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BRANCH BANKING, EFFICIENCY AND STABILITY IN THE GHANAIAN BANKING SECTOR

BY

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DECLARATION

I hereby declare that this thesis is my own work produced from research undertaken under supervision. This thesis has not been presented by anyone for any academic award, in this or any other institution. All references made to work done by other studies have been duly acknowledged. I am solely responsible for any shortcomings of this study.

……. ……..

FREDERICA ESI ASOMAWOMA ANNAN DATE

CERTIFICATION

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

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DEDICATION

I dedicate the entire work to my husband, parents and siblings.

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BoG	Bank of Ghana
DEA	Data Envelopment Analysis
GDP	Gross Domestic Product
NPL	Non-Performing Loans

ABSTRACT

The purpose of the study is to investigate the relationship between branch banking and stability using efficiency as a conduit in the Ghanaian banking sector. Two measures of bank stability (the z-score and non-performing loans ratio proxies) were used. This is to ensure that the analysis of the relationship was from two complementary dimensions i.e. instability resulting from the risk of insolvency and non-performing loans. The fixed effect model was used to assess the impact of both bank-specific factors and macroeconomic indicators on bank stability after the Hausman test was adopted to ascertain the right model. The Data Envelopment Analysis (DEA), however was used to determine the efficiency of the banks using five output and input variables each. Again, the regression analysis was used to estimate the driving factors of efficiency with specific emphasis to bank branches.

For the efficiency measure, the findings revealed the branch ratio as a significant factor driving efficiency of banks. Whereas for the stability measure, the findings ascertained a significant relationship for the branch variable when the NPL stability proxy was used. However, an insignificant relationship was ascertained between the branch variable and the z-score stability proxy.

The implication of the study to regulators, as well as policy makers in Ghana must consider the role of bank branches in the Ghanaian economy as a driver for stability.

The study is one of the few studies to ascertain the impact of bank branches considering both bank-specific variables and macroeconomic indicators on the stability of the Ghanaian banking sector.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

The study would investigate the relationship between branch banking and efficiency and finally how this impacts stability in the banking sector using data envelopment analysis, regression analysis and fixed effect panel model. This chapter therefore, covers the background of the study, the problem statement, the objectives of the study, the research questions, scope of the study, significance of the study and finally, the organization of the study.

The next section would highlight the background for the study.

1.2 Background to the Study

Branch banking is inevitable considering the plethora of changes all over the world, as well as the growing population and the competition in the banking sector. Various researchers have examined how branch banking affects rivalry in the banking sector and stability in an economy (Berger, Demsetz, & Strahan, 1999). The contribution of banks can indeed not be overemphasized as they have immense impact in the economy. To add on to the immense economic impact of banks, the competitive nature of the industry emphasizes the importance of analyzing the performance of banks and further evaluate their effect on the stability in the banking sector. This study, therefore, highlights the role of branch banking in terms of their performance as well as their effect on the stability in the Ghanaian banking space.

The role of branches of a bank is to serve as an intermediary for the parent or headquarters by collecting monies from depositors and other sources of funds from shareholders and creditors and

supplying the monies accumulated in various ways as loans, mortgages, financial claims and other forms of financial products and services. According to Paradi, Rouatt and Zhu's (2011) study, a branch would be considered efficient and effective if it is capable of giving out loans and is able to receive periodic payments for the loans given out. Branches of banks were established to create convenience for those with cheap deposits as a result of the challenge accompanying the marketing of financial products and services (Howcroft, 1993). The increase in branches served as an active barrier to entry in the economy. The reasons for branch banking as revealed in various studies included the desire for existing banks to increase the portion of their market share, strategy for regulating new entrants in the banking sector as a result of increasing branches of existing banks (Cohen & Mazzeo, 2010). Other researchers also reveal advancement in technology as a reason for branching as larger banks are able to compete with smaller banks thereby gaining competitive advantage (Berger, Goldberg & White 2007). This technological advancement has also helped larger banks who encountered the challenge of low operational efficiency as a result of long distance from the parent bank to mitigate this problem (Berger & DeYoung, 2006).

Performance measurement of branches can be linked to the increase in branch openings as a result of increased competitiveness thereby increasing bank quality in terms of service, skilled employees, operational efficiency, increased networks etc. (Dick, 2006). Measuring the performance of the branches of banks for the purpose of this study would be from the efficiency angle of the banks in the Ghanaian economy. This task calls for a meticulous analysis as a result of the varying products and services offered as well as the sizes and the geographic locations of the banks (Tsolas & Giokas, 2012). Again, with regards to performance measurement of banks, competition encountered by the various financial institutions has had great impact on the profitability of these firms. The measure of profitability as developed by Thygerson (1991) was

founded on two major assumptions namely: the investment decisions of the firms and the distribution systems of the firms. This method has been adopted by several researchers in their study. For instance, the method revealed a strong relationship between service efficiency and profitability (Oral & Yolalam, 1990). Though Thygerson (1991) thought it unwise for a branch to be evaluated by a single performance measure, as a result of the numerous dimensions of bank performance, efficiency also has various dimensions that can evaluate a branch's performance into details. Jayaratne and Strahan (1998) on the other hand, related their study to non-interest costs, wages, and loan losses which decreased as a result of branch deregulation. In contrast to their study, Hughes, Lang, Mester and Moon (1999), revealed improved performance of banks after the deregulation. Other studies, also used financial indices (i.e. return on assets, size of non-performing loans, market value of equities etc.) as a measure of performance (Hirtle, 2007).

Efficiency as a measure of performance can indeed not be overemphasized. Since efficiency comprises increased revenue, cost minimization, operational efficiency, several researchers in their studies revealed how branches of banks reduced their operational cost (Hensel, 2003). This study was conducted on banks in Europe which revealed this advantage as a result of branch banking. Again, another study by Evanoff and Ors (2008), revealed that cost improved when a smaller bank is acquired by a larger bank. However, Valverde, Humphrey and Paso (2007) are of a different view since their studies conducted in Spain, revealed that the increase in bank branches as well as the use of ATMs were major factors of the cost inefficiency among banks in Spain. Another study also revealed no relationship between efficiency and branch networks (Hirtle, 2007).

The banking sector in Ghana as at July, 2017 comprised thirty-six (36) banks, of which nineteen (19) are domestically controlled and the rest are foreign-owned. The number of bank branches is 1,377 branches distributed across the ten (10) regions of the country (Banking Sector Report, July

2017). The year 2017 recorded the number of licensed banks as thirty-four (34) on account of the revocation of the licenses of two insolvent banks: UT and Capital banks as at December (2017). Their licenses were revoked in July 2017 due to their severe capital impairment. Though these banks had high visibility and the perception was that they were performing well, they failed as a result of severe capital deficiencies. The root cause of these capital impairment can be directly attributed to the poor lending practices which affected the quality of credit of both banks. Matters with regards to poor risk management procedures, weak oversight responsibility on the part of the board, funds diversion to related parties as some placements could not be traced, irregular board meetings, high interference of non-executive directors in the daily operations of the banks, high compensation schemes for executive directors that did not commensurate with the banks' operations and efforts in being efficient in all compounded the failure of these two banks. Again, they did not adhere to the principle of credit management as no evidence of interest payments were traced on the banks' investments, customers placements could also not be traced to the records of the banks though some customers were able to provide evidence of their investment with the banks, therefore, leading to the impairment of their investments. Of the thirty-four (34) licensed banks, seventeen (17) are now domestically-owned (i.e. from 19 as at July 2017), while the rest of the seventeen (17) banks are still foreign-owned. The close of December 2017 reported the increase in the number of bank branches from 1,377 to 1,483 across the ten (10) regions of the country (Banking Sector Report, December 2017). Finally, the number of banks as at July 2018 revealed thirty (30) banks that have been licensed to operate.

An overview of the regulations in Ghana reveal how the Banking Acts (IDPS, 2009) has evolved as a response to the significant and rapid changes in the banking industry over the years to enhance the financial system. For instance, The Banking Act 2004 (Act 673) was adopted in place of the

Banking Law 1989 (PNDCL225) in 2004. Again, in 2006, the Foreign Exchange Act 2006 (Act 723) was passed to regulate foreign exchange transactions including payments, transfers, investments, taxes etc.; and the Whistle Blowers Act 2006 (Act 720) was passed to encourage persons to expose any criminal, corrupt or illegal conduct. In 2007, the Credit Reporting Act 2007 (Act 726) was also passed to enhance the supervisory role of BoG with regards to credit bureau operations, reports, data protection and other credit reporting activities of credit bureaus and financial institutions. The Fair Wages and Salaries Commission Act, 2007 (Act 737) was also passed in 2007 to ensure transparency on matters related to salaries classification and grading, job analysis and evaluation, allowances etc. The Banking (Amendment) Act 2007 (Act 738) was passed to strengthen the financial sector and also attract foreign direct investment, create employment. Again, four Acts were passed in 2008. These Acts were the Borrowers and Lenders Act, 2008 (Act 773) to enhance disclosure on lending and borrowing and promote loan recovery systems; the Non-Banking Financial Institutions Act, 2008 (Act 774) to regulate all matters of non-bank financial institutions; the Home Mortgage Finance Act, 2008 (Act 770) to provide a framework for mortgage financing and eliminate bottlenecks; and finally the Anti-money Laundering Act, 2008 (Act 749) to regulate any unlawful activity such as terrorist financing, weapons for destruction or any other organized crime. The adoption of International Financial Reporting Standards (IFRS) by financial institutions was also a directive from BoG for Banks to comply with. All these regulations were put in place in order to enhance as well as stabilize the banking systems in Ghana therefore portraying the great headway the economy of Ghana has made in the banking sector.

Financial stability alternatively, is defined as a state where institutions do not suddenly collapse and cause adverse economic effects to the public who could not have reasonably anticipated the

collapse (Allen & Wood, 2006). Studies that examined the effects of bank branches on stability argued that, through competition resulting from the increase in bank branches, slightly profitable banks are forced out of the industry through mergers or liquidating voluntarily (Matutes & Vives, 1998; Koskela & Stenbacka, 2000). Again, as these frail or inefficient banks exit, a state's banking system improves significantly due to consolidation. They further argued that, increase in competition lead to a fall in interest rates. Thereby, enhancing debtors ability to remain solvent and repay the amount borrowed (i.e. the credit advanced or loans) as a result of the reduced interest rates, thus, leading to a fall in instability. Also, the increase in competition leads to a fall in profits resulting from the likelihood of banks taking up more risks. Other researchers also confirmed that the increase in bank branches increases systemic stability. They found a positive correlation between bank branching and financial stability (Wheelock, 1995; Mitchener, 2004).

The effects of bank branch on stability as examined by various researchers such as Carlson (2004), Carlson and Mitchener (2006), Calomiris and Mason (2000) have revealed consistency with the above studies. They revealed that increase in bank branches tended to stabilize the economy through competition as weak banks would be eliminated from the banking space as a result of their inefficiency and greater diversification in the form of diversified risk and loan portfolio. Mitchener (2004) revealed that laws that prohibited branch banking and high reserve requirements contributed to the increase in bank instability during the great Depression. They revealed that the relationship between bank branching and suspension rates was positive and significant. This suggests that state that allowed branching had lower suspension rates (i.e. instability) than states that did not.

The evidence of bank branching globally according to Pasiouras and Zopundis (2008), in their study revealed how the Greek banking system has evolved over the years especially how the

deregulation process attracted new entrants into the market through strategic alliances. By 2008, there were 19 Greek commercial banks with 27 branches (Bank of Greece, 2009). This deregulation was not quite different from the US. This is because US banks increased with more branches when there was a ban lift, that is, the legislation on the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA S 102 and 103) in 1994 that permitted the banks to increase their branches (Johnson and Rice, 2008). Again, Japan also had restrictions on bank branching before the 1980s and was gradually removed till 1997 (Harimaya and Kondo, 2016). The removal of the restrictions on bank branching in Japan, therefore gave banks the opportunity to freely open as many branches as possible without any permission from their Financial Regulators (i.e. Financial Services Agency).

Studies in Africa on the other hand, have also revealed how the size of a bank affects information asymmetry on financial access (Asongu & Nwachukwu, 2018) in thirty-nine African countries. Other researchers have also examined the distribution of branches across the rural and urban areas in Ghana (Ansong, Chowa, & Adjabeng, 2015). Their study discovered that the branches of banks were concentrated in urban areas than rural areas thereby contributing to inaccessible financial services to about 70% of Ghanaians. Sufian and Kamarudin (2016) conversely, assessed how globalization has influenced the banking industry in South Africa. They confirmed that banks with parent in highly developed economies performed very well in terms of high profitability levels than banks with parents in countries with numerous social and political problems. These social and political problems normally affect all sectors especially sectors that contribute highly to economic growth. In Ghana, the financial system is highly dominated by the banking sector as the proportion of financial sector assets to GDP grew from 48% in 2010 to 68% in 2016. Of this proportion to GDP, commercial banks had the highest contribution of 47% in 2016, which was then followed

by 9.4% from the fund management sector and finally the pension sector with 9.2% (World Bank Ghana, 2018)

1.3 Problem Statement

The desire for banks to take over greater portion of the market share in an economy as a result of increased competition in the sector has led these institutions to increase the number of branches, they have in order to achieve this objective (Cohen & Mazzeo, 2010). There have been considerable studies on bank branching over the years. Some researchers have examined the evolution of branches of many banks before restrictions on branches and after the ban lift of these restrictions on bank branches in the USA (Hendrickson, Nichols, & Fairchild, 2014). Their study revealed how branches of banks increased after the ban was lifted and the legislation permitted their ability to open more banks. Other studies have also examined the advantages of increased branching from the efficiency and profitability perspectives resulting from competition (Carlson & Mitchener, 2006). They explained that competition has the ability to make these firms operate efficiently in order to survive. Again, Stiroh and Strahan (2003), revealed how competition can distinguish between the weak and inefficient as compared to the strong and efficient banks thereby driving the inefficient ones from the market. In contrast, Carlson and Mitchener (2006) further revealed the disadvantages of increased branches from inefficiency and monopoly perspectives. Additionally, they emphasized that as a result of competition thereby driving weaker banks out of the market, there would be monopoly in the banking sector. Again, Asongu and Nwachukwu (2018) in their study on Africa also revealed that inefficiencies would increase since the bank branches would encounter difficulty in the satisfaction of customers' needs and requests thereby increasing the probability of mistakes or faults in carrying out duties.

Also, evidence from Ghana has shown a rapid decline in the number of banks from 36 banks in 2017 to 30 banks in July 2018 as a result of license revocation by the Bank of Ghana (2017) following capital impairment issues, non-performing loans, operating under false license, insolvency and other internal operations issues. (Addison, 2018). These were the challenges that led to the collapse of these banks from BoG's point of view. BoG and other studies did not consider the contribution of the role of branches to the stability of the Ghanaian banking economy.

