UNIVERSITY OF CAPE COAST

# IMPACT OF LIQUIDITY ON RURAL AND COMMUNITY BANKS PROFITABILITY IN THE EASTERN REGION OF GHANA

BY

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# DECLARATION

## Candidate's Declaration

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

Candidate's Name; Osumanu Alhassan Date……

Signature……

## Supervisor's Declaration

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

Supervisor's Name; Dr. Edward Amarteifio Date……

Signature…….

## ABSTRACT

Despite the major role played by rural and community banks in economic development and in the financial climate, their performance over a decade now have not been up to expectations. They continue to experience huge challenges due to innovations in technology as well as globalization which create opportunities for growth. The purpose of this study was to examine the impact of liquidity on rural and community banks in the Eastern Region of Ghana selected from eleven (11) banks for the period of ten years from 2007 – 2016. The study used panel data and secondary data was used to collate the ratios from all the selected rural and community banks. A regression model was developed with Return on Asset as the dependent variable accompanied with other six explanatory variables. Findings from the study revealed that quality of loan portfolio ratio; capital ratio and loan to total assets had significant and positive relationship with profitability. It was also revealed that shocks in all the liquidity variables had one or other implications on profitability. Finally, based on finding seven, which states that cost to income has negative and significant effect on profitability, the study recommended that management must adopt information and communication technology to reduce cost and easy access to banks' product in the form of Automated Teller Machine.

**KEY WORDS**

Liquidity

Profitability

Rural and Community Banks

Return on Assets

Financial System

Bank of Ghana

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## DEDICATION

To my lovely parents; Alhassan Issifu and Alimatu Sadia Amadu

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| | | |
|---|---|---|
| ADB | - | Agriculture Development Bank |
| ARB | - | Association of Rural Bank |
| BIS | - | Bank of International Settlement |
| CAPM | - | Capital Asset Pricing Model |
| CLRMA | - | Classical Linear Regression Model Assumptions |
| CR | - | Capital Ratio |
| CTI | - | Cost to Total Income |
| DOTA | - | Deposit to Total Asset |
| GDP | - | Gross Domestic Product |
| IIS | - | Interest Income Share |
| QOLP | - | Quality of Loan Portfolio |
| LOTA | - | Loan to Total Asset |
| OLSR | - | Ordinary Least Square Regression |
| RCBs | - | Rural and Community Banks |
| ROA | - | Return on Asset |

# CHAPTER ONE

# INTRODUCTION

Rural and community banking has contributed to economic development and rural financial climate. It has succeeded in collecting funds from those who spend less from their surplus to those who want to spend more but with little funds. Therefore, the success or otherwise of these banks is with utmost concern to the government. In recent times, creation of liquidity has received concern by many scholars including Moussa (2015). The interest on the level of liquidity required by banks to maintain healthy financial position was confirmed by Basel Committee on supervision of the Bank of International Settlement (BIS) of Switzerland (Goodhart, 1995). The problem was that about six percent (6%) of the rural and community banks were liquidated and declared bankrupt for not meeting the requirement of Bank of Ghana as confirmed by World Bank Working Paper on Rural Banking in Ghana (Nair & Fissha, 1997). Many of these studies concentrated on drivers of profitability and credit risk management with little emphasis on liquidity. This study indicated that optimal level of liquidity was a sign of vibrant and stable banking sector devoid of runs and shocks. Below is a brief background of how the rural and community bank industry evolved over the years.

## Background to the Study

Many Sub-Saharan countries including Ghana suffer economic development as a result of poor advancement of key sectors of economic development (Zahir, 1992). The Ghanaian economy is structured into primary,

secondary and tertiary sectors of economies and the primary sector contributes a greater proportion of economic output. It makes use of natural resources in the areas of farming, forestry, fishing, animal rearing and mining. All these are mostly located in the rural areas and those who operate in these areas do so with low capital. It was because of this reason that the government set up Agricultural Development Bank (ADB) to assist farmers with a source of finance for their operations (Mensah, 1993; Ranade, 1994). Unfortunately, all these banks were located in the urban sectors and could not address the real problem and it is for this reason that the rural folks came up with co-operatives which turned to rural and community banks to assist them financially so as to increase productivity for economic growth. Ahiable (2012).

The backbone of Ghana's economy is agriculture and it was the largest contributor to the country's Gross Domestic Product (GDP) and agriculture is largely practised in the rural communities. With the discovery of oil in large quantities in 2008, the concentration has shifted from the agriculture sector and is not surprising that the growth rate under agriculture was about two percent in 2015 (Ghana Statistical Service Report, 2016). Our farmers, fishermen and headsmen now face the challenges of poor education on agriculture, and lack skills and knowledge in marketing of their produce. Again, there are not enough resources or funds to purchase farming equipment for their activities and operations. The above-mentioned problems led to the birth of another banking system in Ghana known as the rural and community banks to help the Agricultural Development Bank in offering funds to enhance agricultural development.

(Munyambonera, 2013).

Before the 18th century, farmers, traders and small business operators in the rural areas were not having any formal or organized institutions for saving and contracting loans to boast their operations (Mensah, 1993). Thus secure, safe and convenient savings and better payment facilities never existed. In order to address this predicament, the Bank of Ghana took several initiatives to increase access to credit in rural areas, including the establishment of rural and community banks (RCBs) (Hug, 1989). Rural and Community Banks were first established in Ghana in 1976 to provide banking services to the rural dwellers, providing credit to small-scale farmers and businesses and supporting development projects (Tsamenyi, Mathew & shazad 2008) with the first in Agona Nyakrom in the Central Region (Hug, 1989). A second bank was opened in the following year at Biriwa, a fishing village also in the Central Region. By 1980, the number of rural banks had reached twenty (20).

Directors of these rural banks form the Association of Rural Bank (ARB) to promote the exchange of information and improve the performance of rural and community bank and the rural communities as a whole. From 1980 to 1984 the number of rural banks jumped to one hundred and six (106). This growth was driven by interest among rural communities in establishing their own banks (Nair & Fissha, 2010). The banks are locally owned and managed. By 2015 one hundred and forty (140) rural banks had been established. They are supervised by the clearing bank ARB Apex Bank under the regulation of the Bank of Ghana; which owns shares in the banks (Sheila, 1993).

According to Ghana Statistical Service (2010), about 57.5 percent of the total population of Ghanaians resides in the rural areas of the country. What this means is that, if Ghana can progress ahead in its development agenda then the rural areas should be made a priority. In Ghana, the need to ensure and enhance Rural Development led to the introduction of the Rural Banking concept in 1976. The main objective was to provide institutional credit to farmers and other rural enterprises to improve the standard of living and to facilitate Rural Development. Rural credit has therefore been used in Ghana to enable the poor to weather shocks without selling their productive assets they need for protection against future shocks (Financial stability Report, 1994).

Liquidity is defined by Bourke (1989) as the amount of cash a company has on hand or can generate quickly reveals how healthy the company is financially. High levels of available cash indicate that the business can pay off debt easily when due dates occur. The types of assets a company has and marketability of those assets are where a discussion of financial liquidity begins. Boadi, Li and Lartey (2016) said liquidity was a major cause of the 2007 financial crises. The bank liquidity is the variables that are controlled by management of a bank. It is the decisions and policies or strategies taken by the directors or management that contribute to the bank's profitability. Banks require liquidity as a means of boasting deposits and shareholders confidence. In respect of this, banks in Ghana are obliged by law to keep 9% of their deposit with Bank of Ghana as a primary reserve. Rural and community banks require liquidity to cover withdrawal of funds by customers, meet unforeseen borrowing request from their customers,

sustain normal cash flow interruptions, satisfy inter-bank indebtedness which may arise daily due to payment clearing system. Mismanagement of assets and liability severely affects the profitability of the bank and management must take serious attention to this area of liquidity so as not to hinder the earning of profit to the banks (Zahir, 1992).

The Rural and Community Banks (RCBs) continue to face stiff competition from the universal banks and the ubiquitous microfinance institutions springing up in every corner of the country. Some RCBs continue to face the problem of low capitalization and operational inefficiencies which are affecting their ability to make profits (ARB Apex Bank Report, 2013). Loan loss provisions to gross loan jumped to 7.2 percent in March, 2016 from 4.3 percent in 2015 same year. Non-performing loans also increased by 59.9 percent from GHC 3.1 billion in 2015 to GHC 4.9 in 2016. The banking industry loans and advances recorded a negative growth of 5.8 percent in March, 2016. Total deposit share of total liabilities moved from 61.9 percent in 2015 to 62.6 percent in 2016 (BOG Financial Stability Report, May 2016). This was taken into consideration for selecting these variables namely; Capital ratios, Interest income ratios, Quality of loan portfolio ratios, and Cost of income ratios, Deposit to total assets ratio, Loans to total assets ratio and Equity to total assets ratio.

‘’Rural Banking has experienced huge changes due to innovations in technology as well as globalization which create both opportunities for growth and challenges for rural banking industry to remain profitable in this increasingly competitive environment’’. Consequently, rural banking performance has

implications on investment, firm growth, industrial expansion and economic development (Wersaingbe & Perera, 2013). Profitability is germane for a bank to remain operational for its owners to obtain deserving returns. The purpose of bank profitability can be evaluated at the narrow and broad level of their operations. At the narrow level, profit is the cheapest sources of fund and is prerequisite for every competitive banking institution. The primary objective of bank management is profit, as is important requirement for running a business. At the broad level, banks that are profitable can withstand bad shocks and may contribute to stability of the financial system. The need for bank profitability at both the narrow and broad level has attracted bank regulators, researchers, bank management and academicians to gain interest on the impact of liquidity on rural and community banks' profitability (Aburime, 2008).

**Statement of the Problem**

Rural and Community Banks are financial institutions that accept deposits and give out loans to its customers. It performs the essential economic function of channeling funds from households, firms and governments that have saved surplus funds for spending less than their income to those that have shortages of funds because they wish to spend more than their income. It is financial intermediations that the rural folks interact with most frequently (Mishkin & Earkins, 2012). Banking sector profitability will encourage investors, strengthening economic development and heightens global orientation on the banking sector.

The rural and community banks have gone through several reforms since its establishment in 1976. Despite these reforms, rural and community banks continue to perform poorly and not efficient in entire financial intermediation. Poor performance is exhibited on low level of economic growth as shown in high inflation rate, high interest rate and high volatility in interest rate, low deposit for investment and low financial sector growth and GDP per-capita (Mensah, 1993). Again, the poor performance continues in poor asset quality, limited and inadequate capitalization, high level of credit risk to individual and firms, greater incidence of non-performing loans, operational inefficiencies and increased level of liquidity (Mombo, 2013). These results compiled in this number of studies including Demerque - kunt and Huizinga (2001); Eichengreen and Gibson (2001); Bikker and Hu (2002); Goddard et al (2004); Gibson (2005); Hardy and Bonuccorsi di Patti (2005) involving others who suggested more research into that areas.

The study looked into the impact of liquidity on rural banks profitability in the Eastern Region of Ghana over the period 2007 to 2016 is in direct response to what had been proposed in the above empirical studies. In understanding the impact of liquidity on rural banks' profitability, the study was put into both overall and specific objectives.

**Purpose of the Study**

To examine the impact of liquidity variables on rural and community banks profitability in the Eastern Region of Ghana over the period 2007 to 2016.

**Objectives of the Study**

Based on the above purpose of the study, these specifics objectives were taken into consideration;

1) To examine the relationship between capital ratio, deposit to total asset ratio and profitability of rural and community banks.
2) To examine the effect of Non-interest income, cost to total income ratio on rural and community banks' profitability.
3) To investigate the relationship between quality of loan portfolio ratio, loan to total asset ratio and profitability of rural and community banks.
4) To assess how profitability responds to shocks in any of the liquidity variables.

**Hypothesis;**

Based on the stated objectives of the study and on the research questions, the following hypotheses were formulated:

**H1.** There is no significant relationship between capital ratio, Deposit to total asset ratio and profitability

**H2**. There is no significant relationship between Non-interest income ratio, cost to total income ratio and profitability.

**H3**. There is no significant relationship between quality of loan portfolio ratio, loan to total asset ratio and profitability.

**H4.** Shocks in Capital ratio, Interest income ratio, Quality of loan portfolio, Cost of income ratio, Loans to total assets ratio and Deposit to total asset ratio do not have significant impact on the profitability of rural and community banks in Ghana.

**Significance of the Study**

Considering the importance of rural banking to economic development through job creation, easy access to credit facilities and contribution to GDP, government or policy makers would be aware of the impact of liquidity on rural banks' profitability for them to set up new minimum capital to safeguard the banks operations, bring out new technology to track creditors in order to reduce non-performing loans. Secondly, researchers and academicians who intend to do similar research and increase their expertise in the topic can use this as a reference document and additional knowledge for their work. Again, the public would be aware of the impact of liquidity on rural and community profitability so that when individuals borrow from the bank, they will repay so as not to increase non-performing loans to keep the banks going.

Finally, management and board of directors of these banks will use this research work to design policies and strategies to minimize its non-performing loans, increase its capital ratios and concentrate on other areas that will shoot up the profitability of the bank.

**Scope of the Study**

The study is being delimited geographically and specifically to rural and community banks in the Eastern Region that had been fully operational for the period under review from 2007 to 2016. The study ought to have covered all the rural and community banks in Ghana but due to time factor and financial constraints, the study was limited to the rural and community banks in Eastern Region. Again, due to similarities of activities among rural and community banks

and proximity to the researcher, the eastern region rural and community banks were adopted to generalize the results.

