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Assessing The Long-Term Impact Of Lending Interest Rate Cap On Economic Growth In Kenya

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Abstract
The study objective was to assess the impact of commercial banks' interest control on loan advancement and subsequently long-run economic growth.
The use of Vector Autoregression (VAR) model with quarterly data for the year 2000 to year 2019 reveal that credit levels are positively correlated with economic growth. It is further noted that irrespective of slow response of credit increment to changes in rate of lending, the relation between lending rate and credit growth is negative. From the results, credit growth fluctuates heavily during the first few periods but still traces own growth path in the subsequent periods. This implies that using monetary policy to influence growth is prudent in the long run. The monetary authorities should therefore consider addressing other factors influencing credit growth to make demand for credit less interest rate inelastic.

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I. Background To The Study

Introduction

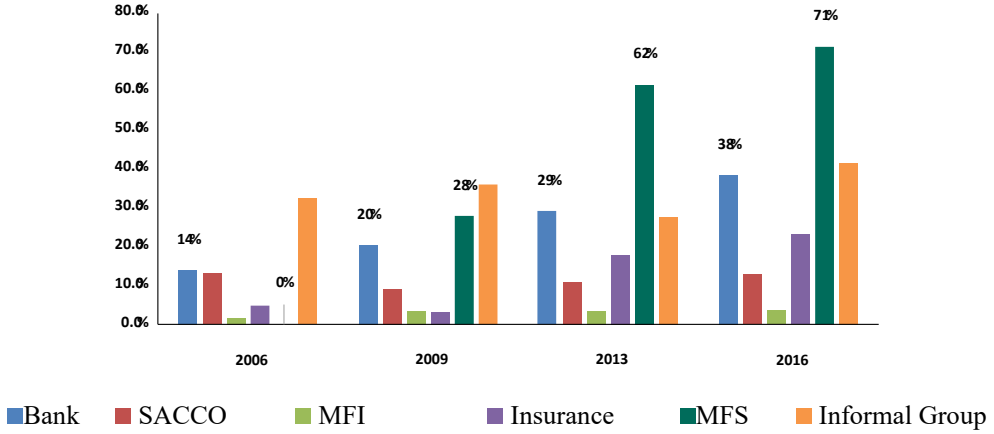
Financial market efficiency is an ideal foundation for sustained economic growth and development, especially for developing countries. Financial markets operate through intermediation between borrowers and depositors. Commercial banks, building societies and cooperative societies play a key role in this intermediation process (Olweny&Shipho, 2011). A number of factors such as market participants, information accumulation and coordination, price determination, an active and growing SME and consumer sector are integral components of a typical financial market (Maimbo& Claudia, 2014). A number of studies, such as Bailey (2005), Mwangi (2010), Nyandika (2012), Cytonn (2017) amongst others observe that price is the most significant factor in determining frequency of flow of credit among stakeholders.

Financial Service Providers

Financial service providers through their intermediation role are important in identifying and funding feasible investment opportunities, (Were, 2001). Cytonn (2017). Financial institution providers shown in Figure 1.1established that amongst the financial service providers, commercial banks commanded a significant proportion.

Figure 1.1 shows users of financial service providers such as Banks, Insurance, Informal Groups, Savings and Credit Cooperative, Micro Finance Institutions and Mobile Financial Services for the period 2006 to 2016 amongst clients.

Figure 1. 1: Use of Financial Service Providers for the Period 2006 to 2016.



Source: 2019 Finances household survey, Kenya.

Where SACCO is Savings and Credit Cooperative, MFI is Micro Finance Institutions and MFS is Mobile Financial Services.

From Figure 1.1, it is evident that between 2006 and 2016, banks constituted a significant proportion of financial service provision just below mobile financial services. Such policies that directly influence banking sector performance are therefore of interest in assessing relative impact on economic performance.

Interest Rates

Rate of interest is a price – principal ratio by a creditor to a debtor for use of financial asset (Henderson 1991). In financial market hypothesis for instance, this rate represents the cost of borrowing to borrowers and returns for lending to financial institutions.

