

UNIVERSITY OF CAPE COAST

CREDIT RISK AND FINANCIAL PERFORMANCE OF LISTED BANKS IN
GHANA

BY

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Humanities and Legal Studies University of Cape Coast, in Partial Fulfillment of the
Requirements for the Award of Master of Business Administration Degree in Accounting.

October,2017

DECLARATION

Candidate's declaration

I here by declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Name: Raphael Kwabla Agodzo

Candidate's Signature:..... Date:.....

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Name: Mr. Seyram Kawor

Supervisor's Signature: Date:

ABSTRACT

Credit creation process exposes banks to high default risk which could lead to financial distress including bankruptcy. The objective of the study is to identify the key determinants of credit risk faced by the banks in Ghana and to assess its impact on their financial performance in terms of profitability. The study is based on data from seven banks operating in Ghana for a 15-year period ranging 2001 to 2015. The study showed an inverse relationship between capital adequacy and credit risk at 1% validating the hypothesis. Also business operation efficiency measured by Management efficiency ratio (MER) and trading income to total revenue ratio showed a negative significant relationship with credit risk at 5% and at 10% level of significance respectively which also provided a strong argument for the stated hypothesis. Return on equity and return on asset showed a significant inverse relationship with credit risk at 1% significant level. similar observation was made on net interest ratio which also showed a significant inverse relationship with credit risk at 5% level of significance but was against the expected positive relationship from the literature. Considering the identified determinants of bank credit risk, combined with how credit risk impacts bank profitability, an efficient operational expense management of banks would not only increase the profit margin of these banks but also reduce the tendency of threat on the survival of these banks. This is due to the significant relationship between management expense ratio and credit risk and also with profitability. From the result of the study, conclusion was arrived on the basis that, though there may be other factors that affect the credit risk of banks in Ghana, capital adequacy, management operational efficiency, management of liquidity risk and the size of the bank, annualised changes in inflation and changes in GDP are major determinants of credit risk due to their high statistical significance level.

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DEDICATION

To my Uncle's Mr. Gilbert Mag-Mawuli, Dr. Yao Elikem Ayekple and Mr
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CHAPTER ONE

INTRODUCTION

Background of the study

Credit risk is defined as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms. According to Chijoriga (1997) credit risk is the most expensive risk⁰ in financial institutions and its effect is more significant as compared to other risk as it directly threatens the solvency of financial institutions. The magnitude and level of loss caused by the credit risk as compared to other kind of risks is severe to cause high level of loan losses and even bank failure. While financial institutions have faced difficulties over the years for a multitude of reasons, the major cause of serious banking problems continues to be directly related to lax credit standards for borrowers and counterparties, poor portfolio risk management, or a lack of attention to changes in economic or other circumstances that can lead to a deterioration in the credit standing of a bank's counterparties (Basel, 1999).

Loans are the largest source of credit risk to commercial banks. However, other sources of credit risk exist throughout the activities of a bank, including in the banking book and in the trading book, and both on and off the balance sheet. Banks are increasingly facing credit risk (or counterparty risk) in various financial instruments other than loans, including acceptances, interbank transactions, trade financing, foreign exchange transactions, financial futures, swaps, bonds, equities, options, and in the extension of commitments and guarantees, and the settlement of transactions. The goal of credit risk management is to maximise a bank's risk

adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks need to manage the credit risk inherent to the entire portfolio as well as the risk in individual credits as transactions.

Credit risk management should be at the centre of banks operations in order to maintain financial sustainability and reaching more clients. Despite these facts, over the years there has been increased number of significant bank problems in both, matured as well as emerging economies (Brownbridge & Harvey, 1998; Basel, 2004). Bank problems, mostly failures and financial distress have afflicted numerous banks, many of which have been closed down by the regulatory authorities (Brownbridge & Harvey, 1998). Among other factors, weakness in credit risk management has all along been cited as the main cause for bank problems (Chijoriga,1997). Since exposure to credit risk continues to be the leading source of problems in banks world-wide, banks and their supervisors should be able to draw useful lessons from past experiences. Banks should now have a keen awareness of the need to identify, measure, monitor and control credit risk as well as to determine that they hold adequate capital against these risks and that they are adequately compensated for risks incurred (Basel, 1999).

Banks are very important in every economy because they provide special functions or services which if disturbed or interfered with, can lead to adverse effects on the rest of the economy. They make available financial resources necessary for economic growth that is, lending to borrowers. They take deposits from surplus units and then lend to those who are in deficit (borrowers) as loans (Stapleton & Woodward, 2009). At a certain stage of their evolution, their

traditional activity of deposit taking and loan making enlarged with activities like remittance, foreign exchange dealings, trustee services, securities brokerages, investment advisory dealings, bill paying, leasing and factoring, among others. This implies that good functioning of banks in every economy has a direct relationship with its economic growth and poor functioning has a negative effect.

The great role banks play by acting as financial intermediaries in the financial market for lenders and borrowers is a very delicate one and its handling thus need a lot of prudence. It is widely accepted that the quantity or percentage of default loans is often associated with bank failures and financial crisis in both developing and developed countries. The recent global financial crisis, which originated in the US, was attributed to the rapid default of sub-prime loans or mortgages.

Banks are exposed to different types of risks, which affect the performance and activity of these banks, since the primary goal of the banking management is to maximize the shareholders' wealth. So, in achieving these goal bank managers should assess the cash flows and the assumed risks as a result of directing its financial resources in different areas of utilization. Credit risk is one of the most significant risks that banks face, considering that granting credit is one of the main sources of income in commercial banks. Therefore, the management of the risk related to that credit affects the profitability of the banks (Li & Zou, 2014). The importance of credit risk management in banks is due to its ability in affecting the banks' financial performance, existence and growth.

The global financial crisis caused the collapse of some financial institutions. In view of this reality it is therefore understandable why much emphasis is placed on default risk when examining financial stability of banks.

Managing loans in banks is critical for the survival and growth of the banks. The issue of loan default risk is of even greater concern because of the higher levels of perceived risks resulting from some of the characteristics of clients and business conditions that they find themselves in. Banks are in the business of safeguarding money and other valuables for their clients. Giving out loans is the main income generating activity for banks. But this activity involves huge risk to both lenders and borrowers.

The risk of borrowers not fulfilling their obligation as per the contract on due date can greatly jeopardize the smooth functioning of a bank's business. Also, banks with high loan default have high bankruptcy risk that puts the depositors in jeopardy. For most banks, loans are the largest and most obvious source of risk.

Many products, activities and services such as derivatives, foreign exchange, and cash management services, also expose a bank to risk. The risk of repayment is either lessened or increased by a bank's credit risk management practices.

Statement of the Problem

Credit creation process exposes banks to high default risk which might lead to financial distress including bankruptcy (Saunders & Cornett, 2006). Banks must create credit for their clients to make some money, grow and survive stiff competition at the market place. Besides other services, banking is both a risk-

taking and profit-making business, and bank loan portfolios should return profits commensurate with their risk. Although this concept is intellectually sound and almost universally accepted by bankers and examiners alike, banks have had difficulty implementing it.

Over the years, volatility in banks' earnings usually has been linked to the loan portfolio. Loan portfolio is typically the largest asset and the predominant source of income for banks. In spite of the huge income generated from their loan portfolio, available literature shows that huge portions of banks loans usually go into default and therefore affect the financial performance of these institutions. For decades, good loan portfolio managers have concentrated most of their effort on prudently approving loans and carefully monitoring loan performance.

This is because if loans are defaulted, they affect the liquidity, lending, deposit mobilization, and profitability of the bank. Failure to reconcile these four key indicators may lead to bank failure and even bankruptcy. This failure can also have a chain effect to influence payment systems and thus affect the whole economy in the long run. Despite the consequences of default risk, it cannot be avoided because it is associated with the core activities of the bank.

In view of the above, it is imperative to find out the determinants of loan default and its effects on financial performance of commercial banks in Ghana.

Objective of the Study

The objective of the study is to identify the:

- i. Key determinants of credit risk faced by the banks on the Ghana Stock Exchange

- ii. To assess the impact of credit risk on their financial performance in terms of profitability.

Research Questions

Evolving from the problem statement discussed above, the study aimed at providing answers to the following questions:

- i. What are the indicators of the credit risk?
- ii. What are the indicators of banks' financial performance (profitability)?
- iii. Does the credit risk affect banks' financial performance (profitability)?

The study seeks to test the following hypothesis;

Hypothesis 1: bank specific factors such as capital adequacy, business operational efficiency, earning potential and firm liquidity significantly affect credit risk exposure of Ghanaian banks;

Hypothesis 2: the profitability of the Ghanaian banks is inversely related to their credit risk exposure.

Significance of the Study

The study would be of immense contribution to bank managers, financial analyst and bank regulators. The findings would enable management of banks to adopt a pragmatic policy for credit risk management aimed at improving the quality of their credits portfolios. The findings are expected to remind credit staff about the implications of their credit decisions in creating quality credit portfolio for their

banks. This will help enhance the performance of credit officers. The findings of this study could be seen as a contribution to existing literature on default risk in banking. Indeed, this would contribute immensely in building up academic knowledge on credit risk in banking.

The study would contribute significantly to the development of the banking industry which plays a pivotal role in the development of the economy. This is because the study also sought to identify the determinants of credit risk in the banking industry.

Organization of the Study

This study is well thought out into five main chapters. The study's background, problem statement, the research objectives, the studies justification, its scope, limitation and how the entire research work was organized are captured in the first chapter. Relevant literature associated to the topic under study is also presented in chapter two. The methodology used in achieving the stated objectives for this research is well spelt out in the third chapter. Chapter four presents the analysis and discussion of the data collected. The final chapter presents the summary of the research findings, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This section primarily deals with what some authors have done in regard to this subject matter. The chapter discusses established theories within the area of loan defaults and its impact on financial performance of commercial banks in Ghana.

Banks are exposed to different types of risks, which affect the performance and activity of these banks, since the primary goal of the banking management is to maximize the shareholders' wealth, so in achieving these goal banks' managers should assess the cash flows and the assumed risks as a result of directing its financial resources in different areas of utilization. Credit risk is one of the most significant risks that banks face, considering that granting credit is one of the main sources of income in commercial banks. Therefore, the management of the risk related to that credit affects the profitability of the banks (Li & Zou, 2014). The importance of credit risk management in banks is due to its ability in affecting the banks' financial performance, existence and growth.

Operational activities of banks

Banks are financial institutions whose main aim is to make profit for their shareholders. They accept deposit and keep valuable items for their customers and make them available on demand. Not only do banks accept deposit but also grant

credits to their customers. Banks grant short-term loans and overdrafts to their customers. Some Operational activities include Lending and Deposit mobilization

Lending

Biney (2006) defines lending as an amount of money provided by a lender and taken by a borrower, payable at some future date on specific terms and conditions and governed by legal contract. Lending is also defined as the offer of money to a person or entity with the expectation that repayment would be made with interest either by instalments or in one amount by a specified date, where necessary a lender will protect himself, by asking the borrower to provide some collateral (Ribeiro, 2006). However, some banks grant credit without taking any collateral with the intention to win customers for the bank. This trend has emerged as a result of competition amongst banks when lending issues arise. The legal framework has not changed much but as the years go by the laws which regulate lending continue to be revised, amended or even replaced entirely to make way for more current and relevant ones.

Rouse (1989) perceives lending as an art rather than science because it involves experience and common sense. This assertion to some extent is true. These two factors alone can perfect some aspect of lending, but not to its entirety. It is through science that lenders come out with accounting procedures, credits and risk's analysis to assess customer's ability to pay, regulatory framework among other factors. Lender lends money and does not give it away (Rouse 1989). There is therefore a judgment that on a particular future date repayment will take place. The lender needs to look into the future and ask whether the customer will repay

by the agreed date. Rouse (1989) indicated that there will always be some risk that the customer will be unable to repay, and it is in assessing this risk that the lender needs to demonstrate both skill and judgment.

Bank lending has been a major source of funding for most businesses. There is the need therefore for banks and other financial institutions to be careful in their loan administration to prevent the inherent risk associated with the product in order to maximize shareholders returns and enhance the image of the institution (Agyemang, 2010). Banks have over the years helped customers to augment capital for most businesses and make them financially strong to accelerate nation building. Anaman (2006) maintains that as much as banks' lending help business to flourish, banks also have its fair share in the forms of fees and incomes to sustain its operations.

