LIQUIDITY AND AGRICULTURAL LENDING IN MALAWI

A Dissertation

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By

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LIST OF ABBREVIATIONS

ACE	Agricultural Commodity Exchange
FEM	Fixed Effect Model
REM	Random Effect Model
AFIT	Amended Financial Intermediation Theory
AGRA	Alliance for Green Revolution in Africa
AICC	African Institute of Corporate Citizenship
ALL	Agricultural Lending Levels
CR	Credit Rationing
GDP	Gross Domestic Product
GTPA	Grain Traders and Processors Association
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
LRR	Liquidity Reserve Requirement
MFIT	Modern Financial Intermediation Theory
MMF	Malawi Mudzi Fund
NGOs	Non-Governmental Organization
RBM	Reserve Bank of Malawi
SACA	Smallholder Agriculture Credit Administration
TBLR	Theory of Bank Liquidity Requirement
TC	Total Credit
TLC	Total Liquidity Creation
USA	United States of America
USAID	United States Agency for International Development
WR	Warehouse Receipt

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ABSTRACT

Malawi's agricultural sector has remained the mainstay of Malawi's economy since independence. Ironically, agricultural production and productivity are observantly below 50% of their respective potentials. This is partly explained by low lending levels towards the agricultural sector by financial institutions. However, just as elsewhere, commercial banks in Malawi are under international obligations of ensuring financial stability by undertaking liquidity management framework and measures. One such liquidity management intervention is the liquidity reserve requirements (LRR). This study departed on the theoretical understanding that quantitative tightening through LRR affects the liquidity position (and funding needs) of the banking system which consequently affect lending levels towards the economy (Alper et al., 2016) and by induction, the agricultural sector. It is on these premises that this study sought to examine the impact of liquidity on agricultural lending levels in Malawi. The study employed secondary data from 6 commercial banks that have been in operation in the opted data period of between 2007 and 2017. Besides estimating total liquidity creation, three sets of relations were tested: the impact of LRR on Total Liquidity Creation (TLC); the impact of liquidity levels on Agricultural Lending Levels (ALL); and, the determinants of Total Credit (TC) in Malawi. To test the relationship between liquidity and lending the Malawian Banking sector, the study adopted the panel regression framework while fixed effects and random effects models were using in the estimations. The control variables included bank capital, bank asset growth, bank deposit growth and loan to deposit ratio. From the empirical analysis, the study shows that banks created liquidity of about 1.2% of total industry assets over the study period. For the period under observation, LRR positively affected TLC. Similarly, the impact of liquidity levels on ALL was positive. In general, TC was positively determined by Bank Deposit Growth and Loan Deposit ratios while LRR, TLC and Bank Capital affected TC negatively. This could imply that an increase in TLC does not automatically result into an increase of TC. The findings further indicate that LRR had a negative effect on ALL. In periods where LRR went up, ALL went down, possibly implying that banks shift to other sectors considered less risky even amidst rising liquidity levels.

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CHAPTER ONE: INTRODUCTION

1.1 Background

Since independence in 1964 until the present, the agricultural sector has remained the mainstay of Malawi's economy. As commented by African Institute of Corporate Citizenship (2017:1), "about 80% of the national employment comes from agriculture, making it not only an important springboard for any industrial efforts in Malawi but currently also the key source for the country's economic development". Ironically, "despite the majority being employed in the agriculture sector, only 40% of the Gross Domestic Product (GDP) – estimated at US$ 4.05 billion – comes from agriculture" (Economics Association of Malawi, 2018:3). This is so "because the yields for the main crops have always been below 50% of the potential levels" (AICC, 2017:1). The "main reasons for low productivity include the small landholding size which discourages the adoption of agricultural productivity-enhancing technologies as well as the erosion of soil fertility" (Chipeta, 2004:4). However, of utmost impact is limited access to agricultural finance by both smallholder and large scale farmers. "Beyond government's patches of direct intervention in agricultural lending, financial institutions' (commercial banks in particular) total lending towards the sector has been hovering around eight and twelve percent for the past 30 years" (AICC, 2017:4). The low lending levels towards the sector is largely attributed to the "risk nature of agriculture enterprises especially farming" (Bankers Association of Malawi, 2017:12).

On the other hand, commercial banks in Malawi and elsewhere, are under international obligations of ensuring financial stability by undertaking stringent capital and liquidity management. One such stringent capital and liquidity management intervention is the "systematic avoidance of highly risky loans such as agricultural loans" (Kalua, 2016:4). The liquidity reserve requirement (LRR) is "one such key financial framework which provided for the capital and liquidity management of commercial banks in Malawi" (BAM: 14). The primary motive for LRR is to ensure that liquidity risk is well managed. Specifically, LRR is considered as a preferable modality of managing liquidity risk due to a number of reasons. Firstly, it ensures that cash is maintained in advance which should save on liquidation costs (Alper et al., 2016). Secondly, as commented by Calomirisi et al (2012: 1) cash is observable and verifiable; and thirdly, "because the risk of cash is invariant to bankers' decisions about whether to invest resources in risk management". Calomiris et al (2012: 1) further argue that the primary benefits derived from LRR relate to "improvements in

bank risk profiles and incentives towards risk during normal times and the consequences of those behaviours for reducing probability of a liquidity crisis making banking systems more resilient from a default risk perspective". However, different studies have generally confirmed that quantitative tightening through reserve requirements affect the liquidity position (and funding needs) of the banking system which consequently affect lending levels towards the economy (Alper et al., 2016, Calomiris, 2012). It is on these premises that this study sought to examine the impact of LRR on agricultural lending levels in Malawi.

1.2 Statement of Research Problem

As observed by (Calomiris et al., 2012: 4) "after the heavy reliance of banks on central bank lending during the 2007-2009 financial crisis, policy makers understandably would like to reduce the dependence of banks on the lender of last resort", and "thus encourage banks to limit or self-ensure (through cash asset holding) some of their liquidity risk". Minimum capital and liquidity reserve requirements are some of the modalities of ensuring that the dependence level on central bank as lender of last resort is minimized. Through LRR in particular, "a liquidity crisis in the economy is assumed to be reduced since the banks do not become weak enough to the extent of making their risk unimaginable" (Medina & Roldos, 2014:14). In addition, "the reaction of many economies to the recent surging capital inflow has been to keep policy rates at low levels in order to avoid excessive appreciation of the domestic currencies while engaging in macro prudential tightening to curb the rapid credit growth" (Calomirsis et al., 2012:5). The LRR has therefore been one of the most popular tools among unconventional monetary instruments (Medina & Roldos 2014). Most central banks—over 90 percent—oblige "depository institutions (commercial banks) to hold minimum reserves against their liabilities, predominantly in the form of balances at the central bank" (Gray, 2011: 65). The LRR is based on the belief that "banks with liquid assets and stable funding structures can effectively maintain their intermediation capacity amidst external negative economic shocks" (Medina & Roldos, 2014:14). As observed by Kalua (2016:56), "this ultimately builds a foundation for sustainable economic growth".

The Reserve Bank of Malawi (RBM) periodically issues liquidity reserve directives whose objective is to use the LRR as "instrument of monetary policy while at the same ensuring flexibility in liquidity management" (RBM, 2017: 9). The LRR is observed in relation (or as a portion of) total deposit liabilities and other liabilities. Just in many countries, the LRR measure in Malawi is

implemented as a prudential measure, monetary control measure and liquidity management system (Gray, 2011). The latest 2015 directive has specific provisions for minimum LRR, deadlines for meeting LRR, penalty for non-compliance, use of funds for LRR and computation of LRR among other clauses. Presently, the LRR is 7.5% (of total deposits liabilites) which is expected to be observed as a minimum on daily basis. The link between LRR and credit growth in an economy has been a subject of vigorous research in the field of Banking and Finance (Kashyap & Stein: 2000; Kishan & Opiela, 2000, Alper et al., 2016). Gray (2011:56) confirms that "numerous studies have confirmed a direct impact of the increase or decrease in LRR on credit growth". While some literature has confirmed bank liquidity as a factor that weakens the effectiveness of the traditional bank lending channel (Kashyap & Stein: 2000; Kishan & Opiela, 2000), others have considered liquidity requirement as a factor that enhances loan issuance (Cornett et al., 2011). The middle ground on the impact of liquidity requirement on bank lending is provided by Alper et al (2016: 12) who argue that "final effect of liquidity requirement on lending levels is dependent on the transmission mechanism of LRR on lending levels". Depending on the assumptions around the substitutability of bank fund and bank deposits, the transmission mechanisms of LRR on lending levels are categorized into three channels namely: costs, interest rate risk and liquidity channels (Alper et al., 2016). Under cost channel, an increase in LRR ultimately leaves lending levels unchanged while under interest rate risk channel, an increase in LRR reduces loans (Alper, et al., 2016). The same applies for liquidity channel. Consequently, the "final impact of liquidity requirement on lending levels depend on the relative strength of the three channels" (Alper et al., 2016:13).

Liquidity creation remains one of the core roles of financial institutions (besides risk transformation). However, given that liquidity requirement impact bank's liquidity creation and therefore lending ability (whether positively or negatively), it should follow that RBM's LRR has some effect on commercial banks' lending levels to the private sector. Whether the effect on total lending level or credit is the same on the agricultural sector or not was the core focus of this study. Specifically, the study aimed at analysing the impact of liquidity on agricultural lending levels in Malawi. The proposed study departed on three sets of relationship as confirmed by literature: i) LRR has an impact on total liquidity creation; ii) total liquidity has an impact on total credit or lending levels (agriculture inclusive); iii) total credit has an impact on agricultural lending levels.

1.3 Research Objectives

1.3.1 Main Objective

In view of the above, the main objective of the study was to analyse the impact of LRR on agricultural lending levels in Malawi between 2007 and 2017.

1.3.2 Specific Objectives

To achieve the above objective, the following specific objectives were pursued:

i. To estimate the Total Liquidity Creation in Malawi.
ii. To examine the impact of Liquidity Reserve Requirement on Total Liquidity Creation.
iii. To analyse the impact of liquidity on total credit and agricultural Lending Levels in Malawi.

1.4 Justification of the Study

Although LRR have been implemented in many countries so far, the focus in many studies as observed by Horvarth et al (2012) has largely been on its impact on general lending levels across all sectors. There "has been little emphasis on the impact towards agricultural lending as compared to other economic sectors of the world" (Horvarth et al., 2012:4). It is imperative that an extra attention is given to agricultural sector not only in Malawi but also other Sub-Saharan countries that are largely dependent on agriculture and are at policy level baffled by low lending levels towards the agriculture sector.

Secondly, while the challenge of agriculture credit and finance has been extensively covered in literature, the focus has largely been on "other structural causes such as disorganized farmer groups, unpredictable weather patterns, price volatility of agriculture commodities and excessive controls by government in both import and export markets" (Mlinde, 2016: 23). There is scarcity of studies on the role of bank capital and liquidity on agriculture lending.

Thirdly, at the centre of Basel II capital requirement is the recognition that a "strong and resilient banking system is the foundation for sustainable economic growth since banks provide credit intermediation" (Basel Committee on Banking Supervision 2003: 5). Thus the accord is intended to "ensure both banks' solvency and liquidity creation" (Basel Committee on Banking Supervision

2003: 5). Given the multiple literature findings that confirm the possible reverse causality of liquidity and bank's solvency caused by Basel II capital requirement, it is critical that a special focus is given to the impact being created on lending levels towards countries' strategic sectors - agriculture in the case of Malawi especially at a time LRR is strictly being applied as a compliance to the Basel II.

1.5 Definition of Key Terms

The study frequently used a number of terms. To ensure proper localization of the study it is important that contextual definitions are provided at the onset. Some of the key terms used include in this study are bank capital, liquidity, liquidity creation, liquidity risk and maturity transformation.

Bank Capital as used in this study means the equity of the bank that serves as the "cushion needed to absorb any unreserved losses that the bank incurs thereby enabling the bank to operate as a going concern and thus avoiding the insolvency or bankruptcy during periods of market correction or economic downturn" (Gambacorta & Mistrulli, 2004:17). Regulatory capital therefore "is the minimum threshold levels required by regulators to protect against bank insolvency as well as to protect against losses to the deposits made by depositors "(Diamond & Rajan, 2000:43). Failure "to maintain capital above regulatory thresholds leads to penalties and possibly bank closure". (Diamond & Rajan, 2000:43). "Regulatory capital thus runs contrary to economic capital which is an optimal level of capital that maximizes shareholder value in the absence of the regulatory requirements" (Gambacorta & Mistrulli, 2004:17).

Liquidity: while the general concept of liquidity implies the ability of an organization to make payments as they fall due, in banking realm, "liquidity implies the possibility or easiness of converting assets into cash without serious loss of time or money" (Whittlesey, 1945: 1). It therefore connotes the extent "relative to the volume and character of liabilities to which the bank holds assets that are either in form of cash or readily convertible into cash without material loss" (Whittlesey, 1945: 1). Liquidity creation therefore is "the process by which banks transform liquid liabilities to illiquid assets" (Horvath et al., 2012). It indirectly determines the bank's ability to create loans.

Liquidity risk as used in this thesis means the risk that a "solvent bank (or financial institution) may find itself unable to manage its current flow of withdrawals from its own stock of liquidity and access to borrowed funds from others" (RBM 2017:3).

Liquidity reserves means the "eligible assets held by a depository institution for the purpose of satisfying the liquidity reserve requirement" (RBM 2017: 3).

Liquidity reserve requirement on the other hand is a "constraint imposed on all intermediaries (often in percentage or ratio form) that specifies the lower bound on the share of a short asset in the intermediary's portfolio" (Farhi, et al., 2009:974). The regulator (central banks usually) do not need to "observe individual contracts signed by different agents with intermediaries but can only observe the aggregate portfolio allocation" (Farhi, et al., 2009:974).

Maturity transformation is a "process whereby assets are financed with liabilities of a shorter maturity" (Bhattacharya & Thakor, 1993: 29). The banks' gains are twofold namely, a reword for bearing interest risk and a reward for the creation of liquidity.

Liquidity creation implies a process through which financial institutions create liquidity through among other channels, deposits, off-balance sheet guarantees, derivatives and other balance sheet and off-balance sheet financial activities (Berger & Sedunov, 2016). Liquidity creation is therefore in essence also a measure of financial intermediaries' outputs.

1.6 Organization of the Study

The proposed study will be organized along five chapters as tentatively indicated below:

- *Chapter 1: Introduction and Background***:** this chapter provide an introduction and background to the study. The problem statement, research objectives for the study and study chapter outline of chapter.
- *Chapter 2: Literature Review:* as a way of contextualising the impact of LRR on agriculture lending, this chapter undertake a literature review of empirical findings on the nexus between several variables namely LRR and total liquidity creation, total liquidity creation and total credit or lending levels as well as total credit and agriculture lending levels. The literature review is premised on the theoretical presentation on the role of financial institutions on lending process

as well as modalities in which lending processes are made possible.

- *Chapter 3: Methodology:* this chapter provide a detailed explanation of the research design, sources of data, types of data, data collection instruments, data analysis techniques and hypothesis testing techniques.
- *Chapter 4: Discussion of Results:* this chapter present and give an analysis of results based on the three specific objectives along the outcomes of hypotheses testing.
- *Chapter 5: Conclusion and Recommendations:* in this chapter a summary of study findings in line with the study's objective is provided. It draws implications and tentative generalisations on the impact of LRR on agriculture lending in Malawi. General recommendations along each of the major finding as they relate to development finance is provided.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents both Malawi's banking system and agricultural landscape overviews. It presents two sets of theories: theories of financial intermediation and theory of bank liquidity. The first set aims at contextualizing the role of financial intermediaries and the mechanism through which the roles are discharged. The second set partly stems from the first set but goes further to discuss why and how liquidity reserve requirement is implemented by the financial intermediaries. After a theoretical background, an analysis of literature along the study objectives is presented. It is the literature review in this chapter that informed model for analysis of data (in chapter 3).