**Limitations**

**Timeliness:** the time limit for the research work was not adequate since work schedule at the office and gathering of information from banks was a big problem but the banks collaborated and the necessary final accounts were provided.

**Financial issues:** Due to inadequate financial resources, the scope of the study was limited to only rural and community banks in the Eastern Region instead of reviewing all the banks in Ghana but due to scattered nature of the banks within the region and all banks were considered, the result can be generalized.

**Organization of the Study**

The research work was organized into five chapters. The chapters were organized sequentially as follows; Introduction, review of related literatures, methodology, results and discussions, and lastly the summary, conclusion and recommendation. Chapter one (1) dealt about the background of the study, statement of the problem, purpose of the study, objectives of the study, research questions and hypothesis, significance of the study, scope of the study and the limitations. Chapter two (2) reviewed other related literatures of the study. It comprised of the theoretical review, empirical review and the conceptual review and frame work.

Chapter three (3) focused on the methodology which essentially addressed the roadmap for achieving the stated objectives of the study. This section captured research design, study area, population, sampling technique and sample size, data

collection instruments and data collection procedures. Again, the data analysis, results and discussions were captured under chapter four. The last chapter constituted the summary, conclusion and recommendation of the study based on the results formed the chapter five.

# CHAPTER TWO

# LITERATURE REVIEW

This chapter looked into existing literature on the impact of liquidity on rural and community banks profitability to provide platform on which the hypotheses and conceptual framework was tested and developed. The chapter was partitioned into three forms namely; theoretical review which dealt with various theories that served as a blueprint and a guide for the model, followed by empirical review which also dealt with similar studies relating to the topic, findings and methodology used and criticism against their findings. The last form was conceptual review which identified important variables from the studies and linked to the broad goal and study objectives.

## Theoretical Review

A set of interrelated propositions, definitions and ideas that paint a picture of a systematic point of view depicting relationship between predicting variables and explaining phenomena (Fox & Bayet, 2007). This section looks at theories on the liquidity impact on rural bank profitability and relates the concepts to banking. This section is very useful because it serves as a compliment to empirical study's findings and widens comprehension in the subject area. There are many profitability theories that are considered in the banking literature but the most common theories to be looked at are as follows, Signaling theory, Expense-Preference (EP) hypothesis, bankruptcy cost hypothesis, market power and structure hypothesis, Structure-Conduct-Performance (SCP) hypothesis, Agency theory and Regulation theory.

**Signaling Theory**

Signaling theory explains the relationship existing between capital and profitability. Thus, if a bank has a higher capital, it is less risky, therefore the market value of its shares are positive. (Ommeren, 2011). The signal theory helps bank management to let the public know that the future prospects of the bank are bright by increasing capital (Berger, 1995 & Trujillo-Ponce, 2012). Thus, a bank with a lower leverage outperforms its competitors that are unable to raise their capital or equity without having effect or diminishing the profitability (Ommeren, 2011). Therefore the signaling theory supports a positive relationship between capital and profitability. This theory simply states that for a bank to gain profit, it must have enough capital. For instance, Bank of Ghana announced last year (2017) that rural and community banks must have minimum capital of GHC1, 000.000.00 by close of year 2018. This directive is to protect the rural and community banks from risk. Therefore, the banks must alert the public that it has met the requirement and therefore it is safe and secure to have saved their monies with them. Therefore, capital ratio is a good liquidity variable for this study.

**Expense-Preference Hypothesis**

This hypothesis is in contrast to profit-maximization theory and it was first instituted by Hannan and Mavinga (1980). Firms normally engage in activities they have positive preference for over maximization of shareholders wealth through adoption of non-profit maximization policies like increased in personal emolument of staff, financing community development activities. Hannan and Mavinga (1980) tested these first in the banking sector and their findings

indicated that banks normally have large size of personnel when it have monopolized market compared to banks operating in competitive market. Smirlock (1985) findings was contrary to that of Hannan and Mavinga findings and instead suggested that banks deviation in profit maximization is caused by cost needed for organizational restructure.

Bourke (1989) also tested the presence of expense-preference in the banking sector adopting value added as a measure of profitability and do away with the effect of labor union negotiated wage demand and managerial induced expenditure from the net income. Value added is described in banking as loan interest plus other revenue less interest paid on deposit and other non-wage expenses (Mishkin and Easkin 2012). The expense-preference could be established when value added used as a dependent variable and the coefficient of concentration remained positive and increased in magnitude. Bourke findings indicated a slightly positive relationship between concentration and pre-tax return on asset. Contrary to the above, value added as a measure of profitability was used as dependent variable, concentration coefficient was negative. Therefore, his findings did not support the expense-preference hypothesis in banking.

This theory supports the argument that rural and community banks should reduce or minimize cost so as to achieve significant profit. It again states that certain cost should not be incurred at all in order to increase profit. It is with this reason that cost to total income ratio of liquidity variable was considered in this study.

**Bankruptcy Cost Hypothesis**

The bankruptcy cost hypothesis also explains the relationship between capital and profitability. In a case where the bankruptcy cost is unexpectedly high, a bank tries to avoid a period of distress by holding more equity (Berger, 1995). This theory also supported a positive relationship between capital and profitability. A bankruptcy cost of debt is the increased cost of financing with debt instead of equity that result from higher probability of bankruptcy. However, these costs can be considered as a financial cost, in view that as the cost of financing increases, the probability of bankruptcy also increases. Bankruptcy cost can significantly affect a banks's cost of capital. When a bank invest in debt, the bank required to service that debt by making required interest payment. (Dietrich & Wanzard, 2009; Ommeren, 2011; Saona, 2011, Sharma and Gounder, 2012). In simple term, banks must reduce the debt component of cost of capital in order to increase gains. It is in this view that capital ratio and cost to total income ratio are selected for this study.

**Market Power and Efficiency Structure Theories**

The market power and efficiency structure theories elaborated the relationship between bank size and profitability. (Smirlock, 1985), Market power states that big firms have the advantage of attracting more customers since it can take a lion share of the market to increase its profit. Efficiency structure indicates that firms do things right thereby increasing their profitability. Evanoff and Fortier (1988) agreed with Smirlock in favour of Efficiency structure hypothesis. The effect of the above findings is that any law that tries to cut market concentration

may lead to lower efficiency and will reduce economic welfare. It was observed in Olweny and Shipho (2011) that the market power ascribed to the industry and the efficiency structure hypothesis states that bank is more efficient when it earn high profit than the others. Relating these theories to the study, banks that accept more deposits and give out more loans are considered as big banks and if the bank is able to recover larger proportion of its loans, it is efficient. In view of these, quality of loan portfolio, loans to total asset and deposits to total asset ratio are used for this study.

**Structure-Conduct-Performance (SCP) Hypothesis**

Under this hypothesis, condition of market structure determines the rivalry among firms in the market as the number and size grows and when modes of entry are relaxed. When there is too much rivalry in the market, it eventually leads to lower prices and it affects profit. Bourke (1989) findings indicated that concentration was positively related to return on asset when they investigated into the determinants of international bank profitability. Molyneux and Forbes (1995) studied on European banking and found a significant positive relationship between concentration and bank profitability which was in support of SCP. Adam et al (2011) investigated banks in Kenya and came out there was no significant relationship between market structure and interest spreads.

**Agency Theory**

Agency theory explains the relationship that exists between ownership structure and profitability. This theory was first institutionalized by Jensen and Meckling in 1976. In their study, they explain why management adopts different

activities in relationship with management and owners when capital structures in entities differ. The principal and agent relationship differ in preference and needs. When a firm disciplines its market structure, owners get control over management thereby giving management of banks a catalyst to be efficient and profitable. Jensen and Mecking (1976) findings indicated that bank owners with value based and stringent supervisions are more likely to perform better financially than mutual and co-operative or state-owned banks since their study deduced that ownership structure and corporate governance structure have significant influence on performance. Relating this to the study, banks must have greater proportion of equity than debt in the cost of capital so that owners can have absolute control over management. In this view, management can reduce cost to increase the value of the bank owners. It is for this reason that capital ratio and cost to total income ratio are selected for the study.

**Regulation Theory**

This theory shows the relationship between regulation and profitability. Economic managers take into consideration that without proper regulations, value maximizing banks venture into more risker operations or activities than banks which are optimal and acceptable for depositors. Every individual bank have the liberty to venture into any risker activities of their choice but one bank failure is highly detrimental for depositors and could spill over to the banking system. For instance, what happened to Diamond Micro-Finance Company in Sunyani in the Brong Ahafo Region, thereby liquidating the company to settle the creditors may deter individuals from saving and investing in other financial institutions

(Registrar General Department Ghana, 2016)? Regulations that mandate banks to have minimum capital ratio would influence profitability negatively as it constrain value maximizing banks in taking risk and reaching optimal capital structure. The net regulatory burden could have negative effect on bank performance (Saunders & Cornett, 2008). The net regulatory burden is mathematically computed as cost minus the benefits of regulation.

This theory elaborated that banks do not operate in vacuum; it is bound by rules and regulations. For instance, Bank of Ghana directed rural and community banks to meet capital requirement of GHC 1,000,000.00. It is also a requirement by law for the banks to save 9% of its deposit with Bank of Ghana. It is for this reason that capital ratio and deposits to total asset were selected.

**Empirical Review**

This section looked at observed, empirical studies conducted related to the topic or issue. It assessed the findings of these studies and how it was reached through methodology, collection instrument, data analysis and presentation (Anol, 2012). Bourke (1989), Dermigic-kunt and Huizinga (1999), Abreu and Mendes (2002), indicated that banks with high level of equity relative to asset perform better and also tend to face lower cost of funding due to lower financial risk. Bourke (1989) findings indicated a positive relationship between capital ratio and profitability and this showed that well capitalized banks enjoyed lower risk funds and lend same to lower risk customers where they charge lower rate. Alternatively, Bourke suggested that high capital ratio be secured in asset portfolio decisions in order to improve provision of loan loss and gain higher profitability. Graf (2000)

findings indicated a positive relationship between equity level and profitability in Britain but there was no relationship between the two America. The results is so important that cost of capital is a major cost to banks and if it is irrelevant in determining profitability in American banks then directors must resort to debt capital which is the cheapest source of financing banking operations.

Bourke (1989) used bank profitability as independent variable and the ratio of liquid asset to total assets (liquidity) served as independent variable. The findings indicated significant positive relationship between liquidity and bank profitability. In contrast to these findings, Molyneux and Thornton (1992) also used liquidity as independent variable and that of bank profitability as dependent variable; he found out that there was a weak inverse relationship between liquidity and bank profitability among European banks. The possible reason for the difference in these two findings is that the different elasticity for demand for loans in the sample size used in the two studies.

Return on asset served as dependent variable and the ratio of total deposit to total assets (DOTA) was used as independent variable. His findings indicated significant negative relationship impact on banks profitability (Heggestad 1977). Tabi and Nzongang (2000) also used same variables in their studies and the findings showed positive relationship between DOTA and bank profitability in Cameroon. The positive could be attributed to lower cost of deposit funding as compared to equity and debt. More so, banks with huge level of cheap deposits normally performed better than banks that relied on expensive debt and equity as method of funding. At normal times, banks spend huge sums of money to open

branches so as to attract more deposit to fund their lending operations. However, if banks are unable to lend these deposits then it would make losses since these deposits attract interest and banks must incur cost to keep the deposits.

Rural and community banks mode of operations are always hindered by assorted risks including credit risk, market risk, operating risk and liquidity risk. They findings indicated a positive relationship between profitability and risk when risks were used as independent variables and bank profitability was adopted as dependent variables (Abreu & Mendes, 2002). This finding was in consistent with the capital asset pricing model (CAPM) which supported positive relationship between risk and returns.

The CAPM was propounded on certain assumptions including; perfect market, perfect liquid assets, investor rationality and risk averseness but these assumptions don't occurred in real life situation as indicated by Bourke (1989) as well as Molyneux and Thornton (1992) where they findings indicated a negative significant relationship between banks profitability and risk levels of banks which led them suggest that this finding of negative relationship was as a result of high concentration on non-performing loans within banks with huge high-risk loans necessitated impairment charges that led to lower profitability. Moreover, difference in risk-profitability theory and empirical evidence is necessary because risk is major concern for bank directors and investigating relationship among risks and profitability for rural and community banks is of great importance for bank management.

## Conceptual Review

‘’Concept is defined as an image or symbolic representation of an abstract idea’’ (Liehr and Smith, (1999). It means that meaning or understanding is extracted or infer from the image and symbols. Profit maximization states maximizing the wealth or revenue of the firm, it is either a firm produces maximum output from any given resources or using minimum resources to produce a given output (Van Horn, 2012). Friedman (1970) states that firm’s use its resources in operations to boost its profitability as long as is a going concern. The main objectives of every bank is to make profit and they must assess their strength so to capitalize on it, know your weakness in order to find solutions for it, examine your threats and tackle it well and exploit opportunities when available. On the bases of theories studied under the theoretical framework, the following concepts were reviewed namely; Concept of return, and risk as a concept

### Concept of returns

A return simply means the measure of gains or loss from ones investment relative to the amount invested. This is normally computed in a percentage form (Nwude, 2012). It can also be describe as the compensation one get from his or her investment. There are two components on the return of investment namely; capital return and current returns.

