

**LENDING RATES AND DEMAND FOR CREDIT BY BORROWERS FROM
THE AGRICULTURAL AND MANUFACTURING SECTORS IN ZAMBIA**

By

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A Dissertation Submitted to the University of Zambia in Partial Fulfilment of the
Requirement of the Degree of Master of Arts in Economics

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ABSTRACT

Credit markets play an important role in facilitating economic growth and development of countries. Zambia's Seventh National Development Plan (7NDP) for 2017-2021 identified the agriculture and manufacturing sectors as essential to facilitate the attainment of Zambia's development agenda by 2030. The overall objective of this study was to examine the impact of lending rates on loan demand from different key economic sectors in Zambia, with a focus on the manufacturing and agriculture sectors. The study utilised quarterly time series data from the Bank of Zambia (BOZ) for 2012 to 2021. Using the Autoregressive Distributed Lag (ARDL) model, the study found a negative and significant relationship between credit demanded by the agricultural sector. Furthermore, the study found no significant relationship between lending rates and the credit demand by the manufacturing sector. Based on the findings, the study recommends policy reforms that would increase domestic credit to the private sector which would stir up investment in the manufacturing sector, which remains low, as well as promote more investment in the agriculture sector. The study further recommends that BOZ ensures stability of the lending rate in the financial sector which would make investment in these two key sectors predictable.

Keywords: *Agriculture sector, Manufacturing sector, Autoregressive distributed lag, lending rates, Credit demand.*

DEDICATION

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ABBREVIATIONS AND ACRONYMS

7NDP	Seventh National Development Plan
BOZ	Bank of Zambia
CMMP	Credit Market Monitoring Reports
FSDZ	Financial Sector Deepening Zambia
GDP	Gross Domestic Product
M2	Money Supply
MCTI	Ministry of Commerce Trade and Industry
MFI	Micro Finance Institutions
MNDP	Ministry of National Development Planning
NFIS	National Financial Inclusion Strategy
PMRC	Policy Monitoring and Research Centre
SME	Small and Medium Enterprises
ZDA	Zambia Development Agency

CHAPTER ONE

INTRODUCTION

1.1 Background

The achievement of sustained economic growth is a major challenge for economic policymakers in many countries, including Zambia. In 2006, Zambia adopted Vision 2030, the country's first ever written long-term plan, which expresses Zambians' aspirations for the attainment of desirable social economic indicators by the year 2030. As operationalization tools for Vision 2030, Zambia resolved to develop five- year development plans. Like the earlier National Development Plans, the Seventh National Development plan (7NDP) for 2017-2021 identified agriculture and manufacturing as key sectors for diversification for the attainment of the objectives of Vision 2030, which strives to make Zambia a middle-income country by 2030 (MNDP, 2017).

The importance of access to credit for these- agriculture and manufacturing sectors to spur economic diversification cannot be over-emphasized. Credit provides the necessary resources to increase productivity as well as capitalize economic operations to maintain or scale up production. Additionally, the provision of credit to individuals and businesses alike is vital to unlock contributions by dormant economic agents, helps to mobilize idle or untapped financial resources, conservation of foreign exchange, utilization of local resources, as well as strong avenues for economic integration. Other roles of credit are to transform traditional sectors into modern form, create employment opportunities, and provide a source of livelihood for many low-income earners nationwide (Chokwe, 2017).

Chokwe (2017) acknowledged that there was a link between financial sector development and economic development in general. Several scholars including Duong and Izumida (2002) and Cheelo and Liebenthal (2020) cited macroeconomic restrictions which relate to variables with a direct impact on the cost of doing business as having a negative direct impact on economic growth. These macroeconomic factors include local currency depreciation, high inflation rates, and high credit or borrowing costs. Additionally, an industrial survey on manufacturing firms in Mozambique revealed that difficulty in accessing credit was consistently cited by firm managers as the most critical constraint to firm growth and performance, more important than

difficulties caused by existing tax administration, corruption, and macro-economic instability (DNEAP, 2007).

This study examined the impact of lending rates on loan demand from different key economic sectors in Zambia. It was based on the premise that although the two sectors have been identified in the 7NDP as key to the achievement of vision2030, contributions to GDP by the sectors have been falling- for the agricultural sector and have remained stagnant- for the manufacturing sector as illustrated in table 1.1.

Table 1.1 Gross value added by kind of economic activity at constant prices, 2010 base.

Sector	Percentage Shares, Constant Prices										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Agriculture, forestry and fishing	9.9	10	9.6	8.8	9	7.8	7.8	8.2	6.2	6.6	7.9
Mining and Quarrying	12.9	12.2	11.4	11.3	10.5	10.8	11.1	11.1	11.3	10.6	11.7
Manufacturing	7.9	8.3	8.1	8.1	8.1	8.6	8.5	8.6	8.6	8.6	8.7
Wholesale and retail	18.4	20.7	20.8	23.6	23.3	24.3	23.4	22.7	22.6	22.3	20.0
Construction	10.9	10.4	9.7	9	9.3	10.7	11.4	11.7	11.5	10.8	10.5

Source: Zambia Statistics Agency

1.1.1 The Agriculture Sector in Zambia

The agriculture sector in Zambia is critical for achieving diversification, economic growth and poverty reduction has consistently (2006-2015) been a significant driver of GDP growth for the country. According to PMRC (2020), this sector is the fourth largest contributor to GDP and the largest contributor to employment. Family agriculture is the backbone of the rural economy in Zambia and therefore the sector provides great potential for modernization. The objective for this sector according to the 7NDP is to have an efficient, competitive, sustainable, and export-led agriculture sector that assures food security and increased income is therefore key to the economic development of the country by 2030.

According to the World Bank (2018), about 48 percent of Zambia's population was employed by the agriculture sector in 2017. The 2015 Finscope survey revealed that

21.5 percent of the Zambian adult population's main source of income was farming, while 1.3 percent of the population's main income source was from fishing activities. Most of the working population in agriculture is comprised of smallholder farmers: about 98 percent of farmers are smallholder farmers, with 71 percent cultivating less than 2 hectares (ha); 24 percent cultivating 2-5 ha and 5 percent cultivating between 5-20 ha.

Although the agriculture sector employs a significant proportion of the country's population, there are substantial gaps in levels of financial inclusion and access to formal financial services of Zambian farmers and fisherfolk compared to the rest of the population. According to the 2015 Finscope survey, only about 27 percent of farmers and fisherfolk had access to formal financial services compared to 42 percent of other Zambians employed in other sectors. In 2015, the gap between farmers and fisherfolk and other Zambians in access to banking services exceeded 10 percent. In aggregate, 18 percent of farmers and fisherfolk had access to or used non-bank formal financial services compared to 32 percent of other Zambians. About 17 percent of non-farmer/fisherfolk had mobile money access in 2015 compared to less than 5 percent of farmers and fisherfolk. Access to other formal channels, including MFIs, cooperatives, and microlenders, was comparable between the two groups, at around 4 percent. Zambians generally have low access to MFIs and cooperatives. Unlike in many other African countries, the MFI and financial cooperative sectors do not have a large outreach in Zambia (ibid).

1.1.2 The Manufacturing Sector in Zambia

The manufacturing sector was also identified in the 7NDP as essential to drive Zambia's development agenda. The sector is a relatively small component of the overall economy and accounts for roughly 8 percent of the country's GDP. In 2017, about 7.4 percent of the country's population was employed by the manufacturing sector. A large increase in this indicator has also been noticed in relation to 2012, where only 4.1 percent of the population was employed by the sector. This indicates that there has been an increase in labour in the sector, although the sector's overall contribution to overall GDP has not changed much. Zambia's Vision 2030 for the sector by 2030 is to be a technology based and export focused manufacturing sector, which is dynamic and competitive with effective entities that add value to the locally

abundant natural resources.

According to ZDA (2021), almost two thirds of the country's manufactured products are food and beverages. This is followed closely by textiles, leather, wood products, paper products and chemicals and plastic products. Secondary metal processing as well as production of fertilizers, chemicals, explosives, and construction materials such as cement are also key activities in the sector. Other activities include wood products and paper products. China, India, South Africa, and the United Arab Emirates are top destinations for the countries manufactured products, with China accounting for almost US\$2.14 billion of export earnings as of 2016.

In relation to access to finance by the manufacturing sector, findings from the Zambian Enterprise Survey (2013) revealed that 38percent of Zambian Manufacturing firms report access to finance as a key constraint. In general, manufacturing firms find it more difficult to obtain loans than other types of firms mainly because they usually require large sums of capital for investment which require longer repayment periods. Access to finance was especially a significant challenge for domestic firms (42 percent), SMEs (41 percent) and non-exporters (41 percent), while it was much less of an issue for foreign owned firms (15 percent), exporters (26 percent), and large firms (18 percent).

1.1.3 The Importance of Credit Markets

Credit markets house different types of economic agents. Firstly, the savers, who do not have immediate use for their financial resources. Secondly, are the borrowers, who do not have the financial resources, but would like to access them for various purposes such as consumption and investment. Additionally, the credit market houses financial intermediaries, which comprises both bank and non-bank financial institutions, whose role is to link the savers and borrowers. The role of financial intermediaries is to ensure that this resource allocation is efficient, and to mitigate against the that the problems generated by imperfections within the market, such as adverse selection and moral hazard that arise form information asymmetry (Xhaferri, 2016).

Credit markets play a key role in facilitating economic growth and development. For businesses, financial intermediation affects the net return to savings and the gross return to investment. Therefore, the lower the average commercial bank's lending

rates, the more efficient and the lower the social costs of financial intermediation will be. In this sense, it is important that this financial intermediation by the banks is carried out with the lowest possible cost to achieve greater economic development (Chokwe, 2017).

1.1.4 Credit Markets in Zambia

The financial sector in Zambia is moderately developed and comprises various subsectors including banking, insurance, pensions, microfinance, and capital markets. The financial sector is regulated by a tripartite of institutions including the Bank of Zambia, The Pensions and Insurance Authority, and the Securities and Exchange Commission. According to the Finscope 2020 Survey by the Bank of Zambia (2021), formal financial inclusion in Zambia remains low, but increased from 59.3percent in 2015 to 69.4percent in 2020. It is further reported that levels of access in Zambia are the lowest overall in the Southern African countries where the Finscope survey has been undertaken (Chokwe, 2017). Table 1.2 illustrates the growth in the use of formal financial services in the country between 2015 and 2020.

Table 1.2 Percentage use of formal financial services by adults in Zambia

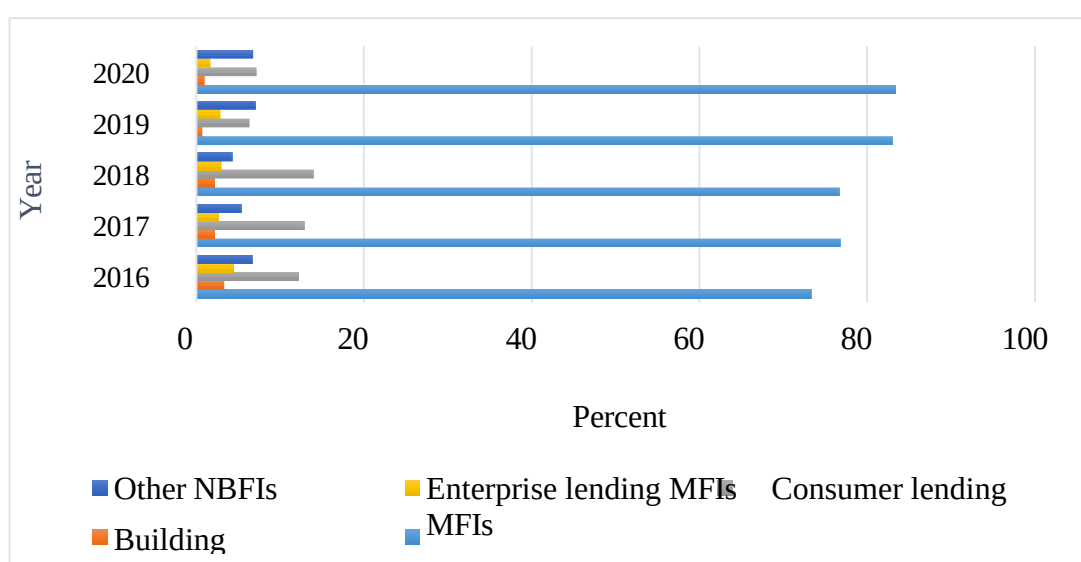
Type of financial service provider	Year	
	2020	2015
	Percent	
Mobile money	58.5	14.0
Bank	20.7	24.8
Pension	9.2	3.8
Insurance	5.0	2.8
Micro-finance	2.1	1.3
Capital markets	0.6	0.3

Source: FinScope 2020 Survey

According to Bank of Zambia Credit Market Monitoring Reports (CMMP), the largest source of formal financial credit in Zambia was commercial banks which, between 2016 and 2020 provided over two-thirds of loans and advances on the financial sector as illustrated in figure 1.1. Consumer lending Micro Finance Institutions (MFI) which service consumers and enterprises were the second largest source of credit.

Notwithstanding, MFI sector in Zambia is still relatively young and underdeveloped even by African standards. Building societies were also highlighted as providers of credit to the Zambian economy, although they serviced a much lesser component of the economy by amount of loans disbursed (BoZ, 2021).

Figure 1.1 Proportion of disbursements of loans by institution type



Source: BOZ

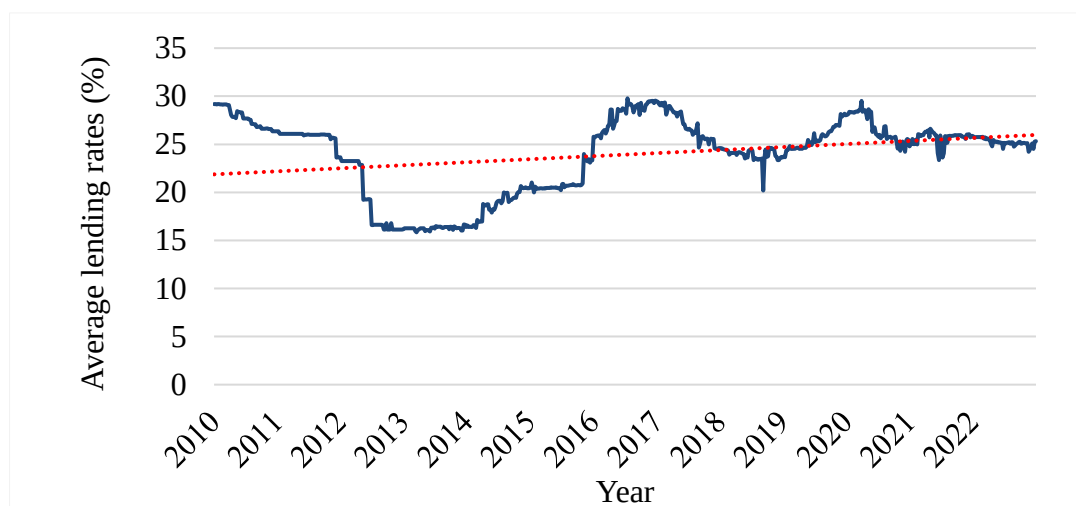
Although the banking sector is the largest source of formal financial credit in Zambia, the country's banking sector still ranks lower in the Southern Africa Development Sector (SADC) as seen in the bank penetration ration measured as a proportion of deposits to GDP which is approximately 19 percent. This can be compared to other economies such as Tanzania and Botswana where the same ratio is 21 percent and 40 percent respectively (Mphuka, et al., 2014).