Brief Account of Interest Rate Regime in Kenya

Kenya attained independent in 1963 with a monetary policy that was relatively short of independence (Were, 2001). In the year 1966, CBK was formulated by an act of parliament (Central Bank of Kenya Act, 1966). It was mandated to formulate monetary policy, ensure price stability, issuance of notes and coins amongst other functions embedded on it as per the act. The law enabled the state to enact and operate an independent monetary policy. The Central Bank of Kenya was given the mandate to monitor the financial institutions, especially commercial banks in financial intermediation process.

In 1966, the government of Kenya through Central Bank of Kenya set an interest rate ceiling, to promote investment and protect borrowers from exploitative practices, especially from high interest rates. The lending rates were however too low, thus resulting into low or negative real returns. In addition, deposit rate was relatively too low to attract savings. However, the government financed its expenditure cheaply at the low lending rates, Olweny & Shipho (2011).

Other than consumer protection, irrespective of disincentive to save in response to low deposit rates, the interest rate was an incentive to capital accumulation, an objective that was geared towards increasing national output. Import substitution investment strategy was also adopted to promote capital accumulation (Mwega& Njuguna, 2002).

In 1989, floating lending rate was initiated through credit information sharing, government auction of treasury bonds, establishment of currency centres, amongst others. In September 1991, Mbengue&Maguette (2013) note that the upper limit lending interest rate was increased to 14% from 10%.

Government of Kenya shifted its policy in 1993 on both exchange rate and interest rate from a capped rate regime to a flexible regime. The government paid key attention to enhancing financial institutions such as central bank in order to improve economic performance given liberalized rates of lending (Dennis &Mehnaz, 2016).

In the year 2016, the Government of Kenya capped the interest to atmost 4% beyond the CBR while the rate of deposit was capped 70% minimum of the same base rate.

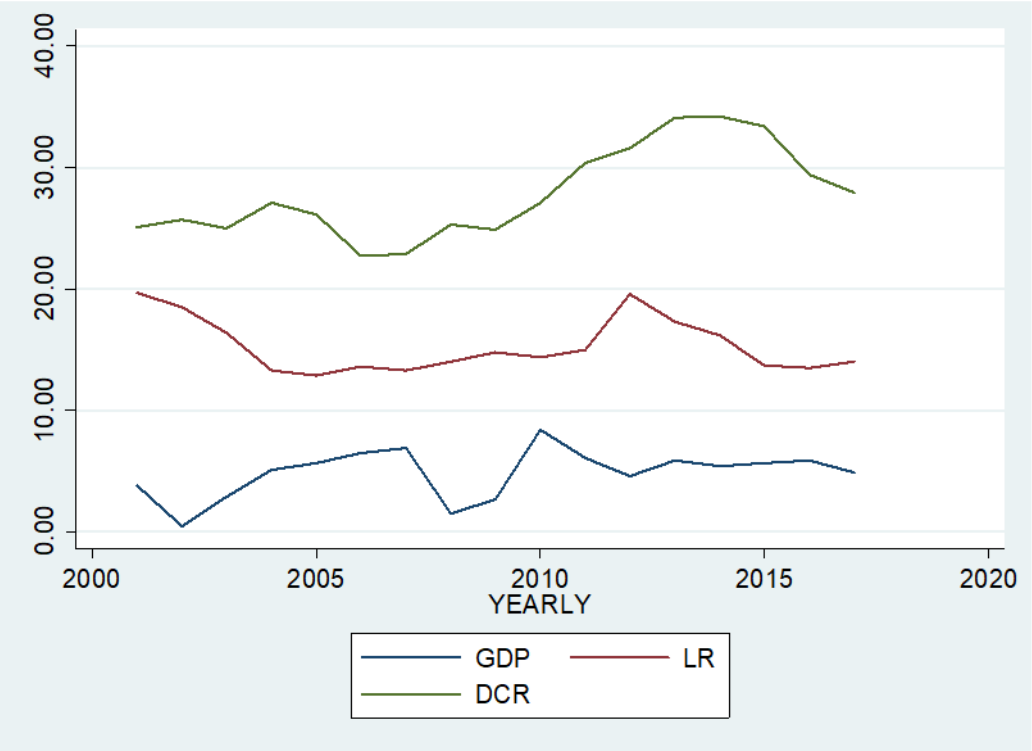
Growth Rate of Kenyan LR, DCR, GDP Profile.