### Capital returns

Capital return is the first component of the returns concept and this is not exhibited in the price change called capital returns. It is normally computed mathematically as the price appreciation (depreciation) dividend by the initial

price of the asset. Therefore, the total return of an asset is given as; total return = current return + capital return. In other cases, the current returns could be zero or positive and the capital return on the other could be negative, zero or positive (Nwude 2012).

**Current return**

When someone said current returns, the initial thing that comes in mind was the yearly cash flow or income that one gets in the form of interest or dividend accrued from his investment. Current return was mathematically calculated as the yearly income in relation to the initial price of the investment (Chanda, 2012). Equating it to banking, banks must be able to give out loans from the huge deposit they received from customers in order to earn sum interest. Some deposit attracts interest so banks must engage in loans that provide higher returns than the deposit.

**Risk concept**

‘’Risk is simply referred to as probability or possibility that the actual outcome would differ from the expected outcome’’ (Bodie, Kane and Marcus, 2008). Many expectations of investors were that the actual outcome was less than the expected outcome and as the range of the outcome widen the greater of risk. No one could study impact of liquidity on bank profitability without saying anything about risk because banking is one of the riskier businesses one can engaged into. The risk under these is grouped or classified into three namely; liquidity risk, credit risk and interest rate risk.

**Liquidity risk**

Liquidity risk is the risk of keeping low liquid assets of the bank and thereby facing huge deposit withdrawals (Oludoyi,2003). The liquidity risk is mathematically computed in a ratio form and goes with the formula liquid asset divided by total asset. Rasaih (2010) and Ommern (2011) study shows that there is negative relationship between profitability and large liquid assets.

**Credit risk**

Credit risk is the risk that may arise when borrowers default in the settlement of their debt. It is computed as provision of loan loss divided by total loans and advances (Abdullahi and Lawal, 2009). According to the study of Bobakova (2003), he stated that for banks to achieve high profitability it must be able to foresee in order to avoid and monitor risk which could bring losses as a result of risk.

**Interest rate risk**

Interest Rate risk on the other hand is the risk that arises as the riskiness of earnings and returns on bank assets that result from interest rate changes (Nwude, 2012). Zainoh and Kasim (2010) stated that one of the most examples of interest rate risk is banks borrowing short and lending long which shows mismatch in maturity period.

**Chapter summary**

The chapter is supported by reviewing theories namely; Signaling Theory, Expense-Preference Hypothesis, Bankruptcy Cost Hypothesis, Market Power and Efficiency Structure Theories, structure-Conduct-Performance Hypothesis,

Agency Theory and Regulation Theory. It further revealed other studies that are similar to this study and lastly, concepts relating to the study were considered.

# CHAPTER THREE

# RESEARCH METHODS

## Introduction

In the previous chapters, having introduced the literature and expatiated on various relevant arguments, the research methodology now becomes important, as it explained the data collection and subsequent analysis used in the study. Since the overarching purpose of a study determines the research design, the chapter highlighted the method which was adopted for the study including the study's population and how the sample size was arrived at. Lastly, the chapter addressed the main research instrument which was employed in the data collection as well as some ethical issues which were incorporated in the study.

## Research Design

Research design is the strategy that the researcher chooses to combine different components of the study into logical and coherent way to ensure the research problem is address effectively (De Vas, 2001). It served as the document binding the researcher for the collection, measurement and analysis of data. Many techniques or strategies exist for research writing and every research has its own technique to be used. Some of these research designs are survey design which was mostly used when data is collected through questionnaires and interviews, experiment designs was also adopted when one wants to test cause and effect relationships in tightly controlled setting and case study research which investigated a problem over extended period of time in one or more life settings, among others.

For the purpose of this research, the panel or longitudinal research design was the best adopted. It looked at the same information over time enabling researcher to track changes and relate them to variables in order to examine why the changes occurred. Longitudinal research explains the pattern of change and helped to establish the path and magnitude of causal relationship. The strength was that longitudinal data facilitated the analysis of the duration of a particular phenomenon, it again helped the measurement of difference in a variable from one period to another and finally, it facilitated the forecast of future outcome based upon earlier factors. The pitfalls were that it took a long period to gather results and again it needed qualitative research data to explain fluctuations in the results.

The study covered ten (10) accounting periods of some selected rural and community banks in the Eastern Region of Ghana from 2007 to 2016. The research engaged the longitudinal research technique for this study in order to collate satisfactory data of non-performing loans, impairment loans for bad debt, non-interest income and others to determine the impacts of these determinants on the rural banks' profitability.

**Study Area**

The Eastern Region, with an area of 19,323 square kilometers, occupying 8.1 percent of the total land area of Ghana, is the sixth largest region of the country. A total of 2,106,696 population for the region representing 11.1 percent of Ghana's population. It is the third most populous region, after Ashanti and Greater Accra. The population is made up of 49.2 percent males and 50.8 percent

females. The region is divided into administrative districts and currently has 26 districts. The region has four main geographical features namely;

1) The Kwahu scarp with an elevation of 2,586 feet above sea level.

2) The Atiwa-Atwaredu ranges near kibi, reaching an elevation of 2,400 feet.

3) The Akuapim highland attaining an elevation of 1,530 feet which is the southern extension of the Togo-Atakora mountain ranges and

4) The isolated hills/mountains dotting the relatively low-lying plains to the south, notably the Krobo and Yogaga mountains (Ghana Statistical Service, 2015).

The region's population is very young, with 41.7 percent aged less than 15 years and 5.8 percent older than 64 years. Females constitute 50.8 and male 49.2 percent of the total population, giving a sex ratio of 96.8 males to 100 females. The main occupations of the economically active population in the region are Agriculture and related work (54.8%), Sales (14.3%), Production, Transport and Equipment work (14.0%) and Professional and Technical work (6.9%) and services, accounting for 5.0 percent. There are four major ethnic groups in the region namely, the akan (52.1%), the Ga-Dangme (18.9%), the Ewe (15.9%) and the Guan (7.2%) (Ghana Statistical Service, 2015).

The study area was chosen not only because of the enormous presence of rural and community banks but also the high degree of stability in the environment which serves as a fertile platform for business nourishment. Again, the researcher happens to be from the region which serves as proximity and familiarized with the environment of operation. As at the end of 2016, there were twenty-two (22) of these banks in the region (Apex Bank Report, 2015). The

study was reviewed over the period 2007 to 2016, therefore the banks selected were banks in continues operation from 2007 to 2016. Below is brief history about the selected rural and community banks in the Eastern Region;

**Mumuadu Rural Bank**

It was established on 1982 at Osino in the Fanteakwa District of the Eastern Region of Ghana. The bank was opened with the aim of mobilizing savings and also bank credit to customers in the catchment area. With over thirty-three (33) years of operation, the bank currently have eight (8) member Board of Directors and a solid management team poised for efficiency and effectiveness in delivery of quality bank services. The services they rendered are consumer Loan Scheme, individual loan scheme, monthly overdrafts scheme, susu savings and credit scheme, group savings and credit scheme, current account, savings account, fixed deposit account, special savings account, susu savings account, lien savings account, entrepreneurial skills development, basic accounting principle and business record keeping (mumuadururalbank, n.d.).

**Upper Manya Kro Rural Bank**

Upper Manya Kro Rural Bank limited was incorporated as a limited liability company on October 28, 1982. It was granted license to operate as a financial institution effective march 3, 1984 in accordance with the banking act. The bank mobilizes rural savings for rural investments with focus on microfinance. Their microfinance provides beneficiaries with credit facilities, savings opportunities, health education, business management and many more. Their products include savings account, current accounts, fixed deposit account,

susu savings and loans, apex link transfer, western union money transfer, money gram transfer, project loans, asila loans, vehicle loan, agricultural loan and E-zwich operations (uppemanyakroruralbank, n.d.).

**Manya Krobo Rural Bank**

Manya krobo rural bank was incorporated on 1978 and is located in Abanse, Odumase-krobo, Ghana. The company is working in banks, credit unions activities. The bank has five branches; it has fully computerized and networked its branches as part of the rural banks computerization programmme being sponsored by the United States government. Apart from micro-financing the bank has introduced innovations such as urban reduction product, the payroll loans for workers who do not save with the bank, the susu scheme for the market women and traders in addition to apex link and western union money transfer (manyakroboruralbank, n.d.).

**South Akim Rural Bank**

South Akim Rural Bank limited was established on August 25, 1984 with the head office at Nankese near Suhum in the eastern Region of Ghana. The products rendered are susu saving, current account, saving accounts, fixed-deposit account, western union money transfer, money gram transfer, apex link transfer (Modern Ghana article, July 2, 2009).

**Akwapim Rural Bank**

Akwapim rural bank limited was incorporated on August 29, 1980 and located at Memfe. It visions of being the best bank in the community by all standards and at all is being achieved with staff who are professional and

proactive, state of the art technology, exceptional corporate governance standards, good knowledge of its catchment area and above all customer centric culture. The services rendered are fixed deposit, fixed deposit plus, akuplus, medoba account, shares, akusika accounts, microfinance credit with education, savings account and current account (akwapimruralbank, n.d.).

**Kwahu Praso Rural Bank**

Kwahu Praso rural bank limited was incorporated on 1982 and located at kwahu Praso in the Nkawkaw District. It objective is mobilizing resources for improvement of life among the folks in its catchment area. The services rendered are current account, savings account, fixed deposit account, susu accounts, western union money transfer, money gram transfer, apex link transfer and so many more.

**Anum Rural Bank**

Anum rural bank limited was incorporated as a limited liability company on December 1, 1980 with the objective of providing financial services. Thus, mobilizing deposits to help finance rural economic activities and promote growth. The bank started operation on April 10, 1981. The bank currently has seven branches with the main office at Anum in the Eastern Region. Their products and services are demand deposit, regular savings deposit, susu saving deposit, time deposit, group saving deposits, microfinance and many more (anumruralbank, n.d.).

**Akim Bosome Rural Bank**

Akim Bosome rural bank was established in 1983 with eight staff at Akim

Swedru. The bank assists churches, schools and other institution and also offers scholarship to brilliant but needy children. Their products include fixed deposit, flexible loan terms, savings account, susu account and loan, western union money transfer, money gram transfer and E-zwich (Ghana News Agency report, 2016).

**Population**

Mugenda and Mugenda (2003) describe target population as the complete set of individual's cases or objects that are being investigated. Nnayelugo (2001) also defined research population as the animate or inanimate on things which a study is focused. The specific animate or inanimate that the researcher meets, interacts and generates information from is accessible population while the specific animate or inanimate variables to study are target population. To be able to identify the population for the research was germane for all scientific study. For the purpose of this study, the population involved all the Rural and Community Banks in the Eastern Region of Ghana. Therefore, the population under consideration was twenty-two (22) Rural Banks in the Eastern Region. Due to the period under consideration from 2007 to 2016, only eighteen (18) were in good standings and fully operational to be considered.

**Sampling Technique and Sample Size**

As indicated by Sekeren (2003), by sampling, the primary goal of the researcher was to get a small collection of units from a much larger collection, such that the researcher could study the smaller group to make and produce accurate generalization about the larger group. A quantitative methodology was employed and due to the geographical location of the banks, the researcher was

compelled to adopt the probability sampling techniques in arriving at the sample size. In these regard, stratified sampling technique under the probability sampling method was employed in selecting the rural and community banks.

Stratified sampling technique involves grouping the population into homogeneous non-overlapping strata based on administrative district and then randomly select a sample from each group to form part of the total sample (Sayeed, Edirisuriya & Hoque, 2012). This often improves the representativeness of the sample by reducing sampling error and it could produce a weighted mean that has less variability than the arithmetic mean of a simple random sample of the population. This was very much adopted in statistical research because the measurement within strata has lowered standard deviation; stratification gave smaller error in estimations. Again, for many applications, measurement becomes more manageable and cheaper when the population was grouped into strata. The only downfall on these sampling techniques was that, it was not useful when the population could not be exhaustively partitioned into disjoint subgroups. It would be misapplication of the technique to make subgroups' sample sizes proportional to the amount of data available from the subgroups, rather than scaling sample sizes to subgroup sizes, if known to vary significantly (Anol, 2012).

**Sample Size**

Sample size is described as set of objects, items or people extracted from a larger population so as represent that population (Mason, Rogers & Sinkey, 1995). In response to the above, the proportional allocation stratified strategy was adopted and the size of the sample in each stratum is taken in proportion to the

size of the stratum. The stratum under consideration was and grouped in tabular form as;

**Table 1 : Grouping of the Strata**

| Strata | Districts | No. of banks |
|---|---|---|
| **1** | Yilo Krobo, Upper Manya, Lower Manya and Asuogyaman Districts | 3 |
| **2** | Akwapim South, Akwapim North, Aburi, Nsawam and Adeiso Districts. | 3 |
| **3** | Asamankese, Oda, Kade, Akwatia and Akyemansa District. | 2 |
| **4** | New Abirem, Nkawkaw, Kwahu South, Kwahu North, Afram Plain South and Afram Plain North District. | 5 |
| **5** | New Juaben, East Akim, Fanteakwa, Atiwa, Suhum and Coalter District. | 5 |

Source: Field survey, Alhassan (2019)

In all, the population is eighteen rural and community banks and the sample size considered for this study was eleven.

