

MAKERERE UNIVERSITY

MAKERERE UNIVERSITY BUSINESS SCHOOL

THE EFFECT OF MONETARY POLICY ON PRIVATE SECTOR CREDIT GROWTH IN UGANDA

BY

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A DISSERTATION SUBMITTED TO MAKERERE UNIVERSITY BUSINESS SCHOOL (FACULTY OF GRADUATE STUDIES AND RESEARCH) IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF MASTER OF ARTS IN ECONOMIC POLICY AND MANAGEMENT OF MAKERERE UNIVERSITY

PLAN A

NOVEMBER 2023

DECLARATION

I declare that this research dissertation entitled; "***The Effect Of Monetary Policy On Private Sector Credit Growth In Uganda***" is my original work and it has never been presented to any academic institution of higher learning for the award of an academic qualification.

Signature.....Date: 23/11/2023

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APPROVAL

This is to certify that this dissertation has been submitted for examination with our approval as supervisors.

Signature .....Date 23/11/2023.....

DR. ODONGO TOMSON

Signature .....Date 23.11.2023.....

MR. OKUMU MOSES

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DEDICATION

I dedicate this study to all the stakeholders that contributed to its successful completion; the supervisors, family and friends, colleagues and my employer. A Luta continua!

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ABSTRACT

This study investigated the effect of monetary policy on Private sector credit growth in Uganda. The specific objectives of the study included investigating the determinants of private sector credit growth in Uganda, examining the causal relationship between commercial lending rate, money supply and private sector credit growth. Employing the Vector Error Correction Model (VECM), the study used monthly time series data that spanned a period of 12 years ranging from 2010 to 2022. The results of the study showed that, in the short run, both money supply and lending rate have positive and significant effect on private sector credit growth while the positive effect of interbank rate was found not to be significant both in the short run and long run. The short run results also indicated that Treasury bill rate has a negative and significant effect on private sector credit growth. In the long run, money supply had a negative effect on private sector credit, though not statistically significant. Lending rate has a negative and significant effect on private sector credit growth in the long run. Treasury bill rate had a positive and significant effect on private sector credit growth in the long run. The granger casualty test indicated a uni-direction causation running from money supply to private sector credit growth, while a uni-direction causation was confirmed running from private sector credit growth to lending rate in Ugandan. The study recommends for further reforms aimed at maintaining monetary policy credibility and promotion of macroeconomic stability and financial sector development.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This section explains the overview and the linkage between private sector credit as the dependent variable and monetary policy as the independent variable. In addition, variables such as lending rate, money supply, treasury bill rate and interbank rate are explained as measures of monetary policy in relation to the private sector credit growth. The chapter is organized in the following sections, the background of the study, the problem statement, the objectives, scope and significance of the study.

1.1 Background of the Study

The private sector is said to be the engine of economic growth for a country, especially, for developing economies, the main private sector players being partnerships, sole proprietorships, small and mid-sized (SME) businesses, large corporations and trade unions. These entities operate across all sectors of the economy, contributes massively to the growth of the economy and employs majority of the citizenry. Most private sector operators however have severe information opacity coupled with relatively low financial backbone, which decreases their credit worthiness and make them non-attractive to the lenders.

The role of finance in economic development has been an ongoing debate dating back to the work of (Schumpeter, 1911). Economist in particular have been trying to understand the relationship between monetary policy and various macroeconomic variables including credit, prices, and output, among others. Specifically, to find out the real effects of money on the economies of nations if any (Kenton, 2018; Kimberly, 2018; Imoisi, Moses, & Opara, 2014; Fasanya, Mariam, & Onakoya, 2013)**,** hence its dominance in the policy and academic

discussions with respect to private sector credit. Most economists advocate for the use of monetary policy for short run stabilization measures. Failure to pursue the right monetary policies can have serious implications on an economy. Monetary policy works in part by varying credit flows in accordance with standard procedure of monetary policy transmission channel.

The Government of Uganda has set up the National Strategy for Private sector development 2017/18-2021/22 and one of the three interventions that this research study will look at is the micro-pillar; "increase profitability and growth of the enterprise" through increasing access to finance by ensuring a conducive interest rate regime through monetary policy. For the ten years from 2010 to 2020, domestic credit to the private sector in Uganda grew from 8.2% to 13% of GDP (International Monetary Fund, 2020). However, to-date private sector credit growth remains weak and below historical trends despite the full landing of the economy in January 2022. There is a widening gap between credit demand and supply as proxied by values of loan applications and approvals which seem to indicate that banks are concentrating on cleaning their loan books following the expiry of credit relief measures for most sectors (BOU, 2022).

Monetary policy strategy assigns a prominent role to money supply and credit analysis as elements for the assessment of risks to price stability. Money and credit analysis, therefore, ensures that the important information stemming from money and credit is considered in the monetary and credit policy decision-making process and provides a cross-check from a medium to long-term perspective of the assessment of risks to price stability based on the economic analysis (European-Central-Bank, 2011).

1.2 Problem statement

The monetary policy framework is used by the Central Bank to maintain a sound financial system so as to stimulate economic growth. The Bank lending rates, and interbank rates are key variables in this framework that the Central bank is expected to influence to drive financial stability and soundness in the economy. The Central bank therefore, sets a monthly policy rate which is observed to have been declining over time, (i.e. from monthly average of 18% to 14.9% to 6.7% in 2012, 2016 and 2021 respectively (BOU, 2022)) as a mechanism to influence the commercial banks' lending interest rates. Subsequently the volume of credit is expected to increase if the banks' lending rate is responsive to the reductions in the policy rate. There is however, a disproportion between the policy rate changes and the commercial banks' lending rate adjustment behaviour in the Uganda banking sector that could partly be the cause of slow growth in private sector credit (International Monetary Fund, 2020; BOU, 2022). Whereas the interbank money-market rates have tended to track the evolution of the policy rate, the commercial bank lending rates have been stickier, only responding partially to changes in the policy rate, with lags (Nampewo, 2021). This study therefore focuses on examining the influence of monetary policy on the volume of private sector credit in Uganda.

1.3 Purpose of the study

The study aims to investigate the effect of monetary policy on the private sector credit growth in Uganda.