In the period 2008 to 2010, the Central Bank of Kenya embarked on a vigorous expansionary monetary policy stance through lending, with the objective of enhancing gross domestic product. To enhance lending, CBK reduced the central bank rate (CBR) from 9 percent in 2009 to 6.75 percent by March 2010. However, the commercial banks did not respond to the changes in the CBR and their lending rates remained relatively unchanged. Without a change in the lending rates, credit availability doesn't change as a result of the changes in the CBR. When variations in central bank rate has no or negligent effect on lending rates and credit growth, then changes in credit may come from other factors, such as interest rate regulations enforcement but not through alteration of base lending rates and cash reserve requirements.

The banks' lending rates were capped to no more than 4% of Central Bank of Kenya bench rate in 2016 to enable trader's access credit at affordable rates. The rationale for reduction in the cost of borrowing is that it improves accessibility and affordability of financial services and products resulting into economic development.

Figure 1.2 shows variations in Kenyan Lending Rates, DCR Sector and GDP growth rates between 2001 and 2017.

Figure 1.2: Rates of Gross Domestic Product, Lending Rate and Credit to Private Sector Between 2001 and 2017.



Source: Author

From Figure 1.2, a trend between lending growth and gross domestic product is eminent. However, a very large deviation of credit from the trend is evident. It would be interesting to determine the shocks that cause the deviations from the trend. The fact that the economy grows at a lower rate also shows that despite the improvement in credit growth, there has been no proportionate growth in the Kenyan economy. This may also be a pointer to the lack of effectiveness of monetary policy effects on economic performance through the credit channel (Love & María, 2012).

Adusei (2013) examined causality between credit growth and economic growth for Botswana. It established a direct relationship between credit level and total output. Choe and Moosa (1999), Odhiambo (2005) and Ghali (1999) for Korea, Tanzania and Tunisia respectively obtained similar results. A direct relationship between lending and economic performance was established.

Nduati (2013) however found slightly different results. The study established significant direct relationship between lending and economic growths in the middle-income countries and a relatively insignificant relationship in high income countries. In this scenario, it is also possible that low interest rate will not automatically lead to economic growth. It is no surprise therefore that even though credit has been growing in Kenya, the economy has not grown proportionately. The question therefore is whether it is realistic to use interest rate capping to influence the level of credit growth and economic growth. A subject matter of interest to the study.

Credit Channel of Monetary Transmission

The primary objective of monetary authorities is to improve social welfare by ensuring price stability, near zero inflationary rate and near zero natural rate of unemployment. To achieve these, authorities use different policy instruments to influence the level of business activity with the objective of influencing investment fund demand and ultimately aggregate demand and GDP growth in an economy. The monetary authorities in influencing financial performance may employ any of these tools: lending channel;other asset pricing channels and exchange rates channels.