1.1.5 Lending Rates in Zambia

Lending rates play an important role in allocating financial resources efficiently. Less developed countries are characterized by relatively higher lending rates than their more developed counterparts. This could reflect the scarcity of the financial resource as individuals in less developed countries tend to have relatively less (Dehejia, et al., 2005). Historically in Zambia, lending rates have been relatively higher as compared to other countries in the world (Calixte, 2013). The bank of Zambia reported an average lending rate of 25.97 percent in March of 2021. Between 2010 and 2020, the highest commercial bank lending rate recorded was 29.4 percent in 2016 and the

lowest was 16.02 percent in 2013. During the same period, commercial bank lending averaged 23.69 percent and the general trend has been rising (BoZ, 2021). Figure 1.2 illustrates the historical trend of lending rates in Zambia.

Figure 1.2 Average lending rates in Zambia



Source: BOZ

There has been concern about the high cost of borrowing in Zambia which impelled monetary authorities to institute a series of policy measures aimed at reducing lending rates in 2011. The reserve requirements and core liquid asset ratios were both reduced by 200 basis points in 2011. Further, in early 2013 BOZ made it compulsory for banks to link their lending rates to the new BOZ policy rate and commercial bank lending rates were subjected to a legal maximum of 18.25 percent. However, evidence demonstrates that these measures achieved very little to address the perceived high lending rates (Chokwe, 2017).

1.2 Statement of the Problem

The credit market is a key source of financing in an economy as it facilitates the transfer of funds and enables the efficient allocation of resources to take place, thereby driving economic activity and inevitably, economic growth. However, credit to the private sector in Zambia represented only 15.6 percent of the country's Gross Domestic Product (GDP) as of 2019 (World Bank, 2021). Over a 20-year period, this amount increased from 7.3 percent in 2000 to 12.2 percent in 2020. To exacerbate this, the Zambia credit market is characterized by high lending rates, which according to

Callixte (2013) are some of the highest in the world.

Nonetheless, World Bank (2008) data on Zambia showed that from 1998 to 2007, credit to the private sector increased for almost all sectors, indicating increased domestic private sector activity. The sectors with the strongest growth in private loans and advances were agriculture, wholesale and retail trade and manufacturing. There are recent efforts at National level to increase access to finance, such as the National Financial Inclusion Strategy (NFIS) of 2017, whose main goal was to achieve universal access to and usage of a broad range of quality and affordable financial services that meet the needs of individuals and enterprises (GRZ, 2017).

The agriculture and manufacturing sectors were selected as sectors of interest for this study as they were identified in the 7NDP as key sectors for the achievement of the country's macroeconomic objectives by 2030. However, over the past decade, the contribution of the agriculture sector to the country's GDP has been generally falling, while that of the manufacturing sector has remained relatively stagnant.

The study therefore sought to examine the theoretical proposition of the relationship between borrowing and interest rates in relation to the identified economic sectors and answering the following questions pertaining to the study area; what was the relationship between lending rates and loan demand for the agriculture sector; what was the relationship between lending rates and loan demand for the manufacturing sector?

1.3 Study Objectives

The following highlights the main objective that guided this research as well as the specific objectives that were adopted.

1.3.1 Overall Objective

The overall objective of this research was to examine the impact of lending rates on loan demand from different key economic sectors in Zambia.

1.3.2 Specific Objectives

To accomplish the overall objective of this research, the following specific objectives were adopted:

- i) To determine the relationship between lending rates and loan demand for the agriculture sector.
- ii) To determine the relationship between lending rates and loan demand for the manufacturing sector.

1.4 Hypothesis

The study hypothesized that:

- i) H_0 : There is an inverse relationship between lending rates and loan demand for the agriculture sector.
- ii) H_0 : There is an inverse relationship between lending rates and loan demand for the manufacturing sector.

1.5 Significance of the Study

The credit market is an important component of the economy, which facilitates the reallocation of unutilized funds towards more productive use. The important role that is played by this sector is evidenced in the economic growth and development that it promotes. The economic growth and development promoted by the credit market is through the various economic sectors that it supports. In the case of Zambia, the agriculture sector is one that has, for many years been the backbone of the economy as it provides food security, a source of livelihood, and employment for many Zambians. Additionally, the manufacturing sector has become increasingly more important over the years, as the country seeks to add value to its abundance of natural resources.

However, the information and past research relating to credit to the specific economic sectors for the case of Zambia was scanty. Where information and research on the credit market was available, most of the literature related to the total borrower population, without a special focus on specific economic sectors. This study therefore strived to contribute to the body of knowledge by specifically focusing on the agriculture and manufacturing sectors. This is crucial in identifying needs for more targeted policies to make the credit market more efficient and promote the development of Zambia's economy through the achievement of macroeconomic objectives such as those presented in Vision2030.

1.6 Scope of the Study

This study focused on the demand for credit by borrowers from the agriculture sector and the manufacturing sector in Zambia. The study focused on these two sectors as they were identified as key components of the Zambian economy according to the 7NDP. To determine the sensitivity of borrowers from different key economic sectors to lending rates in the credit market, the study utilized quarterly credit data from the Bank of Zambia for 2012 to 2021. On a quarterly basis, the Bank of Zambia consolidates and aggregates credit level data from the various bank and non-bank financial institutions which it has oversight over. Alternatively, the study could have utilized credit level data from the financial institutions themselves. However, access to this data proved futile and therefore the study was limited to the aggregated data by the Central Bank.

1.7 Limitations of the Study

The study only used quarterly data as opposed to the yearly data points. This was because the data on demand for credit by each was recorded on a quarterly basis by the Bank of Zambia. Additionally, the scope of this research was only limited to credit issued by local commercial banks and did not consider the other sources of credit which can be accessed by the manufacturing and agriculture sectors such as Co-operative Societies and Micro Finance Institutions. Furthermore, some smallholder farmers and MSMEs involved in agriculture access Government support such as the Farmer Input Support Programme (FISP). Due to the limited scope of data points available for the study, there are still some areas that warrant further investigation using annual data points which would improve the accuracy of the estimated models.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section explores the literature on interest rates and the demand for credit by borrowers from different economic sectors. First, the chapter explores the theoretical paradigms of financial market liberalization with a focus on the McKinnon-Shaw (1973) model; and Stiglitz and Weiss (1981) credit rationing theory. Second, the empirical literature on the above-mentioned issues is explored. The literature review will serve as the basis for which the methodology of the study will be formulated and provide the framework for the analysis of results.

2.2 Theoretical review

2.2.1 The Theoretical paradigms of Financial Market Liberalization

The financial repression hypothesis by McKinnon (1973) and Shaw (1973) and the Stiglitz and Weiss (1981) credit rationing theory are the two main theories that explain the malfunctioning of financial markets in developing countries.

The McKinnon-Shaw financial repression hypothesis asserts that policies that lead to artificially low interest rates, directed credit programs and high reserve requirements often result in financial market distortions, which culminate in the decline in savings and resource misallocation. Hence, government policies that place ceilings on deposit and lending rates stimulate demand for credit and discourage the supply of credit. In such a situation, the high demand for credit often leads to the adoption of non-price strategies such as rationing through other means other than the interest rate. Individuals and institutions who have connection with bankers are therefore given preferential treatment in terms of loan allocation. This practice results in a fragmented financial market and the crowding out of SMEs from the formal financial sector. Unable to secure loans from the formal financial sector, SMEs must resort to the informal financial sector to meet their financial needs. However, the high interest rates charged by the informal financial sector serve as a constraint to the amount of funds that can be borrowed.

In order to improve access to finance by businesses, the McKinnon (1973) and Shaw (1973) model advocated for the abolishment of repressive financial policies and the adoption of financial deregulation policies such as the removal of ceilings on deposit and lending rates, adoption of a flexible exchange rate regime, abandonment of directed credit policies among others.

The “Financial liberalization view” proposed by McKinnon-Shaw poses that allowing deposit and lending rates to be determined by the forces of demand and supply would provide an incentive for both savers and investors. Savers would be motivated to save more due to the expected increase in the real interest rate while investors would also invest in high yielding projects which have the potential to promote growth. The increase in the real interest rate also serves as a disincentive for low yielding investments, and thereby increases the average efficiency of investment. Further, increases in output growth rate are expected to increase the savings rate. Thus, the pursuit of financial market liberalization policies is essential for efficient functioning of financial markets; a condition which would lead to improved access to finance by all businesses including SMEs.

The Stiglitz and Weiss (1981) credit rationing theory provides another framework for analysing financial market inefficiencies. According to the credit rationing theory, information asymmetry is regarded as the main cause of financial markets malfunctioning in developing countries. Banks that advance loans are primarily concerned about the interest rate they receive on the loan and the riskiness of the loan. However, the interest rates charged by banks on loans tend to affect the riskiness of a pool of loans by either sorting potential borrowers – adverse selection effect; or affect the behaviour of borrowers – moral hazards. Thus, asymmetrical information problem in credit markets takes two main forms namely adverse selection and moral hazards (Stiglitz, & Weiss, 1981).

Adverse selection problem arises from the fact that different borrowers have different probabilities of loan repayment. The expected return to the banks is also dependent on the probability of loan repayment. Due to this, the bank will have to distinguish “good borrowers” from the bad ones using a variety of screening devices. The interest rate that an individual is willing to pay is considered as one of the screening devices to identify potential borrowers with a high probability of repayment. According to

Stiglitz and Weiss (1981), individuals who are willing to pay high interest rates on the average, are worse defaulters; they are willing to borrow at high interest rates because they perceive their probability of repaying the loan to be low. Thus, increases in the rate of interest raise the riskiness of borrowers and affects the bank's profit negatively.

Furthermore, at high rates of interest, less risky projects may become unprofitable and pose a threat to loan repayment. Due to the high interest rates, borrowers with high yielding risky projects are favored and the associated high probability of default consequently threatens the capital base of the banks. Therefore, to minimize risk, banks tend to give out loans at a relatively lower rate than at market rates. This realignment of loan portfolios therefore implies that the interest rate mechanism will be unable to achieve market rate equilibrium and credit rationing may be used to allocated funds.

Another way in which the interest rate affects the bank's expected return from a loan is by changes the behaviour of borrowers. Moral hazard problem arises mainly because it is prohibitively expensive for the banks to effectively monitor the behaviour of borrowers after loans have been advanced to them. Therefore, the banks must take into account the effect of interest rates on the behaviour of borrowers. However, increasing the rate of interest raises the relative attractiveness of riskier projects inducing firms to divert approved funds to finance only high yielding projects. The high risk associated with these high yielding projects would instead affect the probability of loan repayment and consequently reduce the profitability of banks. Thus, the moral hazard phenomenon may compel lenders to ration credit rather than raise the interest rate when there is an excess demand for loanable funds.

2.2.2 Theories of Interest Rates

From the lenders perspective, the interest rate is considered as the premium paid to savers for making surplus funds available through financial intermediaries. From the borrower's point of view, the interest rate is the price of the user cost of capital incurred by using funds for investment. There are numerous schools of thought regarding interest rates in literature. Four of these include Theory of Austrian School (Friedrich von Wieser, 1851-1926), Neo classical theory (Herman Heinrich Gossen 1810-1858), Liquidity theory (John Maynard Keynes 1883-1946) and Loan theory (Knut Wicksell 1851-1926).

The classical school regarded the rate of interest as the factor which brings the demand

for investment and the willingness to save into equilibrium with one another. Here, investment represents the demand for investable resources and saving represents the supply, whilst the rate of interest is the “price” of investable resources at which the two are equated (Keynes, 1936).

In the classical system, savings and investment is a function of the interest rate. The higher the rate of interest, the more savers will be willing to replace present consumption with future consumption, thereby increasing the level of savings. Hence, the classical economists viewed the interest rate as a real reward for abstinence or thrift. The flow of savings therefore represents a supply of loanable funds in the capital market. On the other hand, investment expenditure on capital goods is negatively related to the rate of interest in the classical model and represents a demand for loanable funds in the capital market (Snowden & Vane, 2005).

The classical theory of interest rate triggered several criticisms especially from Keynes. One major criticism of the classical theory is the neglect of the influence of changes in the level of income on the marginal propensity to save. Keynes argued that “if the level of income is assumed to be given, we can infer that the current rate of interest must lie at the point where the demand curve for capital corresponding to different rates of interest cuts the curve of the amounts saved out of the given income corresponding to different rates of interest” (Keynes, 1936).

Another setback of the classical theory is that the assertion that savings must necessarily equate the level of investments may not always be true since investment is also determined by other factors such as business expectations and the level of income. For instance, investment decisions could be influenced by tides of irrational optimism and pessimism, causing large swings in the state of business confidence, which brings into question the efficacy of interest rate adjustments as a way of influencing the volume of investment. In his book “The General Theory of Employment, Interest and Money” Keynes (1936) rejected the idea that the interest rate was determined by the real forces of thrift and the marginal productivity of capital. In the General Theory the interest rate is a purely monetary phenomenon determined by the liquidity preference (demand for money) of the public in conjunction with the supply of money which is exogenously determined.

Like the classical economists, Keynes agreed that people demand for money to

undertake day- to-day transactions but asserts that economic agents may also hold real money balances to cushion against unforeseen contingencies. Keynes' major departure from the classical school of thought is the introduction of the liquidity preference theory which is sensitive to the rate of interest. Keynes rejected the classical notion that interest was the reward for postponed current consumption. For him the rate of interest is the reward for parting with liquidity or not hoarding for a specified period. In a world characterized by uncertainty there will always be a speculative motive to hold cash in preference to other financial assets (such as bonds), and in Keynes's view liquidity preference would always exert a more powerful influence on the rate of interest than saving decisions (Snowden & Vane, 2005).

Thus, by introducing the speculative motive into the money demand function, Keynes made the rate of interest dependent on the state of confidence as well as the money supply. The modern view of interest rate based on imperfect information was propounded by Hoff and Stiglitz (1990). By augmenting the classical theory of interest rates and introducing imperfection information, they asserted that interest rates may not equilibrate credit supply and demand due to the existence of credit rationing brought about by asymmetry information.

The classical view of interest rates states that if there is excess demand for loans at a given interest rate, the price will rise to choke off the excess demand. Higher interest rates would raise the lender's return if they did not increase h (Hoff & Stiglitz, 1990) is risk by increasing the probability of default. But at a higher rate of interest, the greater risk and thus the higher probability of default will offset the increased interest income of the loan portfolio. In order to minimize risk and achieve a favorable risk composition of projects, the lender has to lower interest rates and adopt other non-price means of rationing the available loanable funds.

Thus, contrary to the classical notion that excess demand for credit necessitates a rise in interest rate to achieve equilibrium, the interest rate may remain unchanged even in the face of excess demand in markets with imperfect information. In cases where lenders did not recognize the effect of interest rates on the risk of their loan portfolio, the impact on returns may even be worse. That is, a situation may arise where at a given interest rate, the default rate may be too high, that the return to lenders would not be enough to cover the opportunity cost of funds. This would put upward pressure

on interest rates, a situation which would further exacerbate the risk mix. This process would continue until the interest rate becomes so high that only risky projects those with the highest probability of default would be undertaken.

2.3 Empirical Review

2.3.1 Access to Finance in Zambia

The importance of access to financial services in fostering growth has been noted by several researchers and policymakers. In Zambia the Financial Sector Development Programme (FSDP) has identified specific initiatives to deepen and broaden the financial sector to “support efficient mobilization and allocation of resources necessary for economic diversification, sustainable growth and poverty reduction”. According to the Zambia Business Survey of 2010, access to finance was cited by over 20 percent of MSMEs as a “very severe obstacle” to the current operations of the business, while a further 29 percent rate it as a “major obstacle”. The cost of finance is also highlighted as an obstacle, although it is less frequently cited as a severe or major obstacle. Key to note is that large businesses are more likely to cite the cost of finance as a very severe or major obstacle, as compared to access to finance (Melzer, et al., 2010).

SMEs are identified to be economic drivers as they create reliable employment and provide opportunities for low-income poor people. This is true for Zambia where SMEs are estimated to account for 97 percent of all businesses in Zambia (FSDZ, 2021). According to FSDZ, of the total adult population in Zambia, 1.2 million operate a business which accounts for a good portion of their income. Despite this, SMEs face challenges, some of which include unanticipated financial mismatches between their income and expenses. More recently a survey undertaken by FSDZ revealed that almost half (49 percent) of SMEs perceive access to credit as a major obstacle to their business operations.