1.4 Objectives of the Study

i. To investigate the determinants of private sector credit growth in Uganda

ii. To examine the causal relationship between commercial lending rate and private sector credit growth

iii. To examine the causal relationship between money supply and private sector credit growth

1.5 Research Questions

i. What is the major determinant of private sector credit growth

ii. What is the causal relationship between commercial bank lending rate and private sector credit growth

iii. What is the causal relationship between money supply and private sector credit growth

1.6 Scope of the study

1.6.1 Time Scope

The study period is designed to have coverage on relevant monthly data between 2010 and 2022. This time period is inferred due to; readily existing data from reliable sources.

1.6.2 Geographical Scope

The study's geographical scope will be Uganda.

1.6.3 Subject Scope

The study focused on the effect of the monetary policy measures most importantly the money supply, commercial banks' lending rate, Treasury bill rate, interbank lending rate and how these may influence the private sector credit volume.

1.7 Significance of the Study

i. The study will aid policy makers to enhance policies which will better influence the commercial banks in proactively responding to the monetary policy statement so as to achieve the objective of price stability, and boost private sector investment during the specific economic cycles.

ii. The study will contribute to knowledge gap by providing empirical evidence on the relationships amongst the monetary policy tools like the interest rate channel, on the private sector credit growth in Uganda.

iii. The commercial banks will also better understand the factors that contribute to economic growth and the effect of their lending rates on the private sector market. Market imperfections in the financial sector that are likely to influence the downward stickiness of the commercial banks' lending rates, will be discussed in this research study.

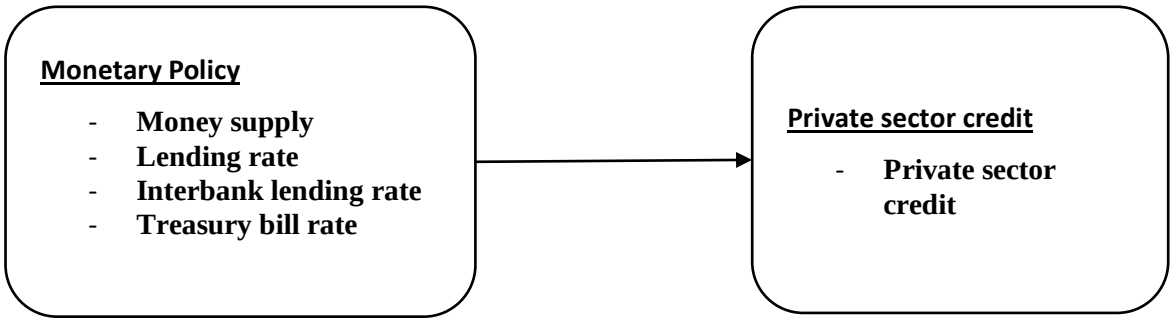
1.8 Conceptual Framework

Monetary policy seeks to impact the rate of aggregate spending by varying the degree of liquidity of various components of the economy including banks, businesses and households. This means, the effect of the action of monetary authorities on the stock of money on the number of currency notes in the people's pockets or the quantity of deposits on the books of the banks. Furthermore, the change in supply of money can permanently change such variables as the interest rates, the aggregate demand and the level of employment, output and income (Jelilov & Onder, 2016). Monetary policy works in part by varying credit flows in accordance with standard procedure of monetary policy transmission channels which impacts the private sector performance. Following; (Charles, Ronnie, Camelia, José-Luis, & Andrea, 2019), the effect of monetary policy on private sector credit in Uganda can be modeled as follows;

$$PSC = f(M2, LR, ILR, TBR) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

That is, Private sector credit (PSC) is a function of Money supply (M2), banks' Lending rate (LR), interbank lending rate (ILR) and Treasury bill rate (TBR).

Figure 1: Conceptual Frame Work Linking Monetary Policy and Private sector credit



Source; Adopted and modified from Charles et al. (2019)

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents and discusses the literature of the study. The chapter begins with theoretical underpinnings for the study and then later discusses the empirical deductions.

Monetary theory

Monetary policy is the framework used by the Central Bank to regulate the circulation of money, interest rates and credit in order to achieve broad economic objectives (Mugume, 2011). Monetary policy tools include; Central Bank Rate, Money Supply, Cash Reserve Ratio and Open Market Operations among others. Modern monetary theory can be traced back to John Maynard Keynes. The Keynesian based theory states that monetary policy is transmitted through interest rates and investment where expansionary monetary policy will decrease interest rates and vice versa, which affects commercial banks in different ways (Mishkin, 2013). The one way is the indirect effect through the real economy, where under the credit channel, tightening of monetary policy leads to an increase in lending rates, which reduces credit demand and growth in the economy, raises default rates and leads banks to increase loan loss provisions to cater for expected losses (Borio, Gambacorta, & Hofmann, 2015). The other way is through the endogenous responses of the bank to policy rate changes. For instance, under the interest rate channel of monetary policy, the central bank sets the short-term rates such as the central bank rate and the 7-day interbank rate, which influences longer-term rates including the Treasury bill rate and yield curve, that would have an impact on the credit affordability by the borrowers (English, 2002).

Credit market theory;

According to credit market theory, which is based on neoclassical economics, it is asserted that the terms of credit clear the market. Expounded, this means that given that collateral and other restrictions (covenants) remain constant, the rate of interest acts as the sole price mechanism such that if a given supply of credit is met with an increase in the demand for credit, this will lead to an increase in the price of credit. At this point, the element of risk, failure to pay back the loan, has not been added to the model. In the case where risk is factored in, it will affect the level of pricing such that the higher the failure risks of the borrower, the higher the interest rate premium (Ewert, Schenk, & Szczesny, 2000; Felicia, 2011).

Loan pricing theory asserts that banks cannot forecast the borrower type at the start of a banking relationship, they have to take into consideration problems of adverse selection and moral hazard that could arise when pricing their loans. It's noted that banks cannot bluntly pursue maximum interest income loan pricing activities since interest rates that are too high could lead to adverse selection problems. Specifically, high risk borrowers would be willing to accept the high interest rates and motivate moral hazard behaviour from them taking on highly risky projects or investments (Felicia, 2011).

2.2 Empirical Literature

2.2.1 The effect of Monetary Policy on Private sector credit

The role of monetary policy, which is of course controlling the volume, cost and direction of money supply was effectively interchanged by Friedman (2006) who emphasized that money supply is a key factor influencing the inflation, promote growth of credit and wellbeing of the economy (Fontana, 2007; Papademos, 2003). Poor monetary policies associated with high and volatile inflationary tendencies distort the allocation of productive resources, eventually harming

economic growth in the long term. Essentially, questions have continued to abound, as to how central bank policy actions affect private sector credit dynamics (Berg, 2013; Papademos, 2003).

