ASHESI UNIVERSITY

EFFECTS OF BANK RECAPITALIZATION ON BANK PERFORMANCE AND BANK RISK

Undergraduate Thesis Report submitted to the Department of Business Administration, Ashesi University in partial fulfilment of the requirement for the award of Bachelor of Science degree in Business Administration

B. Sc. Business Administration

Mawunyo Avetsi

May 2020

Declaration Page

I hereby declare, that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's signature: …………………………………………

Candidate's name: Mawunyo Avetsi

Date: May 2020

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 Ashesi University College.

Supervisor's signature: ……………………………….……………...

Supervisor's name: Esther Afoley Laryea

Date: May 2020

ACKNOWLEDGEMENT

I would like to thank The Lord God Almighty for making this thesis possible. For His blessing of good physical and mental health throughout the entire period. I would also like to give a heartfelt thanks to my supervisor, Esther Afoley Laryea, who has been very supportive and provided me with comprehensive feedback to bring this thesis to fruition. I would also like to thank Dr. Stephen Emmanuel Armah for his guidance for my data analysis.

Special thanks to my mum, Esther Dzoagbe, for her support, prayers and encouragement that has kept me going. And my final appreciation goes to all my friends and loved ones who have just been there for me and to the Family of Christ, for all your prayers. God bless them all.

Abstract

Increasing the minimum capital requirement of banks is a major bank policy reform tool used by the Bank of Ghana (BOG) to prevent bank insolvency and ensure robustness of the Ghanaian banking sector. The existing literature shows that increasing bank capital can be beneficial in different contexts. But very few of that literature focuses specifically on African countries and other developing economies. This research was to determine how bank recapitalization affects bank performance and bank risk. Based on the literature on the subject, the major variables used in this study were return on equity, capital adequacy ratio, return on assets, net interest margin and bank risk.

This study used the t-test of means as well as panel regressions to test the hypothesis stated in the paper. The findings revealed that bank recapitalization positively affects bank performance; this is consistent with the empirical literature. In determining the effect on bank risk taking on the other hand, the t-test of means revealed a negative effect while the regression showed a positive effect.

Table of Contents

LIST OF TABLES

CHAPTER 1 - INTRODUCTION

1.1 BACKGROUND

The role of banking is woven as an essential part of any economy; from facilitating local and international trade to serving as an agent of development. The activities of banks therefore have ripple effects on any nation's progress. In Ghana, banks are important for the vitality of both financial and non-financial firms. They provide funding for businesses and even provide jobs for people in the country (Agyei & Yeboah, 2011). Nonetheless, banks can pose several risks for the economy in ways that consumers may not be able to observe. Government regulation is frequently touted as a means of reducing the risk of bank failure. This is to keep them in check and ensure that their activities create positive impact and economic growth. It cannot be assumed though, that the decisions made by the central bank always yield their expected results. What can be done instead is to study the impact of some of the regulatory actions the Central Bank has made in the past, to make informed decisions in the future.

One of the primary tools of bank regulation is capitalization requirements. Capitalization requirements can affect performance, but they can also affect risk. Although many studies examine the impact of bank capital requirement on bank performance, this study also looks at its effect on bank risk. As and when it is required, the minimum capital requirement is increased by the Central Bank, and banks must increase their capital to meet the new regulation. In Ghana, the minimum capital requirement has been increased several times over the past 20 years. This paper studies the effects of such recapitalization exercises on bank performance and bank risk in Ghana.

According to Adegbaju & Olokoyo (2008), recapitalization simply means increasing the amount of long-term finances used in financing an organization. This long-term capital can come from a variety of sources, which includes but is not limited to, issuing new shares, raising funds from existing shareholders, and through mergers and acquisitions. For banks, Rose and Hudgins (2006) make it clear that this capital is needed for the bank to cover any loses that it incurs. Bank recapitalization is therefore increasing the long-term base of the financial support of a bank. Banks stand the risk of being insolvent and illiquid if they do not have enough capital. The result of this leads to the inability to absorb losses and consequently and inability to pay back depositors, hence creating fear and panic in the nation. In a bid to correct and ensure robustness in the banking sector, banking reforms aimed at raising the capital base of the banks are implemented as banks grow their loan books and economic conditions change. According to Homar & Wijnbergen (2016), a banking crisis has negative effects on unemployment, public debt and fiscal policy but recapitalization of banks helps to shorten such crisis and speeds up economic recovery. Therefore, once a crisis or a recession is detected to be looming or any of the economic indicators are treading in a negative direction, bank recapitalization helps to mitigate the negative effects.

In 2017, the Bank of Ghana announced that the minimum capital requirement for banks had increased from GHS120 million to GHS400 million and banks had until the end of 2018 to meet this new regulation. Prior to the new regulation in 2017, the Bank of Ghana had made similar announcements in the past. In 2003, the capital requirement for banks was increased to GHS7 million (BOG, 2004), in 2009, it was again increased to GHS60 million (BOG, 2009), later it was increased to GHS120 million in 2012 and then the most

recent increase to GHS400 million in 2017, representing the largest increase of 233% (BOG, 2017).

The bank recapitalization exercise announced in 2017 was deemed a "cleanup exercise" by the Minister of Finance. One of the objectives of this exercise was to have a quality banking sector that could support the financial system in Ghana even if that reduced the number of banks in the country (Bank of Ghana, 2019). This objective is very similar to the objective of the financial sector reform implemented in Nigeria in 2004; to have a few banks that have a strong capital base (Soludo, 2004).

The 2017 recapitalization exercise, the largest increase in the minimum capital requirement, garnered a lot of public interest and raised questions regarding the Ghanaian banking sector and its ability to perform its functions properly. Out of the 34 banks that existed before the recapitalization exercise, only 23 met the new minimum capital requirement at the end of 2018: (the deadline given by the Bank of Ghana). Three mergers were approved to allow the merged banks jointly raise the new minimum capital required (Bank of Ghana, 2019).

Bank recapitalization exercises have the potential to grossly affect not only the financial system and businesses but also, the banks themselves. Some aspects of banking that can be affected include the bank's performance as well as the ability of banks to take on more risk and cover their exposure to risk.

Several factors cause the risks that banks are exposed to in their business. One of which include the amount of capital the bank possesses. According to Furlong and Keeley (1989), incentives to increase asset risk declines as capital increaseFs. Thus, as banks' capital

increases, it reduces the likelihood of banks taking on more asset risk. This study will examine if this statement applies in the context of Ghana, and if so, what the consequences of such actions are and what can be done to mitigate any negative outcomes.

One area that bank recapitalization could affect is bank performance. According to Allen, an increase in bank capital has the effect of increasing bank performance (Berger & Bouwman, 2013). Thus, the relationship between bank capital and bank performance is a positive one. The reason given for this is that capital improves banks chances of survival and market share and also enhances their performance.

Using Ghana as a case in point, this paper will focus on a recapitalization exercise that occurred in Ghana in 2012 to study its impact and understand the effects it had on bank performance and bank risk of Ghanaian banks. It will look at the period before the recapitalization exercise (2009 to 2012), and the period after the 2012 recapitalization exercise but before the 2017 recapitalization announcement (2013 to 2017).

1.2 PROBLEM STATEMENT

Extensive research on bank recapitalization exercises has been conducted in many places. However, the problem is that most of the research focuses on western countries like Japan (Montgomery & Shimizutani, 2011), the USA (Berger & Bouwman, 2013), and countries in Europe (Steinherr, 1997). This may be attributed to the fact that these countries have more advanced banking and financial systems than most African countries. It could also be reasoned that they have readily available and easily accessible data. For the African continent in general, this topic has been explored mostly in Nigeria by Adegbaju &

Olokoyo (2008) and Oleka & Mgbodile (2014). One research done by Rojas-Suarez (2002) with a specific focus on the African continent and other emerging markets mainly compared emerging economies to that of developed economies and how the same international capital regulations may not be applicable in the different contexts.

Additionally, the very few studies on the topic that have been done in Ghana have focused predominantly on the impact between the exercise and the performance of the banks involved, as evidenced in research done by Yalley et al., (2018) and Samadji (2018). These studies in Ghana have nonetheless ignored other equally relevant areas such as the effect of bank recapitalization on bank risk. The study undertaken by Yalley et al. (2018) sheds light on how bank recapitalization exercises have affected domestic and foreign banks differently. Their study is extensive and follows in the manner of Adegbaju & Olokoyo (2008). Despite this, the focus on only bank performance is not enough to adequately capture the extent to which bank recapitalization can influence banking. Adding another aspect to this research, bank risk, will expand the work already done.

One major concern raised in the 2019 Banking Sector Report from the central banks is that most of the banks that collapsed had high non-performing loans which substantially increased their exposure to risk (Bank of Ghana, 2019). Studying how bank risk is affected by bank recapitalization will enable bank regulators understand if recapitalization exercises are beneficial, with respect to the risk banks tend to bear. Also, it will help determine if the unreasonable levels of risk taken by some banks in Ghana which eventually led to their insolvency and eventual collapse had anything to do with the amount of capital that they had. This will enable bank regulators to incorporate a lot more variables in their policies that ensure a more robust banking and financial system is built.

