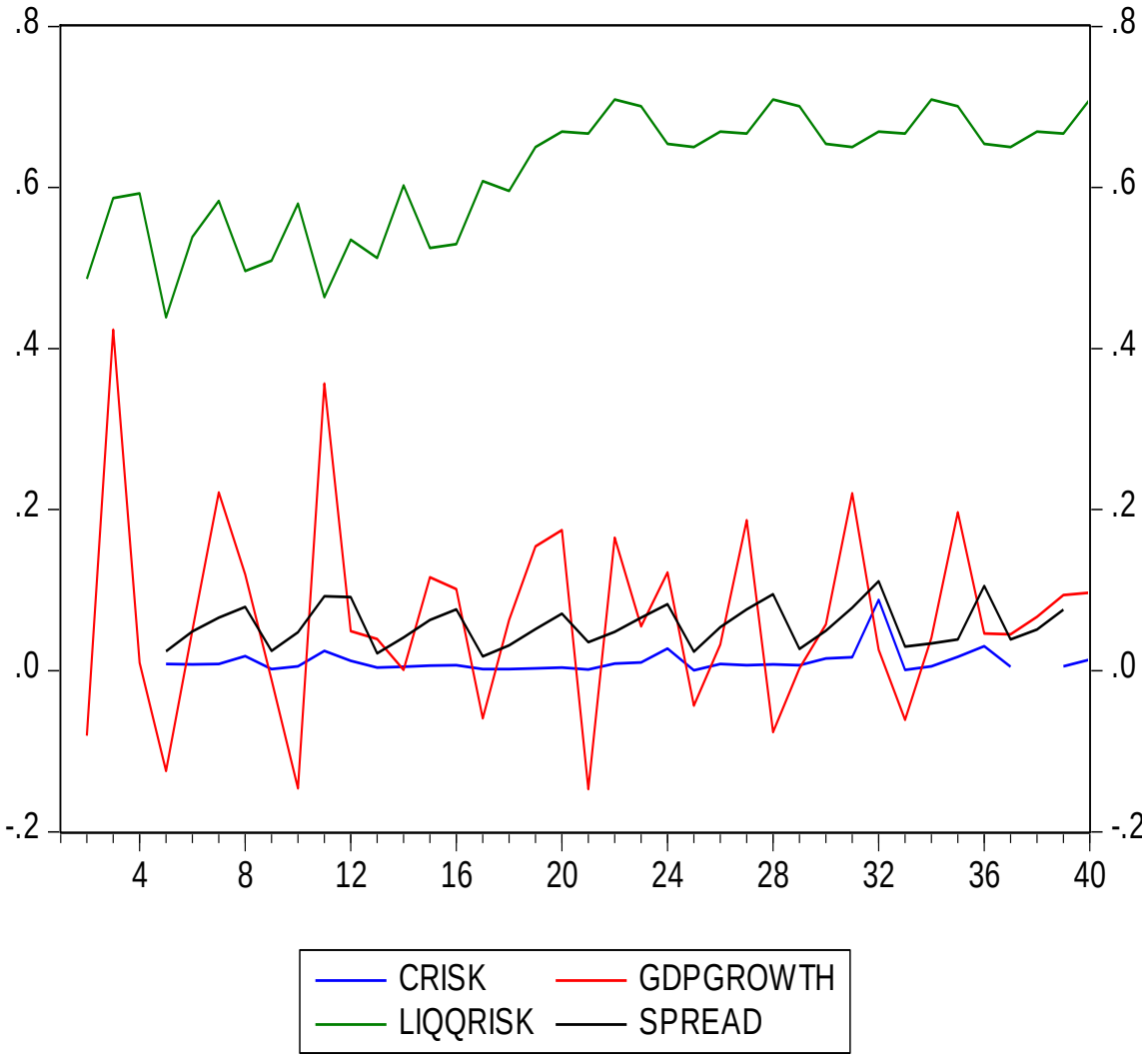
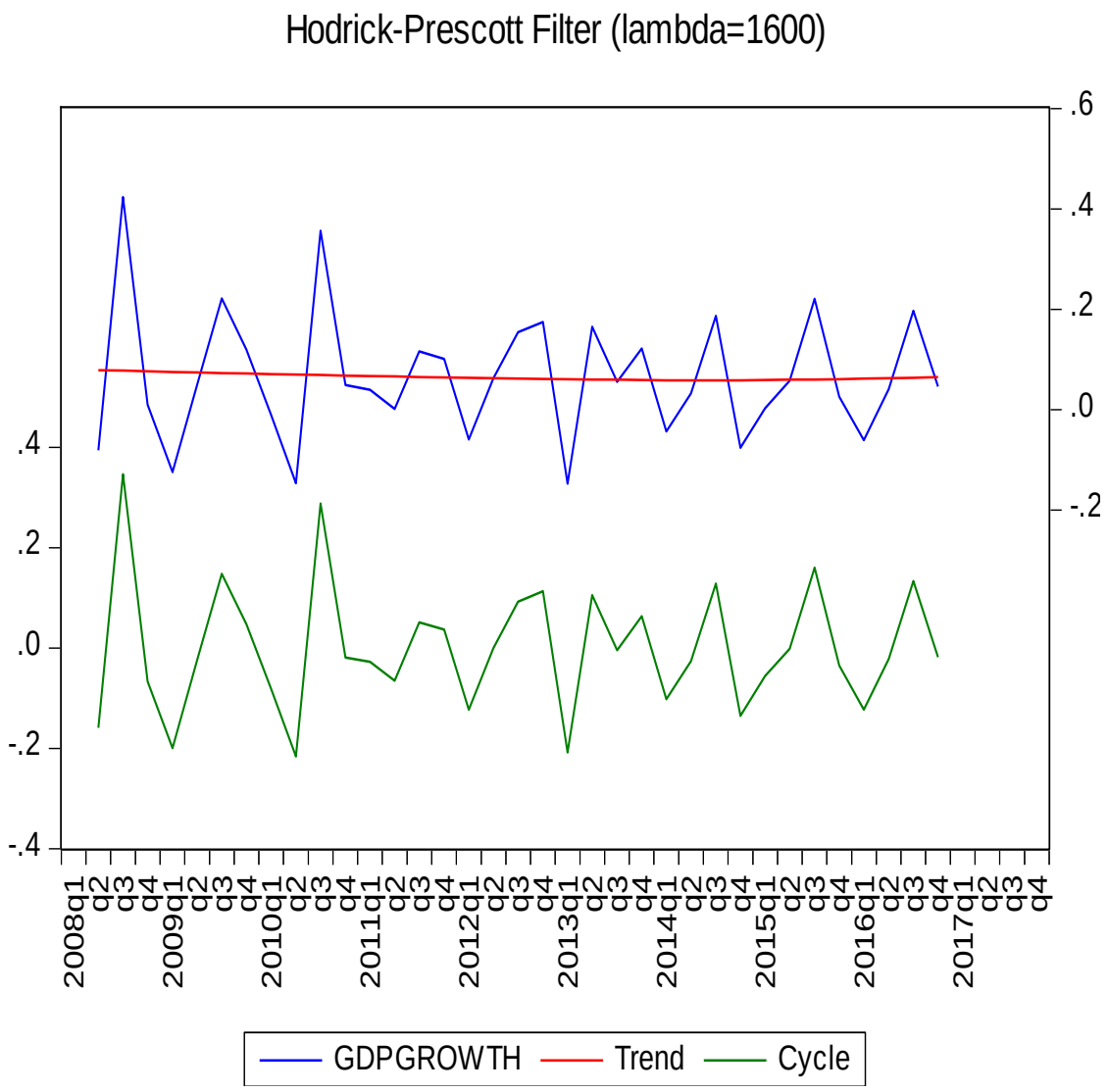


**Fig 1.2. GDP growth (Business cycle) over the sample period**



### 1.3 Objectives of the Study

The main objective of the study is to determine the relationships among bank risks, business cycle and bank spread. The study, specifically, seeks to attain two key objectives. These are:

i. To determine the relationship that exists between bank credit and liquidity risks and bank spreads in Ghana
ii. To determine how bank credit and liquidity risks affect bank spread during various stages of the business cycle in Ghana

### 1.4 Research Questions

i. What is the relationship between liquidity risk, credit risk and bank spreads in Ghana?
ii. How do liquidity credit and liquidity risks affect bank spreads during various phases of the business cycle in Ghana?

### 1.5 Significance of the Study

Among other things, the findings of this study aim to:

Provide new insights and information on the determinants of banks' interest spread in relation to business cycles in Ghana and the Sub Saharan African region.

Inform decisions by Bank of Ghana and other Central Banks in other developing countries in formulating policies that will affect interest rate.

Inform internal policy of banks on how to control their liquidity and credit risks during various phases of economic fluctuations.

### 1.6 Limitations of the Study

The study concentrates on Ghana. Based on the unavailability of adequate quarterly data on banks in Africa, this study was restricted to only listed banks in Ghana. Secondly, due to the limited time frame of this work, it was difficult to retrieve data from all the banks in Ghana individually. Notwithstanding these limitations, the findings of the study are reliable.

### 1.7 Chapter Organisation

The study is organized into five key chapters. The first chapter introduces the study through the background and presents the problem statement, the objectives and research questions, significance of the study and the organisation of the study. In chapter two, the study comprehensively reviews extant literature in relation to liquidity and credit risks, bank spreads and business cycles. In line with this subject area, the review covers the

theoretical as well as empirical perspectives of the issues. In chapter three, the adoption of a suitable research design is discussed; the process through which data was collected is well outlined, as well as a presentation of estimation techniques for onward analysis of the data. The variables (independent and the dependent) included in this research are also expatiated in chapter three. Chapter four discusses the results of regression analysis and the characteristics of the data, as well as the correlation between pairs of variables. The report ends with chapter five which introduces a summary of the report, the conclusions of the study and recommendations for policy and future research.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction of Chapter

There is an active on-going conversation in the bank literature regarding the factors that explain bank spread. In this chapter, the study reviews previous research in these areas by taking a close look at the underlying theories and existing empirical works that are related to this study. It begins by presenting definitions and description of concepts that relate to the research topic and a critical analysis and discussion of these definitions. Also, relevant theories and empirical evidence presented by prior studies are evaluated in the context of this study.

The motivation behind this work is to give a foundation to concepts that run through much of the literature on bank spread, business cycles and bank risks. This is done for both theoretical and empirical literature. This phase of the research process is important as it establishes what is already known and points to what is unknown (Boateng, 2015). This helps situate the present study in the academic discourse as well as make a case for it. Effectively, it shows that this study is well situated in a tradition of scholarship (Boateng, 2015). The style of review in this chapter is the thematic approach. The chapter concludes with a summary of what has been discussed in the chapter.