Studies have revealed mixed findings on the linkage between monetary policy and credit growth, there are also studies that discount the negative relationship between inflation and economic growth (Levine, 1992; McCandless, 1995), arguing that monetary policy actions driving steady and stable inflation tend to have a depressing effect on private sector credit growth, resulting in a sacrifice ratio (Mankiw, 2010). Many studies have used economy-wide model to investigate the simultaneous relationships of aggregate credit with economic activity and monetary policy. In an early contribution, (Bullock, 1989) examined the ability of various financial indicators to lead real private demand in Australia. They found that credit aggregates appeared to lag rather than lead changes in activity.

In later work, Tallman & Chandra (1996, 1997) argued that financial aggregates held little or no predictive power for other macroeconomic series. However, Blundell-Wignall (1992) suggested that the conclusions of Bullock (1989) and Stevens (1989) may not hold after the Australia financial reforms of the 1980s. For the period 1984–1991, they showed that business credit led business investment, while overall credit was found to have a two-way relationship with GDP. While Bullock (1989) and Stevens & Thorp (1989) did cover some of the deregulation period, Blundell-Wignall & Gizycki contended that it was not sufficient to fully capture the change in dynamics.

Blundell-Wignall & Gizycki additionally argued that credit rationing had not been important in Australia because the supply of loans had consistently exceeded demand. This suggests that a supply-driven credit channel may not have been particularly strong in Australia. Using a VAR model, this view for bank loans is supported (Suzuki, 2004). In contrast, (Tallman, 2000) argued

that credit supply considerations can be important, at least at a more disaggregated level and during particular episodes. They found that after the distress of the early 1990s recession, the major banks pulled back on risky commercial lending. They noted that this reallocation was more marked in the banks that were under the most financial stress.

The literature emphasizes the importance of bank's credit in the transmission mechanism for developing countries, mainly because the economies are dominated by many bank-dependent borrowers especially small businesses rely heavily on banks for financing (Ramlogan, 2007; Mishra, 2010; Montiel, Adam, Mbowe, & O'Connell, 2012; Moussa & Chedia, 2014; Onyemaechi, 2015; Onoh, 2017). The traditional money view attributes the force of monetary policy entirely to changes in the money supply, which change interest rates and spending in turn. If there are substantial information problems in financial markets, the impact of monetary policy will be amplified and distributed across borrowers.

However, the credit channel of monetary policy transmission is not one way. First, tight policy may reduce the supply of private sector credit, which reduces spending by bank dependent borrowers [the lending channel (Bernanke, 1988)]. Second, tight policy weakens firms' balance sheets, reducing their ability to borrow from all sources [the balance sheet channel (Gertler., 1995)]. As much as this may stand to be the case for Tanzania (Montiel, Adam, Mbowe, & O'Connell, 2012; Mbowe, 2017), different opinions have emerged over time regarding the effectiveness of monetary policy in promoting bank's credit for economic growth in developing countries (Fontana, 2007; Afolabi, 2018).

More empirical studies on the effects of monetary policy towards bank's credit extension have shown that the policy rate is a poor tool to deal with excess leverage, risk taking or the apparent deviations of asset prices from fundamentals. This view is also enshrined by the recent practice

of central banks in the developing world, to focus on policy rate to spur private sector credit for higher economic growth (Ndikumana, 2010). There are also evidence suggesting that the policy rate is a blunt tool — a higher policy rate does reduce some excessively high asset prices but it comes at a cost of a larger output gap (IMF, 2013; Gumata, 2017). As such, restrictive monetary policy works not only by raising interest rates, but also banks' ability to extend credit through making new loans are constrained directly by monetary tools and consequently, lowers the availability of credit to borrowers who depend on bank's finances, hence low economic growth (Onyeiwu, 2012; Wrightman, 2012; Ezirim, 2015; Chowdhury, 2013).

An investigation on the effects of monetary policy was carried out on macroeconomic variables in Tanzania, with a particular attention being paid on the relationship between credit to the private sector and monetary policy. The SVAR was estimated, and the econometric results revealed that, the real effect of monetary policy on credit growth is quantitatively small a 2.5% rise in cash rate leads to a decline in real growth of credit to the private sector by 0.1%. Though, in responding to the macroeconomic consequences of the shock to the growth of private sector credit, monetary policy appears to stabilize the economy effectively (Mwankemwa & Bonaventura, 2022).

Using panel data set consisting of 312 banks, an investigation on the impact of monetary policy was carried out on bank lending in France from 1993-2003 following (McAdam, 2001). The study found that monetary policy tightening decreases bank lending (Loupias, Savigna, & Sevestre, 2011). Some studies suggest that a monetary policy impetus to spur growth is likely to be inflationary, having a countervailing effect (Issing, 2001). The surge of non-conventional monetary policy in the wake of the global crisis of 2008 highlights the limited role of conventional monetary policy.

Moreover, the link between monetary policy, inflation, private sector credit and economic growth has been found to be weak, particularly in developing countries (Al-Mashat, 2008; Mishra, 2010; Montiel P. C., 2012). For stance, (Amidu, 2006), examined whether bank lending is constrained by monetary policy in Ghana from 1998 to 2004. Study submitted that Ghanaian banks' lending behavior is controlled significantly by changes in money supply and country's economic activities. (Dhungana, 2016), studied if bank lending and monetary transmission mechanisms are closely interlinked in Nepal from 1996 to 2015. The study concluded that excessive bank's credit extension will have inflationary impact on the economy.

Using the Ordinary Least Square (OLS) method of econometric analysis (Agbonkese, 2013) examined monetary policy on bank credit abilities in Nigeria from 1980 to 2010. Results showed a positive linear relationship between bank's total private sector credits, while the reserve requirement ratio and interest rate had a negative relationship with the private sector credit growth.

A study by (Abuka, 2007) concluded that monetary policy actions, inflation and the monetary market rate were found not to influence the growth of private sector credit. Instead, income was one of the important factors that affects growth of credit to the private sector in the East African Community countries, including Kenya, Tanzania and Uganda. The role of bank's lending rate as one of the factors that determine the growth private sector credit has long been recognized, and empirical evidence has supported that (Ibrahim, 2006; Ndanshau, 2016; Tomak, 2013; Azira, 2018; Moussa M. &., 2018). Manamba (2014) focused on co-integration analysis using macro-level quarterly data covering 1986-2013 period and found that, the price of private sector credit in Tanzania (i.e., bank's lending rate) is significantly determined by lack of competition among financial institutions; and not central bank policy actions. Specifically, existence of diseconomies

of scale in the financial system; and that, as proportion of liquid assets increases the bank liquidity risk decreases, leading to lower bank's lending interest rate spreads.