However, studies in Ghana have focused on the relationship between the efficiency of banks and financial programs that focused on bank restructuring (Isshaq & Bokpin, 2012). Mathisen and Buchs (2005) on the other hand assessed the level of competition in the Ghanaian banking sector and highlighted that the structure, market characteristics constitute an indirect barrier to entry thereby impacting negatively on the performance of the Ghanaian banking sector. It is important to note that the numerous studies in the above underscores examined by the various researchers focused on various aspects of the banking sector but did not limit their study to the branches, performance in terms of efficiency of these banks and the impact on the stability in the Ghanaian banking sector. This as well as the various capital impairment, corporate governance and other issues arising in the Ghanaian banking sector calls for investigating how branching feeds into efficiency of banking in Ghana. In Ghana, the study of Kwetey, Caesar, Appiah and Cobblah (2018) revealed that banks with good standing could extend more efforts in building more branches across the country to increase the patronage of banking services by the 70% of Ghanaians who are still unbanked. Their study further stressed on the importance of increase in branches of banks as the majority who are unbanked revealed their fears concerning the protection of their hard-earned funds in their personal possession. Adusei (2016), on the other hand stressed on the need for macro-prudential indicators (i.e. technical efficiency) to be designed in order to evaluate as well as

monitor the vulnerability in the financial sector of Ghana, given its recent crises. Again, fewer studies have investigated the overall impact of the increase in the branches of bank on profitability (Harimaya & Kondo, 2016). Whereas, Balfour, Joo, Whited and Lin (2015) identified that future researchers should broaden the variables used in analyzing a branch as well as measuring the efficiency of the banks over time as their study relied on a month's data.

Brick and mortar banks have the ability to reach out to potential and new clients and also offer new products and services. The various benefits that accrue to the presence of brick-and-mortar include improved trust, increased brand awareness etc. For instance, reduced consumer risk which results from accessible location. This is when clients can easily register complaints and sometimes return goods. Marketing theorists on the other hand have argued that brick-and-mortar can be capitalized on to increase brand awareness. This is because consumers build trusts through branding (i.e. familiar name) which are directly linked to established firms; before trust can even be extended to online services (Granovetter, 1985). A study in Turkey by Onay and Ozsoz (2013) also found that online banking has not come to compete rather complement the brick-and-mortar banking as the study revealed a substantial fall in profits as a result of increased competition from the online platforms. Bhatnagar and Ratchford (2004), Neslin et al. (2006) in their study argued that as businesses provide more channels of distribution, there is an increase in sales, the search cost of customers are reduced hence creating convenience for customers.

Again, Ghanaian banks in the earlier period as shown in Tables 1.1 to 1.3 did not branch quite unnecessarily as some banks in the middle and late period tables did.

Figure 1.1: Increasing number of bank branches in the Ghanaian economy

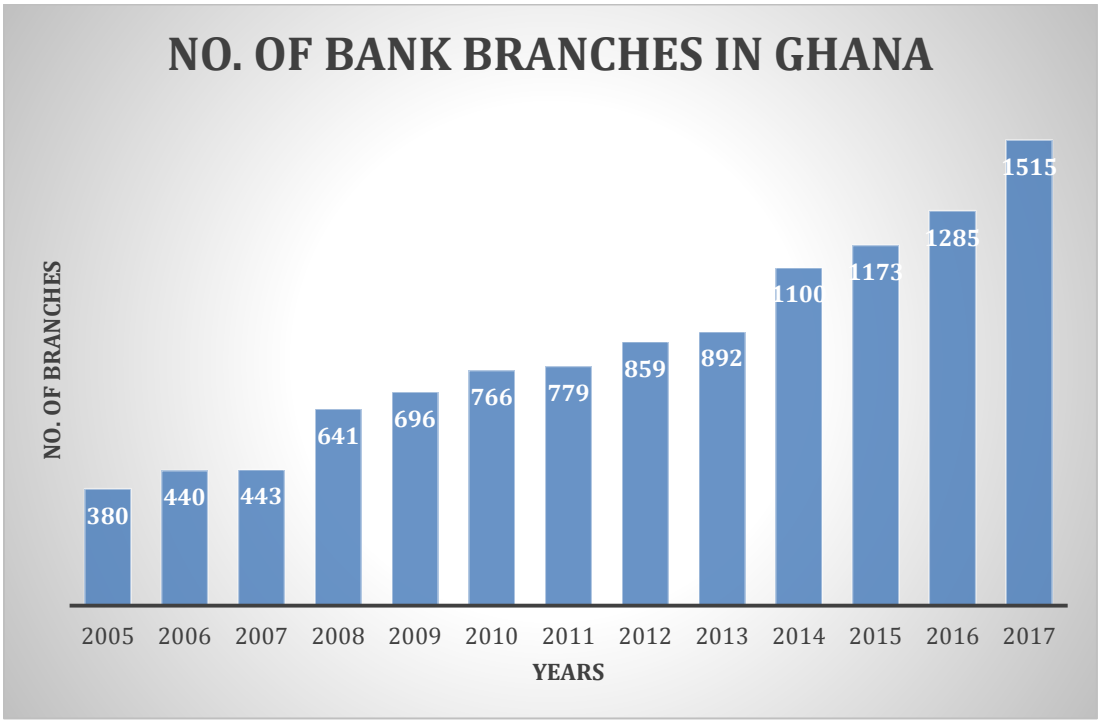

Figure 1.1 illustrates the increasing number of branches in the Ghanaian economy from 2005-2017. It is interesting to note that the growth of branches has been consistently increasing over the period from 380 branches in 2005 to 1515 branches in 2017. Some researchers have argued that the motivating factors for increase in the number of branches include: the fact that existing banks would want to grow their market share before they experience any increase in competition from other banks; again, another factor is that of the strategy of creating a barrier to entry by potential banks as increase in bank branches discourage new banks from entering the industry (Cohen & Mazzeo, 2010).

Figure 1.2: Branches, Non-Performing Loans (NPL) Ratio and Z-Score

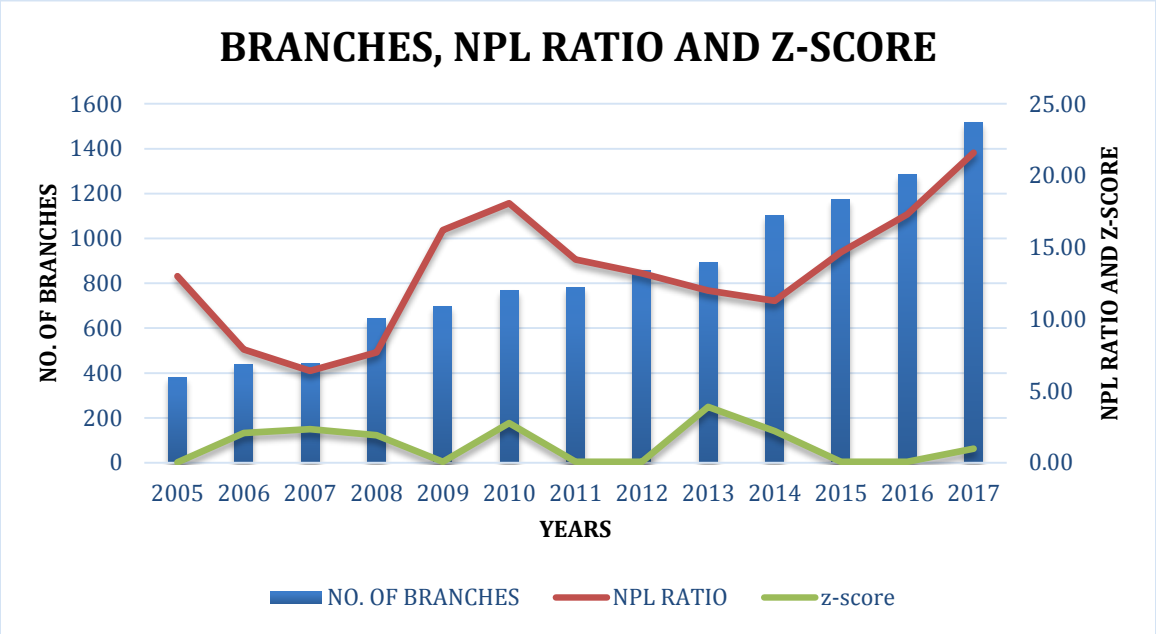

Figure 1.2, on the other hand, shows increase in the number of branches of banks as against non-performing loan ratio and the z-score. Again, it is quite clear as to the unstable nature of the non-performing loans ratio as branches of banks increases. The non-performing loans ratio was 13% when the number of bank branches was 324 in 2005 and was quite unstable till it started increasing in 2014 from 11.27% when the number of bank branches was 1100 through to 21.59% in 2017 when the number of bank branches was 1515. On the other hand, the z-score was also not stable as the number of branches increased however, the figure illustrates that from the year 2014, as the NPL ratio and branches were increasing, the z-score was decreasing. The above figure illustrates the relatively unstable nature of both the NPL ratio and z-scores as the number of bank branches increased and therefore tends to serve as a major motivating factor for the study which would statistically test in a regression framework if the increase in the number of bank branches influenced stability positively or negatively.

Table 1. 1: Early Period Banks

Name of Bank	Year bank commenced	No. of branches (as at 2017)	Years in existence
Standard Chartered Bank Ghana Limited	1896	27	122
Barclays Bank Ghana Limited	1917	60	101
GCB Bank Limited	1953	183	65
National Investment Bank Limited	1963	49	55
Agricultural Development Bank Limited	1965	78	53
Universal Merchant Bank Limited	1971	38	47
Societe Generale Ghana Limited	1975	43	43
CalBank Limited	1990	30	28
Ecobank Ghana limited	1990	68	28
Republic Bank Ghana Limited	1990	43	28
Prudential Bank Limited	1993	40	25
First Atlantic Bank Limited	1994	31	24
FBNBank Ghana limited	1996	18	22
Bank of Africa Ghana Limited	1997	26	21
Stanbic Bank Ghana limited	1999	39	20

The table above shows how banks who started operations in the early period (1896-1999) did not branch unnecessarily. These banks are classified as early period as a result of their long years of being in existence. Their years have been proxied by 20 to over 100 years of operations in the Ghanaian economy. For instance, Standard Chartered Bank, Ghana has 27 branches currently and it is the bank with the longest years of operation in Ghana since it has been in existence for over 122 years, which is then followed by Barclays Bank with 60 branches and has been operating for

over 101 years through to Stanbic Bank Ghana Limited which has 39 branches and has been in existence for 19 years.

Table 1. 2: Middle Period Banks

Name of Bank	**Year bank commenced**	**No. of branches (as at 2017)**	**Years in existence**
UniBank Ghana Limited	2001	57	17
Guaranty Trust Bank (Ghana) Limited	2004	32	14
United Bank for Africa (Ghana) Limited	2005	28	13
Zenith Bank (Ghana) Limited	2005	27	13
Fidelity Bank Ghana Limited	2006	72	12
Bank of Baroda Ghana Limited	2007	3	11
Access Bank (Ghana) Limited	2008	47	10
Sahel Sahara Bank Ghana Limited	2008	17	10
Energy Commercial Bank Limited	2011	12	7
The Royal Bank Limited	2011	28	7

The table above portrays how banks who also started operations in the middle period (2001-2011) also increased the number of branches quite acceptably. These banks are classified as middle period as a result of their years of being in existence is quite satisfactory. Their years have been proxied by 5 to 19 years of operations.

Table 1. 3: Late Period Banks

Name of Bank	Year bank commenced	No. of branches (as at 2017)	Years in existence
First National Bank	2015	7	3
GHL Bank Limited	2017	4	1
GN Bank Limited	2014	298	4
Heritage Bank Limited	2016	6	2
OmniBank Ghana Limited	2016	25	2
Premium Bank Ghana Limited	2016	4	2
Sovereign Bank Limited	2016	4	2
The Biege Bank	2017	70	1
The Construction Bank (Gh) Limited	2017	1	1

The table above again illustrates how banks who also started operations in the late period (2015-2017) increased their branches quite unreasonably. These banks are classified as late period as a result of their years of being in existence being satisfactory. Their years of operation have been proxied by 5 years and below.

Consequently, based on the above factors, there is the need to undertake a study to evaluate the impact of bank branching on the stability in the Ghanaian banking sector through the efficiency of the various banks over a period of thirteen years using Data Envelopment Analysis and Regression analysis to fulfill the current research gap in the area. Hence, this study will examine bank branch efficiency in Ghana with particular emphasis on the impact of bank branching on the stability of the banking sector.

The purpose of this study is to investigate the relationship between bank branching and efficiency as well as its impact on stability in the Ghanaian banking sector. As identified from the above, this study will have implications for policymakers such as regulators in the banking sector in Ghana as well as filling in the empirical gap for literature and theory.

1.4 Research Objectives

The general research objective of this study is to examine the impact of the increasing number of branches of banks in the banking sector. Specifically, with reference to Ghana, the study will:

a. Investigate the relationship between bank branching and efficiency.
b. Assess the impact of bank branching on bank stability.

1.5 Research Questions

Based on the above objectives, the following research questions will be addressed in this study:

a. What is the efficiency performance of banks?

b. What are the factors driving bank efficiency?

c. What is the impact of bank branching on bank stability?

1.6 Scope of the study

The study examines the relationship between bank branching and stability. The study focuses on banks in the Ghanaian economy thereby excluding other financial players such as the insurance sector, micro-finance institutions, credit unions, discount houses, leasing companies and other non-bank institutions in the financial system. Expanding the scope would demand extra time from the researcher as the period for the study is very limited and can accommodate a study within the

banking sector Ghana. It also relies mostly on the annual data of individual banks in the Ghanaian economy and excludes banks without data for a particular period of collapse.

1.7 Significance of the Study

The findings from the study would make the identification of potentially efficient banks easier as the potential strengths and efficiency of the operations of the banks would be identified.

With implications to policymakers and regulators (such as Bank of Ghana), they would better be informed about the major drivers of performance and stability in the banking industry to apprise their decisions when implementing policies and regulations. The study again would highlight some policy suggestions that would enable policy makers to provide avenues to help banks that are not performing well to make them efficient.

The contribution of the study to academia would be an immense contribution to the ongoing literature on the impact of branch efficiency on bank stability as other researchers can rely on this in further studies for the banking sector.

1.8 Organization of the Study

This section gives a brief summary of the chapters and how these chapters would be organized in this study. The study comprises five main chapters as follows: this chapter (chapter one) has already introduced the topic by highlighting the background, the problem statement, research questions and objectives of the study, scope and limitation of the study, significance as well as the organization of the study. Chapter two (the literature review) would highlight the theoretical and empirical underpinnings of the study by outlining the necessary background for the discussion of the findings in chapter four; chapter three (the research methodology) would account for the data analyzed and tools used in the analysis thus, it will describe, the research design, the data collection

techniques and the data analysis used for the study; chapter four (the discussion of results) would discuss the findings obtained after the analysis; and chapter five (the implications and recommendations) would outline a summary of the findings as well as conclusions drawn and suggest recommendations to enhance the banking sector in its operations to improve efficiency.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on Bank Branching, Profitability and Stability. It addresses the following thematic areas: review of theoretical literature, review of empirical literature on bank branch, efficiency and stability and finally the chapter conclusion.