Also, research conducted in the past including that of Yalley et al. (2018), covers a relatively limited timeframe. This study expanded on what has been started by Yalley et al. (2018) on the performance of banks as well as throw light on bank risk in Ghana over a longer period. Their study was from 2009 to 2015 while this study covered the period from 2007 to 2017.

This research will attempt to fill in the gaps identified above.

1.3 RESEARCH QUESTION

This study will analyze data collected and empirical studies to answer the question below:

What effects have bank recapitalizations had on bank risk and the performance of banks in Ghana from 2012 to 2017?

1.4 RESEARCH OBJECTIVE

The aim of this study is to explore the effects bank recapitalization has had on bank risk and on the performance of banks in Ghana from 2009 to 2017.

1.5 RELEVANCE OF TOPIC

The banking crisis faced by Ghana in 2018 has, in the first place raised concerns about the Ghanaian banking sector and its ability to match up to the top banks in the world. Most Ghanaians have also lost trust in the banking sector (Banahene, 2018). For Ghana to

develop, the banks and the entire financial sector need to be strong in terms of performance and ability to withstand risks. This topic is relevant for a variety of reasons. The first reason is to determine the impact that increasing the minimum capital requirement has had on banks so far, so as to provide policy direction where bank recapitalization is concerned

Another importance of this research is that it adds to the existing literature on banking in Ghana. There is little literature regarding the banking sector, especially with regards to bank recapitalization. This research also adds on to the knowledge in the field and for people who will want to further explore the banking sector of Ghana in the future, they can use this literature as a springboard for their own studies.

Finally, this study will help the banks to understand the relationship between having adequate capital to run their business and also enough risk that does not threaten their existence and allows them to thrive. They will always be on the lookout and take appropriate measures to keep their activities in check as well as cover their exposure to bank risk.

1.6 OUTLINE OF THE THESIS

This study is outlined in five chapters. The first chapter includes the introduction, the background of the study, problem definition, research objective, relevance of the topic, and states the method that will be used to analyze the data later in the coming chapters. The first chapter also outlines the structure of the entire study.

In the second chapter, empirical literature relevant to the study is reviewed. In the third chapter, the methodology employed is discussed into further detail. In the fourth chapter, the data collected is analyzed using regression analysis and ratio analysis and other statistical tests are employed as well. In the concluding chapter, the key findings from the data analysis are discussed, conclusions are drawn, and recommendations are made.

CHAPTER 2 – LITERATURE REVIEW

2.1 INTRODUCTION

This literature review provides insights on research conducted by different experts in different contexts regarding bank recapitalization, bank risk and bank performance. It also examined fundamental theories underlying the topic and synthesized findings from these experts. That informed the type of data collected and the kind of research conducted. It organizes the literature in the field in a chronological manner as it relates to the banking system in Ghana. It also acknowledges people who have made such significant research contributions to the field of banking.

2.1.1 WHAT IS BANK RECAPITALIZATION?

According to Rose and Hudgins (2006), bank equity capital provides the long-term solid base of financial support upon which the financial firm will rely to grow and to cover any exceptional losses it incurs. Bank capital plays a major role in banks efficiently performing their function of connecting borrowers and lenders. In a paper by Chimpango (2017), he talks about the fact that most sub-Saharan countries are dealing with huge infrastructure deficit and that capital markets play an important role in the development of such economies. Thus, the role of banks can be thought of as being the financial lifeline of an economy. If any bank fails, an entire economy can be brought to a standstill and because of this, Basel Accords, as well as other regulations and regulatory bodies, have been developed across time to regulate the activities of banks. Among these regulatory bodies are the central banks of various countries. The central banks adopt international standards

and regulations to suit the needs of the local banks in their various jurisdictions. They are the ones in charge of setting the minimum capital requirement as part of their regulatory and supervisory role. A major principle of the Basel II Accord states that, a minimum capital requirement, specific to the central bank in a nation, must be set to keep banks healthy to execute their function properly in the economy (Bank for International Settlement, 2001). The quality of bank capital is important to help contain systemic risks that results from the interrelation of financial institutions (Basel III, 2010). This importance has also been captured in a statement below:

"Banks should maintain a level of capital that is sufficient to:

a. Reduce the likelihood of bank insolvencies to a level consistent with a stable banking system.

b. Immunize taxpayers from losses incurred by government-guaranteed bank claimants in the event of bank insolvencies and

c. Align the incentives of bank owners and managers with those of uninsured claimants with respect to the risks assumed by banks"("Reforming Bank Capital Regulation | AEI," 2001).

2.2 THEORIES ON BANK CAPITAL

The idea of capital being such a crucial part, not just for banking operations but for any organization, can be explained by different theories in finance. The theories regarding capital are from many experts who have formed the basic infrastructure upon which capital

structure has grown and been applied in different situations. They provide a framework for understanding capital and capital structure and some of these theories specific to banks capital are discussed below.

2.2.1 RISK AND RETURN

The theory of risk and return from Harry Markowitz states that the riskier an investment, the higher the returns on the investment. This theory suggests that taking on more risk should be rewarded in higher returns for an investment. It is not implying any form of certainty in the returns of a risky investment. It rather points to the possibility of earning higher returns on riskier investments (Mangram, 2013).

In a capital structure, taking on more equity is considered risky as compared to debt (Knight, 2009). Deducing from this, equity should reward with higher returns as compared to debt based on the riskiness of the two capital sources. Thus, when banks increase their equity capital due to a policy directive by the central bank authority, this theory suggests that they should expect higher returns and the higher returns will lead to increased bank performance.

2.2.2 THE BANK CAPITAL CHANNEL

This theory propounds that the capital structure of a bank is a tool that affects bank lending behavior and bank fundraising. This theory stands on the premise that there are imperfect markets, there is a maturity imbalance between assets and liabilities that increases banks'

exposure to interest rate risk, and the regulatory capital requirement influences the supply of credit. It goes further to state that if bank equity is not enough and it is not possible to raise funds on the stock markets, banks reduce their lending, thus their credit risk as well. The implication of this is that low equity leads to low lending and low risk exposure (Enoch, 2013).

2.2.3 FINANCIAL INTERMEDIATION

This theory explains the function of banks as intermediaries and the fact that in performing this role, monitoring costs and delegation costs are usually transferred to them. This prevents duplication of costs that would have otherwise been incurred if small investors were to take up this task on their own and the absorption of these costs by banks benefits of the consumer. For the banks, they centralize these costs and diversify to cover their exposure to risk and make gains in order to continue in their role of intermediation. To perform this role, banks need liquidity and having a lot of capital even though it has many advantages reduces the liquidity available to the banks (Diamond, 1984).

2.3 EMPIRICAL STUDIES ON BANK PERFORMANCE

Several studies regarding bank recapitalization and bank performance have been conducted in different contexts. These studies tend to be less concentrated in Africa than the other areas of the world. In African countries though, more information regarding bank capital and its effects is needed as stakeholders of the banking system are becoming the majority

(World Bank, 2019). The studies conducted in other jurisdictions have presented varying results that would serve as a foundation for further exploration, just like in a study such as this. Other people's works were reviewed to derive insights on how best this research could be conducted in the context of Ghana.

According to Berger & Bouwman (2012), past research to determine the effect bank capital has on bank performance has failed to acknowledge the economic period in which the banks existed. Based on this, they conducted a study that took into consideration two significant periods for banks, normal and crisis times. They analyzed how their performance is impacted differently in those times. Also, in their study, they split bank performance into two major categories, bank survival and market share. The impact of capital is measured against both aspects of bank performance. They found that regardless of the period banks are operating in, increased capital results in an increase in bank performance for small banks. But for medium and large banks, capital only affects performance positively during the crisis period and not during normal times. This is because according to the study, during crisis the period, medium and large banks had a good amount of support from the government, which gave them a larger market share and improved their performance. This study had both normal and crisis times considered but in most emerging economies that have less advanced banking systems, it may not be applicable. Nonetheless, it is important to note when discussing bank performance, it should reflect in both the bank's survival and the market share of the banks.

Rojas-Suarez (2002) discusses the unique case of emerging economies. She mentions that some have poor accounting and transparency systems and there are no capital markets to validate the real value of capital contributed by stockholders. Stringent capital regulations

such as those from the Basel Accord would not yield its expected results. This makes capital regulations weaken banks in emerging economies instead of strengthening them. This also happens because governments tend to be the biggest debtors when they are perceived to be the safest debtors. As a solution to the unique case of emerging economies, Chiuri, Ferri, and Majnoni, (2000) make the suggestion that capital regulations should be slowly phased out to reduce any negative outcomes. Allowing new capital requirements to be enforced in phases helps banks in emerging economies adjust properly to raise their capital, since the cost of capital is also expensive in emerging economies.