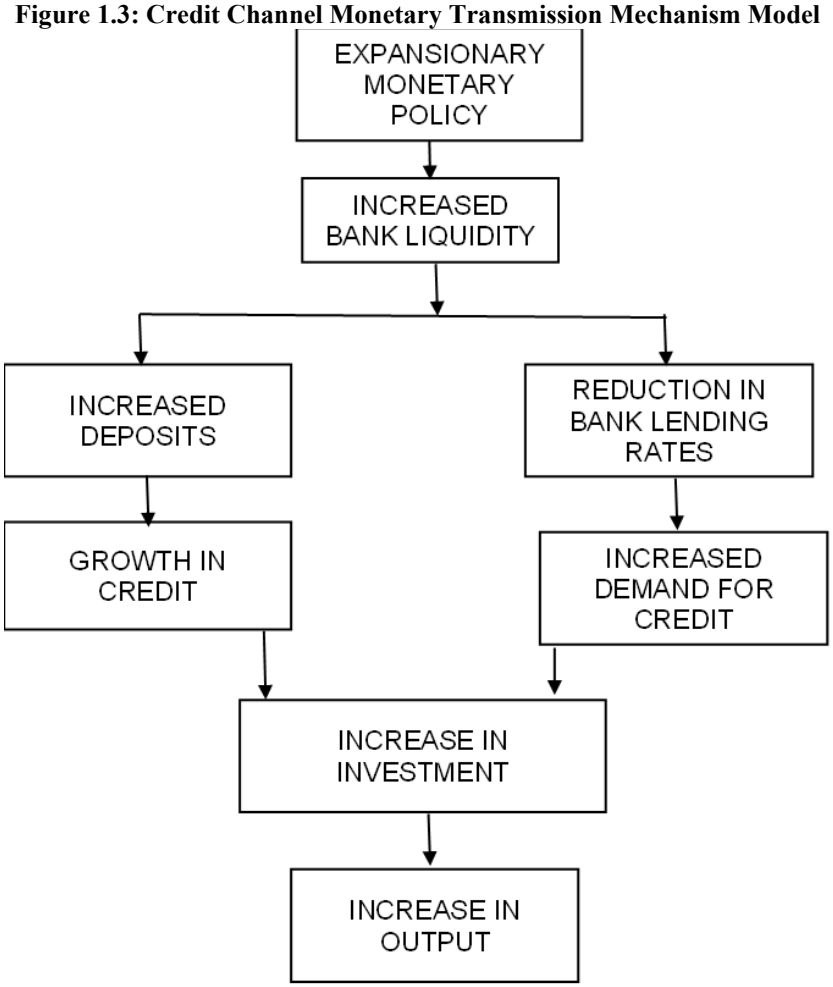
Credit channel forecasts that monetary policy will influence aggregate demand and income growth through its effects on demand for investment funds. A loose monetary policy will induce a reduction in the bank lending rates, thereby creating an incentive for credit growth which ultimately leads to higher economic growth. Monetary policies are therefore supposed to be reflected in the way credit growth tracks economic growth. If economic growth does not respond to credit growth, then that means that monetary policy effects do not influence economic performance and therefore the central objectives of monetary policy of price stability and employment

creation will not be achieved. In other words, monetary policy will in this case be ineffective in influencing economic growth.

From previous discussions, economic growth in Kenya does not seem to move in tandem with growth in credit. This signals the ineffectiveness of monetary policy effects on economic performance through the credit channel.

Figure 1.3 presents a generalized credit channel monetary transmission mechanism model.

Figure 1.3: Credit Channel Monetary Transmission Mechanism Model



Source: Author

From Figure 1.3, credit growth will affect economic growth if financial institutions react positively to lending enhancing policy changes. However, unresponsiveness by commercial banks to the policy changes renders the policy tool redundant. Alternatively, if commercial banks respond to the changes and expand their lending but the credit is not directed into investment purposes, the credit growth will not affect GDP growth. In this case, policy makers will need to adopt alternative measures in order to encourage investments.

In recognition of the significantrole of credit expansion in economic performanceand consumer protection, in July, 2016, the parliament of Kenya put in place a law that bars commercial banks from charging no more than 4% of the central bank benchmark rate. This however has not been the case. There appears to be market imperfections characterized by hidden credit charges and customer discrimination manifested through a cut in lending to SMEs and low credit score individuals. These being the core economic stratum, such actions ultimately impede economic activity (CBK, 2018).

Economic Impact of Interest Rate Controls Across Studies

This portion analyzed the impact of interest rate caps as captured across studies.

