THE IMPACT OF LIQUIDITY ON PROFITABILITY

An explanatory study of the banking sector between 2008 and 2017

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Chembe Rodney Bwacha & Jing Xi
Abstract

The 2007/08 global financial crisis led to significant changes in the financial world especially the banking sector. It led to regulators and governments tightening regulations in banking sector in order to mitigate the aftermath effects of the global crisis as well as prevent a repeat of the mistakes that initially led to the kick-off of the crisis. One area that received major attention in the post-crisis period is liquidity management and led regulators, governments and international committees such as the Basel Committee to come up with supervisory and regulatory standards aimed at ensuring that banks were liquid enough to avoid bank runs and ensure business continuity.

Therefore, this research was bent towards analysing the nature of the impact of liquidity on profitability in the banking sector. This led us to the research question of what the impact of liquidity on profitability in the banking sector is. The current literature pertaining to the subject of liquidity and profitability has produced mixed results. Some studies have concluded that liquidity does not impact profitability while others have found that liquidity does impact profitability. It is also worth noting that most of these studies were conducted within the context of a country, solely focused on the financial crisis and not in the ordinary course of business or analysed the impact within a short-term time horizon. It is for this reason that our study was directed at specifying the impact of liquidity on profitability; in the ordinary course of business, in a multi-geographical setting and in a mid-long-term time horizon.

A quantitative study was conducted on a research sample comprising 50 banks which happen to be the part of the 100 largest banks in the world by asset size and these are domiciled in 3 geographical regions – Asia, Europe and North America. The period of consideration was 10 years i.e. between 2008 and 2017. The quantitative data for these banks was collated to provide a measure of our variables: loan to deposit ratio (LDR), deposit to asset ratio (DAR) and cash and cash equivalents to deposit ratio (CDR) as liquidity proxies while return on equity (ROE) and return on assets (ROA) were the profitability proxies. Based on these 5 variables, 6 hypotheses were developed and used in determining the impact of liquidity on profitability.

The findings of this study indicate that only DAR significantly impacts profitability computed as ROE while all the other hypotheses proved insignificant. DAR was not found to significantly impact ROA due to the high liquid assets holdings by banks in the post-crisis period. Both LDR and CDR were found not to significantly impact ROE and ROA owing to the high interest payable on deposits, high liquid assets holdings and high lending rates. Hence, it was concluded that generally liquidity does not significantly affect profitability in the banking sector.
Acronyms

CCC  Cash & due From Banks to Total Assets
CCE  Cash & Due from Banks to Total Deposits
CDDEP  Cash Conversion Cycle
CDR  Cash Conversion Efficiency
CDTA  Cash Deposit Ratio
CR  Current Ratio
DAR  Daily Sales Outstanding
DIH  Days Inventory Held
DPO  Days Payment Outstanding
DSO  Deposit Asset Ratio
INVSDEP  Investment to Total Assets
INVSTA  Investment to Total Deposits
LCR  Liquidity Coverage Ratio
LDR  Loan to Deposit Ratio
NIM  Net Interest Margin
NPM  Net Profit Margin
NSFR  Net Stable Funding Ratio
ROA  Return on Assets
ROD  Return on Deposits
ROE  Return on Equity
WCM  Working Capital Management
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1.0 INTRODUCTION

This chapter presents the background of the study as a commencement of the introduction to the research. The theoretical gap is then presented to give the context of the development of the research question. The research question and purpose are later stated and finally the limitation of our study is discussed.

1.1 SUBJECT CHOICE

We are two finance enthusiasts pursuing a master’s degree in finance at Umea University. We purposed to conduct research in the sphere of financial management and to be specific the implication of liquidity management decisions on profitability of banks. Throughout our studies we have been exposed to different concepts and principles in business and finance. Amongst these concepts and principles, financial management is one of the key concepts that stood out hence the undertaking of a research in this area. After a review of prior studies on the matter, we noted that empirical studies have yielded mixed results in addition to a study that was done in a multi-geographical and normal business context missing; thereby motivating us to take up the challenge of filling the theoretical gap. Our target sample will comprise banks operating in North America, Asia and Europe. Conducting a research in the aforementioned area will not only enable us to fill the knowledge gap but also gain a deeper insight in the area of financial management.

1.2 PROBLEM BACKGROUND

Businesses world over regardless of their size engage in financial management in order to ensure continued operations. Corporations make use of financial management strategies in order to ensure that the business is profitable. Any economic enterprise’s main goal is to continually increase the profit and it is for this reason the main purpose of a firm is to maximise its profits (Paramasivan et al., 2016, p. 1).

Profit maximization exploits by firms is one of the oldest and chief most fundamental practices. Almost all business models for the delivery of goods or services start with profit maximization (Levitt, 2015, p.1). This implies that a firm’s investments need to be maximised and that solely probable profitable investments are engaged in with a view of attaining efficiency in the management of funds (Obara et al., 2000, p. 8). In addition, all decisions relating to not just investments but financing as well as dividends are all directed at optimizing profits (Borad, 2018, p. 1). Therefore, there is a direct link between profitability and the key company decisions that are subsequently made. This study will assess the implication of decisions relating to liquidity management on profitability of banks.

Financial management decisions relating to how much liquidity a bank has impacts the goal of profit maximization for banks (Ibe, 2013, p. 1). The financial crises that have occurred have highlighted just how important a role liquidity can play in the operations of banks. The impact is not just on operations but there is also a direct bearing on the profitability (Lamberg et al., 2009).

Accounting liquidity is described as the “company’s capacity to liquidate maturing short-term debt (within 1 year)” (Shim et Siegel, 2000, p. 46-47), which is rather important to keep the continuing work of one company. Liquidity ratio higher than 1 is seen to be normal for a company, on the contrary, liquidity ratio lower than 1 reflects the companies don’t have enough cash to repay the short-term obligations (Morrel, 2007, p. 62). Normally, a high liquidity ratio is a sign of financial strength (Chandra, 2001, p. 72), but
according to some researches, too high liquidity ratio also reveals mismanagement problems of a company (Matarazzo, 2003, p.55), which means companies didn’t make best use of assets to maximize the companies’ profit because of less profitability of current assets compared with fixed assets.

Bank’s should strive to maintain the right balance of liquidity in order to avoid short-term liquidity pressures. The right balance entails not having excess or inadequate liquidity suitable for the bank’s desired operational level (Bhunia, 2012, cited in Ibe 2013, p. 1). Attaining the right trade-off between liquidity and profitability is the crux of the matter in liquidity management (Nahum et al., 2012, p. 1).

Liquidity necessitates pulling out of funds that can be invested to generate profits for the need to ensure stability in operations. On the other hand, reducing the liquidity by an increase in working capital which when invested can potentially result in higher rates of profitability (Raykov, 2017, p. 2). Banks face liquidity management dilemmas such as choosing whether to invest in income generating investments such as high yield bonds which can be illiquid but offer a high return or rather prioritising liquidity stability by keeping the would-be investment funds as cash. The cash held by the banks might present an opportunity cost or might end up being a basis for continued profit generation through the stability it accords. It is the goal of this research to shed more light on how liquidity and profitability are interrelated in the normal course of business.

We find it’s important for us to research the relationship between liquidity and profitability. First of all, it enables us to gain more knowledge on working capital management and profit maximization. Besides, by choosing representative bank samples as research objects, we hope the result will give bank managers an overall overview of the situation their banks are in concerned with profitability and liquidity. Furthermore, this research may give managers guidelines on how to manage working capital properly to achieve the balance between liquidity and profitability.

1.3 THEORETICAL GAP

Numerous studies have been conducted on the impact of liquidity of firms on their profitability. Similar studies have also examined on the effects of working capital management on profitability.

Björkman et al. (2014), examined the effects of working capital management on firm profitability. This study focused on the cash conversion cycle of firms and how this impacted profitability. This study was conducted by evaluating the two-year data for the Swedish wholesale industry. The findings of this study were that working capital had a positive impact on profitability. Lamberg et al. (2009), studied the impact of liquidity management on profitability with a focus on the liquidity strategies that firms used in the 2007/08 financial crisis. The research was based on small capped companies on the Stockholm Stock Exchange and it was found that liquidity strategies had no impact on profitability though liquidity forecasting was concluded to have a positive impact during the crisis.

Tran et al. (2016), assessed the relationship between liquidity creation and bank profitability of US banks. They found that the highly liquid banks which exhibited high illiquid risk tend to have lower profitability. Raykov (2017), conducted a study on the trade-off between liquidity and profitability in Bulgaria with also the financial crisis underpinning the study. The empirical findings of this research showed negative correlation between liquidity and profitability. Ibrahim (2017), analysed the impact of
liquidity on profitability of five Iraqi commercial banks and observed that there was a positive correlation between liquidity and profitability.

Rasul (2013), conducted a similar study to Ibrahim (2017) but with a focus on Islamic banks instead commercial ones. Rasul (2013), concluded that liquidity does affect the profitability of banks though it can be positive or negative depending on the liquidity and profitability proxies used. In addition, other studies conducted by Vintila & Nenu (2016) and Bellouma (2011) found that negative correlation existed between profitability and liquidity while Tufail et al. (2013) and Bordeleau et al. (2010) found the converse based on their research designs.

However, our study differs from these prior studies in the following ways. Firstly, most of the prior studies have been limited to analysing the relationship of liquidity and profitability within the context of a financial crisis as liquidity gained some much importance after crisis. Our study will seek to analyse this aforementioned relationship in the normal course of business and not in unique circumstances like crises. Secondly, previous studies have been limited to a specific geographical setting that is why our study’s target sample will include companies from different geographical settings to have a comprehensive analysis hence, making generalisations much more ideal. Thirdly, most studies’ time horizon for the analysis was short while ours takes into account a longer of time to capture both the short and long-term liquidity effects on profitability. In addition, our sample size is much higher in comparison to the prior studies into to have a more representative sample. It can also be seen that the different studies have had different conclusions as to the relationship between liquidity and profitability.

Therefore, it is clear that there exists a gap in present literature relating to an analysis of the relationship between liquidity and profitability that takes into account this relationship in; the normal course of business, a multi-geographical setting and mid-long-term horizon. This study will also seek to clarify what the relationship is between liquidity and profitability as current literature presents mixed results.

1.4 RESEARCH QUESTION

1. What is the effect of liquidity on profitability in the banking industry.

1.5 RESEARCH PURPOSE

First of all, the purpose of this research is to analyse the relationship between liquidity and profitability in the banking industry. This will be done through a quantitative study, by selecting 50 representative banks from three continents including North America, Europe and Asia; analysing related liquidity and profitability ratios, to see if there is explicit impact of liquidity on the profitability of banking industry. Secondly, our research fills the gap of previous research, we don’t discuss impact of liquidity on profitability in certain circumstances like financial crisis but focus on relationship between liquidity and profitability in the normal business of banking industry. Besides, according to previous research, the relationship between liquidity and profitability can be determined by several factors, like the numbers and types of banks they chose, the country where the banks are, the time span of the research design, those different factors may result in different conclusions. For our research, we selected 50 banks from different areas, researched the relationship of liquidity and profitability in the short and medium run, which gave us a more complete overview of the relationship between liquidity and profitability. Thirdly, our research can help bankers gain more knowledge of the relationship between the above
two factors, and on this basis manage to balance these two factors to achieve business goals and gain maximum benefits for banks.

1.6 RESEARCH LIMITATIONS

Liquidity management and profitability are two important concepts in every company regardless of its business model. In order for a company to ensure that it is a going concern sound liquidity management and profit realisation are indispensable. With the understanding that these two concepts are relevant for all companies, it is impracticable to study different companies from diverse regions and models in our context on conducting this research due to time and other related constraints. It is for this reason that our research will be focused on the banking sector with special attention to the largest banks by asset size. We set out to focus on the banking sector as it is one of the sectors were liquidity and profitability trade-off is pronounced and recent the financial crisis has showed just how important this subject is resulting in regulators and governments taking interest and have set out stringent regulations in the banking sector.

In addition, the study is assessing the impact of accounting or funding liquidity on profitability, thus market liquidity is not the focus of this study. Funding liquidity deals with how a firm is able to meet financial obligations in a timely manner while market liquidity deals with how quickly an asset can be bought or sold in a market without adversely affecting its price (Brunnermeier & Pedersen, 2008, p. 1).
2.0 SCIENTIFIC METHOD

This chapter presents the authors’ philosophical stances by means of the ontological and epistemological views. In line with the authors’ philosophical stances the research design and approach for the research are presented. Lastly, how literature was searched for is outlined and also the choices of concepts and theories to be used in our study are tabled.

Scientific method is defined as “the process by which scientists, collectively and over time, endeavour to construct an accurate (that is, reliable, consistent and non-arbitrary) representation of the world” (Wolfs, 1998). This chapter introduces ontology; epistemology; the research approach we adopted; the strategy of our research design; literature search and choices of concepts and theories.

2.1 ONTOLOGY

Ontology is defined as a “branch of philosophy that studies the nature of reality or being.” (Saunders et al., 2009, p. 510). The central question for this philosophy is whether social entities should be considered as objective and have a reality external to social participants, or whether the social entities are results of activities from social actors and can be influenced by social actors (Bryman & Bell, 2011, p. 23).

Ontology has 2 positions which are objectivism and constructionism, objectivism shows that the nature of reality is pre-existing and independent from social actors, which shows that social phenomena maintains the same regardless of researchers. While constructionism is defined as “an ontological position which asserts that social phenomena and their meanings are continually being accomplished by social actors” (Bryman & Bell, 2011, p. 24), which means the social actors have influence on social reality since social actors are components of social reality themselves.

In our thesis we research the effect of liquidity on profitability by analysing 50 commercial banks. We choose objectivism as our ontology position, since we conduct this research by using quantitative methods, the two factors we try to research from banks can be measured by relevant ratios from available financial resources, which are quantifiable and objective, the whole process won’t be influenced by activities from social actors.

2.2 EPISTEMOLOGY

Epistemology is defined as “what is regarded as acceptable knowledge”, the central question is whether we should use the same methods of researching natural sciences to research social science. (Bryman & Bell, 2011, p. 29).