2.2.2 The effect of Lending rates on the Private sector credit

A research carried out on monetary policy using aggregate data documents a weak or nonexistent bank lending channel in developing countries. The study used the case of Uganda, which provides a supervisory credit register with high-quality information on loan applications and rates, coupled with extensive regional statistics on real sector activity, and largely unanticipated variation in monetary policy during 2010–2014. It is found that a tightening of monetary policy reduces the supply of bank credit to firms and dampens economic activity. Farther a significant and sizeable effect of monetary policy on the quantity and price of credit, with adjustments in credit supply on both the extensive and intensive margins. The analysis reveals a quantitatively and statistically significant bank balance sheet channel. The tightening of credit conditions through higher rejection of loan applications, reduced volume of new loans, and higher loan rates (Charles, Alinda, Camelia, José-Luis, & Andrea, 2019).

A studying on the impact of lending rates on Private Credit identified there was no significant impact in case of Latin America but significant Impact in case of some Asian countries (Cochrane, 2020). Whereas an exploration on the Private Sector Deposits and their impact on the PSC using data of over three decades, Johansen Cointegration and VECM could not find any substantial significant dependence between the two variables (Schoenholtz Kermit L, 2020).

Another study also used quarterly macro-level data and a co-integration and error correction model to establish relative importance of macroeconomic and regulatory factors in explaining high bank's lending rates in Tanzania. The results reveal that interest rate spreads in Tanzania are strongly influenced by net government borrowing from commercial banks, development of the

banking sector, monetary policy i.e., statutory minimum reserve requirement and the discount rate (Aikaeli, Mugizi, & Ndanshau, 2011). The common measure of inflation is annual change in the CPI. A positive relationship has been established between inflation and credit supply in many studies. Risk-averse consumers may increase their precautionary savings because inflation increases uncertainty regarding future income growth (Harron, 2006).

A study by (Alagidede, 2020) relied on the three stage least square technique (3SLS) in a system of equations that trace the eventual effect of monetary policy on inflation through different channels. By specifying a system of equations that are simultaneously estimated, the chosen approach enabled to determine how changes in monetary policy stance eventually impacts inflation through sub components of the respective channels. The technique was robust to endogenity and delivers consistency and efficiency in their estimates. It was found that the interest rate and the lending channels are operative in South Africa. Specifically, a percentage restriction of monetary policy in South Africa reduces banking sector credit and a fall in private sector credit.

The analysis on the long-term and short-term impact of interest rate, exchange rate and inflation on the private sector credit of Pakistan and the interest rate effect on private sector effect depicted negative impact in both short and long term (Muhammad, Saliha, Mazhar, & Ghulam, 2020).

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the methodology used to meet the objectives and hypothesis of the study. The chapter is divided into three sections namely, Research design and sources of data, Variables and their measurement, Specification of the Model and estimation technique.

3.1 Research Design

The study employed a longitudinal research design with a quantitative approach. The design helps to establish relationships between variables and allows the testing of the effects of variables against each other. This kind of research design facilitated a proper fulfilment of the objectives of the study.

3.2 Data Types and Sources

This study employed secondary data collected from Bank of Uganda website. The reason for using secondary data is that the variables studied are aggregated at national level and their data is already captured at the national databases. Time series data was used because the study focusses on a single phenomenon over a given period of time. In order to get a good result from the regressed time series econometric model, the number of observations matters a lot. The higher the number of observation the better the result obtained, therefore this study used monthly data covering the period of 12 years (2010-2022) for the variation of dependent and independent variables.

3.3 Specification of the Model

The main variables of interest are monetary policy as the independent variable and the private sector credit as the dependent variable, following (Charles, Ronnie, Camelia, José-Luis, &

Andrea, 2019; Emenike O. K., 2017), the effect of monetary policy on private sector credit in Uganda can be modeled as follows;

PSC = f (M2, LR, ILR, TBR) …. ……. (1)

To test the above relationship, the following estimation model was used.

$$PSC = \beta_0 + \beta_1 M2 + \beta_2 LR + \beta_3 ILR + \beta_4 TBR + \mu \ldots\ldots (2)$$

Where;

PSC = Private Sector Credit, M2 = Money Supply, LR = Banks' Lending rate, ILR = Interbank Lending rate and TBR = Treasury bill rate

3.5 Estimation Techniques

3.5.1 Unit Root Test

It is important to test the order of integration of each variable in a model, to establish whether it is non-stationary and how many times the variable needs to be differenced to derive stationary series. Stationarity of each individual data series was estimated based on the assumption that the variables are either I (0) or I (1) series. The study employed Augmented Dickey Fuller (ADF) test and Phillips Perron test (1988). The ADF test is used in determining the order of integration of each variable in the model because it assumes the errors are statistically independent and have a constant variance. A unit root null hypothesis was tested against a stationary alternative. The stationarity test in the study used regressions of a time series data analyzed against a constant. These regressions can be expressed as follows;

$Y_t = \alpha + \beta.t + \varepsilon_t$ ……. (1)

$$dY_i = a + \beta_t + \sum_{i=1}^{n} \lambda\, dY_{t-i} + \delta Y_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

The stationarity of residuals (ε_t) were tested. Lag length (p) of ADF (dY_{t-i}) and Phillips Perron equations was selected using Schwarz Information Criterion (SIC) and Bartlett Kernel respectively.

3.5.2 Co-integration Test

The next process after the stationarity is determined to estimate the short and long run relationship of the variables. In a regression involving non-stationary variables, spuriousness can only be avoided if a Stationary co-integrating relationship is established between the variables. Therefore, if two or more variables can be linked together to form an equilibrium relationship spanning the long run, then even though the variables themselves may contain stochastic trends, they will nevertheless move closer over time and the difference between them will be stable. Therefore a test for co-integration, need to be run and the ADF unit roots test to be used to test for the stationarity of the residuals. If the residuals are stationary, then there is a proof for the presence of co-integration in the series used in the model (Adam, 1993; Perman, 1989).