Deposits mobilization

The principal source of funds for banks in Ghana is the deposits they mobilise from households and other company surpluses. According to Dighe (2005), deposits forms 63% of bank's liabilities. This indicates that factors that affect deposits mobilisation have a huge impact on the performance of commercial banks.

The ability of the bank to lend depends on its deposit mobilization. The higher the deposits mobilized, the better the position of the bank to give out loans. Incoom (1998) indicates that the requirements of lenders and borrowers are diverse and conflicting. Lenders expect high returns on the loanable funds whilst borrowers expect to pay less on monies advanced to them. Depositors expect to earn higher

income in the form of interest. For the bank to balance these conflicts of interest it should ensure profit maximization while taking into accounts the potential environmental risk as well as the liquidity of the bank. Though lending by commercial banks is a major source of funding to most businesses and forms a chunk of the income of banks resulting from interest charges on the loans advanced, there exist the risk of non-payment of these loans. Hence there is a need for a proper credit assessment before these loans are disbursed to reduce the risk of non-payment.

Theoretical Review.

Risk is the position where the actual return of an investment is different than expected return. Risk means the possibility of losing the original investment and the amount of interests accrued on it.

Credit risk is the risk that a borrower defaults and does not honor its obligation to service debt. It can occur when the counterpart is unable to pay or cannot pay on time (Gestel & Baesens, 2008,).

Credit risk is the risk of loss of principal or loss of a financial reward stemming from a borrower's failure to repay a loan or otherwise meet a contractual obligation. Credit risk arises whenever a borrower is expecting to use future cash flows to pay a current debt. Investors are compensated for assuming credit risk by way of interest payments from the borrower or issuer of a debt obligation, and credit risk is closely tied to the potential return of an investment, the most notable being that the yields on bonds correlate strongly to their perceived credit risk.

Credit risk refers to the probability of loss due to a borrower's failure to make payments on any type of debt. Credit risk management, meanwhile, is the practice of mitigating those losses by understanding the adequacy of both a bank's capital and loan loss reserves at any given time – a process that has long been a challenge for financial institutions. Credit risk denotes to the risk that a borrower will default on any type of debt by failing to make required payments. The risk is primarily that of the lender and includes lost principal and interest, disruption to cash flows, and increased collection costs.

Effective management of credit risk is inextricably linked to the development of banking technology, which will enable to increase the speed of decision making and simultaneously reduce the cost of controlling credit risk. This requires a complete base of partners and contractors (Lapteva, 2009). Credit risk is one of significant risks of banks by the nature of their activities. Through effective management of credit risk exposure banks not only support the viability and profitability of their own business but also contribute to systemic stability and to an efficient allocation of capital in the economy (Psillaki, Tsolas, & Margaritis, 2010). "The default of a small number of customers may result in a very large loss for the bank" (Gestel & Baesems, 2008,). It has been identified by Basel Committee as a main source of risk in the early stage of Basel Accord.

Basel Committee Banking Supervision - BCBS (1999) defined credit risk as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms. Credit risk according to BCBS (2001) and Gastineau (1992) is the possibility of losing the outstanding loan partially or totally,

due to credit events (default risk). Credit events usually include events such as bankruptcy, failure to pay a due obligation, repudiation/moratorium or credit rating change and restructure.

Credit risk is critical since the default of a small number of important customers can generate large losses, which can lead to insolvency (Bessis, 2002). Borrower's default risk is one of the fundamental concerns for financial institutions and as such accurately assessing all the relevant risks associated with loans will definitely increase their market efficiency (Lee & Liu, 2002).

Empirical Review.

There are numerous researches on the effect of credit risk management on financial performance, and how could the effective credit risk management assist in reducing the possibility of failure and restricting the uncertainty of achieving the required financial performance. Most of these researches support the notion that there is a positive relationship between effective credit risk management and banks' profitability, and some of these studies support the notion that there is a negative relationship between them, as follows. Hakim and Neaime (2001) tried to examine the effect of liquidity, credit, and capital on bank performance in the banks of Egypt and Lebanon; they found that there was a sound risk management actions and application of these banks rules and laws. Hosna, Manzura and Juanjuan (2009) found that Non-performing loans indicator effected on profitability as measured by (ROE) more than capital adequacy ratio, and the effect of credit risk management on profitability was not the same for all the banks included in their study. Njanike

(2009) found that the absence of effective credit risk management led to occurrence of the banking crisis, and inadequate risk management systems caused the financial crisis. Kithinji (2010) indicated that the larger part of the banks' profits was influenced by other variables other than credit and nonperforming loans. Aduda and Gitonga (2011) found that the credit risk management effected on profitability at a reasonable level. Aruwa and Musa (2012) investigated the effects of the credit risk, and other risk components on the banks' financial performance. They found a strong relationship between risk components and the banks' financial performance.

Boahene, Dasah and Agyei (2012) examined the relationship between credit risk and banks' profitability. They found a positive relationship between credit risk and bank profitability. Gakure, Ngugi, Ndwiga and Waithaka (2012) investigated the effect of credit risk management techniques on the banks' performance of unsecured loans. They concluded that financial risk in a banking organization might result in imposition of constraints on bank's ability to meet its business objectives.

Kolapo, Ayeni and Oke (2012) showed that the effect of credit risk on bank performance measured by ROA was cross-sectional invariant, though the degree to which individual banks were affected was not captured by the method of analysis employed in the study. Poudel (2012) explored the various credit risk management indicators that affected banks' financial performance, he found that the most indicator affected the bank financial performance was the default rate. Musyoki and Kadubo (2012) seek to assess various parameters pertinent to credit risk management as it affects banks' financial performance. They concluded that all these parameters had an inverse impact on banks' financial performance; however,

the default rate was the most predictor of bank financial performance, on the contrary of the other indicators of credit risk management. Nawaz and Munir (2012) found that credit risk management effected on the banks' profitability, and they recommended that management should be cautious in setting up a credit policy that might not negatively affect profitability. Abdelrahim (2013) concluded that liquidity and bank size affected strongly on effectiveness of credit risk management.

Adeusi, Akeke, Adebisi & Oladunjoye (2013) concluded that risk management indicators (doubt loans, and capital asset ratio) effected on banks performance. Berrios (2013) showed that less discreet lending effected negatively on net interest margin. Kaaya & Pastory (2013) showed that credit risk indicators negatively effected on the bank performance. Ogboi & Unuafe (2013) concluded that bank's financial performance had been affected by sound credit risk management and capital adequacy. Abiola & Olausi (2014) revealed that banks' profitability had been affected by credit risk management. Singh (2013) revealed that Effective risk management was critical to any bank for achieving financial soundness. Idowu and Awoyemi (2014) revealed that credit risk management had an effect on the banks' profitability.

Li and Zou (2014) found that the indicator of nonperforming loans had positive impact on banks profitability as measured by return on equity (ROE) and return on assets (ROA). Kurawa & Garba (2014) revealed that the variables of credit risk management effected on the banks profitability. This research improves on some of the existing studies, in that it investigates the sub-total and overall effect

of credit risk management and its indicators on financial performance of Jordanian commercial banks using certain individual indicators of credit risk management.

Credit risk policy/philosophy

Banks, like any other firm or corporation, have formal laid down policies and principles that have been put in place by the board of directors on how to manage credits and these have to be carefully implemented by management. This restricts supervisors or managers on how to take action. They must do so by looking at the policies laid down to know if they are doing the right thing at the right time. Maness and Zietlow (2005) specifies that a credit policy has four major components which include credit standards, credit terms, credit limits and collection procedures.

Credit standards

This is the profile of the minimally acceptable creditworthy customer. These are the criteria that the client should meet to qualify for credit according to Kakuru (2000). These require intensive analysis to ensure effectiveness. Credit standards are the criteria that the firm follows when selecting customers for credit allocation. It is vital for the credit standards to be set basing on individual credit applicant by considering credit information, credit limits and default rate (Kakuru, 2001). Pandey (1993) recognizes the 5Cs as measurement parameters in setting credit standards and these include the following.

Definition of Terms

Character

This evaluates the applicants' traits to analyze the willingness to meet the credit obligations. Kakuru (2001) highlighted the following variables to consider when analyzing applicant's character. These include applicant's banking behaviour from the bank's records, the level of education, mental status, occupation stability, contact, attachment to government agencies and previous dealings with banks. This is done to ascertain the applicant's honesty in repaying the loan.

Capacity

This evaluates the applicant's ability to pay the debt when advanced in the required time period. This is ascertained by evaluating the value of customer's capital and asset offered as collateral against the loan.

Capital

This refers to the general conditions of the firm. This is ascertained by the analysis of the financial statements with special emphasis on the risks and the debt-equity ratios and also evaluating the customer-firm working capital positions (Floucks, 2001). The financial manager can also assess the balance sheet to ascertain how much the owner has invested into the business as his own personal stake (BPP, 2000).

Collateral

This refers to items like land, houses, commercial and residential estates or any other property of value offered as security of the value of the loan extended to the borrower (Kakuru, 2001). The collateral should be safe, easily marketed and that its value should be able to cover up the debt when sold in case the borrower defaults to pay (Van Horne, 1995).

Conditions

These refer to the prevailing economic and financial environment which may affect or be a detriment to the borrower's ability to pay the debt and which may prove unprofitable to the creditor. For instance, under inflationary tendencies it is unsuitable to grant credit as the creditor is bound to loose on the loaned amount if not earning low returns. The financial manager should form a reasonable judgment regarding the chances of default and estimate the probability of loss under such conditions (Pandey, 1996).

Credit terms

Credit terms refer to the stipulations under which the firm or the bank institution offers credit to borrowers (Pandey, 1993). The credit period is the schedule of the interest payment and the final settlement of the principal amount. It is the time length between credit extension times to the expected time the customer is expected to pay back the credit.

Credit limit

This is the maximum amount of credit which the bank can extend to customers at any point in time. In setting up the credit limit, considerations must be taken to maximize the returns in terms of the sales and also the financial strengths of the customer to ascertain whether he/she will be able to meet the credit obligation.

Collection procedures

These are detailed statements regarding when and how the company will carry out collection of past due amounts. Banks have varied collection procedures based on information such as due dates, grace periods, penalties, date of repossession, date of turnover of delinquent account to collection agency, among others. The collection procedure for any loan arrangement should be spelt out as part of the loan terms. It is important for borrowers to be aware of the details of the collection procedure so as to avoid penalties, and in the case of collateral or secured loans, repossession of the collateral. In spite of the above credit risk assessment processes carried out by banks, borrowers still default on loan repayments.

Definition of credit risk/loan default

Credit risk is the risk that a borrower defaults and does not honor its obligation to service debt. It can occur when the counterpart is unable to pay or cannot pay on time (Gestel & Baesens, 2008, p. 24).

Loan default can be defined as the inability of a borrower to fulfil his or her loan obligation as and when due (Balogun & Alimi, 1990). Default is the failure to pay back a loan. Default may occur if the debtor is either unwilling or unable to pay his or her debt. This can occur with all debt obligations including bonds, mortgages, loans, and promissory notes. Basel (1999) provides that loan default is the uncertainty about the likelihood that the obligator is unable to serve his or her obligations.

Determinants of credit risk/loan default

Research findings and publications show that loan defaults occur as a result of some factors; Berger & De Young (1997) identified poor management as one of the major causes of problem loans. They argue that managers in most banks with non-performing loans do not practice adequate loan underwriting, monitoring and control. Rouse (1989) identifies that lack of good skills and judgment on the part of the lender is a possible cause of loan defaults. Bloem and Gorter (2001) point out that deficient bank management, poor supervision, over optimistic assessments of creditworthiness during economic booms, and moral hazard that result from generous government guarantees are some of the factors that lead to loan defaults.

A World Bank policy research working paper on Non-Performing Loans in Sub-Saharan Africa revealed that loan defaults are caused by adverse economic shocks coupled with high cost of capital and low interest margins (Fofack, 2005). Goldstein and Turner (1996) stated that “the accumulation of non-performing loans is generally attributable to a number of factors, including economic downturns and macroeconomic volatility, terms of trade deterioration, high interest rate, excessive reliance on overly high-priced inter-bank borrowings, insider lending and moral

hazard''. Bloem and Gorter (2001) indicated that non-performing loans may rise considerably due to less predictable incidents such as the cost of petroleum products, prices of key export products, foreign exchange rates or interest rates change abruptly.