Some of the reasons for the perceived poor financial support towards SMEs included; Most Zambian banks only lend to SMEs who have adequate collateral, business owners require a faster response for loans and other financial services than the banks are able to achieve, some women SME business owners perceive banks to offer them less equal opportunities than their male counterparts, and many international banks have a conservative approach of their ideal client risk profile, business sector, and

business model. To overcome these challenges, SMEs require support from Financial Services Providers (FSPs) like Banks and Micro Finance Institutions (FSDZ, 2021).

2.3.2 Determinants of Loan Demand

It is imperative to understand the factors that determine borrowers' demand for loans. Sebatta et al (2014) sought out to investigate the factors that affect smallholders' decision to access rural finance and the intensity of their participation in the financial markets in Zambia. The study was undertaken with knowledge of the fact that despite the numerous reforms undertaken by the Government and the donor community, including financial sector reforms, many rural farmers have remained in poverty with limited capacity to access safety nets like loans to mitigate against hunger and disease. To achieve its objective, the paper conducted a household survey in five provinces from which thirteen districts were purposively selected. Selection of the sample was based on purposive and random sampling techniques, and a pre-tested questionnaire was administered on 1,326 households. The data was analysed using a double huddle model. Results indicated that education level of household head, size of household and number of daily meals served significantly influenced decision to access finance while loan payback period, having a phone and personal savings influenced the intensity of participation in the rural financial market.

To analyse credit demand in the Mozambican manufacturing sector, (Byiers, et al., 2010) employed two industrial firm surveys to identify the key determinants of credit demand in Mozambican manufacturing sector. The researchers constructed five different measures of being credit constrained and estimated desired debt demand. In addition to firm size and ownership structure, there was evidence that general manager education and business association membership are associated with whether a firm is credit constrained or not. The paper concluded that around 43 percent of the firms surveyed were constrained, and these enterprises would almost triple their debt burden if borrowing constraints were relaxed.

While Sebatta et al (2014), whose study was based in Zambia, and Byiers et al (2010) whose study was based in Mozambique found that mainly socio-economic factors such as education level of the household head and house-hold size where the determinants of credit demand, Fecke et al. (2016) found that interest rate has a significant negative

effect on loan demand for agriculture firms in Germany, whereas the granted grace periods, the gross value added (GVA) in agriculture and farmers' business expectations have significant positive effects on the loan demand. Fecke et al. (2016) utilized detailed loan data at farm level, which was provided by a major German development bank for the agricultural sector. The data covered the period from 2010 to 2014 and consisted of 68,430 observations. An ordinary least square regression was conducted with the loan amount as the dependent variable. Many explanatory variables were included, such as the interest rate, the intended use of the loan, grace periods, the gross value added (GVA) and the business climate index for agriculture. The results indicated that the interest rate had a significant negative effect, whereas the granted grace periods, the GVA in agriculture and farmers' business expectations have significant positive effects on the loan demand.

Calza et al (2003) carried out a study to analyse the determinants of loans to the private sector in the Euro area for the period 1980-1999. By use of the Johansen Cointegration methodology, the study identified one cointegrating relationship linking real loans, GDP, and interest rates. This relationship implies that in the long-run real loans are positively related to real GDP and negatively to real short-term and long-term interest rates. Both the signs and the magnitude of the coefficients suggest that the cointegrating vector describes a long-run demand equation. The short-run dynamics of the demand for Euro area real loans is subsequently modelled by means of a Vector Error Correction Model (VECM). Several specification tests performed on the VECM produced satisfactory results, with tests of stability of the model parameters showing no signs of structural breaks during the sample period. The results and conclusions of the study suggest that developments in real loans to the private sector in the Euro area can be reasonably explained by the model.

Theobald and Silke (2020) sought to contribute to the body of knowledge of credit market in Europe. This was done with the objective of quantifying the impact of euro area sovereign bond spreads on private-sector lending by employing it as a proxy for private-sector credit risk. The researchers regressed long-term private sector borrowing rates on a money market rate, a term premium and credit risk. The panel estimates showed significant, though rather small, long-run effects. Another finding of the study was large cross-country heterogeneity. The findings of the study provide useful insights as to the relationship between private sector borrowing and money

market rates.

2.3.3 Lending Rates and Credit

Several researchers have attempted to examine the relationships of lending rates and credit. For example, in the Netherlands, Fase (1995) presented a paper which identified a two-equation structural model of short-term loans and the lending rate, which were estimated with quarterly credit data from the Netherlands. The paper placed emphasis on the fact that the lending rate is observed as a zone rather than as a unique and directly measurable market price. An important empirical result is that the interest rate elasticity of loan demand was significant. This conclusive finding confirms the intuitive feeling regarding the importance of the rate of interest for credit prevailing in the banking community but is seldom found in empirical econometrics.

In Ghana, Quashigah and Quashigah (2017) investigate the relationship between interest rates and demand for credit in Ghana. The paper used time series data from 1965 to 2010 and adopted the Johansen cointegration to examine the relationship between interest rate and demand for credit. The results suggest that interest rates have a negative impact on the demand for credit in both the short run and the long run. An increase in the real lending rate may not immediately prevent the demand for credit but it may result in a fall in the demand for credit in both the short run and long run. This implies that if market forces tend to put an upward pressure on prices, authorities should take advantage of it and make more credit available. The researchers recommended that authorities should place emphasis on stability of price in order to reverse the negative short run or negative long run effect between the real lending rate and demand for credit.

Contrary to the researchers who found a negative relationship between lending rates and credit demand, Maiti et al (2020) investigated the impact of financial liberalization on the demand for credit in Ghana in a study aimed to investigate the effectiveness of interest rate liberalization in driving private sector demand for credit in the short and the long run and obtained contrary results. By use of the Auto Regressive Distributed Lag (ARDL) model, the results of Maiti et. al (2020) indicated that there was no significant impact of interest rate on the demand for credit both in the short-run and long-run. Inflation was also found to have a negative significant effect on the demand

for credit in the short run. The findings seemed to indicate that the financial market in Ghana was not fully competitive.

In relation to SMEs, (Amoono, et al., 2003) conducted a study to establish the relationship between interest rates and demand for credit. Using regression analysis based on Ordinary Least Squares method to establish the relationship between the variables of interest, the results of their study revealed that there was a negative relationship between interest rates and the demand for credit. The study further recommended that a lower interest rate would result in increased demand for credit by the poor and SMEs and called for fiscal policy amendments in Ghana.

In Zambia, Chileshe and Olusegun (2017) conducted a study to examine the relative importance of the different channels of the monetary transmission mechanism in Zambia. The researchers used Vector Autoregressive Methods to examine the strength of various channels of monetary policy including interest rate, exchange rate, credit and asset price channels. The results indicate that the exchange rate and credit are effective channels of monetary policy transmission in Zambia. Further, they presented evidence to show that credit channel in Zambia is working in line with those of Simatele (2004). The study highlighted the increase in the number of Small Medium Enterprises (SMEs), which are bank dependent, as key drivers of the credit channel.

However, the findings of Chileshe and Olusegun (2017) were contrary to those obtained by Lungu (2007) who found that loan supply was insensitive to policy rate changes throughout the sample period of 1990 to 2006 and noted a positive but insignificant relationship between the key policy rate and loan supply. He however noted that up to four quarters, monetary policy had a positive but significant impact on loan rates and deposit rates, and after the four quarters, had an insignificant impact. These contrasting results could be due to several reasons including the introduction of salary backed loans has also made many households to become exposed to bank credit thereby enhancing the credit channel. Additionally, the increase in the sample size could also attribute to the difference in results. Furthermore, there has been an increase in the number of Small Medium Enterprises (SMEs) which are bank dependent, thereby enhancing the credit channel.

2.3.4 Price Elasticity of Demand for Credit

The price elasticity of demand for credit has major implications for macroeconomics, finance, and development. Karlan and Zinman (2005) present estimates of this parameter derived from a randomized trial. The experiment was implemented by a consumer microfinance lender in South Africa and identified demand curves that, while downward sloping with respect to price, are flatter than recent estimates in both developing and developed countries throughout most of a wide price range. The study found that notwithstanding, demand becomes highly price sensitive at higher-than-normal rates. The study also found that loan size is far more responsive to changes in loan maturity than to changes in interest rate. This pattern is more pronounced among lower income individuals, a comparative static that has been observed in the United States as well and is consistent with liquidity constraints that decrease with income.

Karlan and Zinman (2013) carried out another study to analyse the long-run price elasticity of demand for credit as a key parameter for intertemporal modelling, policy levers, and lending practice. The authors used randomized interest rates, offered across 80 regions by Mexico's largest micro-lender to identify 29-month dollars-borrowed elasticity of -1.9. This elasticity was found to increase from -1.1 in the first year to -2.9 in the third year. The number of borrowers was also found to be elastic similar to the findings of Karlan and Zinman (2005). Furthermore, the study noted that lending competitors were observed to not respond by reducing rates, perhaps because their profits remained unchanged.

In the same vein of authors who examined the price elasticity of credit demand, Salazar, et al., (2011) analysed price elasticity of microcredit in the Dominican Republic. The authors highlighted the fact that most theoretical models assume that demand for microcredit is inelastic. Using a survey to extract loan demand schedules and elasticities of MFI borrowers in the Dominican Republic, the study found that client demand elasticities were not homogeneous and that they in fact, correlated with certain borrower characteristics. The researchers further observed that Micro-entrepreneurs had close to unit elastic demand for microcredit. Additionally, clients with wage labour as their primary income source and clients with low monthly business sales exhibited significantly more inelastic demand. Clients who were more comfortable taking risks in order to make profits, who have acquired vocational

training, and who invest their loan in productive items were also found to have more elastic demand.

Hong-Ru and Man-Ying (2008) analysed the interest rate elasticity of demand for credit in the rural area in Guizhou. Their result revealed that farmers are sensitive to the interest rate and the high interest rate is not possibly accepted by them. The view of high interest rates is only from the perspective of the small credit suppliers and the demanders are neglected. It is verified that increasing or decreasing artificially the interest rate is not rational. The interest rate should be determined by supply and demand in the credit market. Understanding the influence of interest rate elasticity is the key to strengthening the service of small credit institutions. This conclusion was arrived at with the knowledge that that high interest rate should be carried out by small credit institutions to meet the demand of local farmers and maintain sustainable development.

2.3.5 Effects of Bank Lending on Economic Sectors

Economic theory suggests that bank lending leads to real effects on the economy. This section explores the literature pertaining to the effects on bank lending to different economic sectors. Florian (2015) studied interest rate elasticity of bank loans using empirical credit demand data. The researcher's objective was to undertake an empirical credit demand analysis at aggregate level to obscure potential behavioural heterogeneity between various borrowing sectors. Florian looked at disaggregated data and analysed bank loans to non-financial companies, to financial companies, to households for consumption and for house purchases separately with respect to a common set of macroeconomic determinants may facilitate more accurate empirical relationships and more reliable insights for economic policy. Quarterly Euro area panel data between 2003 and 2013 was utilized, and empirical evidence for heterogeneity in borrowing behaviour across sectors and the credit cycle with respect to interest rates, output and house prices was found.

In line with the findings of Florian (2015) who found heterogeneity in borrowing behaviour across sectors, Arnold et al (2006) presents evidence on the industry effects of bank lending in Germany and identified the industry effects of bank lending associated with changes in monetary policy and industry specific bank credit demand.

Arnold et al (2006) estimated individual bank lending functions for thirteen manufacturing and non-manufacturing industries and five banking groups using quarterly bank balance sheet and bank lending data for the period 1992 to -2002. The evidence from dynamic panel data models showed that industry-specific bank lending growth predominantly responded to changes in industry-specific bank credit demand rather than to changes in monetary policy. The findings showed that with regards to bank lending, the effects of monetary policy were very sensitive to the choice of industry. The empirical results lend strong support to the existence of industry effects of bank lending. Because industries are a key source of variation in the bank lending effects of bank credit demand and monetary policy, the research concluded that the industry composition of bank credit portfolios was an important determinant of bank lending growth and monetary policy effectiveness.

Obamuyi, et al. (2006) conducted a study in Nigeria to investigate the effect of bank lending and economic growth on the manufacturing sector output in Nigeria. The study utilized time series data covering a period of 36 years from 1973-2009. The data was analysed and tested with the cointegration and vector error correction model (VECM) techniques. The findings of the study show that manufacturing capacity utilization and bank lending rates significantly affect manufacturing output in Nigeria. However, the relationship between manufacturing output and economic growth could not be established in the country. The authors recommended the need for intensive effort by the government, manufacturers, and the lending institutions to review the lending and growth policies and provide appropriate macroeconomic environment, in order to encourage investment-friendly lending and borrowing by the financial institutions.

2.4 Summary

Overall, the review of the theoretical and empirical literature confirmed the importance of credit with regards to economic growth and development. The theoretical literature provided an understanding of the way that credit markets work and further provided an explanation of malfunctioning of financial markets in developing countries through the financial repression hypothesis by McKinnon and Shaw, and the Stiglitz and Weiss credit rationing theory. Furthermore, the analysis of the empirical literature revealed that central to understanding the determinants of loans to the private sector are the relationships between real loans, GDP, exchange rates, and interest rates. With regards

to price elasticity of demand for credit, the analysis showed that loan demand generally became highly price sensitive at higher-than-normal rates. Further analysis of the literature showed that the sensitivity of borrowers may not necessarily be homogenous across classes of borrowers from different economic sectors. This review therefore informed the study on how to analyse how borrowers from the different economic sectors in Zambia, specifically agriculture and the manufacturing sector behave relative to lending rates. Much of the literature available in this area is from Europe and other parts of Sub-Saharan Africa. Although some Institutions such as IAPRI have conducted studies in relation of access to credit to the agriculture sector in Zambia, there is a gap for such research in the context of Zambia. The study will therefore seek to fill this gap. This is necessary to advise policy on credit markets, which is a key driver of economic growth, and which will play a critical role towards the advancement of the countries goals as highlighted in the Vision 2030.

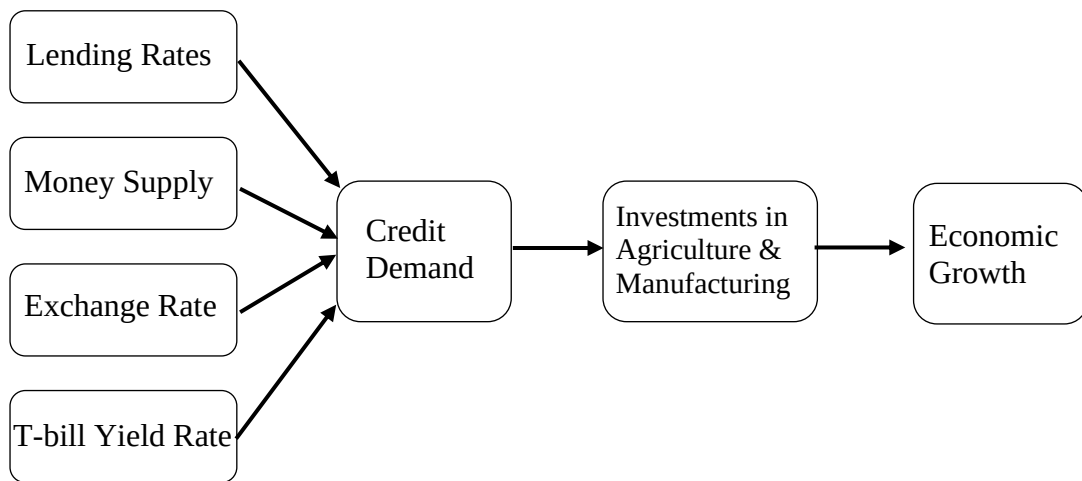
CHAPTER THREE

CONCEPTUAL FRAMEWORK

3.1 Introduction

This section presents the expected relationships amongst variables of interest and provides an explanation of the key relationships among the variables that need to be studied. Figure 3.1 illustrates the theoretical relationship between lending rates and loan demand by borrowers for various purposes, which subsequently results in economic growth.