The purpose of a branch is to play an intermediary role between the bank and customers and the performance of a branch would directly influence the overall performance of the bank (Tsolas, 2011). Generally, the banking sector has seen major improvements all over the world with regards to the number of branches a bank could operate. Greek, USA, Japanese, Korea and other countries have faced the challenge of operating a bank with increasing their branches worldwide.

The Ghanaian banking sector has seen numerous improvements in the banking sector since the 1980s. There were previously nine banks in 1988 which increased to sixteen banks in 2000 and currently 30 banks in 2018. The current interest of the performance of banks in Ghana can be tied to micro-economic reasons such as corporate governance issues, the regulatory requirement for capital, non-performing assets as well as macroeconomic reasons such as uncertainty of the political conditions etc. International ratings of the performance of banks have also not been left out. Currently Ghana has been rated from B- to B for the long-term local and foreign currency sovereign credit rating (S&P, 2018) which is a positive news for the financial sector. Banks in every economy, aside the provision of banking services also serve as long-term capital investment. For this reason, the regulators of these banks need to consider the corporate governance issues, the

majority stakeholders' interest, the management and financial condition of the banks in itself and other related issues in response to the rising challenges in the financial sector (Buriak, 2014).

2.2 A Case for Branch Banking in Ghana

The general increase in technological innovations which include the use of ATMs, mobile banking as well as and internet platforms are now contending with branch banking which serve as the major conduit for the delivery of financial services around the world. To reorient the concept of branch banking based on financial inclusion, there is a need to be aware of the seventy percent of Ghanaians who are unbanked (World Bank, 2014). In the study of Kwetey et al., (2018) which was conducted in Ghana, it was revealed that individuals consider the reputation (i.e. how long a bank has been in existence and how well it has performed over the period). Their findings indicated that key banks in the country with good standing could extend their efforts in building more branches across the country to increase patronage of bank products and services in order to reduce the proportion of the unbanked population in the country.

Again, to buttress the point of increasing the branches of banks in Ghana their findings further revealed that, most individuals who are unbanked believed that keeping money with them was not safe at all and that they were really scared of keeping monies in their personal possession. The respondents again, revealed that they will patronize the banking facilities if they had easy access to financial institutions to safeguard their monies.

The role of the branches of banks can indeed not be overemphasized in the African setting because they play important role as the channels for financial service delivery (Ergungor & Moulton, 2011). The World Bank Report again, revealed that about 71.20% Ghanaians who are account holders use the banking halls to withdraw cash whereas 94.30% use the banking hall as their

primary mode for cash deposits. Despite the increase in bank branches by some of the banks over the years, bank penetration sill continues to be low as revealed by some analysts in the Ghanaian setting.

In Ghana, the state-controlled banks dominated the financial sector before the 1980s since there were only 2 foreign banks (i.e. Barclays and Standard Chartered Banks) according to Asamoah (2008). This was because the environment in terms of restrictions from regulatory bodies were unfavorable to any private bank. The Bank of Ghana (the Central Bank and the regulator of banks in Ghana) in its bid to develop the financial market collaborated with the World Bank and introduced the Structural Adjustment Program (SAP) to promote fiscal and monetary discipline as well as to also remove any governmental restrictions as opined by Aryeetey et al., (1996). Again, through SAP, private sector participation in the financial sector increased by the launching of the Financial Sector Adjustment Program (FINSAP) in the late 1980s.

2.3 Theoretical Review

This section would highlight the theoretical underpinnings for the study specifically the branch banking, its effect on efficiency and the conceptual framework that would be adopted by the study.

The cost involved in branch banking as compared to branchless banking is quite huge especially when where the branch is located is not able to raise substantial revenue. The enquiry therefore being raised is the motivation behind costly branch operation and management as compared to cost-effective branchless banking opportunities.

The first theory to be discussed is that of Ergungor and Moulton (2011) which is the theory of brick-and-mortar branch. This theory argues that, the presence of brick-and-mortar branch enables

the bank to access and accumulate important expertise with regards to credit risk and other business opportunities through the face-to-face interaction in the market. Accumulating such expertise with the bank's business of advancing credit and receiving deposits from their client is very critical. This is because of the presence of credit bureaus that provide lenders with information about the historical borrowing and repayment behaviors of potential or current customers or clients. Again, gathering private information from potential or current borrowers is best done on a face-to-face basis. This can be obtained when banks are closer to borrowers through the establishment of branches in order to facilitate efficient collection or payment as well as gathering soft information (Agarwal & Hauswald, 2010). This theory in the long-run enables the bank to make prudent decisions concerning loans and advances.

The next theory has to do with the resources of the business. The resource-based theory argues that it is quite expensive to gather information and also carry out due diligence (i.e. when processing loans) if the bank branches are not closer to customers. Additional costs will be incurred if bank branches are far from the customer base especially in the loan application process. For screening of loan applicants, for instance there is sometimes the need for onsite multiple visits in order for the borrowers to be monitored and assets to be evaluated which will cost time, transportation cost and other resources as opined by Brevoort and Wolken (2009). Again, for Ghana, it is quite difficult to collect debt, yet still banks have to advance credit and still make returns to survive (Amoabeng, 2011). The above reasons raised conclude that, there is a strong need for banks to be closer to their customers through branch operations in order to build strong lending relationships (Cerqueiro, Degryse & Ongena, 2009).

The final theory will focus on the theory of spatial attractiveness. This theory supports the rationale behind customers' decisions to access financial services or products. The theory again explains

why firms would want to make goods and services accessible to their customers geographically. Hinson, Owusu-Frimpong and Dasah (2009) study in Ghana confirm this as their findings revealed that proximity of a bank branch is very important for customers when deciding on their choice of banks. This confirms that most Ghanaians will always choose the principle of least effort by choosing to operate or work with a bank within their reach regardless of technological advancement in the financial sector (most especially going branchless). That is, they would want to travel less or short distance to gain access to financial services and prefer branches that are closer to their awareness, home and workplace environment (Ansong, Chowa & Adjabeng, 2015). Customers again, find it convenient if banks are closer to them for them to increase the use of financial products and services. This is because customers will consider their transaction cost in accessing financial services. These transaction costs include transportation fees and the cost involved in searching for the bank on the part of customers. If these costs are reduced, this will increase the satisfaction of customers about financial products.

From the above theories justifying the need and expansion of bank branches, there is therefore the need to ivestigate the impact of these branches on the performance of the bank and industry as well as its impact on the stability of the economy.

2.4 The Concept of Profitability and Efficiency

Several studies have looked into what constitutes profitability in the banking industry (Lartey, Antwi & Boadi, 2013; Palečková, 2015; Alhassan & Ohene-Asare, 2016). These researches sometimes defined profitability as the ability of an entity to generate profit from the resources of the firm. How the firm is profitable is also a clear indication of efficient management, that is, how management is able to achieve its strategic objectives in the long run. Efficiency on the other hand

focuses on how the firm is able to utilize the resources efficiently and effectively. Few amongst these studies focused on the strength of capital of the bank, management of cost, credit risk, liquidity etc. which is specific to the efficiency of the bank (Athanasoglou, Brissmis & Delis, 2008). For the determinants specific to the industry, their studies related profitability to ownership and concentration whereas macroeconomic indicators looked into productivity and inflation. Antwi et al (2013) referred to profitability as the excess of revenue over cost thereby enabling the bank to be immune to negative shocks therefore making this, a contributing factor to growth and stability in the banking sector. They further used financial variables such as bank deposits, bank credit, expense, and interest rates of the market, changes in capital, liquidity, and the composition of loans as well as non-financial variables such as the number of branches of the bank, size and location as determinants of bank profitability. Alhassan and Ohene- Asare's (2016) view captured the difference between interest income and expense, as well as returns on assets and equity. Again, Giokas (2008) in his study defined short-term profitability as the ability of the branches of a bank to generate income from commissions whereas long-term profitability indicated the ability of the branch to generate income from lending.

Trujillo-Ponce (2013) in his study in the Spanish banking sector addressed the major determinants of profitability namely: bank-specific determinants and industry-specific determinants. The bank-specific determinants include: quality of assets, the structure of assets, financial structure, and diversification of revenue, capitalization efficiency, and size. The industry-specific determinants include: concentration of the industry, economic growth, interest rates and inflation rates. Menicucci and Paolucci (2016) on the other hand defined profitability in terms of an organization's ability to sustain profits year after year which is of utmost importance to investors. They believe that profitability would contribute to economic growth as an organization's profits have an impact

on the decisions of investing and savings. This is because profits also impact on the performance of cash flow thereby impacting easy access to funds which would increase productivity and hence employment and competition in the economy. Specifically, their variables focused on the internal determinants of profitability in the banking.

2.5 Branch Banking and Efficiency

Harimaya and Kondo (2016) on the other hand examined how branch expansions have being efficient by looking at Japan's regional banks. They found out that expanding the branches of banks to a certain level would decrease inefficiencies in cost, and regional banks would gain other benefits. Tsolas (2011) evaluated the performance of branches of banks with regards to efficiency and effectiveness in Greece. A two-stage DEA model was used to sample 50 branches of a Greek Commercial Bank and further segregated the performance in terms of profitability efficiency and effectiveness.

The findings revealed that superior results were obtained due to selected key performance indicators such as value of net income, net income per employee and total cost to total income ratio. The input- output (cost-income) model for profitability efficiency was assessed. Whereas the effectiveness looked at other income categories as input to the net income as output. Balfour et al., (2015) evaluated the performance of the branches of a commercial bank's operations in the USA in order to help in benchmarking internally. DEA was used to evaluate how efficient the branches were. Again, to determine the factors of efficiency, the OLS regression model was used. The findings revealed that staff who were employed on a full-time basis as well as fees and charges on service had statistically significant impact on the efficiency of bank branches.

Alhassan and Ohene-Asare (2016) examined the relationship between efficiency and competition in the banking sector in Ghana. In analyzing the data, technical and cost efficiency scores using

the data envelopment analysis were used as well as the Boone indicator which proxied for competition. 26 banks were used from the period of 2004-2011. Ordinary least squares, instrumental variables and fixed-effects were used to estimate the panel regression to control for bank size, lending, income diversification, tangibility, leverage and profitability. The findings of the paper revealed that there is a positive relationship between competition and cost efficiency. Ansong, Chowa and Adjabeng's (2015) paper examined the presence of the branches of bank in Ghana specifically the gaps in the distribution of bank branches across rural, foreign and urban dwellers as well as the patterns these branches follow thereby stressing the need for proximity of banks to customers through their branches. The study used geographically weighted Poisson regression as well as the industry's data to highlight the determinants of the branch location of the bank. The findings revealed that the branches of banks are more concentrated in the urban south than in the rural north. Again, factors such as the size of the population, rate of literacy, size of workforce and urban residents affect the location of a branch.

Finally, the paper recommended that it is imperative of banks to improve their infrastructure (i.e both physical and electronic) for deprived areas to enable them access financial institutions too.

Again, as most of the above studies used the efficiency indicator to measure the performance of banks, Giokas (1991, 2008) and Vassiloglou and Giokas (1990) also confirm this. For this reason, the data envelopment analysis model would be used as an indicator for efficiency in this study.

However, various studies have examined the factors that determine the efficiency of banks in the banking industry. These factors include the following:

2.5.1 The Size of the Bank

The rationale for including the size of the bank (i.e. the measure of total assets) in the model is to highlight the benefits associated with reduced cost advantages. Numerous studies have examined

the relationship between bank size and efficiency. Evidence from these studies which include: Camilleri (2005), Athanasogloue et al., (2008) and Saeed (2014) discovered a positive relationship between bank size and efficiency. Their explanation revealed that economies of scale as a result of large-scale operations reduced cost, diversified risks and increased efficiency operationally thereby revealing a positively significant relationship between bank size and efficiency.

In contrast, other researchers also obtained negative relationship between efficiency and bank size as a result of the credit quality of these banks. This was because of the non-performing loans that could not be recovered thereby causing lower profits and in some cases huge losses to the banks due to increased operations (Dietrich & Wanzenried, (2011); Sufian & Chong, (2008); Miller & Noulas (1997)).

The study would therefore, include the size of the bank as an independent variable and the expectation is for the results to have a positive relationship on efficiency.

2.5.2 The Capital Adequacy Ratio

This ratio considers the strength of capital and financial power of the bank as opined by Golin (2001). Thus, the measure used would be the ratio of equity to total assets thereby, enabling the banks to absorb their losses and overcome the insolvency risk that could be faced in periods of crises or distress.

Positive and significant results of capital adequacy ratio and profitability have been revealed by various studies. This is to explain that banks with high capital ratio tend to reduce their cost of capital since higher levels of equity mean less external financing which leads to reduced risk (i.e. low leverage risk), increased creditworthiness of banks and less funding or borrowing costs (Suffiang & Chong (2008); and Pasiouras & Kosmidou (2007)).

Negative relationship between the capital adequacy ratio and efficiency of banks by other researchers discussed that entities with low capital ratio tended to have high profits as compared to well-capitalized entities since they engaged in less risky ventures thereby yielding less profits according to Saona (2011) and Ali et al., (2011).

This ratio is expected to have a positive relationship with efficiency as examined by previous researchers underscored above.

2.5.3 Loan Ratio

The loan ratio measures the liquidity as it considers the ratio of the total loans to total asset of the various banks understudied. Interest income earned from loans is the core source of returns for banks. Managing assets (i.e. loans in this case) and liabilities (i.e. deposits) efficiently transcends into how liquid a bank can be. A high loan ratio implies high profit through the increase in interest income as a result of increased operations thereby revealing a positive relationship between loan ratio and efficiency according to Bashir (2003). Nonetheless, higher loans may also affect the quality of credit (i.e. Non-Performing Loans) which would lead to a fall in profits therefore rendering banks inefficient. To confirm this, Miller and Noulan (1997) also revealed a negative relationship between loan ratio and profitability as they explained that as interest income is being received, a higher loan ratio may mean lower revenue if it includes a lot of high-risky or non-performing loans, therefore, leading to a fall in the quality of credit, returns and high financial loss.

The study therefore predicts a negative relationship between loan ratio and profitability.

2.5.4 Deposits Ratio

Lee and Hsieh (2013) revealed in their study that a high ratio of deposit increases profits as it with these customer deposits that banks advance loans to their customers thereby revealing a positive relationship. Again the ability of the banks to transform or allocate these deposits into profitable

investments and quality lending would lead to a positive relationship as previously revealed by Allen and Rai (1996). Nonetheless, high deposits would have a negative relationship on bank's profitability if the loan demand in the market is insufficient or inadequate. Since it is a means of providing avenue for the deposits to be transformed. Therefore, the predicted relationship for this ratio on profitability is also a positive relationship.

2.5.5 Loan Loss Provisions Ratio

This ratio measures the quality of the bank's asset in terms of credit quality. A high ratio implies lower credit quality which will affect profit negatively. This means that non-performing loans are high (i.e. less quality loans) therefore increasing the level of provisions on the doubtful loans which will finally lead to a fall in profitability (Miller & Noulas, 1997).

On the other hand, a positive relationship between loan loss provisions ratio and efficiency would exist when returns are increased as a result of the increase in risky ventures or projects due to the positive relationship between risks and returns (Athanasogloue et al., 2008).