2.2 Contextual Overviews

2.2.1. Financial Institutions and Intermediary Services Landscape in Malawi

Just as in many developing countries, "commercial banking system in Malawi forms most vital component of the financial sector responsible for accepting deposits and granting short-term credit to productive entities" (Mlinde, 2016: 34). The Reserve Bank of Malawi (RBM) is the core of the formal financial system responsible for ensuring the financial system's soundness (Reserve Bank of Malawi, 2016). In Malawi, "the financial sector's ability to grow and serve more markets is inhibited by key factors including high real rates of interest and uncertainty generated by macroeconomic instability" (IMF, 2015: 15). The financial sector in Malawi has nine commercial banks (providing savings, lending and other investment products) on top of other financial institutions namely National Bank of Malawi, Standard Bank, NBS Bank, First Merchant Bank, Ned Bank, Eco Bank, CDH Investment Bank, New Finance Bank, FDH Bank. Table 1 below presents a consolidated summary of total assets, credit and concentration levels.

Table 1: Summary of Banks' Total Assets, Loans and Advances

2017	MALAWI KWACHA (MILLION
TOTAL ASSETS	1,572,300.00
LOANS AND ADVANCES	414,163.64
TOTAL DEPOSITS	995,500.00

Source: 2017 Malawi Financial Stability Annual Report

In terms of concentration levels, Agriculture came top with 22.3% in 2017 as shown in the Table 2 below although the preceding 10 years had agriculture on fifth position consistently.

Table 2: Lending Concentration Levels (2017)

Sector	*K' MILLION*	*%*
Agriculture	97,358.3	22.03
Mining and Quarrying	1,102.0	0.25
Manufacturing	72,439.7	16.4
Electricity, water and gas	10,638.1	2.4
Construction and civil engineering	15,278.6	3.5
Wholesale and retail trade	103,889.9	23.5
Transport, storage and communication	26,069.3	5.9
Finance, insurance, real estate and business services	20,001.3	4.5
Community, social and personal services	46,613.8	10.6
Other sectors	28,341.05	6.4
Total	**441,934.7**	100

Source: 2017 RBM Financial and Economic Review

Private sector involvement in the financial sector, "including the entry of new players, has increased with financial liberalization measures" (BAM, 2017:2). Two banks, National Bank of Malawi and Standard Bank, dominate the sector with 58 percent of the sector's assets, and 59 percent of its deposits (IMF, 2015: 5). The first foreign shareholders entered the market in 1994 following banking sector reforms. Majority of foreign controlled banks own over 46% of total assets in the sector, with most foreign owned investors entering the market through investments in new companies (RBM, 2016: 6). In recent years, other private firms including NBS, Leasing and Finance Company have expanded operations.

Around "95% of the total credit from the financial institutions is provided by the commercial banks, making their role in economic growth significantly critical" (RBM, 2017:5). In Malawi, Government Treasury Bills offer high real rates of return which consequently encourage their purchase. In addition to fiscal and monetary policies, "lack of competition in the banking sector has contributed to wide spreads between lending and borrowing rates (upwards of 20 percent) for the past five years" (IMF 2015:6). For example, minimum and maximum nominal lending rates of the two largest banks varied from 46 to 52 percent while the average nominal savings rate was 26

percent, representing a spread of 20 to 26 points in the past four years (Kalua 2016). It is in view of these dynamics that the banking sector in Malawi appears profitable with an average gross profit growth of 80 percent for the two major banks (Burritt, 2006).

Consequently, as commented by Kalua (2016: 18) "the high appetite by commercial banks to lend towards government's high deficits has continuously created disincentives towards private sector lending and for the development of the financial system in general". For example, out of 78 percent of total credit by commercial banks, only 35 percent has been extended to private sector between 2005 and 2014 (IMF 2015). The very high rates of return to Treasury Bills "discourages banks from lending to the private sector besides discouraging banks from competing with each other to attract clients with services and competitive pricing that translates into lower real rates of interest for clients" (Kalua, 2016: 19).

The major casualty of low credit levels to private sector has been agriculture. AICC (2017: 23) estimates that "the average lending towards the sector has been consistently below 12% for the past 10 years". There are at least four major reasons that possibly explain this outcome. Firstly, Commercial banks consider lending to the agricultural sector as a risky investment and prefers to lend to non-farm sectors (Malawi Government, 2017). "Product markets and input markets for agricultural growth are still functioning poorly" while with "respect to product markets, most smallholder farmers are poorly organized and lack of bargaining power over pricing of produce" (AICC, 2016:14). As a result, transaction costs remain high due to low traded volumes of agricultural produce and lack of agriculture financing (Malawi National Agricultural Policy, 2017). Secondly, consistently high levels of interest rate increase non-repayment levels of loans by both farmers and other agricultural value chain players (ECAMA, 2018). Interest rates on loans in Malawi are far higher than in the other countries in the Southern African Development Community region (IMF, 2015). Thirdly, commercial banks in Malawi "are biased towards urban areas and town centers thereby denying the service to the agricultural value chain activities which are predominantly undertaken in the rural areas by rural dwellers" (Malawi Government, 2017:32) Finally, with poorly defined land rights in Malawi, "the ability of rural farmers to offer collateral to commercial banks as a condition for accessing credit is greatly hampered" (AICC, 2016:21).

However, although Malawi's literature on Bank lending does not confirm the effect of Liquidity Reserve Requirement (LRR) on lending levels, evidence elsewhere shows its effect on general lending levels. In Malawi, the LRR set Reserve Bank of Malawi (RBM) through Monetary Policy Committee remained constant from 2009 to 2014 at 15% which was revised and reduced to 7.5% as shown by Figure 6 below.

Figure 1 : Liquidity Reserve Requirement Trend for Malawi Banks

Source: Own Depiction from RBM Data

2.2.2 Malawi's Agricultural Landscape

Although agriculture is Malawi's backbone, the irony is that "175 inhabitants occupy one square kilometre of arable land, putting Malawi as one of most densely populated countries in Africa" (IMF 2015:3). Ironic also is the fact that, despite having one short rainy season (of four to five months), farming is predominantly rain-fed. Within the agriculture sector, there are limited products, with maize dominating and grown by about 80% of smallholder farmers (AICC, 2016). The main exports are consequently agricultural raw materials. Tobacco continues to be the main export (which alone contributes over 65% of the value of exports) followed by tea and sugar, along with a range of other food crops (AICC, 2016) – despite the international anti-smoking campaign. Evidently but not surprising, "the sector suffers from myriad challenges ranging from weather conditions, small landholding size and fragmentation, low markets access and value addition besides access to finance" (Malawi Government, 2017: 4). These factors as commented by Mlinde

(2016: 32) “account for sub-optimal yield of 50% below the potential levels in all agricultural value chains”.

2.2.2.1 Evolution of Agricultural Lending in Malawi

During the colonial era, the Malawi Government provided farm credit “as part of colonial economic policy that promoted commercial production to supply the colonial administration” (Mawaya, 1994: 14). Agricultural credit under the colonial regime targeted large-scale commercial farmer’s especially political leaders. This approach of farm credit, as commented by Kalua, (2016: 5) “neglected rural small-scale farm production and influenced post-independence rural credit policies”. This was the outcome, because after independence, “the government adopted this approach although the clientele was broadened based on a master farmer approach (Kalua, 2016: 5). However, due to high rate of default, “government failed to recover the loans it gave out to, hence made a decision of granting credit to large indigenous farmers” (Chirwa, 1995: 5). In late 1970s, farm credit was extended to small-scale farmers based on group lending approach with constraint to it. For a group to access the credit, it was required to deposit 10 percent of the requirement upfront as part of the contractual agreement. This scheme was consolidated into the smallholder agricultural credit administration (SACA) in the year of 1985/86 growing season (Kalua, 2016).

The credit division with the Ministry of Agriculture was transformed into the Smallholder Agriculture Credit Administration (SACA) was a department of the Ministry of agriculture that provided seasonal agricultural loans to smallholder farmers. (AICC, 2016) The project was introduced to support the country’s efforts to promote food security and expansion and diversification of smallholder production (Malawi Government, 2017). Smallholder families were anticipated to benefit from the increased crop production resulting from improved farm technology applied with the use of credit and extension (Kalua, 2016). SACA was providing credit to smallholder farmers. In its initial years it was able to meet its operating costs from its income (Kalua, 2016). This program was unsustainable because throughout the year of its operation, it faced administrative and operation burdens which resulted in the substantial financial losses (AICC, 2016). During implementation of SACA, the repayment performance was impressive with repayment rate of 79 percent in the years between 1985 and 1990 (Kalua, 2016). This performance was disrupted by political instability in 1991 season that led to the transition to multiparty democracy and subsequent drought that destroyed crops in 1991 bringing in difficulties in loan

repayments and economic recession which led to the collapse of SACA (Malawi Government, 1990).

Another well-known program was by Malawi Rural Finance Company (MRFC), this was a creation of the Malawi Government with funding from World Bank following the collapse of SACA. Since 1994, MRFC inherited the operations of SACA, its portfolio was giving loans to the state, besides that, MRFC's target clientele was smallholder farmer's organized into joint liability credit groups of 5 to 10 members (AICC, 2016). MRFC mostly provides seasonal agricultural loans for seed, fertilizer and pesticides for the crops. It also offered short-term and medium term loans for farm equipment (Malawi Government, 1990).

Malawi Mudzi Fund (MMF) was another initiative which was introduced in the agriculture sector. This was a pilot credit and savings scheme, it was a separate World Bank funded agricultural credit project and also supported SACA (Kalua, 2016). MMF was supported by the International Fund for Agricultural Development (IFAD). The pilot scheme visualized a program to the rural poor following certain aspects of the Banglash Grameen Bank approach (Malawi Government, 1995). MMF operated as a separate legal entity from SACA and commenced its functions in June 1990, a year behind schedule due to delays in positioning its staff and lack of coordination between the Ministry of Finance and the Reserve Bank of Malawi regarding the opening of a special account (World Bank 2000). At the beginning of the pilot, MMF was offering cheap credit to its beneficiaries and the program was sustained through the funds from donors. It was later discovered that in order to eliminate the subsidy, MMF was supposed to charge normal interest rates unlike what was charged (Chirwa, 1998). According to Hulme and Mosley (1996) there is evidence of positive association between access to credit and increase in income due to Malawi Mudzi Fund. For example, the increase in income participants in the MMF credit program average percentage of the average income change of the control group was 117% (Hulme & Mosley, 1996: 21). On the other hand, the increase in participant's income were higher at 9.1% in families above the poverty line compared to a decline among families below the poverty line (Hulme & Mosley, 1996: 21).

Warehousing receipt has been another venture of agriculture financing. Malawi's first pubic warehouse receipt was issued at GSL silos in Kanengo, Lilongwe. The Agriculture Commodity Exchange for Africa (ACE) and Grain Traders and Processors Association (GTPA) implemented

the system. The Agricultural Commodity Exchange for Africa (ACE) has advocated for a Warehouse Receipt System (WRS) as an integral part of agricultural trade and financing since its incorporation in 2005 (ACE, 2011). ACE grain deposits are in turn backed by a warehouse receipt which can immediately be financed by a bank. This provides "buyers an opportunity to purchase more grain of a known quality and quantity, whilst at the same time providing the depositor the prospect of accessing funds to meet immediate needs, and at the same time, keeping ownership of the grain" (AICC, 2016: 27). A number of donors, common fund for commodities, EU, AGRA and USAID are funding diverse components of the system, ranging from software development, rural warehouse restoration, trainings, linking farmers and actual implementation. However, Malawi does not have a regulatory framework for warehouse receipts (WRs) so the system has to be built on contractual relationships between grain depositors, storage operators, financial institutions and ACE.

Over the last 10 years, development partners, NGOs and private sector players progressively recognized value chain as the key lens through which they understand farming, processing and distribution to consumption markets for a particular agricultural commodity. It is for that view, that the agricultural interventions by development partners, NGOs and private-sector players increasingly use (at least partially) the value chain approach and seek to facilitate the improved functioning of value chains (USAID 2007. In value chain approach, improving access to finance along the value chain is now recognized as essential component. However, Agricultural value chains collectively have needs and challenges that surpass the needs of particular actor, some of which can be met or alleviated in part by improving access to financial services.

Presently, the occurrence of lending for agriculture is well below the share of the sector as a percentage of GDP. Table 3 below show sector's share of GDP and Domestic private credit between 2000 and 2016.

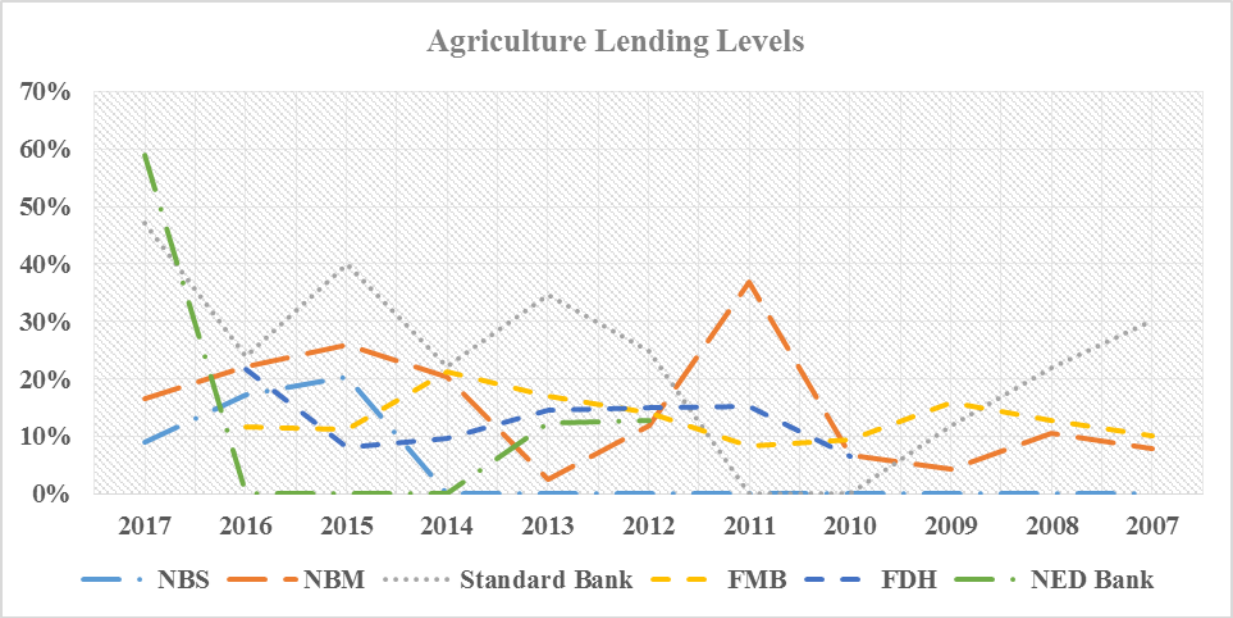
Table 3 : Sectoral Share of GDP against credit concentration (2000 -2016 Averages)

SECTOR	SHARE OF GDP (%)	SECTOR LENDING (%)
AGRICULTURE	36.0	11.0
TRADE	14.0	11.8
MANUFACTURING	8.0	9.7
TRANSPORT & COMMUNICATION	6.8	14.8
FINANCIAL SERVICES	6.4	10.2
CONSTRUCTION	4.6	4.2
REAL ESTATE	4.1	11.4
HOTEL AND FOOD	1.7	4.2
UTILITIES	1.5	19.9
MINING	0.9	10.5
OTHERS	19.1	23.9

Source: Own compilation from RBM Economic and Financial Statements

Table 1, shows that only 11% of lending goes to agriculture, even though it accounts for around 36% of GDP and being the highest contributor to the GDP. In Malawi, "the agriculture sector employs 87% of the labour force, creates 36% of GDP (54% including distribution), and 90% of exports" (AICC 2017: 5). Smallholders dominate agricultural production and their share of total production relative to estate farms is growing (Kalua, 2016). Despite agriculture's prominence in the economy, commercial bank advances in the sector has significantly fluctuated in the period under study with most banks registering a similar declining and increasing trend as shown Figure 2 below.