The 3 positions of epistemology contain positivism, realism and interpretivism. Positivism is defined as “an epistemological position that advocates the application of the methods of the natural science to the study of social reality” (Bryman & Bell, 2011, p. 28). It is believed knowledge can only be measured and observed and researchers can only perceive the objective findings without adding their own subjective understanding, which shows the independence of social phenomena from researchers. While interpretivism shows the close connections between researchers and social science researches, researchers may involve own subjective understanding with researches. Besides, realism is similar to positivism because of the belief that applying the same methods of nature science on social science, and the view that reality is external (Bryman & Bell, 2011, p. 29).
For our thesis, we take positivism as our epistemology position. We conduct a quantitative research on the effect of liquidity on profitability, data was collected from annual reports in recent 10 years to measure the above 2 factors, and the analysis of the relationship through SPSS is objective and independent from researchers, we don’t add our subjective understanding of data collected and results from SPSS analysis.

2.3 RESEARCH APPROACH

The three approaches for conducting research contains deduction, induction and abduction. Induction is defined as “collecting data to explore a phenomenon and you generate or build theory” (Saunders et al., 2012, p. 145), which means theories are generated mainly through conducting the research. Induction is defined as “proceeds from a set of general premises to a more specific conclusion” (Ketokivi & Mantere, 2010, p. 316), the specific conclusions are derived from general researches. While abductive research can be defined as: “collecting data to explore a phenomenon, identify themes and explain patterns, to generate a new or modify an existing theory which you subsequently test through additional data collection” (Saunders et al., 2012, p.145).

For our thesis, we aim to investigate the effect of liquidity on profitability, we choose deduction as our research approach. By collecting data from available financial resources, certain ratios were calculated to measure liquidity and profitability, through the analysis of relevant ratios, we figure out if there exist general relationship between liquidity and profitability.

2.4 RESEARCH DESIGN

Research design is defined as “plans and procedures for research that span the decisions from broad assumptions to detailed planning regarding methods of data collection and analysis” (Creswell, 2009, p. 3).

The main 2 strategies for research design include quantitative and qualitative research. The quantitative strategy is defined as “a research strategy that emphasizes quantification in the collection and analysis of data” (Bryman & Bell, 2011, p. 38), which is based on the external reality. Quantitative research mainly focusses on testing the rightness of theory through conducting the research. While qualitative is defined as “a research strategy which emphasizes word rather than quantification in the collection and analysis of data” (Bryman & Bell, 2011, p. 38), unlike quantitative research, qualitative is based on the premise that reality is internal, which focus on generating theories through observation of researchers.

Our research aims to investigate the relationship between liquidity and profitability, we choose quantitative study as our research strategy, financial statements from annual reports of 50 banks give us access to data in recent 10 years; the liquidity and profitability can be measured by certain ratios calculated from the financial data collected; the analysis is conducted through SPSS, and through the above process we generate general conclusions which can be used to guide future bank managers.
2.5 LITERATURE SEARCH

The reason for literature review is to know what is already discussed in this field to avoid repeating previous research. Besides, using the existing literature on a topic is a means of developing an argument about the significance of your research and where it leads (Bryman & Bell, 2011, p. 100). The normal ways of literature search include reading of books, academic journals and reports; searching keywords from electronic database like EBSCO, SSCI; reading newspapers and public research from non-academic institutions like World Bank; searching on google engine (Bryman & Bell, 2011, p. 102-104). For our literature search, we mainly rely on searching keywords like “Liquidity”, “Profitability” from Umea University electronic database like Factiva, Thomas Reuters Eikon and Diva.

2.6 CHOICE OF THEORIES AND CONCEPTS

The theoretical framework is imperative in highlighting the plausible relationships among several important research problem components. The framework stems from the prior studies that have been conducted in the pertinent area of study and offers a conceptual basis for the research (Sekaran, 2003, p. 87).

In our research, the 2 main concepts include liquidity and profitability. Accounting liquidity is described as the “company’s capacity to liquidate maturing short-term debt (within 1 year)” (Shim et Siegel, 2000, p. 46-47), for our quantitative study, we chose LDR, DAR and CDR ratios to measure the liquidity of banks. Another important concept profitability is measured by ROA and ROE ratio. Besides, although we took theories from previous research into consideration, one thing to mention is that previous researches may focus on relationship between liquidity and profitability in special circumstances like financial crisis, in specific areas like US, or in short time horizon, which limited their research to generate comprehensive conclusions for us to refer to.
3.0 THEORETICAL FRAMEWORK

In this chapter, we discuss the theoretical framework, which is divided into three general parts. During the first part we illustrate liquidity definition, working capital, liquidity measurements, liquidity risk and liquidity regulations. The second part, we discuss profitability measurements, previous research about relationship between liquidity and profitability and other profitability determinants. The third part, we introduce the conceptual models adapted and propose hypotheses.

3.1 LIQUIDITY

3.1.1 CONCEPT OF LIQUIDITY

Our thesis discusses the impact of liquidity on bank profitability. As we mentioned before, liquidity is significantly important for the sustainable work of banks. Researchers have given different definition about liquidity. Shim et Siegel define Accounting liquidity as “company’s capacity to liquidate maturing short-term debt (within 1 year)” (Shim et Siegel, 2000, p. 46-47). Maness & Zietlow (2005, p. 31) summarizes 3 components to define liquidity, which is amount, time and cost. Amount means how many resources the company has to fulfill its financial obligations; time means how long the company takes to transfer assets into cash; cost means if the company can transfer assets into cash without much costs. While Campbell et al., defines liquidity as “the ability of a firm to augment its future cash flows to cover any unforeseen needs or to take advantage of any unexpected opportunities” (cited by Maness & Zietlow 2005, p. 32). For bank industry, liquidity is defined as “the capability to secure the necessary funding through attracting deposits, cash, or pledging encumbered assets” (Aldo, 2015, p. 3).

Crockett (2008), indicates liquidity is much easier to be recognized than be defined, and the researcher also summarizes 3 concepts of understanding liquidity. Financial Instrument liquidity refers to the availability of change them into cash without value loss. Market liquidity refers to the capability to trade certain securities or assets without influencing their price. The third concept of liquidity deals with monetary liquidity concerned with quantity of fully liquid assets in the financial world.

Compared to liquidity, there is a relevant concept called solvency, which measures the extent of how much companies’ assets exceed its liabilities, ratios like current ratios, quick ratios and the concept called net working capital which measure solvency are also used to measure liquidity. (Maness & Zietlow, 2005, p. 25).

It’s vital for companies to meet liquidity needs, the concept of liquidity is accompanied with one company's financial strength, which means the capability to finance for the investment activities. High liquidity tends to improve the efficiency of the financial operation and performance of financial management (Chandra, 2001, p. 72). While profitability influences the quality of the future development of one company, liquidity decides directly the survival and sustainability of this company, one company usually becomes default or go to bankruptcy due to lack of liquidity rather than lack of profitability.

For commercial banks, Adalsteinnson (2014, p. 25) points out the liquidity can be achieved through 3 different ways, the first one is the sales of assets, the second way is to borrow money from creditors in financial markets, and the third way is relied on the repayment of debts from debtors.
3.1.2 LIQUIDITY THEORIES

➢ Shiftability Theory

Shiftability theory means the feasibility of banks holding assets can be easily sold for cash to avoid lack of liquidity, which gives banks guidelines on possible approaches of meeting liquidity needs. When financial managers manage the categories and proportions of holding assets, focus on this theory may help enhance their capability in liquidity. Instead of relying on assistance of central banks while meeting unexpected situations, commercial banks can manage convertible assets in advance to avoid losses caused by emergency situation (Ibe, 2013, p. 3).

Shiftability theory emphasizes the possible ways of enhancing liquidity through holding self-liquidating assets, which makes this theory infeasible for banks which are incapable of available assets. Thus, some researchers point out increasing holding of liability, since lack of liquidity can be caused by both assets side and liability side from balance sheet.

While Dodds (1982) mentions other ways of securing liquidity of banks, which is meeting liquidity needs through borrowing from customers instead of holding marketable assets, which focus more on the liability management of banks. To achieve this, commercial banks need to consider the ways they seek money from their creditors and the proper standards to measure the amounts banks borrow from creditors.

➢ Liquidity Theory in Stock Market

Biderman & Santschi (2005), posited that the liquidity theory can be applied to avoid stock market theory, he suggests investors invest in stock market in the same way as corporate insiders and public companies do, which means selling stock when they sell, buying stocks when they buy them. This liquidity theory is supposed to be referential by both individual and institutional investors like banks to avoid failure in investment.

➢ Commercial Loan Theory

Commercial bank theory is another liquidity theory of instructions on meeting needs of their creditors, due to the time mismatching between selling of goods and collecting receivables, depositors may meet problems of lacking money for next business cycle. At this time, commercial banks are supposed to make short term commercial loans to the creditors (Ibe, 2013, p. 3).

While this theory is not supported by Dodds (1982) and Nwankwo (1992). They argue that this theory only focusses on the importance of short term theory while ignoring the impact of long-term theory on the growth of economics.

3.1.3 LIQUIDITY RISK

As we mentioned, liquidity plays crucial roles in the stability of financial systems, lack of liquidity may cause bank’s default in fulfilling its financial obligations in normal conditions. More seriously, when it comes to unexpected emergency situation like financial crisis or economic shock, liquidity problems may result the bankruptcy of banks and the instability of whole financial system.

2008 global financial crisis proved that the risk of lack of liquidity. For commercial banks, liquidity risk means the incapability of meeting payment needs by using cash or cash equivalent instruments. Another definition of liquidity risk is from market point of view,
which is “the failure of offsetting or unwinding one position without affecting its price”. (Aldo, 2015, p.5).

For banks, the liquidity risk doesn’t exist solely but are interconnected with several risk factors. Aldo (2015) points out credit risk, reputation risk, market risk and concentration all have certain influence on the generation of liquidity risk (Aldo, 2015, p. 7). For example, reputation risk tends to increase the funding cost and trigger liquidity risk of banks accordingly.

For the source of liquidity risk, Adalsteinsson (2014, p. 43) points out all liquidity risks come from 3 main resources, the first one is systematic source which produces external avoid less liquidity risks, market disruption is an example of this source; Another is called individual source, which generates liquidity risk due to bank specific factors, like bank reputation damage and bank loss; the third source is called technical source (timing source), which generates liquidity risk due to time mismatching of liquidity assets inflow and outflow.

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3.1.4 MEASUREMENT OF LIQUIDITY

Liquidity can be quantitatively measured by several indicators, we start discussing liquidity by concerning working capital first, as working capital is crucial in measuring liquidity. Working capital can simply means the cash one company needs to support its daily operation. Sharma (2008, p. 26), mentions 2 different concepts of working capital regarding their purpose, gross working capital means current assets, while net working capital means the difference between current assets and current liabilities.

Net working capital = Current assets - Current liabilities

The normal terms of working capital for companies when considering working capital include cash, short-term financing, receivables, inventory, payables, prepaid expenses and so on. (Sagner, 2010, p. 3).

Thus WCW (Working Capital Management) is important issue for financial managers to consider, which include cash inflow and outflow management; inventory management; trade receivable management, short-term finance, and so on. Working capital management is vital because it plays important role on financial management and it’s closely linked with sales growth (Dhiraj Sharma, 2008, p. 26).

Good financial managers are obliged to control working capital because both too much or too little working capital remaining in company will do harm to company’s profit maximization. Too much working capital may result in inefficient use of funds, more control and supervision needs, bad debt loss and low profitability. While too little working capital will cause inevitable interruption or termination of business operation, damage of reputation, missing business opportunities, difficulties in dealing with sudden crisis and so on. Although working capital plays such important role in the survival and development of company, it is still ignored for several reasons (Dhiraj Sharma, 2008, p. 27).

As one factor to measure liquidity, theoretically, high net working capital means high liquidity for a company. But one thing to mention is that, although all the terms mentioned in the category of working capital can account for working capital, they have different level while considering their liquidity. For example, the risk-bearing securities and treasury bills have different levels in terms of liquidity, although they all belong to current assets. Thus, pay attention to the detained category of working capital is needed when measuring liquidity.

Besides, the most direct way of measuring it is cash flow from operations, Cash flow from operations can be calculated as profit after tax adding changes in working capital and plus depreciation and amortization. It can be easily understood that one company must generate positive cash flow from operations to meet its liquidity needs, and more cash flow from operations means stronger liquidity of one company.

Another indicator to measure liquidity is CCE (cash conversion efficiency), which shows the companies’ efficiency to transfer revenues into cash flow from operations.

CCE = cash flow from operations/sales

The third indicator to measure liquidity is Cash conversion period, Figure 1 shows the cash flow time line.
The first component of cash conversion period is DIH (Days inventory held, also called Days in inventory), DIH measures the number of days between the inventory is received and the inventory is finally sold. The calculation of DIH is inventory divided by daily cost of sales. In general, high DIH indicates high liquidity, which means the company is efficient in dealing with business cycle concerning selling inventories.

\[ \text{DIH} = \frac{\text{inventory}}{\left(\frac{\text{cost of goods sold}}{365}\right)} \]

The second component cash conversion period is DSO (Daily sales outstanding), which measures the efficiency of receivable collections. It can be calculated by the average days from goods sold to payments received. The calculation of DSO is payment receivables divided by daily sales. Normally, the higher the DSO is, the stronger liquidity ability the company has.

\[ \text{DSO} = \frac{\text{payment receivables}}{\left(\frac{\text{annual sales}}{365}\right)} \]

The third component of Cash conversion period is DPO (Days payment outstanding, also called days in payables), which measures the efficiency of payable payments. It can be calculated by the average days from inventory purchase to cash payment for inventories. The calculation of DPO is trade payable divided by average daily cost of sales. Higher DPO shows the company has higher efficiency in repayment of payables, which is not a good signal for the company’s liquidity because of the cash outflow to producers of inventory.

\[ \text{DPO} = \frac{\text{payables}}{\left(\frac{\text{cost of sales}}{365}\right)} \]

The forth indicator of measuring liquidity is CCC (Cash Conversion Cycle), the concept of CCC (Cash Conversion Cycle) is introduced by Gitman in 1974, which measures the time period between inventory purchase and money collection from selling goods. The formula of calculation is DSO (Days sales outstanding) plus DIO (Days Inventory Outstanding, then minus DPO (Days payable outstanding). CCC is regarded as a comprehensive factor including DSO, DIO and DPO, thus, it’s often widely used by some research to act as the representing factor to measure liquidity. Normally high CCC shows the company has high liquidity.
CCC= Days Sales Outstanding + Days Inventory Outstanding – Days payable Outstanding

Apart from the above 4 indicators measuring liquidity, Other quantitative ratios are also commonly used to measure liquidity.