Nigeria is one country in Africa that has had extensive bank recapitalization exercises over time. Adegbaju & Olokoyo (2008) studied the recapitalization exercise over a period of six years and their study showed that the bank recapitalization exercise of 2001 led to decreased bank performance in Nigeria and in effect, shareholders could be made worse off. Their study used various ratios which include return on equity, net interest margin, return on asset, yield on earning assets and funding cost. Interestingly, a similar study conducted by Oluitan, Ashamu, and Ogunkenu (2015) showed that bank recapitalization in Nigeria has had a positive effect on bank performance. Their study used variables such as Bank size, Bank financial characteristics, Bank deposits, and Total banking sector deposit. The discrepancies in the two studies can be explained by the periods of the study and the different metrics used in their methodologies. So, while Adegbaju et al.'s (2008) study was for six years, Oluitan et al. conducted their study based on a period of 8 years and Adegbaju et al also used a t-test of means while Oluitan et al., used a multiple regression analysis.

In Ghana, a research was conducted by Yalley et al. (2018) on how bank recapitalization affects bank performance in Ghana and it showed that there is a positive relationship between bank recapitalization and bank performance. Even though the study admits that this may not be the case in other places due to transactional cost differences, Ghanaian banks generally tend to perform better with increased capital. This was attributed to the relatively low cost of capital that banks in Ghana enjoy compared to other countries. Because banks in Ghana pay very little or no interest on savings and on the deposits of their customers, their cost of funding is also greatly reduced. So, after banks raise capital, the cost of the capital, being so low, does not erode the benefit they receive afterward. The research conducted used three different financial metrics to measure bank performance in Ghana: ROA, ROE, and Profit Before Tax (PBT). And all three measures show a positive relationship between bank performance and bank recapitalization.

Samadji (2018) in his study of capital structure and how it affects bank performance argued that increasing bank leverage results in an improvement in bank performance. Thus, when there is a directive for banks to increase their capital, their performance will most likely increase should they resort to using more debt capital than equity capital.

2.4 EMPIRICAL STUDIES ON BANK RISK

Bank risk-taking arises because of a variety of factors including regulatory actions, risk preferences, leverage, and ownership structure. Bank recapitalization forms part of the regulatory actions taken by banks in adherence to the central bank authority in the various economies (Kwan & Eisenbeis, 1997). Bank risk is of primary importance to bank

stakeholders as risky banks are just existing on the margin and can create adverse effects on the economy.

Milne et al. (2001) opine that the effect regulatory capital has on banks in the short run is different from the impact in the long run. They argue that banks actually want to have a capital buffer over and above the regulatory requirement and if there is a breach in that target, they work their way up to meet it. This desire is what influences their risk-taking behavior. They used a continuous-time model to analyze their data and found that in the long run, the regulatory minimum capital requirement does not affect their risk-taking behavior. On the other hand, in the short run, where there are fluctuations in meeting their target capital requirement, they find that the bank risk-taking behavior reduces, and banks become more risk-averse when the bank capital requirement increases. This means that the period in which this study would be relevant is in the short run as that is when the banks react immediately to the capital directive and become more risk averse.

Calormiris and Wilson (1998) studied the manner in which banks manage risk during both normal and crisis times. For instance, during the great depression, they found that banks reduced their portfolio risk. According to their study, if the cost of capital is low, banks tend to increase their asset risk but then increase their capital reserves to avoid default risk. They measure bank asset risk using the standard deviation of the log asset value. And they use the Black-Scholes model to measure the riskiness of bank debt.

Calem and Rob (1999) discovered a unique U-shaped relationship in their study of bank capital and bank risk-taking behavior. In this U-shaped relationship, undercapitalized banks take on maximum risk, and then as capital increases, they take on less risk. Then as

capital increases, even more, they take on more risk. The maximum risk that undercapitalized banks take exposes them to bank insolvency. Hence the amount of risk a bank takes depends on the capitalization level of the bank and it implies that small banks (banks with low levels of capital) cannot be expected to take on the same level of risk as big banks. This explains why some banks survive regulatory increases in capital and others do not, due to insolvency. The methodology that led to this discovery in their research involved an infinite horizon model.

Altunbas, Carbo, Gardener, and Molyneux (2007) used bank loan-loss reserves as a proxy for bank risk and determined bank capital as the ratio of equity to total assets. For the overall approach used to analyze the data, they used Zellner's Seemingly Unrelated Regression Approach. They found that there is a positive relationship between risk and the level of capital. On the other hand, they also found that banks that are inefficient in Europe experience an inverse relationship between capital and their risk-taking behavior.

The more loans a bank gives out, the more it exposes itself to risk. This is because their bank loan-loss reserves increase when more loans are given out. Ladime, Sarpong-Kumankoma, and Osei (2013) conducted a study in Ghana and found that having large reserves of capital encourages banks to lend more as they would have more capital to absorb any losses they incur. Also, as banks lend more, they expose themselves more due to increases in credit risk. If this increased capital motivates banks to lend more and increases the risk banks take on, then a bank recapitalization leads to an increase in bank risk.

Osei-Assibey and Asenso (2015) also opine that high capital leads banks to take on more risk. They studied the relationship between capital and bank risk in Ghana for the period between 2002 and 2013. Their methodology involved the use of GMM estimation technique. They found that high excess capital leads to high non-performing loans and thereby risk-taking of banks. This is because as banks have large amounts of excess capital in their reserves, and this capital serves as a cushion against risk, banks find avenues to take on more risk by giving out loans to businesses and households.

2.5 CONCLUSION

The empirical analysis conducted showed that there is a positive relationship between bank recapitalization and bank performance in most countries. Still, in some cases, a study showed a negative relationship between the two. It also showed a positive relationship between bank recapitalization and bank risk.

CHAPTER 3 – METHODOLOGY

3.1 INTRODUCTION

The methodology examines the way in which the research objective will be analyzed empirically. This chapter will reveal the data sources and the descriptions of the variables used in the study. The aim of this study is to determine the effects of bank recapitalization on bank performance and bank risk in Ghana.

3.2 DATA SOURCE

The data for this research is obtained from the financial statements of banks in Ghana and the Bank of Ghana. This data collected is for the period 2007 to 2017, 10 years. This is to enable the study collect data before the bank recapitalization exercise of 2012 and after the recapitalization. The financial statements will be obtained from the annual reports of the banks listed on the Ghana Stock Exchange as well as those published on some of the bank's website. In analyzing the data gathered, the study used a panel regression, a Chow test and a difference of means test to determine the effect and relationship between bank performance and bank recapitalization. The data is analyzed in Microsoft Excel and SPSS application.

This study will employ quantitative methods in analyzing the data collected. The reason for this lies in the fact that the data collected contains a lot of figures drawn from financial statements and thus requires that the analysis be done quantitatively. Also, previous studies

on the topic done by Yalley et al. (2018), Adegbaju and Olokoyo (2008), Samadji (2018) and Osei-Assibey & Asenso (2015)employed quantitative techniques in their analysis.

3.3 HYPOTHESIS

The debate on whether bank capital is a major determinant of the performance and risk appetite of banks is largely unsettled and more research is being conducted in various jurisdictions to reach a consensus. The literature review showed extensively that many people have conducted this research in different geographies and this study expanded on that literature as well as shed more light on the context of Ghana. The hypothesis shows what was tested in this case. The hypothesis for this study is stated below:

3.3.1 HYPOTHESIS FOR BANK PERFORMANCE

Null Hypothesis: Bank recapitalization has a negative effect on bank performance.

Alternate Hypothesis: Bank recapitalization has a positive effect on bank performance.

3.3.2 HYPOTHESIS FOR BANK RISK

Null Hypothesis: Bank recapitalization has a negative effect on bank risk.

Alternate Hypothesis: Bank recapitalization has a positive effect on bank risk.

This study used the stated methods and approaches in testing the stated hypothesis. This was based on evidence from previous research and empirical research as well as the nature of the data used.

3.4 POPULATION AND SAMPLING TECHNIQUE

Currently in Ghana, there are 23 universal banks. They perform various functions ranging from retail and commercial banking, advisory services, M&A, asset and wealth management and other investment banking activities. Eight of these banks are listed on the Ghana Stock Exchange (GSE), and therefore publish their financial statements for the perusal of the public. Based on the availability of data, the financial statements that was used was from the banks whose financials statements could be retrieved for all the years needed in this study. This brought the sample size to 10 banks. 10 banks out of a total of 23 banks represents 43% of the total population and quite representative of the population.

3.5 RESEARCH DESIGN

For the quantitative analysis, this study is grouped into two different periods. The first one focused on the period before the recapitalization exercise of 2012, that is from 2007 to 2011, within this period, there was a recapitalization that took place in 2009 but the recapitalization that this study focuses on is that of 2012. The second part sheds more light on the period after the recapitalization exercise, that is from 2013 to 2017. This research did not include 2012 as it was the year of the recapitalization. As Adegbaju and Olokoyo (2008) describe these two time periods in their study, the former was referred to as pre-capitalization period and the latter was referred to as the post-capitalization period. This enabled the research to do a clear comparison of the variables pre and post capitalization. The research design for bank performance and bank risk are discussed in depth below. We

measured bank performance by using profitability ratios and we measured bank risk by using the ratio of total loans and advances to total assets.