## 2.2 Theoretical literature

### 2.2.1 The Hedging Hypothesis

Ho and Saunders (1981) crafted this hypothesis. The Hedging hypothesis proposes that banks determine their spread by matching the maturities of their assets against their obligations. Ho and Saunders (1981) asserted that the experience of high and unstable interest rates has led to severe financial management problems, with the impact of rate volatility on interest margins being an important factor among their considerations. In this manner, the supporting theory proposes that banks look to coordinate the developments of benefits and liabilities, keeping in mind the end goal to maintain a strategic distance from the reinvestment or renegotiating dangers which emerge if resource developments are either too short or too long.

The hypothesis demonstrates that the ideal increase (entirety of expenses) for deposits and advance administrations will rely upon four factors: (i) the variance of interest rates; (ii) the appetite of management risk aversion; (iii) the number and the volume of bank transaction and (iv) the level of market concentration and competition that the bank operates. It is also shown that even in a world where there exist a high level of competition in the banking markets, positive margins have the tendency to exist, that is, interest margins cannot disappear, under quite reasonable assumptions, as long as there is the existence of transactions uncertainty.

Ho and Saunders (1981) built up a model of bank interest margin or spreads in which the bank is seen as a risk-averse dealer. It was shown that a premium spread or edge would dependably exist and this was the after-effect of exchanges vulnerability detected by banks. Besides, it was demonstrated that this pure spread relies upon four factors: the level of administrative hazard

avoidance; the span of exchanges attempted by the bank; bank showcase structure, and difference of loan costs.

### 2.2.2 Risk Aversion and Bank Spread

Zarruk (1989) proposed a framework for analysing bank spreads under conditions of uncertain deposit levels. He argues that deregulation of deposit markets leads to narrowing of spreads. His structure suggests that as the pattern toward deregulation proceeds, banks should commit more to the administration of their spreads (Zarruk, 1989). Zarruk (1989), having identified the shortfalls of Ho & Saunders (1981), improved on the theory propounded by Ho & Saunders. He contended that the bank's ideal assurance of the spread amongst credit and deposit rates have drawn moderately less consideration in the writing. He examined the choice of the optimal spread between loan and depositors for a bank under uncertainty and risk aversion.

Zarruk's (1989) paper displays a model of the keeping money firm under vulnerability and risks avoidance. By surveying the bank as a spread setter (concurrent advance and deposit rate setting), various outcomes concerning the conduct of the bank's spread are acquired. It is demonstrated that, while the risks disinclined bank works with a little spread than the risk neutral bank, the normal size or size of task is bigger on account of hazard avoidance. Near statics after effects of the model have suggestions for bank direction and nature of bank resources. As exhibited by Chan, Greenbaum and Thakor (1986), narrowing loan fee spreads lessens screening of campaigns on banks which prompts the weakening of bank resources quality.

The model likewise has suggestions about the outcome of changes in the cost of store protection on bank resources quality. Be that as it may, under DARA (decreasing absolute risk aversion), the most sensible speculation concerning hazard taking conduct, an expansion in the store protection premium, ambiguously affects bank's spread. The outcomes have suggestions concerning the impacts of deposit changeability on bank resources quality and bank size. Zarruk (1989) proposes that risk-averse banks will narrow their spreads by increasing deposit interest rate. Zarruk's (1989) model shows that higher deposit interest rate will attract more deposits, and having considered the size of deposits as a measure of bank size, Zarruk (1989) shows that big banks keep narrower spreads. This suggests that big banks are more risk-averse than small banks.

Zarruk (1989) and Zarruk and Madura (1992) additionally used firm-hypothetical models to clarify bank spread conduct. A prominent contrast between their model and that of Wong (1997) is that they take a look at circumstances with just a solitary wellspring of vulnerability: financing risk as in (Zarruk's, 1989) model and acknowledge chance as in (Zarruk & Madura,1992). With the more extravagant risk structure in Zarruk and Madura (1992) model, they can infer more outcomes which are bolstered by exact proof. For instance, Zarruk (1989) demonstrates that an expansion in working costs ambiguously affects ideal bank interest margins and that bigger banks have more extensive spreads if the hidden inclinations of banks display the sensible property of diminishing supreme risk avoidance in the Arrow-Pratt sense. These hypothetical discoveries are not in consistent with the (Ho & Saunders, 1981) experimental discoveries that bank premium edges are decidedly identified with working costs and conversely identified with bank measure. Wong (1997) then looked at the impact of more noteworthy loan cost chance which is available neither in (Zarruk & Madura, 1992) nor in Zarruk (1989).

This hypothetical model was propounded by Wong (1997) to give a firm-theoretic model of bank conduct to determine the assurance of ideal bank interest margins. The model exhibits how cost, control, credit risk and loan cost chance conditions decide the ideal bank interest margin choice. Credit risk is available on the grounds that advances are liable to non-execution and the bank does not know what extent its advances will perform. Financing cost risk emerges in light of the fact that the bank subsidises some portion of its settled rate advances by means of variable rate stores (i.e. there is a confusion of rate sensitivities of advantages and liabilities).

This model was based upon the qualities and shortcoming of the models by Ho and Saunders (1981) and Zarruk (1989). Wong (1997) contended that, the common model demonstrates that banks are seen as risk-averse dealers in loans and deposit markets where advance demands and store reserves arrive non-synchronously at arbitrary time intervals. Bank interest margins are expenses charged by banks for the arrangement of liquidity. Despite the application of the elective firm (hypothetical), his model yields much indistinguishable consequences from the current models. In such manner, his model ought to be seen as an affirmation instead of showdown of the existing writing. Therefore, Wong (1997) confirmed the existing theoretical models on bank spread.

Besides, Wong (1997) found that the ideal bank interest margin is bigger when the bank is risk-averse than when the bank is risk neutral. Additionally, the spread augments as the bank's level of risk averting rises. With sensible suppositions about the bank's basic inclination, various intriguing similar statics are inferred. He demonstrates that the ideal interest margins respond decidedly to an expansion in showcase control, an expansion in working costs, an expansion in credit hazard, or an expansion in loan cost chance. Be that as it may, an expansion in the interbank showcase rate (e.g., the Fed stores rate) unrelatedly affects the ideal bank interest

margins contingent depending on whether the bank is a net borrower (beneficial outcome) or a net loan specialist (uncertain impact) in the interbank market. Finally, he demonstrates that an expansion in the bank's value capital negatively affects the spread when interest rate risk is truant or insignificant.

### 2.2.3 Keynesian Liquidity Preference Theory

As stated in the Liquid Preference Theory of Keynes, bank spread can be determined by applying traditional economic theories of supply and demand (Quarmye, Kwaning & Ababio, 2014). The theory suggests that interest rate is a monetary phenomenon and diverges from the classical theory. It is desirable for banks to be liquid, so they would consider the demand for loans in the determination of interest rates and the supply of loanable funds and hence spread.

### 2.2.4 Adverse Selection Theory

This theory is based on the quality and availability of information. Adverse selection is the tendency of banks to lend to risky borrowers rather than relatively safer borrowers due to inadequate and lack of information. Banks would attempt to mitigate risk by charging a high-risk premium to borrowers due to increased uncertainty on the probability of repayment (Pagano & Jappelli, 1993). Thus, if banks have better information, they would have narrower spreads. The theory also implies that enhanced information leads to lower default rates.

## 2.3 Business Cycle Theories

### 2.3.1 Real business cycle theory

The Real business cycle theory was propounded by Kydland and Prescott (1982). Unlike other theories that advanced that business cycles are due to nominal shocks, the Real business cycle theory argues that business cycles can be considered as and accounted for by real shocks. According to this theory, the business cycle is an efficient response to changes in variables that are outside of the real economic environment; that is, they are exogenous. The implication of this argument is that, there is practically no need for governments to intervene in the economy through the use of tools such as fiscal and business cycle which are intended to smooth the economy by managing expected spates of short-term fluctuations. This argument and proposition is in contrast to Keynesian thoughts which are the basis of modern economic management. The Keynesians are of the view that government intervention is necessary to bring balance in economic activities. Thus, the RBC proponents hold the view that fiscal and monetary policies are useless; a non-interventionist view shared by classical economists.

Just as stylised facts were important in defining the neoclassical growth theory, they are important in defining business cycles. Establishing business cycle stylised facts is important for measuring business cycles. Since Kydland and Prescott (1982) published their seminal work which argued that stochastic technological shocks are a significant source of fluctuations in the business cycle, there has been a lot of research on RBC. Kydland and Prescott (1982) asserted that short-term and long-term fluctuations in production should be expatiated by similar theories. They based this argument on the neoclassical growth model stating that “modern business cycle models are stochastic versions of neoclassical growth theory” (Kydland & Prescott, 1996).

The RBC theory may however not be as relevant in present times given that technology has advanced significantly beyond the levels that existed at the time of proposing the theory. Though the RBC theory has attempted to reconcile conflicting theories, there has since been an overwhelming emphasis on short-term fluctuations in the business cycle in both empirical and theoretical works. A key emphasis of the empirical literature on the RBC theory has been on how to measure the business cycle. As can be expected with theoretical issues, there are diverging ideas among “RBC authors” regarding the details on how to measure the business cycle. Firstly, this is because of the need to separate growth from cycle. Secondly, there is no consensus on how the relevant data should be de-trended. Also, the supposedly business cycle stylised facts are deemed to be sensitive to the mode of identification used to determine them. This lack of consensus is also the basis of the RBC theory.

In trying to investigate bank risks, business cycle and bank spread, the above literature limits the exchanges to banks size where Zarruk (1989) argued that big banks keep narrow spreads. Wong (1997) also argued that banks that are risk averse will have a large spread than when they are risk neutral. These literary works called for attention to the part of credit risk in spread assurance, yet there has been little endeavour to connect bank risks to the business cycle expressly. Such a connection is the basic thought of some ongoing speculations of the business cycle. The fundamental papers by Kiyotaki and Moore (1997) and Bernanke and Gertler (1989) demonstrate that business cycles are increased by the repeating conduct of bank loaning rates since borrowers' total assets (or guarantee) fall apart amid retreats of the "financial quickening agent." Thus, borrower reliability is specifically connected with the phase of the business cycle. This connection could be fortified if the profits on borrowers' speculation ventures are procyclical.

## 2.4 Empirical literature

This section will concentrate on all the methodologies used by existing literature and also review all the empirical results associated with their findings. This section would be linked to their methodologies and findings to establish the essence and uniqueness of the current study. This study will contribute to literature by highlighting the relationship and the effects of Bank risk (liquidity and credit), and Bank Spread during Business Cycle in Ghana.