Sample Size can be derived through various ways namely Fisher et al sample size table, Sample size calculator, among others. Yamane (1967) provides a simplified formula for calculating sample size at a 95% confidence level with a probability of 0.05. The formula is given as: $n = \frac{N + 2}{1+N(e)}$

Where, n - Sample Size, N – Population and e is Probability.

Therefore, $n = \frac{18 + 2}{1 + 18(0.05)}$,

n = 10.53, Approximately 11

In order to arrive at the sample size, the researcher mathematically computed by multiply each group size by the sample size and divided by the total population size. Breakdown followed in tabular form as;

**Table 2: Calculation of the Sample Size**

| Groups | Respondents | Results | Sample size |
|---|---|---|---|
| **1** | 3 * (11/18) | 1.80 | 2 |
| **2** | 3 * (11/18) | 1.80 | 2 |
| **3** | 2 * (11/18) | 1.20 | 1 |
| **4** | 5 * (11/18) | 3.06 | 3 |
| **5** | 5 * (11/18) | 3.06 | 3 |
| **Total** | | | 11 |

Source: Field survey, Alhassan (2019)

The first items represented respondents from each group, 11 represented the sample size and the 18 represented the total population.

**Data Collection Instrument**

Data Collection Instrument is the instrument used to collect precise and reliable data to derive solutions to scientific problems. For the purpose of this study, the secondary instrument was used to gather data. This was solicited through documentary evidence such as public records, diaries and official reports. The public records include financial statements, annual reports of the various rural banks and annual reports from Bank of Ghana. In order to fulfill the research objectives and hypothesis, the respective annual reports of the various banks helped in calculating for the independent variable ratios (capital ratio, deposit to

total assets ratio, etc.). To ensure reliability and validity accuracy, similar studies were considered at the commercial banks and secondary data was selected. This data collection instrument was appropriately used where ‘’primary data was infeasible or too costly and historical data was available at a level of analysis suitable for answering the researcher’s questions’’ (Anol, 2012). The negative aspect of this collection instrument was that data gathered might not be in scientific manner and cannot be used for scientific research and might not addressed research questions needed.

**Data Collection Procedure**

Data was collected from the annual reports of the eleven (11) Rural and Community Banks in the Eastern Region of Ghana. The Banks were Mumuadu Rural Bank, Atiwa Rural Bank, Kwahu Praso Rural Bank, South Akim Rural Bank, Upper Manya Kro Rural Bank, Akwapim Rural Bank, Kwahu Rural Bank, Akim Bosome Rural Bank, Manyo Krobo Rural Bank, Anum Rural Bank and Afram Rural Bank.The data gathered from the annual reports of the rural banks were used to compute for the accounting ratios of the various independent variables but not lifted from the computations made by the banks in order to have uniform accounting ratio for this scientific research. The period for the study spanned from the year 2007 to 2016. The data was generated from the Banks Annual Audited Financial Statement from 2007 to 2016.

**Data Processing and Analysis**

Under this section, the various ways or techniques for achieving each objective is expanded.

***To investigates liquidity variable that has significant impact on profitability of rural banks***

In order to fulfill this objective, Econometric-Views statistical software was used to solicit the significant impact of various independents variables on the dependent variable of the various banks. To achieve this, panel data series was used for this analysis. Return on Asset was used as a reference point as dependent variable and the independent variable include capital ratio, Quality of loan portfolio ratio, Deposit to total asset ratio, loan to asset ratio, interest to Income ratio, Cost to Income ratio.

The model used in this study was the economic model. This model shows the basic characteristics of economic situation and what happens in the real world (Fonta el al, 2009). In order to determine the relationship between banks profitability and its determinants, empirical model used by Haizinga and Demirguc-Kunt (1999) and make well known by other researchers like Kakra and Ameyaw (2010) was adopted and further adjusted to attain the objectives of the study.

The general formula or equation is;

$$Y = \alpha + Bx + \mu \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad \text{Eqn 1}$$

And the specific equation

$$ROA_{it} = \alpha + \beta QOL_{it} + \beta_2 LTA_{it} + \beta_3 CTI_{it} + \beta_4 IIS_{it} + \beta_5 DTA_{it} + \beta_6 CR_{it} + \beta_7 INF_{it} + \beta_8 GDP_{it} + \mu_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad \text{Eqn 2}$$

**Where;**

ROA - Return on Asset Ratio,

QOL- Quality of Loan Ratio,

LTA - Loan to Asset Ratio

CTI - Cost to Income Ratio,

IIS- Interest Income Share Ratio,

DTA- Deposit to Total Asset Ratio,

CR - Capital Ratio,

μ- Error Term,

$\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, $\beta_5$, $\beta_6$, $\beta_7$, $\beta_8$ - Coefficient of Variables

**To assess how profitability will respond to shock in any of its determinants**

Lastly, to test how profitability will respond when there is shock in any of the determinants of profitability; the researcher used E-views statistical software to run the impulse respond test that occurred in profitability when there was any change in its determinants. This is represented in a graphical form to know how profitability reacts in a change of its determinants at a point in time.

*Variables Description*

The variables used for bank profitability analyses are presented. A summary of the variables and how they are measured are also given.

*Dependent Variables*

Two measures of profitability are used by many researchers namely Return of Asset (ROA) and Return on Equity (ROE). The most widely used is Return on Asset because it reflects how management of banks makes effective use of the

bank asset to generate profit. It is computed in the ratio form as profit after tax divided by total assets. A higher Return on Asset indicates that bank is earning more money on less investment. (Flamini, McDonald & Schumachur, 2009, Scott and Arias, 2011, Oladele et al, 2012, Babalola, 2012) in their study adopted the Return on Asset because is a better proxy of profit and Return on Equity ignores financial leverage and the risk associated with it.

*Independent Variables*

**Capital Ratio (CR)**

Capital Ratio is calculated as average capital divided by average total assets. It measures the financial stability to withstand any losses including customer deposits loss as a result of shock. There are two types of capital namely; tier one and tier two. The reason why minimum capital ratio is important is to make banks have enough cushions to absorb reasonable amount of losses before banks become insolvent and later lose depositor's funds.

*Quality of Loan Portfolio (QOL)*

It is calculated by dividing the impairment charge for credit losses by average total loans in a year. A higher QOL implies a lower quality loan portfolio and is expected to lead to lower profitability. Thus, if the ratio is too high, the bank will not have enough liquidity to meet unforeseen fund requirement and when the ratio is low, the bank might not be earning much as expected to be.

*Cost to Income Ratio (CTI)*

It is operating cost divided by total revenue earned within a financial year. The operating costs are staff salaries, branch office expenses, administrative cost,

and property cost excluding losses from non-performing loans. It is estimated that higher cost to income ratio will lower profit level. It indicates the percentage at which the cost consumed the revenue within a particular period. The industry average as at 2015 was seventy-five (75%) percent (Bank of Ghana).

*Deposit to Total Asset Ratio (DOTA)*

Deposit is the main source of finance for banks and it positively impact on bank performance so far as it can be invested in a higher interest rate in the form of loan. It is calculated by dividing average deposit to total average assets.

*Interest Income Share (IIS)*

The average bank relies solely on non-interest income and is the primary way to generate sales. Some banks see non-interest income strategic line item on the income statement especially when the interest rate are low and cannot generate enough profit from loans (Bank of Ghana). It is mathematically computed as dividing non-interest by total income and expressed in percentage form. Non- interest comprises of commissions, fees, service charges, capital gains, foreign exchange gains contribute to the overall income of banks.

*Loans to Total Assets (LOTA)*

Loan intensity is computed by dividing total loans with total assets. LTA measures expected income from loans and non-loan assets. Higher LTA will have impact on bank profitability.

**Chapter Summary**

This researcher used the panel or longitudinal research design for the study and the study covered ten (10) accounting period from 2007 to 2016. The

population was twenty-two (22) rural and community banks but for the period under review, only eighteen were in operations and functioning. Quantitative methodology was employed as sampling technique and eleven banks were selected as sample size. Secondary data was collated from the final accounts of the various banks for the period under review.

# CHAPTER FOUR

# RESULTS AND DISCUSSIONS

## Introduction

This chapter presents an analysis of the data obtained for the study in relation to the objectives stated. The analysis brought to the fore some essential elements that if present can help create awareness of liquidity variables that have impact on rural and community banks' profitability. The discussed results of the study cover liquidity variables that have significant relationship with profitability, linearity test, normality test, serial or auto correlation test and homoscedasticity test. Lastly, it also discusses how profitability responds to shocks in any of the liquidity variables.

### *Test Results for Classical Linear Regression Model (CLRM) Assumptions*

'There are some assumptions that must be met in order to show that the estimation technique, ordinary least squares (OLS), had a number of desirable properties, and also so that hypothesis tests regarding the coefficient estimates could validly be conducted'' (Brooks, 2008). For the purpose of this study, these various tests were conducted to ensure that the assumptions of CLRM are not violated in the model.

### *Normality Test*

Brooks (2008) said a normal distribution must have a coefficient of skewness of 0 and kurtosis of 3. Jarque – Bera (JB) is the most commonly used applied test and states that if the residue is normally distributed, the JB statistic would not be significant at 5% significance level.

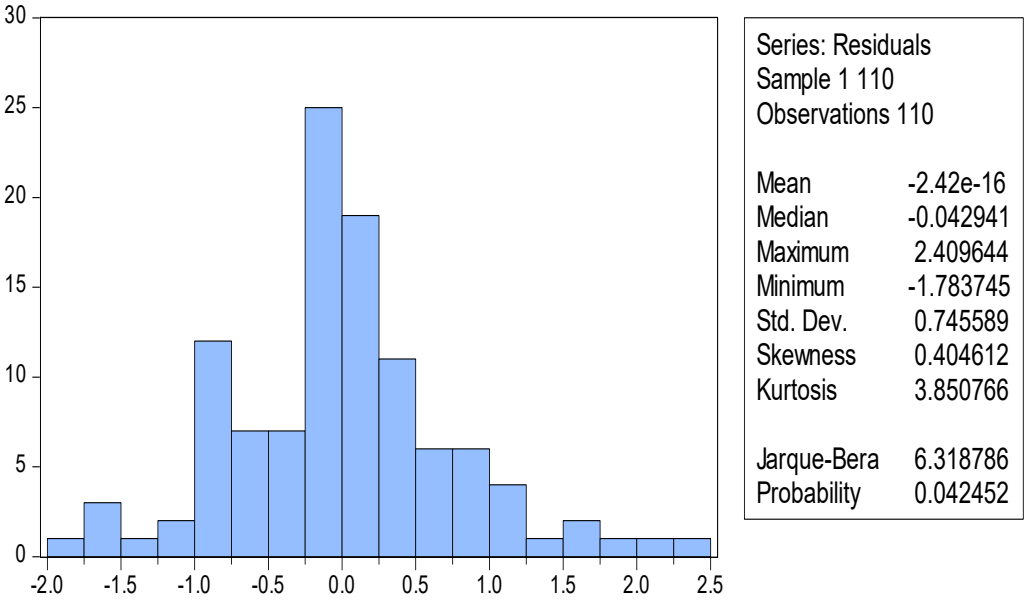


**Figure 1 : Normality Test of the Liquidity Variables**
Source: Field survey, Alhassan (2019)

From the test above, the skewness is a little above 0 and the kurtosis also above 3, the Jarque – Bera statistic had a P-value of 6.318786 which implies that the data is consistent with normal distribution.

*Linearity Test*

The rational of the test is to determine whether the regression equation model is linear specification model. This is to ensure that the assumption of a linear specification model is not violated and the commonly test used is Ramsey Reset Test. The hypothesis of the test was;

Ho; the regression equation model is a linear specification

**Table 3: Linearity Test of the Liquidity Variables using Ramsey Test**

| | Value | Df | Prob. | Sum of Square | Mean Square |
|---|---|---|---|---|---|
| T-statistic | 0.461380 | 102 | 0.6454 | | |
| F-statistic | 0.213056 | (1,102) | 0.6454 | | |
| Likelihood ratio | 0.229526 | 1 | 0.6319 | | |
| F-test summary | | | | | |
| Test SSR | | 1 | | 0.126303 | 0.126303 |
| Restricted SSR | | 103 | | 60.59345 | 0.588286 |
| Unrestricted SSR | | 102 | | 60.46715 | 0.592815 |
| LR test summary | | | | | |
| Restricted LogL | -123.2871 | 103 | | | |
| Unrestricted LogL | -123.1723 | 102 | | | |

Source: Field survey, Alhassan (2019)

From Table 3 above, using the the F- statistic P- value of 0.6454 compared with 0.05 alpha level which is greater, we fail to reject the null hypothesis and conclude that the regression equation model is a linear specification which implies that the assumption has not been violated.

*Test for Heteroskedasticity*

Rational for heteroskedasticity is to determine whether there is no heteroskedasticity in the error term of the regression equation model. This was to ensure that the assumption of a heteroskedasticity in the error term is not violated. The null hypothesis states that there is no heteroskedasticity in the Error term and

the alternate is there is heteroskedasticity in the Error term.