Figure 3.1 Conceptual Framework



Source: Author's own compilation

3.1.1 Lending Rates

In financial markets, the price means the interest rate. The lending rate in this case is the interest rate that is paid by borrowers to access capital. The “Financial liberalization view” proposed by McKinnon-Shaw (1973) poses that allowing deposit and lending rates to be determined by the forces of demand and supply would provide an incentive for both savers and investors. Thus, the pursuit of financial market liberalization policies is essential for efficient functioning of financial markets; a condition which would lead to improved access to finance by all businesses including SMEs. It is therefore expected that there is an inverse relationship between the lending rates, and the quantity of loans or credit demanded.

3.1.2 Credit demand

Like the classical economists, Keynes (1936) agreed that people demand for money to undertake day- to-day transactions but asserts that economic agents may also hold real money balances to cushion against unforeseen contingencies. Keynes' major departure from the classical school of thought is the introduction of the liquidity preference theory which is sensitive to the rate of interest. Keynes liquidity theory explains the interest rate on the role of the demand and supply of money. The hypothesized relationship is that interest rates and demand for money go in direct opposition to each other.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter covers the methods used in the study. The chapter considers the entire research design including the methods adopted in the sampling technique; sample size of the study; the nature and source of data, and the way these data were collected and analysed.

4.2 Research Design

To examine the impact of lending rates on loan demand from different key economic sectors in Zambia, the study adopted a descriptive research design which used quantitative data to achieve its aim. Quarterly secondary time series data from the Bank of Zambia from 2012 to 2021 was used. This data contained information on the average lending rates, credit loan borrowings from the agriculture sector and manufacturing sector, USD/ZMW exchange rate, M2 Money Supply, and the 91 days treasury bills rates.

4.3 Empirical Model

Keynes (1936) categorizes the motive of demand for money into three motives, namely the transactions motive, precautionary motive and the speculative motive. According to Keynes (1936), the demand for money relates negatively to the interest rates. Therefore, the function of the demand for money can be expressed as shown in equation (i)

$$M_t^d = f(y_t, r_t) \dots \dots \dots (i)$$

where M_t^d is the real demand for money, y_t denotes the output and r_t denotes the interest rate.

In line with the aims of this paper, the standard function of demand for money as in Equation i is modified and extended to encompass other control variables. As proposed by Maiti et. al (2020), the study employed a demand function for credit, and modelled the relationship between demand for credit facilities by borrowers from the agriculture and manufacturing sectors, and factors determining the credit demand is shown in

equation (ii)

$$M_t^d{}_i = f(X_1, X_2, X_3, \dots, X_N) \dots\dots\dots (ii)$$

Where;

$M_t^d{}_i$ is the amount of the credit demanded by the borrowers from either the agricultural sector or the manufacturing sector, and $X_1, X_2, X_3, \dots, X_N$ are the factors influencing the amount demanded by the borrower.

4.4 The Econometric Model

The review of theoretical and empirical literature advised the selection of variables and justify the econometric model and methods used. In view of this, demand for credit by the agriculture sector and manufacturing sector was modelled against USD/ZMW exchange rates and interest rates. The interest rates included lending rates and 90-day T-bill rates. Additionally, money supply was included in the model as an indicator of other key macro- economic indicators that influence borrowing decisions by businesses.

The model for investigating the relationship between commercial banks' loans and advances and exchange rate was thus specified as shown in equation (iii):

$$M_t^d{}_i = \alpha + \beta_1 \text{Lending Rate} + \beta_2 \text{M2 Change (\%t)} + \beta_3 \text{Exchange Rate} + \beta_4 \text{91DBYR} + \varepsilon_t \dots\dots\dots (iii)$$

Note:

β_0 is a constant.

β_1 to β_4 are the coefficients for each variable.

Where;

M_t^d = real loan demand

i = agriculture sector or manufacturing sector.

Lending rate = average lending rate by commercial in a quarter.

M2 Change (percent) = average annual change in the money supply(M2) as reported by BOZ.

Exchange Rate = the amount of kwacha required to purchase one United States Dollar.

DTBYR = 91days Treasury Bill Yields Rates as measured by the Bank of Zambia

Equation iii is linearized as below.

$$\ln(M_t^d) = \beta_0 + \beta_1(\text{Lending Rate})_t + \beta_2(\text{M2 Change } (\%))_t + \beta_3(\text{Exchange Rate})_t + \beta_4 \ln(\text{DTBYR})_t + \varepsilon_t \dots \dots \dots (iv)$$

4.5 Definition of Variables

The variables considered in the study are defined as follows.

4.5.1 Demand for credit

This is a measure of the proportion of loanable funds acquired by the private sector from financial institutions and excludes credit issued by the central bank as well as funds acquired by the public sector (Levine, et al., 2000). The choice of this variable and its measure is focused solely on the private sector and subsequently serves as a measure of opportunities for new enterprises as well as large firms for expansion. According to McKinnon (1973), credit is a fundamental economic variable that drives investment and economic growth in developing countries.

4.5.2 Lending rates

This measures the cost of borrowing money from the financial institutions lending institutions in the country. Thus, it was expected that the lending rates would encourage or discourage citizens or investors from borrowing money from commercial banks. From the classical point of view, a higher lending rate would induce bank saving and consequently reduce investment. However, according to by McKinnon (1973) and Shaw (1973), a higher interest rate would induce bank savings and enhance credit mobilization which would consequently increase investment. Weller and Radha (2004) assert that the lower interest increase borrowing and improves private investment. That is, the choice of lending rate as a predictor variable would measure how the private sector responds to changing levels of interest rates.

4.5.3 Money Supply (M2)

The choice of money supply as a variable in this study was adopted in line with Maiti, et al (2020) who noted that higher levels of money supply may imply the availability of loanable funds and a lower cost of borrowing. This study adopted the standard definition of M1 as the money supply which includes those monies that are very liquid such as cash, checkable (demand) deposits, and traveler's checks. That is the coins and currency in circulation that are not held in Treasury Bills, at the Bank of Zambia, or in bank vaults.

The study adopted M2 as the measure of money supply which is considered less liquid in nature and includes M1 plus savings and time deposits, certificates of deposits, and money market funds. M2 includes savings deposits in banks, which are bank accounts on which you cannot write a check directly, but from which you can easily withdraw the money at an automatic teller machine or bank. Many banks and other financial institutions also offer a chance to invest in money market funds, where the deposits of many individual investors are pooled together and invested in a safe way, such as short-term government bonds. It was anticipated that an increase in money supply would reduce the demand for credit.

4.5.4 Exchange Rate

As proposed by Bruno and Shin (2019), the foreign currency exchange rate influences the demand for credit via the impact on prices for inputs and outputs for agriculture and manufacturing purposes. Therefore, the USD/ZMW exchange rate was used as a variable in this study and was measured as the number of Kwacha units required to purchase one unit of United State Dollar. This is an important variable given that investment in agriculture at commercial level and manufacturing requires some machinery and other inputs which may not be available locally hence need to be imported. It is anticipated that depreciation of kwacha would increase the demand for credit.

4.5.5 91 days Treasury Bills Rate

This is an interest rate on securities used to finance short term financial requirements of the Government. The 91-day investment is predominantly bought compared to the other securities. Banks prefer to lend to the government through treasury bills because

the rates are often above inflation rate and earn banks positive returns and are also relatively safe compared to other investments. Treasury bill rate is an indicator of interest rate policy undertaken by the government and acts as a benchmark for rates charged by commercial banks, (Garr, 2013).

4.6 Data Sources

This research utilized secondary credit data from the Bank of Zambia. The raw data was mainly daily data which was converted into quarterly variables using averages for all independent variables while the dependent variable used the total amount of credit that was demanded in each quarter, from 2012 to 2021. The selection of the years was based on the availability of data from the Central bank for which all variables of interest were available. Therefore, the data employed began from the first quarter of 2012 to the first quarter of 2021.

4.7 Data Processing and Analysis

In order to examine the impact of lending rates on loan demand from different key economic sectors in Zambia, the study used EViews version 9.0 software package to organize the data and carry out economic modelling in order to achieve the objective of this study. The analysis began by carrying out a univariate analysis of the variables to analyse the data by use of descriptive statistical tools. The study proceeded to estimate the model using the proposed Demand Function for credit. Thereafter, the standard diagnostic tests were done which include the test for spatial autocorrelation and heteroscedasticity within the model by use of the Breusch-Pagan Godfrey test respectively.

4.8 The Econometric Technique

Stationarity Test Economic modelling using time series data attempts to quantify the historical relationships amongst variables of interest, which is then used to forecast the future. However, it must be noted that in the instances where economic fundamentals change significantly, then the historical relationships may not precisely be used forecasting the future without the great caution. Hence, it was of paramount importance that the time series variables followed at least a stochastic process and satisfies the condition of stationarity.

Non-stationarity series refers to times series data that has means and variances that are

not statistically constant overtime. This implies that non-stationarity series have varying means and variances at different points in time. If a series is differenced p times to become stationary, then it is said to be integrated of order p , denoted $I(p)$. In this study, the Augmented Dickey Fuller and Phillips Perron tests were used to determine the stationarity condition of the four variables of interest under the null hypothesis that there is a unit root in the series.

4.8.1 Testing for Lag Structure

One of the challenges in specifying an optimal lag length (ρ) for a model is that if the chosen lag length is too small, it is possible the model may be mis-specified due to the omission of relevant variables and if too large, it is possible the number of degrees of freedom may be lost. Thus, a model with relatively large number of lags is most likely to produce residuals that approach the white noise process but might not be parsimonious. On the other hand, a model with smaller lag lengths is more likely to be parsimonious but might not produce residuals that are random enough to approach a white noise process.

The above problem implies that there is the need to select an optimal lag length ρ which mitigates against the two extreme situations. The most used criterion in literature to select the optimal lag lengths that produces errors that approach a white noise process, subject to the constraint that the smallest number of lag terms will be selected are the Schwartz Bayesian information Criteria (SIC) and the Akaike information Criteria (AIC). These approaches were employed to determine the optimal lag length of variables for this study.

4.8.2 Diagnostic Tests

Kramer et al. (1985) asserts that conventional regression output needs to be supplemented by several specification tests before interpretation and discussion. This is for the purpose to verify that the conditions for drawing inferences about the coefficients in a linear model have been met including the residuals have a constant variance, are approximately normally distributed, and are independent of one another over time. A series of tests were thus applied in this study before the results were interpreted and conclusions were drawn. These include testing the residuals for normality, homoscedasticity, and autocorrelation. Also, a test was carried out on

coefficient in various models for their significance. Lastly, the Ramsey's Reset test and stability tests were done.

CHAPTER FIVE

RESULTS

5.1 Introduction

This chapter presents and analyses the empirical results of sensitivity of borrowers from the agriculture sector and manufacturing sector in Zambia to the lending rates in the credit market. The chapter is based on the results presented in appendix I, appendix II, and appendix III. In order to keep the findings in the right perspective and thus establish the sensitivity of borrowers from different economic sectors to lending rates in the credit market the in Zambia, Regression method was used to model the data. Appropriate tables were presented to facilitate the discussion.

5.2 Descriptive Analysis

The descriptive analysis shows the mean and standard deviation of the different variables of interest computed from the credit market data from the Bank of Zambia. It also presents the minimum and maximum values of the variables which help in getting a picture about the maximum and minimum values a variable achieved.

Table 5.1 Summary of descriptive statistics

	Agri credit (ZMW' Mn)	Manu credit (ZMW' Mn)	Lending Rate (%)	M2 Change (%)	Exchange Rate(K/USD)	91DTB Yields
Mean	13.439	8.098	22.97162	18.63054	9.966486	12.79595
Median	13.113	7.819	24.05000	16.66000	9.820000	13.72000
Maximum	22.679	14.628	29.20000	49.89000	21.62000	21.85000
Minimum	5.996	4.767	16.18000	-3.460000	4.940000	6.120000
Std. Dev.	3.758	2.471	4.245249	10.79403	4.498303	4.455567
Skewness	0.277	0.673	-0.349988	1.010314	1.016838	0.295960
Kurtosis	3.282	2.809	1.835206	4.451021	3.424805	2.191449
Jarque-Bera	0.595	2.848	2.847013	9.540446	6.654296	1.548024
Probability	0.743	0.241	0.240868	0.008478	0.035895	0.461159
Observations	37	37	37	37	37	37

Source: Study data

The results in table 5.1 show that only two variables were not multivariate normally distributed. These include the percentage change in the money supply (M2 change), and exchange rate over time. Nevertheless, the non-normality of individual variables does not affect the estimates obtained from times series data but that of the model error term (Fox, 2015).

5.3 Unit Root Test Results

Literature recommends that before any economic modelling is done based on time series data there is a need to check whether the underlying variables are stationary. Otherwise, this may lead to spurious regression giving unreliable results. Table 5.2 shows the results from the two statistical tests that were employed in this study.

Table 5.2 Results of the unit root tests.

Test	Augmented Dickey-Fuller test			Phillips-Perron test statistic		
Variable	Level	1st Diff.	Lag (SIC based)	Level	1st Diff.	Bandwidth
Agricultural Credit	-2.138678	-5.725507***	9	-2.215670	-5.762240***	3
Manufacturing Credit	-1.265113	-3.876290***	0	-0.870125	-3.853778***	3
Lending Rate	-2.015957	-3.217921***	0	-1.305422	-3.112402***	4
M2 Change	-0.542657	-5.369880***	3	-1.647374	-5.205242	0
91 days T-bills	-2.419407	-4.055182***	0	-1.879257	-4.169749***	3
Exchange Rate(K/USD)	2.162504	-4.276706***	0	1.915558	-4.276706***	0

*Note: The asterisks *, ** and *** imply significance at 10%, 5% and 1% levels respectively.*

Source: Study data

For all the variables of interest, the null hypothesis of the existence of the unit root was only rejected after the first difference at the 1 percent level of significance. This implies that all the variables used in this study were of integration of order (1) based on the two statistical tests.

5.4 Lag Selection Criteria

As proposed by Hussain (2009), before running the co-integration test, there is need to determine the optimal lag length to be used before embarking on economic modelling of time series data. The study used two lag selection criteria for both models that were estimated to achieve the two objectives of this study. Table 5.3 reports lag-order selection statistics.

Table 5.3 Lag Selection Criteria Results

Lag	Agricultural Credit		Manufacturing Credit	
	AIC	SC	AIC	SC
0	20.02390	20.25065	19.08657	19.31331
1	12.90179	14.26225*	12.19011	13.55057
2	12.97258	15.46676	12.25568	14.74986
3	13.11316	16.74105	11.77097	15.39887
4	10.14614*	14.90775	8.784615*	13.54623*

Source: Study data

* Indicates lag order selected by the criterion AIC: Akaike information criterion

SC: Schwarz information criterion

The result from table 5.3 shows that the Akaike information criterion had the lower criteria value compared to the Schwarz criterion. Both of the models show that the optimal lag was four (4).

5.5 Cointegration test

The study employed the bounds test to test for the presence of the long-run relationship among the variables of interest for all models which are critical to achieving the objectives of the study. The F-statistics values for all the models are presented in table 5.4.