The observational writings on determinant of interest margins depend on the pioneer work by Ho and Saunders (1981); in their paper, they regarded the bank as a risk-averse merchant/dealer. This is where the bank sets financing cost on deposits on one period and credits to boost benefit and face the unevenness between the planning of deposit supply and the interest for advances. The writings on bank spread or premium edges (interest margins) determinants, originating from the Ho and Saunders (1981), can be connected to two kinds of methodologies. In this manner, there are existing analysts who took after a two–stage approach (Allen, 1988; Brock & Rojas – Suarez, 2000; Saunders & Schumacher, 2000; Afanasieff et al., 2002) while others (Angbazo, 1997; McShane & Sharpe, 1985; Maudos & Guevera, 2000) took after a solitary approach in finding the determinants of interest spreads.

The two–stage approach takes cognisance of both pure and theoretical spread of the actual interest margins. When using the two-stage approach, the main regression is utilised to assess the hypothetical unadulterated spread by controlling the other free factors. In the following stage, the block which is derived from the principal regression is utilised as a needy variable in the second regression to ascertain the degree of the causality of the hypothetical determinant of the unadulterated spread.

Ho and Saunders (1981) were the first to apply the two-stage approach and their outcomes are as follows. It was discovered that, given certain sensible suppositions, the unadulterated spread could be experimentally recognised. It was again discovered that, this spread was emphatically and fundamentally identified with the difference in the rate on securities as anticipated by the hypothetical model. In the end, their investigation proposes that the extent of bank spreads or edges is straightforwardly amiable to hypothetical and observational display.

As indicated by Allen (1988), who broadened the two-stage display approach by Ho & Saunders (1981), the relational word of unadulterated premium spreads might be decreased when cross–flexibilities of interest between bank items are examined. The subsequent enhancement benefits radiate from the relationship of requests crosswise over bank administrations and items – a sort of portfolio impact.

Angbazo (1997) ponders the determinants of bank net interest margins of banks in the United States of America (USA), utilising yearly information for 1989-1993. The paper tests the speculation that saving money with more unsafe advances and higher premium–rate hazard introduction would choose advance and deposit rate to accomplish higher net premium margins. The outcomes demonstrated that, the general confirmation is steady with the theory that bank premium margin reflects both default and loan fee premium charge.

Moreover, there is prove that net interest margin are decidedly identified with non-interest bearing assets, capital, administration quality and adversely identified with liquidity. Maudos and de Guevara (2004) on the contrary took after the single-stage approach. They noticed that, the interest margin relies on aggressive conditions, loan fee charge, credit charge, and normal working expense of provisions, instalment of verifiable interest and the nature of administration.

However, there are existing studies that have been conducted with particular reference to countries in the African continent which include Ndug'u and Ngugi (2000), Beck and Hesse (2006), Aboagye, Akoena, Antwi-Asare, and Gockel (2008), Folawewo and Tennant (2008) and Tarus, Chekol, and Mutwol (2012), among others. Ndung'u and Ngugi's (2000) main objective was to explain what factors determine interest rate spread in the banking sector in Kenya. Their results concluded that the interest rate spread had increased because of high intermediation costs and yet-to-be gained efficiency. The increase in spread in the post-liberalisation period was as a result of the country inability to meet some laid down financial reforms, reforming the legal system and the lag in adopting indirect business cycle tools. The variations observed in the interest spread are ascribable to the efforts of banks to sustain threatened profit margins.

Tarus et al. (2012) attempted an examination using a panel data to decide the net interest margins of Kenya's commercial banks. Their work was centred on the industry-specific, bank-specific and macroeconomic determinants of interest rate margins. Their results show that operating expense has a huge and positive effect on net interest margins of Kenya's business banks. Credit risk has a tendency to be emphatically connected with net interest margins. They discovered that the greater the swelling, the bigger the net interest margins.

Beck and Hesse (2006) utilised bank level information of Uganda to investigate the high loan cost spread and margins. The outcomes showed that banks that were not owned locally had low spread, and there was no economic significant relationship between interest rate spread and outside bank entry, privatisation, market structure and banking efficiency.

### 2.4.1 Determinants of Spread

### 2.4.2 Macroeconomic Variables

Like other industries, banks are impacted by macroeconomic variables or the macroeconomic environment. It affects both supply and demand side of banks' intermediation role. For example, borrowers are constraints in their ability to repay their debts leading to high non-performing loans as a result of poor economic growth. This may lead to an increase in monitoring cost or higher risk premiums for loans, hence wider spreads. Other macroeconomic factors are discussed in this section.

### 2.4.3 Inflation

This is characterised as the constant increment in the general value level in a nation over a certain time frame (Abdul-Razak, 2015; Gelos, 2009; Tan & Floros, 2012). Inflation is expressed as a rate of change of price level over a period of time. Consumer Price Index is used to measure the level from time to time (Albulescu, 2015; Leitemo & Söderström, 2005; Mugableh, 2015)). When the inflation rate is high, prices are generally rising. It is worth noting that the interest rate is also a price, and so when prices are rising generally, the interest rates also rise. Thus, when there is higher demand for loanable funds, banks' lending interest rate and hence its spread is expected to be higher, all things being equal (Beck, Jakubik, & Piloiu, 2013; Boahene, Dasah, & Agyei, 2012; Nkundabanyanga, Kasozi, Nalukenge, & Tauringana, 2014); Matemilola, Bany-Ariffin, Etudaiye, & Muhtar, 2015); Quartey, Afful, & Afful-Mensah, 2014)). When interests are high, the value of assets falls over time, and so lenders tend to charge a premium for asset

risk which tends to widen the spread (Pandey, 1999). There is thus, an expectation that inflation and spread will be positively related.

### 2.4.4 Treasury Bill Rate

Treasury bills are short-term government securities that are issued with maturities ranging from a period of three months to one year (Gilchrist et al., 2012; Lahiri & Wang, 1996; Wu & Hong, 2012)). The interest rate offered by the government for investors is the Treasury bill rate. Banks rely on the rates of Treasury bills to determine their lending rate; moreover, government uses the Treasury bill rate to signal business cycle direction. When an investor purchases Treasury bills, the investor effectively lends to the government. The government is theoretically considered to be the safest borrower; every other borrower is risky and so must pay a risk premium above the Treasury bill rate (Ngugi, 2001).

Thus, a high Treasury bill rate will mean that borrowers will pay even more, hence a wider spread. Contrarily, banks mobilise deposits to make loans to lenders. If Treasury bill rates are significantly higher than deposit interest rates, some savers will choose to lend to the government instead of depositing into savings accounts. This will reduce the supply of loanable funds and cause lending rate and spreads to widen, all things being equal (Demirgüç-Kunt & Huizinga, 1999; Gropp et al., 2007; Nkundabanyanga, Kasozi, Nalukenge, Tauringana, et al., 2014). However, if banks want to attract more deposits, they have to offer excessive deposit interest rates which will mean a narrow spread, all things equal.

### 2.4.5 Bank Specific Variables

The loan fee spread depends additionally on a few qualities of the banks. Ho and Saunders (1981) indicated that the spread of banks relies upon administration, bank measure and the risk appetite of management. Maudos and Fernandez (2004) were of the view that working costs influence bank loan fee spread. Default hazard is additionally a bank particular factor that influences the premium spread (Angbazo, 1997). This section analyses some bank particular factors and how they affect upon bank premium spread.

***Bank credit risk***

Credit risk is defined as the likelihood of exposure to loss resulting from the failure of a credit customer to meet his/her obligations under a loan contract, or the failure of a borrower to carry out those obligations fully or partially in the time frame agreed in the contract (Hassan et al., 2016). In order to manage this risk, banks keep an amount of credit risk weighted assets to prevent adverse impact in the situation where they are exposed to events that trigger borrower defaults (Stolz & Wedow, 2011). Credit risk is made up of non-performing loans, changes in exchange risk and changes in values of collateral (Sarno & Valente, 2005).

It is anticipated that credit risk will impact the spreads of banks through the lending channel as interest rates are adjusted to accommodate credit risk. Credit risk has been found to significantly impact the profits of large banks adversely (Terraza, 2015). This has implications for performance and stability (Funso, Kolade, & Ojo, 2012). Credit risk arises from uncertainty around borrowers' abilities or willingness to repay loans (Abbas, Zaidi, Ahmad, & Ashraf, 2014; Chiesa, 2008; Luqman, 2015; Mwangi, 2012; Opoku, Angmor, & Boadi, 2016). To compensate them for assuming this risk, banks charge a risk premium. Risk premiums vary by customer type,

loan principal and the collateral offered. Higher risk premium leads to higher lending interest rates and higher spreads. Banks also make provisions for loan loss in their books as a means to protect against the impact of borrower default. According to Saka et al. (2011), a higher provision is indicative of the amount of credit risk the banks estimate to be inherent in their portfolio.

***Bank Size***

Bank size is noted to impact banks' spread (Chernykh & Theodossiou, 2011; Hyung-Kwon Joeng, 2009). Banks that are considered to be bigger in size are expected to have economies of scale in the loan market and so are able to offer lower lending rates, hence lower spreads. Also, big banks are expected to access customer riskiness more accurately than smaller banks and so have little information asymmetry. This will reduce the probability of adverse selection (Demirguc-Kunt & Huizinga, 1998). Big banks may also be more diversified and so rely less on interest income. These factors jointly cause spreads to be reduced for big banks.

***Expenses***

Some authors expressed the view that the level of bank expenditure was salient in determining the interest rate spread of banks. Banks are expected to charge exorbitant interest rates if their cost of operation is high. This is closely related to management efficiency which has been cited by Angbazo (1997) as having an impact on bank spreads. Low cost of operation can be said to be an indication of efficiency management. Cost efficiency has been variously characterised in the banking literature. It has been considered as the ratio of operational cost to operating income by Fiordelisi and Marqués-Ibañez (2013).

A lower proportion flags that a bank is cost efficient. Maudos and de Guevara (2004) characterised cost effectiveness as the working cost important to produce a unit of gross salary. Demirgüç-Kunt and Huizinga (1999) concluded that distinctions in bank spreads are the consequence of contrasts in working expense and overhead cost. These have shown that working expenses are essential determinants of bank spreads.

***Banking Sector Competition***

The bank premium spread is accepted to be influenced by the sort or nature of the business that the banks work in. Previous studies have indicated that when the business is competitive, the spread between the loaning and savings rate will be low since the opposition will drive effectiveness through aggressive evaluation (Grenade, 2007). Ho and Saunders (1981) indicated that the span of the spread is typically considerably higher in non-competitive markets than in aggressive markets. Rivalry is measured utilising intermediaries, for example, the Lerner Index, fixation proportion or the Herfindahl Hirschman Index (HHI). The estimation of the file ranges from 0 (consummate rivalry) to 10000 (restraining infrastructure). Lower rivalry demonstrates higher margins.