**Table 4: Heteroskedasticity Test using Breusch-Pagan-Godfrey**

| | Value | Prob. |
|---|---|---|
| F-statistic (6,103) | 2.030136 | 0.0682 |
| Obs*R-squared (Chi-Square) (6) | 11.63292 | 0.0707 |
| Scaled explained SS (Chi-Square) (6) | 14.53816 | 0.0242 |

Source: Field survey, Alhassan (2019)

From table 4 above, using F-statistic P-value is 0.0682 compared to 0.05 margin of alpha which is greater, we fail to reject the null hypothesis and conclude that the assumption has not been violated.

*Autocorrelation Test*

Autocorrelation test was presented using Durbin – Watson test to determine whether the error term value was correlated with each other. This was to ensure that the assumption of there should be no autocorrelation was violated. From the model presented below, analyzing the residual term we focused on the Durbin – Watson (DW). From the Durbin – Watson in the model which was 1.940922 falling within the specify parameters $1.5 \leq DW \leq 2.5$ indicated that there is no autocorrelation in the Error term.

**Table 5 : Autocorrelation Test of the Liquidity Variables**

| Variables | Coefficient | Std. Error | t-statistic | Prob. |
|---|---|---|---|---|
| CR | -0.013341 | 0.031426 | -0.424522 | 0.6721 |
| CTI | 0.003869 | 0.009887 | 0.391343 | 0.6964 |
| DOTA | -0.002036 | 0.006807 | -0.299041 | 0.7655 |
| IIS | 0.001943 | 0.014577 | 0.133280 | 0.8942 |
| LOTA | -0.003795 | 0.011178 | -0.339536 | 0.7349 |
| QOLP | 0.003550 | 0.061667 | 0.057575 | 0.9542 |
| C | 0.220754 | 0.869085 | 0.254008 | 0.8000 |
| RESID(-1) | 0.353919 | 0.100961 | 3.505509 | 0.0007 |
| RESID (-2) | 0.052782 | 0.105175 | 0.501850 | 0.6169 |
| R-squared | | | | 0.130452 |
| Adjusted R-squared | | | | 0.061577 |
| S.E. of regression | | | | 0.722269 |
| Sum squared resid | | | | 52.68891 |
| Log likelihood | | | | -115.5991 |
| F-statistic | | | | 1.894039 |
| Prob(F-statistic) | | | | 0.068976 |
| Mean dependent var | | | | -2.42E-16 |
| S.D. dependent var | | | | 0.745589 |
| Akaike info criterion | | | | 2.265438 |
| Schwarz criterion | | | | 2.486386 |
| Hannan-Quinn criterion | | | | 2.355056 |
| Durbin-Watson stat | | | | 1.940922 |

Source: Field survey, Alhassan (2019)

*Unit Root or Stationary Test*

This test was done to determine whether a variable or variables can be described as stationary or non-stationary. It is done in assessing the appropriateness of the regression analysis test and it also help to determine

whether financial data follows random walk hypothesis. Test for unit root in this study by using Fisher PP individual test which states that;

Ho; it has a unit root (not stationary),

H1; it has no unit root (stationary)

**Table 6 : Unit Root Test of the Liquidity Variables using PP Fisher Test**

| Method | Statistics | Bandwidth | Obs | Prob. |
|---|---|---|---|---|
| PP – Fisher Chi-square | 71.5706 | | | 0.0000 |
| PP – Choi Z-stat | -6.34028 | | | 0.0000 |
| ROA | | 2.0 | 109 | 0.0000 |
| QOLP | | 6.0 | 109 | 0.0037 |
| LOTA | | 5.0 | 109 | 0.0380 |
| IIS | | 2.0 | 109 | 0.0610 |
| DOTA | | 4.0 | 109 | 0.0218 |
| CTI | | 5.0 | 109 | 0.0018 |
| CR | | 0.0 | 109 | 0.0393 |

Source: Field survey, Alhassan (2019)

From table 6 above, comparing fisher chi-square test which is 0.0000 to 0.05 margin of alpha, we reject the null hypothesis which states that there is a unit root and conclude that the test has no unit root and therefore it is stationary.

**Impact of liquidity variables on Profitability**

Quality of loan Portfolio (QOLP) has positive and significant relationship with Return on Asset which is in line with Bourke, 1989 and Pasiouras, 2005. From table 7 below, a unit change in QOLP will lead to a positive change in ROA by 0.243134 which is to be significant (P-value = 0.0003) at 0.05 alpha levels. QOLP indirectly measures loans quality and as the loan quality diminishes, profitability of bank reduces in the form of impairment charges which is taken in the year the credit losses are actualized. Total impairment charge for bad debt is regulated by law and the Apex bank of the Bank of Ghana ensures that banks adhered accordingly. Thus, banks cannot postpone taking this expense in their profit and loss account so as to manipulate profitability. Banks not holding adequate provisions for non-performing loans are severely punished to restrain or deter others from manipulation and committing similar offences. This leads to the rejection of the third null hypothesis which states that Quality of loan portfolio does not have significant relationship with Return on Asset.

**Table 7 : Test of influence of Liquidity Variables on Return of Asset**

| Variables | Coefficient | Std. Error | t-Statistics | Prob. |
|---|---|---|---|---|
| QOLP | 0.243134 | 0.065029 | 3.738849 | 0.0003 |
| CR | 0.173561 | 0.033167 | 5.232959 | 0.0000 |
| CTI | -0.029468 | 0.010442 | -2.822150 | 0.0057 |
| DOTA | -0.036672 | 0.007133 | -5.141274 | 0.0000 |
| LOTA | 0.029760 | 0.011804 | 2.521105 | 0.0132 |
| IIS | -0.017225 | 0.015451 | -1.1144847 | 0.2675 |
| C | 4.440730 | 0.918931 | 4.832496 | 0.0000 |
| R-squared | | | | 0.457255 |
| Adjusted R-squared | | | | 0.425639 |
| S.E.of regression | | | | 0.766998 |
| Sum Squared resid | | | | 60.59345 |
| Log likelihood | | | | -123.2871 |
| F-statistic | | | | 14.46268 |
| Prob(F-statistic) | | | | 0.000000 |
| Mean dependent var | | | | 4.280364 |
| S.D. dependent var | | | | 1.012049 |
| Akaike info criterion | | | | 2.368856 |
| Schwarz criterion | | | | 2.540705 |
| Hannan-Quinn criterion | | | | 2.438559 |
| Durbin-Watson stat | | | | 1.263837 |

Source: Field survey, Alhassan (2019)

Capital Ratio (CR) has positive and significant relationship with Return on Asset which is also in consistent with Demirgic- Kunt and Huizinga (1999), Ayanda, Ekpo and Mudashiru (2013) and Samad (2015). From table 7 above, a unit change in capital ratio will lead to a positive change in Return on Asset by 0.173561 which is to be significant (P-Value = 0.0000) at 0.05 alpha level. CR is a benchmark of measuring the riskiness of business and it has significant influence on profitability. Businesses or Banks with high capital ratio are anticipated to be profitable and due to their low financial risk, they can raise cheap capital to finance its operations. However, low capital ratio banks could also be profitable due to proper management of their debt (leverage effect on debt performance). In theory, banks with high capital ratio do not gain from low risk balance sheet. This leads to the rejection of the first null hypothesis that capital ratio does not have significant relationship Return on Asset.

Cost to Total Income (CTI) has negative but significant effect on Return on Asset which is consistent with Athanasoglou et al (2004) and Ndegwa (2011). A unit change in cost to total income will lead to a negative change in Return on Asset by -0.024482 which is significant (P-Value = 0.0143) at 0.05 alpha level. Banks with large amount of cost or expense negatively affect profitability and this cost cannot be passed to customers. In current competitive environment management of banks must adopt new technologies that could reduce their overhead cost in order to attain reasonable profit. This leads to the rejection of the second null hypothesis that cost to total income ratio does not have significant relationship with Return on Asset.

Deposit to Total Asset (DOTA) has a negative but significant effect on Return on Asset in line with Ndegwa (2011). A unit change in DOTA will lead to a negative change in Return on Asset by -0.036542 which is to be significant (P-Value = 0.0000) at 0.05 alpha level. Deposits are primary source of finance to banks and the onus lies in management to transform these deposits to loans in order to earn interest or income but if they are unable to give it out as loans, it affect the profitability negatively. Similarly, the margin between loan interest income and loan interest expense on deposit could be too small to turn into profit due to overhead cost and the results indicated that high deposit to total asset affect profitability negatively. This lead to the rejection of the first null hypothesis that deposit to total asset does not have significant relationship with Return on Asset.

Loans to Total Asset (LOTA) have a positive and significant effect on Return on asset which is consistent with Alper and Anbar (2011) findings. A unit change in LOTA will lead to positive change in Return on asset by 0.043874 which is significant (P-Value = 0.0013) at 0.05 alpha level. It measures the income source of the banks and always estimated to affect profitability positively unless banks try to take unacceptable risk. If banks are able to recover it loans from lender, their profitability will go up. From the results above, rural and community banks are doing well in recovering it loans. This lead to the rejection of the third null hypothesis which indicated that loan to total asset ratio do not have significant relationship with profitability.

Non-Interest to Total Income (IIS) has a negative and insignificant effect on Return on asset which is in line with Yamuna (2013) findings. A unit change in

IIS will lead to negative change in Return on asset by -0.031162 which is insignificant (P-Value = 0.2675) at 0.05 alpha level. Interest charged on loans are always risky and normally compensate accordingly compare with earnings from fees or commission. When banks move from interest on loans to earnings from fees or commissions, the profitability will significant decrease. This leads to the acceptance of the second null hypothesis which states that non-interest to total income do not have significant effect on Return on Asset.

**Impulse Response**

This test depicted how rural and community banks profitability would react when there are fluctuations in any of the independent variables. This is normally represented by diagram or graphically. The purpose of these tests is to find solution for the second objectives.

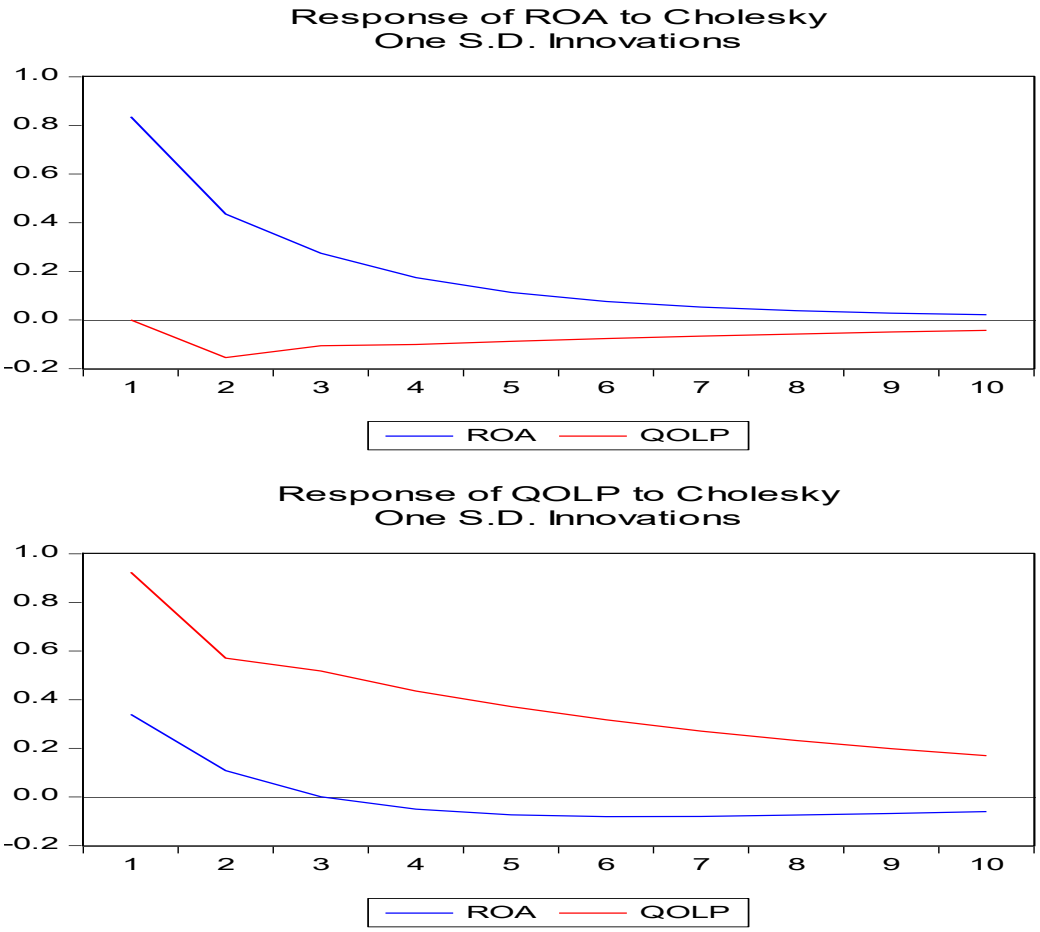


**Figure 2 : Impulse Responses on QOLP and ROA**

Source: Field survey, Alhassan (2019)

Using figure 3 above, it can be deduced that as the quality of loan portfolio reduces, profitability increases astronomically. For instance, when the QOLP fell a little below the zero, ROA remained positive and when QOLP further went to almost -0.20, ROA also increased from positive 0.1 to 0.40. This result simply indicated that as the quantum of money or resources set aside to cater for non-performing loans reduces, profitability increases and vice versa.