Figure 2 : Agriculture Lending Levels for 6 Banks in Malawi



Source: Authors Own Depiction Banks Balance Sheets and RBM

2.3 Theoretical Framework: Lending Behaviour and Mechanisms of Financial Institutions

Understanding how LRR affect lending levels would require putting into perspective how and why lending institutions discharge their roles. With regard to the "how" lending institutions discharge their duties, Finance and Banking literature generally provides four key financial processes which are relevant to the understanding this role. These are financial mobilization, intermediation, maturity transformation, risk transfer and financial deepening and repression. Mobilization in finance is mainly concerned with "moving surplus funds form savers to those who have the need for funds but do not have them" (Kalua, 2016:32). Put differently, financial mobilization ensure that surplus funds are attracted from savers and are put into productive use (through investment lending). Intermediation on the other hand happens when "an individual, institution or market sources funds and then issues a claim against itself: the claim eventually end up as liabilities on the balance sheet" (Kalua, 2016:33). The claims that the supplier of funds acquires from the user of the funds appear as asset on the intermediary's balance sheet. In this way, the intermediate serves as the link between those with loanable funds (savers) and user who do not have funds of their own (borrowers) but have investment opportunities. Maturity transformation helps "banks to borrow short term money and invest in long term duration projects: (Qi, 1998: 198). Banks by their very nature are best placed to be efficient in maturity transformation since they are able to raise

money through deposit mobilization (Jaffee & Modigliani, 1969). The fact that financial institutions have a large number of lenders or depositors reduces the risk of an expected upsurge in withdrawals (Qi, 1998). With regard to risk transfer, a bank "ensures a fair distribution of inherent risk and returns through taking one or two guarantees or through taking an equity stake in a given project" (Jaffee & Modigliani, 1969: 851). Finally, financial deepening occurs when "the rate at which financial assets are accumulated is faster than the rate at which non-financial assets are accumulated" (Qi, 1998: 200). In the case of financial repression, government controls the cost of borrowing.

All the above processes are therefore relevant to the understanding of bank lending processes. However, the intermediation role remains cardinal to the lending processes of the banks. Two theories of financial intermediation will therefore be examined in this study. With regard to why banks decide to or not to lend, bank liquidity reserve requirement and credit rationing are of cardinal importance in understanding the lending patter of banks. The theories of liquidity reserve requirement and credit rationing will therefore be examined below.

2.3.1 Modern Financial Intermediary Theory

The Modern Financial Intermediary Theory (MFIT) is built on the notion around the reasons for the existence of intermediaries. MTIF uses the foundations of modern theory of finance which has three pillars namely: optimality, arbitrate, and equilibrium (Scholtens & van Wensveen, 2003). Optimality refers to the "notion that investors aim at optimal returns while arbitrage implies that the same assets has the same price in each single period in the absence of restriction" (Scholtens & van Wensveen, 2003: 34). Equilibrium implies that markets are cleared by price adjustment – through arbitrage – at each moment in time. In the perfect market for capital or Arrow-Debreu world, as observed by Calomirisi and Kahn (1991: 42), the following criteria usually must be met:

- "No individual party on the market can influence price"
- "Conditions for borrowing/lending are equal for all parties under equal circumstances"
- "There are no discriminatory taxes"
- "Absence of scale and scope economies"
- "All financial titles are homogeneous, divisible and tradable"
- "There are no information costs, no transaction and no insolvency costs"

- All market parties have *ex ante* and *ex post* immediate and "full information on all factors and events relevant for the (future) value of the traded financial instruments".

In the Arrow-Debreu market, "savers and investors find each other because they have perfect information on each other's preferences at no cost in order to exchange savings against readily available financial instruments" (Qi, 1998: 204). In addition, the supply of capital is sufficiently "diversified so as to provide the possibility of full risk diversification, courtesy of complete information and homogeneous expectations on market parties" (Calomirisi &Kahn, 1991: 42)

Qi, (1998: 201) argues however that as "as long as the above factors do not hold and there are deviations from this perfect world, intermediation will creep in to exploit the situation". Intermediaries will creep in to bring savers and investors together and to create instruments that meet their needs. According to MTIF, "financial intermediaries are active because market imperfections prevent savers and investors form trading directly with each other in an optimal way" (Diamond & Dybvig , 1983: 45). MTIF argues that that there are three avenues or opening under which financial intermediation is made possible. These modes are in principle the core reasons for the existence of financial intermediaries. These are information problems (asymmetry), transaction costs and regulatory factors.

From an asymmetric information argument, "*ex ante* asymmetries (which lead adverse selection challenge), interim asymmetries (which cause moral hazard) and *ex post* asymmetries (which result into auditing and costly state verification and enforcement) jointly create market imperfections which results into some (transaction) costs" (Calomirisi & Kahn, 1991: 42). Financial intermediaries partly overcome these costs since they act as "coalition of depositor that provide household with insurance against idiosyncratic shocks that affect their liquidity position" (Diamond & Dybvig , 1983: 45) Besides acting as coalition of depositors, banks also act information sharing coalitions as well as "delegated monitors on behalf of ultimate savers" (Qi, 1998:200). In case of" households that do not turn to intermediated finance but prefer direct finance, there is a still a brokerage role for financial intermediaries such as investment banks" (Diamond & Dybvig, 1983: 45). Here the reputation effect is also at stake. In financing, "the reputation of the borrower and that of the financial are relevant" (Diamond & Dybvig, 1983: 45). Information asymmetry studies focus on bank-transaction based lending and lender relation. In

transaction-based lending "class information that is relatively available at the time of loan origination is used while in relationship lending, data gathered over the course of the relationship with the borrower is used' (Qi, 1998:204).

Under the transaction approach, the assumption of complete markets are not contradicted. The approach is based on the "non-convexities in transaction technologies" (Diamond & Dybvig, 1983: 45). Here the financial intermediaries act as "coalition of individual lenders or borrowers who exploit economies of scale or scope in the transaction technology" (Diamond & Dybvig, 1983: 45). The notion of transaction costs here is not restricted to monetary costs but also search costs, monitoring and auditing. Here the role of financial intermediaries is "to transform particular financial claims into other types of claims consequently offering liquidity" (Qi, 1998:200). Thus unlike in the information asymmetry approach, the reason for existence of financial intermediaries under transaction costs approach is exogenous.

The third approach focuses on financial intermediaries' existence from the angle of regulation on money production as well as savings in the financing of the economy. It is argued that regulation affects solvency and liquidity with the financial institution. The activities of intermediaries inherently "ask for regulation". This is so because "the banks by the way of their activities are inherently insolvent and illiquid" (Diamond & Dybvig , 1983: 45).

Despite the general usefulness of MTIF, there are inherent weakness that render its usefulness limited. Its inherent weakness stems from the fact that relies so much neoclassical concept of perfect competition (Qi, 1998). Three key flaws are conspicuous. Firstly, "in view of the liberalized and deregulated financial market, advancement in information technology, communication revolution as well as instant availability of important macroeconomic data and monetary data in real time on the global level, the theory would imply that financial intermediaries are becoming superfluous" (Qi, 1998: 204). However, evidence in the real world shows that their economic importance is higher than ever and appears to be increasing (Diamond & Dybvig, 1983).

Secondly, as others have observed, it is increasingly becoming evident that the "main determinant of the relative size of the country's financial system is the separation of the functions of savings and investing among different economic units" (Qi, 1998: 205). Tremendous theoretical and

empirical studies find that a well-developed financial system is beneficial to the economy as a whole (Jaffee & Modilglian, 1969). Financial intermediation affects economic growth by acting on the saving rate – a fraction that goes towards productivity and investment (Qi, 1998). Besides determining the level of investments and savings, financial intermediation increases efficiency in the allocation of financial funds in the economic system.

Finally, even in the case where there is "evident substitution of bank held assets (loans) by securitized assets held by the public" (equity and bonds for example), this cannot be seen as a sign of "disintermediation process" (Qi, 1998: 205). In practice, banks are increasingly becoming essential in the processes of securitized instruments as they initiate, arrange and underwrite the floating of these instruments (Jaffee &Modilglian 1969).

2.3.2 Amended Financial Intermediation Theory

The amended financial intermediation theory (AFIT) departs on premise that in the "real world, financial intermediaries do not consider themselves agents who mediate between savers and investors by procuring information on investors to savers and by selecting and monitoring investors on behalf of savers" (Calomirisi & Kahn, 1991: 14). AFIT argues that this is not the job of financial intermediaries. Instead, they mainly deal in money and risk. Thus it is risk and risk management that drives value creation on the part of banks. "The nature of value added by financial intermediaries through financial instruments are not created by savers and investors themselves (individually) by rather by financial intermediary intensified by the competition in the market place between existing financial institutions and new entrants which strongly stimulates innovation of new financial products in order to compensate for profit erosion on existing standard products" (Qi, 1998: 200). AFIT argues that although risk management has become a key area of intermediation activity, MTIF has offered little to explain why institutions should perform this function. AFIT argues that under MTIF, risk appears as a negatively operating factor or peripheral. It is considered to result in adverse selection, credit rationing and moral hazard "yet the absorption of risk is the function that bridges a mismatch between the supply of savings and demand for investments as savers are on average more risk averse than investors" (Qi, 1998: 201). Thus risk (maturity, counterparty, market, life expectancy and income) is the core business of financial

industry. Financial intermediaries can absorb risk on the scale required by the market because their scale so[1].

AFIT argues that even with perfect information, "the time and risk preferences of savers and investors fail to be matched completely by the price (interest rate) mechanism thus it is the financial intermediary that has to with these missing links by managing risks in order to allow for the activities of other types of households within the economy" (Qi, 1998:201). It is argued that financial intermediaries diversify risk and exploit economies of scale especially when investors want to invest in firms. In such a scenario, "research, legal and organization costs associated with such investments can be prohibitive for a single investor but an intermediary can perform these tasks for a group of investors, thereby lowering the cost per investor" (Qi, 1998: 201).

AFIT does not deny the pivotal role information plays in financial intermediation process. On the contrary, "under the strong influence of modern communication technologies and of the world wide liberalization of financial services, the character of financial intermediation process is changing rapidly" (Qi, 1998:202). This has consequently caused a decrease in traditional form of financial intermediation, (on-balance sheet banking) and fastened the pace and intensity of counterpart of financial intermediation (capital markets where savers and investors deal in marketable securities) (Calomirisi & Kahn, 1991). AFIT argues that "capital market processes would be unthinkable in the absence of financial intermediaries' bridging of difference risk preferences of market parties by means of derivatives" (Qi, 1998: 203). In summary, AFIT and MTIF have the following differences as shown by Table 4.

[1] It is important to note that although information asymmetry includes risk, risk involves more than uncertainty by a lack of complete information. Risk refers to a chance that of unpredictable emergencies for both contracting parties. In other words, not asymmetric distribution of information but no secure information at all even with perfect ad hoc information on both sides, on future events I the at the heart of financial business.

Table 4 : (Stylized) Contemporary and Amended Theory of Financial Intermediation

MTIF	AFIT
Static: Perfect market differentiation	Dynamic: market Development; market
Market imperfections development	Product innovation and market
Financial intermediary is an agent between savers and investors, monitors loans on behalf of depositors	Financial intermediary is an entrepreneurial provider of financial services
Efficient allocation of savings	Qualitative asset information; risk transformation
Transaction costs	Value creation
Asymmetric information	Customer orientation, both to real investors and savers
Adverse selection, moral hazard, credit rationing, auditing	Risk Management, risk/reward optimization
Regulation as market imperfection	Regulation for institutional and systematic risk control
Disintermediation	Dynamics of intermediation (new markets, new products, new agents)

Source: Calomirisi & Kahn, 1991: 45

2.3.3 Theory of Bank Liquidity Requirements

The theory of bank liquidity requirements (TBLR) is grounded on the "rightfulness or appropriateness of cash requirement (reserves) as compared to capital for prudential regulation" (Diamond & Dybvig, 1983: 65). It presents three justifications for cash holding as a prudential regulatory framework: i) "maintaining cash in advance saves on liquidation costs"; ii) "cash is observable and verifiable" (while measuring capita requires a valuation of the loan portfolio, measuring cash does not) and iii) "because the riskiness of cash is invariant to bankers' decisions about whether to invest resources in risk management, greater cash holdings improve incentives to manage risk in the non-cash asset portfolio of risky assets held by the bank" (Qi, 1998: 2005) TBLR presents three scenarios under which liquidity reserves are equally necessary. The first scenario is "stand-alone autarkic banking equilibrium where cash is held voluntarily by banks as a commitment device to manage risk properly" (Diamond & Dybvig, 1983: 66). Under this

scenario, increasing cash holdings response to adverse news stems from depositors' incentives to withdraw funds (Diamond & Dybvig, 1983). Thus although there is no regulation of liquidity in this scenario, voluntary choice of liquidity reserve level is important. The second scenario is where there are multiple banks. Under this scenario, there is diversified risk. The "coalition of banks will commit to lend each other funds in response to ban-specific needs to accumulate cash. In that equilibrium, cash requirement will be imposed by the group to prevent free riding on efficient interbank liquidity assistance and cash requirements will be less than cash holdings voluntarily held in the autarkic equilibrium" (Diamond & Dybvig, 1983:67). The third scenario has a government deposit insurance. In this set-up, "cash holding will be set higher than under either the autarkic or multiple bank equilibrium since in the presence of deposit insurance, higher cash requirements are necessary to prevent moral hazard and ensure proper risk management" (Diamond & Dybvig, 1983: 67). TBLR argues that beyond insurance role, "liquidity requirements encourage good risk management making the banking system more resilient from a default risk perspective" (Qi, 1998: 2005). It argues further "that not only does cash mitigate the liquidity risks attendant to exogenous shocks, it also mitigates endogenous default risk" (Qi, 1998: 2005)

Just like MFIT, the starting point for TBLR is a perfect market scenario where there are no transaction or information costs. This is called Black-Scholes-Merton framework. In this framework, "all information that can be known is known equally to all parties and all securities are equally liquid and can therefore be sold for their true value without incurring liquidation costs" (Qi, 1998:203). In that set-up, the only special feature of cash is that it has no risk. From the "standpoint of prudential regulation, greater cash holding and greater reliance on equity finance each reduce default risk of the bank" (Qi, 1998: 203). More cash assets under this set up reduces asset risk while more equity reduces default risk for any given level of asset risk. Thus cash and equity (bank capital) under this framework are two alternative ways of reducing default risk. Given that the prudential goal of controlling default risk can be achieved through different combinations of the two, there is no optimal combination of cash-to-asset ratio and equity-to-asset ratio (Qi, 1998).

However, when the Black-Scholes-Merton assumptions are relaxed, the effects of cash and equity on default risk are not the same. For example, Diamond and Dybvig (1983) found that the physical costs of liquidation make liquidity risk costly which could motivate the holding of inventories of

liquid assets. As further observed by Calomirisi and Kahn (1991) depositors also receive noisy and independent signals about risky portfolio outcome of the bank. Thus by holding reserves, banks insulate themselves against the liquidity risk of a small number of misinformed early withdrawals in states of the world where the outcome is actually good. Without those reserves, "banks offering demandable debt contract would unnecessarily subject themselves to physical liquidation costs when they fail to meet depositors' requests for early withdrawal" (Diamond & Dybvig, 1983: 68). Since equity is undesirable means of controlling risk because of the hg costs of raising equity, cash holding is regarded as desirable because it is cost effective in reducing default risk (Qi, 1998).