***Regulatory Factors***

The sector is arguably the most regulated industry in most countries though attempts have been made to deregulate the industry (Lindquist, 2004; Shim, 2013). This is probably attributable to the fact that failures in the banking industry have severe economy-wide implications. A major point of debate worldwide has however been the nature that bank regulation should take. Notwithstanding the divergence in views, the required capital and reserve requirement are

perhaps the most used regulatory tools (Maudos & de Guevara, 2004; Zheng, Xu, & Liang, 2012).

The required capital is the minimum or least capital that the regulatory authorities set for banks to maintain. A high capital requirement has the effect of increasing the loanable funds available to banks, thereby leading to lower lending rates. Besides, the fact that these funds come from equity means that the banks are going to be relatively more stable than from other sources such as deposits (Grenade, 2007). A high capital requirement restricts entry to the sector and can force existing banks to exit the industry, thereby reducing competition in the industry (Maudos & de Guevara, 2004). As other forms of regulation become less common, attention has been turned towards the capital adequacy ratio, another variable that is affected by regulation. Capital Adequacy Ratio (CAR) is a ratio that compares bank capital to assets.

### 2.5 The Relationships Among Liquidity Risk, Business Cycles and Bank Spread

Banks are mandated by their regulatory body to sustain a minimum level of capital; this is to make sure that banks have available liquidity to meet their day to day transactions. According to Dudley (2008), banks' "scarcity of capital" can be said to be the main factor explaining the nature of the behaviour of spread. A bank which has an adequate capital is able to borrow and lend without exceeding leverage target difficulties. However, studies have arrived at various different results (Sarkar & Wang, 2008, Wu, 2008, and Frank & Hesse, 2009). These studies postulate that there is an economically significant positive correlation between liquidity measure and money market rates. However, Taylor and Williams (2009) have a different view about the relationship that exists between the measure of liquidity and money market rates. They find that

liquidity measure did not play any role in spread determination. However, Aydemir and Guloglu (2017) have also established that, liquidity risk has a positive correlation with spread but not economically significant, but its interaction with business cycle provided a stronger relationship and economically significant output.

### 2.6 The Relationship Between Business Cycles and Bank Spread

According to Niktin and Smith (2009), loan deposit spread in most countries is countercyclical. This means some economic activities in the country are inversely correlated with the overall state of the economy, thus, activities that have the tendency to increase when the general state of the economy is slowing down.

### 2.7 The Relationship Between Credit and Liquidity Risks

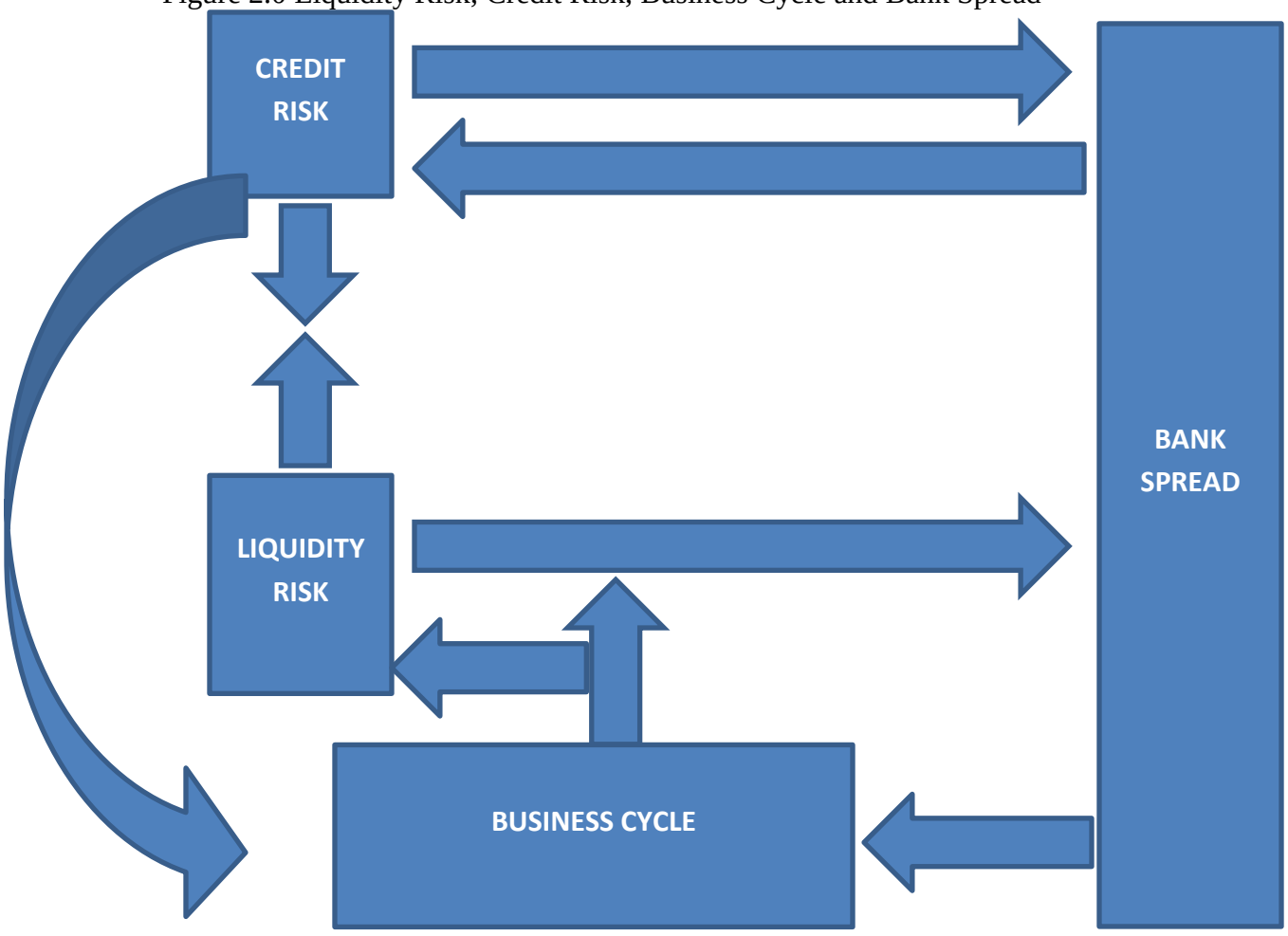
There have been different views on the relationship that exists between liquidity and credit risks. Some scholars assert that there is a positive correlation, while others postulate that there is a negative correlation or association between the credit and the liquidity risk. Xiong (2012a), and Diamond and Rajan (2015) found that there is a positive relationship between credit and liquidity risks. Cai and Thakors (2008) also showed that the relationship that exists between liquidity and credit risk is negative. Their work was about bank competition and their results showed that there exists a negative interbank competition, that is, high credit risk may result in low liquidity risk. The relationship between the liquidity risk and credit risk from the literature could be either

negative or positive depending on the economic models and economic conditions that the banks operate in and the type of bank understudied.

## 2.8 Conceptual Model

Figure 2.1 depicts a visual overview of the key concepts of an explanatory theory and the hypothesised relationship that exist between them. From the above exchanges in the literature until now, it can be deduced that the relationship between spread and credit risk is bi – directional.

Figure 2.0 Liquidity Risk, Credit Risk, Business Cycle and Bank Spread



The literature also establishes both positive and negative relationship between credit and liquidity risk (Xion, 2012a, Cai & Thakor, 2008). Moreover, the conversation in the literature also shows that business cycle and bank spread are countercyclical (Nikitin & Smith 2009). Additionally, it was reviewed that, the relationship between bank spread and liquidity was positive and not economically significant, but interaction with business cycle provided a strong relationship and a significant output. This means that liquidity has a direct relationship with bank spread but the strength of its effects depends on another variable that is, Business cycle.

In summary, there are a number of theoretical and empirical studies stemming on the determinants of interest margins and spread, scanning different sets of factors: , macroeconomic, bank specific, industry and any other factors that may be relevant to the determinants of interest margins. Various methodologies have been explored using both panel data and time series depending on the type of data, coverage and frequency. This notwithstanding, extant literature has failed to show how these determinants have affected the widened nature of bank spread in Africa, taking into consideration the growth of the Gross Domestic Product (GDP) over its long-term trend. The various phases of the business cycle may have different correlation and effects on bank spread.

This current study therefore aims at considering two main bank risks (credit and liquidity) which have been empirically reviewed as determinants of bank spread in ascertaining the relationship and its effects on bank spread during business cycle.

# CHAPTER THREE

# METHODOLOGY

## 3.1. Introduction

On the basis of replication, it is important to give details about the method adopted to arrive at the conclusions. This chapter takes a closer look at the empirical methods that were employed to find answers to the research questions stated in the first chapter. The purpose of this chapter is to describe the techniques chosen, as well as the motivation for including the variables that were selected for the study. The chapter also provides information about the source of data on the variables. The rest of the chapter is structured as follows: Section 2 discusses briefly the design of the study. Section 3 describes the research paradigm that guided the study. The fourth section explains the method of analysis and econometric model specifications. In the fifth section, the sources of the data employed for the research study are outlined, while section 6 discusses in detail the measures of bank spread and variables used in this study.

## 3.2. Research Design

The primary aim of this research is to investigate the correlation or relationship and the effects between business cycle, bank spread and bank risk by banks in Ghana. To achieve the purpose of this study, an interim relationship is established based on the intellectual discourse in the bank spread literature; this study tests these relationships and analyses the findings in chapter 4. The quantitative approach is used for this research, because this approach allows the researcher to determine the correlation between the two variables as well as predict the cause and effects from the relationships.

### 3.3. Research Paradigm

Research paradigms are sets of beliefs, technique and values that are shared by participants in a given academic landscape. Paradigms generally serve as guides on how to identify and study reality (Boateng, 2014). This study ascribes to the positivist paradigm. Positivism states that there exists a single reality, which is objective and tangible. The nature of the subject matter of this study (spreads, business cycles and bank risks) makes it acquiescent to the positivist paradigm; this paradigm is common in banking research. Positivism does not allow room for subjectivism and the nature of reality is deemed to be independent of time and context. For this present study, the phenomena studied are well defined and widely agreed upon in the literature-making it unsusceptible to imposition of potentially biased representation of the facts. This is ensured by performing several robustness checks on the model specifications.

Consistent with this paradigm, the quantitative approach is adopted for the research. Secondary data was also obtained from widely accepted sources. Positivism flourishes on deductive reasoning and so the conclusions in this study are made deductively based on the parameter estimates obtained after running the specified regressions. Relevant non-quantitative dimensions are discussed where appropriate.

### 3.4. Econometric Specification

Bank spread is a function of business cycle, risks and other controls. It is represented as:

$$\text{BANK SPREADS}_{it} = f(\text{BUSINESS CYCLE}_t, \text{RISK}_{it}, \text{CONTROL VARIABLES}_{it})$$

Specific models are formulated to examine variations of the relationships that were established in chapter two.