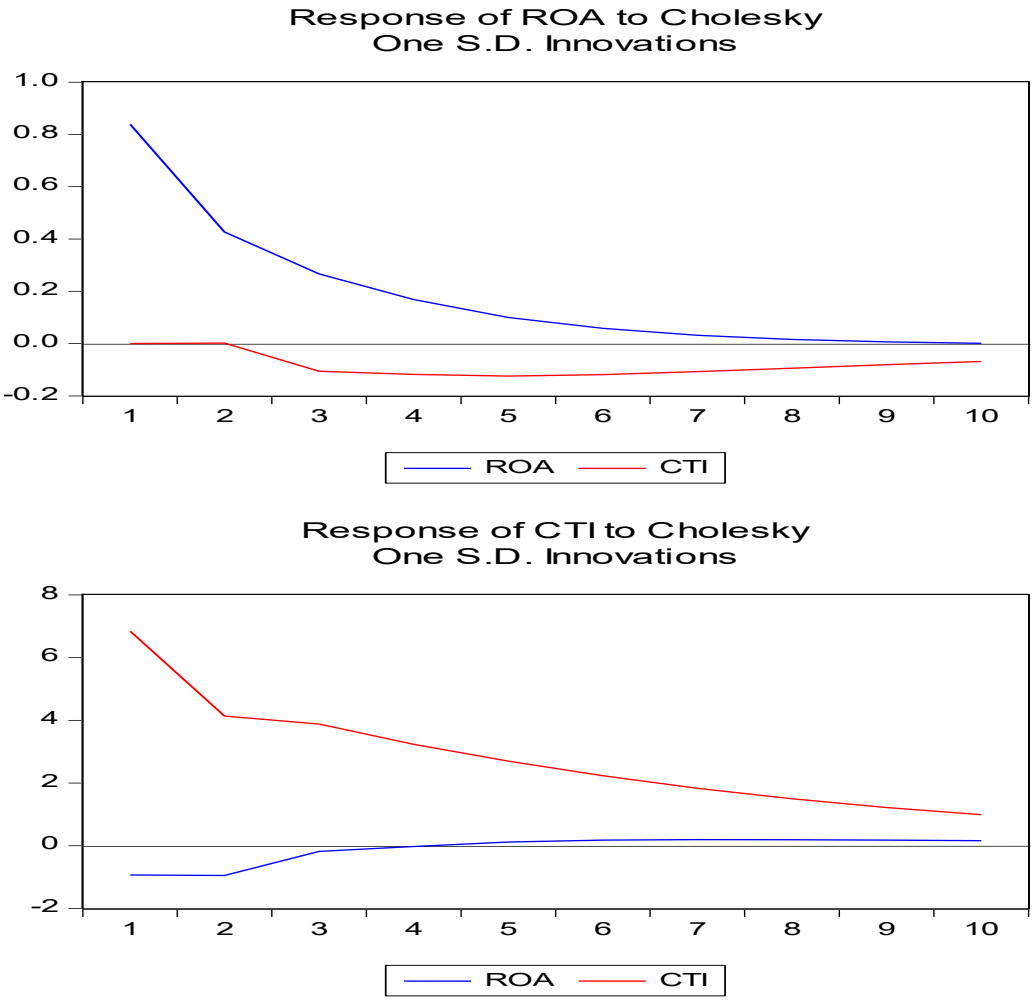


**Figure 3 : Impulse Response on CTI and ROA**
Source: Field survey, Alhassan (2019)

From figure 4 above, it can be interpreted that when cost to total income (CTI) is reduced, profitability or Return on Asset (ROA) increase tremendously and any time the CTI increases, it also affects ROA thereby reducing the profit. Assessing from the diagram above, when the CTI was at -0.1, profitability was at 0.00 and when the CTI jumped to 0.00, ROA also rose from 0.00 to 0.80 which indicates that cost to total income has serious implications on the profitability of the banks in the Eastern Region of Ghana. Again, when the CTI was at 0.1, profitability remained at 0.00 and when the CTI jumped to 6 and above, ROA

reduced drastically to -0.10.

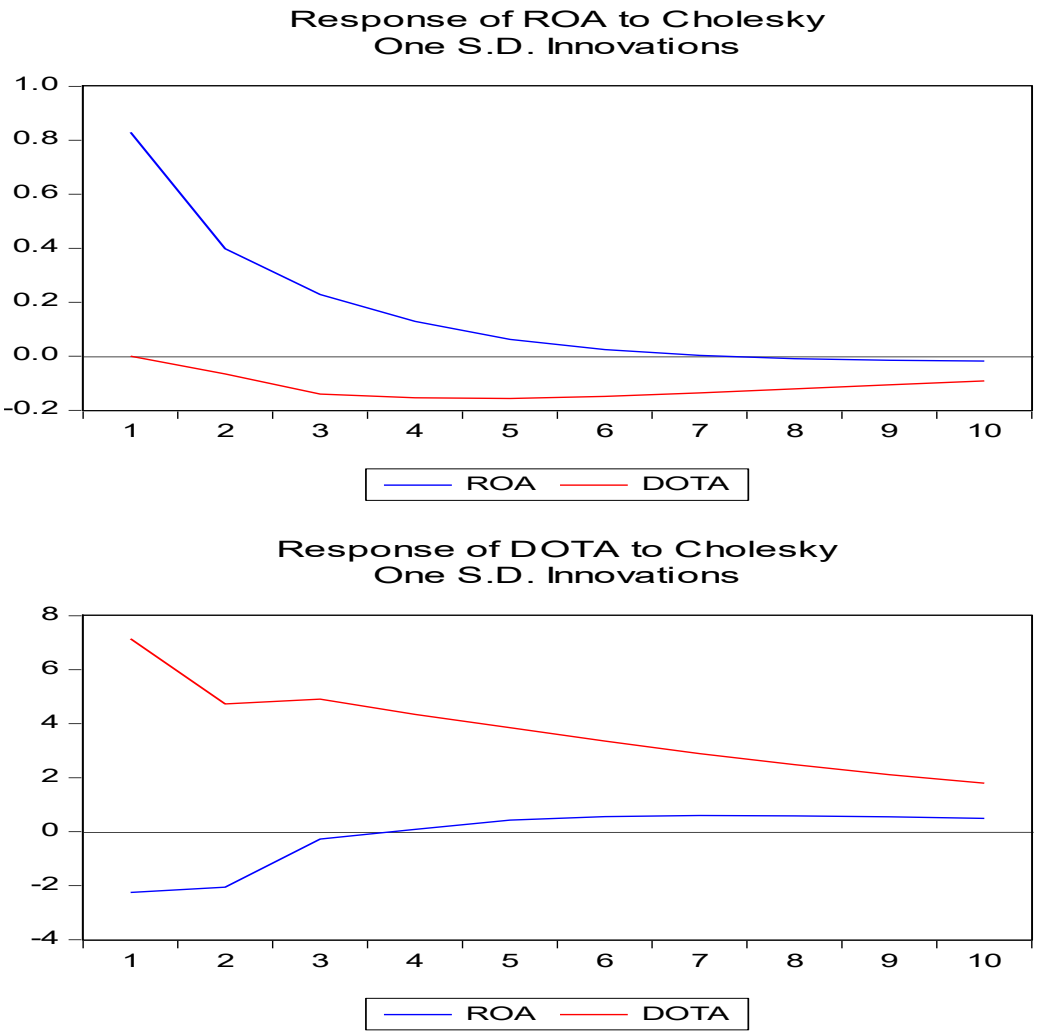


**Figure 4 : Impulse Response on DOTA and ROA**
Source: Field survey, Alhassan (2019)

Deposit to total asset represents the savings that customers have made to the banks for unspecified period of time and it is prudent upon the banks to invest those monies under their custody. From the above diagram, when deposit to total asset (DOTA) falls to -0.10, profitability (ROA) stays at zero and when DOTA reduces to -0.10, ROA also further rises to 0.40. Again, when DOTA rises from 1 to 6, ROA also falls from 0 to -2. Therefore, shocks or serious fluctuations in DOTA severely affect bank profitability. These results implied that when banks

receive too much deposit without investing, it becomes a cost to them and thereby reducing profitability but when these monies are well invested and given out as loans to other customers, profitability obviously shoot to the highest point.

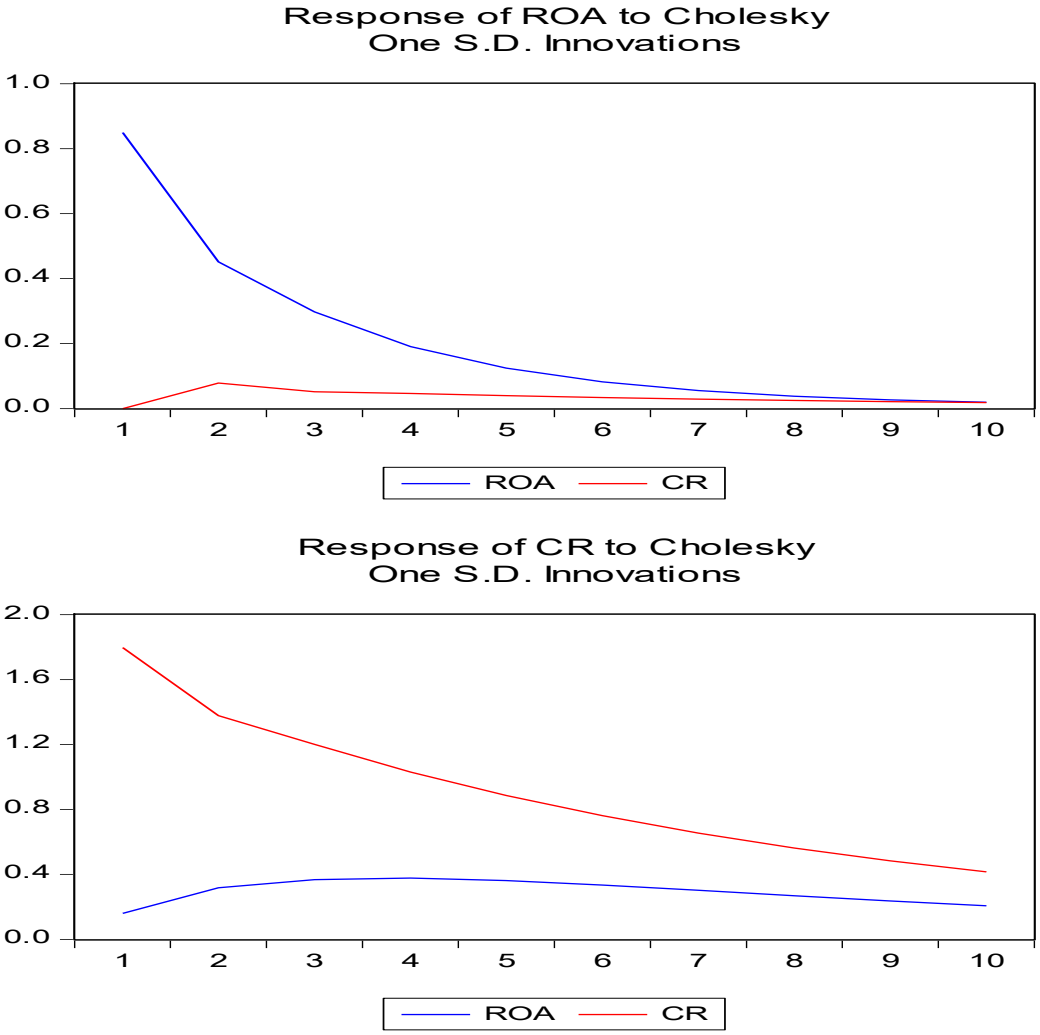


**Figure 5 : Impulse Responses on CR and ROA**
Source: Field survey, Alhassan (2019)

Capital Ratio measures a bank financial strength to withstand unexpected shocks that could lead to loses including loss of customer deposits. It is assumed on paper that higher capital ratio to total asset is safer compared to lower capital ratio. Lower capital ratio is riskier and anticipated to generate higher returns (Samad, 2015). From the results above, anytime capital ratio reduces, return on

asset or profitability increases and when the capital ratio increases, profitability also reduces. For instance, when capital ratio is at 0.10, profitability remains at 0.10 but when capital ratio further reduces to 0.00, profitability moves skyrocket high of 0.80. Again, when the capital ratio is at 0.40, profitability remains at 0.20 and when the capital ratio increases further to above 1.60, profitability also reduces to 0.10. These results indicated that rural and community banks in the eastern region of Ghana are keeping lower capital ratio which is riskier to their operations but it is done deliberately to increase profit.