Income is a commonly used proxy of the borrower's financial wealth and his or her ability to repay (Dinh & Kleimeier, 2007). There is a positive relationship between income and the borrowers' default rate; higher income is associated with lower default risk (Jacobson & Roszbach, 2003). According to Dinh and Kleimeier (2007), employer refers to the type of company for which a borrower works such as state-owned, joint-stock company among others. The type of company a borrower works in could be a proxy for income level and stability. Missing values of this variable are also very informative as borrowers who do not answer this question show the highest probability of default. Occupation is a common variable used in credit scoring model and is highly correlated with the borrowers' income level.

Thomas (2000) emphasizes that education enhances the borrowers' ability to repay. The better educated borrowers are deemed to have more stable and higher income employment and thus a lower default rate. Borrowers with high level of education are more likely to repay their loan since they occupy higher positions and with high income levels.

Boyle, Crook, and Thomas. (1992) confirm that older borrowers are more risk adverse, and therefore the less likely to default. Thus, banks are more hesitant to lend to younger borrowers who are more risk averse. Armingier, Enache, and Bonne. (1997) note that gender in addition to age is one of the most used socio-

demographical variables to differentiate the predictive power between men and women. There is clear evidence that women default less frequently on loans possibly because they are more risk adverse. According to Coval and Shumway (2000) gender is a fair discriminatory base on the statistical default rates of men versus women.

There are ample evidences that women default less frequently on loans because women are more risk adverse. According to Dinh and Kleimeir (2007), marital status affects the borrower's level of responsibility, reliability, or maturity. The probability of default is higher for married than single borrowers. They discover that the marital status is typically related to number of dependents which in turn reflects financial pressure on the borrower and borrower's ability to repay a loan.

Pandy and Muralidharan (1979), using data from the Uttar Pradesh State in India, attempted to develop criteria for classifying borrowers as to their willingness to repay their loans on the basis of differences in their socio-economic characteristics. The discriminant function analysis indicated that the percentage of total income derived from sources other than crop production, the amount of loan, the purpose of loan, per capita consumption expenditure, and the ratio of cash expenditure to total expenditure were the major characteristics that classified borrowers into defaulter and non-defaulters. Berger and De Young (2006) suggest that geographic distance increases the costs of information collection and monitoring such that loan default rate increases with the distance between the borrower and the lender.

It is worth noting that though the literature obtained from foreign sources indicate some causes of credit risk, some of these may not apply to banks in the Ghanaian environment. Besides, it is possible that there are other serious factors that are causing loan defaults in Ghana which have not been revealed in the literature reviewed.

It is because of these reasons that it has become necessary to identify the causes of these loan defaults in the Ghanaian banking environment, looking at the case of listed banks on the Ghana Stock Exchange. This would form the basis for cogent recommendations to be made towards solving the problem.

Effects of credit risk/loan default

When a bank fails to put in place a good credit risk management system, it will find itself faced with a lot of problems and negative consequences. There may be many interrelated problems but the most basic ones which are so obvious and interrelated revolve around trying to be profitable, solvent and liquid. Profitability is the proof of an effective and well managed business. The banks are into business like any other firm with the purpose of making a profit. For this to be attained, losses have to be minimized. Advising on losses suffered by banks is that the same basic causes tend to occur time and again so, it therefore makes sense that before reviewing office procedures, the causes of the different losses which have been incurred both within the bank and by competitors conducting similar business should be looked into (Richard & Simon, 2001). The bank has to be sure about the capability of repayment of the borrower before granting any loans.

Credit risk leads to capital inadequacy (insolvency). Capital adequacy means the financial capability of the bank to meet up with its financial obligations or uncertainties that may arise and thus will reduce the risk that it may face to some extent. An acceptable capital adequacy position is equivalent to saying that a bank is not over exposed to risks (Gardner, 2007). This is because its primary role or main function is to absorb unexpected and exceptional losses that it might experience especially in situations of uncertainty. The more capital a bank has, the more are its creditors or the government insurance agency protected, and the greater is the capital loss that can be sustained without resulting in bankruptcy (Shah, 1996).

Credit risk also bring liquidity problem. A more liquid bank will be more able to meet up with financial demands from its customers and thus create more value. Bank liquidity creation is positively correlated with bank value (Berger & Bouwman, 2009). Banks have as main service, the creation of liquidity, but, this good can be destroyed by the behavior of individual financial institutions (Gaffney, 2009). This being because when the monetization of the various types of collateral (such as land or capital) turns over slowly, the bank's liquidity is lost. A loss in liquidity shows that they cannot meet up with demand if customers turn up and thus crisis can develop (Gaffney, 2009).

Von-Pischke (1980) states that some of the impacts associated with default include: the inability to recycle funds to other borrowers; unwillingness of other financial intermediaries to serve the needs of small borrowers and the creation of distrust. As noted by Baku and Smith (1998), the costs of loan delinquencies would be felt by both the lenders and the borrowers. The lender has costs in delinquency

situations, including lost interest, opportunity cost of principal, legal fees and related costs. For the borrower, the decision to default is a trade-off between the penalties in lost reputation from default versus the opportunity cost of forgoing investments due to working out the current loan. Loan default is closely related to corporate bankruptcy.

According to Bloem and Gorter, (2001), though issues relating to non-performing loans may affect all sectors, the most serious impact is on financial institutions such as commercial banks and mortgage financing institutions which tend to have large loan portfolios. Besides, the large default loans will affect the ability of banks to provide credit. Huge non-performing loans could result in loss of confidence on the part of depositors and foreign investors who may start a run on banks, leading to liquidity problems. Caprio and Klingebiel (2002), also reported that during the banking crisis in Indonesia, non-performing loans represented about 75% of total loan assets which led to the collapse of over sixty banks in 1997. This means that banks holding huge default loans in their books can run into bankruptcy if such institutions are unable to recover their bad debts.

Credit risk is the most important of these risks because it comes about as a result of failure of the borrowers to pay their debts or when there is a delay to meet up with their obligations in time. Credit risk has been pointed out or identified as the key risk in terms of its influences on bank performance (Sinkey, 1992). When this risk arises, it leads to less capital adequacy because the bank will look for other sources of finance to cover up the loss. It will also lead to less liquidity to meet up with other customer's demand and thus less profitability because of a slowdown in business or even bankruptcy. This goes to show that credit risk and returns are so

intertwined so, the more credit risk, the less returns and vice versa. But there is also a trade-off between the two. Riskier securities (higher yield loans) pay a risk premium (higher average return) because there is a greater uncertainty of payment (Kohn, 1994).

The profitability of a bank is adversely affected by defaults. Provisions for bad and doubtful debts are directly subtracted from the revenues of good loans. Valid, flawless and expressly binding credit documentation reduces the tendency of wilful default and enhances the performance of banks. The performance of a bank has linear relationship with the credit and recovery process (Asari, Muhamad, Ahmed, Latif Abdullah, and Jusoff, (2011),). Asari et al. (2011) rightly argued that banks are unable to profit from credits in default. The study relating to validity of credit documentation (a medium to abstain defaults) has direct relevance to the performance of a bank. The provisions for loan defaults reduce total loan portfolio of banks and as such affects interest earnings on such assets. This constitutes huge cost to banks. Study of the financial statement of banks indicates that unsecured loans have a direct effect on profitability of banks. This is because charge for bad debts is treated as expenses on the profit and loss account and as such impact negatively on the profit position of banks (Price Water-House Coopers, 2009).

Berger and De Young (1997), indicate that failing banks have huge proportions of bad loans prior to failure and that asset quality is a statistically significant predictor of insolvency. Fofack (2005) also reported banks holding huge loan defaults in their books can run into bankruptcy if such institutions are unable to recover their bad debts. A possible effect of loan defaults is on shareholders earnings. Dividend payments are based on banks performance in terms of net profit.

Thus since loan defaults have an adverse effect on profitability of banks; it can affect the amount of dividend to be paid to shareholders. The effect of loan defaults on the amount of dividend paid to shareholders can also affect capital mobilization because investors will not invest in banks that have huge non-performing loans portfolio.

Kargi (2011) evaluated the impact of credit risk on the profitability of Nigerian banks. Financial ratios as measures of bank performance and credit risk were collected from the annual reports and accounts of sampled banks from 2004-2008 and analyzed using descriptive, correlation and regression techniques. The findings revealed that credit risk management has a significant impact on the profitability of Nigerian banks. It concluded that banks' profitability is inversely influenced by the levels of loans and advances, non-performing loans and deposits thereby exposing them to great risk of illiquidity and distress.

Kithinji (2010) assessed the effect of credit risk management on the profitability of commercial banks in Kenya. Data on the amount of credit, level of non-performing loans and profits were collected for the period 2004 to 2008. The findings revealed that the bulk of the profits of commercial banks are not influenced by the amount of credit and non-performing loans, therefore suggesting that other variables other than credit and non-performing loans impact on profits.

It can be inferred from the literature on the effect of loan default that all banks incur certain loan losses when some borrowers default in repaying their loans. Irrespective of the extent of the risk involved loan default reduces profitability and liquidity of banks. Given the foregoing problems amongst others which banks can encounter if they do not manage their credit risk well, the

managers should see into it that while carrying out their operational function of risk assumption, a judicious balance between profitability, liquidity and capital adequacy must be considered.

Ways of Minimizing loan default

Collateral

Credit securitization

compliance to basel accords

adoption of a sound internal lending policy

Asset-by-asset approach

Portfolio approach

Credit scoring systems

a. Collateral

Stiglitz and Weiss (1981) argue that banks' requirement for collaterals when making loans reduces the adverse selection problem, which in turn leads to lower default rate. Aghion & Bolton (1992) also suggest that collaterals are effective tools to guarantee borrowers' good behaviour.

b. Credit securitization

According to Marsh (2008), credit securitization is the transfer of credit risk to a factor or insurance firm and this relieves the bank from monitoring the borrower and fear of the hazardous effect of classified assets. This approach insures the lending activity of banks. The growing popularity of credit risk securitization can be put down to the fact that banks typically use the instrument of securitization

to diversify concentrated credit risk exposures and to explore an alternative source of funding by realizing regulatory arbitrage and liquidity improvements when selling securitization transactions (Michalak & Uhde, 2009).

c. Compliance to basel accords

The Basel Accords are international principles and regulations guiding the operations of banks to ensure soundness and stability. Compliance with the Accord means being able to identify, generate, track and report on risk-related data in an integrated manner, with full auditability and transparency and creates the opportunity to improve the risk management processes of banks. The New Basel Capital Accord places explicitly the onus on banks to adopt sound internal credit risk management practices to assess their capital adequacy requirements (Chen & Pan, 2012).

d. Adoption of a sound internal lending policy

A lending policy guides banks in disbursing loans to customers. Strict adherence to the lending policy is by far the cheapest and easiest method of credit risk management. The lending policy should be in line with the overall bank strategy and the factors considered in designing a lending policy should include the existing credit policy, industry norms, general economic conditions of the country. Kithinji, A.M. (2010).

e. Asset-by-asset approach

Traditionally, banks have taken an asset-by-asset approach to credit risk management. While each bank's method varies, in general this approach involves

periodically evaluating the credit quality of loans and other credit exposures, applying a credit risk rating, and aggregating the results of this analysis to identify a portfolio's expected losses. The foundation of the asset-by-asset approach is a sound loan review and internal credit risk rating system. A loan review and credit risk rating system enable management to identify changes in individual credits, or portfolio trends in a timely manner. Based on the results of its problem loan identification, loan review, and credit risk rating system management can make necessary modifications to portfolio strategies or increase the supervision of credits in a timely manner (Greuning & Bratanovic, 2009).

f. Portfolio approach

While the asset-by-asset approach is a critical component to managing credit risk, it does not provide a complete view of portfolio credit risk, where the term risk refers to the possibility that actual losses exceed expected losses. Therefore, to gain greater insight into credit risk, banks increasingly look to complement the asset-by-asset approach with a quantitative portfolio review using a credit model. Banks increasingly attempt to address the inability of the asset-by-asset approach to measure unexpected losses sufficiently by pursuing a portfolio approach. One weakness with the asset-by-asset approach is that it has difficulty identifying and measuring concentration. Concentration risk refers to additional portfolio risk resulting from increased exposure to a borrower, or to a group of correlated borrowers (Greuning & Bratanovic, 2009).

g. Credit scoring systems

A credit granting process comes in place when a company which needs a loan from a bank or lending institution hands in an application demanding for a loan. This application then goes through some procedures or processing in the bank which evaluates the application using their individual evaluation method to determine the credit worthiness of the company. Some banks do the evaluation using numbers (credit scoring) while others do so using subjective evaluation like personal ID of the company or the owner. Credit scoring is a statistical technology that quantifies the credit risk posed by a prospective or current borrower and seeks to rank them so that those with poorer scores are expected to perform worse on their credit obligations than those with better scores. Credit scoring has an advantage in that it saves time, cost and believe to increase access to credit, promote competition and improve market efficiency. Credit scoring reduces subjective judgment and possible bias during the credit assessment process (Holger, 2003). This shows that if a good credit scoring is taken by a bank before granting loans to customers, it can determine the ability of the customers to pay back the loans although in some cases it may not really be a guarantee since the future is uncertain. The way things or situations can be seen today may change tomorrow and obviously affect already taken decisions.