Current ratio is the first developed ratio to measure liquidity, it was first put forward in early 20th centuries. Current ratio measures the capacity of owning current assets to cover up existing current liability obligations. It can be calculated as the current assets divided by current liabilities. Historically, current ratio as 2 was taken as the benchmark for companies to ensure its liquidity, but recently the ratio tends to decline due to managerial decision of decrease of current assets.

Current ratio = Current assets / Current liabilities

Quick ratio, which is also called acid-test ratio, is another ratio measuring liquidity, the difference between current ratio and quick ratio is that it deletes inventory from current assets because of the less liquidity of inventory compared with other current assets.

Quick ratio = Current assets – Inventories / Current liabilities

Our thesis analyses the impact of liquidity on profitability of banks, unlike other industries, bank liquidity can be measured by certain special ratios, the denominators and are accessible directly from financial statements of banks. The common ratios used by financial institutions to measure liquidity include borrowing ratio, LDR (Loan to deposits ratio), DAR (Deposit to assets ratio), cash & cash equivalent ratio and so on.

Borrowing Ratio 1 = Total Deposits / Total Funds

Borrowing Ratio 2 = Volatile Funds / (Cash+ Marketable Securities)

Borrowing Ratio 3 = (Volatile Funds - Current Assets) / (Total Assets - Current Assets)

LDR measures the bank’s capability to fulfil its financial obligations through deposits, it is calculated as total loan divided by total deposits, and banks with lower loan to deposit ratio tend to have higher liquidity. Banks with loan to deposit ratio higher than 100% is viewed as having problems of over assets growth; while banks with loan to deposit ratio lower than 70% tend to have too much liquidity (Choudhry et al., 2011, p. 246).

Loan to Deposit Ratio = Total Loan / Total Deposits

Cash & cash equivalent ratio measures the efficiency of banks in using immediately available cash or other instruments which can be easily converted to cash to meet financial obligations without influencing credit business operations. Banks with higher cash & cash equivalent ratio are believed to have more liquidity.

Cash Liquidity Ratio 1 = Cash / Total Assets

Cash Liquidity Ratio 2 = (Cash+Short-term investments+Funds sold) / Total Assets

Cash Liquidity Ratio 3 = Marketable Securities / Surrenderable Liabilities

Cash Liquidity Ratio 4 = 30-day Saleable Assets / Surrenderable Liabilities
3.1.5 LIQUIDITY REGULATION

Liquidity plays a significant role in the sustainable development of banks and the stability of financial system, strict liquidity regulations are supposed to be put forward to guard against problems due to lack of liquidity. Rochet (2008) indicates 2 reasons for liquidity regulation, from micro point of view, liquidity regulations prevent bank’s bankruptcy and damage of depositors’ interest by regulating liquidity buffer of banks; from macro point of view, liquidity regulation help maintenance of financial system stability.

The 2008 global financial crisis reminded financial institutions of the threat of liquidity risk on financial systems. This prompted the BCBS (Basel Committee on Banking Supervision) to reach a consensus on the main items of Basel Accord III; compared with previous Basel Accords (1998 and 2004) which mainly focus on capital management, Basel III took liquidity regulation into consideration and put forward global rules for liquidity regulation, which aims to improve bank’s ability against financial crisis and other unexpected economic shocks.

### TABLE 2: THE DEVELOPMENT OF LIQUIDITY REGULATIONS

| BCBS | • Sep 2008 Principles for Sound Liquidity Risk Management and Supervision.  
| SFA  | October 2009 Strengthening liquidity standard PS |
| CBI  | October 2011 Review of the requirements for the management of liquidity risk |

Basel III focused on liquidity by introducing liquidity coverage ratio (LCR) and net stable funding ratio (NSFR), and the principles for liquidity risk management and supervision.

LCR (Liquidity Coverage Ratio) was put forward to enforce banks have more HQLA (high quality liquidity assets) in case of extreme situations. The formula of calculating LCR is high quality assets divided by 30 days net cash outflows, and it is required that banks need to have LCR above 100%, or else its exposure of liquidity risk is high, to address this the bank needs to increase its HQLA (Basel Accord 3, 2010).

\[
LCR = \frac{\text{High Quality Asset}}{\text{30 days net cash outflows}}
\]

NSFR (Net Stable Funding Ratio) measures the bank’s ability to get access to stable funding, this ratio comes out to make sure banks have available stable funding within 1-year period. It can be calculated as available stable funding divided by required stable funding, normally banks with NSFR above 1 is seen as standard.

\[
\text{NSFR} = \frac{\text{Available Stable Funding}}{\text{Required Stable Funding}}
\]

### 3.2 PROFITABILITY

#### 3.2.1 CONCEPT OF PROFITABILITY

Profit is defined as the difference between revenue generated from the sale of output and the full opportunity cost of factor used in the production of that output (Aburime, 2008:1). Profitability maximization is the ultimate goal for banks because of their for-profit essence, through previous definition, two aspects are concerned with profitability, the revenues generated and the cost. Thus, the ways of improving profitability includes enhancing revenues and managing cost. In general, there are several ways of improving profitability, like breakeven analysis, cost control, ratio analysis. (Ibe, 2013, p.41).

Although profitability maximization is the common goal for all the commercial banks, it’s not easily be achieved since so many variables are concerned. Tsomocos (2003), points out survival of companies should be taken as priority before concentrating on its profitability, which connects the concepts of liquidity and profitability. If one company expects to improve profitability by increasing revenues, then it should manage liquidity at first to seize the proper investment opportunities and make most use of available funds; If cost control is the approach one company use to achieve wealth maximization, then liquidity management is equally important to avoid extra cost generation caused by lack of profitability.
3.2.2 MEASUREMENTS OF PROFITABILITY

Banks’ performance can be measured by stability and profitability, while stability is related to risk exposure and profitability concerns with banks’ financial return. Bowman (1980), proposed risk and return theory, which led to the use of accounting ratios to quantitatively measure profitability. Banks’ profitability is usually measured by ROE, ROA and Net profit margin. (Nickel & Rodriguez, 2002; Miller & Bromiley, 1990).

ROA measures the efficiency of using total assets to produce profit, it was calculated as net income divided by total assets, the higher ROA indicates higher profitability of banks.

\[
\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}}
\]

Another similar ratio for measuring profitability is ROE, unlike ROA, ROE measures the efficiency of using shareholder’s equity to produce profit, which is the most concerned indicator for shareholders, banks with high ROE is normally viewed as profitable and promising by shareholders.

\[
\text{ROE} = \frac{\text{Net Income}}{\text{Shareholder’s Equity}}
\]

NPM (Net Profit Margin) measures the efficiency of translating revenue into profit, which indicates bank’s management ability of cost control, higher NPM is viewed as a favourable signal for good capability of cost management of banks.

\[
\text{NPM} = \frac{\text{Net Profit}}{\text{Revenue}}
\]

Another ratio for measuring profitability is NIM, which measures how much net interest earnings gained from bank’s business operations, it was calculated as the interest income minus expenses, then divided by average interest-bearing assets. Higher NIM represents higher profitability of bank operations.

\[
\text{NIM} = \frac{\text{Interest Income} - \text{Expenses}}{\text{average interest-bearing assets}}
\]

While profitability is the most concerned consideration of financial managers, the importance of profitability varies depends on the role of stakeholders. The depositors would take stability of deposits as priority, while shareholders would view profitability as the most important indicator, and debt holders may consider in-time repayment of financial obligation at first.

3.3 RESEARCH ABOUT LIQUIDITY AND PROFITABILITY

As we mentioned above, banks regard wealth maximization as their final goal, and a lot of researches (Albertazzi & Gambacorta, 2009, Pasiouras & Kosmidou, 2007, Stirohand Rumble, 2006) focus on the determinants of bank profitability, while only a few researches discuss the relationship between liquidity and profitability.

3.3.1 THEORY ABOUT RELATIONSHIP BETWEEN LIQUIDITY AND PROFITABILITY

For the relationship between liquidity and profitability, a lot of researches mentions the trade-off between them. Due to the modern portfolio theory proposed by Markowitz (1985). The return of one financial instruments is determined by its risk, in other words, the higher the risk it bears, the higher profitability it will gain, there is a positive relationship between risk and profitability. While the liquidity of one company influences negatively on the risk, as we mentioned before, efficient liquidity management enhances the efficiency of investments and other business operations, reduces extra cost caused by
lack of liquidity, thus reduces liquidity directly and other risk like default risk. By
discussing the role of risk on profitability and the relationship between risk and liquidity,
we connect the concept of liquidity and profitability. It can be assumed that there exists a
negative relationship between them, the high liquidity will result in low profitability.
Figure 3 shows the impact of liquidity on profitability:

![Diagram showing the relationship between liquidity, risk, and profitability](image)

**Figure 3: The relationship between Liquidity, Risk and Profitability**

(Adapted by the authors)

Although trade-off theory is well accepted by most researchers, some researches argue
that profitability can be enhanced by efficient liquidity management, which shows the
positive relationship between them. Although current assets are less profitable than fixed
assets, holding proper liquidity may prevent companies from other extra cost, thus
improve the profitability through this way. For example, promising investment
opportunities requiring in-time money inputs can be seized by banks with adequate
liquidity reserves, sudden financial needs due to mismatch of cash outflows and inflows
can be met through enough liquidity reserves, otherwise the company will face risk of
default and other costs from generating liquidity.

Bordeleau and Graham (2010), discusses the relationship between bank liquidity and
profitability by comparing US and Canada banks, indicates that although liquidity assets
tend to gain less profit, the behaviour of banks increasing liquidity assets against default
or bankruptcy may lower the cost produced due to mismatching of assets and liabilities
and offset the profit loss caused by owing more liquidity assets, hence there is a positive
relationship between bank liquidity and profitability to some extent. But when the
liquidity assets banks hold exceeds the threshold, too much liquidity may cause idle use
of bank funds, which leads to inefficiency of financial operations and investment
management, and in this circumstance the relationship of liquidity and profitability
becomes negative.

Figure 3 shows the finding of relationship between liquidity and profitability researched
by Bordeleau & Graham, which partly suggests the positive impact of liquidity on
profitability. While the whole conclusion of this research is both too high liquidity will
deter the bank’s pursuit for wealth maximization, there exists one threshold of liquidity
level which could achieve wealth maximization and bank stability in the same time, this
research also reminds us the importance of achieving proper liquidity level to balance
liquidity and profitability.

When connecting this research with the current regulations, the new Basel Accord puts
forward global rules for commercial banks to regulate liquidity. Central banks also
regulate the minimum liquidity reserves to protect banks from financial crisis and
economic shock, while research by Bordeleau & Graham mentions the disadvantage of
holding too much liquidity assets. Thus, it’s also needs to be considered by banks to avoid
using too much liquidity when they try to obey the rules set by BCBS and central banks.
That’s also one big issue for financial managers to figure out the threshold of liquidity
holding of their own companies to achieve wealth maximization.
FIGURE 4: THE RELATIONSHIP BETWEEN LIQUIDITY AND PROFITABILITY

Source: Bordeleau & Graham, Impact of Liquidity on Bank Profitability (2010)

The researcher also calls for more studies on this issue in other geographic locations in order to have a comprehensive and uniform understanding of the impact of liquidity on bank profitability.

3.3.2 EMPIRICAL RESEARCHES ABOUT LIQUIDITY AND PROFITABILITY

Arnold (2008), indicates the positive impact of liquidity on profitability, it lists the benefits liquidity could bring for the companies, first of all, liquidity assets can cover the ordinary operation cost like salaries, administration expenses and so on; secondly, holding liquidity assets enables companies to seize promising investment opportunities which require rapid payments; Thirdly, liquidity helps maintain normal business operation in circumstances of emergency situations.

Some of the previous researches are in line with the positive relationship between liquidity and profitability. Owolabi and Obida (2012), discovered that there is a positive relationship between liquidity and profitability by analysing Nigeria manufacturing companies. Ariyadasa & Selvanathan (2016), chose 10 LCBs (Licensed Commercial Banks) from 2006 to 2014 in Sri Lanka, points out the positive impact of liquidity on profitability in the short run, and the research doesn’t find explicit relationship between them in the long term. Guimares & Nossa (2010), chose 621 healthcare insurance companies in 2016 to investigate the influence of working capital management on profitability, and the result suggest that positive working capital tend to influence on the bank’s profitability positively and highlights the importance of liquidity on the survival and sustainable development of insurance companies.

Valverde & Fernandez (2007) researches the determinants of bank profitability in Europe, the positive impact of LDR (loan to deposits ratio) on bank profit supports the theory that liquidity positively influences profitability. Dietrich & Wanzenried. (2011), chose 372 commercial banks in Switzerland from the period 1999 to 2009 to investigate the determinants of bank profitability, the findings of positive relationship between loan rate and NIM suggests the positive relationship between liquidity and profitability.

Neto (2003), indicates the disadvantage of holding liquidity on the profitability, compared with fixed assets, the current assets are proved to be less profitable, over focus on the holding of liquidity may cause the accumulation of idle resources, incapability of maximizing investment returns and inefficiency of financial management.