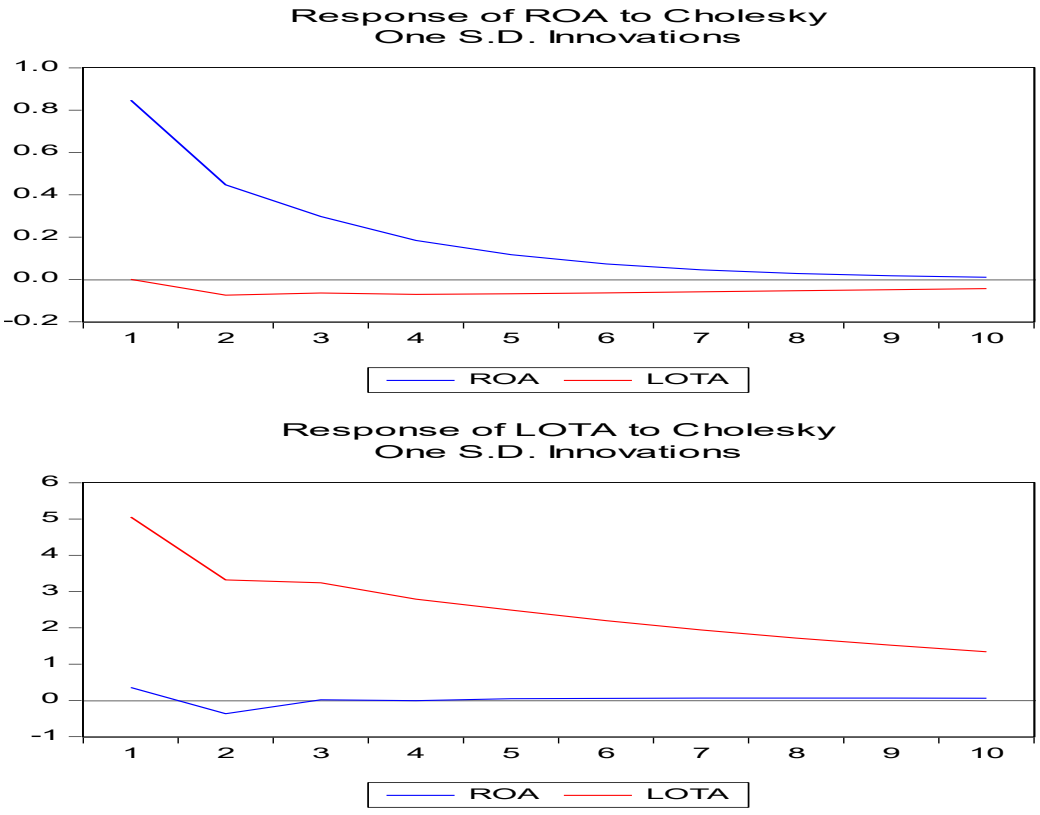


**Figure 6 : Impulse Responses on LOTA and ROA**
Source: Field survey, Alhassan (2019)

Loan to total asset (LOTA) measures the expected income or revenue from loans given out to customers. Loans are asset of banks and when properly

managed increases their profitability (ROA). From the test above, when LOTA stays at -0.10, profitability remains at 0.00 and when the LOTA moves further to 0.00, profitability astronomically jumped to 0.80. Again, when LOTA is at 1.00, profitability remains at 0.00 and when LOTA shoot to 5.00 and above, profitability marginally increases to 0.05. We can deduce from this data that when banks put in place good policies and strategies to retrieve monies given out as loans, their profit will increase significantly. When banks are unable to recover these loans from customers, it will sink their profit and if care is not taken may collapse these banks as happened in the GT bank and Capital bank.

**Profitability Reaction to shocks in Non-Interest Income Ratio.**

Non-interest income (IIS) is income received from commissions, fess, service charges, foreign exchange gains, capital gains. When banks try to shift from interest income to non-interest, it severely affects their profitability. From the analysis above, when non-interest income is a little below 0.00, profitability remains at a little above 0.00 and when IIS is at 0.00, profitability skyrocketed to 0.80. Again, when IIS is at 0.40, profitability reduces to below -0.30 and when IIS jumped to 2.40, profitability increases marginally to 0.10. Interpreting the data above, when banks concentrate only on non-interest, it affects their profitability badly but when they blend or marry the interest and non-interest together, the banks will continue to enjoy better returns.

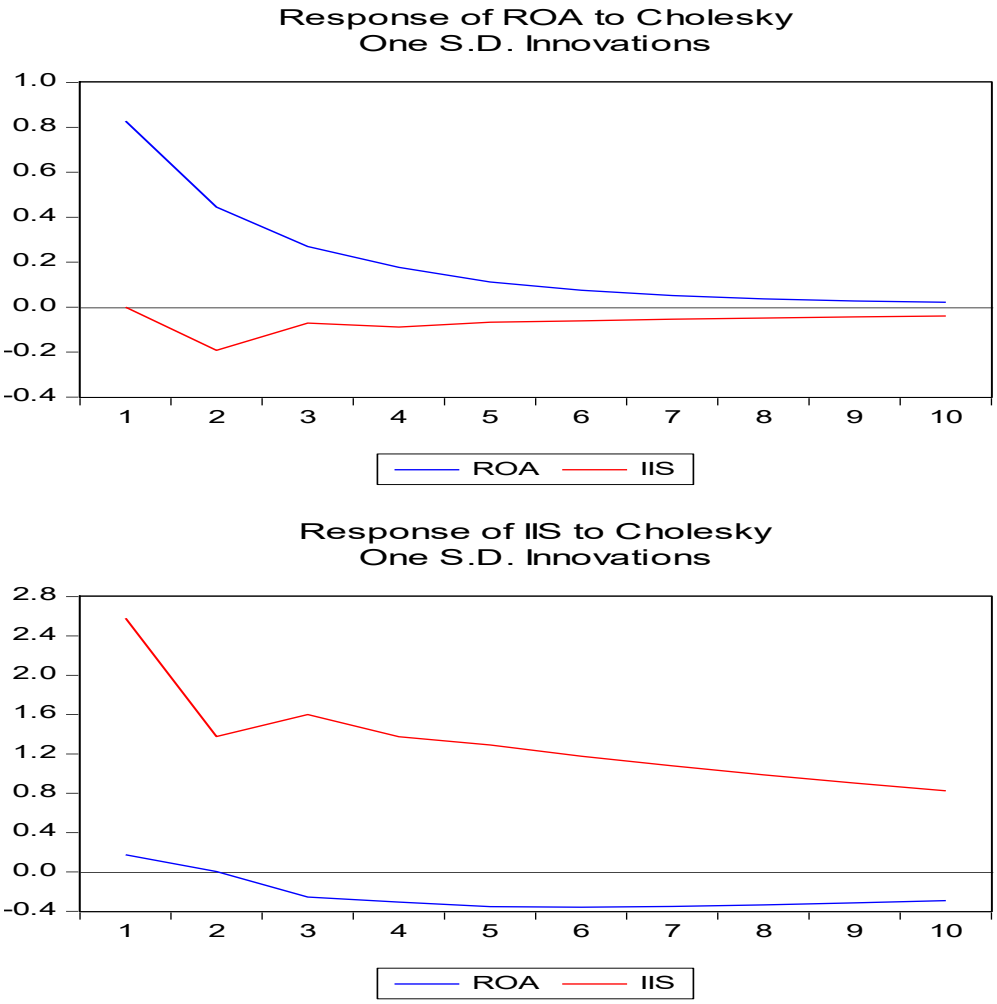


**Figure 7 : Impulse Responses on IIS and ROA**
Source: Field survey, Alhassan (2019)

## Chapter Summary

It was disclosed that the assumptions of normality test, linearity test, autocorrelation test, heteroskedasticity test and stationery test were not violated. Again, costs to total income and deposit to total asset had negative but significant implication on profitability. Non-interest income had negative and insignificant relationship with Return on Asset and Quality of loan portfolio, capital ratio and loan to total asset had positive and significant influence on profitability. Finally, shocks or over runs in capital ratio, loan to total asset, deposit to total asset,

non-interest income, cost to total income and quality of loan portfolio caused changes or fluctuations in Return on Asset.

# CHAPTER FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## Introduction

This chapter presents the summary of the findings on the study and the conclusions. Recommendations as well as suggested areas for future research are also made. The study was aimed at finding the impact of liquidity variables on rural and community banks, specifically rural and community banks located in the Eastern Region of Ghana.

The research was basically a panel or longitudinal studies because it sought to establish processes occurring over time and which therefore may conduct their observation over extended period of time. A quantitative methodology was adopted and a panel data survey strategy was employed as a result of financial challenges. The population of the study was all rural and community banks in the Eastern Region of Ghana. A total of 11 rural and community banks were carefully selected from the various clusters within the region and which has been in existing from 2007 to 2016 for the period under review. An 11 and 10 items respectively were taken using random effect of panel was adopted.

## Summary of key findings

The main findings of the study were in the areas of classical linear regression model assumptions, liquidity variables-profitability relationship particularly those pertaining in rural and community banks; thus which of the liquidity variables have significant effect or influence on profitability, and lastly the impulse response which explains how profitability react when there is

fluctuations or shocks in any of the liquidity variables.

1. It was revealed in the study that the assumptions of normality test in checking whether the model is normally distributed, linearity test verifying if the model is linear, heteroskedasticity test knowing whether there is no heteroskedasticity in the error term, stationary test identifying whether the model has a unit root or not, autocorrelation test confirming whether the error terms are correlated or not. This result reaffirms earlier research conducted by Brooks (2012) who asserted that normality test, linearity test, heteroskedasticity test, serial or autocorrelation test and stationary test must be conducted so as to ensure that these assumptions are not violated and provide accurate results.

2. Per the findings of the study in respect to the effect of liquidity variables on the Return on Asset or profitability, the results brought to the fore that cost to total income and deposit to total asset have negative but significant implications on profitability as reaffirmed in earlier research conducted by Athanasoglou (2004) and Ndegwa (2011) respectively.

3. Non-interest income has negative and insignificant influence or relationship on profitability as affirmed by Yamuna (2013) in his research conducted.

4. Again, the research further indicated that quality of loan portfolio, capital ratio, and loan to total asset have positive and significant impact on rural banks' profitability as indicated in earlier researches instituted by Bourke (1989), Dermigic-kunt and Huizing (1999) and Alper and Anber (2011) respectively. The results in the findings indicated that well managed quality of loan portfolio,

capital ratio and loan to total asset is beneficial or germane to the surviving of rural and community banks in the eastern region of Ghana.

5. In the area of reaction to profitability in shocks to any of the liquidity variables, the results in the findings clearly illustrated that even though quality of loan portfolio, loan to total asset and capital ratio have positive and significant relationship with profitability, any shock or fluctuation in these liquidity variables lead to severe transitory in profitability.

6. Again, non-interest income too has negative and insignificant relationship with profitability but any shocks that happen to it also affect profitability slightly.

7. Lastly, deposits to total asset and cost to income have negative and significant effect on profitability and fluctuation in these severely affect profitability.

**Conclusions**

1. A number of conclusions can be drawn from the findings. The study noted that quality of loan portfolio; capital ratio and loan to total asset have positive and significant relationship with profitability. This was largely the case because banks that keep or set aside fewer amounts to cater for non-performing loan increased their profit earnings. Again, banks that are well capitalized are normally secured from any unforeseen dangers. Therefore, well capitalized banks have the opportunity to spread its investment avenues and lastly, banks that give out its deposits to customers as loan always generate satisfactory profitability.

2. It was established from the study that both cost to total income and

deposit to total asset have negative but significant relationship with profitability. Again, non-interest income also has negative and insignificant relationship with profitability. Thus, when rural and community bank incurred huge expenditures to generate few gains, it seriously affects the banks. Deposit to banks is a liability to the bank so monies received by these banks should be invested wisely to generate the needed income for the compensation of your investment. Non-interest income in one way or the other also provides income to the banks but one banks shift from interest income to non-interest income; the banks are severely punished for that.

3. Lastly, it could be concluded that all the liquidity variables have some responsiveness to profitability. Thus, shocks or fluctuations in any of the independent variables have serious implications on profitability irrespective of whether it is significant or insignificant. This means that whether the variable has positive but significant or negative but significant or negative but insignificant relationship with profitability, any shock against it will cause profitability to change.

**Recommendations**

Based on the findings of this study, the recommendations and suggestions that follow below are however put forward for considerations by various authorities; it is recommended to directors of these rural and community banks to innovate and create policies to drastically reduce cost of operations at the banks. For instance, the directors can adopt new technologies for their activities like reducing the number of employees engaged for employment and use computers

and also using Automated Teller Machines. Again, directors must demand for collateral from borrowers in order to reduce the impairment losses or bad and doubtful debt expenses set aside by these banks. Directors must conduct investment analysis so as to know where monies received as deposit from customers will be invested to earn enough returns whether in loans or other avenues.

Furthermore, it is recommended that government should initiate policies and strategies to support these banks to reduce non-performing loans in order for these banks to support the rural people activities. Also, government must increase the minimum capital requirement for the rural and community banks to protect them against risk and industry collapse that has recently hit the rural and community banks.

Again, the management of rural and community banks should consider or request for collateral or guarantors before giving out loans. The necessary information must be gathered from the loan applicant such as the Global Position System (GPS) Address, House Number, Church attended and others. This will enable the bank to locate the applicant even if the applicant relocates.

Lastly, it is recommended to the general public that, monies given to customers as loans is the main asset of the bank. Therefore, they must repay their loan or debt to these banks to guide against collapsing and for them to be able to serve other customers who are also in need of monies for their activities.

**Areas for further research**

During the study an area was identified for possible further research. This area is briefly discussed. Impact of macroeconomic variables on rural and community banks profitability in the Eastern Region of Ghana. Macroeconomics variables have to deal with the external environment in which rural and community banks operate and the banks cannot directly change them. There exist some expectations between owners or shareholders of bank and the government which when fulfilled could lead to a greater advantage to them. Thus, the government will be satisfied with their contributions towards economic development provided by the banks and the shareholders or owners will also be satisfied with sustainable economy to earn enough from their investment.