This study follows the modelling set out in Aydemir and Guloglu (2017) to estimate the relationship and the effects of Bank spread and Bank risks during Business cycles.

$$BS_{it} = \beta_1 BS_{i,t-1} + \beta_2 BC_t + \beta_3 CR_{it} + \beta_4 (CR_{it} \times BC_t) + \beta_5 LR_{it} + \beta_6 (LR_{it} \times BC_t) + \beta_7 (CR_{it} \times LR_{it}) + \beta_8 (CR_{it} \times LR_{it} \times BC_t) + \beta_9 EXP_{it} + \beta_{10} SIZE_{it} + \beta_{11} CAP_{it} + \beta_{12} INFL_t + \epsilon_{it} \ldots\ldots\ldots\ldots\ldots (1)$$

Where *t* signifies the index for year and *i* is the index for individual bank. All other variables have the same meaning as in Table 3.1.

**3.5. Variables**

3.5.1 Dependent Variable

Spread (SD)

Brock and Rojas – Suarez (2000) provided six estimated provisions for determination of bank spread; the estimation was divided into narrow and wider estimation. Interest income received less interest income paid out divided by total assets is one of the wider estimation definitions. This definition in general is widely utilized in literature since it is easier to estimate from the financial statements of banks.

Interest Income - Interest Expenses

Total Assets

### 3.5.2 Independent Variables

- **Credit Risk (CR)**

The Non-Performing Loans (NPL) ratio is a measure that shows the stock of loans that are not performing compared with the total loan stock at a given point in time (Angkinand & Wihlborg, 2010). An alternative model is estimated using NPLR (expressed as a percentage) to measure of credit risk variable (Shahid, 2016). This is computed as follows:

$$NPLR = (\frac{\text{Non-Performing Loans}}{\text{Total Loans}})$$

Banks face higher risks as the amount of non-performing loans increases subject to the total loans increase. Banks would therefore have no option than to increase the spread to compensate the loss on a given deposit. Therefore, a positive relationship between bank spread and credit risk is expected.

- **Liquidity Risk (LR)**

LR is measured using the proportion of liquid assets to total deposits and short-term borrowing (expressed as a percentage). A ratio that is relatively higher suggests that a bank is more liquid and will be capable of meeting its liabilities as they reduce due or unforeseen demand for funds. In this way, a higher ratio is desirable; however, this is inverted so that a higher ratio will mean higher risks. It is stated formally as:

$$LR= \frac{\frac{1}{Liquid\ Assets}}{\text{Total assets}}$$

When customers are not able to pay their loans as and when the need arises, the banks liquidity will fall as depositors also demand withdrawal as and when the need arises. This will cause liquidity risk to rise; banks will therefore increase their interest rate to make their loans unattractive, since giving more credit will invariably decrease the liquidity at hand. Upon this, we expect liquidity risk to have a positive correlation with bank spread.

- **Business cycle (BC)**

Business cycle is a key variable of interest in this study. In chapter two, it was shown that business cycle affects bank spreads and also moderates the effect of risk on spreads. We measured the business cycle using real growth rates in the annual GDP of Ghana following Aydemir and Guloglu (2017) Zakrajsek (2012), and Hamiton (1989). Meanwhile quarterly GDP growth rate is used in this study.

In order to understand how these risks (credit and liquidity) behave over the business cycle, we interact both risks with the business cycle indicator, thus (CR*BC) and (LR*BC) (Aydemir & Guloglu, 2017). It is worth noting that a positive sign will mean an expansion period and a negative sign will also mean a recession period. The interaction term CR*LR*BC will assist in understanding how as banks are exposed to more credit (liquidity) risk over the business cycles and how liquidity (credit) risk has an effect on spreads. The interaction between liquidity and credit (CR*LR) risk was to determine how these risks jointly explain bank spread.

- **Bank Size**

Bank size has been found to influence bank spread. Bank size has been measured in different ways. Two of such ways include total asset and capitalisation. Another way is using the total deposit over a period. This research uses the natural log of total assets following Bhagat, Bolton, and Lu (2015), Stolz and Wedow (2011) and Ioannidou et al.(2015) as a proxy for the variable bank size. This has the advantage of reducing the possibility of heteroscedasticity and to pull in extreme values (García-Kuhnert, Marchica, & Mura, 2013). In addition, the results can be interpreted in terms of a percentage change - a desirable way to describe the effects of changes in size on bank spread. The introduction of bank size is to determine the diseconomies and economies of scale of the market share and its effects on the Bank spread. We expect either negative or positive sign, since there is a diverse view that big bank have the tendency to raise expensive capital and charge a wide spread as a result. However, there are other views that also suggest that big banks may charge a low spread due to the cost efficiency (Laeven & Levine 2007).

- **Bank Expenditure (EXP)**

The Bank expenditure is represented by EXP; this is an essential determinant of bank spreads in relation to the efficiency of management since an efficient management, thus lower cost of expenditure, will raise spread. We expect that a negative correlation will exist with efficient

management (i.e., low expenditures) and bank spreads which will lead to efficiency. Thus, lead to an increase in bank spreads.

EXP = Operating cost / Total Assets

- **Macroeconomic Determinants of Banking Sector Spreads**
- **Inflation (IFL)**

We included inflation rate for the country, and it is computed as the quarterly percentage change in the CPI inflation rate in order to cater for the general economic development, institutional framework and macroeconomic stability that will probably affect bank performance and stability in each nation. This inflation variable is an indication the cost involve in doing business in an country and hence, it is expected to have a positive correlation with spread, especially in developing countries where inflation is regarded variable and high (Chilrwa & Mlachila, 2004).

**Table 3. 1 Variables**

| **Variable** | **Measurement** | | **Sign** | **Data Source** |
|---|---|---|---|---|
| Bank Spread (BS) | "Difference between interest income and interest expenses divided by total Assets" | Interest Income - Interest Expenses/ Total Assets | | Ghana Stock Exchange |
| Credit Risk (CR) | "Ratio of Non-Performing Loans to Total Loans" | $\frac{NPL}{Total\ loans}$ | + | Ghana Stock Exchange |
| Liquidity risk (LR) | "Ratio of liquid assets to total deposits and short-term borrowing" | $\frac{1/Liquid\ assets}{\text{Total Assets}}$ | + | Ghana Stock Exchange |
| Bank Size (SIZE) | "Natural log of Total Assets" | ln (Total Assets) | + - | Ghana Stock Exchange |
| Business cycle (BC) | "Quarterly growth rate of GDP" | - | | WDI |
| Inflation Rate (INF) | "CPI Inflation rate" | | + | Ghana Statistical Service |
| Bank Expenditure | "Operating Expenses Divided by Total Assets" | Operating Expenses/Total Assets | - | Ghana Stock Exchange |
| Capital Adequacy | "Equity Divided by Total Assets" | Equity / Total Assets | + | Ghana Stock Exchange |

### 3.6 Method of Analysis

This section debates the methods of analysis that are adopted in this study. The principal method of analysis is the General Moments of Methods (GMM). The AR (2) and Sargan test are performed for robustness. The Sargan test is used after estimation of the GMM for joint validity test of the instruments as suggested by Arellano and Bond (1991). Appropriate parametric as well as diagnostic tests are carried out on each model. There are a vast number of analysis techniques such as General Moments of Methods (GMM), Instrumental Variables (IV), Ordinary Least Squares (OLS), Fixed and Random Effects, Two and Three stage Least Squares (2SLS and 3SLS) that can be used for this study. However, this study utilised the GMM Estimator due to the potential endogeneity that may exist within the regressors since the regressors include lag of the dependent variable, which in turn makes the model dynamic. It controls simultaneity biases that emerge from the existence of endogenous explanatory variables. GMM produces efficient and consistent results in the face of endogeneity. Additionally, it generates its own instruments as compared to IV. Moreover, 2SLS and the 3SLS methods are particular cases of GMM as indicated by Stevester (2002). Therefore the use of GMM is ideal since it covers a broader scope than the former. Also, this modelling technique would allow for variation in the characteristics in the sample and controls for unobserved heterogeneity.

GMM is currently regarded as a framework that is described as one which is influential unifying for econometric inference in the last three decades (Greene, 2003; Imbens, 2002). This methodology is based on the idea that there could be an instance where there would be more moment conditions than there are variables. In such a situation, it is impossible to approximate

the parameters utilising the methods of moments. The GMM model combines information in population moment conditions with economic assumptions to yield estimates of the unknown parameters. There exists two types of GMM estimators and they are the System GMM (SGMM) and the Difference GMM. The Difference GMM estimator has been shown to be biased because it utilises the lags of the independent variables as instruments which are inappropriate (Agbloyor, Gyeke-Dako, Kuipo, & Abor, 2016). Besides, the difference estimator eliminates country-specific effects. On the other hand, the System GMM surmounts these problems. Though it uses the lagged differences of the variables, it avoids the problems of the Difference GMM by combining regression in differences with those in levels. The System GMM comes in two forms: the one-step and the two-step SGMM (Louhichi & Boujelbene, 2016; Naudé & Krugell, 2007). The two-step GMM is generally considered to be more efficient than the one-step (Bond, Hoeffler, & Temple, 2001). The two-step SGMM is used to estimate the parameters of this study.

Generalised method of moments (GMM) is appropriate to use in estimating interesting extensions of the basic unobserved effects model. Most especially for models where interaction between unobserved heterogeneity interaction and observed covariates is observed. Lemiieux (1998) adopts GMM to estimate the union–wage effect when unobserved heterogeneity is evaluated differently in the non-union sectors. GMM is applied more often to models that have unobserved effects when the independent variables are strictly exogenous even after controlling for an unobserved effect. An additional leading application of GMM in panel data contexts is when a model contains a lagged dependent variable along with unobserved effect. One of the standard methods of estimating such models dates back to Anderson and Hsiao (1982) which is

estimating the first-difference and it is used to estimate the unobserved effect, and then lags two and beyond are used as instrumental variable for differential lagged dependent variable.

The advantages of using SGMM to estimate panel economic models are many. Firstly, it is generally known to provide more efficient estimates than other techniques such as the Instrumental Variables method because unlike the others, it accounts for heteroscedasticity (Guidara et al., 2013). Secondly, SGMM estimates are consistent and do not need any additional assumptions concerning the distribution of the parameters. Moreover, it does not impose any more assumptions other than what is inherent in the model or that which the underlying theory of the model postulates.

Several authors have argued that the GMM estimator is appropriate where there exists a potential for endogeneity in a model. This is particularly expected where macroeconomic data is involved. The technique controls for simultaneity biases that emerge from the existence of endogenous explanatory variables. GMM produces efficient and consistent results in the face of endogeneity compared with other techniques. The Arellano-Bond estimation is referred to as the Difference GMM, since it is the usage of differencing to transform all regressors.