This statement can be supported by a series of researches. Smith and Begemann (1997), discusses the negative relationship between liquidity and profitability by choosing
industry firms listed in JSE (Johannesburg Stock Exchange), liquidity is represented by ratios concerned with working capital and profitability is measured by ROI (Return on Assets). Lyroudi et al. (1999) chose companies listed in LSE (London Stock Exchange) from 1993 to 1997 to analyse the relationship between liquidity and profitability, liquidity is measured by Current Ratio, Cash conversion Cycle and Liquidity Ratio, and profitability is measured by ROA, ROE and NPM. The research shows a negative relationship between liquidity and profitability. This research is in line with the research conducted by Eljelly (2004), who studies the same issue by choosing Saudi Arabia’s companies from 1996 to 2000, similar to Lyroudi et al (1999), the researcher uses CCC and CR to measure liquidity, finds out the negative relationship between liquidity and profitability. Garcia-Teruel and Martinez-Solano (2007) chooses both small and medium size companies of Spain to investigate the impact of working capital on profitability and finds out the negative relationship between them. Similar research conducted by Uyar (2009) also support the negative relationship between the 2 factors. Other research conducted by Marques and Braga (1995) and Blatt (2001) also shows the inverse correlation between liquidity and profitability.

Rasul (2013) analyses the relationship between liquidity and profitability by choosing 2 Islamic banks in Bangladesh during the period from 2001 to 2011. The ratio of calculating liquidity is CDTA (cash & due from banks to total assets), INVSTA (investment to total assets), CDDEP (cash & due from banks to total deposits), and INVSDEP (Investment to total deposits). The ratio to calculate profitability is ROE (Return on Equity), ROA (Return on Assets) and ROD (Return on Deposits). The research confirms the strong impact of liquidity on profitability.

The ISEF (Indicator de Saúde Economico-Financeira das Empresas) model which adapted by Marques et al. (2004) gives researchers assess to investigate liquidity, profitability and the relationship between them.

Other Determinants of Profitability

Profitability maximization is the common goal for all commercial banks, thus, previous research has widely discussed determinants of profitability. In general, determinants of profitability can be divided into external and internal. The external determinants of bank profitability include GDP (Gross Domestic Product) growth, Inflation rate, tax and other macroeconomic factors (Dietrich & Wanzenried, 2014, p. 338).

GDP is defined as the “overall market value of the goods and service during one period of time”, GDP Growth is the increase or decrease between GDP of 2 years divided by GDP of previous year. Inflation rate measures the percentage change in purchasing power of a particular currency. Figure 3.6 shows the calculation of inflation rate

$$Rate\ of\ Inflation = \frac{CPI_{t+1} - CPI_t}{CPI_t}$$

$CPI_t$ – Initial Consumer Price Index

Athanasoglou et al (2008), indicates GDP growth and inflation rate influence bank profitability positively while taxation has negative influence on bank profitability. But this conclusion turns to be controversial when Albertazzi and Gambacorta (2009) finds out weak relationship between tax and bank profitability.

Another external determinant of profitability is concentration in bank industry, in other words, the market structure in the bank industry, it can be measured by concentration
ratio, which is calculated as the assets of three biggest banks divided by total assets of the bank system in one country.

Concentration Ratio = \frac{Assets \ of \ 3 \ biggest \ banks}{Total \ assets \ in \ bank \ industry}

There isn’t a uniform conclusion about the relationship between them, the “structure-conduct-performance paradigm” points out the positive relationship between market power and bank profitability, argues that more concentrated market structure of banks tend to result in monopoly, which leads to high interest and service charges of banks. While Demirguc-Kunt and Huizinga (1999) get the reverse results through research, shows the fiercer competition due to concentrated market structure of banks tend to deter bank from getting profitable.

Internal determinants of bank profitability include bank specific factors like bank size; ownership structure, credit risk and so on.

It is believed that there is a positive relationship between bank size and bank profitability due to economic of scale ((Pasiouras & Kosmidou, 2007), while larger banks are always accompanied with problems of “too big to be managed”, Stirohand Rumble (2006) discovered the negative relationship between banks size and bank profitability due to unfavourable cost related to the big size of banks.

For the relationship between Ownership (Private-owned or State-owned, foreign owned or domestic owned) and profitability, there isn’t explicit explanation about private-owned and state-owned banks, which are more competitive in improving bank profitability (Bourke, 1989; Molyneux & Thornton, 1992). Micco et al. (2007) indicates foreign-owned banks are proved to be more profitable than domestic banks in developing countries, so it is clear that the impact of ownership structure on bank profitability can vary depending on the external circumstances banks are in.

Another internal determinant of bank profitability is the efficiency of operation, which can be quantitatively measured by cost to income ratio. The formula to calculate cost to income ratio is operation cost divided by total income.

Cost to income ratio = \frac{operation \ cost \ (salary, \ administration \ cost \ and \ so \ on)}{total \ revenues}

It is widely accepted that a high cost to income ratio tends to decrease the bank’s profitability.

Credit risk is believed to be another determinant of bank profitability, it can be measured by loan-loss provisions divided by total loans. Previous researches indicate the negative relationship between credit risk and profitability. Other internal determinants of profitability also include bank growth, income diversification and so on.
3.4 SUMMARIES AND PROPOSITIONS

In this section, we discuss liquidity and profitability separately at first, liquidity is always viewed as politic monitoring factors regulators care about to supervise the stability of one financial situation. The pressure and requirements to increase liquidity from government aims to maintain bank’s sustainable development. While profit is the factor which shareholders and managers care about most to achieve wealth maximization. Since Liquidity is excluded from the common determinants of bank profitability analysed by previous researches, there isn’t enough research investigating the relationship between liquidity and profitability. But 2008 global financial crisis make financial managers to realize the importance of liquidity management and the balance between liquidity and profitability. Besides, although existing researches confirms the impact of liquidity and profitability, the result varies depending on the industry researched, countries in which samples are located, the time period it chooses and the numbers of samples. Based on that, it’s not easy for us to have an explicit understanding of the relationship between bank liquidity and profitability. Our thesis chooses to choose 50 most profitable bank as samples to figure out if there exists regular relationship between liquidity and profitability.

For the quantitative part of our study, we use the conceptual model to analyse the relationship between liquidity and profitability. Figure shows the conceptual model we adapt.

![Conceptual Model Diagram]

The concepts we choose from our theoretical framework include liquidity and profitability. As we mentioned in previous part of theoretical framework, liquidity can be measured by factors like CCE, CCC, DIH, DPO, DSO, working capital, LDR and so on, due to the particularity and the difference between bank industry and other industries, we choose LDR (Loan to Deposit Ratio), DAR (deposit to Assets Ratio) and cash & cash equivalents to deposit ratio to measure Liquidity. while Profitability can be measured by ROA (Return on assets), ROE (Return on equity), NPM (Net Profit Margin) and NIM (Net Interest Margin), here we choose the most typical ratios called ROA and ROE as the measurements of profitability. Liquidity and profitability are connected. According to
analysing the relationship between these ratios, thus we propose the following 3 hypotheses.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Hypotheses</th>
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<tbody>
<tr>
<td>H1a</td>
<td>The loan to deposit ratio significantly impacts the return on equity</td>
</tr>
<tr>
<td>H1b</td>
<td>The loan to deposit ratio significantly impacts the return on assets</td>
</tr>
<tr>
<td>H2a</td>
<td>The deposit to asset ratio significantly impacts the return on equity</td>
</tr>
<tr>
<td>H2b</td>
<td>The deposit to asset ratio significantly impacts the return on assets</td>
</tr>
<tr>
<td>H3a</td>
<td>The cash &amp; cash equivalents to deposit ratio significantly impacts return on equity</td>
</tr>
<tr>
<td>H3b</td>
<td>The cash &amp; cash equivalents to deposit ratio significantly impacts return on assets</td>
</tr>
</tbody>
</table>

The above 6 hypotheses are derived from the research question we proposed before. Hypothesis 1a is about the relationship between LDR and ROE; Hypothesis 1b analyses the relationship between LDR and ROA; Hypothesis 2a analyses the relationship between DAR and ROE; Hypothesis 2b investigates the relationship between DAR and ROA; Hypothesis 3a analyses the relationship between cash & cash equivalent to deposit ratio and ROE; Hypothesis 3b is about the relationship between cash & cash equivalent to deposit ratio and ROA. LDR, DAR and cash & cash equivalents to deposit ratio are three independent variables and location is added as the control variable, ROA and ROE act as dependent variables.

Our conceptual model will be tested by regression analysis to investigate the relationship between the above 3 independent variables and the above 2 dependent variables, the reason we choose this method is to analyse the impact of liquidity on bank profitability.
4.0 PRACTICAL METHOD

This chapter highlights how the research was conducted methodologically. How the data was collected, and the sampling method used have been presented. The proxies for the model variables are advanced and later on the statistical analyses to be performed are described to facilitate comprehension of the chapters that follow. Lastly, the ethical contemplations are propounded.

4.1 DATA COLLECTION

There are two sources of data, namely primary and secondary data. Information collected directly by the researcher on the pertinent variables for the explicit use in the study is what is termed as primary data. On the other hand, information collected from already existing sources is termed secondary data (Sekaran, 2003, p. 219). Primary data collection methods include surveys, questionnaires, observations, experiments, etc. and these methods generally involve interaction with the target group (Sachdeva, 2008, p. 111). The primary data collection methods offer the researcher the merits of being able to collect detailed and reliable information (Kothari, 2004, p.98). The demerits of primary data collection methods include; can be expensive and time consuming when the target sample is widely spread geographically, and some information collected can be susceptible to bias from both the respondents and researcher (Kothari, 2004, p.99).

Secondary data incorporates raw data as well as published information. The bulk of the secondary data is information collected and kept by organisations to support their operations and to also communicate with diverse stakeholders about important matters. Payroll details, minutes of meetings, reports, etc. can include valuable information useful for researchers (Saunders et al., 2009, p. 256). Secondary data is most of the time cheaper to access and allows the researcher to have quick access to information when compared with primary data (Greener, 2008, p. 75). The cons of secondary are that the data may have been collected for a different aim altogether which might not match the purpose of the research leading to the data being inadequate or inappropriate to answer the research question if due care is not exercised. In addition, the researcher has no control over the quality of the data used and access to secondary data can be difficult at times (Saunders et al., 2009, p. 269-272).

We took into account the different pros and cons of the two data sources prior to deciding on which one to utilize in our study. On the basis of our research objectives and question we settled for secondary data. This is because the goal of our study is to analyse the impact of liquidity on the profitability of banks and secondary data will enable the conducting of the study in an efficient and effective manner. The data needed in order to meet our research objectives is large and necessitates high quality data to be used in the analysis. Seeking to collect this kind of information via primary data collection methods would be inefficient and unfeasible. Moreover, the geographical expanse of our study is vast seeing that target sample consists of banks from three different continents and localities. Hence, analysing secondary data of these banks as contained in their reports is timesaving and efficient.

4.1.1 QUANTITATIVE DATA COLLECTION

The ideal research design for the nature of this study is a quantitative study. Empirical data was collected from Factiva which happens to be a business information and research tool run by Dow Jones & Company. The secondary data from Factiva is of high quality and reliability. This is because the content on the database is mined, refined and curated by a dedicated team of specialists and also the content is sourced from over 33,000
premium and credible sources (Dow Jones, 2018). Besides Factiva, Thomas Reuters Eikon database was also used to collate information relevant for our study. Eikon has the largest and most extensive data sets covering different asset groups, sectors and geographies. Like Factiva, its information is high quality and is refined and updated by dedicated specialist teams (Thomas Reuters, 2018). In addition, the accounting and financial information of corporations that will be used stems from audited financial records ensuring that information is free from bias and meets the international accounting standards.

4.1.2 SAMPLING

When conducting research, it is generally impracticable to acquire information needed about a large group of things or people to be in a position to answer questions or examine all of the things. It is for this reason that a small group of items out of the large group is selected through the process of sampling. It is important to note that the sample selected for a given population should be typical of the population. If the sample is representative of the population, then inferences can be drawn which are relatable to the entire group or population (Walliman, 2011, p. 93). There exists two main types of sampling techniques probability and non-probability sampling. In probability sampling, the likelihood of each item being selected from a given population is equivalent for all items, while non-probability sampling is based on judgemental factors like convenience among others (Saunders et al., 2009, p. 213).

For purposes directed at meeting our research objective, a non-probability sample shall be adopted. The sample selected will avail pertinent information with which the research question and theoretical insights will be explored (Saunders et al., 2009, p. 233). The focus of this study is mainly the banking sector and hence, our sample constitutes fifty (50) banks domiciled in Asia, Europe and North America. In the selected sample, all the 50 banks are listed as part of the 100 biggest global banks ranked according to assets (Relbanks Info, 2018). In addition, a time window of ten (10) years from 2008 to 2017 will be considered for our analysis. We believe that our sample captures a substantial amount of the total assets in the global banking sector and therefore, the conclusions of our study can be generalisations. This sample is also ideal in that it not only gives us a suitable sample size but also is in line with theoretical gaps discussed in the introductory chapter. In the empirical findings chapter, the number of banks selected from each geographical location will be presented.

4.2 MEASURES

Our study is of a quantitative nature and will utilize secondary data for our sample banks. Therefore, we will make use of numerical information from the publicly available information of these banks. We scoured similar studies before settling on the reliable measures for our variables both independent and dependent. The reliable measures are to be the proxies for our main concepts liquidity and profitability.

In studies conducted on liquidity and profitability trade-off, multiple yet similar measures have been used to achieve this goal. In a study conducted by Raykov (2017) focusing on the liquidity-profitability trade-off in Bulgaria used the quick ratio and return on current assets to measure liquidity and profitability respectively. However, their measures were solely focused on working capital management effects and not the entire operations of firms. Rasul’s (2013) study on Islamic banks and liquidity opted to use ROA, ROE and ROD to measure profitability, and cash asset ratio, cash deposit ratio, investment asset ratio and investment deposit ratio. The liquidity measures for this study were tailored for
Islamic banks though similar to the ones employed in this study. In Bordeleau et al. (2010), measured profitability using ROE and ROA, and liquidity the cash and cash equivalents to total assets ratio. Ibe (2013), differs slightly in his measurement of profitability via his use of the actual profitability figures from the income statements as opposed to using ratios though the liquidity measures were consistent with other studies.