3.5.3 Vector Error Correction Model (VECM)

The study objectives were analyzed using Vector Error Correction Model and it can be explained as follows; the analysis of vector error correction model is carried out to determine whether there exist any short run or long run causal relationship within variables in the model specified. The presence of co-integrating relationship within endogenous variables is a necessary condition for estimating vector error correction model. Following (Tomson, 2014), the general form of the vector error correction model estimated in this study can be presented as follows;

$$\Delta X_t = \sum_{i=1}^{n} \beta t \, \Delta X_{t-1} + \sum_{i=1}^{r} Yi \, ECT_{t-1} + v_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where X_t is an nx1 matrix and n = 6 vectors of dependent variables, ΔX_{t-1}, β and γ are parameters, while V_t is a residual. Error correction mechanism is evidence in the Error Correction Term (ECT_{t-1}). There are as many error correction terms as there are co-integrating vectors (r). Parameter γ_i associated with ECT_{t-1} measures proportion of adjustment back towards equilibrium that can be completed within a single period. If parameter γ_i is not significantly different from zero then there is no error correction process working within the model. Parameter β_t on the other hand, indicates the presence of a short term lag from one variable to another and it measures short term adjustment back towards equilibrium.

3.5.4 Granger Causality Test

The study proceeded to establish the causal relationship and this was analyzed using Granger Causality test, this can be indicated as follows. The Granger pair wise test was carried out in this study to estimate the causal relationship between monetary policy and private sector credit in the period under the study. Granger (1969), proposed a time series data technique to determine causal relationships between set of variables. Granger causal relationship is said to exist if variable X_t helps to improve forecast of another variable, say Y_t. Following (Tomson, 2014), the forecast of Y_t can be denoted as $Y_{t+h}|\Omega$ for optimum *h*–step at origin *t*, based on set of all relevant information in the universe (Ω_t). X_t is said to be Granger non-causal for Y_t if and only if

$Y_{t+h}\,\Omega = Y_{t+h}\,|\Omega/[X_{t,s}|x\leq t], h=1,2, \ldots\ldots\ldots\ldots\ldots \quad (4)$

X_t can be non-causal for Y_t if removal of past information from X_t does not change optimal forecast horizon. In turn X_t Granger causes Y_t if (4) does not hold for at least one *h* and therefore a better forecast of Y_t can be obtained from some forecast horizon by including past information

on X_t in the information set. The optimum lag length in the Granger causality test can be determined by information criteria.

CHAPTER FOUR

PRESENTATION AND INTERPRETATION OF FINDINGS

4.0 Introduction

This chapter presents the results of the study and their interpretations. Descriptive as well as inferential analyses are presented following the objectives of the study as earlier stated.

4.1 Pre-estimation diagnostic tests

Pre-estimation diagnostics are statistical tests carried out before model estimation to ensure that the selected variables are fit to be included in the model to be estimated.

4.2 Stationarity tests on the model variables

The study proceeded to conduct stationarity tests on model variables, using the Augmented Dickey Fuller (ADF) and Phillips Perron tests as the most commonly used stationarity tests in academic literature. The ADF test is based on establishing the presence of unit roots by testing the null hypothesis that a unit root is present in a given time series sample. If the test-statistic (t-statistic) within the ADF is lower than its associated critical value (at 5% significance level), then the null hypothesis cannot be rejected. The study checked for unit roots at both the variables' levels and their first differences as presented in table 4.1 below.

Table 4.1: Stationarity test results

Estimation period (Jan2010 - Dec2022)

Variables	ADF(level)	PP(level)	ADF(Difference)	PP(Difference)
LOG(PSC)	-2.902920**	-4.149072**	-3.859585***	-10.08656***
LOG(M2)	0.263370	-1.558706	-3.916216***	-16.01785***
LOG(LR)	-1.8083336	-2.315997	-4.865651***	-16.12184***
LOG(IBR)	-3.450721	-2.636620	-4.213215***	-13.17977***
LOG(TBR)	-4.196853	-2.489609	-3.702300***	-8.051387***

Source: Researcher's computation using secondary data from Bank of Uganda Jan2010-December2022. ***, **Significance at 1% & 5% respectively

The results in table 4.1 indicate that while some variables log (PSC) and log (TBR) are stationary in levels (integrated of order zero I(0)), other variables only become stationary after first differencing (they are integrated of order one I(1)). These results thus indicate the variables under study have mixed orders of integration.

4.3 The test for Cointegration

The cointegration test has been carried out in this study to determine whether there exists any long run relationship within the variables in the model specified. The results for the cointegration test carried out in the study are presented in table 4.2 below.

Table 4.2: Cointegration test results

Tress test of:	**Trace Statistics**	**Critical Values**
$r \leq 4$	0.966667	3.841465
$r \leq 3$	11.45561	15.49471
$r \leq 2$	35.68299**	29.79707
$r \leq 1$	66.96743**	47.85613
$r \leq 0$	115.3445**	69.81889
Maximum Eigen Value	**Max-Eigen Statistics**	**Critical Value**
Test of:		
$r \leq 4$	0.966667	3.841465
$r \leq 3$	10.48895	14.26460
$r \leq 2$	24.22738**	21.13162
$r \leq 1$	31.28444**	27.58434
$r \leq 0$	48.37710**	33.87687

** Indicates significance at 5% level. Source: Researcher's computation using secondary data from Bank of Uganda, Jan2010 – Dec2022

The results from Unrestricted Trace Statistics indicate that there are three cointegrating vectors at 5 percent level of significance. Similarly, the results from Maximum Eigen Statistics indicate the presence of three cointegrating vectors at 5 percent level of significance. Therefore the Johansen Cointegration test concludes that there exists long run relationship within variables in the model

specified. Thus the study can proceed to estimate the Vector Error Correction Model (VECM) and the Granger Causality test indicated in the earlier chapter.