The difference estimators make a few presumptions about the underlying data-generating process and also use more complex approaches to isolate relevant information. Conditions like endogeneity, distributed individual fixed effects, dynamic model with the present cognizance of the dependent variable influenced by previous ones, and the error terms which are uncorrelated across individuals must exist in order to use the above-mentioned estimators.

Li and Vashchilko (2010) indicated that the use of Arellano-Bond GMM (Difference GMM) estimator will use first-differencing method to eliminate the time-invariant fixed effects as well

as employ instruments to create moment conditions. The Blundell-Bond or Arellano-Bover estimator (System GMM) outdoes the Difference GMM when the autoregressive process is constant. It also gives a larger set of moment conditions to minimize the finite sample bias in panels with short "T" and regressors that are persistent, to overcome some weak instruments biases of the first-differenced estimator. It also helps to identify time-invariant variables (e.g. distance) and address endogeneity problems of numerous variables with suitable instruments.

System GMM needs additional moment conditions relative to the Difference GMM (Farla, De Crombrugghe, & Verspagen, 2016; Blundell & Bond, 1998). As stated by Roodman (2009), due to the risks posed by instrument explosion, it is advisable to have fewer instruments as compared to the cross-sectional sample size. Morrissey and Udomkerdmongkol (2012) stated that GMM estimates are said to be sensitive to the instrument set adopted, particularly in cross-country regressions with comparatively not many country observations. They further noted that the findings can be sensitive to the data (sample). Farla, De Crombrugghe and Verspagen (2016) stressed the sensitivity of System GMM estimation results to the assumptions and detailed specification made.

### 3.6.1 Data

### 3.6.2 Sources of Data

The potential sources of data for this research are varied. These include Ghana Statistical Service, World Development Indicators and Ghana Stock Exchange (GSE). The aim of the research was to have access to the entire data on all the commercial banks in the country. The

Bank of Ghana (BoG) which has been the main regulator of Ghanaian commercial banks failed to provide the quarterly data on all the commercial banks for this research. Since this work is paramount to the growth of the economy and the development of the banking industry is engineered by the interaction between growth and cycles, a perfect comprehension of those occurrences is necessary for an accurate analysis of economic thrust and for forecasting future movement. A bank level data was sourced from Ghana stock exchange, which consisted of only listed financial institutions in Ghana.

### 3.6.3. Study Sample

A total of 8 banks were listed on the Ghana Stock Exchange at the time of research but only 6 banks have quarterly data spanning from 2008 – 2017. Also, the availability of business cycle data or other proxies for the country the bank operates in was considered as criteria for selection. The period of the research is 10 years from 2008 to 2017. The data was unbalanced due partly to a quarter or a year in which certain banks joined the Ghana Stock Exchange and partly due to some missing quarter data on some banks.

## 3.7 Further Robustness Check

The Sargan test confirms the rationality of instruments by evaluating the moment conditions in the estimation. The consistency of the estimates was confirmed by both the Arellano and Bond Test to check for second-order autocorrelation in the error term as well as the Sargan test for over identification restrictions

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## 4.1 Introduction

This chapter provides the results of the study, discusses the results in the context of extant literature and conclusions are drawn. The chapter seeks to answer the research questions that were asked in the first chapter. Section two discusses and presents the descriptive statistics on the variables that were included in the study. Section three introduces a correlation matrix of all the variables and discusses the relationship between the variables. In this section also, a preliminary determination is made of whether there is multicollinearity in the data; a further determination is made in section five. Section four shows the regression results and presents in-depth discussion and analyses of the relationships between spreads and liquidity risk, the business cycle and credit risk. The chapter concludes with a set of diagnostic tests in section five in accordance with best practices in econometric research.

## 4.2 Descriptive Statistics

This section shows the descriptive statistics table of the variables included in the research. This is important to understand the nature of the data employed and putting further analysis into perspective. These statistics are presented in Table 4.1. Column one shows the variable names and column two shows the number of observations for each variable. Column three shows the mean of the variables. The mean shows the average value for each variable for the banks

included. What this means is that the mean represents the typical bank in the sample. The next column shows the standard deviation of the variables. This displays the degree to which actual values deviate from the 'typical'. A wide deviation shows that there are banks that are considered to be outliers. The last two columns of the table show the minimum and maximum values for each variable. The descriptive statistics is adopted to represent the nature of the data set employed in the research. The table projects any possible outliers that have the potential to lead to any possible biased results. Based on the summary statistics, outliers that may affect the efficiency, consistency and biasness of the coefficient is not detected in this data set.

From Table 4.1, spread, being the dependent variable, has an average of 5.5%, indicating that banks employ an average of 5.5% as spread in the country with a minimum average spread of 0.07% and maximum as 14.58%.

Bank expenditure has an average of 4.5%, this means that, banks spend almost 4.5% of the value of their assets on bank expenditure.

Economic growth has a mean of 6.5% quarterly over the sample period. This means the mean growth rate of Ghana has been 6.5% per quarter over the period. The rates have however ranged from -14.73% to 42.37%. The average credit risk is 20.3% and the average liquidity risk 0.3. The credit risk shows the likelihood of loans not being repaid and liquidity risk also shows averagely the banks' solvency position. The means that an average of 20.3% of the loans offered by the commercial banks tend to be bad loans, but the liquidity risk among the sampled banks can be said to be moderate. The disparity between the lowest value and the highest value however shows that some banks have had significantly high liquidity risk and others have had extremely low levels of liquidity risk.

**Table 4. 1 Descriptive Statistics**

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| SPREAD | 213 | .0554972 | .0279165 | .0070367 | .1458231 |
| 1SPREAD | 210 | .091956 | .0612219 | .0131588 | .633517 |
| BC | 210 | .065207 | .1274796 | -.1472816 | .4236731 |
| CRISK | 213 | .2023735 | .1832444 | .1010264 | .30327056 |
| LIQRISK | 212 | .3018162 | .2535027 | 2.28e-07 | .7094173 |
| INFLATION | 216 | 13.97083 | 4.013682 | 7.823333 | 20.45333 |
| BANKEXP | 213 | .0445118 | .0233569 | .0070965 | .1257715 |
| SIZE | 213 | 14.28149 | .9185601 | 12.08941 | 15.95224 |
| EQUITY | 202 | .1382794 | .0785457 | 4.17e-09 | 1.002362 |

Sources: Research Data (2018)

The banks had good capitalisation on average at 13.82% which is above the Bank of Ghana's minimum requirement of 10 percent. The lowest values however suggest that some banks have had very low levels during the period. This is not surprising since there have been concerns recently over the adequacy of banks' capitalisation in Ghana. The rate of inflation in Ghana averaged about 14% over the period within the bounds of 7.82% and 20.45%.

### 4.3 Correlation Analysis

This section, the pairwise correlation between the variables included in this study is presented. The correlation coefficients are displayed in Table 4.2 and Table 4.3. Two sets of correlation matrix were developed. Table 4.2 gives clear insight on the pairwise correlation to establish if

there exists any multicollinearity in the model. The Table 4.3 was generated due to the number of interaction between the variables in the model. The main aim of this table is to help achieve the second objective of this study. Correlation coefficient indicates the degree of association between pairs of variables. These associations however do not suggest causation but instead are only representative of the degree of association (Alalade, Binuyo, & Oguntodu, 2014; Rufai, 2010; Vishnani & Shah, 2007). The prime purpose of analysing the correlation is to inform our knowledge on the relationships implied by the regression analysis.

Generally, there appears to be a weak correlation between pairs of variables. This can be seen from the tables. For instance, the correlation coefficient between liquidity risk and credit risks is 4.95%. This means that the two variables only propel in the same direction 4.95% at the time. The strongest association is between economic growth and bank expenses at 40.7%. This is expected since business spending typically increases the more when the economy is expanding, and reduces when there is a decline in the economic growth. Capitalisation has a negative association with credit risk and liquidity risk. This is an indication that banks that are well capitalised are less risky. This is intuitive as this is the case in practice.

The Table 4.3 also shows clearly that, in times of expansion period in the country, both credit and liquidity risks have a positive relationship with spread. This is intuitive and also confirms the regression results, where the Business cycle of the economy predicted procyclical. This means that, as the economy regains strength and expands investors will undertake more risky ventures.

**Table 4. 2 Correlation Matrix**

| | SPREAD | L.SPREAD | BC | CRISK | LIQRISK | INFL | BANKEXP | SIZE | EQUITY |
|---|---|---|---|---|---|---|---|---|---|
| SPREAD | 1.0000 | | | | | | | | |
| L.SPREAD | 0.0733 | 1.0000 | | | | | | | |
| BC | 0.4135 | -0.0246 | 1.0000 | | | | | | |
| CRISK | 0.3894 | -0.0033 | 0.1048 | 1.0000 | | | | | |
| LIQRISK | 0.0416 | -0.0214 | -0.0225 | 0.0495 | 1.0000 | | | | |
| INFL | -0.0018 | 0.1125 | -0.0464 | -0.0409 | -0.1580 | 1.0000 | | | |
| BANKEXP | 0.7644 | 0.0168 | 0.4070 | 0.1829 | -0.0899 | -0.0178 | 1.0000 | | |
| SIZE | 0.2366 | 0.0823 | 0.0080 | 0.0516 | 0.1666 | 0.1790 | -0.0199 | 1.0000 | |
| EQUITY | 0.1519 | 0.0438 | 0.0238 | -0.0198 | -0.2090 | -0.1426 | 0.1911 | -0.2135 | 1.0000 |

**Table 4. 3 Correlation Matrix with Interactions**

| | SPREAD | L. SPREAD | BC | CRISKBC | LIQCRISKBC | LIQRISKBC | BANKEXP | INFLATION | EQUITY | SIZE |
|---|---|---|---|---|---|---|---|---|---|---|
| SPREAD | 1.0000 | | | | | | | | | |
| L. SPREAD | 0.0733 | 1.0000 | | | | | | | | |
| BC | 0.4135 | -0.0246 | 1.0000 | | | | | | | |
| CRISKBC | 0.3022*** | 0.0712 | 0.6014 | 1.0000 | | | | | | |
| LIQCRISKBC | 0.2568*** | 0.0889 | 0.5056 | 0.9390 | 1.0000 | | | | | |
| LIQRISKBC | 0.3314*** | 0.0657 | 0.8337 | 0.5673 | 0.6107 | 1.0000 | | | | |
| BANKEXP | 0.7644 | 0.0168 | 0.4070 | 0.1877 | 0.1406 | 0.3016 | 1.0000 | | | |
| INFLATION | -0.0018 | 0.1125 | -0.0464 | -0.0713 | -0.0823 | -0.0716 | -0.0178 | 1.0000 | | |
| EQUITY | 0.1519 | 0.0438 | 0.0238 | -0.0126 | -0.0430 | -0.0424 | 0.1911 | -0.1426 | 1.0000 | |
| SIZE | 0.2366 | 0.0823 | 0.0080 | 0.0097 | 0.0570 | 0.0573 | -0.0199 | 0.1790 | -0.2135 | 1.0000 |

*** Correlation matrix for the interaction terms

### 4.4 Regression Analysis

This section presents the results of the regression analysis. The results in Table 4.4 show the estimation of the model specified in chapter three. We used different specifications in determining the results, at each panel a critical explanatory variable of interest was either added or exempted in each case. We have five (5) main specifications that have passed through all the econometrics techniques discussed in chapter three. Panel one examines the relationships that exist between the variables of interest and the Bank spread, where we exclude all the interactions in the model. Panel two includes an interaction between credit risk and the business cycle where we exclude the main variables of interest (credit and liquidity risk). Panel three includes an interacted term of liquidity risk and business cycle, where all the variables of interest are present. In panel four, the model includes some interactions with the exclusion of liquidity risk, and the interaction of credit risk and business cycle. Panel five includes all the variables in the model excluding the interaction between credit risk and business cycle, and liquidity and credit risk. This assesses how these variables affects bank interest rate spread during different state of the business cycle. It is important to note that business cycles are determined using the real GDP growth rate. Periods of positive GDP growth are considered as a normal period or a period of recovery or expansion while negative growth indicates a recession in situations where the business cycle indicator is being interacted with the variable of interest. This approach is similar to that of (Aydemir and Guloglu, 2017). These results are discussed further. The model appears to be suitable for the panel data, since all pertinent tests are highly significant as shown below.