Table 5.4 The Bounds Test Results

Null hypothesis (H_0): there is no long-run relationship

Test Statistic	Agricultural Credit		Manufacturing Credit	
	Value	K	Value	K
F-statistic	11.70016	4	4.641630	4

Critical Value Bounds

Level significance	I(0)	I(1)	I(0)	I(1)
10%	2.45	3.52	2.45	3.52
5%	2.86	4.01	2.86	4.01
2.5%	3.25	4.49	3.25	4.49
1%	3.74	5.06	3.74	5.06

Source: Study data

The results in table 5.4 show that all the three F-statistics were greater than critical values at least at 2.5 percent level of significance for both models. Only the Manufacturing credit model was insignificant at 1 percent level of significance. This implies that there was insufficient evidence for the presence of long run relations among the variables of interest.

5.6 Autoregressive Distributed Lag Model (ARDL)

Since all the variables in this study were $I(1)$ and the presence of cointegration among the variables of interest was not found, the ARDL was used. However, it must be noted that even the VECM would still be valid. Using the optimal lags of four (4) based on the Akaike Information Criterion (AIC) selection criteria, the estimated ARDL models are shown in table 5.5.

Table 5.5 Selected lags for the ARDL Models

Model	Maximum Independent	Selected Model
Agricultural Credit	4	ARDL (3, 4, 4, 4, 4)
Manufacturing Credit	4	ARDL (2, 0, 0, 1, 0)

Order of independent variables; lending rate, m2 change (%), exchange rate (k/usd), 91dtb yields.

5.7 Model Estimation

The next step was to estimate the long run equilibrium relationship among the variables of interest once the existence of cointegration among the variables is established.

5.7.1 Long Run Results

The results from the demand for credit by the agriculture sector were driven by all four variables of interest in this study. The long run results show that only the exchange rate was positively related to the growth in the credit for agriculture related investment expenditure. A ZMW1 depreciation in the kwacha would result in an increase in the demand for agricultural credit by 0.1 percent on average at 1 percent level of significance and the converse would hold.

On the other hand, the results showed that for every 1 percent increase in the lending rates amongst commercial banks is expected decrease demand for agricultural credit by 0.0239 percent on average at 5 percent level of significance. Additionally, a 1 percent increase in the money supply annually would decrease the demand for agricultural credit by 0.0232 percent on average at 1 percent level of significance in the long run. Furthermore, a 1 percent increase in the yields on the 91-day Treasury Bill would decrease the demand for agricultural credit by 0.0230 percent on average at 1 percent level of significance and the converse would hold. The long run results are presented in Table 5.6.

Table 5.6 Long run relation between demand for Credit and variables of interest

Variable	Agricultural Credit	Manufacturing credit
Lending rate	-0.023915** (0.009122)	-0.042382 (0.026950)
M2 change	-0.023175*** (0.002990)	0.001226 (0.005919)
Exchange Rate(k/usd)	0.103056*** (0.008944)	0.046060* (0.023337)
91dtbyr	-0.023028*** (0.006371)	0.054704*** (0.013858)
C	16.701377*** (0.140269)	15.648102*** (0.399446)

Note: * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$, Level of significance for standard errors in parentheses are standard errors.

Source: Study data

As opposed to the demand for credit by the agricultural sector, demand for credit to manufacturing was only influenced by the yields on the 91 days treasury bills at most 5 percent level of significance. For every 1 percent increase in the yields on the 91 days Treasury Bill would decrease in the credit demanded for manufacturing sector by 0.055 percent on average. The results also show that the lending rate has a negative yet insignificant effect on the credit demanded for manufacturing sector.

5.7.2 The Short Run Analysis

Table 5.7 presents the short-run results between the three models modelling demand for credit by the agricultural sector and the manufacturing sector and differential in the growth between the two sectors over the period.

From the results presented in Column 2 of Table 5.7 demand for credit by the agriculture sector in the short run was significantly determined by the annual percentage change in lagged Money Supply lagged up to three lags, three quarters lagged exchange rate (K/USD), and three quarters lagged yield on the 91 days Treasury

Bill.

The model for the demand agricultural credit had a negative error correction coefficient 1.0247 and was statistically significant at all three (3) levels of significance implying that when there is disequilibrium in the model in the short run, such disequilibrium was corrected to long run equilibrium at a speed of 102 percent. This error correcting coefficient implies that the model is overshooting and could be explained by the fact that returns on investment in agriculture tend to be realized over medium to long term as opposed to the case for manufacturing sector. Hence, the difference in the magnitude of the coefficient of the cointegration term in which the disequilibrium was corrected in the following period.

Using demand for credit from the manufacturing sector, the results show that annual change in the money supply, exchange rate (K/USD) and yield on the 91 days Treasury Bill were its main determinant in the short run. Specifically, a 1 percent increase in the annual money supply would lead to a 0.0173 percent reduction in the demand for credit towards the manufacturing sector. A 1-unit (Kwacha) depreciation in kwacha would increase demand for credit towards manufacturing sector by 0.04835 in the short-run. Additionally, the results also show that a 1 percent increase in the yield on the 91 days Treasury Bill would lead to 0.0223 percent increase in the demand for credit towards manufacturing sector.

The model for the demand for credit from the manufacturing sector had a negative error correction coefficient -0.408240 and was statistically significant at all three (3) levels of significance. This implies that when there is disequilibrium in the model in the short run, such disequilibrium is corrected to long run equilibrium at a speed of 40.82 percent.

Table 5.7 The Short Run Analysis

Variable	Agricultural Credit	Manufacturing credit
D(LENDING RATE)	0.017479 (0.012121)	0.259556 (0.152845)
D(M2 CHANGE_	0.000085 (0.002075)	-0.017302* (0.009749)
D(M2 CHANGE(-1))	0.009101*** (0.001716)	0.000501 (0.002442)
D(M2 CHANGE(-2))	0.007267*** (0.001538)	
D(M2 CHANGE(-3))	0.011378*** (0.002365)	
D(USA_K_USD)	-0.019658 (0.013225)	0.048343*** (0.016179)
D(USA_K_USD(-1))	-0.051790*** (0.010724)	
D(USA_K_USD(-2))	-0.007028 (0.012378)	
D(USA_K_USD(-3))	-0.052692*** (0.015z767)	
D(_91DTBYR)	-0.005744 (0.007162)	0.022332*** (0.006623)
D(_91DTBYR(-1))	0.000478 (0.008195)	
D(_91DTBYR(-2))	0.014237 (0.006744)	
D(_91DTBYR(-3))	0.015985*** (0.005312)	
CointEq(-1)	-1.024772*** (0.171401)	-0.408240*** (0.105630)

Agricultural Credit

Cointeq = LNMANUCREDIT - (-0.0424*LENDING RATE + 0.0012*M2 CHANGE + 0.0461*USA_K_USD + 0.0547*_91DTBYR + 15.6481)

Manufacturing credit

Cointeq = LNAGRICREDIT - (-0.0239*LENDING RATE-0.0232*M2 CHANGE + 0.1031*USA_K_USD -0.0230*_91DTBYR + 16.7014)

Note: * p < 0.1, **p < 0.05 and ***p < 0.01, Level of significance for standard errors in parentheses

Source: Study data

5.8 Diagnostic Checks Results

The diagnostics and stability tests were done to ensure that the models were correctly specified. The four tests that were used in this study includes normality test, autocorrelation test, Heteroskedasticity test and Cusum for stability of the models. The standard p-value was used to arrive at the conclusion. That is when probability value is less than ($p < 0.05$), the null hypothesis was rejected and when the probability value is more than ($p > 0.05$), the null hypothesis was not rejected. Table 5.8 presents the results for the two models.

Table 5.8 Summary of the Post Estimation Diagnostics

Test	Test statistic	p-value	Conclusion
Autocorrelation (LM test) Ho: no serial correlation			
Agricultural Credit	$F(1,8) = 0.338054$	0.5770	There is no serial correlation
Manufacturing Credit	$F(2,25) = 1.250327$	0.3037	There is no serial correlation
Normality test (Jarque bera) Ho: Residuals are multivariate normal			
Agricultural Credit	(JB) = 2.500423	0.28444	Residuals are normally distributed.
Manufacturing Credit	(JB) = 2.37006	0.21005	Residuals are normally distributed.
Heteroskedasticity (Breuch pagan) Ho: Constant variance			
Agricultural Credit	$F(2,7) = 2.051713$	0.1320	No Heteroskedasticity
Manufacturing Credit	$F(7,27) = 0.266973$	0.9615	No Heteroskedasticity
Multicollinearity Ho: no serious Multicollinearity	Correlation matrix	Max=0.791258	Multicollinearity is not Serious since all Coefficients of the correlation coefficient are below 0.85

Source: Study data

The second row of table 5.8 shows the hypothesis that was applied to test for the presence of autocorrelation in the two models that were derived from the two objectives of this study. Since the two probability statistics were all above 0.05, the study concludes that autocorrelation was not a serious issue in the models.

Secondly, table 5.8 also shows the results for normality test for two models of interest to this study. Using the probability value of 0.05 as the critical value, the study found the residues were multivariate normally distributed for both models which implies that spurious regression would not pose a problem.

Additionally, table 5.8 presents the results for the Heteroskedasticity test for both models based on the Breusch Pagan test. Since all probability values were greater than 0.05, the study concludes that Heteroskedasticity would not be a problem.

Furthermore, literature asserts that it is also important to perform the recursive tests when an ARDL model is employed in the time series economic modelling. The study employed both the Cumulative Sum of recursive residuals (CUSUM) and Cumulative Sum of Squares of recursive residuals (CUSUMSQ) to test the assumption that the coefficients are stable over time. The results from figures 5.1 to 5.4 show that the parameters for the two models plotted lies within 5 percent level of significance, hence, the study concluded that the parameters were stable over time.

Agricultural Credit

Figure 5.1 CUSUM test for stability of the agriculture sector credit

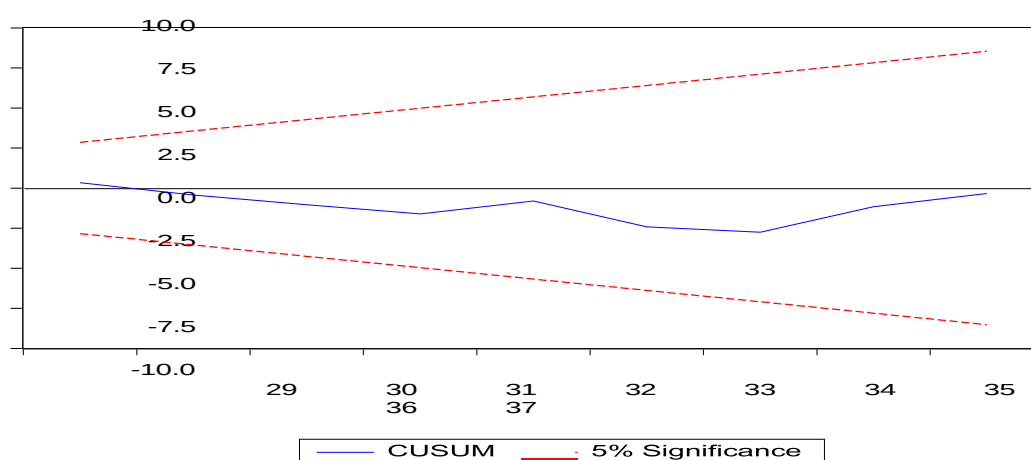
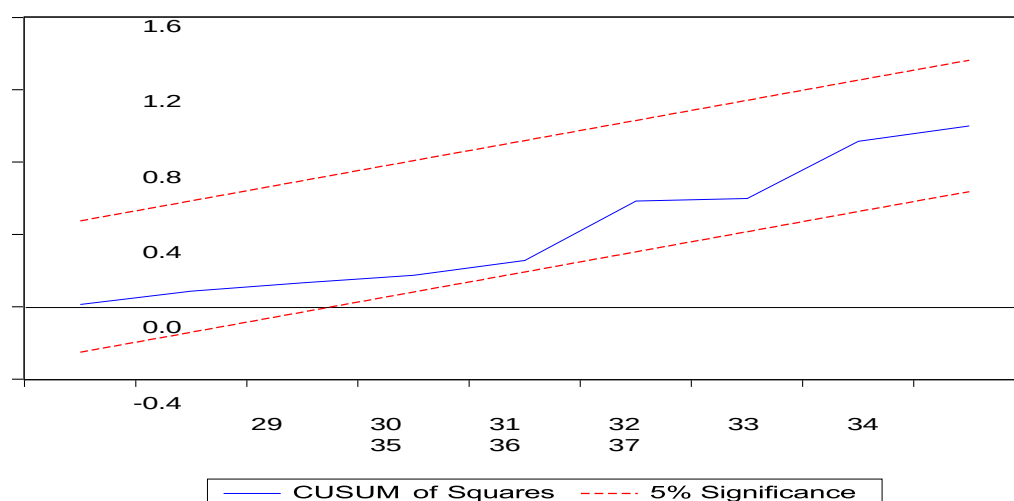


Figure 5.2 CUSUMQ test for agriculture sector credit



Manufacturing Credit

Figure 5.3 CUSUM test for manufacturing sector credit

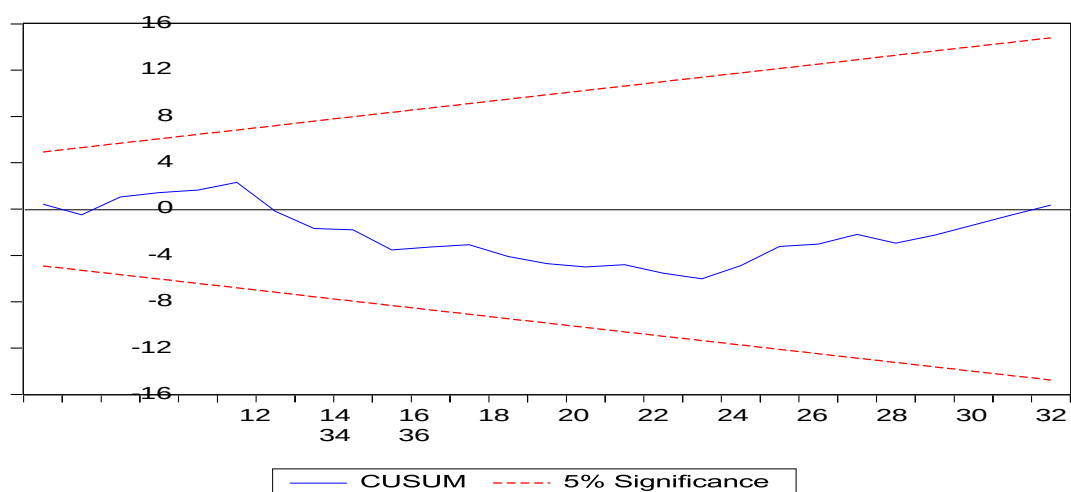
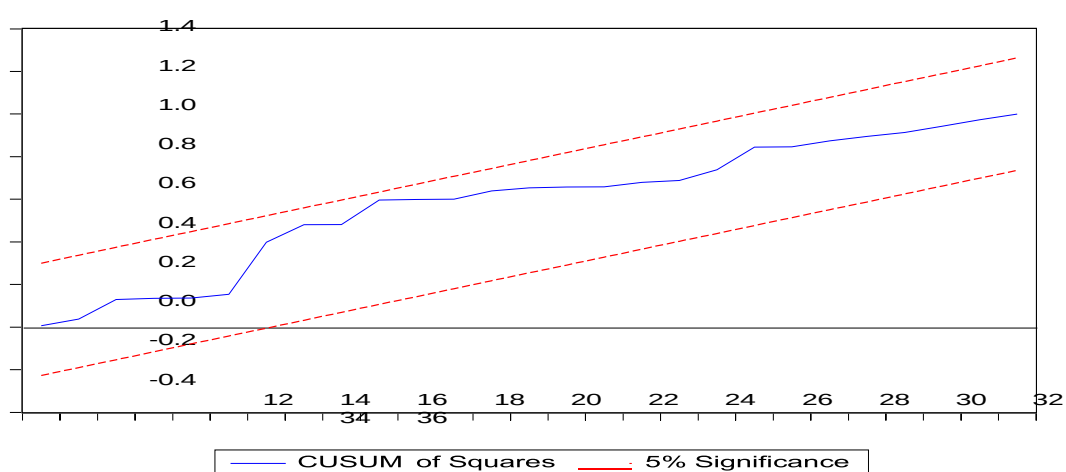


Figure 5.4 CUSUMQ test for manufacturing sector credit



CHAPTER SIX

DISCUSSION

6.1 Introduction

The chapter presents a discussion of the findings in the light of relevant literature to rationalize the findings of the study. The following discussion is made bearing in mind the objectives and findings of the study.