The choice of measures to employ for our study are grounded in the studies conducted by Ibrahim (2017) and Vintila et al. (2016). The measures used in these studies are relevant and appropriate for banks as they are based on the traditional liquidity and profitability measures except they are tailored for use when analysing banks were need arises. Consequently, liquidity measures that will be adopted from the aforementioned studies include loan deposit ratio, deposit asset ratio and cash deposit ratio while the profitability ones consist of primarily return on assets and return on equity. Hence, our conceptual model variable proxies for the analysis of the impact of liquidity on profitability of banks are as follows:

Independent variables (liquidity proxies): Loan Deposit Ratio (LDR), Deposit Asset Ratio (DAR) & Cash Deposit Ratio (CDR)

Dependent variables (profitability proxies): Return on Assets (ROA) & Return on Equity (ROE)

The variables will be computed over a 10-year period via the formulas presented in the table below:

**TABLE 4: VARIABLE MEASURES**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDR</td>
<td>loans and other advances/total deposits</td>
</tr>
<tr>
<td>DAR</td>
<td>total deposits/total assets</td>
</tr>
<tr>
<td>CDR</td>
<td>cash &amp; cash equivalents/ total deposits</td>
</tr>
<tr>
<td>ROA</td>
<td>net income/ total assets</td>
</tr>
<tr>
<td>ROE</td>
<td>net income/ shareholders’ equity</td>
</tr>
</tbody>
</table>

4.3 QUANTITATIVE DATA ANALYSIS

Upon completion of data collection via Factiva, statistical methods of analysis will be used in order to test our hypotheses. The statistical package that will be used for analysing the data is Statistical Package for the Social Sciences (SPSS). The sole purpose of the analyses is to ascertain the impact of liquidity on profitability of banks. Descriptive statistics and correlations will be presented before the main analysis which is the multiple regression analysis.

4.3.1 DESCRIPTIVE STATISTICS

It is imperative to analyse the data collected by certain values, their central tendency, their range, their dispersion around the mean before conducting sophisticated analyses (Greener, 2008, p. 59). Descriptive statistics are a modus operandi of quantifying the attributes of parametric data (Walliman, 2011, p. 70). Accordingly, descriptive statistics will be used to describe and collate variables numerically enhancing our understanding of the data. The research objectives and question form a basis for the choice of the relevant statistics to be included in the analysis (Saunders et al., 2009, p. 444). The basic descriptive statistics include mean, median, mode and standard deviation. The mean denotes a measure of central tendency or typical figure for a dataset that clusters around
the central value. In a dataset with extreme values or very dispersed data the mean can be fallacious, and the mode or median are more ideal. The median is the middlemost number when data is arranged according to order of size while the mode is most recurring number in the data. The standard deviation is a summary of the average distance of all values from the mean in the dataset (Sachdeva, 2008, p. 197-198).

4.3.2 CORRELATIONS

The correlation analysis is used to assess the nature and strength of the linear relationship between two variables (Kothari, 2004, p.138). The three main correlation techniques are the Pearson’s correlation, Spearman’s correlation and cross tabulation techniques. For purposes of this research the Pearson’s coefficient of correlation will be used to highlight the linear relationship between the variables loan deposit ratio, deposit asset ratio, cash deposit ratio, return on assets and return on equity. The correlation coefficient scale ranges from -1 to +1 where -1 entails perfect negative correlation and +1 perfect positive correlation. Positive correlation means there exists an association between the variables such that as one increases the other increases as well. On the one hand, negative correlation means the association is such that when one variable increases the other decreases and vice versa. A correlation of zero means the variables are dissociated (Saunders et al., 2009, p. 459). Although correlation coefficients denote the nature of the relationship between variables, they cannot for certain indicate a causal relationship which can only be established by means of a regression analysis (Kothari, 2004, p.138).

4.3.3 MULTIPLE REGRESSION ANALYSIS

In order to meet the objective of the research i.e. to determine the impact of liquidity on profitability, multiple regression analysis will be employed by finding the causal relationship of the independent variables (LDR, DAR and CDR) and the dependent variables (ROA and ROA). In order to control for effects outside of our variables i.e. we will control for differences in the different geographical locations in terms of regulations, market conditions, unique risks and so on so forth by means of a control variable – location (Moore et al., 2011, 171). Three dummy variables will be used based on the control variable location. These dummy variables will be European, Asian and North American symbolising were banks are domiciled. Multiple regression enables calculation of the relative weightings of the independent variables on a dependent variable (Cohen, 2007, p. 665). Subsequently, the performed regression will be utilized in making a decision with regards to our hypothesises. The multiple regression coefficient’s (represented by \( r^2 \) in the model) value ranges from 0 to +1. It is a representative measure of the change in the dependent variable that can be ascribed statistically to the independent variables. The multiple regression coefficient’s probability of occurring will be established to facilitate the process of rejecting or accepting our hypotheses. If the significance value of the coefficient is lower than the significant level (\( \alpha=0.05 \) in our analysis) then it is improbable that the coefficient happened by chance and if the significance value is above the significant level, then the converse is true (Saunders et al., 2009, p. 461-462).

Our multiple regression model is as follows:

\[
y = \alpha + \beta_1 \text{LTD} + \beta_2 \text{DTA} + \beta_3 \text{CTD} + \gamma \text{D}_1 + \gamma \text{D}_2 + \varepsilon
\]

where: \( y = \) dependent variable, \( \alpha = \) the constant, \( \beta = \) the regression coefficient, \( \gamma \text{D} = \) control variable regressor and \( \varepsilon = \) error term
Upon completion of modelling our data for the 50 banks, we will be able to pinpoint the effects that liquidity has had on the profitability of these banks based on the variables.

4.4 ETHICAL CONSIDERATIONS

Research ethics deal with concerns of how the research topic is constructed and defined, research is designed, data is accessed and collected, data is processed and stored, data is analysed and presentation of research findings in an honest and accountable fashion (Saunders et al., 2009, p. 184). Clarity in the ethical dimensions of a research is imperative for three key motives: enhancement of research outcomes, sensitive topics navigation and keeping up with professional conduct. Many research topics may be sensitive regarding business organisations and also may be construed differently by diverse parties. Therefore, the researcher committed to research ethics will anticipate the probable impact of the research on the participants and proactively deal with the concerns (Macintosh et al., 2015, p. 197). Research ethics enhance the quality of the research outcomes in that research that has been conducted in an ethical manner is more reliable and reputable to be relied upon in a practical context. Consideration of ethical concerns go past the researcher and present moment of researching as the corporate or business world places requirements for professional or ethical conduct to enhance accountability and integrity (Macintosh et al., 2015, p. 198-199).

In business research ethics it is beneficial to determine who the stakeholders are in the study. The potential stakeholders of our study include the participant banks (domiciled in Europe, Asia and North America), shareholders of the participant banks (all banks in our sample are quoted companies), participant banks’ clientele and we the researchers among others. We analysed the risk factors to the various stakeholder groups faced and mitigated them by ensuring that we got publicly available information and performed contextual analysis to ensure correct presentation of facts as per available information (Greener, 2008, p. 43).

The banks comprising our target sample have had their identity withheld because it is not pertinent to the results of this study and also due to lack of interaction between the researchers and the participant banks as secondary data was relied upon (Greener, 2008, p. 44).

In business research it is important that the researcher obtains consent from the participant; not implied or assumed consent but informed consent wherein the participants are fully informed about the use of the data provided and, they give it liberally (Saunders et al., 2009, p. 190). Since this study will rely on secondary data extracted from publicly available information, the concept of informed consent will not be abrogated as the information has been freely issued by the participant banks vis-à-vis annual reports and other statutory reports. The researchers of this study are also careful not to deceive in any way when using the collected data as the study is purely for an academic purpose though with practical relevance (Walliman, 2011, p. 48).
5.0 EMPIRICAL FINDINGS

The empirical findings of our research are presented in this chapter. For starters, the segmentation of our target sample in terms of geographical location and asset size are presented. Later on, the descriptive statistics and linear relationships of the constructs are postulated. The findings of our regression analyses are also presented ending with a revised conceptual model.

5.1 SEGMENTATION

In order to meet our research objectives, we collected secondary data with an emphasis on the annual financial reports of the banks in our sample. We collected information on 50 banks over a 10-year window for our analysis. Data for all our variables both metric and control variables was available as all the banks chosen were listed on the pertinent stock markets and were fully operational during the period under consideration. Our sample consisted of 50 banks domiciled in Asia, Europe and North America. Consequently; 15 Asian banks were selected representing 30% of the total sample, 22 European banks representing 44% and lastly 13 North American banks representing 26% of the total sample. We determined that this was a good representation from the three geographical locations with the asset size in mind. The figure below denotes the geographical representation of the target sample:

![Geographical Representation](image)

After identifying our geographical focus of our research, we now accented on the asset size (as at 31.12.2017) of the banks to come up with our sample. In order to have a representative sample we centred on the largest banks based on asset size. Hence, our target banks’ asset size ranges from $300 billion to $4 trillion. Thus, 9 banks had total assets between $100 and $500 billion which constitutes 18% of the target banks. We had 21 banks having total assets falling between $600 billion and $1 trillion representing 42% of the sample. The number of banks with asset size between $1.1- $1.5 trillion and, $1.6-$2 trillion were 4 and 6 respectively. Banks with assets size between $2.1-$3 trillion were 7 while only 3 banks had assets of above $3 trillion. All the banks sampled had been in operation for more than 10 years. Figure 7 shows the number of banks per asset size category:
According to Greener (2008, p. 59), it is imperative to analyse the data collected by certain values, their central tendency, their range, their dispersion around the mean before conducting sophisticated analyses Therefore, we analysed the descriptive statistics of our constructs namely LDR, DAR, CDR, ROE and ROA. To enhance the understanding about these constructs we ascertained their mean, median, mode, standard deviation and range. Table 5 shows the summary statistics of the model constructs.

<table>
<thead>
<tr>
<th>Statistics (in decimals)</th>
<th>LDR</th>
<th>DAR</th>
<th>CDR</th>
<th>ROE</th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>.81</td>
<td>.59</td>
<td>.81</td>
<td>.10</td>
<td>.03</td>
</tr>
<tr>
<td>Median</td>
<td>.73</td>
<td>.60</td>
<td>.71</td>
<td>.09</td>
<td>.01</td>
</tr>
<tr>
<td>Mode</td>
<td>.63</td>
<td>.86</td>
<td>.49</td>
<td>.14</td>
<td>.004</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>.32</td>
<td>.20</td>
<td>.47</td>
<td>.07</td>
<td>.12</td>
</tr>
<tr>
<td>Range</td>
<td>1.60</td>
<td>.75</td>
<td>2.30</td>
<td>.38</td>
<td>.82</td>
</tr>
</tbody>
</table>

The values for the aforementioned constructs were computed for every single bank and year over the course of ten years. Accordingly, the mean for both LDR and CDR was 0.81 which shows that on average the amount of net loans banks carried in their books during the period under consideration was almost the same as that of cash & cash equivalents. It also shows that on average banks had less net loans and cash & cash equivalents compared to deposits during the same period. On the other hand, the DAR mean was 0.59 denoting that on average banks financed their assets with almost 60% deposits during the 10-year period. It can also be seen that the average ROE and ROA was 10% and 3% respectively with the ROE being higher has expected since the book value of equity is less than that of assets.

The median which is useful in quantifying the midpoint of the distribution when data is ranked was computed (Field, 2013, p. 140). The median value for LDR was 0.73 which differs slightly from the mean value by 8 basis points. The median DAR was 0.6 which is almost the same as the mean DAR of 0.59. The median CDR of 0.71 like the median
LDR did not substantially differ from its mean value. The median ROE of 9% was approximately the same as the 10% mean value while the median ROA was different from the mean by 2 basis points. It is worth noting that the mean and median values are not exactly the same because the median is unaffected by extreme values (Saunders et al., 2009, p. 444).

The mode refers to the value that occurs the most in a dataset (Sachdeva, 2008, p. 196). For most of the banks considered in this study, their modal LDR was 0.63 which shows that for most banks net loans represented a significant portion of total deposits. The modal DAR was 0.86 which denotes that for most banks deposits formed an important source of asset funding. The mode for CDR was 0.49 which entails that for most banks the cash & cash equivalents were about half of the total deposits during the period 2008 to 2017. The ROE mode value was 14% which denotes that most banks were profitable during the period under consideration while the modal ROA was quite low for most banks of only 0.4%.

The standard deviation measures the dispersion of data about the mean (Cohen et al., 2007, 606). Assuming the dataset is normally distributed, the LDR standard deviation of 0.32 is about half its mean which rather high and shows that banks have significantly different LDRs. The DAR standard deviation of 0.2 is a third of its mean which can also be considered to be slightly high for our dataset. This also denotes slight variations in the DARs of banks during the apposite period. The CDR standard deviation of 0.47 is quite high for a mean of 0.71 and highlights the high variation in CDRs for our sample banks. The significant differences are expected as all the banks are unique to one another, some operate under a different set of regulations, different market conditions among others. The ROE and ROA standard deviations of 0.07 and 0.12 respectively are no exception as they are also high relative to their means.

The range shows the differentiation between interval values (Greener, 2008, p. 59). As can be seen from Table 5, the difference in the extreme values for all the constructs is reasonable which eliminates problems that outliers can pose such as violation of the linearity assumption pivotal in regression analysis (Saunders et al., 2009, p. 462). The low ranges for all the constructs also reinforces that the measures of central tendency are free from bias (Field, 2013, p. 549).