**Table 4. 4 Regression Analyses**

| VARIABLES | (1) Model A SPREAD | (2) Model B SPREAD | (3) Model C SPREAD | (4) Model D SPREAD | (5) Model E SPREAD |
|---|---|---|---|---|---|
| L.SPREAD | 0.0102** | 0.0065 | 0.0177*** | 0.0147*** | 0.0156*** |
| | (0.0044) | (0.0080) | (0.0042) | (0.0042) | (0.0045) |
| BC | 0.0273*** | 0.0070 | 0.0506*** | 0.0460*** | 0.0505*** |
| | (0.0070) | (0.0100) | (0.0150) | (0.0148) | (0.0182) |
| CRISK | 0.6354*** | | 0.4301*** | 0.6359*** | 0.6329*** |
| | (0.0845) | | (0.0950) | (0.0758) | (0.0779) |
| BANKEXP | 0.8073*** | 0.9395*** | 0.8116*** | 0.8069*** | 0.8068*** |
| | (0.0486) | (0.0840) | (0.0514) | (0.0502) | (0.0509) |
| LIQRISK | 0.0029 | | | | 0.0066 |
| | (0.0064) | | | | (0.0072) |
| INFLATION | 0.0000 | -0.0001 | 0.0000 | 0.0000 | 0.0000 |
| | (0.0001) | (0.0002) | (0.0001) | (0.0001) | (0.0001) |
| EQUITY | 0.0406 | 0.0335 | 0.0404 | 0.0409 | 0.0402 |
| | (0.0269) | (0.0229) | (0.0258) | (0.0263) | (0.0265) |
| SIZE | 0.0143*** | 0.0109*** | 0.0141*** | 0.0141*** | 0.0145*** |
| | (0.0025) | (0.0021) | (0.0025) | (0.0022) | (0.0023) |
| CRISKBC | | 1.3900*** | | | |
| | | (0.3783) | | | |
| LIQCRISK | | | 0.6455*** | | |
| | | | (0.1434) | | |
| LIQRISKBC | | | -0.0622*** | -0.0551*** | -0.0663*** |
| | | | (0.0191) | (0.0170) | (0.0223) |
| LIQCRISKBC | | | | 0.8951** | 0.9000** |
| | | | | (0.3814) | (0.3875) |
| CONSTANT | -0.1990*** | -0.1468*** | -0.1957*** | -0.1948*** | -0.2039*** |
| | (0.0351) | (0.0267) | (0.0353) | (0.0322) | (0.0324) |
| Observations | 163 | 176 | 163 | 163 | 163 |
| Number of ID | 6 | 6 | 6 | 6 | 6 |
| No of Instruments | 34 | 34 | 34 | 34 | 34 |
| Hansen (P – Val) | 160.5 (0.1019) | 160.3(0.2130) | 159.0 (0.1067) | 155.7(0.1434) | 153.8 (0.1552) |
| AR(2) Z (P- Val) | 1.42 (0.113) | 1.21 (0.1902) | 1.04 (0.1017) | 1.56 (0.1024) | 1.382 (0.1291) |
| Wald Test | 451.37*** | 373.84*** | 462.62*** | 443.99*** | 441.02*** |
| Linear Form | 451.37*** | 323.35*** | 451.19*** | 451.19*** | 451.37*** |

(BC = Real gdpgrowth (quarterly); CRISK (Credit Risk) = Non Performing Loans/ Total Loans; BankExp (Bank Expenses) = Operation Expenses / Total Assets; LIQRISK (Liquidity Risk) = Liquid Assets/Total assets; INFLATION = CPI Inflation rate (quarterly); EQUITY = Equity/ Total Assets; SIZE = In Total Assets) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The lag of bank spread is seen to be significant, which confirms the dynamic nature of the empirical specification. The value of the coefficient of lag of spread is between 0 and 1 which suggests that bank spread persists but will eventually return to its average value. A value close to zero means that the financial institution industry is fairly competitive; that is, the rate of spreads changes frequently. On the other hand, a value of the coefficient close to 1 means that it takes a very long time for the rate of spread to response to changes in the industry, which depicts that less competition in the industry (Althanasoglou et al., 2008). Hence, the estimation results suggest that the values are not so close to zero but far from 1; therefore, the Ghanaian banking industry can be suggested to be experiencing strong competition. As noted, in panel two, the exclusion of the main variables of interest, thus, credit and liquidity risks in the model made the lag insignificant, which was expected to determine whether these two risks under study truly explain spread in the country.

The findings in panel one also show that business cycles have a strong relationship with bank spread. This is also statistically significant at one percent, suggesting that there is a strong causal relationship between business cycle phases and the interest rate spread of banks. This result suggests that bank spread is procyclical (Aydemir & Guloglu, 2017); that is, it increases with expansion and decreases with contraction. This is intuitive. It can be explained that when the economy is in a recession, business spending is low and consumption slumps. For banks to be able to “sell” (loans) during these periods, they need to reduce their “prices” (which is interest rates on loans) to be able to attract borrowers. This decrease will cause bank spread to be lower, ‘ceteris paribus’. On the other hand, in normal or expansionary periods, consumer and business spending are reversed, and they increase their demand for loans. The increase in the demand for loans will certainly lead to demand exceeding supply, and hence, the interplay of these forces

will cause the banks to increase their prices, given the amount of available loanable funds. This increases their interest income and their bank spread.

Explaining the results from the point of the cost of loanable funds, it can be stated that during periods of recessions, business and household earnings are generally lower, hence less savings, limiting the amount of loanable funds available to banks. They will have to pay more to attract deposits and this increases their interest expense and decreases their bank spread. The reverse holds true in boom periods. That is, business and household incomes are higher and so savings may go up, increasing the amount of loanable funds available to banks. They are then able to pay less for these funds, leading to lower interest costs and then higher bank spreads, all things being equal. Similar findings run across the panels in the table below, except in panel two. The exceptions will be discussed in a later paragraph.

The findings also shows that liquidity risk has a positive relationship with bank spread as expected. The measure of liquidity shows that a higher value of the ratio represents lower liquidity risks and lower values represent higher liquidity risk. This suggests that banks that have lower amounts of deposits tend to have higher bank spreads. This is intuitive since a bank that has lower deposits is likely to be paying higher interests on them than a bank that has higher amounts of deposits; those with less deposits would want to pay more interest to attract deposits (Gropp et al., 2007). This will translate into higher lending rates, hence higher bank spread. This is however not statistically significant, thus suggesting that there is no causal relationship between liquidity risk and bank spread.

The positive and statistically non-significant result for liquidity risk is as expected. This is because, previous banking crisis in other parts of the world had been regarded as the result of

liquidity risk (Berrios, 2013; Sufian, 2011). This led to regulators turning their attention to the monitoring of liquidity of banks. The measures taken by bank regulators (especially BASEL adherents) may have largely eliminated any possible causal impact of liquidity risk (Khan, Scheule, & Wu, 2015; Ratnovski, 2013). Moreover, liquidity is an aggregate measure, so it is easier to monitor and be controlled by regulators. This improved management of liquidity risk could account for the insignificance ( Ratnovski, 2013). The 2017 Ghana Banking Survey compiled by Price Waterhouse Coopers indicated that in the year 2003, the minimum capital was Gh¢ 7 million, which increased to Gh¢ 60million in 2008 and shot up to Gh¢ 120 million in 2013. Recently in 2018, the BOG has called for Gh¢ 400million minimum paid up capital to be met before December, 2018. This shows that there have been numerous steps to curb any situation of bank run and panic in the country. For this reason, liquidity risk has relationship with spread but do not explain spread. This result can also be linked to the first graph in figure 1.1, where it could be seen that the liquidity risk is projecting upwards and far from the spread which seeks to confirm the theoretical findings of Kara and Ozsoy (2014) that established that banks always react to introduction of fresh capital.

Notwithstanding the above discussion, in panel two, liquidity risk shows a negative and statistically significant coefficient when interacted with business cycle. This suggests that in periods of recessions or economic contractions, liquidity risk matters to banks while liquidity alone does not matter or explain spread in Ghana. This is interpreted to mean that as banks' liquidity risks increase, they tend to increase their spreads more in recessions than in boom. That is, for any given level of liquidity risk, banks tend to require higher spreads in recessions than in booms. Banks will want to do this to improve their liquidity ratios during recessions by giving less credit to their customers in recessions (Agarwal, Mahoney, & Stroebel, 2015; Gaiotti, 2013).

This result presents clearly that the Ghanaian banks' performance in response to liquidity risk is delicate during economic fluctuations. In this same panel, business cycle was not significant. This explains the point that spreads cannot be explained by the business cycle without the interaction of credit and liquidity risks, confirming the purpose of this study, which is to achieve the correlation between bank spreads and the business cycles pertinent to the various bank risks in Ghana.

The interaction of credit risk and liquidity risk and in panel three yielded a positive effect on bank spreads. This is interpreted to mean that banks with higher liquidity risks, compared to other banks that have lower liquidity risk, charge higher spreads as their credit risk increases. This is acceptable since banks with insufficient liquidity are expected to require higher spreads to compensate for the increased risks of possible loan defaults (Ahmed & Anees, 2012; Elian, 2013).