3.2.4 Theory of Credit Rationing

Credit Rationing (CR) broadly "refers to any situation in which lenders are unwilling to advance additional funds to a borrower even at a higher interest rate" (Mlinde, 2016: 78). Jaffee and Modilglian, 1969: 850-851) define CR as a situation "in which the demand for commercial loans exceeds the supply of these loans at the commercial loan rate quoted by the banks". By implication, changes in the interest rate cannot be used to clear excess demand for loans in the market which entails that CR is a supply-side phenomenon with the lender's supply function becoming perfectly inelastic at some point. Thus, as observed by Jaffee and Modilglian (1969: 851), credit rationing occurs in circumstances where either:

a) "Among loan applicants who appear to be identical some receive a loan and others do not and the rejected applicants would not receive a loan even if they offered to pay a higher interest rate"; or,
b) "There are different identifiable groups of individuals in the population who with a given supply of credit are unable to obtain loans at any interest rate, even though with a larger supply of credit, they would".

Practically, the above implies two situations. Firstly, the "one in which increases in the interest rate cannot clear excess demand in the loan market, whether this excess demand reflects a single borrower who would like a larger loan amount or any" (Kalua, 2016: 56). The second one as presented by Stiglitz and Weiss (1981), is where some borrowers are completely rationed out of the market, even though they would be willing to pay an interest rate higher than prevailing in the market.

The interest in CR has always emanates from the "role it plays in transmitting the macroeconomic effects of monetary policy on the economy and its role in explaining the development and underdevelopment of financial institutions in developing countries" (Munnell et al., 1996:12). Interest in CR also emanates from its ability to explain bank fragility, especially bank-runs. Seen from this perspective, CR happens in a reversed way since customers decide on the quantity of deposits (to leave or give to banks) regardless of price of the deposit (Munnell et al., 1996). Finally, interest in CR has largely increased due to increasing interest in different loan denial rates across different groups. (Munnell et al., 1996).

As observed from Scott (1957: 45), the earliest discussion on CR viewed it as a "non-equilibrium phenomenon arising either because of exogenous interest rate rigidities or because of a lack of competition in the loan market". Soon after Scott's (1957) analysis, subsequent authors made a distinction between temporary CR (where market interest rates are slow to adjust to exogenous shocks such as changes in the lenders costs of funds or borrower demand) and equilibrium CR (which persists after the market has fully adjusted to these shocks. Of the two, equilibrium CR has been hard to explain. Hodgman (1960), was the first to explain it under what he called rational equilibrium framework. Under this framework, "lenders evaluate potential borrowers on the basis of the loan's expected return-expected loss ratio" (Hodgman, 1960: 23). It further assumes that "there is maximum repayment that the borrower can credibly promise, which effectively limits how much the lender will offer the borrower regardless of interest rate" and eventually the expected losses become too great relative to the expected return" (Mlinde, 2016: 81). Miller (1962) tried to beef-up Hodgman (1960) analysis by arguing that Hodgman's analysis could be made consistent with rational expectation between the borrower and lender by incorporating bankruptcy costs that would be incurred by the lender upon the borrowers' default. Freimer and Gordon (1965) resolved Hodgman's (1960) and Miller's (1962) analyses by showing that CR can occur with a risk-neutral lender if the borrower has a fixed-sized funding need. This was done with the assumption of an exogenous interest rate. Jaffee and Modigliani (1969) completed the picture by endogenozing the equilibrium interest rate by modelling both the supply and demand sides of the market.

From the modern perspective, while Akerlof's (1970) article on adverse selection partly explained CR, it was Jaffee and Russell (1976) who provided an expected asymmetric information rationale

for CR in general sense. In their model, "lenders cannot distinguish ex-ante between high and low quality borrowers" (Jaffee & Russell (1976:19). Seen from this perspective, "low quality borrowers must accept the contract that is preferred by the high-quality borrowers, lest they be identified as deadbeats they are". (Jaffee & Russell, 1976: 43).However, although a market clearing interest rate-loan amount combination does exist, high quality borrowers prefer a contract that entails CR. In this model however, the equilibrium is not stable.

Five years later in 1981, Stiglizt and Weiss published the canonical model of CR where contract choices with a stable equilibrium were endogenized. In Stiglitz –Weiss (1981: 22) framework, CR "occurs because the lenders expected return is not monotonically increasing in the interest rate". Instead, adverse selection and moral hazard problems eventually "cause the lender's expected return to decline as the interest rate rises" (Stiglitz & Weiss, 1981:45). In the adverse selection model, "borrowers and lenders are both risk neutral. Borrowers are characterized by their projects which are assumed to have the same expected returns but differ from another in their risk" (Rothschild & Stiglitz, 1970: 45). The borrower projects differ on the basis of mean-preserving spreads (Rothschild & Stiglitz, 1970). These projects are "also assumed to require a fixed investment and borrowers have a fixed amount of internal equality that they can invest in the project" (Mlinde, 2016: 56). Thus "limited liability upon default means that the lender's payoff is a concave function of the project's return, while the borrower's profit is convex" (Rothschild & Stiglitz, 1970: 46). The reality of these assumptions is that at any given interest rate, a subset of the least risky borrowers will drop out of the market, choosing to forego their projects. By implication, "borrower's limited liability means that he reaps all the project's gain when its return is high but loses his collateral only when the projects return is low" (Rothschild & Stiglitz, 1970: 47). For low risk projects, however, the potential upside gains are small. If those "low-risk borrowers are pooled with high risk borrowers, they will face higher than warranted interest rates" (Qi, 1998: 35). Low risk borrowers "will increasingly withdraw from the market as interest rate rise since they are better off withdrawing drawing from the market and simply consume their endowments than agreeing to invest and pay a high interest rate" (Qi, 1998: 205). Thus "increase in interest rate cause more good borrowers to drop out of the market, lowering the average creditworthiness of the lender's remaining applicant pool" (Rothschild & Stiglitz, 1970: 47). This means that the "size of adverse selection premium faced by low risk borrowers becomes larger

with each interest rate rise because the interest rate must compensate for the default risk of an ever-worsening pool of borrowers" (Kalua, 2016: 49).

Increase in interest rate therefore affect lenders return in two ways. First it raises lender's return (Kalua, 2016). It also however "lowers average quality of lenders applicant pool thereby lowering lenders expected return from any given loan" (Kalua, 2016: 4). Eventually, this secondary adverse selection effect may outweigh the first interest rate effect, causing profits to decline as interest rate rises. As Kalua (2016: 4) observes further, "once the non-monotonicity of the lenders return in the interest rate is established, the possibility of CR follows". Mlinde (2016: 32) argues that "profit maximizing lenders will not voluntarily choose to raise interest rate beyond where the adverse selection effect dominate". If excess demand exists in the market at this rate, CR "will be the equilibrium. It should be noted that rationed borrowers are the high risk-borrowers who stay in the market and request funding" (Kalua, 2016: 67). Stiglitz and Weiss (1981) equally show how CR may occur when there is more hazard in the project choice.

CR however has its own limits. Firstly, from the "standing of efficient allocation of capital, an important phenomenon is not CR *per se* but rather the extent to which market fails to allocate resources efficiently since there have been moral hazard and adverse selection cases where credit is misallocated through non-funding of projects with positive net-present value or funding of negative net-present value" (Qi, 1998: 205). Secondly, the use of credit scores and loan-to-value ratios now make the lenders more knowledgeable about applicant's true credit risk, consequently limiting the possibility of CR (Kalua, 2016).

2.4 Literature Review and Analytical Framework

2.4.1 Agricultural Lending and Agricultural Development

Inadequate funding is one of the basic challenges now facing the agricultural sector in many developing countries. It is in that regard that researchers hold the view that governments in developing countries need to address the challenge of inadequate funding toward the agricultural sectors especially in rural areas by making credit available to smallholder farmers so as to reduce the decline in the agricultural sector. The basic assumption behind this call is that credit plays a vital role in the growth of the agricultural sector. The role of the credit in agricultural development is presented different by different authors. According to Adeloa and Fredrck (2016), agricultural

credit anables farmers to purchase necessary agricultural inputs needed in growing and expanding agricyltural output. Nasir, (2017) found that agricultural credit makes it possible for farmers to embark on new investments and adopt now technologies on the farm while Adeola and Fredrick argue that credit helps in enabling farmers to finance processing, storage and marketing of the farm outputs. In principle, there is an observable linkage between credit and agricultural output. Catherine and Boucher (2008) for example examined the effect of credit constrainst on Peruvian agriculture and found that credit constraints lowered the valye of agricluture production by 26% in the study region. Izhar and Tariq (2009) on the other hand found that lower nstitutional credit lowered the aggredgate agricultural output in Inida during the post-reform period of 1992 to 2005. Ahmed (2011) arraived at the same conclusion for a study he did on the effect of instistuional credit on agricultural proiductivity in Pakisatan between 1974 and 2008 period. In Nigeria, Ammani (2012) examined the relationship between agriclutural output and credit supply. Using a simple regression model, he found that formal credit is positively and significantly related to agriclutral production (Ammani 2012). A similar finding was collaborated by Imoisi et al (2012) who carried out a appraisal of credit facilities on agricltural output in Nigeria between 1970 and 2010. Focusing on the effect of commericial banks credit to the agriclutural sector in Nigeria, Obilor (2013) found that credit gurantee schemes funds and governement fund allocation to the agricultural sector had a siginificant positive effect on agriclutural output while commercial credit to the agriclutural sector had a negtaive effect on agricultural productiveity. Using a Cobb-Douglas function, Chisasa (2014) investigated the effect of bank credit on agricultural production and found that credit had a negative effect on a short run and positive effect on a long run. Salami and Arawomo (2013) examined the impact of agricultural credit in Africa by using using panel data covering 1990 to 2011 for ten countries across the five sub-regions of the continent. Their findings showed that higher savings rates yielded greater agriclutral credit in the continent which in turn positively impacted on agrcultural output (Salami and Arawomo, 2013). Toby and Peterson (2014) investgiated the role of bank lending on agriclutural output in Nigeria between 1981 and 2010 and found a significant weak corelation between bank lending and agrucltural output. Using an Error Correlation Model (ECM), Nnamocha and Charles (2015) examined the effect of bank credit and agricultural output in Nigeria between 1970 and 2013. Their findings revealed that agricultural credit has a positive effect on agricultural output in the lon run while industrial output had a postive effect in the short-run (Nnamocha & Charles, 2015).

However, while different authors converge on the positive impact of credit on agricultural development, the exact mode and extent of the impact is a subject of different contestations. While some are of the opnion that adequate bank credits to farmers are vital for the deveopment of the sector, others are of the view that there are other factors that affect agricultura sector and place less empgaisis on the role of bank lending in the development of the agriculturla sector. Another herd of researchers put extra emphaisis on the presence of other precondictions as necessary for the effect of credit on agricultural output. Stover et al (1985) for example found that the impact of agricultural credit on agricultural output in the USA was dependent on the nature of farm management, industrial market conditions, loan purpose (production or marketing), collaterial, repayment mode and pricing system of the the yield. Salami and Arawomo (2013) for on the other hand found a positive relationship between aggruclurural output and credit in a scneraio where access to land is unhampered. Khan et al (2015) using time series data for the period 1970 and 2008 found that agriclutrla credit had a posutive effect agricultural output in Pakistan only with availablity of water, inter-cropping, cropping intensification and agricultural labour force. Osa-Afana and Kelikume (2015) on the other hand found that agriculture credit had a positive effect on agricultural output when accompanied by banking sector reforms. Using a Vector Auto Regressive (VAR) approach, Adeola and Ikpesu (2016) found that agricultral lending had a positive effect on agricultural production only in the presence of increased money supply (money in circultion) in Nigeria for the period 1981-2003.

2.4.2 Liquidity Reserve Requirement and Credit Creation

Farhi et al (2009) observe that immediate historical roots of LRR can be traced to the US national banking system between 1863 and 1913. In that period, regional and city banks were subjected to different reserve requirements. At that time, the demand for withdrawals fluctuated with the quality of crops and was hard to predict (Sprague, 1910). In other words, liquidity shocks were prevalent. Consequently, the national baking system experienced several major crises. Sprague (1910) argues that crises were mainly due to insufficient amount of aggregate reserves in form of liquid assets set aside by the financial system. He argues further that this was reinforced by the practice of paying interest on the reserves deposited to the central. This partly has given rise to the present practice of interest free reserves held by the central bank.

In the contemporary global practice, LRR is generally reinforced as a form of prudential measure, monetary control and liquidity management procedure. "As a prudential measure, reserves provide some protection against both liquidity and solvency risk" (Kalua, 2016: 7). As observed by Gray (2011: 3), "this requirement stems back to the gold standard era when 'commercial banks' ability to take deposits and issue their own banknotes was constrained by a requirement to hold a proportionate reserve balance either directly or at another bank (eventually a central bank) which in turn held the gold reserves". On the other hand, as a monetary control measure, reserve requirement restricts commercial bank's balance sheet growth (since reserves cannot be easily increased). This is in line with Alper et al (2016) observation that LRR is used as policy tool to contain excessive credit growth. In addition, central banks may vary the level of (unremunerated) LRR in a way intended to influence the spread between deposit and lending rates in order to impact the growth of monetary aggregates and thus inflation (Gray, 2011). Finally, as a liquidity management tool, the central bank can (through active channel) "immobilize surplus reserves by administrative float so that the impact of a surplus on bank behaviour surplus on bank behaviour (low interest rates, demand for foreign exchange) does not in turn lead to inflation or depreciation (both of which involve a loss of value for the currency)" (Gray, 2011: 8). Similarly, if demand for reserves exceeds supply, the central bank could lower LRR in response. A "passive approach can be adopted, if LRR can be met on average over a period: short–term liquidity management by the commercial banks is facilitated, with a consequent reduction in short–term interest rate volatility" (Gray, 2011: 9).

While the LRR is important parameter for determining the liquidity creation and ultimately total credit created, the impact of bank capital on total credit creation is of equal utmost importance. The "relationship between capital and liquidity creations are of importance in the field of Banking and Finance because liquidity creation signifies the bank's overall ability to effectively serve as a financial intermediary" (Berger & Bouwman, 2009: 14). However, "the relationship between capital and liquidity creation has only been a subject of diverse results in terms of the type of causality and relationship's sign recently" (Kalua, 2016: 45). Until 2009, literature on the relationship between the two variables was scarce and only boomed following the work by Berger and Bouwman (2009). Berger and Bouwman (2009) proposed a classification of all balance sheet items as either liquid or semi liquid or illiquid. This classification is applied to all items in a bank's assets, liabilities, and equity and off-balance-sheet activities

Berger and Bouwman (2009) present two hypotheses on the link between bank capital and liquidity creation similar to the hypotheses on the link between lending and capital. These are risk absorption hypothesis and financial fragility hypotheses. The risk absorption hypothesis "predicts that increased capital enhances the ability of banks to create liquidity" (Berger & Bouwman, 2009:6).This hypothesis stems from two strands of literature concerning the role of banks as risk transformers. Liquidity creation increases the bank exposure to risk. By contrast, "more capital allows the bank to absorb greater risk" (Berger & Bouwman, 2009:6). However, the financial fragility hypothesis predicts that increased capital hampers liquidity creation (Diamnond & Rajan 2001). Hovath et al (2012) present a coherent logic of how financial fragility hypothesis. Their argument is that "financial fragility effect is an outcome of a process where a bank collects funds from depositors and lends them to borrowers" (Hovath et al., 2012:45). Once the loan is issued, the bank has to monitor the borrower and collects loan repayment. This process, as argued by Hellwig (1994: 1368), "helps the bank obtain private information on its borrowers that gives the bank an advantage in assessing their profitability". However, this information advantage creates an agency problem "whereby the bank might be tempted to extract rents from its depositors by demanding a greater share of the loan income" (Kishan et al., 2000: 123). Should depositors refuse to pay the higher costs, the bank threatens to curtail its monitoring or loan collection efforts. As depositors know that the bank might abuse their trust, "they become wary of depositing their monitor with the bank" (Hellwig, 1994: 1365). The bank is thus forced to demonstrate its commitment to depositors "by adopting a fragile financial structure with a large share of liquid deposits" (Hellwig, 1994: 1365). Thus the result of this fragile financial structure is that bank runs the risk of losing funding if it attempts to withhold depositors (Hovath et al., 2012). Eventually, the threat of bank runs mitigates the holdup problem that arises after depositors have put their funds in the bank. Resultantly, "by allowing the bank receive more deposits and finance more loans, financial fragility favours liquidity creation" (Kishan et al., 2000: 123). As greater capital reduces financial fragility, "it enhances the bargaining power of the bank and hampers the credibility of its commitment to the depositors" (Hellwig, 1994: 1365). Consequently, increased capital works to diminish liquidity creation (Hovath et al., 2012).