5.3 CORRELATIONS

Correlation coefficients indicate the direction and strength of the linear relationship between two variables. However, it must be stated from the onset that correlation is not causality (Kothari, 2004, p.138). To analyse the relationship between our variables we made use of Pearson’s correlation. The correlation coefficient is always between -1 and 1, and the strength of the linear relationship increases as the coefficient value moves away from 0 and approaches either -1 or 1 (Moore et al., 2011, p. 93-95). Table 6 shows the linear relationship between the independent variables (LDR, DAR and CDR), dependent variables (ROE and ROA) and the control variables (Asian, European and North America).
TABLE 6: PEARSON’S CORRELATION

<table>
<thead>
<tr>
<th></th>
<th>LDR</th>
<th>DAR</th>
<th>CDR</th>
<th>ROE</th>
<th>ROA</th>
<th>Asian</th>
<th>European</th>
<th>North American</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDR</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAR</td>
<td>-.393**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDR</td>
<td>.107</td>
<td>-.623**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>-.232</td>
<td>.705**</td>
<td>-.610**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>.095</td>
<td>.039</td>
<td>.046</td>
<td>.017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>-.408**</td>
<td>.722**</td>
<td>-.315*</td>
<td>.579**</td>
<td>-.094</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European</td>
<td>.616**</td>
<td>-.567**</td>
<td>.495**</td>
<td>-.564**</td>
<td>-.176</td>
<td>-.580**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>North American</td>
<td>-.270</td>
<td>-.113</td>
<td>-.231</td>
<td>.033</td>
<td>.298*</td>
<td>-.388**</td>
<td>-.525**</td>
<td>1</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

It is imperative that independent variables are not highly correlated because if they are it becomes difficult to determine their separate effects on the dependent variables as they will exhibit multicollinearity (Saunders et al., 2009, p. 462). As can be seen from Table 6, the correlation coefficient of LDR and DAR is -0.393 which signifies a weak negative relationship between the two variables. This entails that when a bank’s LDR increases, its DAR is expected to decrease and vice versa. This is expected as the deposits are involved in the computation of both ratios and in one ratio it’s the numerator while in the other, a denominator. The LDR and CDR linear relationship coefficient is 0.107 manifesting a weak positive correlation. When the LDR increases, the CDR increases as well, and the opposite is true for both. This is also logical as both ratios that take into account net loans and cash & cash equivalents have the same basis of deposits. Hence, any increase or decrease in deposits held by a bank will result in similar changes in both ratios. The DAR and CDR correlation coefficient is -0.623 which exhibits a moderate negative linear relationship. This means when the DAR increases, the CDR reduces and vice versa. The logical reason of such a situation is because the bank deposits held affect these two ratios differently. The weak and moderate linear relationships between the independent variables provide for a robust regression analysis to be conducted.

It is cardinal to point out that the correlation coefficients between LDR and CDR and also the independent variables with some control variables is rather high as can be seen in Table 6. Hence, there was need to assess the multicollinearity between the variables we used in our regression analysis. These are presented in Table 9 & 12 which show the collinearity statistics are within the normal range of above 0.1 and below 10 for tolerance value and variance inflation factor (VIF) respectively (Saunders et al., 2009, p. 463).

The correlation coefficients of the independent variables and the dependent ones were also computed. The correlations between the dependent variable ROE relative to the independent ones LDR, DAR and CDR were -0.232, 0.705 and -0.61 respectively. It shows that, ROE and LDR have a weak inverse linear relationship such that when LDR increases, ROE decrease would be anticipated. Similarly, when CDR increases ROE would be expected to decrease and vice versa. Conversely, DAR and ROE seem to move in the same direction linearly as epitomised by the strong positive correlation. On the other hand, the linear relationship between the other dependent variable ROA relative to
LDR, DAR and CDR were -0.095, -0.039 and 0.046 respectively. There exists a very weak negative linear relationship between ROA and the two independent variables LDR and DAR. An increase or decrease in ROA will presuppose a decrease or increase in the two independent variables correspondingly. The linear relationship between ROA and the other independent variable CDR is also very weak except it’s a positive one; meaning the two variables move in the same direction.

The correlation between the two dependent variables ROE and ROA is very weak which is ideal for our multiple regression analysis as the two are almost independent of each other. The control variables used in our model do not exhibit unusual correlations with the other variables and in a sense makes the model more robust as they reduce multicollinearity in the independent variables (Williams, 2015, p. 2).

5.4 REGRESSION ANALYSIS 1: ROE AND LIQUIDITY PROXIES

In order to specify the impact of liquidity on profitability as per research question, multiple regression analysis was carried out. The first analysis that was done was based on ROE as the independent variable while LDR, DAR and CDR were the independent variables. A control variable in the form of “location” was also added to the model to account for regional differences as these have a bearing on the profitability of banks in our sample. On the basis of the control variable, three dummy variables were created namely European, Asian and North American with only the European and North American dummy variables being fitted in the regression model. Table 7 shows the model summary of the first regression analysis:

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.770&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.593</td>
<td>.547</td>
<td>.04972</td>
</tr>
</tbody>
</table>

The model’s adjusted R square is preferable in explaining the variation in the dependent variable over the R square, as it takes into account the number of predictors in the model. Hence, the adjusted R square helps avoid over-fitting as each and every independent variable in a regression model is always expected to explain a little supplementary bit of the variation in the dependent variable (Statistics Solutions, 2018, p. 143). The adjusted R square of our model is 54.7%, suggesting that the independent variables (LDR, DAR and CDR) conditioned by the dummy variables account for 54.7% of the variation in the dependent variable ROE.

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>.159</td>
<td>5</td>
<td>.032</td>
<td>12.846</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>.109</td>
<td>44</td>
<td>.002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>.267</td>
<td>49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: ROE
b. Predictors: (Constant), European, CDR, N.American, LDR, DAR
Table 8 shows the ANOVA Table and is useful in establishing whether the findings may have been arrived at via a sampling error. In other words, the ANOVA Table helps decide whether the regression line differs from zero. If the regression line does indeed differ from zero, then it can be established that the findings are not due to sampling error (Miller et al., 2002, p. 168). From Table 8, with a confidence level of 90% (significance level of 0.1) it can be seen that the model is significant.

Table 9: Regression 1

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficientsa</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardized Coefficients</td>
<td>Standardized Coefficients</td>
</tr>
<tr>
<td>(Constant)</td>
<td>.048</td>
<td>.073</td>
</tr>
<tr>
<td>LDR</td>
<td>.036</td>
<td>.031</td>
</tr>
<tr>
<td>DAR</td>
<td>.140</td>
<td>.068</td>
</tr>
<tr>
<td>CDR</td>
<td>-.035</td>
<td>.023</td>
</tr>
<tr>
<td>N.America</td>
<td>-.026</td>
<td>.025</td>
</tr>
<tr>
<td>European</td>
<td>-.062</td>
<td>.027</td>
</tr>
</tbody>
</table>

a. Dependent Variable: ROE

Table 9 is a presentation of the regression model coefficients that shows not only the regression coefficients but the intercept and the significance of all the coefficients (Statistics Solutions, 2018, p. 144). The standardized beta coefficient shows the unit change in the standard deviation of the dependent variable (ROE) for every unit change in the standard deviation of the independent variables (Cohen et al., 2007, p. 663). This entails that, for every unit change in the standard deviation of LDR, DAR and CDR, ROE will change by +15.4%, 37.1% and -22.3% respectively. The contribution of each predictor variable to the outcome of the dependent variable can be judged by looking at its significance (Field, 2013, p. 1033). Given our confidence level of 90%, our criterion for significance is a p-value of less than 0.1. Hence, it can be deduced from Table 9 that only DAR is significant which means only DAR impacts profitability as measured by ROE. The other two independent variables are insignificant while the dummy variables are only relevant in controlling for categorical effects. The collinearity statistics are within the normal range of above 0.1 and below 10 for tolerance value and variance inflation factor (VIF) respectively. Hence, the separate effects of the independent variables can be assessed (Saunders et al., 2009, p. 463).

5.5 Regression Analysis 2: ROA and Liquidity Proxies

The second regression analysis involved ROA – the dependent variable and the predictors LDR, DAR, CDR and two dummy variables. Table 10 presents the regression model summary with the adjusted R square being equal to 1.6%. Consequently, the predictor variables of the model only explain 1.6% of the variation in the dependent variable ROA. This is a very low value of the adjusted R square indicating that the model predictors almost none of the variability in ROA. Hence, our model for the second regression analysis poorly fits the data collected (Muijs, 2004, p. 165).
### TABLE 10: MODEL SUMMARY

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.341a</td>
<td>.117</td>
<td>.016</td>
<td>.11414</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), European, CDR, N.American, LDR, DAR

The analysis of variance is presented in Table 11 and depicts that the model is insignificant based on a 90% confidence interval. This presupposes that LDR, DAR, CDR and the dummy variables offer no explanation in the dependent variable ROA when used in the form of the regression model equation (Moore et al., 2011, p. 598).

### TABLE 11: ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>.076</td>
<td>5</td>
<td>.015</td>
<td>1.161</td>
<td>.344b</td>
</tr>
<tr>
<td>Residual</td>
<td>.573</td>
<td>44</td>
<td>.013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>.649</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: ROA
b. Predictors: (Constant), European, CDR, N.American, LDR, DAR

From Table 12, the regression model coefficients can be seen. The standardized beta coefficients that indicate the unit change in standard deviation of the dependent variable relative to the unit change in the corresponding independent variables values shows that; for every unit change in standard deviation of LDR, DAR and CDR, the dependent variable ROA will have a variation of +8%, 13.2% and +24.4% correspondingly. With regards to the significance of the predictor variables, it can be concluded that all the predictor variables are statistically insignificant at 90% confidence level. Therefore, the liquidity proxies LDR, DAR and CDR have no impact on profitability as measured by ROA. The collinearity statistics are within the ideal range of above 0.1 and below 10 for tolerance value and variance inflation factor (VIF) correspondingly. Hence, the separate effects of the independent variables can be assessed without problems of collinearity (Saunders et al., 2009, p. 463).

The results of the second regression analysis differ slightly from the first regression analysis were DAR was found to be significant. Furthermore, ROE and ROA are known to exhibit positive correlation and would be expected to be impacted similarly by different variables (Kabajeh et al., 2012). However, based on our sample they were affected differently which is consistent with similar studies such as the ones conducted by Rasul (2013) and Mebounou et al. (2015).
The goal of our conceptual model is to present the interactions between our variables in order to highlight how liquidity affects profitability, thereby attaining the objective of this research. Multiple regression analysis was utilized to assess the impact of our independent variables (LDR, DAR and CDR) on the dependent variables (ROE and ROA). In addition, the conducted analyses enabled us to test our various hypotheses relating to the variables. Subsequently, a revised conceptual model can be presented based on the conducted statistical analysis.

After conducting the regression analysis with ROE as the dependent variable, only DAR was found to be statistically significant with the confidence interval being at 90%. The other two independent variables LDR and CDR were statistically insignificant as regards ROE. The other regression analysis performed with ROA being the dependent variable yielded no statistically independent variables. Based on these results stemming from the analysis performed we can summarize our hypotheses in the form of Table 13 and also a revised conceptual model in figure 8:

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-.106</td>
<td>.167</td>
<td></td>
<td>-.634</td>
<td>.529</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDR</td>
<td>.029</td>
<td>.070</td>
<td>.080</td>
<td>.411</td>
<td>.683</td>
<td>0.530</td>
<td>1.886</td>
</tr>
<tr>
<td>DAR</td>
<td>.077</td>
<td>.156</td>
<td>.132</td>
<td>.497</td>
<td>.622</td>
<td>0.286</td>
<td>3.492</td>
</tr>
<tr>
<td>CDR</td>
<td>.060</td>
<td>.053</td>
<td>.244</td>
<td>1.145</td>
<td>.258</td>
<td>0.443</td>
<td>2.259</td>
</tr>
<tr>
<td>N.American</td>
<td>.089</td>
<td>.057</td>
<td>.342</td>
<td>1.560</td>
<td>.126</td>
<td>0.417</td>
<td>2.397</td>
</tr>
<tr>
<td>European</td>
<td>-.021</td>
<td>.063</td>
<td>-.092</td>
<td>-.336</td>
<td>.738</td>
<td>0.269</td>
<td>3.720</td>
</tr>
</tbody>
</table>

a. Dependent Variable: ROA

5.6 REVISED CONCEPTUAL MODEL

The goal of our conceptual model is to present the interactions between our variables in order to highlight how liquidity affects profitability, thereby attaining the objective of this research. Multiple regression analysis was utilized to assess the impact of our independent variables (LDR, DAR and CDR) on the dependent variables (ROE and ROA). In addition, the conducted analyses enabled us to test our various hypotheses relating to the variables. Subsequently, a revised conceptual model can be presented based on the conducted statistical analysis.

After conducting the regression analysis with ROE as the dependent variable, only DAR was found to be statistically significant with the confidence interval being at 90%. The other two independent variables LDR and CDR were statistically insignificant as regards ROE. The other regression analysis performed with ROA being the dependent variable yielded no statistically independent variables. Based on these results stemming from the analysis performed we can summarize our hypotheses in the form of Table 13 and also a revised conceptual model in figure 8:
TABLE 13: REVISED HYPOTHESES

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Hypothesis</th>
<th>Significance</th>
<th>Verdict</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a</td>
<td>The loan to deposit ratio significantly impacts the return on equity</td>
<td>.249</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H1b</td>
<td>The loan to deposit ratio significantly impacts the return on assets</td>
<td>.683</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H2a</td>
<td>The deposit to asset ratio significantly impacts the return on equity</td>
<td>.045</td>
<td>Supported</td>
</tr>
<tr>
<td>H2b</td>
<td>The deposit to asset ratio significantly impacts the return on assets</td>
<td>.622</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H3a</td>
<td>The cash &amp; cash equivalents to deposit ratio significantly impacts return on equity</td>
<td>.129</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H3b</td>
<td>The cash &amp; cash equivalents to deposit ratio significantly impacts return on assets</td>
<td>.258</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>
6.0 ANALYSIS AND DISCUSSION

This chapter comprises the analysis and discussion of our quantitative study. The descriptive statistics are discussed before proceeding to the conceptual model-based hypotheses introduced in the theoretical framework chapter. The main basis of the discussion are the empirical findings and the extensive literature on the subject. Our findings are compared to existing literature and inferences are posited.

The primary objective of this study is to specify the impact of liquidity on profitability in the context of the banking sector. This strategy was to conduct a quantitative research of major global banks domiciled on three continents namely Asia, Europe and North America. The banks with the largest asset sizes were targeted in order to capture a great deal of the global banking sector. The descriptive statistics will be discussed prior to the regression and correlation analysis that will highlight the relationship between liquidity and profitability.

The study’s conceptual model comprised two dependent variables ROA and ROE and three independent variables LDR, DAR and CDR. The two dependent variables are the profitability proxies while the independent ones are for liquidity, and these variables were conditioned by the geographical location as the control variable to account for categorical differences. The data analysis and discussion will be on the basis of the data collected for fifty (50) banks over a ten (10) year period and the output from the statistical analysis.