CHAPTER THREE

RESEARCH METHODS

Introduction

In this chapter we discuss the methods used in carrying the study to achieve the study objective. It discusses the scope of the study and data source for the study. The various tools and estimation method applied to the data collected are also discussed in this chapter. The discussion covers the description of the research design employed, model specification, the study variables and discussion of the econometric model for analysing the data collected. It further explore justification of the econometric model applied and also provide the reasoning behind the selection of the variables used in the model.

Data sources

In order to achieve objective of the study, a panel data on the seven banks listed on the Ghana stock exchange over a thirteen-year period from 2003 to 2015 was used. The data from three banks, namely Ecobank Ghana, CAL bank and UT bank was made up of pre-listing data and post listing data in an effort to obtain a balance panel data. This time period was selected on the basis that, it provides a current time series observations and also represents the period over which there were a major reformation in the Ghanaian banking system where the concept of universal banking principle was amplified which led to the revision of the banking law in 2004 (Act 673) to provide a sound legal framework, increasing the scope of financial liberalization and intermediation consistent with an Central Bank supervision policies. Bank specific data in relation to determinants of banks' performance were collected from different audited accounts of the listed banks and

from the fact book of the Ghana Stock Exchange (2015). Data on the macroeconomic variables was collected from the World Development Indicators data base (World Bank Online, 2013) from 2000 to 2015.

Model specification

Model parameters

In specifying the parameters of the model for the study, the procedure adopted by Aspachs, Nier, & Tiesset, (2005), Saunders and Cornett (2006), Shen, Chen, Kao, and Yeh (2009) and Vodova (2011) was followed where the functional forms of the model to estimate the determinants bank credit risk (measured by loan and advances impairment loss provision ratio, LLR) is expressed as follows;

$$LLR = f(CR, TTR, ROE, ROA, SIZE, FG, IFL, GDP) \dots \dots \dots (1)$$

Credit risk exposure of Ghanaian banks is represented by loan and advances impairment loss provision ratio (LLR). The model is specified to include bank-specific factors such as Capital adequacy measured by capital ratios (CR), Business operational efficiency measured by trading income as a percentage of total revenues (TTR); Earnings potential measured by return on equity (ROE), and return on assets (ROA); Bank Size (SIZE) and liquidity risk measured by financing gap ratio (FG). Also, included in the model in (1) are common market factors which include percentage change in inflation (IFL) and growth in gross domestic product (GDP).

Similarly, the effect of credit risk on bank performance (in terms of profitability measured by return on return on asset (ROA)) can be functionally expressed as;

$$ROA = f(LLR, LR, MER, NIR, SIZE, SBL, SYC) \dots \dots \dots (2)$$

The model in (2) is specified to include loans and advances impairment loss provision ratio (LLR), leverage ratio (LR), expense efficiency ratio (EER), net interest income ratio (NIR), Bank Size (SIZE), Short-term borrowing to total liabilities (SBL) ratio. Also, included in the model in (2) is a common market factors known as slope of the yield curve (SYC).

The model

To estimate the determinants of credit risk, the standard linear specification for a panel data regression model was followed and the functional model in (1) is expanded as follows;

$$LLR_{i,t} = \beta_0 + \beta_1 CR + \beta_2 LR + \beta_3 ZS + \beta_4 EER + \beta_5 TTR + \beta_6 NIR + \beta_7 ROA + \beta_8 ROE + \beta_9 SIZE + \beta_{10} FG + \beta_{11} LDR + \beta_{12} IFL + \beta_{13} GDP + \beta_{14} SYC + u_i \dots \dots \dots (3)$$

Where $LLR_{i,t}$ denote a proxy measure of credit risk ratio (which is loan and advances impairment loss ratio determined in accordance with Bank of Ghana prudential guidelines and IFRS 9) for bank i at time t , with $i = 1 \dots 7$ (number of banks) and $t = 2001 \dots 2015$ (15 time periods). This represent the endogenous variable for this model. CR, LR, ZS, EER, TTR, NIR, ROA, ROE, SIZE, FG, LDR, IFL, GDP and SYC denoted capital ratios, trading income as a percentage of total revenues, return on assets, return on equity, bank size, financing gap ratio, change in inflation and growth in gross domestic product respectively. $\beta_i (i = 1, 2, \dots, 14)$ denote corresponding sensitivities to the explanatory variables respectively and u_i denotes the error term.

Again, to estimate the effect of credit risk on corporate performance, the functional model in (2) is expanded as follows;

$$ROA_{i,t} = \alpha_0 + \alpha_1 LLR + \alpha_2 LR + \alpha_3 EER + \alpha_4 NIR + \alpha_5 SIZE + \alpha_6 FG + \alpha_7 SYC + v_i \dots \dots \dots (4)$$

Where $ROA_{i,t}$ denote a proxy measure of corporate performance (which is return on asset) for bank i at time t , with $i = 1 \dots 7$ (number of banks) and $t = 2001 \dots 2015$ (15 time periods). LLR denotes loans and advances impairment loss provision ratio. In order to estimate the effects credit risk on bank profitability, model (4) is specified to include other explanatory variables (control variables) that may help in the estimation of bank profitability though they are not the main variables of interest. These include LLR, LR, EER, NIR, SIZE, FG and SYC which denotes loans and advances impairment loss provision ratio, leverage ratio, expense efficiency ratio, net interest income ratio, bank size, financial gap ratio and slope of the yield curve. α_i ($i = 1, 2, \dots, 7$) denote corresponding sensitivities to the explanatory variables respectively and v_i denotes a stochastic disturbance.

As a general rule, when a variable is endogenous such as the case of LLR in model (1) and ROA in model (2), it will be correlated with the disturbance term (u_i) in the case of model (1) and (v_i) in the case of model (2), hence violating the generalised method (GM) assumptions and making our ordinary least square (OLS) estimates biased. This is easily seen in from model (1) and (2) where LLR and ROA are endogenous variable. So putting model (1) into model (2), we have;

$$\begin{aligned}
ROA_{i,t} = & \alpha_0 + \alpha_1 (\beta_0 + \beta_1 CR + \beta_2 LR + \beta_3 ZS + \beta_4 EER + \beta_5 TTR + \beta_6 NIR \\
& + \beta_7 ROA + \beta_8 ROE + \beta_9 SIZE + \beta_{10} FG + \beta_{11} LDR + \beta_{12} IFL \\
& + \beta_{13} GDP + \beta_{14} SYC + u_i) + \alpha_2 LR + \alpha_3 EER + \alpha_4 NIR \\
& + \alpha_5 SIZE + \alpha_6 FG + \alpha_7 SYC + v_i \quad \dots \dots \dots (3)
\end{aligned}$$

We can then see that ROA is a linear function of u_i (among other things), and hence will be correlated with u_i . This violates the GM assumptions, and the OLS estimator β_7 will be biased.

Model identification

The equations (1) and (2) are specified to include an endogenous variable, LLR in the case of (1) and ROA in the case of (2). So loan and advance loss provision which a dependent variable for (1) is jointly determine by bank profitability together with other variables such as bank size and changes in inflation. Also, bank profitability which is a dependent variable in (2) is jointly determine by loan and advance loss provision and term structure of interest rate among others. In this case, endogeneity in these econometric models arise is likely to arise as a result of measurement error, auto regression with auto correlated errors, simultaneity, omitted variables, sample selection errors, etc. Thus, the estimates obtained from the ordinary least squares (OLS) regression of model (2) become inconsistent and biased. There are several ways proposed to solve the problem of endogeneity. Notable among them is the use of indirect least squares and the two stages least squares (through the use of instrumental variables) which is meant to purify the estimates of the correlation between the explanatory variables and the error term. .

The problem of identification helps to choose between either the indirect least squares or the two stages least squares or to determine whether the coefficients can be estimated at all.

Where simultaneity or endogeneity is suspected in a system of equation, the structural equations containing the endogenous variables must be properly identified in order to apply the right estimation procedure (Gujarati, 2004). Identification in system of equation is applied in order to determine whether the parameters of a particular equation can be uniquely estimated. In this case, an equation can be under-identified, just identified or over-identified. Certain conditions (known as order and rank conditions of identification) needs to be specified in order to correctly identify the system of equation. Although these conditions are only necessary for identification, they are not sufficient. However, in most practical applications, it has been found to be very helpful in identification of system of equation.

Let m denotes the number of endogenous variables in the system of equation, k denotes total number of variables (endogenous and exogenous) excluded from the equation under consideration, then, the following cases can arise;

- i. Case 1: if $k < m - 1$, the equation is under-identified. If an equation is under-identified, the parameters of the equation cannot be estimated through any estimation procedure.
- ii. Case 2: if $k = m - 1$, equation is just or exactly identified. If an equation is just identified, the estimate of the parameters in an

equation can be obtained through the method of indirect least squares (ILS).

- iii. Case 3: if $k > m - 1$ there is more than one numerical value for one or more parameters of an equation, the equation is said to be over-identified. In this case, the method of two stage least squares (2SLS) is normally used to ascertain the unique estimates for the parameters.

It is important to mention the fact that, the order and rank conditions can be applied can be applied to an individual equation in a system without directly taking into account any other equation(s) in the system (Gujarati, 2004).

In the current study, model (1) which estimates the determinants of credit risk and its effect on bank profitability as shown in model (2) have two endogenous variables (LLR and ROA), thus $m = 2$ and this is equal to the number of equations with the presence of endogeneity $k = 2$. In the bank profitability equation, there are eight variables (CR, ZS, TTR, ROE, FG, LDR, IFL and GDP) excluded but are present in model (1). In this case, the model (2) is over-identified since $k = 6 > m - 1 = 2 - 1$, thus requiring the application of instrumental variable(s) through the use of Two Stage Least Squares (2SLS) estimation procedure for the parameters.

Method of estimation: Two Stage Least Squares (2SLS) method

This method involves two successive applications of OLS. It aimed at eliminating the likely correlation between ROA and u . To do this, we find a proxy for ROA, that will not be correlated with u . This proxy is going to be called \widehat{ROA} .

The first stage of 2SLS is to generate the proxy and the second stage is to simply substitute the proxy for ROA, and estimate the resulting equation using OLS. The proxy should however be such that, it should belongs to model (2) in the second equation (the one predicting ROA), but does not belong in model (1) (the one predicting LLR). In other words, a variable Z need to be found such that it determines ROA, but that does not influence LLR. Thus, the variable need to satisfy the following condition;

$$corr(Z; u) = 0 \text{ and } corr(Z; ROA) \neq 0$$

Then the following equation need to be estimated using OLS:

$$ROA_{i,t} = \alpha_0 + \alpha_1 Z + \beta_1 CR + \beta_2 LR + \beta_3 ZS + \beta_4 EER + \beta_5 TTR + \beta_6 NIR + \beta_7 ROA + \beta_8 ROE + \beta_9 SIZE + \beta_{10} FG + \beta_{11} LDR + \beta_{12} IFL + \beta_{13} GDP + \beta_{14} SYC + v_i \dots\dots\dots (4)$$

What is being done here is to include all of the exogenous variables from model (1) on the RHS equation (4) and added Z. These estimates would allow the generation of a new set of values for the variable \widehat{ROA} so that;

$$\widehat{ROA}_{i,t} = \alpha_0 + \alpha_1 Z + \beta_1 CR + \beta_2 LR + \beta_3 ZS + \beta_4 EER + \beta_5 TTR + \beta_6 NIR + \beta_7 ROA + \beta_8 ROE + \beta_9 SIZE + \beta_{10} FG + \beta_{11} LDR + \beta_{12} IFL + \beta_{13} GDP + \beta_{14} SYC \dots\dots\dots (5)$$

Now, $\widehat{ROA}_{i,t}$ can be substituted for ROA in model (1) as follows;

$$LLR_{i,t} = \beta_0 + \beta_1 CR + \beta_2 LR + \beta_3 ZS + \beta_4 EER + \beta_5 TTR + \beta_6 NIR + \beta_7 (\widehat{ROA}_{i,t} + \widehat{v}_i) + \beta_8 ROE + \beta_9 SIZE + \beta_{10} FG + \beta_{11} LDR + \beta_{12} IFL + \beta_{13} GDP + \beta_{14} SYC + u_i \dots \dots \dots (6)$$

Equation 6 can be re-written as;

$$LLR_{i,t} = \beta_0 + \beta_1 CR + \beta_2 LR + \beta_3 ZS + \beta_4 EER + \beta_5 TTR + \beta_6 NIR + \beta_7 \widehat{ROA}_{i,t} + \beta_8 ROE + \beta_9 SIZE + \beta_{10} FG + \beta_{11} LDR + \beta_{12} IFL + \beta_{13} GDP + \beta_{14} SYC + (u_i + \beta_7 \widehat{v}_i) \dots \dots \dots (7)$$

The new equation is then estimated using OLS. This will produce consistent estimates of all the parameters, including β_7 .