6.2 Discussion of Study Results

6.2.1 The relationship between lending rates and loan demand for the agriculture sector

In line with the specific objective to determine the relationship between lending rates and loan demand for the agriculture sector, the study had the null hypothesis that there was no relationship between lending rates and loan demand for agriculture activities and the alternative hypothesis that there was a relationship between lending rates and loan demand for agriculture activities. The results from the estimated model for the credit demanded by the agricultural sector showed that lending rate had a negative influence on the credit demand for agricultural purpose in the long run. This implies that an increase in the lending rates would reduce the credit demand for agricultural purposes and vice versa. This could be explained by the fact that high lending rates by commercial banks resulted in high cost of borrowing capital which in turn reduces the expected returns on the agricultural projects. Thus, investors would reduce demand for credit towards the sector. The study finding was consistent with the assertion of many researchers, including Fecke, et al (2016), Quashigah and Quashigah (2017), and Chishimba and Mukonda (2017) for studies based in Germany, Ghana, and Zambia respectively. They generally assert high lending rates encourage adverse selection of those demand for credit and those who take high risk and tend to obtain credit are normally those with high default rates.

With regard to growth in money supply (M2), the study found that growth in M2 in the long run was associated with an increase in the credit demanded from the commercial banks for agricultural purposes. This finding was in line with that of Sulaiman (2020) who, in a study conducted in Nigeria to examine the effect of money supply to private sector funding, found a positive and significant relationship between

credit demand and increase in M2 in which could be supported by the fact that increased money supply would translate into lower borrowing costs. Additionally, the study found that credit demanded for agricultural purpose was only influenced by the lagged values up to three quarters which may be explained by the fact that investment in agriculture sector tends to be medium term to long term hence taking long to respond to changes in money supply (Odhiambo , 2010). This could also be explained by the fact that generally, the productivity effects of expenditure on agriculture may materialize through various channels, and the effects often materialize with a lag, rather than contemporaneously (Benin, 2015).

Additionally, the study found that in the long run, there was a positive relationship between the credit demanded for agricultural purposes and the exchange rate between the dollar and kwacha, which was only significant when lagged. This implied that depreciation of the kwacha against the dollar was significantly associated with increased demand for credit towards agricultural in the long run. This could be explained by the fact that investment in agricultural requires machinery and inputs whose large proportions are imported. Thus, deprecation of the kwacha against the United States dollar implies that more units of kwacha would be needed to investment in the project than the prior periods. This finding was contrary to that of (Efanga, et al., 2020) who found that exchange rate had negative and insignificant impact on commercial banks' credit to agricultural sector in Nigeria.

Furthermore, the study found a negative relationship between credit demanded and yields on the 91-day Treasury Bill which only became positive and significant which lagged three quarters. This finding implies that increased yields on the 91 days Treasury Bill would discourage investors to demand credit from commercial banks for agricultural purposes and could be explained by the fact that the 91 Treasury Bill was less risky and matured more quickly as compared to the investment sector agricultural sector which normally requires a longer investment horizon. Hence, the potential investor would instead opt to invest in the 91-day Treasury Bills when the yields increase as opposed to demand credit for agricultural purpose. This could also be explained by the fact the higher treasury bills rates indicate increased cost of borrowing for the private sector (Ratha, 2005).

6.2.2 The relationship between lending rates and loan demand for the manufacturing sector

In line with the specific objective to determine the relationship between lending rates and loan demand for the manufacturing sector, the study had the null hypothesis that there was no relationship between lending rates and loan demand for the manufacturing sector and the alternative hypothesis that there was a relationship between lending rates and loan demand for the manufacturing sector. The findings found an insignificant relationship between the two variables, which led to a conclusion that was inconsistent with the assertion of Stiglitz (1989) and Quashigah and Quashigah (2017) who found a negative relationship in both the short and long run. This was however consistent with the findings of (Maiti, et al., 2020) who attributed the insignificant relationship between credit demand and lending rates to an underdeveloped credit market. This may also be explained by the fact that credit demanded by the manufacturing sector was low as compared to the credit demanded by the agricultural sector. Over the period of 2012 and 2021 covered in the study, credit demanded by the manufacturing sector averaged only ZMW 8.1 billion compared to ZMW13.4 billion. Furthermore, Simpasa and Pla (2016) highlighted that the credit allocation of commercial banks to the private sector differs from sector to sector and by type of borrower. Simpasa and Pla opined that banks' choice of sectors to lend was not always determined by the sectors' contribution to GDP and employment but is often informed by banks' own assessment of the viability and riskiness of the sector. An additional explanation could be that manufacturing firms required funds for long term investments in assets and capital expenditures, therefore short-term credit could not give significant results. This is supported by the findings of Marobhe (2014) who recommended for manufacturing firms to use more long term debts as compared to short term debts to finance their investments in assets, while ensuring that the gearing ratio is controlled, failure to which the firms profitability could be adversely impacted.

According to the study results, only exchange rates and the 91-day T-bill yield rate were found to be significant factor of credit demanded by the manufacturing sector in Zambia in the long run. The study revealed that there was a positive influence of exchange rates on the demand for credit by the manufacturing sector. This would be explained by the fact that depreciation of the kwacha against the United States Dollar

would be good in the long run demand for credit access for manufacturing production. Additionally, the study found a positive relationship between credit demanded by the manufacturing sector and yields on the 91 days Treasury Bill. One probable explanation is that of Nathan and Jagongo (2017) who noted that yields on the 91 days Treasury Bill were inversely related to the inflation rate, which had an impact on the viability of investments in manufacturing sector. Thus, higher yields on the 91 days Treasury Bill would signal an expected decline in inflation which would then make probable returns on investments in manufacturing more attractive, hence, the positive relationship.

The above findings were in line with that of (Okurut, et al., 2005) who, in their investigation of household credit found that credit demand had implications that linked together micro-level analysis with factors that determine long-term macro-economic performance. In view of this relationship, the authors highlighted that in Uganda, mainly macro-level policies were implemented from the early 1990s to improve the efficiency of the financial sector which included liberalisation of interest and foreign exchange rates.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

In chapter five, the paper presented the results from the estimation process, described the variables selected for the study and chapter six discussed results against previous studies carried out in the academic realm. The results of the tests are presented in appendix I, appendix II and appendix III. This section presents the conclusions against the study objectives and provides recommendations for policy and suggestions for future research.

7.2 Conclusion

The study sought to examine the relationship between credit demanded by the agriculture sector and the manufacturing sector to the lending rates offered by commercial banks in Zambia for the period 2012 to 2021. To achieve this, an ARDL model was estimated. Bearing in mind the objectives of the study and the results obtained, the following conclusions were made.

In line with the specific objective to determine the relationship between lending rates and loan demand for the agriculture sector, the findings showed that in the short run, demand for agricultural credit was only affected by the lagged variables for growth in money supply, exchange rate of a kwacha against dollar, and yields on the 91 days Treasury Bill. In the long run, the study found that the lending rate, growth in money supply, exchange rate of kwacha against dollar and yields on the 91 days Treasury Bill were all key determinants of credit demanded by the agricultural sector. The results revealed that for every 1 percent increase in the lending rates, credit demand by the agriculture sector is expected to decrease by 0.0239 percent on average at 5 percent level of significance.

With regards to the specific objective to determine the relationship between lending rates and loan demand for the manufacturing sector, study findings showed that in the short run, exchange rate of the kwacha against dollar and yields on the 91 days Treasury Bill were the key determinants of the demand for credit towards manufacturing sector. On the other hand, only yields on the 91 days Treasury Bill was the main determinant of demand for credit towards the manufacturing sector in the

long run. There was no significant relationship between lending rates and credit demand by the manufacturing sector.

7.3 Recommendations

The following recommendations are suggested based on the findings of the study.

Firstly, given the importance of the agriculture sector to Zambia's economy, there is need for the government to come up with policies aimed at promoting investments in the agriculture sector such as coming stabilizing interest rates and the exchange rates. This would aid to modernize the sector and improve overall efficiency by promoting predictability of the economic environment in which the agriculture sector operates. In turn, this would promote the contributions to GDP by the sector.

With respect to the manufacturing sector, there is need to develop policies that would stir up investment in the sector, which remains low. This would help the country to increase gains from the sector, by increasing the contributions to GDP. This would further increase the competitiveness of the country on regional and international markets, and subsequently improve the trade balance.

Furthermore, the Bank of Zambia needs to ensure that there is stability of the lending rate in the financial sector which would make investment in these two key sectors predictable. Key to achieving this is to ensure that the inflation rate is managed and to also ensure consistency in the monetary policy rate. This is pivotal for the attainment of the country's economic goals in line with Vision2030.

Finally, further research in the study area could be done such as to examine the impact of lending rates on loan repayment in Zambia, as well as to explore the causes of low domestic credit to the private sector in Zambia.

REFERENCES

- Amoono, E., Acquah, K. P. & Asmah, E. E., 2003. The Impact of Interest Rates on Demand for Credit and Loan Repayment by the Poor and SMEs in Ghana. Geneva: International Labour Organization.
- Arnold, I. J., Kool, C. J. & Raabe, K., 2006. Industries and the Bank Lending Effects of Credit Demand and Monetary Policy in Germany, Discussion Paper Series 1. Frankfurt: Deutsche Bundesbank.
- Bank, W., 2008. What are the Constraints to Inclusive Growth in Zambia?, Washington D.C: World Bank.
- Benin, S., 2015. Returns to Agricultural Public Spending in Africa South of the Sahara. Washington D.C: International Food Policy Research Institute.
- BoZ, 2021. Bank of Zambia. [Online] Available at: <https://boz.zm/monetary-and-financial-statistics.html> [Accessed 4 July 2021].
- BoZ, 2021. Bank of Zambia. [Online] Available at: <https://boz.zm/financial-stability.htm> [Accessed 4 February 2021].
- BoZ, 2021. Finscope Zambia 2020 Survey Report. Lusaka: Bank of Zambia.
- Bruno, V. & Shin, H. S., 2019. Dollar exchange rate as a credit supply factor - evidence from firm-level exports. BIS Working Papers No 819. Bruno: Bank for International Settlements.
- Byiers, B., Rand, J., Tarp, F. & Jeanet, B., 2010. Credit Demand in Mozambican Manufacturing. Journal of International Development, Volume 22, pp. 37-55.
- Calixte, A., 2013. Determinants of Bank Interest Margins in Sub-Saharan Africa, IMF Working Paper- African Department (WP/13/34), Washington D.C: International Monetary Fund.
- Calza, A., Gartner, C. & Sousa, J., 2003. Modelling the demand for loans to the private sector in the euro area. Applied Economics, 1(107-117), p. 51.

Cheelo, C. & Liebenthal, R., 2020. The Construction Sector in Zambia. In: Mining for Change: Natural Resources and Industry in Africa. Oxford: Oxford University Press, pp. 397-421.

Chileshe, P. M. & Olusegun, A. A., 2017. The Relative Importance of the Channels of Monetary Policy Transmission in a Developing Country: The Case of Zambia. *African Journal of Economic Review*, 5(11), pp. 149-174.

Chishimba, K. C. & Mukonda, F., 2017. Effect of High Cost of Lending on the Performance of the Zambian Economy. s.l., s.n.

Chokwe, E., 2017. Net Interest Rate Margins in Zambia: The Role of Competition Dynamics, Bank of Zambia Working Paper Series (WP/2017/2). Lusaka: Bank of Zambia.

Dehejia, R., Montgomery, H. & Morduch, J., 2005. Do interest rates matter? Credit demand in the Dhaka Slums. National Bureau of Economics Research Working Paper, pp. 329-342.

DNEAP, 2007. 2006 Survey of Mozambican Manufacturing Firms, Maputo: Republic of Mozambique.

Duong, P. B. & Izumida, Y., 2002. Rural Development Finance in Vietnam: A micro-economic analysis of household surveys. 35.. *World Development*, Volume 30, pp. 319-335.

Efanga, U. O., Etim, R. S. & Akpan, O., 2020. Impact of exchange rate on commercial banks credit to agricultural sector in Nigeria. *American Journal of Multidisciplinary Research & Development*, 2(4), pp. 52-62.

Fase, M. G., 1995. The demand For commercial bank loans and the lending rate. *European Economic Review*, 39(1), pp. 99-115.

Fecke, W., Feil, J. H. & Musshoff, O., 2016. Determinants of loan demand in agriculture: empirical evidence from Germany. *Agricultural Finance Review*, 76(4), pp. 462-476.

Florian, H., 2015. Interest rate elasticity of bank loans: The case for sector specific capital requirements, CFS Working Paper. Volume Series 504 ed. s.l.:Centre for Financial Studies (CFS).

Fox, J., 2015. Applied Regression Analysis and Generalized Linear Models. 3 ed. California: Sage.

FSDZ, 2021. Financial Sector Deepening Zambia. [Online] Available at: <https://www.fsdzambia.org/access-to-finance-sme-perceptions-of-financial-service-providers/> [Accessed 12 June 2021].

Garr, D. K., 2013. Determinants of Credit Risk in the Banking Industry of Ghana. *Developing Country Studies*, 11(64-74), p. 3.

GRZ, 2017. National Financial Inclusion Strategy 2017-2022, Lusaka: Ministry of Finance.

Hoff, K. & Stiglitz, J. E., 1990. Introduction: Imperfect Information and Rural Credit Markets: Puzzles and Policy Perspectives. *The World Bank Economic Review*, 4(3), pp. 235-250.

Hong-Ru, W. & Man-Ying, B., 2008. An Empirical Analysis on Interest Rate Elasticity of Demand about Rural Small Credit in China. China: Dalian.

Hussain, K., 2009. Monetary Policy Channels of Pakistan and Their Impact on Real GDP and Inflation. 41 ed. s.l.:CID Research Fellow and Graduate Student Working Paper Series.

Karlan, D. & Zinman, J., 2005. Elasticities of Demand for Consumer Credit, Working Papers 926, Yale: Economic Growth Center.

Karlan, D. & Zinman, J., 2013. Long-Run Price Elasticities of Demand for Credit: Evidence from a Countrywide Field Experiment in Mexico. *Latin American Economics eJournal*.

Keynes, J. M., 1936. The General Theory of Employment, Interest, and Money. Volume VII ed. s.l.:RES Collected Writing.

Levine, R., Beck, T. & Loayza, N., 2000. Finance and the sources of growth. *Journal of Financial Economics*, 58(1-2), pp. 261-300.

Lungu, M., 2007. Is There a Bank Lending Channel in Southern African Banking Systems?. *African Development Review*, 19(3), pp. 432-468.

Maiti, M., Ali Esson, I. & Vuković, D., 2020. The impact of interest rate on the demand for credit in Ghana. *Journal of Public Affairs*, 2(3).

Marobhe, M. I., 2014. The Influence of Capital Structure Structure on the Performance of Manufacturing Companies: Empirical Evidence From Listed Companies in East Africa. *Research Journal of Finance and Accounting*, pp. 92-100.

McKinnon, R. I., 1973. *Money and Capital in Economic Development*, Washington D.C: The Brookings Institution.

Melzer, I., Agasi, R. & Botha, H., 2010. Demand-side analysis of access to financial services for businesses in Zambia, Lusaka: Zambia Business Survey.