For this reason, this ratio is included as an independent variable in the regression analysis to measure the quality of the loans and the risk associated with a high loan ratio and the predicted relationship is also a negative one.

2.5.6 Branch Ratio

Studies have confirmed the positive relationship between bank branching and efficiency as well as stability. Grossman (1994) revealed in his study that countries that allowed the increase in branch networks of banks were faced with a high probability of not encountering bank crises. Though his study did not provide a direct explanation to this positive correlation between branch banking and stability, his reason was the diversification and value addition benefits that increases the bank's profitability which makes them efficient, hence affecting stability. Calomiris and Mason

(2000) and Carlson (2004) confirmed a different view of a negative relationship between branching and stability. This was because the banks engaged in numerous insufficient diversification and overexpansion. Carlson (2004), however explained that the banks were not able to reduce the risk of their portfolios through branch banking thereby causing bank failure during the great depression. The study therefore, predicts a negative relationship with efficiency.

2.6 Factors influencing branch banking

In the bid for banks to perform efficiently and effectively in the banking sector, there is a great need for these banks to decide the optimum branches they would want to operate to be successful. Numerous studies have revealed why a bank would want to increase its branches for its smooth operations. The reasons include: sustaining a profitable market base through the loyalty of customers, establishing new channels of distribution with high benefits as against high cost, innovative channels of distribution that can respond rapidly to competition, and finally leveraging on the benefits that the infrastructure comes with as opined by Howcroft (1993). Issues to be taken into consideration in increasing the channels of banks also include: customer loyalty, technology, market size.

With regards to technology, other researchers also see internet and online banking as taking over bank branches whereas others have different opinions. Rose (2000), however is also of the view that online banking is frustrating and can cause many problems as it solves problems it tends to bring by itself. The internet banking entails no human interactions between customers and the banking platforms that are online.

Other researchers are also of the view that, technology has not come to replace bank branches rather, through information technology, a branch can offer broad range of services with fewer staff instead thereby, complementing each other.

The branch is also established to provide customers with wider access to services more currently than in previous times in order to reflect the needs and taste of customers. The branch provides customers with the human touch of business (i.e. it has the ability to interact with staff in answering questions and aid in financial planning).

The branch again, provides flexibility to enable changes in the layout of the branch to keep up with customers' changing needs. The location of a bank branch is also key in relation to profitability.

2.7 Financial Crisis over the years

This section would focus on some financial crisis that has been faced over the world as well as the financial crisis Ghana recently faced. Studies have revealed that over 130 countries out of the 180 countries as part of the International Monetary Fund (IMF) have experienced crises in their financial sectors. These crises have not only been experienced by developed economies but also developing economies such as Ghana where Fukuyamea and Matousek (2011) reveal that these developing economies also have fragile banking sectors. The following will be discussed in the next subsections:

2.7.1 The Great Depression

Craft and Fearon (2010) revealed in their study that there was already trouble before October 1929 in the US stock market. In August 1929 there was an increase in unemployment and a fall in production whereas stocks were also overvalued in spite of these economic problems. Many

researchers are of the view that the Federal Reserve (i.e. the central bank of USA) also aided in the depression through its tight monetary policies when there was a rise in the reserve for federal funds. Investors drove their attention into the currency market when the stock market crushed and dollars were traded for gold in 1931 leading to dollar runs. Even with this, the central bank still increased interest rates to preserve the value of the dollars leading to increased bankruptcy of a lot of companies. Investors then withdrew all their monies from financial institutions thereby creating more panic whereas the central bank still did not go to the aid of these financial institutions. Franklin Roosevelt, president of USA in 1932 in his bid to solve this issue created 42 agencies to provide unemployment insurance, create jobs, allowed unionization etc.

2.7.2 Asian Financial Crisis

This crisis affected a lot of sound economies such as South Korea, Thailand, Malaysia, Indonesia, Singapore, Philippines etc. This was also caused by the rise in the value of real estate properties, increased corporate spending, and large volumes of public infrastructure projects resulting from increase in foreign direct investment which were all financed with huge debts from financial institutions specifically, banks. The climax of it all was when the investors from Thailand realized that the property market was unstable (i.e. the increase in asset bubbles which is the over-inflation of assets such as housing, stocks etc. without corresponding demand for the product). This led to the attack of Thailand's baht to the US dollar in the currency market which was successful and was devalued which was then followed by other Asian currencies such as the Indonesian rupiah, Malaysian ringgit, Singapore dollar etc. which fell rapidly (Kuepper, 2019). However, this led to increase in inflation which moved to South Korea and even in Japan. Loans were given to Thailand, South Korea and Indonesia by IMF which was worth over $110billion to help the economy stabilize. Again, the conditions attached to these loans were very strict. These conditions included:

increased taxes, fall in public spending which will reduce asset bubbles, the closure of banks that were illiquid without any concern for those who will lose their jobs.

2.7.3 The Russian Financial Crisis

This was caused by the sharp fall of the ruble in the global foreign exchange market thereby making it difficult for debts in foreign currencies (especially the US$ denominated debts) to be repaid by Russian companies in 2014. This was also heightened with the fall in crude oil prices in 2015.

2.7.4 The Ghanaian Banking Crisis.

Ghana was initially plagued with financial crises in the early 1980 which some researchers such as Aryeetey et al., (1996), Biekpe (2011) revealed the causes of this crisis to include: low competition, absence of innovations, high political interference, poor legal and regulatory framework, corruption, lack of due diligence in the approval of loans, weak management, obsolete accounting systems, inadequate capital and weak internal controls.

The current crisis on the other hand began when an asset quality review was conducted by the Bank of Ghana (i.e. BoG, Ghana's central bank) in 2015 and 2016 which revealed how some indigenous banks did not meet the capital requirement limit, significant Non-Performing Loans, and poor corporate governance systems.

Over the past two years BoG has cleaned some of the messes in the banking industry it discovered in its asset quality review. UT and Capital banks were the first to be liquidated with their inability to meet the minimum capital requirement in August 2017. Again in August, 2018, the licenses of Unibank, Royal Bank, Beige Bank, Construction Bank, Sovereign Bank were revoked thereby consolidating these banks and announcing the Consolidated Bank.

Specifically, for Unibank related party transactions played an important role as over GHC 3 billion had been advanced as credit (i.e. loans) to stockholders and other related parties which had not been accounted for and reported as part of the bank's loan portfolio, no collateral was taken from these parties, as well as no interest income was charged on these loans. Again, GHC 2.3billion of customers' deposits were not disclosed to BoG.

Royal Bank on the other hand, suffered severe capital impairment as a result of under- providing for their loans as well as a breach in the cash reserve ratio (Act 930, S. 36 of the Banking Act) and finally poor controls for managing their liquidity risk.

Beige on the other hand, however operated under false licenses. Also, funds of the bank were transferred to an affiliate company to be further transferred to the parent company of the bank which also reinvested that amount back into the bank as part of the bank's capital which violated the regulatory requirement.

Sovereign Bank also obtained its license under false pretense through the use of non-existent capital. Therefore, not being able to meet its liquidity obligations and did not issue its audited accounts for December, 2017 which also violated Act 930 S. 90 (2) of the Banking Act.

Construction Bank was charged with violation of the Banking Act 930 S9d whereby BoG found that the initial minimum capital was not entirely raised by shareholders of the Bank rather, they were funded by loans they took from NIB Bank Ltd and Unibank.

On the whole, weak corporate governance systems, poor risk management practices, non-compliance of regulations and poor banking supervision were the significant causes of the banking crisis

2.8 Bank Stability

Bank stability has to do with the absence of bank crises that is achieved if all banks in the banking space are stable (Brunnermeier, 2009). Various studies have documented factors that influence the stability of banks in the banking sector and these factors include: economic, financial structure, regulations, institutional factors and other factors. These factors have been outlined in the following subsections:

2.8.1 Economic Factors

The uncertainty in fluctuations of the economic cycles (i.e. the effects of booms and recessions) impacts the stability of the banking sector as opined by Segoviano and Goodhart (2009). These economic factors as used by various studies include GDP per capita, GDP growth, Inflation and Unemployment rates. Boateng, Huang and Kufuor (2015) found that the aforementioned factors have significant effect on the performance of banks. This is seen when the effects of these factors impact on the ability of the borrowers to repay their loans most especially. In relation to the GDP growth, an increase in economic growth increases performance of banks as a general increase in the activity level of an economy is expected to have a direct impact on profits and hence efficiency of the banks. The performance of banks is also influenced by the rate of unemployment. Increase in the level of unemployment as opined by Hefferman and Fu (2008) leads to a fall in aggregate and an increase in rates of loan default, thereby causing a negative relationship between bank performance and unemployment levels. This is as a result of borrowers' inability to pay the loans due to losing of their jobs in the period of increased unemployment. For this reason, the study expects a positive relationship between instability and unemployment.

Low inflation on the other hand increases the profitability of banks because, reduced rate of inflation decreases the operating costs of banks and improves performance therefore a positive relationship on bank stability as assessed by Boyd and De Nicoló (2005)

2.8.2 Regulation and Supervision

Regulation and Supervision has to do with the banks being accountable to a higher authority as well as transparent per the laws of the land or the country in which the bank operates. Incomplete and ineffective regulation also impact on the stability of banks in the banking sector. Incomplete regulation as defined by the US Financial Crisis Inquiry Commission (2011) is the weak regulatory system that leads to the increase in regulatory reforms.

Again, Barth *et al*. (2013), define ineffective supervision as the use of weak supervisory tools and styles. The impact of these supervision and regulation are reflected in the performance of the banks. Studies that have examined the effects of regulation and supervision on stability of the banking industry looked at how the performance of the banks are used to analyze if regulations or supervisions have been effective. Some revealed that, banks that were performing well had lower leverage and higher returns before the crisis. They further revealed that, countries that had a lot of restrictions for their large banks performed better than other banks. However, their conclusion revealed that there was no effect of bank regulation and supervision on banking stability (Beltratti & Stulz, 2012).

Other researches on the other hand have found that strict regulations will affect the growth of credit since banks will reduce their lending and subsequently affect the banking stability negatively (Fratzscher et al., 2016).

2.8.3 Financial Structure

This focuses on the concentration of banks in the banking sector which also influences the stability of the banking sector. This is seen when the failure of one bank can threaten the banking industry. Banks in the concentrated market can easily come together to rescue the troubled bank to prevent the widespread of the failure that will arise from the contagion (Sáèz & Shi, 2004). From a different perspective, risky lending will be reduced in a more concentrated market as a result of lower competition or fewer competitors in the market.

Again, the banks in higher concentrated markets will encounter the problem of moral hazard by the borrowers if they charge high interest rates on their loans. This is because as a result of the higher loans the borrowers will want to engage in very risky investments or projects which could threaten the stability in the banking system when losses materialize (Boyd & De Nicoló, 2005).

Uhde and Heimeshoff (2009), on the other hand, studied banks in the EU countries and they are also of the view that capital regulations impact positively on financial stability whereas with Ijtsma et al. (2017), no relationship was found between bank concentration and bank stability.

2.8.4 Bank-specific factors

The Bank-specific factors that impact stability include the bank size, capital ratio, loan loss provisions ratio, loan ratio, number of branches and efficiency of the banks.

With regards to the size of the bank which is normally proxied using total assets, studies have revealed positively significant relationship between bank size and instability as they are of the view that a large banking sector implies high bank instability as excessive competition from the various banks increases the probabilities of the banks taking excessive risk which could translate

into losses in times of poor economic levels and influence stability negatively (Ozili, 2017). The study therefore expects a negative relationship between the size of the bank and stability.

Capital ratio on the other hand, reflects the ability of the bank to absorb unforeseen losses as and when they occur. This occurs when regulatory bodies increase the capital requirement of financial institutions which serves to cushion them when they embark on risky activities. As discovered by Diamond and Rajan (2001), a high capital ratio implies high buffer for the banks even when the banks undertake excessively risky ventures which also reflect on a relatively stable banking sector. A positive relationship is expected between capital ratio and stability.

Loan loss provision is deducting a proportion of the net income of the bank to shield any anticipated credit losses on the portfolio of the bank loan. This amount must be adequate enough to minimize any losses of the loan portfolio. A high loan loss provision would mean that there would be a higher shield for loans that would go bad thereby improve on bank stability. A high loan loss provision ratio reflects sufficient protection against bad loans which would lead to a fall in non-performing loans and thereby improve stability (Ozili & Outa, 2017). A negative relationship is expected between the loan loss provision ratio and stability.

Loan ratio reflects the liquidity of the banks and shows the ability of the bank to meet the demand for loans using its total assets as opined by Rivai (2007). A high loan ratio indicates a better credit performance on the part of the banks nonetheless a high loan ratio also indicates a negative relationship with liquidity as this implies that more funds would be allocated to credit instead of meeting its other liabilities and therefore impact on stability negatively if non-performing loans resulting from poor policies, mismanagement, manipulations increase proportionately (Siam, 2007). A negative relationship is expected between loan ratio and stability.

The increase in branches of banks as revealed by various studies showed a stabilizing effect for the banking sector. The increase in branches of banks leads to increased diversification of loans and deposits as well as increased competition thereby collapsing inefficient banks and leaving efficient banks in the system. A well- diversified loan portfolio should lead to a low NPL and thereby improve the stability of the banking sector (Calomiris, 2000; Carlson & Mitchener, 2006). The study therefore predicts a negative relationship between bank branch and stability.

The efficiency variable is a proxy for bank performance. Efficiency is the ability of the banks to utilize its resources effectively to generate the maximum output and increase revenue. The relative increase in the number of efficient banks leads to an improved bank stability (Berger & DeYoung, 1997). Efficiency can be linked to good lending decisions, right lending policies, strict monitoring of delinquent borrowers and other intensive controls by the bank to reduce the non-performing loans. We therefore predict a negative relationship between efficiency and bank stability.

2.8.5 Other Factors

Various studies have also looked at how other factors such as bank efficiency, supervisory/ regulatory styles, deposit insurance, liquidity etc. impact on the stability of the banking industry.

Banking efficiency implies the ability of banks to manage their credit risk (i.e. non-performing loans, NPLs) so as to improve the stability in the banking sector (Berger & De Young, 1997). They further revealed that a high supervisory culture impacts positively on the stability of banks in Europe.

Deposit insurance alternatively protects bank depositors against the risk of loss that could be caused by the failure of a bank. The effect of deposit insurance revealed that there was no relationship on banking stability and bank runs. However, when deposit insurance is interacted

with private sector advances or loans then, it will impact banking stability positively (Ngalawa et al., 2016).

Liquidity implies the bank's ability to meet their obligations as and when they fall due. Higher liquidity levels have a negative impact on bank stability (Wagner, 2011).

All the above factors give substantial evidence for factors that determine stability in the banking industry in Asia and Europe with scant literature on Africa and specifically Ghana.