Fixed or random effect

In applying 2SLS regression model to estimate a model parameters, either the fixed effect model (FEM) or the random effect model (REM) or the Error Components Model (ECM). In the FEM, the observed variables (i.e. firm's performance) expressed in terms of explanatory variables are treated as if the observe variables were non-random. In FEM, it is assumed that the intercept varies for each bank (that is over space), but is constant across through time but the regression coefficients are assumed to be common across the banks. This allows for a limited degree of bank specific characteristics and disturbances capture differences over space and time. Thus, the individual specific effect is correlated

with the independent variables. Conversely, the REM assumes a common average value for the intercepts and a cross-sectional differences in the intercept values of each bank are reflected in an error term.

In deciding between FEM and REM, Judge *et al.* (1980) stated that, it depends on the assumption one makes about the likely correlation between the cross-section specific, error components and the regressors. If it is assumed that the error components and the regressors are uncorrelated, REM may be appropriate, but if they correlate, FEM may be appropriate. However, in this study, the choice between FEM and REM is based on the Hausman tests (Hausman, 1978; Baltagi, 2001). Hausman test the null hypothesis that, the preferred model is REM as opposed to the alternative hypothesis that the preferred model is the FEM.

Measurement and justification of variables used in the credit risk model

With credit risk being the dependent variable, the determinants of credit risk of listed banks in Ghana were grouped into bank-specific determinants ($X_{i,t}$ as in equation (3)) and common determinants ($Y_{i,t}$ as in equation (3)). The measurement and justification of these factors are presented in this section of the methodology. Table 1 presents the different variables, their corresponding specific measures, data source and expected relationship with the dependent variable.

Dependent variable

Loans and advances impairment loss ratio (LLR)

The dependent variable in the model is measured by the amount of impairment of loans and advances granted by the banks which is determined in accordance with the Bank of Ghana prudential guidelines and IFRS 9. The amount of impairment loss is based on loans and advances that have proved uncollectible,

and is written off against the related allowance for loan impairment. Such loans are written off after all necessary procedures by the bank have been completed and the amount of loss has been determined.

The magnitude of the risk faced by the company is determined by the amount provisions made and reported in the bank's financial statement. For the purpose of the model, the LLR ratio is determined as the amount of impairment charges as a percentage of the total gross loans and advances outstanding.

Independent variable

The independent variables in the model are grouped into two; bank specific determinants and common determinants

Bank-specific factors

The main bank-specific factors in the model are capital adequacy, bank's asset quality, business operational efficiency, earning potentials, size and liquidity. Each of these factors are measured by indicators which are expected to have influence on the credit risk of the bank.

The following paragraph provide a description of the bank-specific factors and the indicators for each identified factor.

Capital adequacy measures the bank ability to accommodate shocks (financial strength) and promote stability and efficiency in the banks operation. It is measured by three alternative variables: capital ratios (CR), leverage ratio (LR), and Z-score (ZS). Capital ratio represents the ratio of equity capital (shareholder's capital and reserves) divided by risk-weighted assets as reported by each bank. Leverage measures the size of average total assets relative to average total equity. It is one of the standard indicators implied by the structural approach to the pricing

of default risk. Higher leverage would correlate positively with default risk. Z-score is a derivative measure of bank capitalization. It is computed as a sum of return on asset (ROA) and return on equity (ROE) to total assets ratio scaled by the standard deviation of ROA (Boyd & Runkle, 1993). A higher value of Z-score indicates a higher resistance to shocks and implies a lower credit risk and vice versa.

Business operational efficiency is measured by quality of management and differences in the business models adopted by the banks. Management quality is approximated by expense efficiency ratio (EER) which is represented by the ratio of operating expenses to total revenues. It measures management flexibility to adjust operational costs to changes in the business development signalled by revenues. A higher EER is an indication of a higher default risk.

Business model is represented by trading income as a percentage of total revenues (TTR). Investment oriented banks would report a high portion of revenues from trading income, while commercially oriented banks would have a lower proportion. Since the trading income is more volatile than interest income, hence riskier, banks with a higher ratio may be expected to pay a relatively higher default risk premium.

Earnings potential assess the ability of the bank to generate income using the available assets. It is represented by three profitability ratios: net interest income ratio (NIR), return on equity (ROE), and return on assets (ROA). The NIR is lending margin charged by a bank and is calculated as the percentage interest yield on interest bearing assets. Since loans are priced according to their risk level, a higher lending margin may therefore signal higher risk portfolio. Therefore, a higher net interest income ratio would imply higher default risk. The *ROE* and *ROA* measures the profit a bank can generate from its available asset, hence should

correlate negatively with default risk. ROE (ROA) is computed as the ratio of net income and shareholders' fund (total assets). A higher ROE or ROA indicates better profit prospects for growth and resilience to shocks, and thus should be associated with lower credit risk.

Bank Size (SIZE) calculated as the natural log of the bank's total assets contributes to its credit since it has ability to mobilize funds from diversified sources. It is suggested that, banks face less credit risk as they grow in size as they can be selective as to who to grant credit facility to and also, are able to obtain funding at a lower cost due to implicit guarantee but beyond particular levels; they begin to face credit risk due to diseconomies of scale. As banks grow in size, they acquire the inherent capacity to mobilize much deposits with less difficulty and also are able to grant more loans at any point exposing themselves to high risk. Bank size is expected to be positively related with credit risk.

A bank is exposed to **liquidity risk** where there is maturity mismatch when liquid liabilities (in the form of customer deposits) are transformed into risky liquid assets (in the form of loans). It shows to what degree a bank is capable of dealing with sudden and unexpected liquidity demand from depositors. In measuring liquidity risk, two indicators were used: financing gap ratio and Short-term borrowing to total liabilities ratio.

Financing gap ratio is the difference between a bank's average core loans and its average core deposits standardized by the total asset of the bank. A value above zero imply that, the bank is not able to endure a sudden customer demand, hence indicate high liquidity risk which push the bank to an acute situation if customers default.

Short-term borrowing to total liabilities measure the degree to which banks can withstand a sudden liquidity distress. A bank with a higher share of short-term borrowing would be more vulnerable in the event of a bank run and hence a higher LLR.

Common market factors

These are factors in model (3) which affect credit risk in the banking industry as a whole. Three main factors were considered as a possible factor which influence the credit risk faced by banks on the Ghana stock exchange. They include percentage change in inflation (IFL), growth in gross domestic product (GDP) and slope of the yield curve (SYC).

It is very characteristic of commercial banks to adjust for inflation factor in pricing their loan products during a period of downturn which affect the premium paid to cover their credit risk insurance. Also, monetary and fiscal policies of central bank affect the supply of money which intend affect inflation which have influence on the credit status of the banks. Annual percentage change in inflation was included in the model using the annualised percentage change consumer price index as reported by Ghana statistical service as a measure of inflation changes. Recent studies (Shen *et al.*, 2016) revealed that the annual percent change in inflation (INF) had a significantly positive correlation with bank's credit risk, thus, in this study, we expect annual percentage change to correlate positively with credit risk.

GDP growth was also introduced into the model as credit risk general reduces as there is an improvement in the economy as indicated by growth in the

GDP rates. GDP growth is therefore negatively correlated with the share of non-performing loans and positively with the recovery rate.

Table 1: Specific measure of study variables

Variable	Indicators	Denoted by	Measure	Data source	Expected sign
<i>Dependent</i>					
Loan an advance impairment loss ratio		LLR	Loan & advance impairment loss divided by total gross loans and advances outstanding	Banks' credit department and bank's annual financial statements	
<i>Independents</i>					
<i>Bank – specific:</i>					
Capital adequacy	Capital ratio	CR	$\frac{\text{Shareholders fund}}{\text{Risk weighted asset}}$	Banks annual reports	Negative
	Leverage ratio	LR	$\frac{\text{Shareholders fund}}{\text{Total asset}}$	Banks annual reports	Positive
	Z-score	ZS	$\frac{\text{ROE} + \text{ROA}}{\text{Standard deviation of ROA}}$	Banks annual reports	Negative
Operational efficiency	Efficiency ratio	EER	$\frac{\text{Operating profit}}{\text{Total income}}$	Banks annual reports	Negative
	Trading income to total revenue	TTR	$\frac{\text{Trading income}}{\text{Total income}}$	Banks annual reports	Positive
Earnings potential	Net interest ration	NIR	$\frac{\text{Interest yield}}{\text{Interest bearing asset}}$	Banks annual reports	Positive
	Return on equity	ROE	$\frac{\text{Net income}}{\text{Equity}}$	Banks annual reports	Negative
	Return on asset	ROA	$\frac{\text{Net income}}{\text{Total asset}}$	Banks annual reports	Negative
Size		SIZE	Logarithm of total Assets	Banks annual reports	Positive
Liquidity	Financing gap	FG	$\frac{\text{Loan} - \text{Deposit}}{\text{Total asset}}$	Banks annual reports	
	Net loan to deposit ratio	LDR	$\frac{\text{Loans}}{\text{Deposit}}$	Banks annual reports	
<i>Common market</i>					

Annualised percentage change in inflation	IFL	Consumer Price Index	Ghana statistical service	Positive
GDP growth	GDP	Real GDP growth	Ghana statistical service	Negative
Slope of the yield curve	SYC	GoG 5-year bond yield	Ministry of Finance	Negative

Source: Field Survey, Agodzo (2017)

In measuring the GDP growth, the real figures were used in order to ascertain the actual impact of GDP on credit risk of the banks. The study therefore expect a negative correlation between GDP growth and credit risk insurance premium.

The slope of the yield curve reflects growth prospects of the economy and expected future short-term interest rates. If the yield curve is steepened, it is a signal of positive prospects for economic growth (hence a decline in non-performing loans and hence improvement in recovery rate would be expected). A steepening of the yield curve (future improvement in economic conditions) should therefore correlate negatively with credit default risk. In this study, the slope of the yield curve was derived here from the return on 5-year government of Ghana bonds.

Measurement and justification of variables used in the profitability model

Dependent Variable

Previous studies into the relationship between bank operating risk and profitability has use return on asset (ROA) and return on equity (ROE) as a proxy of measuring profitability (Ara *al el*, 2009). This study adopted a similar measure of profitability (that is, return on asset (ROA)). ROA measures the effectiveness of management in the utilization of the funds contributed by both shareholders of the

bank and other credit providers. It is computed as the ratio of net operating profit and average total assets indicating the how efficient a bank is managing its assets to generate income. This study did not use return on equity (ROE) as a measure of profitability due to its major drawback of overstating the ROE ratio for banks with high financial gearing. This is so with any level of profit, as when leveraged, the ROE increased due to the lower denominator.

Independent variables

In explaining the variations in the profitability of the selected bank, consideration was given to bank-specific factors and industry factors. Bank specific-factors are those factors that are influenced by a bank's operational decisions and policy objectives. They include the level of credit risk exposure measured, bank size, liquidity risk, capital adequacy and operational expense management. Industry factors relate to factors that affect the banking industry as a whole and is believed to have impact on the profitability of the selected banks. They include impact of the yield curve. The justification of these variables in the profitability model is considered in turn.