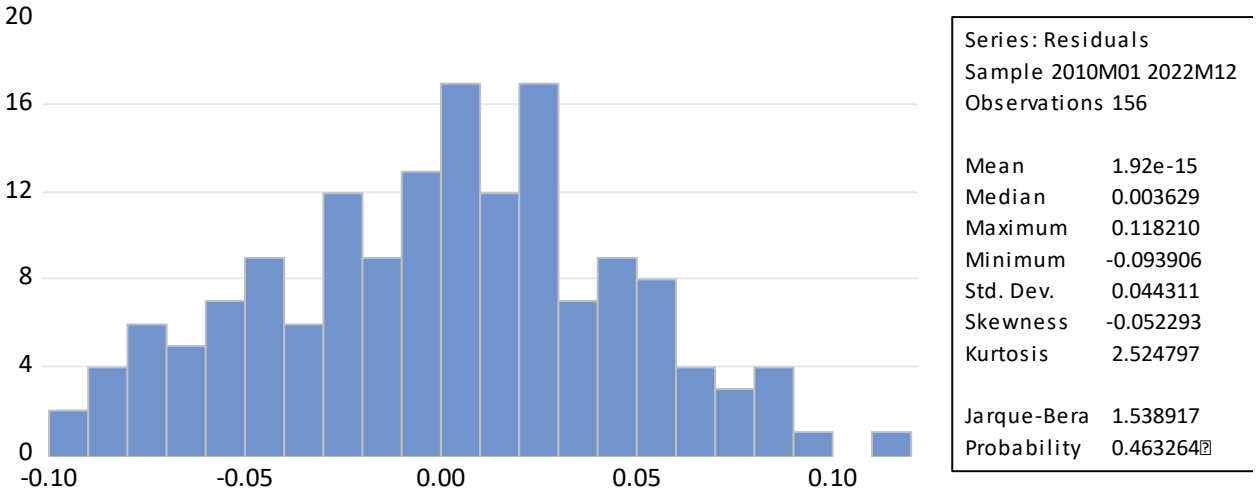
4.4 Residual Tests

Residual tests carried out in this study include; Normality test, Serial Correlation test and Heteroskedasticity test. The normality test has been carried out using histogram. The test for serial correlation has been carried out using LM serial correlation test while Heteroskedasticity test has been carried out in the study using Breusch-Pagan-Godfrey test. The details are indicated below.

4.4.1 Normality Test

Normality test has been carried out in this study to determine whether the data series estimated in the study are normally distributed or not. The result in the figure below displays a histogram and descriptive statistics of the residuals including Jarque-Bera statistic that test for normality. If the residuals are normally distributing, the histogram should be belled shaped and the Jarque-Bera statistic should not be significant. The reported probability in the table below indicates that the Jarque-Bera statistic exceeds the value under the null hypothesis. The study therefore does not reject the null hypothesis of a normal distribution.

Figure 2: Normality test



4.4.2 Serial correlation test

The study carried out the Breusch-Godfrey LM test for serial correlation. The null hypothesis under this test is *no serial correlation.* If the associated Prob. chi-square value is significant at 5% level of significance, then the null hypothesis can be rejected, else it is not rejected. The study observed that the prob. chi-square value (0.2046) associated with the B-Godfrey test was not significant at 5% level. Thus, the null hypothesis could not be rejected. The study thus concluded that the model did not suffer from serial correlation. The results are presented in 4.3

Table 4.3: Breusch-Godfrey LM Test for Serial Correlation

F-statistic	5.053422	Prob. F(2,150)	0.2060
Obs*R-squared	5.051681	Prob. Chi-square(2)	0.2046

Source: Researcher's computation using secondary data from Bank of Uganda

4.4.3 Heteroscedasticity test

The study carried out The Breusch-Pagan test to check for presence of Heteroscedasticity. The null hypothesis under this test is *no Heteroscedasticity*. If the prob. chi-square value associated

with this test is not significant at 5% level of significance, then the null cannot be rejected, else it is rejected. This study observed that the prob. chi-square value (0.8088) was not significant at 5% level. Thus, the null hypothesis of the test could not be rejected. The study thus concluded that the estimated model did not suffer from Heteroskedasticity. The results are presented in table 4.4

Table 4.4: Breusch-Pagan test for Heteroscedasticity

F-statistic	0.391124	Prob. F(4,150)	0.8148
Obs*R-squared	1.599958	Prob. Chi-square(4)	0.8088

Source: Researcher's computation using secondary data from Bank of Uganda

4.5.1 The test for multicollinearity

Multicollinearity is an econometric problem that exists whenever an independent variable is highly correlated with one or more of the other independent variables in a multiple regression equation. Presence of multicollinearity in a model undermines the statistical significance of the affected variables. To test for multicollinearity, this study generated the variance inflation factor (VIF) for each of the independent variables. The results are indicated as follows;

Table 4.5: VIF Results

Variable	**VIF**	**1/VIF**
LogTBR	8.78	0.113913
LogIBR	8.36	0.119654
LogLR	3.32	0.300875
logM2	2.09	0.479586
Mean VIF	**5.64**	

Source: Researcher's computation using secondary data from Bank of Uganda 2010-2022

According to Suleiman (2019), VIF values need to be lower than 10 and tolerance values to be above 0.2 for there not to be a threat of severe multicollinearity in the model. From the results of

table 4.6, it is evident that the VIFs for all the variables are lower than 10. The study thus concluded that the variables could be included in the model together and not cause severe multicollinearity.

4.6 Determinants of Private Sector Credit growth in Uganda and the Causal Relationship between Commercial Banks' Lending rate, Money supply and Private sector credit in Uganda

This study basically uses the VECM to estimate the determinants of private sector credit growth in Uganda in the period under review. The study also uses Granger pairwise test to investigate the causal relationship between Commercial Banks' Lending rate, Money supply and private sector credit in the period under review. The details are indicated below.

4.6.1 Determinants of Private Sector Credit growth in Uganda

The first analysis carried out in this study investigates the determinants of private sector credit growth in the period under review. Specifically this examines the individual relationship between (Money supply, Lending rate, interbank rate & Treasury bill rate) and Private sector credit growth. The study uses Vector Error Correction Model (VECM) to determine whether there is any short run or long run causal relationship between the independent variables i.e M2, LR, IBR & TBR and Private sector credit.

The presence of cointegrating vectors in the model specified implies that there exists long run error correction process working within the model such that any deviation from the long run equilibrium path would be restored by correction of equilibrium error back towards its long run relationship. The VECM results in this study are presented in the table (4.6) below. The results in this table indicate the estimated parameters in each of the five versions of the VECM

equations that are drawn from each column. The first row contains Error Correction Term (ECT) for each equation. The estimated parameters on ECT are presented in the first row and their standard errors are presented in the second row, while *t* ratios are presented in the third row.