Hence, a similar study could be considered for research on the impact of macroeconomic indicators on rural and community banks profitability in the Eastern Region of Ghana. This would go a long way to extend the frontiers of the effective management of macroeconomic variables to the sphere of rural and community bank profitability.

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# APPENDICES

## APENDIX A

Panel Data

| FCODE | ROA | QOLP | DOTA | IIS | CTI | LOTA | CR |
|---|---|---|---|---|---|---|---|
| 1 | 3.78 | 1.00 | 74.89 | 20.56 | 71.67 | 57.67 | 15.78 |
| 1 | 4.00 | 0.47 | 75.25 | 21.45 | 70.45 | 59.23 | 16.57 |
| 1 | 3.86 | 0.32 | 73.91 | 18.43 | 72.40 | 54.62 | 14.97 |
| 1 | 4.46 | 0.29 | 76.50 | 28.35 | 71.20 | 58.19 | 14.49 |
| 1 | 3.58 | 0.22 | 76.96 | 20.25 | 73.01 | 55.36 | 15.09 |
| 1 | 5.33 | 0.35 | 76.04 | 36.45 | 69.38 | 61.01 | 13.89 |
| 1 | 3.90 | 1.19 | 76.84 | 26.25 | 72.11 | 62.23 | 16.29 |
| 1 | 4.07 | 0.81 | 93.31 | 17.58 | 73.40 | 63.01 | 17.61 |
| 1 | 4.17 | 1.02 | 58.44 | 16.62 | 65.08 | 55.72 | 17.51 |
| 1 | 4.12 | 0.97 | 76.05 | 17.45 | 68.72 | 53.88 | 16.89 |
| 2 | 2.99 | 4.01 | 80.56 | 19.45 | 73.15 | 51.78 | 8.88 |
| 2 | 3.05 | 4.22 | 83.45 | 18.35 | 71.66 | 51.54 | 9.12 |
| 2 | 2.89 | 4.73 | 82.39 | 19.27 | 74.01 | 49.38 | 8.95 |
| 2 | 2.58 | 4.79 | 86.19 | 17.01 | 72.20 | 53.38 | 9.07 |
| 2 | 3.00 | 4.67 | 86.59 | 17.15 | 72.04 | 53.97 | 8.95 |
| 2 | 2.99 | 4.91 | 85.79 | 16.87 | 72.36 | 52.78 | 9.19 |
| 2 | 3.01 | 4.42 | 87.38 | 17.42 | 71.72 | 55.15 | 8.71 |
| 2 | 2.97 | 5.40 | 84.19 | 16.32 | 72.99 | 50.40 | 9.67 |
| 2 | 2.44 | 6.83 | 85.95 | 21.04 | 73.04 | 39.64 | 9.23 |
| 2 | 2.75 | 6.11 | 86.21 | 19.06 | 73.44 | 54.45 | 9.46 |
| 3 | 3.87 | 3.01 | 47.67 | 19.17 | 59.45 | 56.73 | 8.79 |
| 3 | 4.26 | 2.78 | 49.08 | 18.34 | 66.56 | 58.23 | 9.45 |
| 3 | 4.28 | 4.94 | 44.48 | 23.41 | 64.05 | 53.81 | 9.93 |
| 3 | 4.23 | 2.54 | 45.15 | 22.20 | 65.53 | 56.58 | 9.53 |
| 3 | 3.93 | 0.20 | 46.14 | 17.14 | 39.06 | 59.06 | 9.46 |
| 3 | 5.32 | 0.71 | 43.72 | 14.64 | 62.57 | 57.35 | 9.87 |
| 3 | 6.00 | 3.24 | 37.90 | 12.24 | 41.05 | 51.05 | 10.86 |
| 3 | 5.05 | 1.02 | 34.14 | 13.79 | 42.45 | 52.45 | 12.00 |
| 3 | 5.52 | 1.36 | 33.41 | 10.87 | 41.44 | 55.44 | 12.95 |
| 3 | 5.28 | 1.88 | 39.99 | 12.34 | 43.56 | 59.47 | 11.22 |
| 4 | 4.09 | 0.89 | 71.45 | 7.23 | 69.98 | 58.35 | 14.44 |
| 4 | 5.26 | 0.41 | 70.12 | 6.45 | 72.04 | 60.19 | 15.56 |
| 4 | 5.75 | 0.47 | 69.31 | 5.79 | 74.84 | 56.03 | 16.18 |
| 4 | 6.81 | 0.20 | 68.40 | 5.97 | 71.40 | 54.79 | 17.26 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4 | 4.68 | 0.91 | 70.22 | 5.60 | 78.27 | 57.26 | 15.10 |
| 4 | 3.92 | 0.31 | 71.99 | 6.34 | 75.01 | 55.19 | 12.67 |
| 4 | 3.56 | 0.54 | 72.31 | 6.05 | 69.04 | 55.31 | 21.23 |
| 4 | 3.40 | 0.49 | 69.30 | 6.62 | 70.61 | 57.00 | 15.88 |
| 4 | 3.11 | 0.87 | 74.74 | 4.85 | 73.11 | 51.33 | 14.85 |
| 4 | 3.26 | 1.25 | 73.55 | 5.97 | 72.34 | 56.67 | 14.09 |
| 5 | 4.85 | 3.01 | 47.30 | 8.23 | 59.23 | 41.45 | 14.21 |
| 5 | 4.99 | 2.31 | 49.23 | 8.34 | 60.56 | 48.79 | 13.99 |
| 5 | 5.09 | 2.13 | 50.23 | 9.17 | 53.69 | 39.01 | 14.12 |
| 5 | 5.43 | 2.12 | 50.30 | 8.45 | 53.00 | 41.80 | 14.41 |
| 5 | 4.74 | 2.14 | 50.16 | 8.88 | 54.38 | 36.22 | 13.83 |
| 5 | 6.11 | 2.09 | 50.43 | 9.01 | 51.61 | 47.38 | 13.98 |
| 5 | 6.54 | 3.10 | 44.51 | 9.42 | 52.82 | 42.77 | 14.30 |
| 5 | 5.48 | 3.42 | 45.98 | 9.40 | 60.26 | 46.11 | 14.67 |
| 5 | 6.01 | 3.26 | 45.25 | 9.41 | 56.54 | 44.44 | 13.77 |
| 5 | 5.88 | 2.45 | 47.09 | 8.98 | 57.45 | 46.33 | 15.08 |
| 6 | 4.45 | 3.89 | 73.23 | 8.01 | 62.83 | 40.56 | 16.98 |
| 6 | 3.79 | 3.29 | 71.98 | 7.63 | 63.76 | 41.43 | 17.46 |
| 6 | 4.76 | 4.03 | 77.01 | 6.69 | 62.48 | 42.45 | 17.05 |
| 6 | 5.02 | 4.19 | 72.89 | 6.47 | 65.09 | 41.99 | 16.99 |
| 6 | 2.88 | 2.78 | 74.97 | 7.21 | 64.36 | 43.88 | 17.35 |
| 6 | 4.51 | 4.34 | 78.89 | 5.67 | 64.38 | 40.17 | 17.34 |
| 6 | 5.89 | 4.44 | 74.15 | 7.29 | 63.97 | 41.05 | 16.67 |
| 6 | 6.16 | 5.78 | 75.56 | 6.65 | 61.78 | 33.59 | 17.23 |
| 6 | 6.99 | 6.48 | 75.12 | 5.70 | 61.10 | 28.58 | 17.06 |
| 6 | 5.19 | 4.32 | 78.50 | 8.51 | 63.59 | 27.31 | 16.59 |
| 7 | 5.04 | 4.45 | 75.67 | 12.56 | 75.34 | 45.23 | 17.45 |
| 7 | 3.58 | 3.02 | 70.98 | 13.05 | 67.45 | 43.23 | 17.67 |
| 7 | 4.23 | 4.09 | 76.23 | 12.45 | 67.54 | 44.09 | 16.74 |
| 7 | 4.06 | 3.67 | 72.89 | 12.89 | 66.19 | 36.96 | 19.01 |
| 7 | 3.62 | 2.62 | 74.65 | 13.17 | 69.09 | 39.08 | 17.34 |
| 7 | 4.51 | 4.06 | 75.94 | 12.99 | 74.23 | 46.96 | 17.37 |
| 7 | 5.70 | 4.87 | 78.75 | 13.08 | 74.78 | 45.63 | 19.11 |
| 7 | 4.53 | 3.54 | 75.94 | 13.28 | 71.89 | 42.78 | 17.24 |
| 7 | 5.34 | 5.05 | 71.35 | 13.29 | 70.01 | 43.80 | 17.45 |
| 7 | 4.66 | 3.98 | 73.45 | 13.89 | 69.45 | 45.34 | 17.67 |
| 8 | 2.72 | 3.00 | 79.31 | 9.45 | 66.45 | 27.59 | 14.89 |
| 8 | 3.87 | 3.23 | 76.32 | 8.36 | 74.56 | 39.47 | 14.99 |
| 8 | 4.68 | 4.01 | 76.65 | 8.34 | 69.14 | 37.45 | 15.02 |
| 8 | 4.04 | 4.87 | 74.78 | 9.56 | 57.47 | 38.87 | 15.34 |
| 8 | 3.99 | 3.54 | 75.94 | 10.18 | 75.38 | 35.32 | 14.75 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | 4.34 | 4.23 | 78.12 | 8.67 | 69.23 | 39.45 | 15.23 |
| 8 | 3.99 | 3.67 | 77.45 | 7.89 | 73.28 | 35.34 | 15.32 |
| 8 | 3.47 | 3.01 | 79.01 | 9.24 | 69.99 | 33.31 | 15.11 |
| 8 | 4.23 | 3.99 | 77.23 | 8.45 | 70.34 | 36.21 | 15.34 |
| 8 | 3.65 | 2.89 | 74.58 | 9.26 | 71.78 | 34.12 | 14.79 |
| 9 | 4.09 | 3.33 | 81.78 | 11.35 | 46.45 | 49.99 | 8.21 |
| 9 | 3.79 | 3.19 | 74.54 | 9.45 | 40.99 | 55.12 | 7.34 |
| 9 | 4.23 | 3.99 | 78.23 | 10.19 | 42.45 | 52.45 | 6.67 |
| 9 | 4.19 | 4.05 | 72.45 | 11.38 | 41.71 | 47.03 | 6.87 |
| 9 | 3.99 | 3.88 | 76.42 | 10.98 | 42.39 | 52.89 | 6.89 |
| 9 | 5.04 | 3.07 | 75.12 | 12.21 | 47.02 | 51.45 | 8.05 |
| 9 | 4.27 | 3.45 | 74.67 | 9.67 | 43.20 | 54.02 | 7.56 |
| 9 | 4.01 | 3.97 | 75.34 | 10.02 | 49.77 | 52.19 | 8.34 |
| 9 | 3.71 | 3.33 | 73.34 | 11.39 | 40.38 | 55.22 | 6.65 |
| 9 | 3.90 | 3.28 | 71.45 | 10.59 | 41.39 | 50.91 | 7.37 |
| 10 | 3.78 | 3.09 | 81.98 | 12.89 | 65.67 | 44.78 | 14.67 |
| 10 | 4.09 | 3.87 | 73.77 | 13.02 | 71.89 | 43.45 | 15.38 |
| 10 | 3.98 | 3.23 | 82.59 | 13.04 | 70.36 | 41.34 | 15.19 |
| 10 | 4.33 | 4.12 | 77.56 | 12.18 | 67.38 | 43.45 | 15.39 |
| 10 | 1.70 | 1.21 | 81.31 | 11.98 | 71.76 | 41.34 | 14.67 |
| 10 | 3.83 | 3.45 | 74.80 | 11.56 | 73.48 | 40.00 | 14.19 |
| 10 | 3.10 | 2.11 | 76.78 | 12.23 | 72.67 | 41.89 | 16.47 |
| 10 | 4.53 | 4.01 | 82.22 | 12.77 | 65.19 | 41.67 | 16.23 |
| 10 | 4.78 | 4.19 | 75.46 | 13.12 | 72.19 | 44.78 | 15.38 |
| 10 | 5.01 | 4.45 | 75.19 | 12.67 | 71.88 | 45.01 | 14.01 |
| 11 | 5.00 | 4.22 | 80.75 | 10.44 | 73.02 | 56.20 | 12.15 |
| 11 | 4.12 | 3.67 | 78.33 | 9.87 | 72.71 | 62.45 | 11.34 |
| 11 | 3.32 | 3.01 | 77.31 | 10.00 | 74.56 | 64.67 | 13.09 |
| 11 | 4.78 | 3.23 | 78.71 | 9.99 | 67.24 | 63.82 | 11.89 |
| 11 | 2.99 | 2.73 | 81.82 | 10.29 | 68.98 | 60.00 | 12.75 |
| 11 | 4.63 | 3.93 | 79.12 | 9.67 | 72.19 | 59.14 | 13.00 |
| 11 | 5.91 | 4.09 | 76.47 | 10.56 | 73.28 | 61.76 | 12.71 |
| 11 | 4.09 | 3.21 | 78.75 | 10.12 | 74.54 | 63.87 | 13.29 |
| 11 | 2.49 | 1.87 | 75.94 | 9.88 | 71.23 | 60.99 | 12.99 |
| 11 | 2.63 | 2.35 | 78.32 | 9.95 | 70.01 | 60.34 | 14.56 |