Credit risk

One of the major factors that impact a bank's profitability has been credit risk and, in this study, loans and advances, impairment loss provisions to loans ratio (LLR) is used to proxy measure of credit risk. Duca and McLaughlin (1990) assert that increased exposure to credit risk is normally associated with decreased firm profitability. There is therefore a great concern about not just the volume of loans made but rather the quality of it. It is from this perspective that Miller and Noulas (1997) suggest that financial institutions heavily exposed to high risk loans increase the accumulation of unpaid loans and thus decrease their profitability. Conversely,

another school of thought is of the view that, riskier loans produce higher interest income and hence higher profitability. Maudos and Fernandez (2004) indicate that the exposure to higher credit risk requires the bank to apply a risk premium implicitly in the interest rates charged for the operation supporting the argument that, banks that assume greater credit risk exhibit higher interest margins. The expectation however in this study is that, credit risk relates negatively with profitability.

Bank size

Several studies have considered the effect of the size of banks (in term of total asset) on the profit generating ability of the banks, though the focus of most of the studies has been on the international economies. For instance, Athanasoglou, P. P., Delis, M. D., & Staikouras, C. K. (2006), find evidence for the economies of scale theory that the effect of bank size in terms of asset on profitability is usually linearly positive and statistically significant. In a similar study, Altunbas *et al.*, (2001) and Kosmidou (2008) found that expansion of the asset base of banks results in scale economies for while Kosmidou, K., Tanna, S., & Pasiouras, F. (2005), and Pasiouras and Kosmidou, (2007) showed that, at an extreme stage, it results in a diseconomy of scale. Very few studies have shown the relationship between bank size and profitability from the Ghanaian perspective. The study however expects that, larger banks defined in terms of assets would earn higher return hence expect a positive relationship between bank size and profitability.

Liquidity risk

A bank is exposed to liquidity risk if there is a possibility of not being able to match decreases in liabilities to increases on the assets in the balance sheet and this mismatch is considered an important determinant of bank profitability.

Liquidity risk is measured using the financing gap ratio (FG) which is determined as the difference between the deposit received by the bank and the loan given to customers, standardized by total asset. A study by Shen, C.H.; Chen, Y.K., Kao, L.F. and Yeh C.Y. (2009) postulate that, there exist a negative relationship between financing gap and bank profitability. The study was justified on the basis that, as financing gap increases, the bank use much of their cash, sell liquid assets and also depend much on non-deposit funding to make up for the gap, this intend increase the cost of funding and hence reducing profitability. On this basis, the study expect an inverse relationship between liquidity risk and corporate profitability.

Capital adequacy

The capital strength of a bank cannot be overlooked when assessing the factors that influence the profitability of an entity. In measuring the capital strength of the banks, a proxy measure is the ratio of shareholders' fund to risk-weighted average asset of the banks known as leverage ratio (LR). Shen, Chen, Kao, and Yeh. (2009) assert that, banks with high capital-asset ratios are considered relatively safer in the event of loss or liquidation. Also, as bank enhances its capital based from the shareholder perspective, it enhances its propensity of higher earnings, thereby, reducing the cost of financial distress. The literature is skewed to a positive relationship between capital ratio and bank profitability (Demirgüç-Kunt & Huizinga, 1999; Barth, Nolle, Phumiwasana, & Yago, (2003); Kosmidou, Tanna, & Pasiouras, (2005)), implying that banks with higher equity to assets ratio depends less on external funding, thereby therefore maximize their profitability. Thus, the study expects a positive relationship between capital adequacy ratio and banks' profitability.

Management operational efficiency

The efficiency of management in their operations have a significant impact on profitability of the banks. Management operational efficiency is measured by expense efficiency ratio (EER), represented by the ratio of operating expenses to total revenues. Bourke (1989) in his study admitted that, management being efficient indicated by a reduction in operational expenses improves bank's profitability, implying that, a negative relationship between a bank's operational efficiency and profitability. In construct to the conclusion of Molyneux, P., & Thornton, J. (1992), observed that generating a higher profit is appropriated an increased expenditure in the form of payroll expenditures, which inspire the human capital to improve their effort to improve profitability. However, several studies has refuted this conclusion as evident in the work of Berger and Mester (1997), Pasiouras and Kosmidou (2007) and Sufian and Chong (2008). On this basis, in studying the impact of credit risk on corporate financial performance, the study postulate a positive relationship between expense management and corporate profitability.

CHAPTER FOUR

RESULT AND DISCUSSION

Introduction

This chapter presents the results obtained from the analysis of the data collected and discussions of the estimations made from econometric model specified in methodology. The chapter is organised into three sections: first section which is basically a descriptive analysis, deals with the preliminary analysis of data on the study variables employed in the regression analysis. This is followed by the analysis of results and discussion of the estimates of determinants of credit risk faced by the Ghanaian banks with loan and advances impairment loss provision (as a proxy measure of credit risk) being the dependent variable. The final part of the chapter presents and discusses the estimate obtained in analysing the effect of credit risk on the banks performance in terms of profitability and share value through the use of instrumental variable regression using the two stage least squares methodology.

Determinants of credit risk

Preliminary analysis

A preliminary analysis of the variables used as determinants of credit risk was carried out to have a fair idea of the distribution of the data for each variable. The analysis is carried out on both the dependent variable and the independent variable (both the bank-specific variables and the general variables). Table 3 shows the summary statistics for all the variables used in the sample over the study period. The mean score for the Loan/Advance loss provision to total loan ratio (LLR),

which measures credit risk is 6.4% with volatility of 3.1%. The distribution of the provision is positively skewed but showed a peak-like structure than a normal distribution.

	Mean	SD.	Skewness	Kurtosis	Jarque-Bera test	
					Statistic	probability
Loan & Advance loss provision (LLR)	0.064	0.031	0.367	- 3.071	2.125	0.001**
Capital Adequacy Ratio (CAR)	0.298	0.129	0.883	3.190	3.215	0.000**
Leverage Ratio (LR)	0.193	0.085	0.974	3.683	2.548	0.012*
Z-Score (ZS)	2.655	0.403	- 0.162	- 3.387	2.225	0.045*
Management Efficiency Ratio (MER)	0.491	0.283	0.829	3.314	2.369	0.023*
Trading income to Total Revenue (TTR)	0.031	0.013	0.873	3.843	3.054	0.000**
Net Interest Ratio (NIR)	0.271	0.128	0.647	3.200	2.156	0.034*
Return on Equity (ROE)	0.353	0.153	0.969	3.042	2.154	0.022*
Return on Asset (\overline{ROA})	0.062	0.027	1.127	3.991	3.654	0.023*
Financing gap (FG)	- 0.431	0.302	- 0.724	3.531	3.526	0.032*
Loan & Advance to deposit Ratio (LDR)	0.534	0.214	1.204	3.134	4.132	0.000**
Size on Bank's Asset (SIZE)	14.942	0.297	- 0.404	- 3.881	4.112	0.000**
Annualised changed in Inflation (INF)	0.183	0.057	-0.031	-3.257	2.154	0.032*
GDP growth (GDP)	0.082	0.019	-0.182	-3.140	3.251	0.012*
Slope of the yield curve (SLYC)	0.210	0.047	-0.096	-3.255	3.258	0.000**

Source: Field survey, Agodzo (2017)

However, the null hypothesis of non-normality is rejected under the Jarque-Bera test indicating that, the distribution is normal. This result suggests that, some of the banks are exposed to a considerable credit hence makes higher provisions against possible losses on the amount granted. The provision made ranges from 1.3% to 13% of the gross amount of granted as loans. This also means that, banks increased the amount of credit granted during the period under study thereby exposing themselves to such risk.

Figure 1 depict the trend movement of credit risk faced by listed banks in the Ghana over the study period using the loan loss provision as a percentage of total loans granted (LLR) as a proxy measure of credit risk.

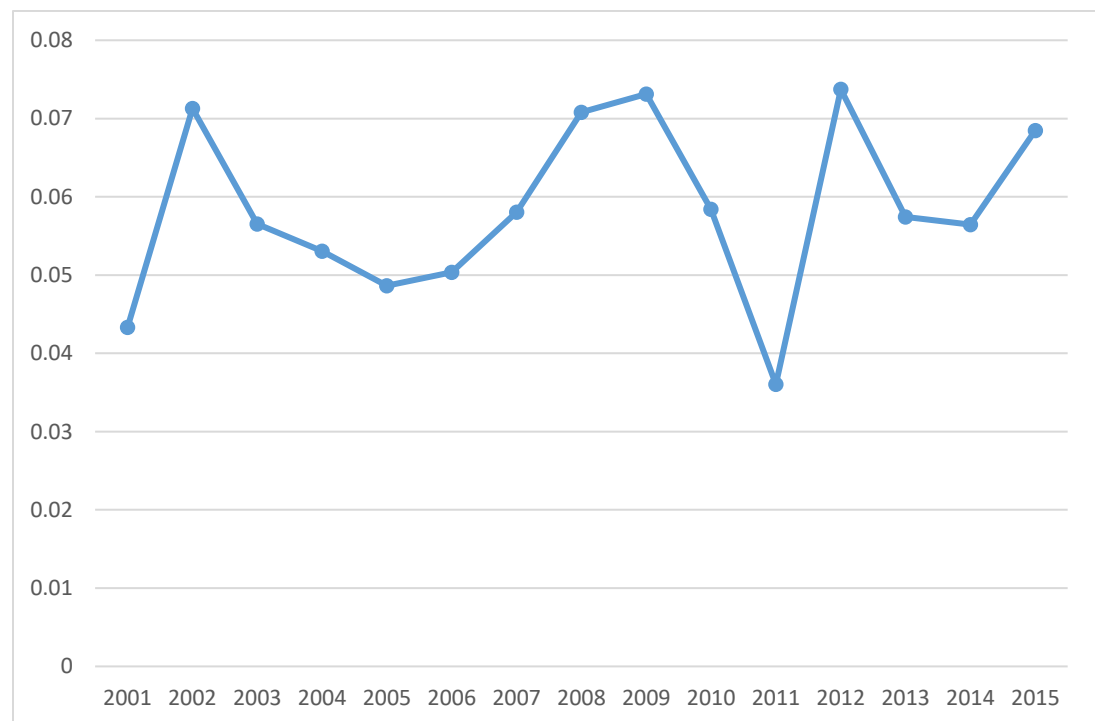


Figure 1: Trend of credit risk (LLR) using the average industry annual data over the study period

Source: Field survey, Agodzo (2017)

The chart gives a clear indication that credit risk even though is highly volatile, the general trend increases over time until the years 2008 to 2011 which saw a drop in the credit risk faced by the banks. This drop in the risk level may be attributed to the improvement in the monetary policies put in place by the Central Bank and also favourable movements in most of the macro-economic indicators.

{ Table 3: Descriptive statistics of study variables }
 n= 105 *significant at 5%, **significant at 1%

In identifying the determinants of the credit risk, the adequacy of the capital of the selected banks were considered which is in line with the study carried out by Samsudin *et al.* (2015). This is necessary to measure the bank's ability to accommodate shocks and efficiency in the bank's operation. The capital adequacy was assessed using the capital adequacy ratio and the leverage ratio. The Z-score was also used to assess the solvency possibility and the level of resistance to shocks and hence credit risk by the banks. On the average, the equity capital of the selected banks represents 29.8% of the banks' risk-weighted assets with a standard deviation of 12.9% which is a strong indication of the resilience of the banks to a sudden shock from borrowers. The size of the total equity to total asset of among the selected banks also showed an average of 19.3% with a standard deviation of 8.5% confirming the ability of these banks to accommodate credit shocks from customers using shareholders' fund. Z-score, which is a derivative measure of bank capitalization showed an average of 2.655 with a standard deviation of 4.03, though negatively skewed but normally distributed as the null hypothesis under the Jarque-Bera test was rejected at 5% significant level. The result obtained from the

Z-score value is a strong indication of resistance to shocks and implies a lower credit risk.

On assessing the earning potentials of the banks included in the study over the study period, the net interest ratio (NIR), return on equity (ROE) and return on asset (ROA) was used. Interest income as a percentage of investment made in asset that bear interest measured by NIR showed as average of 27.1% with a standard deviation of 12.8% indicates a substantial improvement in the earning potential of the banks over the study period. This result may be due to the factor that, majority of the interest-bearing asset of these banks are kept in the form of loans and advances which are lent out to customers at an average of 27%. ROA which measures of the ability of the bank's management to generate revenue from the bank's assets, showed an average of 6.2% for all the banks included in the study over the study period with a variation of 2.7%. A similar measure, ROE which measures the returns the bank was able to generate on the investment made by the shareholders showed as average 35.3% with a standard deviation of 15.3%. Both ROA and ROE depicted as positively skewed distribution but somewhat normally distributed as the null hypothesis under the Jarque-Bera test was rejected at 5% level of significance. This picture suggests a good performance during the period under study.