2.9 Branch Banking and Financial Stability

The Central Bank (BoG) in 2014 revealed that the unbanked population in Ghana was over 70%. The unbanked population is defined by Anderson-Porisch (2006) as persons who are outside the mainstream of the banking industry (i.e. these individuals neither have a checking or savings account). This definition has also been confirmed by Pew Health Group, (2011) who defined the unbanked as individuals who use different sources of financial services without having access to a traditional bank account. This revelation by BoG means that, there are still areas in Ghana that do not have access to banking services therefore making the economy an underdeveloped economy in relation to access to formal financial services. This also serves as another opportunity for banks to tap areas without access to financial services. The rationale behind the use of branches is to provide a complete picture of the effect of how the increase in bank branches affect the stability of the industry as a result of the absence of laws that regulate the establishment of bank branches.

For instance, in the US, there are some specific laws on the restrictions of branching which include:

- Approval of any branch establishment from the Comptroller of Currency
- No new branches are to be opened in cities with a population less than 25,000 people

- Only two branches are to be operated in cities with population between 50,000 and 100,000
- Minimum age of a bank that wants to branch
- Explicit agreement from state authorities for de-novo branching
- Deposit cap for banks that want to branch

Thailand also have some specific laws which include:

- Approval of any branch establishment by the central bank (i.e. Bank of Thailand)
- Annual reports of the bank including a profile of branches that have been approved, and those that have not started operations yet, the opening date etc. of each branch.

There have been no specific laws in Ghana concerning the restrictions of branching in the banking system, therefore the focus of the study is to use the increase in branches of banks to capture their impact on their performance and the banking system.

The role of branches can indeed not be overemphasized as they improved the stability of the banking industry during the 1920s and 1930s in US. This was through the inducement of competition of US states that allowed branching thereby weak and inefficient banks were removed.

Wacht (1968) opined that branch banking increases banking stability through the reduction of their vulnerability to economic shocks. This is achieved through diversification of loans and deposits over a wide geographical area or customer base.

Various researchers are of the view that restricting banks from branching increased the risk of bank instability in the economy. For instance, Friedman and Schwartz (1963) is of the view that the restrictions on branch banking led to the high rate of bank panics during the Great Depression in the US.

Again, Calomiris (2000) confirmed that regions in the US as well as other countries that prevented banks from engaging in branch banking had the highest rates of bank failures. Canada, on the other hand, in its banking distress experienced during the Great Depression did not suffer panics or widespread failures in their banking industry as a result of its laws on branching. This again was confirmed by Grossman (1994) in his study on 25 countries during the Great Depression and found that banks in countries with a lot of branch networks were less likely to suffer banking crises.

In contrast with the stabilizing effect of bank branches in the banking industry, other studies are of opposing view. Calomiris and Mason (2000), revealed that banks with branches tended to fail sooner than unit banks. This was because the branch banks employed diversification to decrease their reserves instead of reducing the risk of their portfolios.

Thailand on the other hand also increased its banks by 14 commercial banks after the Asian economic crisis in 1997 and clearly spelt out the roles and conditions of the branch of a bank (Hawkins & Mihaljek, 2001). Foreign banks were not major players in Thailand's financial industry at all as the government then after World War II restricted the branch offices of foreign banks to only one in order to promote economic growth in the banking sector. But these restrictions were removed in the 1960s which also fostered economic growth in the Thailand Banking Industry.

This chapter examined the theoretical and empirical evidence on the scope of bank branching efficiency and stability globally. The next chapter would address the methods and techniques used and the analysis in arriving at the findings of the study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter would highlight the various techniques that are adopted in analyzing the data in order to achieve our research objectives. It highlights the research design, the sources of the data, the sampling procedure and the methods that are employed to analyze the data. Particularly the data envelopment analysis and the regression techniques would be highlighted.

3.2 Research Design

The study examines the impact of the increment in bank branches on the efficiency of all banks in Ghana. The study adopts the longitudinal time dimension whereby the same group or organization is observed across multiple periods (Wang et al., 2017). Particularly, banks in Ghana were examined in terms of their profitability across the period of 2005 to 2017. The population for the study includes all banks in the Ghanaian economy including both listed banks on the Ghana Stock Exchange and non-listed banks. The total number of banks for the 2017 period comprised twenty-eight banks. Currently, the banks listed on the exchanges are eight which includes Access Bank, Agricultural Development Bank, Cal Bank, Ecobank Ghana, Ghana Commercial Bank, Republic Bank, Societe General Ghana and Standard Chartered Bank. All the listed banks on the Ghana Stock Exchange as well as the rest of the non-listed banks would be used for the purpose of this study.

3.3 Sources of Data

Data was collected from secondary sources such as financial statements of the banks, data from the World Bank Open Data, global financial development database of the World Bank and annual

reports were also accessed. The only primary source of data was collected from the Bank of Ghana.

Table 3.1 presents the total variables with their sources that was used for the study.

Table 3. 1: All Variables used for the Study

VARIABLES	DEFINITION/MEASURE	SOURCE
Efficiency Variables ***(Output and Input)***		
Output Variables		
Interest income	Income from loans	Annual Report
Commission and Fees	Income from administrative activities of the bank	Annual Report
Loans and advances	Credit advanced to customers	Annual Report
Investment	Investment in securities made by banks	Annual Report
Customer Deposits	Deposits made by customers	Annual Report
Input variables		
Personnel Expenses	Payment made to staff for their service	Annual Report
Operating Expenses	Expenses incurred in operations	Annual Report
Provisions on loan losses	Provisions made for doubtful debts	Annual Report
Equity/ Stated Capital	Capital requirement for banks	Annual Report
Branch	Number of bank branches	Bank of Ghana
Regression Variables (Stability and Efficiency)		
Branch	Number of bank branches	Bank of Ghana
Size of the Bank	Total Assets	Annual Report
Capital ratio	Ratio of equity to total assets	Annual Report
Loan ratio	Ratio of loans to total assets	Annual Report
Loan Loss Provisions	Ratio of provisions made to total loans	Annual Report
Deposit ratio	Ratio of deposit to total assets	Annual Report
Unemployment	Unemployment rate	World Bank Open Data
Economic growth	GDP growth	World Bank Open Data
Inflation	Inflation rate	World Bank Open Data
Z-Score	Ratio of return on assets plus capital ratio to standard deviation of return on asset	Annual Report
NPL	Ratio of non-performing loans to total loans	Global Financial Development

3.4 Methods Used for Data Analysis

The study adopted the Data envelopment analysis and fixed effect panel models in addressing its two main objectives. As the study sought to address the relationship between branch banking and efficiency, the DEA was used to reveal the efficiency scores of the individual banks. The output from the DEA was further used as an independent variable in a regression analysis to determine its driving variables. And finally, the relationship between bank branch and its impact on stability. Therefore, based on the above, the methods would be presented in the subsequent sub-sections below:

3.4.1 The Data Envelopment Analysis Model

The model to be used to address the first objective of the study in determining the factors influencing the efficiency of the Ghanaian banking sector. The linear programming model per Charnes Cooper and Rhodes (1978) is formulated as follows:

Maximize (EFF=$\sum_{r=1}^{s} u_r y_{rk}$) (1)

Subject to $\sum_{i=1}^{m} v_i x_{ik} = 1$ (2)

$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \geq 0, \ (j = 1, \dots, n)$ (3)

$u_r \geq 0, \ r = 1,2,\dots,s$ (4)

$v_i \geq 0, \ i = 1,2,\dots,m$ (5)

where:

EFF is the efficiency score for each bank computed over time

v_i is the weights to be determined by the model for input i

m is the number of inputs

x_{ik} is the input variable for each bank k

u_r is the weights to be determined for output r

s is the number of outputs

y_{rk} is the output variable for each bank k

The model above explains that the objective of each DMU is to maximize outputs (i.e. equation 1) subject to constraints: input constraints (equations 2-5). The linear programming model would then assign the co-efficient or weights for each unit which will be the branch of the bank in each case. The inputs and outputs would be extracted from the financial statements and will assume positive figures.

The model is then subject to constraints which imply that, the optimal efficiency of the DMUs should be equal to 1 and also all slacks are equal to 0. A frontier would be formed for the efficient DMUs whereas DMUs with less than 1 efficiency scores implies inefficient units. In this case, the slack for inefficient units would not be equal to 0 which also implies that one input is being overused than the efficient units to produce equal amount of outputs. There are some assumptions of DEA that is explained by the constraints of utmost importance to the study is the assumption of convexity (Fried *et al.*, 2008). The DMU would operate under variable returns to scale if an increase in input does not result in a change in the proportional increase in outputs. The convexity assumption also ensures that the multiple units is the same scale size as the unit being measured.

The Data Envelopment Analysis (DEA) as well as regression analysis would be used for analyzing the data. For the DEA technique, the main objective is to assess the relative efficiencies of Decision-Making Units (DMUs) with multiple inputs and outputs. In assessing the DMUs which would be the branches of banks in this case, a linear programming model would be solved for each bank under evaluation.

The DEA technique can be input oriented or output oriented. For the input-oriented model, the objective would be to minimize the inputs subject to control the output. So, for an inefficient unit

to be efficient, the model would vary (i.e. decrease) the inputs while holding the output constant. The output-oriented model on the other hand, seeks to maximize the outputs subject to control of the inputs. The inefficient unit in an output-oriented model would seek to increase output whereas the input would remain unchanged. For the purpose of this study, the output-oriented model would be used. This is because the model can give interpretations both to the inputs and outputs. Again, the efficiency measure in the model remains unchanged by scalar transformations since these transformations could easily impact the efficiency measurements.

The purpose of the study is to analyze efficiency of the branches of banks in Ghana. The efficiency model is able to assess the ability of the branches of the banks to generate both short and long-term profits given their limited inputs (Giokas, 2008). The sets of outputs would include five variables.

The outputs were identified based on the research conducted by various researchers in Table 3.2. The output variables would assess the efficiency of the resources been used in generating income which would include:

y_{r1}-Interest income
y_{r2}-Commission and Fees
y_{r3}-Loans and advances
y_{r4}-Investment
y_{r5}-Customer Deposits

The inputs on the other hand would consist of major costs for the bank operations which would include:

x_{i1}-Personnel Expenses
x_{i2}- Operating Expenses
x_{i3}- Provisions on loan losses

x_{i4}-Equity/ Stated Capital

x_{i5}-Number of bank branches

Table 3.2 presents input and output elements as used by various researchers which the study relied on in selecting its input and output elements.

DEA has the ability to interact with several input and output variables and also give important information on efficient and inefficient units of the banks. The DEA technique also has the ability to preserve the discriminating power in terms of the weights assigned to the inputs and outputs provided the units which are the branches of the banks in this case are more than the number of inputs and outputs elements. Again, the availability of data would also affect the output and input element chosen which would therefore consider substitutes per the data.

Table 3. 2: The Input and Output elements of DEA as adopted by various researchers

Publication	Output	Input	Number of Branches
Vassiloglou and Giokas (1990)	Transactions	Labour, Expenses, Rent, ATM	20
Giokas (1991)	Weighted number or transactions, deposit, credit, foreign receipts	Number of employees hours worked, operating expenses excluding labour, utilized branch space (square meters)	17
Athanassapoulous and Shale (1997)	Number of deposit accounts, number of credits, number of debits, number of loan applications evaluated, number of transactions on services involving commissions,	Number of employees, aggregate number of ATM and teller machines, number of computer terminals	68
Athanassapoulous and Giokas (2000)	Number of transactions; easiest, medium-easy, most difficult, credit transactions, deposit transactions, foreign receipts	Labour hours, branch size, computer terminals, operating expenditure	47
Giokas (2008)	Value of loan, value of deposits, non-interest income	Personnel cost, running cost and operating expenses	171
Noulas et al, (2008)	Deposits, financial products, loans and other loans	Personnel costs, other operating expenses	58
Giokas and Tsolas (2008)	Difference in average value of loans in 2 consecutive years, difference in average value of deposits in 2 consecutive years, deposit-based transactions, loan-based transactions, other transactions	Personnel costs, running costs, other operating expenses, number of ATMs	156
Saka, Aboagye and Gemegah (2012)	Loans, Investment in securities, Deposits with other banks, total revenue	Fixed assets, Intermediating deposits, total expenses and shareholder's equity	23 banks
Alhassan and Ohene-Asare (2016)	Loans, other earning assets, fees and commission income	Deposits, fixed assets, personnel expenses	26 banks

3.4.2 Model specification for efficiency

To investigate the relationship between the banks' internal factors and efficiency, the ordinary least squares model would be adopted. This was adopted and slightly modified from the study of Menicucci and Paolucci (2016). The equation includes the specific determinants of bank efficiency is shown below in equation (6):

$$EFF_{it} = \alpha_0 + \alpha_1 BRN_{it} + \alpha_2 SIZ_{it} + \alpha_3 CAP_{it} + \alpha_4 LOR_{it} + \alpha_5 LLP_{it} + \alpha_5 DEP_{it} + \varepsilon_{it} \quad (6)$$

where:

EFF_{it} is the efficiency scores from the DEA for bank i at time t

BRN_{it} is the bank branches measured as the number of bank branches for bank i at time t

SIZ_{it} is the size of the bank which is measured by the Total Assets for bank i at time t

CAP_{it} is the capital ratio which is measured by Equity Total assets for bank i at time t

LOR_{it} is the loan ratio measured by Loans divided by Total assets for bank i at time t

LLP_{it} is the Loan loss provisions measured by Provision for loan losses divided by Total loans for bank i at time t

$DEP_{it}$is the Deposit ratio measured by Total Deposits divided by Total assets for bank i at time t

ε_{it} is decomposed into u_i which is the unobservable individual-specific effect and λ_t which is the unobservable time-specific effect

The regression model has been used by several researchers to assess the relationship between efficiency and the internal factors of the bank. The regression model considers the internal determinants of efficiency in the Ghanaian banking sector, thereby applying a panel data regression. Only one model which in this case is the efficiency score was used to measure the performance of the bank. The output (i.e. efficiency scores) from the DEA model became the input that is the dependent variable for the second model. The determinants or factors driving each bank's efficiency included: the number of branches, the size of the bank, capital ratio, loan ratio, deposits ratio and loan loss provisions as similarly adopted by Menicucci and Paolucci (2016) which is also linked to some elements of the input and output of the DEA model discussed above.

As revealed in the literature the increase in bank branches to a certain level, would increase profits of the banks thereby reducing cost and making banks efficient (Harimaya & Kondo, 2016). Carlson (2004), on the other hand, explained that a bank increasing its branches does not necessarily mean the bank would be able to reduce risk of its loan portfolio and be efficient. The study therefore predicts a negative relationship between a branch and efficiency. The efficiency of a bank is also dependent on the size of the bank which in this case is the total assets. For a bank to be efficient, its operational efficiency should be able to embrace the market base through its assets, which should increase economies of scale, diversify its risk and have a positive impact on the performance that is, efficiency of the bank. Golin (2001) confirms the importance of the capital ratio as it can assess the capital adequacy or strength of the capital of the bank. The efficiency of a bank is also dependent on the ability for the capital ratio to meet its obligations as and when they fall due. The higher the capital of banks, the easier the bank is able to meet its capital requirement in order to use the excess as loans which would increase their efficiency. The loan ratio on the other hand is also very key to the model since the main source of income for banks is the interest income which stems from the loans they give out. How efficient banks would be is also dependent on the ability to gain revenue from their main operations of advancing loans and credit to their clients. The higher the loan ratio, the higher the interest margin from these loans and the higher the profit which would also lead to an increase in efficiency. The loan loss provisions also measure the quality of the banks' assets as well as credit risk whereas the deposits ratio measures the operating efficiency of the banks. The error term is also normally distributed with a mean of zero. Again, the error term advocates that an important part of the variance of the result is due to unobserved heterogeneity across banks.