MNDP, 2017. *Seventh National Development Plan 2017-2021*. Lusaka: Ministry of National Development Planning.

Mphuka, C., Simumba, J., Maboshe, M. & Banda, B., 2014. *Supply Side Opportunities and Constraints of Bank Credit to MSMEs in Zambia: Lessons and Implications for Policy*, Dakar: Investment Climate and Business Environment Research Fund.

Nathan, M. M. & Jagongo, A., 2017. Monetary policy tools and inflation in Kenya. *Money*, 7(1), pp. 86-97.

Obamuyi, T. M., Edun, A. T. & Kayode, O., 2006. Bank Lending, Economic Growth and the Performance of the Manufacturing Sector in Nigeria. *European Scientific Journal*, 8(3), pp. 19-36.

Odhiambo, N. M., 2010. Financial deepening and poverty reduction in Zambia: an empirical investigation. *International Journal of Social Economics*, 37(1), pp. 4-53.

Okorut, F. N., Schoombee, A. & Van Der Berg, S., 2005. Credit Demand and Credit

Rationing in the Informal Financial Sector in Uganda. *South African Journal of Economics*, 73(3), pp. 482-497.

PMRC, 2020. *Economic Diversification in Zambia: Are We Getting There? Assessing the Prospects for Economic Diversification in Zambia*, Lusaka: Policy Monitoring and Research Centre.

Quashigah,, P. O. & Quashigah, N. K., 2017. Analysis of Demand for Credit and Interest Rate in Ghana. *Asian Journal of Economics, Business and Accounting*, 4(4), pp. 1-94.

Ratha, D., 2005. Demand for World Bank Lending. *Economic Systems*, 29(4), pp. 408-421.

Salazar, G., Bogan, V. & Turvey, C., 2011. *The Elasticity of Demand for Microcredit*. s.l.:Social Science Research Network.

Sebatta, C., Wamulume, M. & Mwansakilwa, C., 2014. Determinants of Smallholder Farmers' Access to Agricultural Finance in Zambia. *Journal of Agriculture Science*, 6(11), pp. 63-73.

Shaw, A. S., 1973. *Financial Deepening in Economic Development*, New York: Oxford University Press.

Simatele, M. C. H., 2004. *Financial Sector Reforms and Monetary Policy in Zambia..* Gothenburg Univeristy Economic Studies Series, Issue 133.

Simpasa, A. & Pla, L., 2016. *Sectoral Credit Concentration and Bank Performance in Zambia*. Abidjan: African Development Bank Group.

Snowden, B. & Vane, H. R., 2005. *Modern Macroeconomics*. Massacheusetts: Edward Elgar Publishing Limited.

Stiglitz,, J. E. & Weiss, A., 1981. Credit Rationing in Markets with Imperfect Information. *The American Economic Review*, 3(71), pp. 393-410.

Stiglitz, J. E., 1989. *Financial Markets and Development*. *Oxford Review of Economic Policy*, 5(4), pp. 55-68.

Sulaiman, A. V., 2020. Money Supply and Private Sector Funding in Nigeria: A Multi-Variant Study. *Asian Finance & Banking Review*, 4(1), pp. 24-41.

Theobald, T. & Silke, T., 2020. Euro area sovereign yield spreads as determinants of private sector borrowing costs. *Economic Modelling*, Volume 84, pp. 27-37.

Weller, C. E. & Radha, C., 2004. The effects of higher interest rate on consumers and the economy. s.l.:Centre for American Progress.

World Bank, 2018. The Global Findex Database 2017, Washington DC: World Bank.

World Bank, 2019. Agriculture Finance Disgnostic Zambia. Washington, DC: The World Bank Group.

World Bank, 2021. World Bank Data Bank. [Online] Available at: <https://data.worldbank.org/indicator/FS.AST.PRVT.GD.ZS?locations=ZM&view=chart> [Accessed 8 July 2021].

Xhaferri, S., 2016. The Role of Credit Markets in Financing the Economy. *International Journal of Economics, Commerce and Management*, 4(4), pp. 618-624.

Zamstats, 2021. The Monthly Bulletin, Lusaka: Zambia Statistics Agency.

ZDA, 2021. Zambia Development Agency. [Online] Available at: [Available at: https://www.zda.org.zm/index.php/priority-sectors/](https://www.zda.org.zm/index.php/priority-sectors/)

APPENDICES

APPENDIX I: AGRICULTURAL CREDIT

I-A: Diagnostic Tests

Null Hypothesis: LNAGRICREDIT has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.138678	0.2315
Test critical values:		
1% level	-3.626784	
5% level	-2.945842	
10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LNAGRICREDIT)

Method: Least Squares

Date: 09/22/21 Time:

21:49

Sample (adjusted): 2 37

Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNAGRICREDIT(-1)	-0.128837	0.060241	-2.138678	0.0397
C	2.138575	0.985824	2.169327	0.0371
R-squared	0.118576	Mean dependent var		0.030556
Adjusted R-squared	0.092652	S.D. dependent var		0.111815
S.E. of regression	0.106509	Akaike info criterion		-1.587223
Sum squared resid	0.385701	Schwarz criterion		-1.499249
Log likelihood	30.57001	Hannan-Quinn criter.		-1.556518
F-statistic	4.573945	Durbin-Watson stat		1.989678
Prob(F-statistic)	0.039730			

Null Hypothesis: D(LNAGRICREDIT) has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.725507	0.0000
Test critical values:		
1% level	-3.646342	
5% level	-2.954021	
10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.
 Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LNAGRICREDIT,2)
 Method: Least Squares
 Date: 09/22/21 Time:
 21:48
 Sample (adjusted): 5 37
 Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNAGRICREDIT(-1))	-1.133879	0.198040	-5.725507	0.0000
D(LNAGRICREDIT(-1),2)	0.130293	0.156567	0.832183	0.4121
D(LNAGRICREDIT(-2),2)	0.111791	0.108357	1.031698	0.3107
C	0.022114	0.013769	1.606093	0.1191
R-squared	0.747746	Mean dependent var		-0.022727
Adjusted R-squared	0.721650	S.D. dependent var		0.126695
S.E. of regression	0.066843	Akaike info criterion		-2.459728
Sum squared resid	0.129572	Schwarz criterion		-2.278333
Log likelihood	44.58550	Hannan-Quinn criter.		-2.398694
F-statistic	28.65443	Durbin-Watson stat		1.663070
Prob(F-statistic)	0.000000			

Null Hypothesis: LNAGRICREDIT has a unit root
 Exogenous: Constant
 Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.215670	0.2044
Test critical values:		
1% level	-3.626784	
5% level	-2.945842	
10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.010714
HAC corrected variance (Bartlett kernel)	0.006454

Phillips-Perron Test
 Equation
 Dependent Variable: D(LNAGRICREDIT)
 Method: Least Squares
 Date: 09/22/21 Time:
 21:50
 Sample (adjusted): 2 37
 Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNAGRICREDIT(-1)	-0.128837	0.060241	-2.138678	0.0397
C	2.138575	0.985824	2.169327	0.0371
R-squared	0.118576	Mean dependent var		0.030556
Adjusted R-squared	0.092652	S.D. dependent var		0.111815
S.E. of regression	0.106509	Akaike info criterion		-1.587223
Sum squared resid	0.385701	Schwarz criterion		-1.499249
Log likelihood	30.57001	Hannan-Quinn criter.		-1.556518
F-statistic	4.573945	Durbin-Watson stat		1.989678
Prob(F-statistic)	0.039730			

Null Hypothesis: D(LNAGRICREDIT) has a unit root

Exogenous: Constant

Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-5.762240	0.0000
Test critical values:	1% level -3.632900	
	5% level -2.948404	
	10% level -2.612874	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.012323
HAC corrected variance (Bartlett kernel)	0.011087

Phillips-Perron Test Equation

Dependent Variable: D(LNAGRICREDIT,2)

Method: Least Squares

Date: 09/22/21 Time: 21:51

Sample (adjusted): 3 37

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNAGRICREDIT(-1))	-1.054827	0.182596	-5.776835	0.0000
C	0.034577	0.020445	1.691184	0.1002
R-squared	0.502801	Mean dependent var		-0.004000
Adjusted R-squared	0.487734	S.D. dependent var		0.159728
S.E. of regression	0.114321	Akaike info criterion		-1.444159
Sum squared resid	0.431290	Schwarz criterion		-1.355282
Log likelihood	27.27279	Hannan-Quinn criter.		-1.413479
F-statistic	33.37182	Durbin-Watson stat		1.919836
Prob(F-statistic)	0.000002			

APPENDIX I-B. REGRESSION ANALYSIS

Appendix I-B Regression analysis for agriculture credit demand

VAR Lag Order Selection Criteria

Endogenous variables: LNAGRICREDIT
AVERAGE_LENDING_RATE M2_CHANGE_ANNUAL
USA_K_USD_91DTBYR

Exogenous variables: C

Date: 09/23/21 Time: 16:40

Sample: 1 37

Included observations: 33

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-309.9283	NA	133.9241	19.08657	19.31331	19.16286
1	-171.1369	227.1133	0.138231	12.19011	13.55057	12.64787
2	-147.2188	31.89081	0.165084	12.25568	14.74986	13.09490
3	-114.2210	33.99768	0.138919	11.77097	15.39887	12.99165
4	-39.94615	54.01808*	0.014293*	8.784615*	13.54623*	10.38675*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Dependent Variable: T

LNAGRICREDI

Method: ARDL

Date: 09/22/21 Time: 22:29

Sample (adjusted): 5 37

Included observations: 33 after adjustments

Maximum dependent lags: 4 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (4 lags, automatic): AVERAGE_LENDING_RATE

M2_CHANGE_ANNUAL_____USA_K_USD_91DTBYR

Fixed regressors: C

Number of models evaluated: 2500

Selected Model: ARDL(3, 4, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNAGRICREDIT(-1)	0.139761	0.187789	0.744243	0.4757
LNAGRICREDIT(-2)	-0.045122	0.109303	-0.412816	0.6894
LNAGRICREDIT(-3)	-0.119411	0.097423	-1.225692	0.2514
AVERAGE_LENDING_RATE	0.017479	0.012121	1.442086	0.1832
AVERAGE_LENDING_RATE(-1)	-0.032528	0.017128	-1.899176	0.0900
AVERAGE_LENDING_RATE(-2)	0.029197	0.022425	1.301987	0.2253
AVERAGE_LENDING_RATE(-3)	-0.003997	0.021764	-0.183634	0.8584
AVERAGE_LENDING_RATE(-4)	-0.034659	0.013074	-2.651015	0.0264
M2_CHANGE_ANNUAL_____	8.49E-05	0.002075	0.040916	0.9683
M2_CHANGE_ANNUAL____(-1)	0.003912	0.001566	2.498259	0.0340
M2_CHANGE_ANNUAL____(-2)	-0.009101	0.001716	-5.302480	0.0005
M2_CHANGE_ANNUAL____(-3)	-0.007267	0.001538	-4.725213	0.0011
M2_CHANGE_ANNUAL____(-4)	-0.011378	0.002365	-4.811058	0.0010
USA_K_USD	-0.019658	0.013225	-1.486449	0.1713

USA_K_USD(-1)	0.013757	0.010053	1.368485	0.2043
USA_K_USD(-2)	0.051790	0.010724	4.829103	0.0009
USA_K_USD(-3)	0.007028	0.012378	0.567796	0.5841
USA_K_USD(-4)	0.052692	0.015767	3.341985	0.0086
_91DTBYR	-0.005744	0.007162	-0.801957	0.4432
_91DTBYR(-1)	0.012847	0.005545	2.316774	0.0457
_91DTBYR(-2)	-0.000478	0.008195	-0.058363	0.9547
_91DTBYR(-3)	-0.014237	0.006744	-2.111008	0.0640
_91DTBYR(-4)	-0.015985	0.005312	-3.009025	0.0147
C	17.11511	2.813186	6.083887	0.0002

R-squared	0.996737	Mean dependent var	16.4460
Adjusted R-squared	0.988396	S.D. dependent var	0.20985
S.E. of regression	0.022605	Akaike info criterion	-
Sum squared resid	0.004599	Schwarz criterion	-
Log likelihood	99.66945	Hannan-Quinn criter.	-
F-statistic	119.5120	Durbin-Watson stat	2.19874
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Bounds Test

Date: 09/22/21 Time: 22:28

Sample: 5 37

Included observations: 33

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	11.70016	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Test Equation:

Dependent Variable: D(LNAGRICREDIT)

Method: Least Squares

Date: 09/22/21 Time: 22:28

Sample: 5 37

Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNAGRICREDIT(-1))	0.164533	0.098478	1.670764	0.1291
D(LNAGRICREDIT(-2))	0.119411	0.097423	1.225692	0.2514
D(AVERAGE_LENDING_RATE)	0.017479	0.012121	1.442086	0.1832
D(AVERAGE_LENDING_RATE(-1))	0.009459	0.012996	0.727838	0.4852
D(AVERAGE_LENDING_RATE(-2))	0.038656	0.012762	3.028928	0.0143
D(AVERAGE_LENDING_RATE(-3))	0.034659	0.013074	2.651015	0.0264
D(M2_CHANGE_ANNUAL_____)	8.49E-05	0.002075	0.040916	0.9683
D(M2_CHANGE_ANNUAL____(-1))	0.027746	0.003574	7.762893	0.0000
D(M2_CHANGE_ANNUAL____(-2))	0.018645	0.002853	6.535626	0.0001
D(M2_CHANGE_ANNUAL____(-3))	0.011378	0.002365	4.811058	0.0010
D(USA_K_USD)	-0.019658	0.013225	-1.486449	0.1713
D(USA_K_USD(-1))	-0.111510	0.022573	-4.939868	0.0008
D(USA_K_USD(-2))	-0.059720	0.019208	-3.109156	0.0125
D(USA_K_USD(-3))	-0.052692	0.015767	-3.341985	0.0086
D(_91DTBYR)	-0.005744	0.007162	-0.801957	0.4432
D(_91DTBYR(-1))	0.030701	0.006497	4.725735	0.0011
D(_91DTBYR(-2))	0.030222	0.006481	4.663150	0.0012
D(_91DTBYR(-3))	0.015985	0.005312	3.009025	0.0147
C	17.11511	2.813186	6.083887	0.0002
AVERAGE_LENDING_RATE(-1)	-0.024508	0.009380	-2.612679	0.0281
M2_CHANGE_ANNUAL_____(-1)	-0.023749	0.003624	-6.553024	0.0001
USA_K_USD(-1)	0.105609	0.016806	6.283895	0.0001
_91DTBYR(-1)	-0.023598	0.007393	-3.191987	0.0110
LNAGRICREDIT(-1)	-1.024772	0.171401	-5.978794	0.0002
R-squared	0.965784	Mean dependent var		0.017576
Adjusted R-squared	0.878342	S.D. dependent var		0.064809
S.E. of regression	0.022605	Akaike info criterion		-4.586027
Sum squared resid	0.004599	Schwarz criterion		-3.497658
Log likelihood	99.66945	Hannan-Quinn criter.		-4.219824
F-statistic	11.04488	Durbin-Watson stat		2.198747
Prob(F-statistic)	0.000396			

ARDL Cointegrating And Long Run Form
Dependent Variable: LNAGRICREDIT
Selected Model: ARDL(3, 4, 4, 4, 4)
Date: 09/22/21 Time: 22:27
Sample: 1 37
Included observations: 33