In general, the studies confirm that higher capital has a negative impact on liquidity creation (Horvath, etal., 2012, Berger and Bouwman, 2009, Wiliam et al., 2008). In their 2010 paper,

Berger and Bouwman found that monetary policy had an impact on aggregate liquidity creation in the US between the period 1984 and 2008 although the impact was found to be large for small banks (Berger & Bouwman, 2010). Berger et al., (2012) also found that capital injections in German universal banks had a reduced liquidity creation in a similar period. A similar result was reported by Rauch et al., (2011) who in trying to compare the influence of macroeconomic factors such as tightened monetary policy and other factors found that tightening of monetary policy reduces liquidity creation. However, they did not find the effect of bank specific factors such as size of the bank on liquidity creation. The implication of these findings is that there "is a trade-off between the benefits of financial stability induced by stronger capital requirements as championed in Basel II accords and the benefits of greater liquidity creation" (Mlinde, 2016: 81).

Diamond and Rajan (2001) found that bank capital may impede liquidity creation by making the banks' capital structure less fragile. They argue that "fragile capital structures encourage banks to commit to monitoring their borrowers and off-balance sheet counterparties, and additional equity capital makes it harder for less-fragile banks to commit to monitoring which in turn hampers their abilities to create liquidity" (Diamond & Rajan, 2001: 43). Gorton and Winton (2014) on the other hand argue that capital also reduce liquidity creation because it crowds out deposits which are an important source of liquidity creation.

An alternative view holds that higher capital improves banks' ability to absorb risk and hence their ability to create liquidity. This is so because liquidity creation makes banks less liquid, exposing them to liquidity risk, raising the likelihood and severity of losses associated with having to dispose of liquid illiquid assets or miss out on lending opportunities to meet customer's liquid demands (Allen & Santomero, 1997). Berger and Bouwman (2009) however, found that the positive relationship between capital size and liquidity creation is different between small and big banks specifically when off balance sheet activities are included in the liquidity creation measure.

2.4.3 Bank Liquidity and Lending Levels

Literature on the effect of LRR on lending levels can be divided into approaches. The first approach considers the effect of LRR from banks liquidity perspective while the second approach considers the impact from the effect on bank's capital.

In the first approach, three channels through which LRR affects lending levels are cost, interest rate risk and liquidity channels. Under cost channel, an increase in reserve requirements affects financial intermediation through an implicit tax on the banking system (Fama 1980, Prada 2008). These studies suggest that as long as central bank credit and deposits are close substitutes as alternative sources of bank funding, higher RR generally produce a fall in deposit interest rates, leaving lending rates unchanged. Consequently, the eventual impact of RR on credit and economic activity is broadly neutral (Alper et al., 2016). Di Gorgio (1999) argue that in a floating exchange rate regime with short term interest rates as the operating target, the liquidity impact of using reserve requirements can be negligible because the central bank meets the liquidity needs to maintain its interest targets. He argues further tan as short-term interest rate becomes the standard operating target for the monetary policy, RR becomes less relevant as a policy tool (Di Giogio, 1999). Alper et al (2016) confirms this perspective and argues that as bank faced with liquidity shock due to a RR hike can compensate the diminished funds without a cost by borrowing from the central bank. Put differently, an increase in RR increases the cost of deposit funding which in turn decreases deposit rate. This in turn reduces levels or volumes of deposits. Consequently, this stimulates increased central bank funding. In the end, the loan rate remains unchanged and loan levels remain unchanged too. Thus from a loanable fund, the effect is neutral as a result of the reserve requirement increase. However, as Alper et al., (2016: 2) argue, this thread of argument ignores the fact that the bank is "typically obliged to pledge sound collateral to borrow from the central bank, especially in emerging economies".

Alper et al (2016) introduce a liquidity channel which factors in imperfect substitution between deposits and central bank funding. This assumption that deposits and central bank funding are not perfect substitutes emanates from the observation central bank funding is collateralized –since the swap of deposits with central bank borrowing depletes the liquid assets of the bank. Under these premises, a policy-induced changed in the liquidity position of the banking system through a change in reserve requirements is seen to alter the bank lending behaviour. In their analysis of Turkey's banking system, Alper et al (2016) found that a hike in LRR altered balanced sheet of a bank. Since the bank cannot cut down its loan commitment immediately, additional funding is needed to be fulfilled by borrowing from the central bank which requires pledging a collateral. In the end the banking systems liquidity positions deteriorates prompting some banks to tighten their lending due to liquidity concerns (Aper et al., 2016). Orr and Mellon (1961), observe that this

outcome is relevant for emerging and developing countries where all interbank funding is collateralized and government bonds are the main source of collateral. A bank with low liquidity buffers may run into collateral constraints rather easily which is particularly undesirable during turbulent times. However, as commented by Alper et al (2016), even from a reputation cost perspective, liquidity positions matter for the bank lending behavior even during normal times. In terms of pattern and trend, Bernanke and Blinder (1992) observe that in the early stages of quantitative tightening (liquidity reserve hike), the decline in bank liquidity is associated with relatively stable bank loans. This is so because the contractual nature of bank loans makes it difficult to adjust or respond quickly. At a "consequent stage, banks are left with less liquid buffers to use against unexpected liquid shocks" (Bernanke & Blinder, 1992: 98). The marginal cost of borrowing from the central bank thus increases "as the banks take into account the additional liquidity risk which in turn leads to higher lending rates or a reduction in the pace of credit growth" (Bernanke & Blinder, 1992: 98)

The third channel is the interest rate risk channel. Through this channel, "a hike in reserve requirement increases interest rate risk which in turn stimulates a hike in deposit rate and loan rate consequently" (Alper et al., 2016: 24). In the end, loan levels go down. (Alper et al., 2016).

As earlier indicated, other literature threads analyses the role of bank liquidity in lending from the angle of the role of liquidity on the positive impact of capital on lending. According to this strand of literature, "an effect of bank capital on lending will only exhibit an upward slope depending on liquidity level" (Bernanke & Blinder, 1992: 98) Put differently, "banks with greater liquid value of assets will supply more lending following an increase in capital than banks with lesser value of liquid assets" (Kim & Sohn, 2017: 45). It is argued that "until they acquire sufficient liquid assets, banks with a lesser value of liquid assets are likely to invest more resources in liquid assets than in supplying loans when capital increases" (Bernanke & Blinder, 1992: 98). This appears to be consistent with other studies that equally observed that less liquid banks are likely to reduce loans to maintain their liquid assets holdings above some dangerously low level (Cornett et al., 2011; Berrospide, 2013).

The relationship between liquidity, capital and lending is largely explained by two strand of theories namely the "financial fragility crowding out" and "risk absorption". The financial fragility

crowding out theory predicts that “the effect of bank capital on lending is negative because unlike depositors, capital investors who cannot run on the bank are reluctant to provide loans” Bernanke & Blinder, 1992: 10). Implicitly, banks with a higher capital ratio might supply fewer loans by crowding out deposits (Kim & Sohn, 2017). Conversely, as further observed by Kim and Sohn (2017:46), “the effect of bank capital on lending is positive under the risk-absorption theory because the bank capital enhances bank risk-bearing capacity”. However, in their observation, the financial fragility “crowding out effect dominates the risk-absorption effect when banks have insufficient liquid assets and vice versa because capital investors are likely to become more reluctant to provide loans when banks possess inadequate liquid assets and when an increase in bank capital alone cannot boost banks' risk-bearing capacity sufficiently" (Kim & Sohn, 2017: 98).

Kim and Sohn (2017) however qualifies the impact of liquidity on capital size's impact on lending by introducing another variable - the size of the bank. In their study Kim and Sohn (2017: 99) finds that for “large banks the effect of an increase in bank capital ratio on credit growth, defined as growth rate of net loans on the balance sheet plus unused commitments represented on the balance sheet, is positively associated with the level of bank liquidity ratio”. This finding implies that the “effect of an increase in capital ratio on credit growth is significantly negative for low liquidity ratio and that it becomes significantly positive as large banks retain sufficient liquid assets” (Bernanke & Blinder, 1992: 99) For small and medium banks this interaction was found to be non-sufficient or negligibly negative. Dohan and Wook (2017) admits that bank capital and lending exhibit a complicated relationship as opposed to a linear one.

However, although the impact of liquidity on lending behavior is treated as significant in several literature sources, the added impact of capital on lending behavior of bans needs full cognizance. Until late 1990s, “much focus was on the effect of reserve requirement on demand deposits with no significant attention paid to the impact of bank capital on lending behaviour” (Dohan & Wook, 2017: 12). It was only in 2000 that the focus shifted to the effect of bank capital on lending channel (Ashcraft 2001, Jayratne & Morgan 2000; Kisahan and Opiela, 2000). However, earlier empirical investigations concerning the effect of bank capital on lending mostly referred to the US banking systems (Furfine, 2000; Hancock et al., 1995; Kishan & Opiela, 2000). The main finding of this strand of literature is that “bank capital increase the capacity of raise uninsured forms of debt and therefore banks' ability to limit the effect of a drop in deposits on lending” (Furfine, 2000: 234).

The capacity of banks “to substitute uninsured for insured liabilities depends on the amount of excess capital, as it is a proxy for banks' default risk” (Dohan & Wook, 2017: 12).

Some other papers have also tried to analyse different mechanisms of how bank capital affect lending behavior (Bolton & Freixas, 2001: Thakor 1996). In these papers, a regulatory capital requirement is explicitly taken into account unlike in first strand of papers. As Gombacorta and Mastrulli (2004:437) put it, "given that the regulatory requirement depends on the amount of loans granted, a link between capital and lending is established with the additional assumption that banks face an imperfect market for their equities". Van den Heuvel (2001:12) argue that this is done in what he calls a "bank capital channel" based on the “maturity mismatch between assets and liabilities which exposes banks to interest rate risk”. Consequently, “a monetary tightening lowers banks’ profits and consequently their capital accumulation” (Van den Heuvel, 2001: 124).The bank capital channel is based on three assumptions: Firstly, there is always an “imperfect market for bank equity: banks cannot easily issue new equity because of the presence of agency costs and tax disadvantages” (Calomiris & Hubbard, 1999: 12). If it is too costly to issue new shares, banks could reduce lending in order to meet regulatory capital requirements. Gombacorta and Mastrulli (2004: 231) found that “well capitalized banks can better shield their lending from monetary policy shocks as they have easier access to uninsured fund raising”. Secondly, “banks are subjected to interest rate risk because their assets typically have a longer maturity than liability” (Calomiris & Hubbard, 1999: 12). Thirdly, banks have to meet regulatory capital requirements linked to credit supply (Thakor, 1996; Bolton & Freixas, 2001). Based on these three assumptions, it is argued that after an increase in market interest rates, a smaller fraction of loans can be renegotiated compared with deposits. This means that “interest rates on bank assets are slower to adjust to changes in market interest rates than those on banks liabilities” (Thakor, 1996: 31). Consequently, “banks bear a loss due the maturity mismatch between assets and banks' liabilities that reduces profits and then capital” (Dohan & Wook, 2017: 12). If equity is “sufficiently low and it is too costly to issue new shares, banks reduce lending or else they fail to meet regulatory capital requirements” (Bolton & Freixas, 2001: 242). Van den Heuvel (2001: 12) argues that even if “capital is greater than regulatory capital requirements, low capitalized banks may optimally forgo lending opportunities now in order to lower the risk of capital inadequacy in the future”. In a study that focused on the impact of capital levels on lending behavior of Italian banks, Gombacorta and Mastrulli (2004:449) found that one percent increase in the monetary policy capital requirement leads to a decline of

around 1.2 percent for the average bank in terms of lending. In Indonesia, Poczeter (2016: 132) found that "increased bank capitalization following the Asian financial crisis increased lending by 3.6 million Indonesian Rupiah and a net increase in bank risk of 40 percent implying that increased capitalization increases risk taking by the banks".

Farhi et al (2009) observed the impact of LRR on lending levels by observing its effect on interest rate. They concluded that LRR "had both a positive and negative impact on interest rates although it largely reduced the space for arbitrage (difference between interest charged and received by banks)" (Farhi et al., 2009: 23).

2.4.4 Liquidity Reserve Requirement and Agricultural Lending Levels

Financial intermediaries, especially banks play a vital role in pooling of savings and extension of credit or lending to several sectors including agriculture. While the link between LRR and lending levels is treated as obvious in the dearth of literature, several authors have concluded that factors that affect agricultural lending in Africa go beyond bank liquidity. In Sub-Saharan region, the "occurrence of lending for agriculture is well below the share of the sector as a percentage of GDP" (Mlinde, 2016: 18). In Malawi, only less than 12 percent of lending goes to agriculture, even though it accounts for around 30 percent of GDP and being the highest contributor to the GDP. Commercial banks and microfinance institutions "consider lending to the agricultural sector as a risky investment and prefers to lend to non-farm sectors" (Mlinde, 2016: 23).

A number of hypothesis from a banking and finance point of view have been put forward as to why lending to agriculture is low in the sub-Saharan region. Betubiza and Leatham (1995: 42) for example observe that "competition for loanable funds has an effect on the cost and availability of loan funds to agricultural borrowers". In their view, borrowing costs go up as lenders attempt to transfer some of these higher costs incurred in acquiring funds to borrowers. In the processes loan "funds to agricultural borrowers may be curtailed as banks seek to match their interest rate sensitive liabilities with interest rate sensitive non-loan assets" (Betubiza & Leatham, 1995: 43). Banks might increase security requirements or decrease the term of the loan. In addition, banks might also opt to increase the supervision of the loans to increase performance. However, "considering that supervision is costly to the bank, loans may only be extended to those borrowers with a more than usual likelihood of repayment, thus excluding many agriculture borrowers" (Betubiza & Leatham, 1995: 43).

Besides the need to match interest sensitive liabilities to interests' sensitive non-loan assets, there are also other factors that explain general low lending towards agriculture by the banks. First, the "nature of competition faced by the banks in a certain vicinity will determine lending levels towards agriculture" (Zhao, et al., 2008:34). It is argued that "competition affect investment decisions and that banks will always allocate less money towards agriculture relative to others assets in areas where production credit associations or corporative are active" (Kalua, 2016: 43). Thus the number of alternative credit associations will always have an effect on lending behavior of banks towards agriculture. Besides competition, the locality of banks has also been observed to have an impact on the magnitude of lending towards agriculture. It is argued that "urban banks have more diverse clients and therefore have more flexibility in moving in and out of agriculture" (Betubiza & Leatham, 1995: 46)). This is in contrast to rural banks which are so dependent on agriculture and are more likely going to lend towards agriculture. Swings in that can be triggered by sudden changes in local farming economic conditions can affect lending levels. The level of farm profitability and mechanization has also been concluded to positively affect lending levels by banks. Adeyinka et al (2015: 35) found that "limited manpower resources for the banks to monitor and control lending in the agriculture sector is one such a cardinal challenge". Finally, land ownership if "properly defined and registered act as collateral needed to secure bank loans towards agriculture sector unlike in a scenario where land system is communal" (Zhao, et al., 2008: 71).