3.5.1 PAIRED SAMPLE T-TEST

The first data analysis tool that is used in this study is the paired sample t-test. The paired sample t-test is statistical technique that is used to compare the means of two samples. The paired sample t-test measures the effectiveness of an event that has occurred by the comparison of the means of the two samples being tested. In this case, the event under consideration is the recapitalization exercise that occurred in 2012. The two used in the study are generated from the pre capitalization and post capitalization data.

After grouping the data into these different periods, the next thing to do is to find the differences in each of the paired data in the sample. The new sample generated by finding the differences is used to determine the average effect of the recapitalization. The test statistic is then calculated to measure the impact of the recapitalization. It measures how far different the data is from the null hypothesis which assumes that the mean difference between the two sets of data is from 0. The formula for calculating the test statistic is stated below.

$$t = \frac{\bar{x}_d - 0}{\frac{s_d}{\sqrt{n}}}$$

Where $\bar{x}_d$ is the mean of the sample of the differences, s_d is the sample standard deviation, n is the sample size and t is the test statistic. The p-value is calculated after the test statistic has been determined and the conclusion is drawn. If the p-value for the data is less than

0.05, the null hypothesis is rejected. If the p-value is greater than 0.05, we fail to reject the null hypothesis.

3.5.2 REGRESSION ANALYSIS

The next data analysis tool used in this study is the panel regression analysis. In this study, a panel regression analysis is used to determine the relationship between bank recapitalization and bank performance and also determine the impact of bank recapitalization on bank risk. Panel regression allows for more than one explanatory variable, helps to explain more of the variation in the dependent variable and is a widely used tool for empirical analysis. It also allows for a dataset with many variables across different time periods. Therefore, using a multiple regression analysis will work in this study. The general model for multiple regression analysis is shown below.

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k + e,$$

Where

y is the dependent variable

β_0 is the y intercept

β_1 and β_2 are the changes in y with respect to x_1 and x_2 respectively

x_1 and x_2 are the independent variables

and e is the error term or the disturbance.

Based on the generalized model above, I develop specific models for both bank performance and bank risk. The different variables in the model are explained more in the subsequent paragraphs.

3.5.3 REGRESSION MODEL FOR BANK PERFORMANCE

The regression model for bank performance is shown below.

$$ROE_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 SIZE_{it} + \beta_3 BFC_{it} + \beta_4 LIQ_{it} + e_{it}$$

$$ROA_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 SIZE_{it} + \beta_3 BFC_{it} + \beta_4 LIQ_{it} + e_{it}$$

$$NIM_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 SIZE_{it} + \beta_3 BFC_{it} + \beta_4 LIQ_{it} + e_{it}$$

Where,

ROE = Return on Equity $[\frac{Net\ Income}{Total\ Equity}]$

ROA = Return on Asset $[\frac{Net\ Income}{Total\ Assets}]$

NIM = Net Interest Margin $[\frac{Interest\ Recieved - Interest\ Paid}{Average\ Earning\ Assets}]$

CAR = Capital Adequacy Ratio $[\frac{Tier\ 1\ capital + Tier\ 2\ Capital}{Risk\ weighted\ Assets}]$

$SIZE$ = Bank Size $[ln(Total\ Assets)]$

LIQ = Bank Liquidity $[\frac{Total\ Loans}{Total\ Deposits}]$

β_0 = y-intercept

β_{1-4} = Coefficients of the respective variables

e_{it} = The error terms.

The independent variables for the above model are Capital Adequacy Ratio (CAR), Bank Size (SIZE), and Bank Liquidity (LIQ). For this model, bank capital will be the major independent variable of interest while the other variables such as the size of the bank, and bank liquidity are the supporting independent variables. The dependent variables in this case, are Return on Equity (ROE), Return on Assets (ROA) and Net Interest Margin (NIM). The reason for using more than one dependent variable to measure bank performance is that several ratios are used to determine bank performance and using more than one helps to make the result robust.

3.5.4 REGRESSION MODEL FOR BANK RISK

The regression model for bank performance is shown below.

$$RISL_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 SIZE_{it} + \beta_4 LIQ_{it} + e_{it},$$

Where

$RISK$ = Bank risk $[\frac{Total\ Loans}{Total\ Assets}]$

CAR = Capital Adequacy Ratio$[\frac{Tier\ 1\ capital + Tier\ 2\ Capital}{Risk\ weighted\ Assets}]$

$SIZE$ = Bank Size $[ln(Total\ Assets)]$

LIQ = Bank Liquidity $[\frac{Total\ Loans}{Total\ Deposits}]$

β_0 = y-intercept

β_{1-4} = Coefficients of the respective variables

e_{it} = The error terms.

The dependent variable for this model is bank risk (RISK), measured as the ratio of total loans to total assets, while the independent variables are capital adequacy ratio, bank size and bank liquidity. Capital adequacy ratio is the main variable of interest whiles bank size and bank liquidity serve as supporting variables in this model.

3.6 JUSTIFICATION OF VARIABLES

The explanation for all the variables used in ratios used in this analysis are explained below.

3.6.1 RETURN ON EQUITY

According to Damodaran (2007), return on equity refers to the earnings left over for equity investors after debt service costs have been factored into the equity invested in an asset. Thus, for every Ghana cedi invested by shareholders into a firm, return on equity measures how much they get in return for their investment. Investors are more willing to invest in firms that record high ROEs because those firms are considered more profitable. It is computed as the ratio of net income after tax to shareholder's equity.

3.6.2 RETURN ON ASSETS

Antwi-Asare and Addison (2000) explain the return on assets as how efficiently the management of the bank has used the resources available to them to generate additional

resources for the bank. It signifies how efficient the management of an organization is in using its existing assets to make profitable gains. It is computed as the ratio of net income to total assets.

3.6.3 NET INTEREST MARGIN

Saksonova (2014) states that the net interest margin is the ratio of net interest income to the average earning assets (interest earning assets) or net interest profitability. It is used to determine if the earning assets of the firm are enough to justify the interest expense.

3.6.4 BANK SIZE

As with many industries, the size of a firm matters, and the financial services industry is no exception. There are small, medium, and large firms that operate in an economy. Having a large size comes with many advantages, some of which include economies of scale, resource availability and market share. According to Samadji (2018), banks can be considered as large firms because of the large size of financial activities they undertake.

Bank size affects not only bank performance but bank risk as well. Research conducted by Rahman et al. (2015) shows that bank size has a significant relationship with bank risk and is a factor that definitely affects bank risk.

In numerous studies such as those conducted by Samadji (2018), Akhtar and Oliver (2009) and Sbeiti (2010), bank size is calculated as the natural logarithm of the total assets of the bank and that is used in this study as well.

3.6.5 BANK LIQUIDITY

Valla et al. (2006) refer to bank liquidity as the "ability to meet cash obligations when due." Liquidity is essential for macroeconomic and financial stability purposes. Liquidity is also needed for banks to run their major business activity and as a means of maximizing the banks' returns. Tanna et al. (2005), in their research on the determinants of bank profitability stated that there are internal and external determinants and bank liquidity forms part of the internal determinants of bank profitability.

Rahman et al. (2015) also mention in their study that bank liquidity is a factor that affects the ability of banks to take on risk as well.

The measure for bank liquidity is computed as the ratio of a bank's total loans and advances to their total deposits (End, 2016). The total loans are calculated as the sum of loans to the banks customers and loans made to other banks and the total deposits are the sum of deposits made by bank's customers and those made by other banks.

3.6.6 CAPITAL ADEQUACY RATIO

Capital adequacy ratio measures the amount of bank capital with respect to risk weighted assets. Thus, how much banks are required to hold as a percentage of their risk weighted assets. It is the main measure of bank minimum capital requirement as stipulated by the Basel Accord. Capital adequacy ratio is important to ensure bank stability and reducing insolvency. It is measured as the ratio of the sum of tier 1 and tier 2 capital to the bank's

risk weighted assets. In Ghana, banks are supposed to have a CAR of 10% and can have a buffer of 3% (BOG 2004; BOG 2017).

3.6.7 BANK RISK

According to Ugwuanyi (2015), bank risk is traditionally determined as the ratio of total loans and advances to total assets. A high ratio in this case shows that a bank has too many loans and its liquidity is very low. Thus, the higher this ratio, the greater a bank's risk is to defaults.

3.7 CHOW TEST

The chow test helps to determine if there have been any significant changes between the regressions of two groups of data. When an event occurs, a chow test determines if the relationship in the data before the event is the same as after the event or if there has been any significant change in the two time periods. The Chow test initially assumes that the coefficients of the two different linear regression of two groups of data are the same and that forms the null hypothesis. The F statistic that is computed in the Chow test is computed as the ratio of the difference between the residual sum of squares for the two datasets and the pooled regression sum of squares to the sum of the residual sum of squares adjusted for the right degrees of freedom. If there is a significant change in the two time periods, the F statistic will be large, but if there is none, then the F-value will be zero depending on the confidence interval. This test is ideal for this research because we are determining the effect of bank recapitalization on bank performance and bank risk using time series data which has been split into two different subsets: before the recapitalization and after the

recapitalization. Determining the stability in the regression will make it easier to identify the impact that the recapitalization event had on the variables of interest.