In addition, when these terms (CRISK*LIQRISK*BC) are interacted, a positive result is obtained, which suggests that banks with lower liquidity risk, compared to those with higher liquidity risk, seem to increase their spreads more during recessions than during booms, as they are faced with higher credit risks during this period. Meanwhile, because they face less pressure of withdrawal of depositors' funds, they have a tendency to charge higher lending rates when the economy is bad, due largely to the increased credit risk.

Credit risk shows positive relationship with bank spread in all panels when taken alone. This is also statistically significant, suggesting a causal relationship. First, this means that higher credit risks are linked with higher bank spreads. This can be explained to mean that when banks' NPLs (representing credit risk) are high, they charge higher interests on loans offered (Abiola &

Olausi, 2014; Amidu & Hinson, 2006; Kargi, 2014; Massah & Al-Sayed, 2015). These higher interest rates on loans are due primarily to the higher risks the banks are taking up. High NPLs is a sign of high credit risks, and this naturally will mean that banks will tend to place higher risk premiums on their lending rates (Boahene et al., 2012). All things being equal, this will increase their interest income and thus, their bank spread. Secondly, the statistical significance of the variable gives evidence to suggest that the high credit risk is what causes them to increase their lending rates. This is both theoretically and intuitively plausible.

As discussed earlier, the relationship between business cycles and bank spread is procyclical as indicated in the four panels. In panel two, the coefficient of credit risk and business cycle is also statistically significant. This finding may be interpreted to mean that as credit risk increases, banks will also increase their spread more during economic booms compared to recessions. Stated differently, during expansionary periods, consumers and businesses may demand for loan to expand their businesses or undertake long-term projects or more risky projects. This may lead to demand exceeding supply since customers may also be unwilling to deposit their monies at the bank (save), instead they may want to invest in more profitable ventures due to the state of the economy. This will invariably cause the banks to increase their spreads to make their loans unattractive to customers in order to minimize the possible credit risk in future.

On the other hand, liquidity risk becomes statistically significant in panels three, four and five with the introduction of the interacted term (Aydemir & Guloglu, 2017). The direction of the relationship is also reversed when cyclicality is introduced in the model. This means that the impact of liquidity risk on bank spread is cyclical. It shows that the effect of liquidity risk on bank spread is procyclical. That is, in periods of booms, bank spread increases with liquidity risk and falls during recessions.

Bank expense, which was proxied by the operating cost per unit of asset, is used to measure the efficiency of banks. Furthermore, banks with lower ratios are generally regarded as more efficient compared to those who have higher ratios. This cost is an indication of the cost of financial intermediation and so is expected to have important implications for bank spread (Abdelaziz, Mouldi, & Helmi, 2011; Furst, Lang, Nolle, & Dept, 2000; Lafourcade, Isern, Mwangi, & Brown, 2006; Sufian & Noor Mohamad, 2012). This variable has a positive correlation with bank spread which is the expected: higher cost of intermediation will reflect in higher interest rate spreads. The statistical significance of the coefficient further suggests causal relation as was expected.

Similarly, bigger banks have higher bank spread. This is likely as a results of their ability to attract cheaper loanable funds/deposits and the ability to borrow at lower rates (Gyamerah & Amoah, 2015; Hakenes & Schnabel, 2011; Laeven, Ratnovski, & Tong, 2015; Sufian & Noor Mohamad, 2012).

### 4.5 Diagnostic Tests

This section presents the results of diagnostic tests for the model specifications discussed above. These tests include Sargan test, AR (2), and Wald test. The Wald tests tell whether the variables included in the models add anything to the model. The null hypothesis indicates that the variables do not jointly explain bank spreads. The p-values of the tests for each of the specifications show that these variables are jointly important in explaining the model. The section presents tests of over identifying restrictions using the Sargan test. The null hypothesis explains that over identifying restrictions are valid. In order words, valid instruments have been used in the model estimates. The p-values of each of the specifications failed to reject the null

hypothesis, hence the conclusion that the over identifying restrictions are valid. The AR (2) test is also used to check autocorrelation problem in the idiosyncratic disturbance term in the models. The results show no such problem.

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

This current chapter concludes the research report. It begins by presenting a summary of the report and then stating the conclusions of the research. The chapter further discusses the policy implications of the findings and closes with some recommendations for banks, regulators and policy makers. The summary is presented in section 5.2, and the conclusions in sections 5.3. The recommendations are presented in 5.4.

## 5.2 Summary of Findings

This section introduces the findings from chapter Four. The objectives of this research were to first, determine the association between bank spreads and the business cycles pertinent to the various bank risks in Ghana. The second objective was to deduce the correlation between bank credit and bank spreads in Ghana and then finally, to determine how bank liquidity and credit risks affect bank spread during various phases of the business cycle in Ghana. The data employed for this research was obtained from the Ghana Stock Exchange. Only banks that had quarterly data from the period of 2008 to 2017 were included in the research. Macroeconomic data was retrieved from the Ghana Statistical Service and World Bank database. These were analysed applying the Generalised Methods of Moments (GMM) estimation technique. This paper is the first study in the literature in Sub-Saharan Africa (SSA) that investigates the effects of cyclical behaviour of banks spread in relation to these bank risks, to the best of our knowledge.

Firstly, the finding in the base model shows that business cycles have a strong positive correlation with bank spread. This relationship is also causal, suggesting that there could be the presence of a strong causal correlation between interest rate spread of banks and business cycle phases. Thus, it is concluded that bank spread is procyclical. This means that it increases with expansion and decreases with contraction.

The estimation results emphasize the essence of bank risks in explaining bank spread in Ghana over the business cycle. The overall findings show that liquidity risk is less important than credit risk in understanding bank spreads. But the revealing aspect is that the impact of the bank risks on bank spread differs over the business cycles relatively to various phases of the cycle. Precisely, credit risk is more significant on spreads in the period of expansion in the economy, whereas liquidity risk is also more significant on spreads in the period of recession in Ghana. Specifically, as far as banks' experiences are exposed to more liquidity risk, they augment their spread more in recession than during the period of boom. Meanwhile, as banks face more credit risk, they increase their spread in the period of boom than during recessions in the country.

The findings also indicate that liquidity risk has a positive correlation with bank spread. The measure of liquidity shows that a higher value of the ratio is a representation of lower liquidity risks and lower values represent higher liquidity risk. The conclusion drawn from this result implies that banks that have lower amounts of deposits tend to have higher bank spreads. However, there is no causal relationship between bank spread and liquidity risk.

The interaction of credit risk and liquidity risk yielded a positive impact on bank spreads. This conclusion presupposes that banks with higher liquidity risks relative to other banks that have lower liquidity risk charge exorbitant spreads as their credit risk rises. Subsequently, when

interacted with the business cycle variable, it gives a positive coefficient. What this implies is that banks with smaller liquidity risk compared to those with greater liquidity risk have the tendency of increasing their spreads more during recessions than during booms, as they are faced with higher credit risks during this period.

There is a positive causal relationship between spread and credit risk, and this holds regardless of the business cycle phase. We conclude that there is persistence of interest rate spread. Banks with high spreads will be forced to subsequently reduce their spread due to increased competition.

Furthermore, based on the findings, it is concluded that banks with high operating costs transfer this cost to higher lending rates, hence higher spreads. Also, banks that are well capitalised tend to have high spreads, but there are no bases to suggest that this is caused by the former.

### 5.3 Conclusions

It is commonly acknowledged that banks play a vital role in the economy of a country. Among other things, these financial institutions play the role of intermediaries between entities with surplus funds and those who have a deficit.

From the regression analysis in chapter four, we can deduce the essentiality of credit and liquidity risk in explaining spread in Ghana. The findings indicate clearly that, credit risk explains bank spread better than liquidity risk. Meanwhile, their various impacts on spread over the business cycle differ. While credit risk becomes highly significant during the period of expansion (Boom), liquidity risk is also more significant in the period of contraction (Recessions). Stated differently, this means that when the banks are confronted with high

liquidity risk, they have the tendency of reducing their spread by increasing the depositor's rate of interest to make it more attractive for surplus units to save their income. During the period of expansion, investors may need adequate funds to undertake more risky projects. When this happens, demand may exceed supply of funds, credit may also have the probability to rise, and this may lead in rise in spread to compensate the risk on borrowing and also to reduce the attractiveness of the loanable funds.

### 5.4 Recommendations

Overall, the estimation results presented and discussed earlier have important implications for policy in the banking sector in Ghana. The central bank, the Bank of Ghana which is the principal regulator of the banking industry in Ghana has over the last decade been particularly concerned about the status of non-performing loans which had been rising. The problem of non-performing loans has been blamed partly for the failure of some banks in recent years despite efforts by the central bank to keep them under control. In their bid to curtail the impact of NPLs on banks, the Bank of Ghana and various industry stakeholders have put policies and other measures in place to minimize the level of credit risk in the industry. Until recently (2018), the central bank did not specifically regulate bank spreads, at least not directly, even though some of its macro-prudential policy interventions have affected bank spreads over time. Its recent policy intervention called the Ghana Reference Rate has an objective to keep the cost involved in financial intermediation low, and this could be the first major intervention that has a direct implication for bank spread.

The findings of this study have indicated that banks respond differently to different risks during the stages of the business cycle. This is in line with the latest policies of the Bank of Ghana that

are targeted at managing credit and liquidity risk in the banking sector. Thus, these policies have allowed the central bank to regulate commercial bank liquidity indirectly by adjusting the reserve requirement from time to time. The findings of this study suggest that these adjustments can be made to coincide with the business cycle phases.

The phenomenon of business cycles is discussed less in Ghana's public discourse as compared to developed countries. It is therefore not readily verifiable whether public policies have specifically considered this phenomenon. Even though the macro prudential policies of the central bank of Ghana are aimed at some of the important risks in the industry, it cannot be verified independently whether these policies were also targeted at the interest rate spreads of banks. This is attributed to the evidence that there are considerable variations among banks' deposit and lending interest rates which do not seem to comply with any regulation. Moreover, regulators appear to only use moral suasion as a measure to appeal to the banks to adjust their lending rates, a call which does not appear to have been ever adhered to. In an attempt to grab hold of this situation, the central bank has since April 2018 introduced the Ghana Reference Rate (GRR), which is intended to serve as a base rate for all banks in determining their lending rates and ultimately improving efficiency and enhancing competition in the industry.

The results of this study have indicated that liquidity risk and credit risk have important implications for bank spreads. They have showed that credit risk is more important in determining bank spreads than liquidity risks but have different impact on spread with respect to business cycles. Banks should therefore factor the cyclical feature of credit risk and liquidity risk in pricing loans. For banks that use risk-based loan pricing, the relative response of the various risk factors is critical for setting appropriate risk premiums. However, we encourage future

researchers to consider cross-country analysis in Sub-Saharan Africa (SSA) to see whether the results of this research can be expanded to include other countries in the sub-region.

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