The results for the long run relationship in the VECM estimates indicate that when the money supply increase by 1 percent private sector growth reduces by 0.0003 percent, though it was found to be statistically insignificant keeping lending rate, interbank rate and treasury bill rate constant. Similarly, in the long run, a 1 percentage increase in lending rate leads to a 0.005 percentage decrease in private sector credit growth ceteris Paribas. Thirdly, in the long run, when interbank rate increases by 1 percent, private sector credit growth increases by 0.004 percent, however this was found not to be statistically significant. Also in the long run a 1 percentage increase in Treasury bill rate was found to increase private sector credit growth by 0.004% ceteris Paribas. The details are summarized below.

$$\Delta(PSC) = -0.0003\Delta(M2) - 0.005\Delta(LR) + 0.004\Delta(IBR) + 0.004\Delta(TBR) \quad (7)$$

Table 4.6: Vector Error Correction Estimates

Error correction	D(LOG(PSC))	D(LOG(M2))	D(LOG(LR))	D(LOG(IBR))	D(LOG(TBR))
CointEq1	**0.001536**	**-0.000256**	**-0.004631**	**0.003943**	**0.003698**
	(0.00038)	(0.00070)	(0.00140)	(0.00363)	(0.00187)
	[4.06018]	[-0.36610]	[3.306721]	[1.08507]	[1.97885]
D(LOG(PSC(-1))2)	**0.087635**	0.270333	-0.248282	1.696078	1.18408
	(0.09447)	(0.17449)	(0.34980)	(0.90748)	(0.46675)
	[0.92761]	[1.54925]	[-0.70977]	[1.86899]	[2.53687]
D(LOG(M2(-1))2)	**0.117321**	-0.307056	-0.337256	0.387000	0.117851
	(0.04910)	(0.09068)	(0.18179)	(0.47162)	(0.24257)
	[2.389521)	[-3.38602]	[-1.85517]	[0.82058]	[0.48585]

D(LOG(LR(-1))2)	**0.054319**	0.028133	0.206067	0.206067	0.090453
	(0.02495)	(0.046009)	(0.23968)	(0.23968)	(0.12328)
	[2.17692]	[0.61045]	[0.85976]	[0.85976]	[0.73374]
D(LOG(IBR(-1))2)	**0.007188**	-0.014895	-0.056891	-0.198146	0.161176
	(0.00965)	(0.01782)	(0.03573)	(0.09269)	(0.04767)
	[0.744861]	[-0.83569]	[-1.59228]	[-2.13768]	3.380761]
D(LOG(TBR(-1))2)	**-0.033532**	-0.028453	0.061853	0.198619	-0.167296
	(0.01591)	(0.02939)	(0.05892)	(0.15284)	(0.07861)
	[-2.10733]	[-0.96813]	[1.04984]	[0.29949]	[-2.12810]
C	0.009708	0.010317	0.002354	-0.021358	-0.013593
	(0.00158)	(0.00292)	(0.00586)	(0.01521)	(0.00782)
	[6.13293]	[3.52884]	[0.40163]	[-1.40466]	[-1.73805]
R-squared	0.985416	0.182678	0.266023	0.178167	0.412273
Adj. R-squared	0.985128	0.118915	0.208762	0.114053	0.366422
Sum sq. resids	0.019814	0.067591	0.271636	1.828159	0.483618
S.E equation	0.011854	0.021895	0.043892	0.113867	0.058565
F-statistic	4.488215	2.864965	4.645825	2.778891	8.991588
Log likelihood	467.7166	373.8431	267.4327	121.5777	8.991588
Akaike AIC	-5.95708	-4.729975	-3.33899	-1.432388	-2.762158
Schwarz SC	-5.719399	-4.492293	-3.101309	-1.194707	-2.524476
Mean dependent	0.010443	0.009808	-0.000726	0.007782	0.006848
S.D. dependent	0.013266	0.023325	0.049344	0.120974	0.073577
Determinant resid covariance (dof adi.)		3.36E-15			
Determinant resid covariance		2.23E-15			
Log likelihood		1495.215			
Akaike information criterion		-18.69563			
Schwarz criterion		-17.40819			

Researcher's VECM computation using secondary data from Bank of Uganda, Jan2010 – Dec2022

The results for the short run relationship in the VECM estimates indicate that a 1 percentage increase in money supply leads to a 0.117 percentage increase in the private sector credit growth holding other factors unchanged. Similarly, a 1 percent increase in Lending rate increases private sector credit growth by 0.054 percent in the short run. Also in the short run, a 1 percentage increase in interbank rate leads to a 0.007 percentage increase in the private sector growth. However this was found not to be statistically significant. Economically this can mean that in the

short run interbank rate does not influence changes in the private sector credit. The results also indicate that in the short run, a 1 percentage increase in Treasury bill rate leads to a 0.034 percentage decrease in private sector credit growth.

Following the results for the short run relationship in the VECM estimates in this study, it is therefore clear that money supply, lending rate and interbank rate significantly influence the changes in private sector credit growth in Uganda in the period under review.

$$\Delta(PSC) = 0.117\Delta(M2) + 0.054\Delta(LR) + 0.007\Delta(IBR) - 0.034\Delta(TBR) \quad (8)$$

4.6.2 The Causal relationship between M2, Lending rate and private sector credit growth in Uganda

Subsequent to setting up the existence of long-run relationship amongst the variables using the VECM approach, the study investigates the direction of causality between money supply, lending rate and the private sector credit growth. Presence of cointegration in data series envisages the existence of Granger causality, but cointegration does not indicate the direction of the causality relationship. The study investigated the causal relationships using the pairwise Granger causality test as indicated in the table (4.7) below.

Table 4.7: Granger Causality test results

Null Hypothesis:	Obs	F-Statistic	Prob.
D(LOG(M2)) does not Granger Cause D(LOG(PSC))	**153**	**5.14431**	**0.0069**
D(LOG(PSC)) does not Granger Cause D(LOG(M2))		2.35429	0.0985
D(LOG(LR)) does not Granger Cause D(LOG(PSC))	153	0.54628	0.5803
D(LOG(PSC)) does not Granger Cause D(LOG(LR))		**4.37943**	**0.0142**
D(LOG(IBR)) does not Granger Cause D(LOG(PSC))	153	1.08238	0.3415
D(LOG(PSC)) does not Granger Cause D(LOG(IBR))		**7.69305**	**0.0007**
D(LOG(TBR)) does not Granger Cause D(LOG(PSC))	153	0.09304	0.9112
DLOGPSC does not Granger Cause DLOGTBR		**16.0713**	**5.E-07**
D(LOG(LR)) does not Granger Cause D(LOG(M2))	**153**	**5.00253**	**0.0079**
D(LOG(M2)) does not Granger Cause D(LOG(LR))		1.82799	0.1643
D(LOG(IBR)) does not Granger Cause D(LOG(M2))	153	0.18095	0.8347
D(LOG(M2)) does not Granger Cause D(LOG(IBR))		**5.05143**	**0.0075**
D(LOG(TBR)) does not Granger Cause D(LOG(M2))	153	0.77548	0.4623
D(LOG(M2)) does not Granger Cause D(LOG(TBR))		2.09863	0.1263
D(LOG(IBR)) does not Granger Cause D(LOG(LR))	153	2.03771	0.1340
D(LOG(LR)) does not Granger Cause D(LOG(IBR))		0.23034	0.7945
D(LOG(TBR)) does not Granger Cause D(LOG(LR))	153	**6.82324**	**0.0015**
D(LOG(LR)) does not Granger Cause D(LOG(TBR))		0.92256	0.3998
D(LOG(TBR)) does not Granger Cause D(LOG(IBR))	**153**	**3.77060**	**0.0253**
D(LOG(IBR)) does not Granger Cause D(LOG(TBR))		**11.0898**	**3.E-05**