The Chow test is used to help determine the stability of linear relationships between two different time periods. It helps to test for the equality of the regression coefficients of two groups of a dataset.

Null Hypothesis: There has been no significant change in the coefficients of the regression of the two groups of data.

Alternate Hypothesis: There has been a significant change in the coefficients of the regression of the two groups of data.

3.8 LIMITATIONS OF THE METHODOLOGY

The sample size of 10 banks used in this study poses a limitation in this study. Small sample sizes have the potential to decrease the confidence level of the study and increase the standard errors. The time period used in this study, thus from 2007 to 2017 meant that banks that came into operation after 2007 and banks that went out of the system before 2017 could not be included in the study. Also, the Ghana stock exchange (GSE) has six banks listed on it and for the remaining banks, the data collected on their websites was used. For some banks, their websites were not updated, and while other banks did not publish their financial statements as well.

Nonetheless, the ten banks used in this study, although it is seemingly small is a relatively good representative of the population. This is because there are currently only 23 banks in Ghana.

CHAPTER 4

4.1 INTRODUCTION

This chapter discusses the data gathered, the tests performed and the results of the various tests. Data for ten banks were collected and analyzed using regression analysis before and after the 2012 recapitalization exercise. For bank performance, the result of the three performance measures are discussed below.

4.2 DESCRIPTIVE STATISTICS

Table 1.0 shows the summary statistics of the variables that were used to generate the results of this study.

Table 1.0 Summary Statistics

Variable	Observations	Standard Deviation	Mean	Median	Min	Max
Return on Equity	100	0.24	0.25	0.24	-0.28	2.34
Return on Assets	100	0.04	0.04	0.03	-0.04	0.37
Net Interest Margin	100	0.04	0.09	0.09	0.00	0.40
Bank Size	100	1.04	14.12	14.26	10.63	16.18
CAR	100	0.16	0.18	0.17	0.02	1.70
Bank Liquidity	100	0.64	0.80	0.70	0.23	6.31
Bank risk	100	0.18	0.53	0.53	0.2	1.72

The summary statistics for Return on Equity, Return on Assets, Net Interest Margin, Bank Size, Bank Risk, Capital Adequacy Ratio and Bank Liquidity is provided above to give further insights into the data used for this study. In total, 100 variables were observed for each variable in the study. This is from the ten banks for 10 years, thus 2007 to 2017, excluding 2012, the year of the recapitalization.

For the three bank performance measures, ROE has the highest mean of 0.25 followed by

NIM and ROA which have means of 0.09 and 0.04 respectively. The ROE means that on

average, shareholders earn 25% on the capital they invest in the banks. The ROA of 4%

shows that on average, 4% profits have been earned on the assets of the banks. The average

net interest margin recorded was 9% and that is an indication that the banks in this study

are making good gains on the interest rate that they charge their customers through loans

and other credit facilities, relative to the assets the bank owns.

Table 1.0 also shows the minimum and maximum figures for each of the variables. The

minimum figures for ROE and ROA are all negative, and that indicates that some of the

banks in the sample recorded losses in some of the years. The biggest bank within the

sample had a natural log of 16.18, which represents total assets of GHS 10,635,005.00 in

2017. On average, banks in the sample recorded 14.12 as their size.

The average bank liquidity is 0.80, which indicates that the banks in the sample accept

more deposits from their customers than they give to them in loans and so the banks can

meet their cash obligations.

4.3 TEST FOR MULTICOLLINEARITY

A multicollinearity test is conducted to determine if there is a perfect correlation or no

correlation between any of the variables. This implies that some level of correlation is

acceptable, but it should not be perfect, thus either -1 or 1. This test is a requirement in

regression analysis as part of the Gauss-Markov assumptions to ensure that the variables

do not already influence each other before the regression analysis is conducted

(Wooldridge, 2015). The table below shows the matrix for the correlation between the independent variables.

Table 2 .0 Table for correlation matrix

	ROE	ROA	NIM	Size	CAR	Liquidity	Bank risk
ROE	1.00						
ROA	0.26	1.00					
NIM	-0.02	0.71	1.00				
Bank Size	0.18	0.17	0.25	1.00			
CAR	0.00	0.92	0.76	0.05	1.00		
Liquidity	-0.11	-0.12	-0.10	-0.14	-0.07	1.00	
Bank risk	-0.16	0.46	0.31	-0.33	0.55	0.32	1.00

From Table 2.0 above, none of the independent variables have a perfect correlation with each other. Thus, there is no pre-existing linear relationship between the variables already to cause any biases. This study therefore used these variables in the data analysis

4. 4 PAIRED SAMPLE T-TEST

The paired sample t-test is mainly used to determine if the means of two datasets have any significant difference. In this case, it is used to compare the means of the different bank performance measures before and after the recapitalization exercise in 2012. The hypothesis for the t-test is stated below:

The first is that the means of the three bank performance measures before and after the recapitalization exercise are the same and this is stated mathematically below as the null hypothesis.

$$Precap\_ROE_u = Postcap\_ROE_u$$

$$Precap\_ROA_u = Postcap\_ROA_u$$

$$Precap\_NIM = Postcap\_NIM_u$$

The next states that the means of the three bank performance measures before and after the recapitalization exercise are not the same. This is also stated mathematically below as the alternate hypothesis.

$$Precap\_ROE_u \neq Postcap\_ROE_u$$

$$Precap\_ROA_u \neq Postcap\_ROA_u$$

$$Precap\_NIM \neq Postcap\_NIM_u$$

4.4.1 FINDINGS FROM TEST OF MEANS

The results of the data computed are shown in the two tables below. First of all, the means for the performance ratios were compared against each other, and the results of that are discussed.

Table 3.0 Comparison of average bank performance

Comparison of average bank performance		
Performance Measure	Pre-Capitalization	Post-Capitalization
ROE	0.203	0.258
ROA	0.025	0.047
NIM	0.078	0.105

Table 3.0 shows the mean performances of banks before and after the recapitalization exercise. The pre capitalization ROE for the banks in the sample was 20.3% but after the recapitalization exercise, the ROE for the banks increased by 5.5% to make the new ROE

25.8%. This explains why the efficiency of the banks increased after the recapitalization and the banks' returns to shareholders in the form of dividends increased after the recapitalization.

The ROA of the banks follow a similar pattern as the ROE, increasing from 2.5% to 4.7% after the recapitalization. Implying that banks used their assets to generate more returns after the increase in capital.

Finally, the average NIM also shows an increase from 7.8% before the recapitalization to 10.5% after the recapitalization. This also means banks gained more on interest charges on loans they gave out after the recapitalization.

4.4.2 TEST OF MEANS FOR BANK PERFORMANCE

As mentioned earlier in this study, research conducted by the likes of Adegbabu et Olokoyo (2008) and Yalley et al. (2018) used the test of means to determine the impact of a recapitalization exercise on bank performance. Their study came up with conflicting findings. This study also used this approach to determine how the bank recapitalization exercise of 2012 affected bank performance and bank risk. Below, Table 4.0 shows the results of the test of means.

Table 4.0 Results for test of means for bank performance

Test of means for Bank Performance						
Performance Measure	No. of observations	Mean difference		t-statistic	p-value One tail	Two tail
ROE	100	0.06		2.17	0.02	0.03
ROA	100	0.02		2.88	0.00	0.01
NIM	100	0.03		2.12	0.02	0.04

From table 4.0 above, the number of observations for the test was 100- 50 points each before and after the recapitalization. The mean difference for ROE after the recapitalization exercise is 6%, and both the one tail and two tail p-values are below 0.05. Based on this, we reject the null hypothesis that the difference in the means of ROE before and after the recapitalization is zero (0). Therefore, it can be concluded that the recapitalization exercise of 2012 has improved return on equity for banks. This finding aligns with research conducted by Yalley et al. (2018), Berger and Bouwman (2012) but contrasts the findings of Wiafe (2019), and Adegbaju and Olokoyo (2008).

The ROA recorded a mean difference of 2% and a one-tail p-value of 0.00 and a two-tail p-value of 0.01. Since these are both below 0.05, we reject the null hypothesis that the means of ROA before and after the recapitalization are the same and the mean difference is zero. It can be concluded that after the recapitalization, banks used their assets more efficiently to generate higher returns. And this result aligns with the study of Yalley et al. (2018) but contradicts the study conducted by Wiafe (2019) and Adegbaju and Olokoyo (2008). Finally, the NIM recorded a mean difference of 3% and a one-tail p-value of 0.02 and a two-tail p-value of 0.04 and since these are both below 0.05, the results are statistically significant. This provides evidence to reject the null hypothesis. Therefore, the null hypothesis that the mean difference of NIM before and after recapitalization is 0 is rejected. It can be concluded based on this, that the recapitalization led to banks earning a lot more interest income relative to their assets. This result agrees with Wiafe (2019) whose p-values were greater than 0.05 and so had to fail to reject the null hypothesis.

4.4.3 TEST OF MEANS FOR BANK RISK

Similar to the test of means for bank performance, a test of means was conducted to determine the impact of bank recapitalization on bank risk. This test compared the mean of the pre-capitalization bank risk to the mean of the post-capitalization bank risk to determine if there has been any significant change. Below is the hypothesis for this test.