The panel is an unbalanced panel data set of Ghanaian banks in Ghana for thirteen years (2005-2017). Banks with accessible data for the period were selected for the analysis. The study excluded insurance companies, microfinance, savings and loans, investment and other financial institutions since our main focus were banks.

3.4.3 Model specification for stability

The study would borrow its model from Fernandez et al., (2016) who expressed bank stability as a function of bank-specific variables, financial structure and macroeconomic factors.

The model is therefore presented below:

$$BS_{jt} = \alpha_0 + \alpha_1 BRN_{jt} + \alpha_2 SIZ_{jt} + \alpha_3 CAP_{jt} + \alpha_4 LOR_{jt} + \alpha_5 LLP_{jt} + \alpha_6 EFF_{jt} + \alpha_7 UNP_{jt} + \alpha_8 GDPPC_{jt} + \alpha_9 INF_{jt} + \alpha_{10} MID_{jt} + \alpha_{11} LAT_{jt} + \varepsilon_{jt} \quad (7)$$

where:

BS_{jt} is the banking stability measured as Z-score or NPL for bank j at time t

BRN_{jt} is the bank branches measured as the number of bank branches for bank j at time t

SIZ_{jt} is the size of the bank which is measured by the Total Assets for bank j at time t

CAP_{jt}I is the capital ratio of the bank which is measured by Equity divided by Total assets for bank j at time t

LOR_{jt} is the loan ratio measured by Loans divided by Total assets for bank j at time t

LLP_{jt} is the Loan loss provisions measured by Provision for loan losses divided by Total loans for bank j at time t

EFF_{jt} is the efficiency scores for bank j at time t

UNP_{jt} is the unemployment measured by unemployment rate for bank j at time t

$GDPG_{jt}$ is the economic growth measured by GDP growth for bank j at time t

INF_{jt} is the inflation measured by the inflation rate for bank j at time t

MID_{jt} is the dummy variable for middle period banks for bank j at time t

LAT_{jt} is the dummy variable for late period banks for bank j at time t

ε_{jt} is decomposed into u_j which is the unobservable individual-specific effect and λ_t which is the unobservable time-specific effect

Stability as a measure was proxied using two variables namely: Z-score and the ratio of non-performing loans to total loans (NPL). The z-score measures the insolvency risk of the bank and it is measured as the ratio of the return on assets in addition to the capital asset ratio all divided by the standard deviation of the return on assets. A high z-score indicates a stable banking sector which also indicates a higher solvency of the banks. The natural log of the z-score was used to obtain a normal distribution. The NPL ratio on the other hand indicates the asset quality of the bank. A low NPL implies good asset quality and therefore indicates a stable banking sector whereas a high NPL ratio reflects poor asset quality as opined by Ozili (2017). With regards to the bank-specific factors, the branch ratio is predicted to have a negative relationship with stability. This is because the increase in branches without the bank not diversifying its investment and loan portfolio satisfactorily would affect stability negatively (Calomiris, 2000). The size of the bank which represents total assets is expected to have negatively significant relationship with stability as Ozili (2017) opined that large banks engage in excessive competition which can increase risk and lead to huge losses of the banks. The capital ratio is expected to have a negative relationship with stability as an increase in capital ratio indicates low financial cost on the part of the banks which also leads to an increase in stability. The loan ratio is also predicted to have a negative relationship with stability. This is because a high loan ratio impacts on liquidity negatively as more funds would be advanced as loans and therefore neglecting to meet other obligations which would consequently impact on stability negatively if non-performing loans resulting from poor policies, mismanagement, manipulations increase proportionately (Siam, 2007). A negative relationship is expected between the loan loss provision ratio and stability. The general increase in the number of efficient banks would lead to an improved bank stability therefore a positive relationship is predicted between the efficiency variable and bank stability.

In relation to the macro-economic variables, a negative relationship is expected with regards to unemployment and inflation rates and a positive relationship between economic growth and stability. With regards to the dummy variables, the reference category is the early period banks with the dummy for middle period banks taking on a value of 1 for this period and zero otherwise. A negative relationship is predicted with stability for middle banks which means stability is lower for middle period banks than early period banks. And also for the dummy of late period banks taking on a value of 1 for this period and zero otherwise, a negative relationship is predicted again. This also means stability is lower for late period banks than early period banks.

This chapter examined the sources of the data, the methods used in analyzing the data and the main variables adopted for the study. The next chapter would address the analysis of the data and results of the findings of the study.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents and discusses the findings of the study that was used to achieve the research objectives. These include the descriptive statistics, efficiency analysis, and test for multicollinearity, correlation co-efficient and regression output. Again, all banks in the Ghanaian economy were selected over the thirteen-year period from 2005-2017 as a result of the recent crises in the banking space. The econometric results have been illustrated in the following sections below:

4.2 Descriptive Statistics

Table 4.1 presents the summary statistics of the variables that were used for the study in determining the factors influencing the efficiency of banks as well as stability factors. With regards to the bank-specific variables on average, the efficiency score of the banks in Ghana for the thirteen-year period was 0.7406. The efficiency scores range from 0 to 1 and the standard deviation for the efficiency scores was 0.333. The huge variation amongst the efficiency of banks was illustrated by the difference between the mean and standard deviation. The minimum score can be attributed to 4 banks namely First Atlantic Bank for the period 2017, First National Bank for the period 2017, Ghana Commercial Bank for the period 2005 and Prudential Bank for the period 2017. For the maximum score of 1.00, about 30 banks were able to score 1.00 for different periods as shown in Appendix A. The stability variables conversely: the NPL ratio reported a mean of 13.56, a standard deviation of 4.26, a minimum value of 6.40 for the period 2007 and a maximum value of 21.59 for the period 2017. The z-score also revealed an average of 0.076 a standard

deviation of 1.003, a minimum value of -0.14 for the period 2007 for Guaranty Trust Bank and a maximum value of 7.35 for the same period for CAL Bank.

The loan loss provision had an average of 0.063, with a standard deviation of 0.112 and a minimum of 0 and a maximum of 0.77. The minimum of 0 is attributed to Energy Bank for the periods 2013 and 2014 and Royal Bank also for the periods 2013 and 2014. The maximum ratio can be attributed to Intercontinental Bank for the period 2005. The Capital Ratio reported a mean of 0.152 standard deviation of 0.133 with a minimum ratio of 0.005 and a maximum ratio of 0.589. The branch variable recorded an average of 32 branches with a standard deviation of 38 and a minimum value of 1 and a maximum value of 298. The banks with only 1 branch included Fidelity Bank in 2006 and 2007, Access bank for the period 2011, Bank of Baroda for the period 2009 and 2010, Sahel Sahara for the period 2008 and Access Bank for the period 2009 and 2010. The bank with the highest number of branches was Ghana Commercial bank for the period 2017.

The total assets revealed an average of GHC1,613,684,597 a standard deviation of GHC 1,809,000,000 a minimum value of GHC 15,081,000 attributable to Sahel Sahara Bank for the period 2008. And a maximum value of GHC 9,558,151,000 attributable to Ghana commercial Bank for the period 2017.

Finally, with regards to the macroeconomic variables, GDP growth recorded an average of 6.87 with a standard deviation of 2.89, a minimum value of 3.72 for the period 2016 and a maximum value of 14.05 for the period 2011. The inflation variable had a mean of 13.37, a standard deviation of 3.625 with a minimum value of 7.13 for the period 2012 and a maximum value of 19.25 for the period 2009. The unemployment variable also reported an average of 3.50, with a standard deviation of 1.17, a minimum value of 2.15 for the period 2015 and a maximum value of 5.32 for the period 2010.

Table 4. 1: Descriptive Statistics

Variables	Obs	Mean	Std. Deviation	Min	Max
EFFICIENCY	328	0.740579	0.332648	0	1
LOANLOSSPR	328	0.063	0.112	0	0.77
CAPITALRATIO	328	0.152	0.133	0.005	0.89
DEPOSITSRATIO	328	0.557	0.255	0.019	0.726
LOANRATIO	328	0.352	0.204	0.0005	0.828
BRANCHES	328	32	38	1	298
GDP GROWTH	328	6.874	2.89	3.722	14.047
INFLATION	328	13.374	3.625	7.126	19.251
UNEMPLOYMENT	328	3.503	1.168	2.154	5.32
NPLRATIO	328	13.552	4.264	6.4	21.591
Z-SCORE	328	0.076	1.003	-0.14	7.35
TOTAL ASSETS	328	1.61E+09	1.80E+09	1.51E+07	9.56E+10

4.3 Interpreting the DEA results

Table 4.1 summarizes the DEA results for all the banks in the Ghanaian economy for the period 2005 to 2017. For each bank five outputs and inputs each were used to examine their efficiency.

As presented in the table 4.2, the year 2009 recorded the highest number of efficient banks with efficiency score of 1 in Ghana. The year 2009 reported 20 banks out of 26 banks as efficient thereby signifying only 6 banks to be inefficient with the minimum score as 0.05. The period 2011 reported the next highest of efficient banks to be 19 out of again 26 banks with a minimum efficiency score of 0.26. For the year 2014, only 17 banks out of 27 banks were presented as efficient, then followed by the next highest period, year 2012, with 16 efficient banks. The years 2006 and 2010 presented 15 banks each as efficient with minimum efficiency scores of 0.19 and 0.33 respectively. The year 2005 yielded 14 banks as efficient then followed by 2007, 2008 and 2013 with 13 efficient banks each. And finally, in 2017, the number of efficient banks fell drastically to 5 banks from 9 efficient banks in 2016. The detailed score for each period has been presented in Appendix A, Tables A.2.

Table 4. 2: Descriptive of efficiency scores

PERIOD	YEAR	TOTAL NUMBER OF BANKS	EFFICIENT BANKS	MINIMUM SCORE	MAXIMUM AFTER EFFICIENT SCORE
1	2005	18	14	0	0.48
2	2006	23	15	0.19	0.89
3	2007	23	13	0.39	0.78
4	2008	25	13	0.18	0.57
5	2009	26	20	0.05	0.66
6	2010	23	15	0.33	0.7
7	2011	26	19	0.26	0.77
8	2012	25	16	0.04	0.81
9	2013	26	13	0.07	0.82
10	2014	27	17	0.26	0.77
11	2015	27	15	0.21	0.81
12	2016	28	9	0.02	0.71
13	2017	28	5	0	0.24

4.4 Correlation and Other Tests

Some tests were performed to overcome the econometric problems that would have been encountered. This can be seen in Tables 4.3 and 4.4. The Table 4.3 did not have any problem of multicollinearity but when the macroeconomic and stability variables were introduced that was when the issue of multicollinearity was detected. The independence of the variables was tested to prevent the multicollinearity problem. The challenge of multicollinearity is encountered when the correlation coefficient is greater than 0.80 as opined by Kennedy (2008). The results in Tables 4.3 and 4.4 demonstrate that there is no collinearity between the independent variables. The correlation matrix has revealed that the model used for the study is very reliable and valid since there is no multicollinearity. Again, the highest degree of correlation coefficient which is 0.75 (i.e. correlation between the z-score and the capital ratio) is found to be quite satisfactory since it is 0.05 points below the threshold of 0.80. The results revealed that there was no problem of multicollinearity

since one variable (that is the deposits ratio as it had a very high collinearity with the loan loss provision ratio) was dropped using the variance inflation factor (the deposits ratio recorded the highest variance inflation factor of 8.21.

Further tests were performed to estimate the biasness and standard error of the factors influencing the efficiency scores thereby using the jackknife and bootstrap methods. The jackknife was introduced to estimate the variance of an estimator and also reduce the biasness of an estimator (Quenouille, 1946). The bootstrap on the other hand, was also introduced as it yielded better results than the jackknife and corrected for skewness of the data distribution. They both revealed almost similar results thereby revealing the robustness of our estimation. Again, additional tests were performed to ensure the right model was used for the panel data in determining the factors that influenced stability. The hausman test was used in determining whether the fixed or the random effect should be used for determining the stability factors. The hausman test for both the NPL and z-score as proxied for stability rejected the null hypothesis that the random effect model should be used and concluded that the fixed effect model should be used as their p-values were less than 0.05. The results for the hausman test have been illustrated in the Appendix B from Tables B.1 to B.4.

Table 4. 3: Correlation matrix for efficiency determinants

VARIABLES	EFF	CAP	LLP	DEP	LOR	BRN	SIZ
EFF	1.00						
CAP	-0.135	1.00					
LLP	-0.076	0.521	1.00				
DEP	-0.072	0.045	-0.37	1.00			
LOR	-0.019	0.521	0.778	0.014	1.00		
BRN	-0.163	0.438	0.371	0.013	0.384	1.00	
SIZ	-0.054	0.602	0.481	-0.085	0.439	0.388	1.00

Table 4. 4: Correlation matrix for stability determinants

VARIABLES	NPL	Z-SCORE	SIZ	EFF	CAP	LLP	LOR	BRN	GDPG	INF	UNP
NPL	1.00										
Z-SCORE	-0.32	1.00									
SIZ	0.33	-0.62	1.00								
EFF	-0.28	0.06	-0.06	1.00							
CAP	0.01	0.75	-0.65	-0.03	1.00						
LLP	0.12	-0.08	0.07	-0.18	-0.02	1.00					
LOR	-0.10	0.62	-0.65	0.06	0.67	-0.27	1.00				
BRN	0.21	-0.10	0.50	-0.09	-0.07	0.03	0.08	1.00			
GDPG	0.05	-0.10	-0.15	-0.05	0.03	-0.10	0.03	-0.08	1.00		
INF	0.12	-0.10	0.06	-0.05	-0.01	0.12	0.03	0.06	-0.67	1.00	
UNP	-0.20	0.09	-0.37	0.28	0.00	0.08	0.00	-0.27	0.45	-0.25	1.00

4.5. Regression Analysis for efficiency determinants

This section highlights the findings from the driving factors of efficiency. Table 4.4 below illustrates the various bank-specific factors driving the efficiency of banks in Ghana. The result revealed consistency and strong model as both the jacknife and bootsrapp were used to test the relationship between the bank-specific variables driving efficiency in the banking sector. The main variable of interest which was the number of bank branches revealed negative and significant relationship with efficiency. This meant that an increase in bank branches would lead to a fall in efficiency. The rationale behind this meant that, if banks are able to increase their branches but this increase does not necessarily transcend into revenue maximization, well-diversified portfolio, then the bank would not be efficient. This was consistent with the expectations of the study and was also confirmed by Carlson (2004) who explained that the ability of a bank to branch does not necessarily mean the bank would be able to reduce risk of its loan portfolio and be efficient. Capital ratio and size of the bank were the only variables that did not reveal any significant relationship with efficiency. Loan loss provisions and deposits ratio both had a negative and significant relationship with efficiency. The negative relationship can be attributed to a high provision on the

loans, which means that the banks expect or a high ratio of the loans are not recovered thereby transcending to a fall in efficiency of the banks. For the loan loss provision ratio, the result was consistent with the study's expectation as opined by Miller and Noulas (1997). They revealed that increase in loan loss provisions as a result of bad loans caused huge losses to the banks due to increase in their operations. Nonetheless, the result of the deposits ratio was inconsistent with the study's expectation of a positive relationship. This implied that, an increase in deposits by customers should lead to an increase in efficiency of the banks. A possible explanation to this in the Ghanaian context might mean that the high deposits might mean that these deposits could not be transformed into loans as a result of the insufficient demands of loans on the market which could lead to a fall in profits thereby making banks inefficient. Again, another explanation could be that, the high deposits received from clients is able to support the assets of the banks satisfactorily without depending on other sources of revenue from clients thereby increasing the efficiency of the banks as opined by Drake and Hall (2003). However, the loans ratio had a positive and significant relationship with efficiency. This was also inconsistent with the study's expectation of negative relationship because a high loan ratio does not necessarily mean increase in revenue which will automatically lead to an increase in efficiency. This is because a higher loan ratio may also mean lower revenue if the non-performing loans are high thereby leading to a fall in profits and rendering the bank inefficient. This assertion was confirmed by Bashir (2003).