In assessing the quality of loans granted, the average financing gap ratio (FG) is 43% with a variation of 30.2% between the ratios of 77% to 146%. Though, the distribution seems to have a long tail to the right, it appears to be a little leptokurtic relative to the normal distribution. However, the null hypothesis under the Jarque-Bera test was rejected at 5% significant level indicating that, the

distribution is approximately normal and good for further statistical analysis. The negative ratios indicate a favourable financing gap ratio, that is, the banks kept a considerable amount of liquidity and hence faced minimal liquidity risk during study period. Also, the ratio of loan and advances to total deposits (NLD), an alternative measure of loan quality, showed that, a mean of 53.4% of all deposits mobilised by the banks were given as loans with a minimum of 23.3% and a maximum of 125.5%. This result is an indication of the bank lending out a significant amount of their deposits to the extent that, other banks granted loans worth more than the value of their deposits indicating that funds other than deposits were given out. Such banks could be regarded as having very strong capital based and strong credit policies.

The size of banks (SIZE) was measured by the natural logarithm of banks' total asset. The average asset of the banks used in the study recorded a score of 14.942 (translating to into over GHS3 billion) with a variation of 0.297 in terms of standard deviation values ranging between 13.932 to 15.839. Of the total assets recorded, an average of 12.53% is kept in the form of liquid asset (cash, balance with Bank of Ghana and short-term funds). About 42.3% of the total bank asset were kept as risky asset in the form of investment in long term asset, loans and advances and other medium-term securities). The higher proportion of asset kept as risky asset may have been motivated the higher returns associated with such assets and also being kept liquid in order to meet financial obligations in a real time as and when due.

Assessing the implication of the common market indicators on credit risk, the main indicators considered were annualised changes in inflation, GDP growth

and the slope of the yield curve using the Government of Ghana five-year bond rates. The annualised inflation showed an average rate of 18.3% with a standard deviation of 5.7% over the study period. Though the distribution of the annualised inflation rates is positively skewed, the null hypothesis under the Jarque-Bera test is rejected at 5% significant level indicating that the distribution of the annualised inflation rates is normal. Similar statistics is observed in respect of growth in the GDP rates and the slope of the yield curve. The GDP showed average growth of 8.2% with a standard deviation of 1.9% over the study period whereas the Government of Ghana five-year bond showed an average rate of 21% with a standard deviation of 4.7%. The distribution of GDP growth and that of the yield curve appears to be negatively sloped but are normally distributed at 5% and 1% level of significance respectively.

Inter-correlations

The object of this section is to examine the presence of multi-collinearity, which occurs when there is a strong correlation between two or more predictor variables in a regression model (Field, 2009). Josef F. Hair, Celsi M.W., Arthur H. M., Samouel P. and Page M.J. (2014) provided two approaches in identifying and dealing with multi-collinearity. First is an examination of the correlation matrix among the predictors. The absolute correlation coefficient greater than or equal to 0.60 is an indication of substantial collinearity. The results of the study, from table 4, reported the highest absolute correlation coefficient of 0.514 with most correlation coefficients falling below 0.2 indicating absence of collinearity. This high correlation occurred between ROA and ROE which is expected since both

measure tends to measure profitability of the banks. However, even though they exhibit high correlation, the correlation coefficient is within the acceptable limit. Secondary, to avoid a collinearity due to the combined effect of two or more predictors, we apply the, variance inflation factor (VIF). A threshold of VIF values of 10 is applied following the recommendation of Gaur and Gaur (2009) and Hair *et al.*(2014). VIF values are shown in parentheses on the diagonal in table 4 which indicates no problem of multicollinearity.

Source: Field survey, Agodzo (2017)

Regression analysis

In testing the stated hypothesis (Hypothesis 1), a multiple regression was carried out to determine whether or not factors such as capital adequacy, business operational efficiency, earning potential and firm liquidity determines the volatility in the firm's exposure to risk. The result of the regression analysis is shown in table five (5) using the loan and advance provision as the dependent variable, a proxy measure of credit risk.

The result obtained from the analysis shows that, the model estimate fits the data as the fitness test, using the F statistic showed that, the null hypothesis of equality between the co-efficient of the predictor variables cannot be accepted at 1% level of significance. The adjusted R-square also showed that, the predictors well explained 62.8% of the variations in the credit risk which is an indication that, the selected predictor variables determines the credit risk exposure by Ghanaian banks.

Table 4: Determinants of credit risk

	Expected relationship	Coefficient	Std. Error	t-statistic	Sig.
(Constant)	?	.504*	.305	1.651	.071
Capital Adequacy Ratio (CAR)	-	-.266***	.038	-6.995	.005
Leverage Ratio (LR)	-	.115	.081	1.408	.163
Z-Score (ZS)	-	-.107***	.030	-3.602	.006
Management Efficiency Ratio (MER)	-	-.027**	.012	-2.317	.023
Trading income to Total Revenue (TTR)	-	-.421*	.218	-1.931	.057
Net Interest Ratio (NIR)	+	-.067**	.030	-2.286	.015
Return on Equity (ROE)	-	-.322***	.069	-4.693	.008
Return on Asset (ROA)	-	-.252	.295	-0.854	.108
Financing gap (FG)	?	.110***	.018	6.228	.006
Loan & Advance to deposit Ratio (LDR)	?	.113***	.021	5.275	.006
Size on Bank's Asset (SIZE)	+	-.084***	.019	-4.329	.007
Annualised changed in inflation (INF)	+	.104**	.058	1.803	.075
GDP growth (GDP)	-	-.033	.141	-0.237	.814
Slope of the yield curve (SYC)	-	-.019	.065	-0.286	.775

Dependent Variable: Loan & Advance loss provision (LLR)

R-square = 0.798

R-square Adjusted = 0.628

F(104) = 2.68 p = 0.000

p is significant at the 0.1 level (2-tailed), **significant at the 0.05 level (2-tailed) and *significant at the 0.01 level (2-tailed)*

Source: Field survey, Agodzo (2017)

On the bank-specific variables, the relationship between capital adequacy and credit risk was assessed using capital adequacy ratio, leverage ratio and a stability measure known as the z-score. As expected, there is a negative significant relationship between capital adequacy ratio and credit risk at 1%. This provides evidence that, bank with a strong capital adequacy is also able to absorb possible loan losses and thus avoids bank 'run', insolvency and failure. Thus if a bank in Ghana wishes to be resistant to its credit risk exposure, it needs to increase in equity capital in relation to its total assets. This observation is in line with the study by Louati *et al.*, (2015) who examine the role of capital adequacy in the credit risk exposure of Islamic and conventional banks, and concluded that, the ability of a bank to withstand credit risk shocks is to capitalise adequately. This also confirm the Bank of Ghana recent directive of increasing the capital requirement of commercial banks in Ghana from GHS120 million to GHS400 million effectively by the end of 2019. Z-score, a measure of solvency of banks which makes use of profitability measures also showed a negative significant relationship between credit risk and bank's solvency at 1% level of significance.

The result implies that, for banks in Ghana mitigate the effect of credit risk exposure, they should engage in more profitable activities which would increase their possibility of survival which intend reduces their exposure to credit risk. This observation is in line with Imbierowicz and Rauch (2014) who concluded that, striving to survive in the industry would lead to reduction in credit risk exposure. Leverage ratio showed a positive relationship with credit risk, though the relationship is not significant. This implies that, in analysing factors that influence the credit risk exposure of Ghanaian banks, shareholder capital in relation to total asset do not significantly contributes to the variations in the credit risk exposure.

In assessing the role of business operation efficiency in explaining the volatility in the credit risk exposure, two proxy measures were used; Management efficiency ratio (MER) and Trading income to total revenue ratio. The MER which measures how well management is able to control operational expense so as to accumulate funds to meet any sudden shock from credit risk showed a negative significant relationship with credit risk at 5%. The implication of this result is that, as management increases their efficiency in managing expenses, thereby increasing operation profit, credit risk exposure is expected to decrease significantly. Similar story could be told about trading income to total revenue which relates significantly negative with credit risk at 10% level of significance.

Return on equity (ROE)) as expected showed a significant inverse relationship with credit risk at 1% significant level. Return on asset (ROA) similarly showed an inverse relationship but the relationship appears not to be significant. This brings out the fact that, the role of management of profitability in relation to shareholder investment plays a significant role in managing credit risk. Efficient management of profitability in relation to shareholder value and even total asset is necessary for effectively managing credit risk as this would ensure accumulation of returns necessary to meet any shock that may be triggered by credit risk exposure.

Net interest ratio (NIR) however showed a significant inverse relationship with credit risk at 5% level of significance as against the expected positive relationship from the literature. The NIR measures the interest earned by the bank as a percentage of total interest bearing assets. The result therefore shows that, higher interest yield investments by the banks would help in significantly manage impact of credit risk. This result contracts the view put forward by İnci Ötker-Robe

and Jiri Podpiera (2010) who studied the fundamental determinants of credit default risk for European large complex financial institutions and concluded that net interest ratio significantly contributes positively to credit risk. This variation in the result may be due to difference in macro-economic framework and differences in the economies within which the studies were carried out.

The relationship between bank size (SIZE), financing gap and credit risk is significantly positive at 1% and 1% respectively providing the evidence that as banks grow bigger in size, they have the incentive to increase risk on customer default as they are able to hold more loans and consequently have larger financing gap ratio. That is, larger banks have the capacity to mobilize more deposits which they are able to sell at relatively cheaper price. Such banks are thus able to take greater risks by granting more loans to deficit units, thereby exposing themselves to higher credit risk. This result is in line with the findings of Lucchetta (2007), Bunda and Desqioûbet, (2008), Rauch, Steffen, Hackethal, Tyrell, (2009) who concluded that, as banks grow in size, their exposure to credit risk increases.

Among the three macro-economic variables which entered the model, only the annualised changes in inflation tends to significantly affect credit risk with the direction of effect being significantly positive. The changes in GDP and the slope of the yield curve, though relates negatively with credit risk exposure, they tend to be insignificant.

Effect of credit risk on banks' profitability

Preliminary analysis

The second objective of the study seek to analyse the effect of credit risk (measured by loan and advance loss provision (LLP)) on the performance of banks in Ghana with return on asset (ROA) being a proxy of measuring corporate

performance. A preliminary analysis of the variables to measure profitability and credit risk as well as the other control variables was carried out to have a fair idea of the distribution of the data for each variable. Table 6 shows the summary statistics for all the variables used in model (2) over the study period.

The profitability of the banks was measured with return on asset (ROA) which assess the ability of the bank's management to generate revenue from the bank's assets. It showed an average of 6.2% for the banks over the study period with a variation of 2.7%. The distribution of the banks' profitability is positively skewed but somewhat normally distributed as the null hypothesis under the Jarque-Bera test was rejected with 95% confidence level. This picture suggests a good performance in terms of profitability during the study period.

Table 5: Descriptive statistics of study variables

	Mean	SD	Skweness	Kurtosis	Jarque-Bera test	
					statistic	probability
Return on Asset (\overline{ROA})	0.062	0.027	1.127	3.991	3.654	0.023*
Loan & Advance loss provision (LLR)	0.064	0.031	0.367	- 3.071	2.125	0.001**
Leverage Ratio (LR)	0.193	0.085	0.974	3.683	2.548	0.012*
Management Efficiency Ratio (MER)	0.491	0.283	0.829	3.314	2.369	0.023*
Net Interest Ratio (NIR)	0.271	0.128	0.647	3.200	2.156	0.034*
Size of Bank's Asset (SIZE)	14.942	0.297	- 0.404	- 3.881	4.112	0.000**
Short term borrowing ratio (SBL)	0.125	0.155	0.412	3.921	3.825	0.001**
Slope of the yield curve (SLYC)	0.210	0.047	-0.096	-3.255	3.258	0.000**

n= 105 *significant at 5%, **significant at 1%

Source: Field survey, Agodzo (2017)

Loan and advance loss provision to total loan ratio (LLR), a measure of credit risk is showed an average of 6.4% with volatility of 3.1% over the study period with the ratio ranging from 1.3% to 13% of the gross amount of granted as loans. This implies that, banks increased the amount of credit granted during the period under study thereby exposing themselves to such risk. The study therefore aimed at assess the effect of this exposure on corporate profitability. Though the distribution is positively skewed, it showed a peak-like structure than a normal distribution. The Jarque-Bera test, however, indicated a rejection of the null hypothesis of non-normality indicating that, the distribution could be described as normal.