Null hypothesis: $Precap\_RISK_u = Postcap\_RISK_u$

Alternate hypothesis: $Precap\_RISK_u \neq Postcap\_RISK_u$

Table 5.0 Comparison of average bank risk

Comparison of average bank risk		
Performance Measure	Pre-Capitalization	Post-Capitalization
Bank Risk	0.57	0.50

Table 5.0 above shows the average bank risk of banks before and after recapitalization. It can be seen that on average, the risks that banks took on after the recapitalization exercise was 7% less than the risk they took on before the recapitalization exercise. This implies that banks reduced their exposure to risk either by reducing the number of loans and advances they gave out or by increasing their assets more than proportionately in comparison to the loans and advances they were giving to their clients.

Table 6.0 Results for the test of means for bank risk

Test of means for bank risk					
				p-value	
Performance Measure	No. of observations	Mean difference	t-statistic	One tail	Two tail
Bank risk	100	-0.07	-1.74	0.04	0.09

Table 6.0 above shows that the number of observations is 100, 50 before and 50 after the recapitalization. The mean difference can be seen to be -0.07, which shows the fall in average bank risk after the recapitalization. The two-tail p-value is 0.09, and that is greater than 0.05. Based on this, we fail to reject the null hypothesis and can conclude that the bank recapitalization exercise of 2012 led to banks taking on much less risk than they were taking before and there is not enough evidence to support that the recapitalization had banks taking on more risk afterward. This could be because an increase in bank minimum capital requirement led to a reduction in the amount of capital reserves the bank has to acquire its assets and absorb losses. Therefore, reducing the amount of risk the bank takes on helps to match the reduced capital they have in their reserves.

4.4.4 HAUSMAN TEST

In calculating a panel regression, one can use either the random effects or the fixed effects and the Hausman test is a test that can be used to determine which of these two to use in a panel regression. The idea is that the random effect is used unless the Hausman test does not accept it. If the p-value for the test is less than 0.05, the fixed effect is used but if the p-value is more than 0.05, the random effect is used. The test was conducted on the variables that were used in this study.

Table 7.0 Results for Hausman Test

Variable	F-statistic	P-value
ROE	8.52	0.04
ROA	5.66	0.04
NIM	12.46	0.01
RISk	39.13	0.00

From the table 7.0 above, the p-values of all the variables are below 0.05 and therefore, the fixed effect was used in the panel regression in this study.

4. 5 REGRESSION RESULTS

4.5.1 REGRESSION RESULTS FOR BANK PERFORMANCE

The regression analysis test was performed to determine the relationship between bank recapitalization and bank performance and the bank's risk. For bank performance, regression analysis was performed for the three performance measures as was done in the t-test of means, and the results are discussed below.

Table 8.0 Pre capitalization Results for ROE regression

Panel Regression Model for Pre-recap ROE			
	Coefficient	Std. error	t-statistic	p-value
Constant	-0.81	0.33	-2.41	0.02
Size	0.08	0.02	3.06	0.00
CAR	-0.05	0.35	-0.14	0.89
Liquidity	0.01	0.05	0.12	0.90
R-squared:	0.327105			
Adjusted R-squared:	0.216189			
F-statistic	3.86146			
Sum of Squared Residuals	0.653538			

Table 9.1 Post capitalization Results for ROE regression

Panel Regression Model for Post-recap ROE			
	Coefficient	Std. error	t-statistic	p-value
Const	-1.01	0.62	-1.64	0.11
Size	0.08	0.04	2.06	0.05
CAR	0.10	0.10	1.02	0.31
Liquidity	0.00	0.03	-0.04	0.96

R-squared:	0.16
Adjusted R-squared:	0.10
F-statistic	1.63
Sum of Squared Residuals	0.82

The results in table 8.0 and 8.1 shows that the coefficient of bank size increased from 0.075 before the recapitalization to 0.083 after the bank recapitalization. The p-value recorded is 0.05 showing that the increase recorded in the liquidity of banks after the bank recapitalization was statistically significant and this implies that an increase in the liquidity of the banks leads to an increase in ROE. The coefficient for CAR recorded was -0.05 and after the recapitalization exercise, the coefficient increased to 0.10 with a p-value of 0.31. Since the p-value is greater than 0.05, there is not enough statistical evidence to suggest that the increase in the ROE was as a result of the increase in the bank capital. Thus, I fail to reject the null that the bank recapitalization had a negative effect on bank performance.

Table 10 Pre capitalization Results for ROA regression

Panel Regression Model for Pre-recap ROA				
	Coefficient	Std. error	t-statistic	p-value
Const	-0.11	0.03	-3.30	0.00
Size	0.01	0.00	3.46	0.00
CAR	0.14	0.03	3.94	0.00
Liquidity	0.00	0.01	0.02	0.99
R-squared:	0.57			
Adjusted R-squared:	0.52			
F-statistic	15.11			
Sum of Squared Residuals	0.01			

Table 111 Post capitalization Results for ROA regression

Panel Regression Model for Post-recap ROA				
	Coefficient	Std. error	t-statistic	p-value
Const	-0.01	0.07	-0.10	0.92
Size	0.00	0.00	0.07	0.94
CAR	0.22	0.01	18.92	0.00
Liquidity	0.00	0.00	-0.29	0.77
R-squared:	0.91			
Adjusted R-squared:	0.90			
F-statistic	130.59			
Sum of Squared Residuals	0.01			

Table 9.0 and 9.1 above show the relationship between bank performance, as measured by ROA, and bank capital before and after the recapitalization exercise. The results show that the coefficient of CAR increased from 0.14 to 0.22 with a p-value of 0.00. Since the p-value is below 0.05, it means that there is a statistically significant correlation between CAR and the ROA. Therefore, I reject the null hypothesis and conclude that the bank recapitalization exercise led to an increase in bank performance as measured by the return on assets.

Table 120 Pre capitalization Results for NIM regression

Panel Regression Model for Pre-recap NIM				
	Coefficient	Std. error	t-statistic	p-value
Const	-0.08	0.10	-0.85	0.40
Size	0.01	0.01	1.47	0.15
CAR	0.20	0.10	2.07	0.04
Liquidity	-0.01	0.02	-0.58	0.56
R-squared:	0.24			
Adjusted R-squared:	0.21			
F-statistic	3.64			
Sum of Squared Residuals	0.05			

Table 131 Post capitalization Results for NIM regression

Panel Regression Model for Post-recap NIM				
	Coefficient	Std. error	t-statistic	p-value
const	-0.38	0.09	-4.14	0.00
Size	0.03	0.01	4.72	0.00
CAR	0.24	0.02	15.94	0.00
Liquidity	0.00	0.00	0.56	0.58
R-squared:	0.86			
Adjusted R-squared:	0.86			
F-statistic	86.27			
Sum of Squared Residuals	0.02			

The tables 10.0 and 10.1 above show the relationship between bank performance, as measured by NIM, and bank capital before and after the recapitalization exercise. After the recapitalization exercise, the capital adequacy ratio recorded an increased coefficient of 0.24 from 0.20. Thus, post-recapitalization, a unit increase in the capital adequacy ratio led to a unit increase in the net interest margin by 24%. A p-value of 0.00, less than 0.05, was recorded post recapitalization and that shows that the capital of the banks played a statistically significant role in the increased performance of the banks after the recapitalization exercise as measured by the NIM. Therefore, I reject the null hypothesis and conclude that bank recapitalization leads to an increase in bank performance. This result aligns with the results obtained for the return on assets and the t-test of means

Based on the results of the three performance ratios above, a conclusion can be drawn that two out of the three ratios show that bank recapitalization does lead to an increase in bank performance.

4.5.2 REGRESSION RESULTS FOR BANK RISK

Table 14.0 Results for pre capitalization bank risk regression

Panel Regression Model for Pre-recap Bank Risk				
	Coefficient	Std. error	t-statistic	p-value
const	0.84	0.29	2.86	0.01
Size	-0.03	0.02	-1.38	0.18
CAR	0.35	0.31	1.16	0.25
Liquidity	0.09	0.05	1.89	0.07
R-squared:	0.23			
Adjusted R-squared:	0.20			
F-statistic	3.45			
Sum of Squared Residuals	0.51			

Table 15.1 Results for post capitalization bank risk regression

Panel Regression Model for Post-recap Bank Risk				
	Coefficient	Std. error	t-statistic	p-value
const	2.96	0.49	6.09	0.00
Size	-0.18	0.03	-5.61	0.00
CAR	0.71	0.08	8.88	0.00
Liquidity	0.08	0.02	3.81	0.00
R-squared:	0.81			
Adjusted R-squared:	0.80			
F-statistic	56.55			
Sum of Squared Residuals	0.51			

The table 11.0 and 11.1 above show the panel regression analysis done to determine the relationship between bank risk and bank capital. The coefficient for CAR recorded after the recapitalization exercise shows an increase from 0.35 to 0.71 with a p-value of 0.00. Therefore, I reject the null hypothesis and conclude that there was an increase in risk-taking activities of banks after the bank recapitalization exercise. This result conflicts with the result obtained in the t-test of means which found that banks took on less risk after the recapitalization exercise.