6.1 DESCRIPTIVE STATISTICS ANALYSIS

From the means that were computed, it was noted that the on average banks had almost the same value for loans outstanding and cash and cash equivalents. This deviates from the expectation that banks prefer loans to cash and cash equivalents as they attract a higher interest, hence more revenue for the banks (Mebounou et al. p. 5). This is because banks endured a financial crisis during the early years of our period of consideration which led to a focus on sound liquidity management to ensure that firms continued to be going concerns (Lamberg et al., 2009, p. 7). That resulted in banks having a great deal of liquid assets in the form of cash and cash equivalents to be able to meet their liquidity needs. Furthermore, on average banks preferred deposits to other ways of raising long term debt to finance their assets. On average deposits accounted for 60% asset financing during the pertinent period. This is due to the fact that deposits offer banks access to lower cost of funds and also because there was a steady stream of deposits after the crisis waned (Mwangi et al., 2005, p. 5). The average ROE (10%) and ROA (3%) during the period were modest owing to the fact that fifteen (15) years prior to the crisis, the ROE averaged 17.5% for major banks. The decline can be attributed to the 2008 financial crisis and its aftermath as well as the subsequent tightening of capital requirements. Banks were required to raise supplementary equity in order to conform to new capital standards such as the Basel Accords and other national requirements. In the long term, it is improbable that the high ROE investors and major banks were familiar with before the crisis will return without banks engaging in riskier investment practices (Norman, 2017, p. 53). Additionally, the average ROA of banks is modest due to reduction in the returns in the follow-up to the crisis (Baily et al., 2015, p. 7).

In the aftermath of the crisis most banks invested a great deal of their funds in government securities as evidenced by the modal CDR of 0.49. Government securities are indispensable investment vehicles in the context of a liquidity cataclysm. They allow for trading in the collateralised interbank markets which become widespread during liquidity crises (Podlich et al., 2017, p. 10). The different model constructs values for the banks.
exhibited significant variations and results from diverse business strategies which are employed by banks. A bank’s business strategies affect profitability, level of earning assets, distribution of assets apportioned to securities and loans and the apportioning of funds raised via core deposits and large-scale liabilities (Regehr et al., 2016, p. 52).

6.2 HYPOTHESES ANALYSIS

In line with the purpose of this research which is to provide an understanding of the impact that liquidity can have on the profitability of banks, a discussion of the statistical analysis will be posited with a focus on the correlations and regression analysis of the model constructs (LDR, DAR, CDR, ROE and ROA). The hypotheses put forward in prior chapters will be presented and evaluated with the goal of aiding comprehension of the research purpose (Byorkman et al., 2014, p. 51).

6.2.1 LIQUIDITY PROXY - LDR AND PROFITABILITY PROXIES – ROE & ROA

The loan to deposit ratio highlights how a bank has utilised depositors funds on credit activity which is liable to credit risk exposure. An increasing or high loan to deposit ratio is a sign that and increasing or high proportion of deposits is being dedicated to earning maximum interest as loans offer banks an avenue to earn a reasonably high return (Sharifi et al., 2016, p. 3). Moreover, this ratio shows a measure of the liquidity and bank intermediation function adequacy. If the ratio is increasing, then intermediation is progressing due to the fact that the funds accumulated from society are being allocated to individual investors, businesses and other deficit units. A subsequent increase in intermediation will result in banks being less liquid and thus banks have to make a trade-off between maximising the interest from investments in the form of loans and their liquidity needs (Wulandari et al., 2016, p. 10).

➢ First Hypothesis

The first hypothesis was aimed at testing whether or not the ratio between loans to deposits has an effect on the profitability of banks as measured by the ROE. This ratio (LDR) is one of the indicators of how liquid a bank is from its perspective of showing the loans which are considered to be illiquid assets which are then compared to customer deposits which are claims on banks that might have to be met on demand depending on the type of deposit scheme of the bank has with its customers or clients. The first hypothesis is as follows:

H1a: The loan to deposit ratio significantly impacts the return on equity

In order to test the hypothesis above a regression analysis was performed, and the results show that this hypothesis is unsupported. The LDR variable is insignificant when analysed in relation to the dependent variable ROE. Hence, the hypothesis that the loans to deposits ratio significantly impacts the return on equity does not hold based on the study conducted. This implies that when a bank increases its level of loans relative to its deposits that will in no way significantly affect its profit even though it will be become more illiquid. However, the linear relationship between LDR and ROE is an inverse one such that when one is increasing the other decreasing and conversely. This inverse relationship is in no way a causal sign as the two are statistically insignificant thereby it can be assumed that their inverse relationship is caused by other factors.

This conclusion as regards LDR being statistically insignificant respective to ROE is in line with a prior study conducted by Abdullah et al. (2014). Abdullah et al. (2014). concluded that the amount of loans a bank makes in comparison to the deposits does not
significantly impact ROE. Nevertheless, other studies such as Edem (2017) studied the Nigerian banking sector and found that the LDR has a positive impact on ROE.

➢ Second Hypothesis

The second hypothesis was directed at assessing whether or not the proportion of loans to deposits has an impact on the profitability of banks as measured by the ROA. As earlier noted, the LDR gives an indication concerning the liquidity of a bank by highlighting how much of the illiquid assets in the form of loans the bank has relative to the customer and/or client claims on the banks in the form of deposits. Bank customers can draw from the bank at a time continent on the type of account they hold and hence, banks need to ensure a proper balance is made between investing the customer funds as well as making funds available from which customers can draw from otherwise bank runs can ensue. The second hypothesis is as follows:

H1b: The loan to deposit ratio significantly impacts the return on assets

A regression analysis was conducted so as to test our hypothesis and the outcome is such that the hypothesis is not supported. The dependent variable ROA was regressed with LDR and the LDR was found to be statistically insignificant. In view of this, it can be stated that the hypothesis that the loans to deposits ratio significantly impacts the return on assets is rejected. The implication of this is that a bank cannot seek to change its ROA significantly by refining its loans to deposits proportions. The relative changes to these parameters will only affect the liquidity levels and is expected not to significantly affect the profit levels when measured using ROA. In spite of lacking a statistical significant relationship. ROA and LDR exhibit a weak inverse linear relationship. The two variables tend to move in opposite directions caused by the interactions of other factors since the two do not have statistical significance.

This finding was also arrived at by Abdullah et al. (2014), who posited that LDR has no significant impact on profitability whether profitability is measured using ROA or ROE. On the other hand, Bagh et al. (2017) in an empirical study focused on the Pakistani banks found that the proportion of loans to deposits does in fact have a positive and significant impact on profitability.

Our findings indicate that the loan to deposit ratio has no statistical significance in terms of impacting the profitability measured as ROE or ROA. The is possibly because the increase in loans would be expected to increase the interest revenue of banks but on the other hand deplete the deposit base (Ducy et al., 2013, p. 7). As earlier noted, loans offer banks a higher interest compared to investment in other avenues that offer interest and a liquidity cover such as Treasury Bills (Mebounou et al. p. 5). This depletion in bank deposits held will lead to a bank losing a critical source of cheap funds to meet its liquidity needs as well as investment funding source (Mwangi et al., 2005, p. 5). Banks facing liquidity needs or meeting the reserve requirements are compelled to borrow usually from other banks or central banks. Normally the benchmark rates for these short-term loans to meet regulatory requirements are set by central banks through their monetary policy decisions (Elliot, 2014, p. 5 & 16). This rate has seen a considerable rise in the aftermath of the financial crises and hence banks have faced high interest rates to meet liquidity needs (Illes et al., 2015, p. 1). Therefore, the maximising of interest revenue through loans is seemingly offset by the corresponding increase in the cost of funds for banks. This effect will be on both return computed based on the shareholders’ funds and average asset base.
The other possible reason is that an increase or decrease in the loan to deposit ratio will have a corresponding effect on the amount of equity. When the loans increase, a bank will might require more capital to improve liquidity and/or absorb losses (Wulandari et al., 2016, p. 10). The increase in equity will counter the supplementary interest income arising from the increase in loan portfolio. On the other hand, a reduction in the loan portfolio will see a reduction in interest income due to investing in lower interest rate yielding avenues this being countered by interest payable on deposits.

6.2.2 LIQUIDITY PROXY - DAR AND PROFITABILITY PROXIES – ROE & ROA

The deposits to total assets ratio indicates to what extent deposits account for asset funding. Banks that collect more deposits are likely to have an increased potential to provide customers with more loan opportunities. An increasing deposit to asset ratio denotes the expansion of relative cheap funds at the banks disposal for profitable utilisation ceteris paribus (Menicucci et al., 2016, p. 3; Misra, 2015, p. 13). Considering this in isolation it would appear the more deposits a bank has, the more profits they will be able to generate. However, if a bank is incapacitated in disbursement of funds through loans it will see its profitability hampered due to the interest payable to depositors. Therefore, an increase in profitability is not always a given when deposits increase relative to other parameters such as assets. Banks need to be effective and efficient at converting deposits into revenue generating assets (Menicucci et al., 2016, p. 3).

➢ Third Hypothesis

The third proposition was aimed at assessing whether the amount of bank deposits comparative to total assets can significantly impact profitability computed using ROE. The DAR measures the proportion between deposits and total bank assets and therefore, conveys the ratio of customer claims on the bank to what the banks has been able to invest in. If a bank is to be liquid enough, a high deposit to asset ratio is coveted since deposits offer a cheap source of asset funding (Mwangi et al., 2005, p. 5). The third hypothesis is stated below:

H2a: The deposit to asset ratio significantly impacts the return on equity

This hypothesis was tested via a regression analysis and it was established that the hypothesis is supported. This means that a statistically significant relationship exists between the liquidity proxy and independent variable DAR, and ROE the dependent variable. In consequence, the hypothesis that the deposits to assets ratio significantly impacts the return on equity is selected based on the study data. In addition, there is a strong positive linear correlation between DAR and ROE which entails that both variables tend to move in the same direction. Therefore, the ratio that a bank decides to have of deposits to assets will impact its profitability determined as ROE. Since, the linear relationship is a strong positive one, it can be deduced that an increase in the deposits comparable to the total assets will result in an increase in ROE.

Menicucci et al. (2016), conducted an empirical investigation on the factors impacting profitability in Europe and also found that the DAR significantly impacts ROE positively. They argued that banks depend on deposits for funding so as to realise high returns on investments in assets and that deposits are key in the determination of high profits. On the contrary, Abdullah et al. (2014), based on their study findings maintained that DAR had no significant impact on profitability reckoned as ROE.
Fourth Hypothesis

The hypothesis fourth in line is aiding our understanding of whether the proportion of bank deposits to assets affects the profitability determined as per ROA. In line with the already existing fact that banks would want to have a high deposit to assets ratio so as to benefit from the liquidity this offers through provision of cheap funds to meet short term financial claims and reduction in costs (Mwangi et al., 2005, p. 5). The interest rates a bank pays on its customers’ deposits is significantly lower than that paid on wholesale funding (Bibihuga et al., 2014, p. 3). Hence, like in the previous related hypothesis, DAR is expected to have a significant positive impact on profitability. In order to ascertain this expectation, we tested the following hypothesis:

H2b: The deposit to asset ratio significantly impacts the return on assets

The regression analysis done calls for the rejection of the expectation as contained in the hypothesis because the hypothesis is not supported. This is because there is no statistical significance between DAR and ROA thus, the proportion of deposits to assets do not significantly impact the return on assets. Additionally, only a very weak inverse linear relationship exists between DAR and ROA. The two variables are hardly related both linearly and also in the area of statistical significance. This might come as a surprise because from the previous hypothesis DAR was found to impact ROE while after testing the fourth hypothesis nothing can be farther from the truth for DAR and ROA. This disparity in terms of the regression of ROE and ROA with similar independent variables and yet have different results is nothing new. Similar studies done by Bassey et al. (2015), Rasul (2013) and Mebounou et al. (2015) had unique results for the two dependent variables due to the fact that inasmuch as ROE and ROA are both profitability proxies they are not identical measures. It can also be seen from our correlation results in Table 6 that the two have extremely weak positive correlation making them almost independent to each other.

Our conclusion of rejecting the hypothesis for DAR and its impact on ROA is consistent with the findings of Abdullah et al. (2014) who also rejected this hypothesis. However, other studies like Bagh et al. (2017) found that DAR impacts ROA positively and that a significant relationship existed between the two variables. They overall conjectured that firms have liquidity management as avenue to boost business profits.

The regression analysis conducted provided us with interesting results were the deposit to assets ratio (DAR) was found to significantly impact ROE but not ROA. DAR was found to impact profitability measured by ROE possibly due to banks being able to make investments in financial instruments that offered a return higher than its corresponding interest payments on deposits. As noted earlier, after the financial crisis lending rates especially the ones on long-term loans have been high despite the existence of low policy interest rates (Illes et al., 2015, p. 1). This has provided a window for banks to earn a favourable interest income from loans and other debt they have extended to customers regardless of the interest rates on deposits being high too. Nonetheless, it was observed that during the period under consideration which happens to be post-crisis period and has led to various liquidity requirements; banks have been compelled to hold large amounts of liquid assets (Podlich et al., 2017, p. 10). This seems to be the reason for DAR not impacting profitability as the marginal interest income between interest from investment activities and interest payable on deposits is being offset by the cost of holding low earning liquid assets. This is impacting profitability measured as ROA as it takes into account all the assets low or high earning ones unlike ROE is not asset based.
Banks generally hold liquid assets in the form of cash and money market instruments to act as a liquidity buffer. Most liquid assets normally yield a relatively low return and hence, a bank directing its funds towards most liquid assets faces an opportunity cost. Assuming regulation is non-existent, the anticipation is that banks would minimize their holdings of liquid assets in order to maximize the revenue they can potentially generate via high return yielding assets such as loans (Bordeleau, 2010, p. 4). Two concepts arise when evaluating the possible impact of liquid assets as a proportion of an indicator (in our context deposits) on profitability. Firstly, the “expected bankruptcy cost hypothesis” that states that since an increment in the relative liquid assets value of banks reduce their default probabilities, subsequent holdings of liquid assets are then expected to impact bank profitability positively. The second is the well-known fact the opportunity costs arising from holding liquid assets should have a negative impact on profitability. Altogether, liquid assets increments are expected to impact profitability positively so long as the marginal benefit of holding them offset their related cost i.e. opportunity cost and cost of funds (Bordeleau, 2010, p. 7).