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNAGRICREDIT(-1))	0.164533	0.098478	1.670764	0.1291
D(LNAGRICREDIT(-2))	0.119411	0.097423	1.225692	0.2514
D(AVERAGE_LENDING_RATE)	0.017479	0.012121	1.442086	0.1832
D(AVERAGE_LENDING_RATE(-1))	-0.029197	0.022425	-1.301987	0.2253
D(AVERAGE_LENDING_RATE(-2))	0.003997	0.021764	0.183634	0.8584
D(AVERAGE_LENDING_RATE(-3))	0.034659	0.013074	2.651015	0.0264
D(M2_CHANGE_ANNUAL_)	0.000085	0.002075	0.040916	0.9683
D(M2_CHANGE_ANNUAL_(-1))	0.009101	0.001716	5.302480	0.0005
D(M2_CHANGE_ANNUAL(-2))	0.007267	0.001538	4.725213	0.0011
D(M2_CHANGE_ANNUAL(-3))	0.011378	0.002365	4.811058	0.0010
D(USA_K_USD)	-0.019658	0.013225	-1.486449	0.1713
D(USA_K_USD(-1))	-0.051790	0.010724	-4.829103	0.0009
D(USA_K_USD(-2))	-0.007028	0.012378	-0.567796	0.5841
D(USA_K_USD(-3))	-0.052692	0.015767	-3.341985	0.0086
D(_91DTBYR)	-0.005744	0.007162	-0.801957	0.4432
D(_91DTBYR(-1))	0.000478	0.008195	0.058363	0.9547
D(_91DTBYR(-2))	0.014237	0.006744	2.111008	0.0640
D(_91DTBYR(-3))	0.015985	0.005312	3.009025	0.0147
CointEq(-1)	-1.024772	0.171401	-5.978794	0.0002

Cointeq = LNAGRICREDIT - (-0.0239*AVERAGE_LENDING_RATE -0.0232
*M2_CHANGE_ANNUAL_____ + 0.1031*USA_K_USD -0.0230*_91DTBYR
+ 16.7014)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AVERAGE_LENDING_RATE	-0.023915	0.009122	-2.621831	0.0277
M2_CHANGE_ANNUAL_____	-0.023175	0.002990	-7.751040	0.0000
USA_K_USD	0.103056	0.008944	11.522328	0.0000
_91DTBYR	-0.023028	0.006371	-3.614360	0.0056
C	16.701377	0.140269	119.067046	0.0000

ARDL Cointegrating And Long Run Form
 Dependent Variable: LNAGRICREDIT
 Selected Model: ARDL(3, 4, 4, 4, 4)
 Date: 09/22/21 Time:
 22:31
 Sample: 1 37
 Included observations: 33

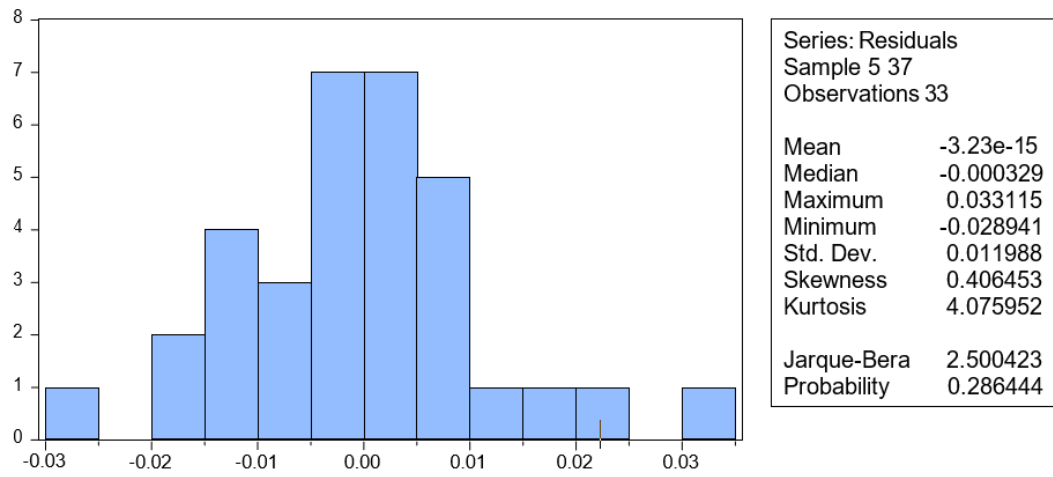
Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNAGRICREDIT(-1))	0.164533	0.098478	1.670764	0.1291
D(LNAGRICREDIT(-2))	0.119411	0.097423	1.225692	0.2514
D(AVERAGE_LENDING_RATE)				
	0.017479	0.012121	1.442086	0.1832
D(AVERAGE_LENDING_RATE				
(-1))	-0.029197	0.022425	-1.301987	0.2253
D(AVERAGE_LENDING_RATE				
(-2))	0.003997	0.021764	0.183634	0.8584
D(AVERAGE_LENDING_RATE				
(-3))	0.034659	0.013074	2.651015	0.0264
D(M2_CHANGE_ANNUAL)	0.000085	0.002075	0.040916	0.9683
D(M2_CHANGE_ANNUAL(-1))				
	0.009101	0.001716	5.302480	0.0005
D(M2_CHANGE_ANNUAL(-2))				
	0.007267	0.001538	4.725213	0.0011
D(M2_CHANGE_ANNUAL(-3))				
	0.011378	0.002365	4.811058	0.0010
D(USA_K_USD)	-0.019658	0.013225	-1.486449	0.1713
D(USA_K_USD(-1))	-0.051790	0.010724	-4.829103	0.0009
D(USA_K_USD(-2))	-0.007028	0.012378	-0.567796	0.5841
D(USA_K_USD(-3))	-0.052692	0.015767	-3.341985	0.0086
D(_91DTBYR)	-0.005744	0.007162	-0.801957	0.4432
D(_91DTBYR(-1))	0.000478	0.008195	0.058363	0.9547
D(_91DTBYR(-2))	0.014237	0.006744	2.111008	0.0640
D(_91DTBYR(-3))	0.015985	0.005312	3.009025	0.0147
CointEq(-1)	-1.024772	0.171401	-5.978794	0.0002

Cointeq = LNAGRICREDIT - (-0.0239*AVERAGE_LENDING_RATE -0.0232
 *M2_CHANGE_ANNUAL_____ + 0.1031*USA_K_USD -0.0230*_91DTBYR
 + 16.7014)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AVERAGE_LENDING_RATE	-0.023915	0.009122	-2.621831	0.0277
M2_CHANGE_ANNUAL_____	-0.023175	0.002990	-7.751040	0.0000
USA_K_USD	0.103056	0.008944	11.522328	0.0000
_91DTBYR	-0.023028	0.006371	-3.614360	0.0056
C	16.701377	0.140269	119.067046	0.0000
F-statistic	0.338054	Prob. F(1,8)		0.5770
Obs*R-squared	1.337937	Prob. Chi-Square(1)		0.2474



APPENDIX II: MANUFACTURING CREDIT

II-A: Diagnostic Tests

Null Hypothesis: LNMANUCREDIT has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.265113	0.6346
Test critical values:	1% level	-3.632900
	5% level	-2.948404
	10% level	-2.612874

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LNMANUCREDIT)

Method: Least Squares

Date: 09/22/21 Time: 21:53

Sample (adjusted): 3 37

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNMANUCREDIT(-1)	-0.076861	0.060754	-1.265113	0.2150
D(LNMANUCREDIT(-1))	0.422729	0.165684	2.551423	0.0157
C	1.238562	0.962422	1.286922	0.2074
R-squared	0.178399	Mean dependent var		0.032000
Adjusted R-squared	0.127049	S.D. dependent var		0.101193
S.E. of regression	0.094546	Akaike info criterion		-1.797636
Sum squared resid	0.286049	Schwarz criterion		-1.664320
Log likelihood	34.45862	Hannan-Quinn criter.		-1.751615
F-statistic	3.474165	Durbin-Watson stat		1.998175
Prob(F-statistic)	0.043110			

Null Hypothesis: D(LNMANUCREDIT) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.876290	0.0054
Test critical values:	1% level	-3.632900
	5% level	-2.948404
	10% level	-2.612874

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LNMANUCREDIT,2)

Method: Least Squares

Date: 09/22/21 Time: 21:54

Sample (adjusted): 3 37

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNMANUCREDIT(-1))	-0.628445	0.162125	-3.876290	0.0005
C	0.021172	0.016804	1.259933	0.2165
R-squared	0.312867	Mean dependent var		0.002857
Adjusted R-squared	0.292045	S.D. dependent var		0.113386
S.E. of regression	0.095403	Akaike info criterion		-1.805973
Sum squared resid	0.300356	Schwarz criterion		-1.717096
Log likelihood	33.60453	Hannan-Quinn criter.		-1.775293
F-statistic	15.02563	Durbin-Watson stat		1.951290
Prob(F-statistic)	0.000477			

Null Hypothesis: LNMANUCREDIT has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-0.870125	0.7862
Test critical values:	1% level	-3.626784
	5% level	-2.945842
	10% level	-2.611531

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.009653
HAC corrected variance (Bartlett kernel)	0.015218

Phillips-Perron Test Equation

Dependent Variable: D(LNMANUCREDIT)

Method: Least Squares

Date: 09/22/21 Time: 21:54

Sample (adjusted): 2 37

Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNMANUCREDIT(-1)	-0.029176	0.060542	-0.481924	0.6329
C	0.493142	0.959446	0.513986	0.6106
R-squared	0.006785	Mean dependent var		0.030833
Adjusted R-squared	-0.022428	S.D. dependent var		0.099982
S.E. of regression	0.101097	Akaike info criterion		-1.691518
Sum squared resid	0.347501	Schwarz criterion		-1.603544
Log likelihood	32.44732	Hannan-Quinn criter.		-1.660813

F-statistic	0.232250	Durbin-Watson stat	1.223569
Prob(F-statistic)	0.632948		

Null Hypothesis: D(LNMANUCREDIT) has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.853778	0.0057
Test critical values:	1% level -3.632900	
	5% level -2.948404	
	10% level -2.612874	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.008582
HAC corrected variance (Bartlett kernel)	0.008344

Phillips-Perron Test Equation
Dependent Variable: D(LNMANUCREDIT,2)
Method: Least Squares
Date: 09/22/21 Time: 21:55
Sample (adjusted): 3 37
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNMANUCREDIT(-1))	-0.628445	0.162125	-3.876290	0.0005
C	0.021172	0.016804	1.259933	0.2165
R-squared	0.312867	Mean dependent var		0.002857
Adjusted R-squared	0.292045	S.D. dependent var		0.113386
S.E. of regression	0.095403	Akaike info criterion		-1.805973
Sum squared resid	0.300356	Schwarz criterion		-1.717096
Log likelihood	33.60453	Hannan-Quinn criter.		-1.775293
F-statistic	15.02563	Durbin-Watson stat		1.951290
Prob(F-statistic)	0.000477			

APPENDIX II-B: REGRESSION ANALYSIS

Appendix II-B Regression analysis for manufacturing credit demand

VAR Lag Order Selection Criteria

Endogenous variables: LNMANUCREDIT
AVERAGE_LENDING_RATE M2_CHANGE_ANNUAL
USA_K_USD _91DTBYR

Exogenous variables: C

Date: 09/22/21 Time: 22:37

Sample: 1 37

Included observations: 33

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-325.3944	NA	341.9320	20.02390	20.25065	20.10020
1	-182.8796	233.2061	0.281633	12.90179	14.26225*	13.35955
2	-159.0476	31.77602	0.338104	12.97258	15.46676	13.81180
3	-136.3671	23.36777	0.531699	13.11316	16.74105	14.33383
4	-62.41129	53.78604*	0.055771*	10.14614*	14.90775	11.74828*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Dependent Variable: LNMANUCREDIT

Method: ARDL

Date: 09/22/21 Time: 22:40

Sample (adjusted): 3 37

Included observations: 35 after adjustments

Maximum dependent lags: 4 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (4 lags, automatic): AVERAGE_LENDING_RATE

M2_CHANGE_ANNUAL USA_K_USD _91DTBYR

Fixed regressors: C

Number of models evaluated:

2500

Selected Model: ARDL(2, 0, 0, 0)

1,

Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNMANUCREDIT(-1)	0.851316	0.168285	5.058758	0.0000
LNMANUCREDIT(-2)	-0.259556	0.152845	-1.698160	0.1010
AVERAGE_LENDING_RATE	-0.017302	0.009749	-1.774752	0.0872
M2_CHANGE_ANNUAL	0.000501	0.002442	0.205013	0.8391
USA_K_USD	0.048343	0.016179	2.987939	0.0059
USA_K_USD(-1)	-0.029539	0.017411	-1.696581	0.1013
_91DTBYR	0.022332	0.006623	3.372089	0.0023
C	6.388183	1.584610	4.031392	0.0004

R-squared	0.953760	Mean dependent var	15.89029
Adjusted R-squared	0.941772	S.D. dependent var	0.282973
S.E. of regression	0.068283	Akaike info criterion	-2.332687
Sum squared resid	0.125888	Schwarz criterion	-1.977179
Log likelihood	48.82203	Hannan-Quinn criter.	-2.209966
F-statistic	79.55846	Durbin-Watson stat	2.042415
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Bounds Test

Date: 09/22/21 Time: 22:44

Sample: 3 37

Included observations: 35

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.141630	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Test Equation:

Dependent Variable: D(LNMANUCREDIT)

Method: Least Squares

Date: 09/22/21 Time: 22:44

Sample: 3 37

Included observations: 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNMANUCREDIT(-1))	0.350196	0.150433	2.327923	0.0277
D(USA_K_USD)	0.055295	0.014732	3.753320	0.0008
C	7.848654	1.977509	3.968959	0.0005
AVERAGE_LENDING_RATE(-1)	-0.014480	0.009439	-1.534048	0.1367
M2_CHANGE_ANNUAL____(-1)	0.002809	0.002351	1.194650	0.2426
USA_K_USD(-1)	0.015760	0.010119	1.557358	0.1310
_91DTBYR(-1)	0.024799	0.008170	3.035166	0.0053
LNMANUCREDIT(-1)	-0.507386	0.128611	-3.945122	0.0005
R-squared	0.630778	Mean dependent var		0.032000
Adjusted R-squared	0.535053	S.D. dependent var		0.101193
S.E. of regression	0.069000	Akaike info criterion		-2.311777
Sum squared resid	0.128549	Schwarz criterion		-1.956269
Log likelihood	48.45610	Hannan-Quinn criter.		-2.189056

F-statistic	6.589520	Durbin-Watson stat	2.203315
Prob(F-statistic)	0.000137		

ARDL Cointegrating And Long Run Form
Dependent Variable: LNMANUCREDIT
Selected Model: ARDL(2, 0, 0, 1, 0)
Date: 09/22/21 Time: 22:41
Sample: 1 37
Included observations: 35

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNMANUCREDIT(-1))	0.259556	0.152845	1.698160	0.1010
D(AVERAGE_LENDING_RATE)	-0.017302	0.009749	-1.774752	0.0872
D(M2_CHANGE_ANNUAL)	0.000501	0.002442	0.205013	0.8391
D(USA_K_USD)	0.048343	0.016179	2.987939	0.0059
D(_91DTBYR)	0.022332	0.006623	3.372089	0.0023
CointEq(-1)	-0.408240	0.105630	-3.864827	0.0006

Cointeq = LNMANUCREDIT - (-0.0424*AVERAGE_LENDING_RATE +
0.0012*M2_CHANGE_ANNUAL + 0.0461*USA_K_USD + 0.0547
*_91DTBYR + 15.6481)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AVERAGE_LENDING_RATE	-0.042382	0.026950	-1.572620	0.1275
M2_CHANGE_ANNUAL	0.001226	0.005919	0.207145	0.8375
USA_K_USD	0.046060	0.023337	1.973642	0.0587
_91DTBYR	0.054704	0.013858	3.947422	0.0005
C	15.648102	0.399446	39.174541	0.0000

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.266973	Prob. F(7,27)	0.9615
Obs*R-squared	2.265710	Prob. Chi-Square(7)	0.9437
Scaled explained SS	3.668261	Prob. Chi-Square(7)	0.8171

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.250327	Prob. F(2,25)	0.3037
Obs*R-squared	3.182574	Prob. Chi-Square(2)	0.2037