4.6 THE CHOW TEST

The results of the chow test for the various variables are discussed below.

4.6.1 CHOW TEST RESULTS FOR BANK PERFORMANCE

Table 16.0 Results of chow test for ROE

Chow test for Return on Equity

Dependent Variable: ROE

Source	Sum of Squares	df	Mean Square	F	Sig.	Critical Value
Contrast	.212	5	.042	2.225	.059	1.96
Error	1.714	90	.019			

The results in the table 12.0 above shows that the F value of 2.25 is greater than the critical

value of 1.96. Based on this, I reject the null hypothesis and conclude that there has been

indeed a significant change in the coefficients of the regression for the pre capitalization

return on equity for the bank and the post capitalization return on equity. This means that

there is evidence to prove that the bank recapitalization exercise of 2012 led to an increase

in bank performance as measured by the return on equity. This result aligns with the results

derived from the t-test of means for the return on equity.

Table 17.0 Results of Chow test for Return on Asset

Chow test for Return on Asset

Dependent Variable: ROA

Source	Sum of Squares	df	Mean Square	F	Sig.	Critical Value
Contrast	.012	5	.002	6.656	.000	1.96
Error	.033	90	.000			

The results in the table 13.0 above show that the F value is 6.656 and that is greater than

the critical value of 1.96. Based on this, I reject the null hypothesis that there has been no

significant change in the coefficients of the regression of the two groups of data. The

conclusion drawn from this is that there has been a significant change between the pre

capitalization return on asset and the post capitalization return on asset. Thus, the bank

recapitalization exercise led to an increase in bank performance as measured by return on

assets. And this result also aligns with the t-test of means.

Table 18.0 Results of Chow test for Net Interest Margin

NIM Test Results

Dependent Variable: NIM

Source	Sum of Squares	df	Mean Square	F	Sig.	Critical Value
Contrast	.028	5	.006	2.614	.030	1.96
Error	.193	90	.002			

The results in the table above show that the F value is 2.614 and that is greater than the

critical value of 1.96. Based on this, I reject the null hypothesis that there has been no

significant change in the coefficients of the regression of the two groups of data. The

conclusion drawn from this is that there has been a significant change between the pre

capitalization return on asset and the post capitalization return on asset. Thus, the bank

recapitalization exercise led to an increase in bank performance as measured by the net

interest margin. And this result also aligns with the t-test of means conducted earlier.

4.6.2 CHOW TEST RESULTS FOR BANK RISK

Table 19.0 Results of Chow test for bank risk

Bank Risk Test Results

Dependent Variable: BankRisk

Source	Sum of Squares	df	Mean Square	F	Sig.	Critical Value
Contrast	.115	4	.029	1.806	.134	1.96
Error	1.465	92	.016			

The results in the table above show that the F value is 1.806 and that is less than the critical value of 1.96. Based on this I fail to reject the null hypothesis that there has been no significant change in the coefficients of the regression of the two groups of data. The conclusion drawn from this is that there is not enough evidence to suggest that there has been a significant change between the pre capitalization bank risk and the post capitalization bank risk. Thus, the bank recapitalization exercise did not lead to an increase in bank risk. And this result also aligns with the t-test of means conducted earlier where the null hypothesis was also accepted, and the conclusion was drawn that the bank recapitalization led to banks taking on less risk afterward.

CHAPTER 5

5.1 INTRODUCTION

This chapter culminates the findings of the research conducted to determine the effects of bank recapitalization on bank performance and bank risk in Ghana. The literature review and empirical evidence showed that most of the research conducted on this topic was outside the scope of African countries. It also showed that the results of those research were not consistent in every jurisdiction and one objective of this particular research was to find out what the results will be in Ghana as well as add on to the literature on this side of the world. This chapter will discuss the findings of the data analysis as well as give recommendations for further research and policy making. The hypothesis that was tested in this research is stated below.

Bank performance

Null Hypothesis: Bank recapitalization has a negative effect on bank performance.

Alternate Hypothesis: Bank recapitalization has a positive effect on bank performance.

Bank risk

Null Hypothesis: Bank recapitalization has a negative effect on bank risk.

Alternate Hypothesis: Bank recapitalization has a positive effect on bank risk.

5.2 SUMMARY OF RESULTS AND CONCLUSION

The results of the t-test of means conducted for bank performance showed that there was an overall increase in the means of the bank performance measures after the recapitalization exercise. The values for the t-test of means for return on equity, return on assets and net interest margin were all found to be statistically significant and therefore the null hypothesis was rejected. This shows that bank recapitalization has a positive effect on bank performance.

The t-test of means was also used to analyze the hypothesis for bank risk as well. The results show the difference of means recorded to be negative, which showed that the banks took on less risk but that was not statistically significant. Therefore, I failed to reject the null hypothesis and concluded that there was not enough evidence to conclude that the bank recapitalization actually led to banks taking on more risk.

After the t-test of means was conducted, a panel regression was done to determine the relationship between recapitalization and bank performance and bank risk. The results for bank performance show that, return on assets and net interest margin has a significant positive relationship with capital adequacy ratio while return on equity showed a negative relationship. Since two out of the three ratios show that an increase in bank capital leads to an increase in the bank performance, I reject the null hypothesis and conclude that bank recapitalization exercise has a positive effect on bank performance.

The panel regression for bank risk showed that the capital adequacy ratio after the recapitalization was positive and statistically significant, meaning the increase in bank

capital led to banks taking on more risk afterwards. This is inconsistent with the results obtained for the t-test of means.

A regression stability test was conducted after the panel regression to determine if there was indeed a significant change in the regression for bank performance and bank risk before and after the recapitalization exercise. The regression stability test conducted was the chow test. The results of the chow test for bank performance showed that all three performance measures, return on equity, return on assets and net interest margin, recorded an F value that was larger than the critical value of 1.96 that was calculated and had a p-value less than 0.05 . Based on this, I reject the null hypothesis that there was no significant change in bank performance before and after the recapitalization and conclude that the recapitalization had a significant effect on bank performance. This result means that the positive relationship observed in the two ratios in the panel regression is significant. Based on this and the results from the t-test of means I draw an overarching conclusion that bank recapitalization has a positive effect on bank performance.

The chow test conducted for bank risk showed that the F-value recorded was below the critical value of 1.96 and had a p-value greater than 0.05. I therefore fail to reject the null hypothesis. Since the t-test of means, and chow test have the same results, I conclude that the bank recapitalization exercise has a negative effect on bank risk. Thus, when there is a recapitalization exercise, banks take on less risk.

5.3 RECOMMENDATIONS

The importance of the banking system in Ghana cannot be overemphasized. Its role is tied to various aspects of the economy, but that also makes it important that it is properly regulated to avoid any bank failures. Even though increasing the minimum capital requirement, as a major tool for bank regulation has been proven to increase bank performance, I recommend that the government gives the banks enough time to raise the needed capital. They can do this by phasing out the increase. For the results of bank risk, the negative effect recorded does not imply that banks need to relax their exposure to risk. It is even more important that they take measures to ensure that their overall risk does not reach uncontrollable levels.

5.3.1 SUGGESTIONS FOR FUTURE STUDIES

Further studies to be conducted between bank recapitalization and bank performance and bank risk could face the problem of small sample size, hopefully, more banks will be listed on the Ghana Stock Exchange (GSE), and bank websites would be up to date with all their financial statements.

Further studies could also face the difficulty of selecting the best statistical measure to analyze the data as there are many, and results could vary based on the methods used. I would recommend that they use methods that have not been used in previous studies.

References

Adegbaju, A. A., & Olokoyo, F. O. (2008). Recapitalization and Banks' Performance: A Case Study of Nigerian Banks. Retrieved from https://core.ac.uk/reader/12356066

Agyei, S. K., & Yeboah, B. (2011). Working capital management and profitability of banks in Ghana. British Journal of Economics, 2, 2.

Akhtar, S., & Oliver, B. (2009). Determinants of Capital Structure for Japanese Multinational and Domestic Corporations*. International Review of Finance, 9(1–2), 1–26. https://doi.org/10.1111/j.1468-2443.2009.01083.x

Altunbas, Y., Carbo, S., Gardener, E. P. M., & Molyneux, P. (2007). Examining the Relationships between Capital, Risk and Efficiency in European Banking. European Financial Management, 13(1), 49–70. https://doi.org/10.1111/j.1468-036X.2006.00285.x

Antwi-Asare, T. O., & Addison, E. K. Y. (2000). Financial sector reforms and bank performance in Ghana. London: Overseas Development Institute.