➢ Fifth Hypothesis

The fifth hypothesis was useful in establishing whether or not the proportion between cash and cash equivalents to deposits has an impact on the profitability computed relative to the shareholder funds – ROE. The CDR underscores how much liquid assets a bank is carrying in its books compared to the customer deposits it holds. Cash and cash equivalents consist of cash and other securities that can easily be converted into cash such as treasury bills. They offer a liquidity buffer but assets like cash can result in opportunity costs for firms and hence an optimal amount should be held. The following hypothesis was used in specifying the impact of CDR on ROE.

H3a: The cash & cash equivalents to deposit ratio significantly impacts return on equity

On the basis of the regression analysis, the hypothesis cannot be accepted as the p-value is above our significance level of 0.1. Consequently, the independent variable CDR is statistically insignificant when regressed with ROE. Therefore, the hypothesis that the cash & cash equivalents to deposits ratio significantly impacts return on equity does not hold. The implication of this is that, when the bank increases its liquidity by means of an increase in cash and cash equivalents comparatively towards deposits, the profitability is not expected to be significantly affected. Nonetheless, there is a moderately strong negative correlation between CDR and ROE which is caused by other factors as correlation is not tantamount to causation (Kothari, 2004, p.138). It would be expected that as the amount of cash and cash equivalents increases the profitability would decrease due to the forgone additional interest and opportunity cost. However, the empirical evidence in this study does not support this expectation.

Bassey et al. (2015), reached the same conclusion that the cash to deposit proportions have no statistical significance with regards to their possible impacts on profitability proxy ROE. This view is inconsistent with Bagh et al. (2017), were it was found that the CDR has a positive impact on ROE. This deviates from most studies on the subject which have rejected the hypothesis expressed by Bagh et al. (2017).
Sixth Hypothesis

The sixth and last hypothesis was directed towards validating the nature of the effect if any of the cash and cash equivalents ratio to deposits on the profitability proxy of ROA. Liquidity management with regards to cash and cash equivalents fits into the classic theory of the liquidity and profitability trade-off. The trade-off theory postulates that in perfect capital market conditions holding cash assets neither create or destroy value (Edem, 2017, p. 3). It therefore became interesting to assess this empirically. The expectation of an increasing CDR would be a corresponding reduction in the ROA due to the perceived increase in assets with low return. The hypothesis is thus as follows:

H3b: The cash & cash equivalents to deposit ratio significantly impacts return on assets

As per regression analysis results, this hypothesis in not supported. This is due to the fact that the independent variable CDR is insignificant upon regressing it with the dependent variable ROA. Accordingly, the hypothesis that the cash & cash equivalents to deposits ratio significantly impacts return on assets is not selected on the basis of the analysis performed. This means that the leveraging of the level of cash & cash equivalents to meet liquidity needs and manage cashflow liquidity risk has no statistically significant impact on the profitability proxy ROA. Despite the lack of significant impact of CDR on ROA, an extremely weak positive linear relationship exists between the two constructs. The constructs are almost independent of each other which almost exactly fits the trade-off theory stated earlier on.

This result is not in line with similar studies such as the one conducted by Ibrahim (2017) on a small sample of Iraqi banks and concluded that CDR impacted ROA positively. However, the author did concede that a study with a larger sample and over a longer time horizon would yield additional insights. It is no surprise that studies done with a larger sample such as Abdullah et al. (2014) and Bassey et al. (2015) did not find a statistically significant relationship between CDR and ROA just like this study.

The results of this study dictate that there is no statistical significance as regards to the impact of liquid assets/cash and cash equivalents to deposits ratio on profitability. This might be due to the associated costs of funding and opportunity cost of liquid assets offsetting the yield earned on the investments in liquid assets. Illes et al. (2015, p. 1), even though central banks slushed their policy rates after the financial crisis, lending rates still remained high especially for long-term loans. This shows that banks missed out on the favourable yields from long-term loans through their investing in liquid assets to meet regulatory requirements which actually became stringent after the crisis and also as part of post-crisis investment strategies crises (Podlich et al., 2017, p. 10). In addition, as a result of increased competition among banks for deposits and the reduction in governments being able to recapitalize their banks has led to widened spreads between deposits and policy rates with the former having been raised (ECB, 2012, p. 63; Paries et al., 2014, p. 26).
7.0 CONCLUSION

This chapter presents the general findings of our research and comparing them to the research objective in order to establish whether the research objective has been met. Later on, the study contributions to the scholastic world and practical benefits are stated. The chapter ends with societal considerations as well as limitations and further research suggestions.

7.1 GENERAL CONCLUSION

The ultimate objective of our study was to specify the impact of accounting liquidity on profitability with a focus on the banking sector. Accordingly, our research question was to find out the effect of liquidity on profitability in the banking sector. While seeking to meet our research objective we stumbled upon nuggets of information. We found that the study period captured developments in the aftermath of the financial crisis on the banks liquidity and profitability trade-off. It was found that contrary to expectations, banks during this period invested in loans and liquid assets almost proportionately due to banks having to adopt sound liquidity management in post-crisis period. Deposits after the crisis were found to have declined and only begun recovering when the financial markets and economies recovered. The profitability of banks post-crisis reduced due to tighter regulation, competition and an economic downturn arising from the economic meltdown. The period under consideration also saw a proliferation of investments in government securities by banks in the goal of managing their liquidity risks.

Our general conclusion as regards liquidity and profitability was arrived at by statistically analysing the liquidity and profitability proxies. Liquidity was measured using the LDR, DAR and CDR while profitability ROE and ROA. LDR was found not to have any significant impact on profitability measured either as ROE or ROA. This is due to the increase in the interest rates at which banks would borrow both from depositors as well as meeting their liquidity needs that offset their marginal interest income from investments in assets like loans. DAR was found to significantly impact profitability measured in terms of ROE but none in the light of ROA. This is because banks were able to reap superior interest income from investments in assets comparative to the interest payable to depositors. However, when this superior interest income is compared to the huge volume of assets held by banks it is almost insignificant and that is the possible reason why DAR does not significantly affect ROA. Like LDR, CDR was found not to significantly impact profitability for both its proxies ROE or ROA. This is for the reason that the increase in liquid assets in the aftermath of the crisis meant an increase in the opportunity cost of holding liquid assets and also the high interest rates on deposits counteracted the interest income on liquid assets.

Based on the empirical study conducted, we posit that inasmuch as liquidity is a very important concept in the banking sector by helping banks remain aloft and ensuring going concern status, it does not significantly impact profitability. Of the hypotheses tested in our study, only one hypothesis was supported relating to DAR and ROE. Otherwise, the other hypotheses establish that accounting liquidity is not expected to significantly affect profitability of banks.
7.2 THEORETICAL CONTRIBUTIONS

One of the reasons of conducting this study was to contribute to the existing theoretical knowledge about the liquidity and profitability trade-off theory. A number of studies have been conducted in the area of liquidity and how it impacts profitability. The studies have focused on various sectors, industries and geographical settings which have provided mixed results. Some studies conducted like Björkman et al. (2014), Tran et al. (2016), Raykov (2017), etc. found that liquidity does impact profitability of companies while other studies such as Lamberg et al. (2009), Abdullah et al. (2014), etc. concluded that liquidity does not impact profitability. The lack of a uniform stance on the matter provided some motivation for us to analyse this subject and make our own independent conclusion. Therefore, the findings of this research form an important contribution to the body of knowledge on the matter. Furthermore, we believe this is the first study conducted over a considerable long period of analysis and spanning different geographical settings with the centre of attention being the banking sector. Most similar studies that focused on the banking sector such as Ibrahim (2017) and Ibe (2013), were limited within one locality (country), period of consideration was short, and the samples involved were small. However, the sample for this study was large and took into account a considerable period of time and will greatly contribute in this area of study.

In the goal of trying to answer the research question we inconsequently highlighted some of the major changes in the banking sector as regards to the prevailing lending rates, interest rates payable on deposits, investment disposition of banks and profitability in the aftermath of the financial crisis. This is one imperative contribution to the existing literature on the developments in the banking sector during the post-crisis period.

7.3 PRACTICAL CONTRIBUTIONS

Our research presents not only theoretical benefits but is of practical relevance too especially for the banking sector. Liquidity management in relation to the entire business functions and not just the profitability side of things is of prime importance. Sound liquidity management can be the difference between continued operations and insolvency. Prior to the 2008 financial crisis most banks emphasised on profitability without due consideration to other important aspects of their businesses such as liquidity management (Congdon et al., 2009, 108). This led catastrophic results such as the case of Northern Rock that went under due to negligent liquidity management practices. Northern Rock using its ‘teaser rates’ (below industry average interest rates) aimed at boosting its loan book and ultimately profits which unfortunately made the bank face liquidity problems and later on bank run ensued (Congdon et al., 2009, 195). This research has highlighted that sound liquidity management practices do not adversely affect profitability; thus, corporations should not fall on the wrong side of history by sacrificing the going concern status for mere focus on profits. This study has also highlighted that a company can reap benefits by finding the right balance between liquidity and profitability.

7.4 SOCIETAL CONSIDERATIONS

The research conducted is relevant to different individuals and companies. The concepts and subjects covered in this thesis concern society at large whether investors, depositors, bank employees, bank management, regulators or bank clientele. Therefore, we endeavoured not to present anything in our thesis in an inaccurate manner or in a manner that will have negative repercussions on any stakeholders. The companies that comprised our sample have been kept anonymous as their identities were not deemed important in arriving at the research objective and should ordinary not face any negative publicity.
through this research. In addition, the information used in our analysis is publicly available information and to the best of our ability this information has not been misconstrued or used outside its context. This research has accentuated liquidity management which could benefit society as their monies with banks is much more secure when banks adopt good liquidity management practices.

7.5 SUGGESTIONS FOR FURTHER RESEARCH

As earlier mentioned, liquidity management is of importance in every business or corporation (Shivakumar & Thimmaiah, 2016, p. 2). However, our research was directed at analysing liquidity effects on profitability in the banking sector only. Therefore, there is still a possibility to conduct further research on the subject of liquidity management and profitability. It would be interesting if this study would be replicated with a focus on smaller banks as this study focused on the banks with large asset size. It would also be interesting to extend this study to other sectors taking into account a longer period of analysis to capture a more comprehensive causal effects of liquidity on profitability. Lastly, it would be ideal to conduct a similar study but using a qualitative or mixed method approach in trying to understand the interaction between liquidity and profitability.
8.0 TRUTH CRITERIA

This chapter presents the truth criteria of our research. The research design and findings are assessed in terms of the reliability, validity and generalisability of the study. This last chapter is basically an evaluation of the research that has been conducted.

8.1 RELIABILITY

For a research to be considered reliable, its results need to be repeatable. The focus of reliability is usually regarding whether the measures that have been utilized in the study are consistent (Bryman & Bell, 2011, p. 80). We contend that our research results are reliable based on the following rationale: Firstly, our research parameters that have been used as measures for our constructs are based on several studies in the already existing literature. The measures have been arrived at via refinement by scholars and therefore we did not need to come up with our own measures which would have rendered the study unreliable. Secondly, the data used to compute the variables has been sourced from reliable sources like Factiva and Thomas Reuters Eikon which maintain databases comprising high quality information. The information collected from these databases is information that companies have made available to the public after auditors have ensured that the financial information is free and fair. Lastly, the computed information (can be found in appendix 1) based on established measures was analysed using standard statistical methods such as Pearson’s correlation and regression analysis. Given that our study focused on the banking sector, similar results should be arrived at by other researchers who base their study on a similar sample.

8.2 VALIDITY

There are three vital elements to consider when assessing the validity of a conducted research. Research has to meet face, construct and internal validity. Face validity entails that a layman should be able to ascertain that the selected method of research makes sense as a method “prima facie”. Construct validity refers to the idea that the method selected measures what is thought it is measuring i.e. the liquidity measures employed in this study must measure liquidity and not something different. Internal validity deals with causality by analysing the interrelationship between variables ascertaining whether there exists a causal relationship or mere association (Greener, 2008, p. 37). In a nutshell, validity stems from the right choice of variables to measure a phenomenon (Vieira, 2010, p. 33). The measures utilised in this study LDR, DAR, CDR, ROE and ROA, are all measures entrenched in observing liquidity and profitability phenomena in existing literature. The liquidity proxies LDR, DAR and CDR are tailored for assessing liquidity in banks and are a refinement of the traditional accounting ratios used in ratio analysis. Hence, we consider our study to be valid.

8.3 GENERALISABILITY

This relates to the research design concerning the extent to which the results of the research are generalisable. For a research study to be considered generalisable, its findings have to be applicable to other research contexts. However, it is not always expected that research findings will be generalisable; it is dependent on the nature of the research being conducted (Saunders et al., 2009, p. 158). We thus posit that our research cannot be generalised to other research settings except the banking sector. The focus of our study was the banking sector and we believe it would only be appropriate for the study to be generalised within this context. In addition, a theory that will apply to all industries or sectors cannot be prescribed as most sectors are quite unique when it comes to liquidity.
management. Our goal was just to specify what the interaction has been between liquidity and profitability in the banking sector motivated by the rise in emphasis on sound liquidity management.

8.4 REPLICATION

At times researchers duplicate the findings of others when they view the original findings differs from other evidence that is relevant to the phenomena being observed. Hence, replicability is cardinal. For a study to be considered as replicable, the researcher must describe the procedures in great detail so us to facilitate replication (Bryman & Bell, 2011, p. 80). We believe our study is highly replicable because the procedures and measures used have been described in great detail in the practical methodology chapter. Researchers that might want to replicate this study are highly encouraged to do so in order to ascertain as to whether the findings in this study can be appertained to other institutions in the banking sector.
REFERENCES


Sunny Obilor Ibe. The Impact of Liquidity Management on the Profitability of Banks in Nigeria. Journal of Finance and Bank Management 1(1); June 2013 pp. 37-48


Note: Only 10-year averages (in decimals) have been presented due to size of the raw data being too numerous.

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