Table 4. 5: Factors influencing efficiency

VARIABLES	Jackknife efficiency	Bootstrap efficiency
BRANCH	-0.190**	-0.190**
	(0.0775)	(0.0798)
CAPITAL RATIO	-0.0488	-0.0488
	(0.0445)	(0.0482)
SIZE	0.0454	0.0454
	(0.0382)	(0.0348)
LOAN LOSS PROVISIONS	-0.0625*	-0.0625*
	(0.0312)	(0.0341)
DEPOSIT RATIO	-0.0901***	-0.0901***
	(0.0331)	(0.0339)
LOANS RATIO	0.134**	0.134**
	(0.0603)	(0.0632)
Constant	1.753	1.753
	(1.232)	(1.177)
sigma_u	0.232**	0.232**
	(0.114)	(0.0966)
sigma_e	0.574***	0.574***
	(0.0544)	(0.0533)
Observations	324	324
Number of bankcode	37	37

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.6 Regression Analysis for stability

This section presents in detail, the factors that affect stability in the Ghanaian banking sector. The results of the factors influencing stability is illustrated in Table 4.5. With regards to the bank specific factors, the main variable of interest which is the number of branches (BRN) showed a positively significant relationship when the NPL stability proxy was used and a negative but not significant relationship when the z-score stability proxy was used. The positive relationship of the branch ratio with the NPL implied that an increase in bank branches leads to an increase in NPL if banks are not able to diversify their loan portfolio and risks very well. This is because an increase

in the number of bank branches increases the operations of the banks which can especially be seen in the increase in their loan portfolio. If these loans are not well-managed by adhering to the strict credit policies of the banks, double-checking on the right documentation and ownership of the given collateral, consistent visits and consultations to clients and other control mechanisms, then these loans might not yield the needed revenue that should commensurate with the increase in the branches and therefore increase NPLs and lead to a fall in stability. This was inconsistent with the study of Carlson and Mitchener (2006) who revealed the stabilizing effect of the increase in bank branches on the banking sector. This might mean that increase in the branches of banks might not mean the portfolio of the banks are well diversified which can lead to increase in non-performing loans ratio and increase instability in the Ghanaian banking sector. The Ghanaian banking sector has seen an increase in the number of branches from 380 to 1515 branches over the period of 2005 to 2017 respectively. The increase in bank branches over the period was a means for banks to gain visibility and increase their market share. The inability for the banks to increase operations efficiently as revealed by the negative relationship between bank branch and efficiency also portrayed that inadvertently, this would impact the sector negatively (i.e. a fall in stability), therefore revealing a positive relationship between bank branch and the non-performing loans ratio. The size of the bank (SIZ) is positively significant when the NPL is used as a proxy for bank stability as opposed to the negatively significant relationship when the Z-score is used as the proxy for bank stability. For the NPL ratio, an increase in the size of the bank implies an increase in the NPL which means a fall in stability thereby indicating that, larger banks by virtue of their large assets are more unstable. The negative relationship with the z-score also implied that an increase in the size of banks would lead to increase competition and risks which can lead to huge losses and affect stability negatively. Generally, the increase or growth in the value of total assets might

act as buffer for banks should they become illiquid. Again, growth in assets may mean more funds for investing in capital investments or projects which might increase economic growth and affect stability positively. The negative relationship as opined by Ozili (2017) was consistent with the expectation of the study and literature. The capital ratio (CAP) on the other hand revealed positive significant relationships for both the NPL and Z-score stability proxies. The positive relationship with the NPL could imply that banks might build wrong confidence in their operations by transforming their access to huge capital into loans, reduce their sensitivity to risk of their portfolio as a result of their high capital ratio which might not necessarily translate into revenue thereby preceding high NPLs and thus a fall in stability. The positive relationship of capital ratio with the z-score also mean the banks have enough capital to even undertake high risks which would be cushioned by the high capital ratio should there be losses therefore preceding high stability. This result supported the findings of Diamond and Rajan (2001) (this was also consistent with the expectation of the study) as revealed in the literature as a high capital ratio can cushion the banks' excessively risky ventures being embarked on and therefore precedes improved stability. The Loan loss provision ratio also revealed a positively significant relationship with the NPL stability measure but for the z-score there was a positive and insignificant relationship. A positive relationship with the NPL ratio, implied that the provisions increased as a result of the banks' expectations of high NPLs thereby the provisions acting as buffer for these NPLs. High NPL means a fall in stability for the banks, though the increase in the provisions would be able absorb these NPLs thereby protecting the banking sector from this hit marginally. This was consistent with the expectation of the study, and this positive relationship can be attributable to the fact that increase in loan provisions also means an expected increase in non-performing loans. This increase in provisions acts as protection for banks to manage their bad debts. The provisions have been made

for any loan that is expected to go bad and this is prudent for the bank than if the bank had not made any or increased provisions at all which would not go well for banks should some or most of the debts go bad. The Loan ratio (LOR) also showed a positively significant relationship with the NPL and a positive but not significant relationship with the z-score. The positive relationship with the NPL stability proxy could be interpreted as a high loan ratio does not necessarily mean increase in revenue as some debtors might default thereby leading to an increase in NPL and a fall in stability. This could also indicate a negative relationship with liquidity as more funds would be allocated to loans instead of meeting the other obligations of the bank and therefore impact on stability negatively if non-performing loans resulting from poor policies, mismanagement, manipulations increase proportionately (Siam, 2007). A negative relationship is expected between loan ratio and stability. Again, this was consistent with the anticipated results for the study and supports the findings of Rivai (2007). This might mean that, a high loan ratio, with high non-performing loans would increase instability significantly. The efficiency score (EFF) on the other hand showed negative relationships for both stability proxies but the NPL stability proxy was a significant relationship whereas the z-score stability proxy showed an insignificant relationship. This explained the fact that high NPL ratio means a fall in efficiency which means that when banks are not efficient it transcends into their operations which would lead to an increase in NPL and lead to a fall in stability. This was consistent with the findings of Berger and DeYoung (1997) who were of the view that increase in efficient banks would lead a fall in the non-performing loans and improve stability, hence a fall in instability.

For the macroeconomic variables, the results established a positively significant relationship for the economic growth (GDPG) when the NPL was used as the stability proxy whereas a negatively

significant relationship was established when the z-score stability proxy was used. The positive relationship with the NPL stability proxy indicates that an increase in economic growth may lead to an increase in NPL thereby leading to a fall in stability. With the z-score stability proxy, a negative relationship, indicates that an increase in economic growth leads to a fall in z-score and therefore influences stability negatively. The study predicted a positive relationship between stability and economic growth as the increase in economic growth implies a boost in economic activities which would increase the ability of debtors to make payments on the loans collected. GDPG basically captures the business cycles being manifested in the economy. Upward and downward movements in the flow of economic activities consequently impact on banks' performance directly hence affecting the efficiency of the banks. This was consistent with the study of Segoviano and Goodhart (2009). The inflation variable (INF) also showed a positively significant relationship when the NPL stability proxy was used and a negatively significant relationship when the z-score stability proxy was used. With regards to the NPL, an increase in inflation increases borrowing costs i.e. interest rates, thereby leading to a high rate in the default of payment hence, an increase in NPL and a fall in the z-score. This was consistent with the findings of Boyd and De Nicoló (2005), as high inflation increases operating costs, interest rates which leads to high non-performing loans thereby increasing instability. The unemployment variable also revealed a positively significant relationship when the NPL stability proxy was used whereas the relationship with the z-score stability proxy ascertained was positive and not significant. This implied that a high unemployment rate indicated that borrowers do not have a stable source of income to repay their debts thereby leading to a high NPL ratio. These findings were consistent with Heffernan and Fu (2008). This meant that increase in unemployment levels is associated with high non- performing loans which results in the probability for debtors to default

on their loan repayment which would lead to an increase in instability. Sigma_u on the other hand, is the standard deviations of residuals within groups whereas sigma_e is the standard deviation of the overall residuals.

With regards to the dummy variable for middle period both NPL and z-score revealed negative and insignificant relationships whereas the dummy variable for late period banks revealed both positive and insignificant relationship with NPL and z-score.

Table 4. 6: Factors influencing stability

	(1 fe)	**(2 fe)**
	NPL	Z-SCORE
BRN	0.101**	-0.149
	(3.07)	(-1.14)
SIZ	3.604***	-6.776***
	(8.72)	(-4.13)
CAP	0.0818***	0.622***
	(4.81)	(9.18)
LLP	0.0371**	-0.0647
	(2.70)	(-1.19)
LOR	0.0803***	0.118
	(3.81)	(1.41)
EFF	-0.0612*	-0.110
	(-2.44)	(-1.09)
GDPG	0.173**	-2.183***
	(3.11)	(-9.90)
INF	0.238***	-2.390***
	(3.46)	(-8.77)
UNP	0.323***	0.404
	(4.86)	(1.53)
MID	-0.127	-0.087
	(0.09)	(0.29)
LATE	0.068	0.041
	(0.08)	(0.28)
_cons	-9.566***	23.18***
	(-7.96)	(4.86)
N	320	317

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

This chapter discussed the empirical evidence on the effects of bank branching on efficiency and finally its impact on stability in the Ghanaian banking sector. As indicated in the methodology

chapter, the empirical evidence were obtained from the annual reports and world bank open data sources that are relevant to the issues examined in the study.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter, a general summary of the major findings, as well as recommendations for the study is presented and has been divided into two sub-sections. The first sub-section highlights the methods used in addressing the objectives of the study, the findings and conclusion. In the second sub-section, recommendations for policy and practice are provided as well as directions for future research.

5.2 Summary of the findings

The study examined the impact of bank branches on the efficiency of banks and the stability in the Ghanaian banking sector. The general objective for the study was to assess the impact of branch banking on stability. Firstly, the DEA model was used in measuring the efficiency of the Ghanaian banks. Further, the normal regression model was used to assess the various factors driving the efficiency of banks with emphasis to the number of bank branches. This was suitable for this particular study because the dependent variable is censored. The output from the DEA model that is the efficiency scores was the dependent variable for the regression model whereas the independent variables were solely bank-specific variables which were used to determine the driving factors of efficiency. Again, the fixed effect model was used in assessing the impact of bank branches on stability. The key dependent variables that were used to measure stability included the z-score and the NPL ratio whereas the independent variables included the bank-specific variables and macroeconomic indicators.

The major findings of the study revealed the following:

The relationship between the increases in the number of bank branches was assessed in relation to bank performance and stability. The study found that the increase in bank branches was negatively significant with the performance of the banks and positively significant with stability.

The study showed that increase in bank branches does not mean banks are efficient as the relationship from the results showed that the increase in bank branches does not lead to increase in efficiency.

With regards to the relationship between bank branch and stability, there was a statistically significant relationship when the NPL ratio stability measure was used whereas the relationship with the z-score stability measure was not significant.

Again, the positive relationship between bank branches and stability also indicates that an increase in the branches of banks leads to increase in the NPL ratio which does not paint a good picture. This is because, a high NPL ratio implies poor asset quality as the ratio of non-performing loans to total loans will be high which means the credit quality of the banks is poor and therefore affects the stability of the banking sector poorly.

5.3 Conclusion

Finally, the study concludes that, the fact that banks in their bid to gain visibility in the financial sector does not mean they can increase their branches unnecessarily to gain a larger proportion of the market share. These expansions should be embarked on provided the increase in the number of branches would lead to an increase in diversification of their risks and investment portfolios as the increase in the branches does not mean the banks are efficient. In effect, an increase in bank branches does not lead to an increase in efficiency which also does not lead to stability in the banking sector. Stability in the banking sector, from the angle of this study would only be realized

if banks are able to increase their bank branches lead to a well-diversified portfolio investment and risk and thereby increase efficiency in their operations. Again, the dummy variables that were introduced to explain if middle and late period banks also influenced stability did not reveal any significant relationship with stability.

5.4 Recommendations

The policy implications of the study indicate that for policymakers, management, and other stakeholders to improve the stability of the banking sector, it would be important to consider the role of bank-specific factors which banks have control over as the results revealed significant relationships with most of these factors when drafting policies such as non-performing loans threshold, branching boundaries, aggressive lending practices, specific experience and tenure of the board and CEO and other policies that directly and indirectly affect branch banking decisions in the banking sector. This is because a bank with high non-performing loans, poor lending practices, inadequate experience of the board and CEO cannot increase its branches unnecessarily and would not succeed in operating its number of increasing branches efficiently.

Again, the role of Central Banks in the banking space globally is very critical to the success of the banking sector, therefore, the Central Bank of Ghana must be very proactive in drafting new policies in details on the oversight role of the board with regards to increasing their branches, penalty charges for regulation non-compliance with regards to opening new branches, time-bound targets for overcoming non-performing loans, most importantly specific laws with regards to branching in the banking sector so as to ensure control and other risk management strategies to help managers diversify their portfolios through branch increase prudently. The aim of the bank branching policies could focus on capital threshold requirement for banks that can branch. This means that BoG could implement the capital required for banks to branch. Again, BoG could also

look into implementing laws that would focus on spacing of bank branches. Another policy could also be attentive to BoG looking into the executive plans of banks that would want to branch. These plans should particularly focus on the research the bank has conducted with regards to the revenue and cost analysis, as well as the efficiency and capital threshold of the bank and that of the particular area before approval is given. If possible BoG can conduct this research on its own to see the viability of the project so as to protect the public welfare and improve stability in the Ghanaian banking sector.

Finally, direction for future studies could also examine the impact of online platforms on bank stability, the efficiency as well as capital threshold before branching and its impact on stability.

This chapter briefly addressed the major findings, the conclusion and recommendations of the study.