However, the specific association between liquidity reserve requirement and lending seem to emanate largely from interest rate effects. Benjamin (undated: 20) found that "rising market interests rates affect the liquidity of rural banks (which mostly lend towards agriculture) by limiting their flexibility in adjusting security portfolios to meet loan demand". A rural banks' lending capacity is largely governed in the long run by its ability to attract deposits (Benjamin, undated). But it can fund fast loan growth in short run by liquidating securities. However, even so, as Benjamin (undated: 20) observes "rising rates of interest complicate this procedure in since on one hand, market rates tend to rise faster than rates from farm loans, with the result that short-run profit incentives for banks shift form loans to other investments while on the other hand rising interest cause prices of fixed-rate instruments in a bank's investment portfolio to decline". Under

all this conditions, the bank is likely to lose on security transactions if it liquates an investment so it can fund loan requests.

2.5 Conclusion

In contextualizing the locus of this study in literature, an understanding of the role of banks in lending processes was deemed necessary. Theory of Financial Intermediation and its amended version were discussed to understand the reasons for existence of commercial banks. Despite its usefulness, Financial Intermediation Theory was considered weak due to its overreliance on neoclassical concept of perfect competition. The amended version of the theory focused on risk taking, management and diversification role of the banks in the intermediation process. With regard to why banks decide to or not to lend, bank liquidity reserve requirement and credit rationing theories were used. The former argued that bank hold cash requirements for prudential regulation thereby barring potential lenders while the later argues that there will always be a situation where lenders will be unwilling to advance additional funds to borrowers even at a higher interest rate.

Empirically, different authors agree that credit has a positive impact on agricultural development. However, liquidity reserve requirement is often used as a prudential measure, monetary control and liquidity management procedure. There is a negative relationship in literature between bank capital levels and liquidity creation. The direct effect of liquidity level on lending behaviour of banks however is dependent on a number of factors such as bank size and deposits growth.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter presents the research design, methods, tools and sources of data. Building on chapter 2, it specifically presents how data was documented, processed and analysed. It also provides limitations of the study.

3.2 Research Design

The study used a quantitative research paradigm since the focus was on understanding the causal relationship premised on the hypotheses. In terms of research methods used, "quantitative research paradigms advocate for quantitative methods in both data collection and analysis" (Becker & Byrman, 2004: 36). They include experimental research, survey research using structured questionnaires with closed-ended questions, and statistical analyses among others (Becker & Bryman, 2004). In contrast, "those who adopt qualitative research designs make use of qualitative research methods such as participant and non-participant observations, field interviews (formal and/or informal) using open-ended semi-structured or unstructured questions, and case studies" (Becker & Bryman, 2004: 36). Thus in this study, a quantitative design was followed for purposes of understanding the purported relationship of several variables provided in the first chapter.

3.3 Data Sources, Type and Sample Size

The research was conducted using secondary data from Reserve Bank of Malawi (Central Bank) and Commercial Banks in Malawi. Data from the balance sheets that the banks report to Reserve Bank of Malawi was used for analysis. During time of the study, Malawi had a total of nine registered commercial banks namely; CDH Investment Bank, ECO Bank, FDH Bank, First Capital Bank, National Bank of Malawi, NBS Bank, NED Bank, Standard Bank Malawi and New Finance Bank Malawi. The data was collected for six commercial banks (77% of the commercial banks) in Malawi namely National Bank of Malawi (NBM), Standard Bank of Malawi, FDH Bank, NED Bank, FMB Bank and NBS Bank where only four commercial banks are listed on Malawi Stock Exchange. The six banks were selected based on three parameters. Firstly, their combined market share is 95% while their total asset share is 96% (RBM, 2017). Secondly, they are the only banks that were operating within the opted period of between 2007 and 2017 as others became operation

few years after 2007. Thirdly, the six banks had traceable and consistent availability of data for the period in question.

3.4 Analytical Framework

To test the relationship between liquidity and lending the Malawian Banking sector, the study adopted the panel regression framework due to the cross-sectional and time series nature of the sample. Equation 1 specifies the relationship between liquidity reserve requirements (LRR) and total liquidity creation

$$TLC_{(i,t)} = \gamma_0 + \gamma_1 BC_{(i,t)} + \gamma_2 BDG_{(i,t)} + \gamma_3 LDR_{(i,t)} + \gamma_4 BS_{(i,t)} + \gamma_5 LRR \quad + \epsilon_{(i,t)}$$

Equation (1)

The regression equation to test the effect of Liquidity on Lending Levels in Malawi are presented in equations 2 and 3.

$$ALL_{(i,t)} = \alpha_0 + \alpha_1 LRR_t + \alpha_2 TLC_{(i,t)} + \alpha_3 BC_{(i,t)} + \alpha_4 BDG_{(i,t)} + \alpha_5 LDR_{(i,t)} + \alpha_6 BS_{(i,t)} + \epsilon_{i,t}$$

Equation (2)

$$TC_{(i,t)} = \alpha_0 + \alpha_1 LRR_t + \alpha_2 TLC_{(i,t)} + \alpha_3 BC_{(i,t)} + \alpha_4 BDG_{(i,t)} + \alpha_5 LDR_{(i,t)} + \alpha_6 BS_{(i,t)} + \epsilon_{(i,t)}$$

Equation (3)

Where

ALL is Agriculture Lending Levels measured as the ratio of agricultural loans and advances to the total loans and advances to all sectors (total credit), TC is Total Credit which is the ratio of total loans and advances to total assets; BS is Bank size measured by total assets, BC is Bank Capital measured by total equity minus liquidity reserve requirement, BDG is Bank Deposit Growth rate measured as the annual rate of change in total deposit levels by customer, LDR is Lending to Deposit ratio measured as level of total lending or credit as portion of total deposit; $\epsilon_{i,t}$ and $\eta_{i,t}$, are error terms α_i and γ_i are coefficients ι and t is Bank name and year respectively.

3.5 Definition and Measurement of Variables

This section discusses the measurement of the variables in the regression equation.

3.5.1 Dependent Variables:

3.5.1.1Total Credit (TC) and Agriculture Lending Levels (ALL)

Total Credit implies the sum of advances and loans granted to all the sectors in Malawi. In principle, it denotes the level of support towards the private sector and consequently the strength of the capital market. Ideally, "the sectorial lending is supposed to roughly match the level each sector's contribution towards the GDP" (Hellwig, 1994: 1364). As indicated in literature, TC is dependent on a number of factors such as GDP growth rate, population growth and bank specific features discussed in the subsequent sections. However, LRR is considered as one of the key determining factor. On the other hand, Agricultural Lending Levels (ALL) is a portion of total lending towards the agriculture sector - regardless of smallholder or large scale farming (Diamond, 1997). It includes total lending towards crop production, animal production as well as fisheries, bee-keeping and aquaculture. It does not include trading and any value addition or micro-processing since these have their own categories. Agriculture lending levels generally depend on total credit levels although the response of agriculture lending levels to changes in total credit differs with the response of others sectors due to the presence of specific factors that affect the agriculture sector only (Montoro & Moreno, 2011).

3.5.2 Independent Variables

3.5.2.1 Liquidity Reserve Requirement (LRR)

In Malawi, according to RBM Liquidity Reserve Directive of 2015, LRR is used for monetary policy and as a tool for flexibility in liquidity management (RBM, 2015). RBM's LRR ratio of 7.5% applies on daily basis with a minimum of US$ 200,000.00 on foreign currency equivalent in Malawi Kwacha. The banks maintain their requires reserves fortnights which include total deposits liabilities, government deposits, repurchase agreements, foreign currency deposits and other liabilities. Although from a theoretical and practical perspective LRR reduces bank runs, there has been a vigorous debate about the negative impact of liquidity regulation on liquidity creation due to its impact on bank lending to the non-financial economy and bank profitability. As observed by Bernejee and Mio (2014: 119), "financial industry groups have argued that liquidity regulation will substantially increase the cost of bank funding and damage the real economy as banks pass on higher costs and reduce credit supply to the real economy". Some authors have however not found any evidence that tightening of LRR has an impact on the overall size of bank balance sheets or a detrimental impact on lending to the non-financial sector either through reduced lending supply or higher interest rates on loans (Li et al., 2017, Bernejee & Mo, 2014). Others authors found that

banks subjected to the LRR adjusted the size of their balance sheets to meet tighter liquidity regulation (Bernejee & Mo, 2014) while others found that some banks alter the composition of both their assets and liabilities (Wierts & Wierts, 2016)

3.5.3.2 Total liquidity Creation (TLC)

Total Liquidity Creation (TLC) was measured in three-stage approach of Berger and Bouman (2009). In phase one, "classification of all bank balance sheet and off-balance sheet activities as liquid, semi-liquid or illiquid was made while phase two assigned weights to the activities classified in phase one" (Berger & Bouman, 2009: 13). In phase three, combination of the activities "as classified in phase one and as weighted in phase two in different ways to construct four liquidity creation measures, 'cat fat,' 'mat fat,' 'cat nonfat,' and 'mat nonfat' was made (Berger & Bouman, 2009: 13).

In the second phase of liquidity creation weights are assigned to all the items in line with financial intermediation theory. The theory stipulates that "banks create liquidity by transforming illiquid assets into liquid liabilities hence a positive weight is allocated to these balance sheets while negative weights are allocated to liquid assets, illiquid liabilities and capital on assumption that liquidity is destroyed if illiquidity liabilities are used to finance liquid assets" (Berger & Bouman, 2009: 14). Thus the equation below illustrates how the liquidity creation is calculated in the third stage.

$$
\begin{aligned}
&Liquidity\ Creation \\
&\quad = \left({}^{1}/_{2} \times Illiquid\ Assests + 0 \times Semi - Liquid\ Assets\right. \\
&\quad \left. - {}^{1}/_{2} \times Liquid\ Assets\right) \\
&\quad + \left({}^{1}/_{2} \times Liquid\ Liabilities + 0 \times Semi - Liquid\ Liabilities\right. \\
&\quad \left. - {}^{1}/_{2} \times Illiquid\ Liabilities\right) - {}^{1}/_{2} \times Capital
\end{aligned}
$$

Equation (4)

According to equation (4) above, the measure of liquidity creation was based on category classification of balance sheet items and maturity classes. This method gave liquidity measure for all six commercial individual banks included in this study.

The transmission from LRR to bank lending behaviour and levels basically considers three channels, namely cost, and interest rate risk and liquidity channels. Under cost channel, "an increase in reserve requirements affects financial intermediation through an implicit tax on the banking system" (Fama, 1980:40, Prada, 2008). These studies suggest that as "long as central bank credit and deposits are close substitutes as alternative sources of bank funding, higher RR generally produce a fall in deposit interest rates, leaving lending rates unchanged" (Prada, 2008: 81). Consequently, the eventual impact of RR on credit and economic activity is broadly neutral (Alper et al., 2016). Alper et al (2016) introduce a liquidity channel "through which a policy-induced change in the liquidity position of the banking system through a change in reserve requirements is seen to alter the bank lending behaviour" (Kishan et al., 2000: 122). The third channel is the interest rate risk channel. Through this channel, a "hike in reserve requirement increases interest rate risk which in turn stimulates a hike in deposit rate and loan rate consequently" (Kishan et al., 2000: 122) . In the end, loan levels go down (Alper et al., 2016).

3.5.4 Control Variables

Literature confirms that lending levels are significantly influenced by a variety of factors, ranging from bank capital, bank asset growth, bank deposit growth and loan to deposit ratio. It was therefore imperative that these firm specific variables should be controlled.

3.5.4.1 Bank Capital Level

A capital requirement is a standardized requirement that the Central Bank places for commercial banks "that determines how much liquid is required to be held for a certain level of assets" (Mlinde, 2016: 45). In principle, changes in bank capital materializes into a wide range of possible outcomes on lending (Gombacorta & Mistrulli, 2004). On one hand, this capital regulatory agenda by the Central Banks imposes a significant cost to commercial banks "because the excess capital is a liquid asset reserved than required, therefore incurs a cost of interest" (Kishan, et al., 2000: 130). Moreover, this regulation is widely perceived by banks as hindering their ability to support credit growth. Alternatively, a "well-capitalized bank or a bank with access to additional sources of

capital will be able to accommodate capital losses without reducing its assets - and hence it's lending" (Gombacorta & Mistrulli, 2004:58). As such, "high capital levels ensure that commercial banks have enough capital to sustain operating loses without tampering with the credit, hence illustrating a positive outcome towards the lending" (Kishan et al., 2000: 122).

3.5.4.2 Bank Size

Literature confirms that total assets of a bank reflect bank size (BS). Larger banks "tend to have more diverse lending opportunities, but also more opportunities to raise deposit funds for lending to more sectors" such agriculture (Gombacorta & Mistrulli, 2004: 15). However, increased bank size could lead to more urbanization of banks. As observed by Gombacorta and Misrulli (2004: 16), large banks may be likely to reduce the agricultural lending "because they use more centralized lending procedures without local bank personnel in the lending decision".

3.5.4.3 Bank Deposit Growth

The most vital operation of commercial banks is to mobilize deposits (cash in demand deposits) to finance their credit creation role (advances loans on credit to customers). Deposit growth (DG) rate for each commercial bank "reflects the changes in an availability of loanable funds in a bank" (Kishan et al., 2000: 122). Loanable fund is "the sum total of money that commercial banks have decided to lend out to customers as an investment" (Nam et al., 2007: 34). Since a bank can have more funds to invest when it has high deposit growth rate, this rate is likely to have a positive impact on the loan growth. Deposit growth rate "has a positive impact on lending because it increases freedom for the commercial banks to tap when planning to invest" (Stover et al, 2001: 81). The higher "growth in loans is related with the higher deposit growth rate" (Nam et al, 2007: 35). This implies that more funds are available to lend to customers.

3.5.4.4 Loan to Deposit Ratio (LDR)

Loan to Deposit Ratio (LDR) is the "tool of assessing bank's liquidity by comparing a bank's total loans to its total deposits for a specific same period" (Stover et al., 2001: 81). Similarly, it is a proxy for the liquidity of the bank and the potential funds available for loan growth. Nam et al., (2007: 34) found that "banks with high loan to deposit levels are limited in the amount of funds available for additional lending". Banks with "high and low growth in agricultural loans are not able to increase additional lending to

agriculture hence negatively affecting the lending to the agriculture sector" (Mlinde, 2016: 31)). Table 5 below summarizes how these variables were measured.

Table 5 : Definition of Variables

VARIABLE	SYMBOL	MEASUREMENT	EXPECTED SIGN	SOURCE OF DATA
Liquidity Reserve Requirement	LRR	RBM Reserve Ratios	+	Reserve Bank of Malawi Reports
Total Liquidity Creation	TLC	Liquidity Creation Approach	+/-	Commercial Bank reports
Total Credit	TC	Sum of all sectors lending to total assets ratio	+	Commercial Bank's Report
Agriculture Lending Levels	ALL	Sum of Agricultural sector lending to all sector lending ratio	+	Commercial Bank Reports
Bank Capital Level	BC	Total sum of equity minus reserve requirement to total assets	+/-	Commercial Bank Reports
Bank Deposit Growth	BDG	Rate of growth in annual deposits by customers	+/-	Commercial Bank Report
Bank Size	BS	Natural logarithm of Total Assets	+	Commercial Bank Reports
Loan to Deposit Ratio	LDR	Total loans as a portion of total deposits	+	Commercial Bank's Report

Source: Author's own summary from different literature sources

3.6 Estimation Approach

3.6.1 Random Effect (REM) and Fixed Effect Model (FEM)

As observed by Oscar (2007:40), "with panel or cross sectional time series data, the most commonly estimated models are probably fixed effects and random effects models". Population averaged models and mixed effects models are also sometime used. As observed by Wooldridge (2010:34) "several considerations affect the choice between a fixed effect model (FEM) and a random effect model (REM)". The nature of "omitted variables in the model affect the choice of either FEM or REM" (Osacr, 2007: 42). If there are "no omitted variables or if the omitted variables are uncorrelated with the explanatory variables that are in the model, then REM is probably the best" (Williams, 2018). It will produce "unbiased estimates of the coefficients, use all the data available, and produce the smallest standard errors" (Oscar, 2007: 45). If there are omitted variables, and "these variables are correlated with the variables in the model, then FEM

provides a means for controlling for omitted variable bias" (Clark et al., 2010: 12). In a FEM, subjects serve as their own controls. The assumption is "that whatever effects the omitted variables have on the subject at one time, they will also have the same effect at a later time; hence their effects will be constant, or 'fixed' (Oscar, 2007: 47).