Source: Researcher's computation using secondary data from Bank of Uganda.

The results of the granger causality test show that in equation one, the null hypothesis *M2 does not granger cause PSC,* is rejected because the associated probability value of the F-statistic is found to be significant at 5% significance level. This implies that money supply granger causes private sector credit growth. In the second equation, the null hypothesis *PSC does not granger cause M2* cannot be rejected because the associated probability value of F-statistic is not significant. This result implies that private sector credit growth does not granger cause central

bank rate. The results of this granger causality test show that there is a uni-directional causality running from money supply to private sector credit.

Secondly, the results from Granger causal relationship in this study also indicate that there is causal relationship running from Private sector credit to lending rate at 5 percent level of significance. Similarly, the study results indicate that private sector growth granger causes interbank rate and Treasury bill rate at 5 percent level of significance. Whereas interbank rate and Treasury bill rate were established to granger cause each other at 5 percent level of significance.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The discussions and conclusions in this chapter are based on the analyses carried out in the study. The analyses carried in this study are based on the objectives of the study. The discussions and conclusions in the study are indicated below.

5.1 Discussions and Conclusions

The results for the long run relationship in the VECM estimates indicates that when lending rate increase by 1 percent private sector credit growth reduce by 0.005 percent. This implies that the supply of credit responds negatively to an increase in interest rates; this is consistent with the presence of the loan pricing theory, where the increase in interest rate increases the cost of the credit which is likely to discourage borrowers. This finding is consistent with those of Gartner and Sousa (2001), Hofmann (2001) and Kiss et al. (2006).

Secondly, in the long run, when money supply increases by 1 percent, private sector credit growth reduces by 0.0003 percent, however this was found to be statistically insignificant. This implies that money supply does not influence changes in the private sector growth levels in the period under review. Similarly, the study results indicate a positive relationship between interbank rate and private sector credit growth both in the long run and short run, however this relationship was found not to be statistically significant.

The results for the short run relationship in the VECM estimates indicate that 1 percent increase in money supply increases private sector credit growth by 0.117 percent. Money supply therefore is a key determinant of growth in private sector credit in the short run over the sample period of

observation. This is in line with the loanable funds theory of interest rates pioneered by Robertson (1940), which argues that the availability of savings determines the level of lending in a market. Robertson argued that the more savings were available in the market, the more the supply of loanable funds or credit was expected in the market. This study finding is also consistent with those of Elekdag and Ham (2015) who concluded that domestic policy, whose primary objective was to influence money supply, was a key determinant for credit growth.

In the short run, a 1 percent increase in lending rate increases private sector credit growth by 0.05 percent. This implies that the supply of credit responds positively to an increase in lending interest rates in the short run; this indicates that, whereas high interest spreads may dampen credit demand according to the loan pricing theory, they certainly create incentive for banks to supply more credit to the market and would, therefore, have a more positive relationship to private sector credit growth levels as observed in this study (Ivanovi, 2016).

The study results also indicate that a 1 percentage increase in Treasury bill rate reduces private sector credit growth by 0.034 in the short run. This is because the increase in Treasury bill rate drives the lending rates upwards as the banks seek to invest in more profitable and less risk assets, this increases the cost of borrowing and thus reduce the credit access to private sector. This study finding is consistent with those of Katusime (2018) who found a direct and negative relationship between Treasury bill rate and private sector credit growth.

5.2 Conclusion

In conclusion, following the results for the short run relationship in the VECM estimates in this study, it is therefore clear that money supply, lending rate and Treasury bill rate are significant determinants of private sector credit growth in Uganda in the period under review. It's also

established that interbank rate does not significantly influence changes in the private sector credit growth in Uganda in the period under review. The results from Granger causal relationship in this study indicates that there is a uni-direction causal relationships running from money supply to private sector credit growth. However the causal relationship between lending rate and private sector credit growth was established to run from private sector credit to lending rate.

5.2 Policy Implication for the study

While Uganda has undergone major policy and institutional reforms, the findings of this study reaffirm the need for further reforms aimed at maintaining monetary policy credibility and promoting macroeconomic stability and financial sector development. Specifically, the finding that macroeconomic variables, such as money supply and interest rate, affect private sector credit growth reaffirms the importance of prudent macroeconomic management in creating an enabling environment for private sector credit growth. For instance, the finding of an adverse effect of lending rate on private sector credit growth suggests that authorities need to pursue policies aimed at maintaining low and stable lending rates in order to support private sector credit growth.

The evidence that interbank interest rates, has no effect on private sector credit growth suggests the need to appraise the effectiveness of the current financial sector development plan, which aims at improving financial sector intermediation with the aim of improving the competitiveness and depth of the financial sector.

5.3 Limitations of this study

The study is limited to money supply and interest rates' influence to private sector credit growth, which are largely monetary policy factors; it does not consider fiscal policy factors in the determination of private sector credit growth in Uganda.

The study looks at private sector credit growth only in terms of the amount of loans borrowed by the private sector from commercial banks. This means that a significant part of private sector credit outside the bank system is ignored by the study. Given that, many businesses have other sources of credit outside the banks means that the study is limited in its outlook on private sector credit.

5.4 Possible areas for further research

Subsequent studies can consider examining the effect of fiscal factors on the private sector credit growth in Uganda.

Future studies should focus on incorporating other sources of private sector credit in order to formulate a wider picture of whether it is growing or not in Uganda.

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