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APPENDIX A

Table A.1: List of Ghanaian Banks used for the Study

NO.	ABBREVIATION	BANK
1	ACCESS	Access Bank (Ghana) Limited
2	ADB	Agricultural Development Bank Limited
3	AMAL	Bank of Africa
4	BARODA	Bank of Baroda Ghana Limited
5	BBG	Barclays Bank Ghana Limited
6	BSIC	Sahel Sahara Bank Ghana Limited
7	CAL	CalBank Limited
8	ECOBANK	Ecobank Ghana limited
9	ENERGY	Energy Commercial Bank Limited
10	FAMBL	First Atlantic Bank Limited
11	FBL	Fidelity Bank Ghana Limited
12	FBN	FBNBank Ghana limited
13	FCB	First Capital Bank
14	FNB	First National Bank
15	GCB	Ghana Commercial Bank Limited
16	GHL	Ghana Home Loans Bank
17	GN	GN Bank Limited
18	GTB	Guaranty Trust Bank (Ghana) Limited
19	HER	Heritage Bank Limited
20	HFC	Republic Bank Ghana Limited
21	IBG	Intercontinental Bank Ghana Limited
22	ICB	International Commercial Bank
23	MBGL	Merchant Bank Ghana/ Universal Merchant Bank
24	METRO	Metropolitan and Allied Bank
25	NIB	National Investment Bank
26	OMB	OmniBank
27	PB	Premium Bank Ghana Limited
28	PBL	Prudential Bank Limited
29	ROYAL	The Royal Bank
30	SCB	Standard Chartered Bank Ghana Limited
31	SG-SSB	Societe General Ghana Limited
32	STANBIC	Stanbic Bank Ghana limited
33	TTB	The Trust Bank
34	UBA	United Bank for Africa (Ghana) Limited
35	UT	UT Bank
36	ZENITH	Zenith Bank (Ghana) Limited

Table A.2: Efficiency scores of banks used for the study

BANKS	YEAR	SCORES	BANKS	YEAR	SCORES
ACCESS	2009	1.00	BARODA	2009	1.00
ACCESS	2010	1.00	BARODA	2010	1.00
ACCESS	2011	1.00	BARODA	2011	1.00
ACCESS	2012	1.00	BARODA	2012	1.00
ACCESS	2013	0.66	BARODA	2013	1.00
ACCESS	2014	0.60	BARODA	2014	1.00
ACCESS	2015	0.81	BARODA	2015	1.00
ACCESS	2016	0.18	BARODA	2016	1.00
ACCESS	2017	0.06	BARODA	2017	0.08
ADB	2005	1.00	BBG	2005	0.48
ADB	2006	0.77	BBG	2006	1.00
ADB	2007	0.47	BBG	2007	1.00
ADB	2008	0.40	BBG	2008	0.39
ADB	2009	0.59	BBG	2009	0.35
ADB	2010	0.41	BBG	2010	0.39
ADB	2011	0.60	BBG	2011	0.26
ADB	2012	0.64	BBG	2012	0.04
ADB	2013	0.52	BBG	2013	0.16
ADB	2014	0.60	BBG	2014	1.00
ADB	2015	0.46	BBG	2015	0.60
ADB	2016	0.16	BBG	2016	1.00
ADB	2017	0.19	BBG	2017	0.11
AMAL	2006	0.44	BSIC	2008	0.18
AMAL	2007	0.60	BSIC	2009	0.05
AMAL	2008	1.00	BSIC	2010	0.33
AMAL	2009	1.00	BSIC	2011	0.37
AMAL	2010	1.00	BSIC	2012	0.27
AMAL	2011	0.73	BSIC	2013	0.24
AMAL	2012	1.00	BSIC	2014	0.57
AMAL	2013	0.79	BSIC	2015	0.49
AMAL	2014	0.69	BSIC	2016	1.00
AMAL	2015	1.00	BSIC	2017	0.02
AMAL	2016	0.14	CAL	2005	1.00
AMAL	2017	0.24	CAL	2006	0.89
AMAL	2005	1.00	CAL	2007	1.00

Table A.2: List of efficiency scores of banks continued

BANKS	YEAR	SCORES	BANKS	YEAR	SCORES
CAL	2008	1.00	FAMBL	2011	0.49
CAL	2009	1.00	FAMBL	2012	0.25
CAL	2010	1.00	FAMBL	2013	0.64
CAL	2011	1.00	FAMBL	2014	1.00
CAL	2012	1.00	FAMBL	2015	1.00
CAL	2013	1.00	FAMBL	2016	0.37
CAL	2014	1.00	FAMBL	2017	0.00
CAL	2015	1.00	FBL	2006	1.00
CAL	2016	0.47	FBL	2007	1.00
CAL	2017	0.12	FBL	2008	1.00
ECOBANK	2006	1.00	FBL	2009	1.00
ECOBANK	2007	1.00	FBL	2010	1.00
ECOBANK	2008	0.57	FBL	2011	1.00
ECOBANK	2009	1.00	FBL	2012	1.00
ECOBANK	2005	1.00	FBL	2013	1.00
ECOBANK	2010	1.00	FBL	2014	0.74
ECOBANK	2011	1.00	FBL	2015	1.00
ECOBANK	2012	0.81	FBL	2016	1.00
ECOBANK	2013	0.82	FBL	2017	0.20
ECOBANK	2014	1.00	FBN	2016	0.02
ECOBANK	2015	1.00	FBN	2017	0.08
ECOBANK	2016	1.00	FCB	2014	1.00
ECOBANK	2017	0.17	FCB	2015	1.00
ENERGY	2011	1.00	FNB	2016	1.00
ENERGY	2012	1.00	FNB	2017	0.00
ENERGY	2013	1.00	GCB	2005	0.00
ENERGY	2014	1.00	GCB	2006	1.00
ENERGY	2015	0.21	GCB	2007	0.53
ENERGY	2016	0.06	GCB	2008	0.53
ENERGY	2017	0.02	GCB	2009	1.00
FAMBL	2005	1.00	GCB	2010	0.65
FAMBL	2006	1.00	GCB	2011	1.00
FAMBL	2007	1.00	GCB	2012	1.00
FAMBL	2008	1.00	GCB	2013	1.00
FAMBL	2009	1.00	GCB	2014	0.76
FAMBL	2010	1.00	GCB	2015	0.76

Table A.2: List of efficiency scores of banks continued

BANKS	YEAR	SCORES	BANKS	YEAR	SCORES
GCB	2016	0.60	ICB/FBN	2005	1.00
GCB	2017	1.00	ICB/FBN	2006	1.00
GHL	2017	0.02	ICB/FBN	2007	0.78
GN	2016	0.16	ICB/FBN	2008	1.00
GN	2017	0.06	ICB/FBN	2009	1.00
GTB	2006	0.21	ICB/FBN	2010	1.00
GTB	2007	0.43	ICB/FBN	2011	1.00
GTB	2008	1.00	ICB/FBN	2012	0.60
GTB	2009	1.00	ICB/FBN	2013	0.07
GTB	2010	0.51	ICB/FBN	2014	0.26
GTB	2011	1.00	ICB/FBN	2015	0.34
GTB	2012	1.00	MBGL	2005	1.00
GTB	2013	1.00	MBGL	2006	1.00
GTB	2014	1.00	MBGL	2007	1.00
GTB	2015	1.00	MBGL	2008	0.36
GTB	2016	0.23	MBGL	2009	1.00
GTB	2017	1.00	MBGL	2010	1.00
HER	2017	0.03	MBGL	2011	1.00
HFC	2005	1.00	MBGL	2012	1.00
HFC	2006	1.00	MBGL	2013	0.60
HFC	2007	1.00	MBGL	2014	1.00
HFC	2008	1.00	MBGL	2015	0.64
HFC	2009	0.53	MBGL	2016	0.55
HFC	2010	0.54	MBGL	2017	0.24
HFC	2011	0.69	METRO	2005	1.00
HFC	2012	0.49	METRO	2006	1.00
HFC	2013	0.63	METRO	2007	1.00
HFC	2014	0.59	METRO	2008	0.31
HFC	2015	0.49	NIB	2005	1.00
HFC	2016	0.29	NIB	2006	0.41
HFC	2017	1.00	NIB	2007	0.39
IBG	2006	0.26	NIB	2008	0.34
IBG	2007	1.00	NIB	2009	0.53
IBG	2008	1.00	NIB	2010	0.70
IBG	2009	1.00	NIB	2011	1.00
IBG	2010	0.67	NIB	2012	1.00

Table A.2: List of efficiency scores of banks continued

BANKS	YEAR	SCORES	BANKS	YEAR	SCORES
NIB	2013	0.62	SCB	2017	0.10
NIB	2014	0.42	SG-SSB	2005	1.00
NIB	2015	0.59	SG-SSB	2006	1.00
OMB	2016	0.23	SG-SSB	2007	0.52
OMB	2017	0.07	SG-SSB	2008	1.00
PB	2016	1.00	SG-SSB	2009	1.00
PB	2017	1.00	SG-SSB	2010	0.53
PBL	2005	1.00	SG-SSB	2011	1.00
PBL	2006	1.00	SG-SSB	2012	0.59
PBL	2007	1.00	SG-SSB	2013	0.48
PBL	2008	1.00	SG-SSB	2014	0.77
PBL	2009	1.00	SG-SSB	2015	0.46
PBL	2010	1.00	SG-SSB	2016	0.22
PBL	2011	1.00	SG-SSB	2017	1.00
PBL	2012	0.62	STANBIC	2005	0.35
PBL	2013	0.70	STANBIC	2006	1.00
PBL	2014	1.00	STANBIC	2007	1.00
PBL	2015	0.71	STANBIC	2008	0.56
PBL	2016	0.35	STANBIC	2009	1.00
PBL	2017	0.00	STANBIC	2010	1.00
ROYAL	2016	0.19	STANBIC	2011	0.77
ROYAL	2013	1.00	STANBIC	2012	1.00
ROYAL	2014	1.00	STANBIC	2013	1.00
ROYAL	2015	1.00	STANBIC	2014	1.00
SCB	2005	1.00	STANBIC	2015	1.00
SCB	2006	1.00	STANBIC	2016	0.40
SCB	2007	0.58	STANBIC	2017	0.08
SCB	2008	1.00	TTB	2005	1.00
SCB	2009	1.00	TTB	2006	1.00
SCB	2010	1.00	TTB	2007	0.57
SCB	2011	1.00	TTB	2008	0.37
SCB	2012	1.00	TTB	2009	0.66
SCB	2013	1.00	TTB	2010	0.64
SCB	2014	1.00	TTB	2011	1.00
SCB	2015	1.00	UBA	2006	0.19
SCB	2016	1.00	UBA	2007	1.00

Table A.2: List of efficiency scores of banks continued

BANKS	YEAR	SCORES	BANKS	YEAR	SCORES
UBA	2008	1.00	UNIBANK	2016	1.00
UBA	2009	1.00	UT	2008	0.23
UBA	2010	0.59	UT	2009	1.00
UBA	2011	1.00	UT	2010	1.00
UBA	2012	1.00	UT	2011	1.00
UBA	2013	1.00	UT	2012	1.00
UBA	2014	1.00	UT	2013	1.00
UBA	2015	1.00	UT	2014	1.00
UBA	2016	0.49	UT	2015	1.00
UBA	2017	0.11	ZENITH	2006	1.00
UNIBANK	2005	0.12	ZENITH	2007	1.00
UNIBANK	2006	0.53	ZENITH	2008	1.00
UNIBANK	2007	0.49	ZENITH	2009	1.00
UNIBANK	2008	0.33	ZENITH	2010	1.00
UNIBANK	2009	1.00	ZENITH	2011	1.00
UNIBANK	2010	1.00	ZENITH	2012	1.00
UNIBANK	2011	1.00	ZENITH	2013	1.00
UNIBANK	2012	1.00	ZENITH	2014	1.00
UNIBANK	2013	1.00	ZENITH	2015	1.00
UNIBANK	2014	1.00	ZENITH	2016	0.71
UNIBANK	2015	1.00	ZENITH	2017	0.13

APPENDIX B

Table B. 1: Determining the right model for NPL

	(1re) NPL	**(2 fe)** NPL
SIZ	2.776***	3.604***
	(7.00)	(8.72)
CAP	0.0786***	0.0818***
	(4.68)	(4.81)
LLP	0.0243	0.0371**
	(1.91)	(2.70)
LOR	0.0523**	0.0803***
	(2.69)	(3.81)
BRN	-0.0545*	0.101**
	(-2.29)	(3.07)
GDPG	0.255***	0.173**
	(4.19)	(3.11)
INF	0.300***	0.238***
	(3.92)	(3.46)
UNP	0.0108	0.323***
	(0.16)	(4.86)
EFF	-0.0926***	-0.0612*
	(-4.10)	(-2.44)
_cons	-6.645***	-9.566***
	(-5.71)	(-7.96)
N	320	320

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B. 2: Hausman Test for NPL

	b Fixed	B Random	b-B Difference	Sqrt(diaf(V_b-V_B) S.E
SIZ	3.6044	2.7765	0.8280	0.1171
CAP	0.0818	0.0786	0.0032	0.0025
LLP	0.0371	0.0243	0.0128	0.0051
LOR	0.0803	0.0523	0.0280	0.0083
BRN	0.1015	-0.0545	0.1560	0.0230
GDPG	0.1730	0.2553	-0.0823	.
INF	0.2381	0.3002	-0.0621	.
UNP	0.3234	0.0108	0.3127	0.01057
EFF	-0.0612	-00926	0.0314	0.0109

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic
chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 129.86
Since Prob>chi2 = 0.0000 which is <0.05, the fixed effect is used
(V_b-V_B is not positive definite)

Table B. 3: Determining the right model to be used for z-score

	(1re) Z-SCORE	(**2fe**) Z-SCORE
SIZ	-4.245**	-6.776***
	(-2.94)	(-4.13)
CAP	0.695***	0.622***
	(11.29)	(9.18)
LLP	-0.0610	-0.0647
	(-1.32)	(-1.19)
LOR	0.146*	0.118
	(2.08)	(1.41)
BRN	0.0935	-0.149
	(1.09)	(-1.14)
GDPG	-2.262***	-2.183***
	(-10.20)	(-9.90)
INF	-2.435***	-2.390***
	(-8.77)	(-8.77)
UNP	0.911***	0.404
	(3.83)	(1.53)
EFF	-0.0724	-0.110
	(-0.87)	(-1.09)
_cons	14.70***	23.18***
	(3.46)	(4.86)
N	317	317

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B. 4: Hausman test for Z-score

	b Fixed	B Random	b-B Difference	Sqrt(diaf(V_b-V_B) S.E
SIZ	-6.7756	-4.2450	-2.531	0.7732
CAP	0.6225	0.6952	-0.0727	0.0285
LLP	-0.0647	0.0610	-0.0037	0.0284
LOR	0.1180	0.1464	-0.0284	0.0446
BRN	-0.1493	0.0935	-0.2429	0.0987
GDPG	-2.1825	-2.2617	0.0792	.
INF	-2.3800	-2.4348	0.0450	.
UNP	0.4043	0.9113	-0.5071	0.1135
EFF	0.1100	-0.0724	-0.0373	0.0565

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 29.81
Since Prob>chi2 = 0.0005 is< 0.05 we reject the null and use the fixed effect model
(V_b-V_B is not positive definite)