Banahene, K. O. (2018). Ghana Banking System Failure: The Need for Restoration of Public Trust and Confidence. International Journal of Business and Social Research, 8(10), 01–05. https://doi.org/10.18533/ijbsr.v8i10.1145

Bank for International Settlement. (2001). Basel II: The New Basel Capital Accord. Retrieved from https://www.bis.org/publ/bcbsca02.htm

Bank of Ghana. (2004). Annual Report 2004. Retrieved from bog.gov.gh/wp-content/uploads/2019/07/AnnRep-2004.pdf

Bank of Ghana. (2009). Annual Report 2009. Retrieved from https://www.bog.gov.gh/wp-content/uploads/2019/07/AnnRep-2009.pdf

Bank of Ghana. (2017). Annual Report 2017. Retrieved from https://www.bog.gov.gh/wp-content/uploads/2019/07/AnnRep-2017.pdf

Bank of Ghana, (2019, January 4). Press Release Update on Banking Sector Reforms. Retrieved from https://www.bog.gov.gh/public-notices/3990-appointment-of-national-advisor-for-nib

Basel III: A global regulatory framework for more resilient banks and banking systems. (2010). https://www.bis.org/publ/bcbs189_dec2010.htm

Berger, A. N., & Bouwman, C. H. S. (2013). How does capital affect bank performance during financial crises? Journal of Financial Economics, 109(1), 146–176. https://doi.org/10.1016/j.jfineco.2013.02.008

Berger, A. N., & Bouwman, C. H. S. (2012). How Does Capital Affect Bank Performance During Financial Crises? (SSRN Scholarly Paper ID 1739089). Social Science Research Network. https://papers.ssrn.com/abstract=1739089

BOG. 2004. Financial Administration Regulations, 2004 [PDF File]. http://www.gaccgh.org/publications/Financial_Administrative_Manual.pdf

BOG. 2017. Notice To The Banks And The General Public, 2017 [PDF File]. https://www.bog.gov.gh/privatecontent/Banking_Supervision/Notice%20on%20New%20Minimum%20Paid%20Up%20Capital.pdf

Calem, P., & Rob, R. (1999). The Impact of Capital-Based Regulation on Bank Risk-Taking. Journal of Financial Intermediation, 8(4), 317–352. https://doi.org/10.1006/jfin.1999.0276

Calormiris, C. W., & Wilson, B. (1998). Bank Capital and Portfolio Management: The 1930's Capital Crunch and Scramble to Shed Risk (Working Paper No. 6649). Retrieved from National Bureau of Economic Research website: http://www.nber.org/papers/w6649

Chiuri, M. C., Ferri, G., & Majnoni, G. (2000). The macroeconomic impact of bank capital requirements in emerging economies - past evidence to assess the future. Retrieved from http://agris.fao.org/agris-search/search.do?recordID=US2012428071

Chimpango, B. (2017). The Development of African Capital Markets: A Legal and Institutional Approach. Taylor & Francis.

Damodaran, A. (2007). Return on Capital (ROC), Return on Invested Capital (ROIC) and Return on Equity (ROE): Measurement and Implications (SSRN Scholarly Paper ID 1105499). Social Science Research Network. https://papers.ssrn.com/abstract=1105499

Diamond, D. W. (1984). Financial Intermediation and Delegated Monitoring. Review of Economic Studies, 51(3), 393–414.

End, J. W. V. den. (2016). A macroprudential approach to address liquidity risk with the loan-to-deposit ratio. The European Journal of Finance, 22(3), 237–253. https://doi.org/10.1080/1351847X.2014.983137

Enoch, O. K. (2013). Bank Recapitalization and Lending Behaviour: A Pragmatic Evident from Nigeria Banking Sector. Journal of Finance and Investment Analysis, 2(4), 1–10.

Homar, T., & Wijnbergen, S. V. (2016, February 13). Bank recapitalisation and economic recovery after financial crises. VoxEU.Org. https://voxeu.org/article/bank-recapitalisation-and-economic-recovery-after-financial-crises

Knight, K. B. and J. (2009, July 15). When Is Debt Good? Harvard Business Review. https://hbr.org/2009/07/when-is-debt-good

Kwan, S., & Eisenbeis, R. (1997). Bank Risk, Capitalization, and Operating Efficiency. Journal of Financial Services Research, 12(2–3), 117–131.

Ladime, J., Sarpong-Kumankoma, E., & Osei, K. (n.d.). Determinants of Bank Lending Behaviour in Ghana. Retrieved November 3, 2019, from https://scholar.googleusercontent.com/scholar?q=cache:tEZUZ_3ExV0J:scholar.google.com/&hl=en&as_sdt=0,5

Mangram, M. E. (2013). A Simplified Perspective of the Markowitz Portfolio Theory (SSRN Scholarly Paper ID 2147880). Social Science Research Network. https://papers.ssrn.com/abstract=2147880

Milne, A., Whalley, A. E., & Wood, G. (2001). Bank Capital Regulation and Incentives for Risk-Taking 1.

Montgomery, H., & Shimizutani, S. (2011). The Effectiveness of Bank Recapitalization in Japan. https://core.ac.uk/display/7101579?recSetID=

Oleka, D. C., & Mgbodile, C. C. (2014). Recapitalization Reform and Banks' Performance—Empirical Evidence from Nigeria. Research Journal of Finance and Accounting, 5(6), 96-101–101.

Oluitan, R. O., Ashamu, S. O., & Ogunkenu, O. S. (2015). The Effect of Recapitalization on Bank Performance in Nigeria. https://doi.org/10.5296/ifb.v2i1.7915

Osei-Assibey, E., & Asenso, J. K. (2015). Regulatory capital and its effect on credit growth, non-performing loans and bank efficiency. Journal of Financial Economic Policy. https://doi.org/10.1108/JFEP-03-2015-0018

Rahman, M. M., Uddin, K. M. K., & Moudud-Ul-Huq, S. (2015). Factors affecting the Risk-taking Behavior of Commercial Banks in Bangladesh. Applied Finance and Accounting, 1(2), 96–106. https://doi.org/10.11114/afa.v1i2.850

Reforming Bank Capital Regulation | AEI. (2001, June 18). American Enterprise Institute - AEI. https://www.aei.org/articles/reforming-bank-capital-regulation-2/

Rojas-Suarez, L. (2002). Can International Capital Standards Strengthen Banks in Emerging Markets? (SSRN Scholarly Paper ID 300895). Social Science Research Network. https://papers.ssrn.com/abstract=300895

Rose, P., & Hudgins, S. (2006). Bank management and financial services. The McGraw−Hill. http://localhost:8080/xmlui/handle/123456789/104

Saksonova, S. (2014). The Role of Net Interest Margin in Improving Banks' Asset Structure and Assessing the Stability and Efficiency of their Operations. Procedia

- Social and Behavioral Sciences, 150, 132–141.
https://doi.org/10.1016/j.sbspro.2014.09.017

Samadji, G. (2018, July). Bank capital structure and financial performance: a comparative analysis of foreign banks and domestic banks in Ghana. Http://scholar.googleusercontent.com/scholar?q=cache:_epjvqzzphcj:scholar.google.com/+bank+capital+structure+and+financial+performance:+a+comparative+analysis+of+foreign+banks+and+domestic+banks+in+ghana&hl=en&as_sdt=0,5

Sbeiti, W. (2010). The Determinants of Capital Structure: Evidence from the GCC Countries | Semantic Scholar. https://www.semanticscholar.org/paper/The-Determinants-of-Capital-Structure-%3A-Evidence-Sbeiti/c759b5e1a0a1a1598f2ea69ae687d97bcb5fd899

Steinherr, A. (1997). Banking Reforms in Eastern European Countries. Oxford Review of Economic Policy, 13(nr 2), 106–125.

Tanna, S., Kosmidou, K., & Pasiouras, F. (2005). Determinants of profitability of domestic UK commercial banks: Panel evidence from the period 1995-2002. In Money Macro and Finance (MMF) Research Group Conference 2005 (No. 45; Money Macro and Finance (MMF) Research Group Conference 2005). Money Macro and Finance Research Group. https://ideas.repec.org/p/mmf/mmfc05/45.html

Ugwuanyi, G. (2015). Regulation of Bank Capital Requirements and Bank Risk-Taking Behaviour: Evidence from the Nigerian Banking Industry. International Journal of Economics and Finance, 7. https://doi.org/10.5539/ijef.v7n8p31

Valla, N., Saes-Escorbiac, B., & Tiesset, M. (2006). Bank liquidity and financial stability. Financial Stability Review, 9, 89–104.

Wiafe, A. N. (2019, July). University of Ghana effect of the minimum capital requirements on performance of banks in Ghana by Akua Nsowaa Wiafe 10045592 th. Http://scholar.googleusercontent.com/scholar?q=cache:u3xox6hpfywj:scholar.google.com/&hl=en&as_sdt=0,5

Wooldridge, J. M. (2015). Introductory Econometrics: A Modern Approach. Cengage Learning.

World Bank. (2019, June 14). Ghana Economic Update: Enhancing Financial Inclusion. World Bank. https://www.worldbank.org/en/country/ghana/publication/ghana-economic-update-enhancing-financial-inclusion

Yalley, S., Djibom, H., Boachie-Yiadom, E., & Kunawotor, M. (2018, September 10). Bank Recapitalization in Ghana, Who Benefits the More? By Stephen Yalley,

Hanania Djibom, Eric Boachie-Yiadom, Mark Kunawotor: SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3266142