As commented by Nwakay and Ijoma (2007:62) "if subjects change little, or not at all, across time, FEM may not work very well or even at all". There needs to be "within-subject variability in the variables if subjects are to be used as their own controls" (Oscar, 2007: 50). If there is little variability within subjects, then the standard errors from FEM may be too large to tolerate. Conversely, REM will often have smaller standard errors. However, "the trade-off is that their coefficients are more likely to be biased" (Clark et al., 2010: 43).

In FEM, the unobserved variables are allowed to "have any associations whatsoever with the observed variables" (Cameron & Pravin, 2005). FEM control for the effects of time-invariant variables with time-invariant effects. Oscar (2007: 35) confirms that "this is true whether the variable is explicitly measured or not". Exactly how they do so vary by the statistical technique being used. In REM, "the unobserved variables are assumed to be uncorrelated with (or, more strongly, statistically independent of) all the observed variables" (Williams, 2018:4). REM can be estimated via Generalized Least Squares (GLS). To decide between fixed or random affects Hausman test is run "where the null hypothesis is that the preferred model is random effects versus the alternative, the fixed effects" (Oscar, 2007: 59). It basically tests "whether the unique errors are correlated with the regressors - the null hypothesis is they are not" (Williams, 2018: 54).

3.7 Limitations of the Study

The key limitation of the study is the time frame under which the sampled banks' lending behaviour was used for analysis. There are only six banks that have been consistently operating or present. This leaves out three more banks that started operating midway through the opted period. Furthermore, amongst the six banks sampled, three are dominant in terms of asset size as compared to the other three. Furthermore, literature confirms the effect of other co-founding factors such as human capital, GDP growth rate, inflation and openness of economy on agriculture lending levels

among other factors. Consequently, the generalization of this study on the effect of liquidity on agricultural lending levels should be cautious of these other factors.

3.8 Conclusion

This chapter presented and justified the methodology that was used in data collection and analysis. The study used quantitative design in understanding the purported relationship of several variables provided in the first chapter. Data was collected on six commercial banks largely due to the continued presence in the data period. The study used panel regression analytical framework due to the cross-sectional and time series nature of the sample. There were six control variables namely bank capital, bank assets growth, bank deposit growth and loan to deposit ratio. The estimation approach combined the fixed effects and random effects models.

CHAPTER FOUR: DISCUSSION OF RESULTS

4.1 Introduction

The section on empirical analysis is divided into four sections. The first section presents a summary of descriptive statistics. Thereafter, in line with the objectives of the study, results of an estimation of the liquidity creation will be presented to be followed by Hausman Test with the aim of selecting the appropriate panel data model for the study. The final section presents a summary of results according to the objectives.

4.2 Descriptive Statistics

Descriptive statistics for the selected variables are presented in Table 6. The mean value of 0.182 for agriculture lending levels (ALL) indicates that approximately 18.2% lending was advanced to the agricultural sector. The total credit (TC) advanced to all sectors averaged 41% of total banks' assets over the study period. The maximum TC over the period has been 77.3% (of total banks assets) while the minimum was 7.2%. Loans as portion of total deposit had mean of 0.529, representing about 53% of the total deposits.

Table 6 : Descriptive Statistics

	TC	ALL	TLC	LRR	BS	BDG	BC	LDR
Mean	0.411	0.182	0.012	0.134	4.836	0.844	0.149	0.529
Minimum	0.072	0.025	-0.286	0.075	4.016	0.456	0.033	0.099
Maximum	0.773	0.589	0.359	0.178	5.641	2.208	0.285	1.067
Skewness (Pearson)	-0.275	1.161	0.210	-0.791	0.107	2.687	0.228	-0.293
Kurtosis (Pearson)	-0.112	1.647	-0.838	-1.219	-0.661	6.694	-0.004	-0.415
Shapiro-Wilk	0.315	**0.000**	0.326	**< 0.0001**	0.399	**< 0.0001**	0.905	0.051
Anderson-Darling	0.119	**0.003**	0.235	**< 0.0001**	0.707	**< 0.0001**	0.760	**0.017**
Jarque-Bera	0.688	**< 0.0001**	0.352	**0.009**	0.563	**< 0.0001**	0.782	0.542

Note: TC=Total Credit; ALL= Agriculture Lending Levels; LRR=Liquidity Reserve Requirement; TLC=Total Liquidity Creation; BS=Bank Size; BC=Bank Capital Level; BDG=Bank Deposit Growth; LDR= Loan to Deposit Ratio. Values in bold are different from 0 with a significance level alpha=0.05. Source: Authors Own Computation

Liquidity reserve requirement (LRR) for the period under review as directed by monetary policy committee (MPC), had an average mean value of 0.134 with 0.075, 0.178 as minimum and maximum respectively. On average, total liquidity created in the industry accounted for 1.2% of total industry assets. The mean of BDG, LDR and BC were 0.844, 0.529, 0.411 and 0.149 respectively. For all variables expect BS (which was a natural log of total assets), BDG had highest mean value while TLC had the lowest value.

4.3 Correlation Coefficient

In determining whether or not linear relationship exists between the variables employed in this study, Pearson correlation coefficient test was considered. The test also measured possibility of multicollinearity within the variables. The presence of multicollinearity affects coefficients test of the multiple regression. As shown by Table 7 below, there was generally a strong relationship amongst all the variables except for TLC and LDR. The results show that BS had a strong correlation with BC, BGD, TC, ALL and LRR with weak relationship with TLC and LDR. Out of the variables that BS had a strong correlation with, its relationship with BDG and LRR was negative. BS and LRR had a negative relationship although it was a strong relationship. TCL on the hand had a weak relationship with all the variables although there was a weaker positive relationship with, BS, ALL and LRR. BC had strong linear relationship with all variables except for TLC and LDR. Equally TC had a strong relationship with all variables except TLC and LDR. ALL had a strong positive relationship with BS, BC and TC. It had a negative strong relationship with LRR partly confirming literature on the negative relationship between ALL and LRR. The relationship between ALL and TLC was observantly weak although positive (implying some small contribution of TLC towards ALL). Similarly, ALL's relationship with BDG and LDR was weak and negative). LDR only showed a strong negative relationship with BDG. LRR was strongly correlated with BS, BC, TC and ALL although negatively.

Table 7 : Pearson Correlation Coefficient Test Results Table

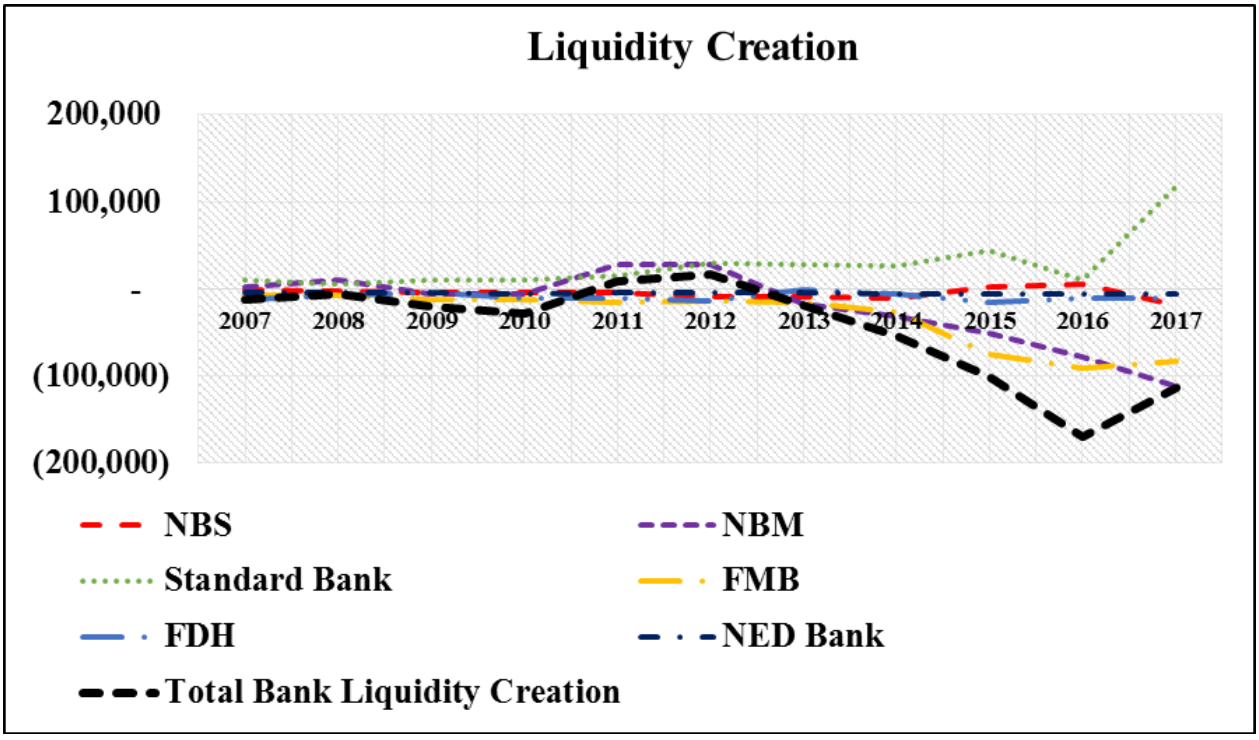
	BS	**TLC**	**BC**	**BDG**	**TC**	**ALL**	**LDR**	**LRR**
BS	**1**	0.094	**0.951**	**-0.291**	**0.842**	**0.338**	-0.142	**-0.648**
TLC	0.094	**1**	-0.030	-0.066	-0.238	0.207	-0.191	0.063
BC	**0.951**	-0.030	**1**	**-0.273**	**0.873**	**0.368**	-0.087	**-0.548**
BDG	**-0.291**	-0.066	**-0.273**	**1**	**-0.282**	-0.190	**-0.508**	0.128
TC	**0.842**	-0.238	**0.873**	**-0.282**	**1**	**0.313**	0.187	**-0.584**
ALL	**0.338**	0.207	**0.368**	-0.190	**0.313**	**1**	-0.113	**-0.308**
LDR	-0.142	-0.191	-0.087	**-0.508**	0.187	-0.113	**1**	0.246
LRR	**-0.648**	0.063	**-0.548**	0.128	**-0.584**	**-0.308**	0.246	**1**

Note: LRR=Liquidity Reserve Requirement; TLC=Total Liquidity Creation; TC=Total Credit; ALL= Agriculture Lending Levels; BC=Bank Capital Level; BS=Bank Size; BDG=Bank Deposit Growth; LDR= Loan to Deposit Ratio. Values in bold are different from 0 with a significance level alpha=0.05. Source: Author's Own Computation

4.4 Total Liquidity Creation

According to banking theory, banks exist because they create liquidity and transform risk. Interestingly, just as elsewhere banks create only about half of their liquidity on the balance sheet, highlighting the importance of off-balance sheet liquidity creation as considered in this study. Standard Bank registered positive LC for the period under consideration as compared to other banks. NBS on the other hand registered negative LC for the entire period except for the years 2015 and 2016 as shown by Figure 3 below. In general, Table 6 confirms that, calculated as a portion of total banking industry assets, there was positive TLC (mean of 0.012 or 1.2% of total assets) while TLC in absolute figures under Figure 3 was below zero except for 2011, 2012 and 2013.

Figure 3 : Trend of Liquidity Creation by Banks



Source: Authors Own Depiction Banks Balance Sheets and RBM

4.5 Hausman Test Results Summary

Hausman test was used for choosing between models in panel data for this study. As Oscar (2007: 98) puts it, "Hausman test examines the presence of indigeneity in the panel model". It is one of the tests used to determine an appropriate model choice (Williams, 2018). The test specifies

whether fixed or random effects panel model should be used. Null (H_0) and alternative hypotheses (H_1) were defined. The null hypothesis was that appropriate model is random effects (RE). This means "there is no correlation between the error term and the independent variables in the panel data mode" (Clark et al., 2010: 61). The alternative hypothesis was that appropriate model is fixed effects (FE). This means that "there is correlation between error term and the independent variables in the panel data model" (Williams, 2018: 65).

In panel model used in this study individual effects terms can be modelled as either random or fixed effect. If the individual effects are "correlated with the other explanatory variables in the model, random effect model is inconsistent while fixed effect model is consistent" (Oscar, 2007: 67). Similarly, if the "individual effects are not correlated with other explanatory variables in the model, both models are consistent and random effects is efficient" (Cameron & Pravin, 2005: 43). Both random and fixed effects estimates are "close when both are consistent and not close or distance when random effect is inconsistent" (Williams, 2018: 65). The Hausman test is based on this distance (Oscar, 2007). If the distance is large, the H_0 "that individual effect are uncorrected with other regressors (random effects preferred) is rejected" (Williams, 2018: 34). Conversely, "if the distance is small, H_0 is not rejected and random effect is preferred as it is more efficient" (Clark et al., 2010: 45). As shown by Table 8 below, H_0 was rejected for Equation 1 (Model 1 BC) and Equation 3 (Model 2 BS) as P-Values were 0.0004 and 0.0323 respectively which are less than 0.005 with large test statistics of 20.61 and 12.19 respectively. This implies that fixed effect model was preferred over random effect model in this analysis for Equation 1 (Model 1 BC) and Equation 3 (Model 2 BS). For Equation 1 (Model 2 BS), Equation 2 (Model 1 BC), Equation 2 (Model 2 BS) and Equation 3 (Model 1 BC), the H_0 was not rejected as P-values were greater than 0.005 with smaller test statistic. This implies that the random effect model was preferred over fixed effect model on Equation 1 (Model 2 BS), Equation 2 (Model 1 BC), Equation 2 (Model 2 BS) and Equation 3 (Model 1 BC).

Table 8 : Summary of Hausman Test Results for Selected Model

Equations	Models	Null Hypothesis	χ^2	Prob>χ^2	Decision
Equation 1	Model 1 (BC)	Reject	20.61	0.0004***	Fixed Effect Model
	Model 2 (BS)	Do not reject	9.45	0.0509	Random Effect Model
Equation 2	Model 1 (BC)	Do not reject	4.90	0.4288	Random Effect Model
	Model 2 (BS)	Do not reject	4.15	0.5280	Random Effect Model
Equation 3	Model 1 (BC)	Do not reject	10.53	0.0615	Random Effect Model
	Model 2 (BS)	Reject	12.19	0.0323***	Fixed Effect Model

Source: Own Summary from Computation

4.6 Impact of Liquidity Reserve Requirement on Total Liquidity Creation

As shown in the Table 7 above, BC and BS are perfectly linearly correlated with 0.951. In order to mitigate influence of collinearity between these two variables BC and BS were fitted separately within the same model as demonstrated above. In order to understand the effect of LRR on TLC, The Equation 1 (FEM BC and REM BS) were fitted. FEM BC Model was significant at 1% and explains 28.17% variations in TLC. Explicitly, when Reserve Bank of Malawi through Monetary Policy Committee directs to raise LRR, TLC is affected.