In assessing how the capitalisation of these banks impact of the profitability, the leverage ratio was used. This measures the size of the total equity of the banks to total asset. This showed an average ratio of 19.3% with a standard deviation of 8.5% with the ratios ranging from 9.8% to 24.6%. these values implies that, on the average, the one-fifth of the total assets of the banks are financed with owners contribution whereas the remaining fourth-fifth is finance by third parties. Though risky, this is an indication that, to a large extent, the banks have the ability to accommodate credit shocks from customers using shareholders fund.

Short-term borrowing ratio (SBL) also assess the liquidity of the banks by determining the extent to which the firm would be required to meet it short term obligation within the shortest time. A higher ratio is an indication of higher commitment to short term obligation.

Management efficiency ratio (MER) was use to measures how well management is able to control operational expense so as to accumulate funds and

hence be profitable in its operations. On the average, the banks' showed that, 49.1% of their total income are converted to operating profit with a variation of 28.3% over the study period. Though the distribution is positively skewed and is approximately normal, the ratio ranges from 19.6% to 62.1% indicating a wide variation across the banks. This shows that, the banks depicted different level of profitability which are significantly different. The effect of earning potential on corporate profitability was assessed using the ratio of interest income as a percentage of investment made in asset that bear interest (that is, net interest ratio, NIR) showed as average of 27.1% with a standard deviation of 12.8% indicates a substantially higher earning potential of the banks over the study period. The distribution of this variable is somewhat positively skewed and can be considered as normal at 5% significance using the Jarque-Bera test of normality.

The size of banks (SIZE) measured by the natural logarithm of banks' total asset showed an average of 14.942 (translating to into over GHS3 billion) with a variation of 0.297 in terms of standard deviation values ranging between 13.932 to 15.839. About 12.5% of these assets are kept in the form of liquid asset (cash, balance with Bank of Ghana and short-term funds) whereas about 42.3% are kept in the form of risky assets such as investment in long term asset, loans and advances and other medium-term securities). The higher proportion of asset kept as risky asset may have been motivated the higher returns associated with such assets and also being kept liquid in order to meet financial obligations in a real time as and when due.

Among the banks included in the study over the study period, on the average, 12.5% of their total obligation is made up of short term obligations with a standard deviation of 15.5% indicating that the ratio of short term obligation to the

long term borrowing of the banks is closely packed around the average figure. This showed that, most of the obligations of these banks are basically long term in nature, hence, not putting much pressure on the short liquidity of the entity. As there exist a relationship between liquidity and profitability, we would expect a significant relationship between short-term to long term ratio to significantly affect profitability. The slope of the Government of Ghana five-year bond showed an average rate of 21% with a standard deviation of 4.7%. Though, the curve appears to be negatively sloped, it appears to be normally distributed at 1% level of significance respectively.

Regression Analysis

In testing the stated hypothesis (Hypothesis 2), another regression analysis was carried out to find out the effect of credit risk on corporate profitability with liquidity ratio, management efficiency ratio, net interest margin, bank size, short term borrowing and the slope of the yield curve being controlled variables. The result of the regression analysis is shown in table 5 using the return on asset as the dependent variable, a proxy measure of performance.

The model estimate fits the data well as the F statistic, which measures the common importance of the explanatory variables, showed that, the null hypothesis of equality between the co-efficient of the predictor variables is rejected at 1% level of significance. The adjusted R-square also showed that, the predictors well explained 78.3% of the variations in the corporate profitability which is an indication that, profitability of Ghanaian banks are determined by the selected predictor variables.

Table 6: Determinants of banks' profitability

	Coefficient	Std. Error	t-statistic	Sig.
(Constant)	1.215	.138	8.792	.000***
Loan & Advance loss provision (LLR)	-.268	.072	-3.717	.002***
Leverage Ratio (LR)	.157	.032	4.863	.000***
Management Efficiency Ratio (MER)	-.012	.008	-1.507	.080*
Net Interest Ratio (NIR)	-.019	.019	-0.987	.326
Size on Bank's Asset (SIZE)	.074	.109	0.679	.201
Short term borrowing ratio (SBL)	-.143	.042	-3.405	.001***
Slope of the yield curve (SLYC)	.092	.044	2.079	.040**

Dependent Variable: Return on Asset (ROA)

R-square = 0.881

R-square Adjusted = 0.783

F(104) = 3.48 p = 0.000

p is significant at the 0.1 level (2-tailed), **significant at the 0.05 level (2-tailed) and *significant at the 0.01 level (2-tailed)*

Source: Field survey, Agodzo (2017)

There appear to be an inverse relationship between credit risk and corporate performance. This is indicated by a negative regression coefficient between Loan & Advance loss provision, the instrumental variable and return on asset, a measure of bank profitability. This relationship tend to be statistically significant at 1%

indicating that, as bank increases its exposure to credit risk, it tends to have a negative impact on the performance of the company in terms of profitability. This confirms the findings of Athanasoglou et al. (2006) and Athanasoglou et al. (2008) who concluded that serious banking problems have arisen from the failure of financial institutions to recognize impaired assets and create reserves for writing off these assets. They concluded that, banks with high credit risk tend to experience a lower profit level on their income statement. In the Ghanaian context, banks providing higher volume of lending thereby holding lesser liquid assets on their statement of financial position tend to have higher volatility in their earnings which pose the threat of lower interest income due to high level of non-collectability resulting in lower return on assets. Consequently, this arises due to the higher interest charged on such loans (due to the incorporation of risk premiums in determining interest rates) thereby, increasing the obligation on the customer which increases the risk of non-payment hence loss of interest income.

Leverage ratio, measured by total equity in the total assets of the bank (LR), positively relates to the performance of banks in Ghana and is statistically significant at the 1%. This implies that, as a firm increases its capital base through equity, the firm tends to generate much profit since it escapes the payment of interest to debt providers. This finding is consistent with the work of Kosmidou (2008), who concluded that, a well-capitalised bank faces lower risks of solvency as the cost of funding is reduced to the minimum. According to Berger (1995), a financial institution with a strong capital structure is essential for their development in a developing economy such as Ghana, for this offers extra financial strength deal

with financial crises and provide assurance to depositors during turbulent macroeconomic conditions.

On assessing the role of management efficiency in determining corporate profitability, Management Efficiency Ratio (MER) was used. This showed an inverse relationship with profitability at 10% significant level the result implies that, increase in management operational expenses (a measure of management efficiency) reduces corporate profit. Thus, management must strive to achieve efficiency in their expense management if it wishes to increase their profit levels. This is in line with the findings from studies undertaken by Athanasoglou et al. (2006), Pasiouras and Kosmidou (2007) and Kosmidou (2008) who also concluded a significant positive relationship between management efficiency in expense management and corporate profitability. This result therefore requires banks to improve their managerial practices in order to maximize profitability.

In assessing whether the size of a bank (SIZE) plays a role in the profitability of the bank, the result indicated that, bank size, measured by the natural logarithm of a bank's total assets showed a positively relationship with bank profitability (ROA) but was not statistically significant. This implies that, the size of bank does not determine with a bank would be profitable or not. This result tends to contrast the theory of economies of scale as confirmed by Athanasoglou (2006), Pasiouras & Kosmidou (2007) where banks benefit from increasing returns to scale arising from corporate expansion.

The slope of the yield curve also depicted a positive significant relationship with the bank's profitability at 5% significance level indicating that, as the government of Ghana increases the rate of interest on its corporate bonds and other

financial instruments, banks tend to take advantage and invest in such instruments, thereby increasing the profit level.

Summary

The analysis of the data collected using the panel data regression based on the random effects GLS results showed that capital adequacy ratio, corporate solvency, management efficiency ratio, trading income to total revenue, liquidity risk, loan & advance to deposit Ratio, bank size and inflation have significant relationship with credit risk exposure of Ghanaian banks. Using the panel data instrumental variables regression analysis based two stages least squares (2SLS), credit risk was found to be negatively and significantly related with profitability (ROA). Other control variables such as management efficiency, net interest ratio and short term borrowing ratio also depicted similar relationship. However, control variables such as capital adequacy and the slope of the yield curve showed a positive significant relationship.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The object of this chapter is to summarise the entire study, draw the necessary conclusions and assess the extent to which the study objective has been achieved base on which a policy recommendation is given. The chapter is organized various sections covering the summary, conclusion and recommendations.

Summary of the study

A bank's profitability and survival can be threatening by the increased exposure to credit risk if not well managed. On this basis, the study sought to achieve two basic objectives; to identify the determinants of bank credit risk in Ghana and also estimated the effects of bank credit risk on corporate profitability in Ghana. The study is based on data from seven banks operating in Ghana for a 15-year period ranging 2001 to 2015.

The study used loan and advance loss provision was used as a measure of bank credit risk and hypothesized that bank specific factors such as capital adequacy, business operational efficiency, earning potential and firm liquidity significantly as well as industry factors such as inflation, changes in gross domestic products and slope of the yield curve affect credit risk exposure of Ghanaian banks.

The study showed an inverse relationship between capital adequacy and credit risk at 1% validating the hypothesis. Also, business operation efficiency measured by Management efficiency ratio (MER) and trading income to total revenue ratio showed a negative significant relationship with credit risk at 5% and at 10% level of significance respectively which also provided a strong argument for

the stated hypothesis. Return on equity and return on asset showed a significant inverse relationship with credit risk at 1% significant level. similar observation was made on net interest ratio which also showed a significant inverse relationship with credit risk at 5% level of significance but was against the expected positive relationship from the literature.

The relationship between bank size, financing gap and credit risk was significantly positive at 1% and 1% respectively providing the evidence that as banks grow bigger in size, they have the incentive to increase risk on customer default. Among the three macro-economic variables which entered the model, only the annualised changes in inflation tends to significantly affect credit risk with the direction of effect being significantly positive. The changes in GDP and the slope of the yield curve, though relates negatively with credit risk exposure, they tend to be insignificant.

Again, the study used return on asset as a measure of corporate profitability and hypothesized that bank profitability is inversely related to credit risk. The study showed an inverse relationship between credit risk and corporate performance indicating acceptance of the second hypothesis. Other control variables were however included in the model used and the study result showed that, control variables such as leverage ratio and slope of the yield curve positively relates to the performance of banks with the relationship being significant. However, variables such as management efficiency ratio showed an inverse relationship with profitability at 10% significant level. factors such as size and interest ratio were not significant in determining the profitability of the banks.

Conclusions

From the result of the study, conclusion was arrived on the basis that, though there may be other factors that affect the credit risk of banks in Ghana, capital adequacy, management operational efficiency, management of liquidity risk and the size of the bank, annualised changes in inflation and changes in GDP are major determinants of credit risk due to their high statistical significance level.

Also, the profitability of banks is greatly affected by credit risk, capital adequacy, management efficiency and the slope of the yield curve. Banks with high exposure to credit risk inversely affect the profits generating ability of the bank resulting from due to high risk of non-payment of loan and hence loss in interest income.

Policy Recommendations

On the basis of the results obtained and the conclusions arrived at, the study makes the following recommendations:

Considering the identified determinants of bank credit risk, combined with how credit risk impacts bank profitability, an efficient operational expense management of banks would not only increase the profit margin of these banks but also reduce the tendency of threat on the survival of these banks. This is due to the significant relationship between management expense ratio and credit risk and also with profitability.

Again, the study results confirmed that there exists a significant inverse relationship between the credit risk of commercial banks in Ghana and their profitability. Management should therefore adopt strategies to reduce their credit risk exposure to ensure increase in profitability. Some strategies would include the use of collaterals as security of granting loans should be further reviewed to reduce

further incidence of bad debts, credit risk managers and lending officers should adhere strictly to good lending practice; they should know the purpose of the loan and ensure the feasibility of every loan proposed.

Also, with capital adequacy having significant relationship with credit risk provides an indication that, banks should be well capitalised in terms of equity capital so as to be able to withstand the likely shocks that are associated with credit default.

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