As shown by Table 9, a positive relationship was observed between LRR and TCL (0.701) which indicates that an increase in LRR stimulated an increase in TLC. Specifically, a one-unit increase in LRR stimulated 0.70149 increase in TLC with p-value 0.08 and standard error of 0.392 which was significant at 10%. This is inconsistent with Alper et al (2016) who found that an increase in LRR reduces TLC. Part of the reason for this occurrence could be that banks adjusted the size of their balance sheets to meet tighter regulation while others may have just altered the composition of both assets and liabilities as theoretically commented by Bernejee and Mo (2014) and Wierts & Wierts, 2016. All coefficients of the model were insignificant except for bank capital (BC) which was observed to be significant and negative at 1% significant. This indicates that increases in bank capital reduces liquidity creation in the Malawian banking industry and support the 'financial-fragility crowding hypothesis' (Berger & Bouman, 2009). The theory argues that bank capital reduces the crises and eliminates the need to create liquidity.

For REM (BS), the model was observed to be insignificant at 1% and only explained 7.9% variations in TLC. However, just as in with FEM (BC) one unit increase in LRR stimulated 0.779

increase in TLC with P-value of 0.231 and standard error of 0.643. All variables were insignificant at 1% and 5% expect for BDG at 10%. This implies that holding all factors constant, LRR affectd TLC positively with an attendant positive BDG. In summary, holding all factors constant, LRR positively stimulated an increase in TLC with BC and BDG important attendant variables although they pulled in different directions.

Table 9 : Fixed Effect and Random Effect Models: Equation 1

Dependent Variable: Total Liquidity Creation (TLC) ratio						
	Model 1 (FEM)			Model 2 (REM)		
Variables	**Coefficient**	**Std. Err.**	**Prob>t**	**Coefficient**	**Std. Err.**	**Prob>z**
LRR	0.70149	0.39236	0.08*	.7708765	.64334	0.231
BC	-1.409495	.3810599	0.001***			
BS				-.01743	.07028	0.804
BDG	-0.0625	0.06567	0.346	-.13403	.07299	0.066*
LDR	0.0226	0.09305	0.809	-.13636	.10496	0.194
Constant	0.16917	0.08903	0.064*	0.32219	0.50505	0.527
F(4,47)	4.6			5.19		
Prob>F	0.0032			0.2685		
R-squared	0.2817			0.0793		
Banks	6			6		
Observation	57			57		

*Note: LRR=Liquidity Reserve Requirement; BS=Bank Size; BC=Bank Capital Level; BDG=Bank Deposit Growth; LDR= Loan to Deposit Ratio. *** denotes significance at 1% * denotes significance at 10%. Author's Own Computation*

4.7 Impact of Liquidity on Agriculture Lending Levels

In order to understand effect of liquidity (TLC and LRR) on ALL, two models were fitted using random effect model according to Hausman test conducted above on Equation 2. In Model 1 (REM- BC), the model was significant at 1% and explains 21.9% variation in ALL. As shown by Table 10, the coefficient of liquidity creation (TLC) was positive and significantly related to agriculture lending (ALL) at 1%. This indicates that one unit increase in TLC increases ALL by 0.3052 with a standard error of 0.111. This suggest liquidity creation enhances agriculture lending by banks in Malawi. The same observation was made in Model 2 (REM-BS), where a unit increase in TLC positively affected ALL by 0.2989 with a standard error of 0.111. However, when all factors are held constant, the coefficient of the liquidity reserve requirement (LRR) was observed

to be negative and significant at 1% in Model 1 (REM-BC). This indicates that increasing liquidity reserve requirements reduces lending to the agriculture sector in Malawi which is consistent with interest rate risk and liquidity channels argument of Alper et al (2016). This could partly be attributed to the fact that banks reduce lending agriculture which is considered risk due to its dependency on climate or due to other agricultural landscape's specific features for Malawi. The result is congruent to observations by Betubiza and Leatham (1995) where LRR was seen to negatively affect ALL.

Table 10 : Results of Random Effect Model: Equation 2

Dependent Variable: Agriculture Lending Levels (ALL)						
	Model 1 (REM)			Model 2 (REM)		
Variables	**Coefficient**	**Std. Err.**	**Prob>z**	**Coefficient**	**Std. Err.**	**Prob>z**
LRR	-1.27048	0.45156	0.005***	-0.77981	0.53836	0.147
TLC	0.305242	0.11106	0.006***	0.298949	0.11164	0.007***
BC	0.429941	0.3087	0.164			
BS				0.065776	0.05313	0.216
BDG	-0.02042	0.06123	0.739	0.003971	0.06837	0.954
LDR	0.014334	0.09507	0.88	0.017238	0.0958	0.857
Constant	0.25821	0.09706	0.008***	-0.0834	0.34111	0.807
Wald (6) χ^2	19.4			18.85		
Prob> χ^2	0.0016			0.002		
R-squared	0.2199			0.195		
Banks	6			6		
Observations	57			57		

*Note: LRR=Liquidity Reserve Requirement; TLC=Total Liquidity Creation; BS=Bank Size; BC=Bank Capital Level; BDG=Bank Deposit Growth; LDR= Loan to Deposit Ratio; * and *** denotes significance at 10% and 1% respectively.*

Source: Author's Own Computation

4.8 Total Credit Determinants

In order to further understand determinants of TC, random effect and fixed effect models were fitted based on Hausman test results shown in Table 8 before using Equation 3. REM (BC) and FEM (BS) were fitted. As shown by Table 11, REM (BC) model was significant at 1% and explains 81.4% variations in TC. The positive determinants of TC were LRR, BDG and LDR with unit increase in LRR, BDG, and LDR affecting a positive increase in TC by 0.0202, 0.21779, and 0.70164 with the standard errors of 0.23758, 0.03222 and 0.05002 respectively. However, only BDG and LDR were significant at 1%. It can however be observed that TLC and BC negatively

affected TC but were insignificant. Thus interestingly, it can be implied that an increase in TLC does not automatically translate into an increase in TC.

In Model 2 (REM-BS) model was significant at 1% and explains 82.99% variations in TC. Similar to Model 1, only bank deposit growth (BDG) and loan to deposit ratio (LDR) were observed to have significant positive effect of total credit (TC). This indicates that increases in deposit mobilization and intermediation enhance the credit creation ability and consistent with Stover et al (2001).

Table 11 : Results of Random and Fixed Effect Models: Equation 3

Dependent variables: Total Credit (TC)						
	Model 1 (REM)			Model 2 (FEM)		
Variables	**Coefficient**	**Std. Err.**	**Prob >z**	**Coefficient**	**Std. Err.**	**Prob >t**
LRR	0.0202	0.23758	0.932	-.35905	.37049	0.338
TLC	-0.0749	0.05843	0.200	-.04569	.07247	0.532
BC	-0.2167	0.16241	0.182			
BS				-.03674	.04242	0.391
BDG	0.21779	0.03222	0.0001***	.27313	.03721	0.000***
LDR	0.70164	0.05002	0.0001***	.69332	.05214	0.000***
Constant	-0.11368	0.05107	0.026	.03968	.25202	0.876
Wald (6) χ^2	300.8			288.83		
Prob> χ^2	0.0001			0.0001		
R-squared	0.814			0.8299		
Banks	6			6		
Observations	57			57		

*Note: LRR=Liquidity Reserve Requirement; TLC=Total Liquidity Creation; BC=Bank Capital Level; BDG=Bank Deposit Growth; LDR= Loan to Deposit Ratio BS=Bank Size: *** denotes significance at 1%. Source: Author's Own Computation*

4.9 Conclusion

In general, using Pearson correction test, BS and BC had perfect linear relationship. On the other hand LRR and ALL had a significant negative relationship with each other. With regard to liquidity formation, only Standard Bank registered positive or increased liquidity creation in absolute figures for the entire period. However, as a ratio of total banks assets industry, there was a positive liquidity creation of an average of 1.2% (of total banking sector assets) for the period under review. With regard to impact of liquidity reserve requirement on total liquidity creation, a positive interaction effect was observed. The findings further show that total liquidity levels had positive

effect on agriculture lending levels. However, in a scenario where LRR went up, Agriculture ALL went down implying that banks shifted to other sectors considered less risky even though liquidity went up. In general, Total Credit was determined by Bank Deposit Growth and Loan Deposit Ration while Liquidity Reserve Requirement, Total Liquidity Creation and Bank Creation affected Total Credit negatively. This could imply that an increase in Total Liquidity Creation did not automatically result into an increase of Total Credit. Liquidity Reserve Requirement affected Total Credit negatively just as it affects Agriculture Lending Levels negatively. A caution however should be observed on the role of Standard Bank and National Bank of Malawi which as seen in the Figure 4 had higher influence.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

Following the regressions' outcomes and analysis of results outlined in the preceding chapter, this Chapter seeks to present a summary of study findings in line with the study's objectives. It draws implications and tentative generalisations on the impact of liquidity on agriculture lending in Malawi. General recommendations along the major finds they relate to Development Finance in general and agricultural lending in particular are also provided.

5.2 Summary of Findings

The study estimated the Total Liquidity Creation among a sample of banks in Malawi from 2007 to 2017. In addition, it also examined the impact of Liquidity Reserve Requirement (LRR) on Total Liquidity Creation (TLC) and impact of liquidity on Agricultural Lending Levels (ALL) and Total Credit (TC). Key conclusions were drawn from the empirical analysis. On the overall, in absolute figures, the liquidity levels declined in the period under consideration except for some three years. However, when liquidity was interpreted as a portion of total banking sector assets, there was a 1.2% liquidity created for the period under review. With regard to the impact of LRR on TLC, the results show that LRR positively affected TLC. The other important variable however was BDG which also affected TLC positively. BC on the other hand had a negative effect on TLC. Furthermore, total liquidity positively affected ALL. There was however some negative effect of LRR on ALL. Thus although LRR affect TLC positively, it did not stimulate ALL, suggesting the likelihood that banks shifted to less risky sectors (in terms of lending) even though on the overall liquidity went up due to a rise in LRR. Finally, TC was positively determined by BDG and LDR while LRR, TLC and BC negatively affected TC. This could imply that an increase in TLC does not automatically result into an increase in Total Credit.

5.3 Policy Recommendations

Drawing on literature and the study's empirical findings, a number of policy implications can be reflected upon specifically around the role of LRR on liquidity creation, the role of Monetary Policy Committee (MPC) in Malawi and the need for alternative financing mechanisms towards

the agriculture sector.

With regard to the role of LRR, although this study did not examine the role of financial institutions in economic growth for Malawi, their indirect role through liquidity creation needs to be well appreciated and stimulated by the wider macroeconomic actors especially the Reserve Bank of Malawi. It is well known that the development of the banking sector promote economic growth through different variables, liquidity creation being one of them. For the Central Bank to stimulate liquidity creation, two immediate factors can be considered. Firstly, the level of liquidity growth was positively related to Liquidity Reserve Requirement. This means that an increase in LRR induced liquidity growth. However, Bank Capital has a negative effect on TLC which could mitigate the positive effect of LRR. Since this means that larger banks creates less liquidity than small banks as equally observed by Gombacorta and Mistrulli (2004), the Basel II and III stringent bank capital requirement cannot be ignored. In this regard, the Reserve Bank of Malawi should be careful against setting LRR and Bank Capital requirement levels beyond some levels. These two should be carefully reflected upon in any attempt to stimulate liquidity creation.

Secondly, although the absolute number of commercial banks is not that low (nine in total), there is high dominance by three banks. Deliberate measures to attract additional participants in the banking sector for increased liquidity creation would be one of the practical strategies.

Besides LRR's role on liquidity creation, the study also found that an increase in liquidity levels positively affected an increase ALL. The caution here is on concentration levels, specifically with regard to the sectors within the agricultural (smallholder or large-scale farmers) which experience a higher stimulation by the increase in liquidity level. However, general reflections on Malawi can be made. Given the fact bank credit extended to private sector has a long term effect on economic growth, any increase in liquidity level is of ultimate importance for Malawi which has registered an average growth rate of four percent in the past 10 years. However, since liquidity levels are used as a form of prudential measure, monetary control and liquidity management procedure, the role of (MPC) in Malawi comes into play.

While the TLC is an important parameter for determining ALL, the impact of factors that affect TLC as discussed above namely BC and LRR should be of priority importance by the MPC.

Considering that studies confirm that higher capital has a negative impact on liquidity creation (Horvath, et.al, 2012, Berger and Bouwman, 2009, Wiliam et al., 2008), the MPC needs to carefully examine the right LRR and Bank capital target so that TLC impact on ALL is not offset by BC.

However, since the stimulation of ALL in Malawi and elsewhere is done alongside careful consideration of controlling inflation, the Bank Rate or Policy Rate on other hand, has been a critical aspect of the monetary policy in the recent years. The Bank Rate is the rate of interest at which Reserve Bank of Malawi advances loans to the commercial banks in the country. In case of inflation, the Central Bank increases the bank rate to which commercial banks have to increase the interest rate. As Kalua (2016: 45) puts it, "due to increase in interest rate, demand for the loans to commercial bank reduces and the money supply in the country shrinks". In this way, inflation is controlled.

Alternatively, "bank rate is reduced in case of depression which results in the reduction of interest rate and the money supply in the country is increased" (Kalua, 2016: 76). Managing the bank rate has been a method by which the Central Bank affected economic activity significantly. The dramatic fall of bank rate from 24% to 16% in 2017 was expected to make substantial impact on the economic growth rate of Malawi. This is so because "lower bank rates help to expand an economy by lowering the cost of funds for borrowers" (Mlinde, 2016: 67). In a nutshell, the ability of TLC to stimulate ALL expansion needs to be considered alongside the role of Monetary Policy Committee in the control of inflation (through Bank Rate) and liquidity creation (through bank capital size requirements).

As seen in the preceding chapter, while LRR positively affected LCL which in turn positively affected ALL, LRR on its own negatively affected ALL. Put differently, increased LRR in this study has proven to be one of the factors that inhibits bank lending levels to the agriculture sector. In Malawi, agricultural loans are regarded as "non-performing loans because they are characterized by inefficiencies which have resulted in low return and poor financial performance" (Mlinde, 2016: 23).

However, high non-performing loans on the balance sheet of Malawi's banks could explain the weak credit delivery that exists in most African countries for fear of banks' credit risking due to high LRR met by the banks. The issue of non-performing loans over agriculture lending levels could "also largely be due to the limited capacity of banks in Malawi to monitor and efficiently assess the risk of their loan clients" (AICC, 2016: 45). Thus it is important that LRR as a stimulus to agriculture lending levels is administered and considered alongside other factors. Some of the other factors have been listed under literature review. However, those of practical relevance for Malawi include the nature of farm management, industrial market conditions, loan purpose (production or marketing), collateral, repayment mode and pricing system of the agricultural yield. Other factors include land tenure system or property rights system as well as availablity of water, inter-cropping, cropping intensification, availability of skilled agricultural labour force and general positive reforms in the banking sector.

Finally, the study observed that BDG and LDR positively determined TC. Interestingly TC was negatively affected by TLC implying that an increase in TLC does not automatically translate into TC. As earlier discussed, TC does not also automatically translate into ALL. This means that ALL should not be left to the whims of TLC and TC alone as stimulants. Banks have their own lending preferences depending on perceived risks associated with different sectors. In this regard, exploration and trial of alternative agricultural financing section by the government and other stakeholders is of cardinal importance as long as the options supplement and not replace or distort the normal lending dynamics to the agriculture sector. The need for pursuance of alternative financing options to the agriculture sector can be advocated for on the premises that the financing levels are still low despite the observable increase over the years.

Furthermore, the impediments that stand in the way of bank lending to sector such as property rights, land ownership, farmer group strengths and low agro-industrialization levels are still there. In the presence of these impediments, funding towards the sector needs to be supplemented by other financing options such as Warehouse Receipt System (WRS), contract farming and out-grower schemes need to be scaled-up.

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