Implementation of interest control measures led to variant responses across economies; first, adoption of interest rate cap in Poland led to reduction in access to credit (Ellison and Forster, 2006). The study further revealed exclusion of low credit rating customers and application of revolving credit to low income households as witnessed in Germany and France respectively.

Introduction of interest rate ceiling in Nicaragua witnessed reduction in lending by micro finance institutions. Relatively higher operation costs associated with interest rate capping also caused closure of MFIs to relocate from non-urban areas, a further increase in fees and charges was also witnessed (Duval, 2004).

In Colombia, introduction of interest controls led to narrow profit margins for microfinance institutions due to inability to cover transaction costs. There was however improvement in the quantity of microcredit following loosening of caps (Porteous, *et al*,2010).

Miller (2013) in a study in Bolivia, showed reduction in licensing of new financial institution upon imposition of maximum credit rates in 2004.

Table 1.1 shows distinct features with respect to financial indicators of countries with interest rate controls, that is, lower credit to GDP ratio, relatively lower proportion of customer access to loans, higher ratio of private owned banks to state owned banks and lower financial market information symmetry with respect to regional average. It illustrates important aspects of monetary system of countries with interest rate regulations on loans (Ellison and Forster, 2006).

Table 1. 1: Financial Sector Indicators, 2008 and 2012.

	Money market performance indicators of countries with credit rate controls with respect to their respective regional average.				
Region	**Credit to GDP ratio**	**Account penetration**	**Access to loan**	**Credit information**	**Share of state-owned banks**
EA & Pacific	1	1	1	1	1
E&CE	1	1	1	1	1
Latin American & The Caribbean	1	1	1	1	2
ME & NA	1	1	1	1	1
South Asia	2	1	1	1	1
Western European Countries	1	2	1	1	1

Source: Author

In table 1.1, 1 implies low performance while 2 implies high performance with respect to and index. Results generally show that credit level to low credit rate borrowers increases with lending rates, however, relatively higher rates increase the chance of default. Irrespective of undesired effects of interest rate ceilings, concerns over banking sector predatory lending practices and high costs of microfinance remains valid.

Statement of the Problem

The economy's inconsistent economic growth over the years is of great concern. This could be as a result of mismanagement characterized by corruption or inappropriate macroeconomic policy measures or both. Interest rate monetary tool has often been used by most economies towards achieving desirable unemployment level, inflation rate and economic growth. Reduction in lending rate has however proven futile in influencing credit growth.

In Figure 1.2, there is a consistent reduction in lending rates between 2010 and 2015. However, credit to private sector seems not respond to changes in the lending rates. Without a change in the quantity of lending, there may be no consequent change in economic growth. A reduction in reserve requirement ratio serves a great incentive for credit growth through money multiplier function, the commercial banks may however fail to respond to central bank's signal for credit growth as a result economic growth remains relative constant.

Theory suggests that GDP is a direct function of credit growth and indirect function of lending rate. In addition, fluctuations in credit to private sector and lending rate is evident between 2001 and 2015.

In the short run, interest rate cap policy stance may produce negative shocks in the economic performance. This thesis therefore aimed at establishing the feasibility of interest stabilization stance on GDP in the long-run.

Objectives of the Study

General Objectives

The study aims at examining whether controls on commercial banks interest rate have an influence on the level of both lending growth and economic activity in Kenya in the long run.

Specific Objectives

i. To assess the long run relationship between credit growth and economic development.
ii. To establish causal relationship between commercial banks' interest rate control on credit growth and subsequently improvement in economic activity.

iii.To advice policy makers on the effectiveness of interest capping in influencing economic growth.

Research Questions

From the background to the research and problem statement, the following policy questions need attention;

i.Does credit growth and economic growth have long-run causal relationship?

ii.Is reduction in credit interest rates effective in influencing the credit growth?

Significance of the Study

The reason for carrying out this study is to; inform the monitory authorities on the effectiveness of interest rate stance on influencing economic performance, suggest alternative tools available in enhancing economic performance and improve the existing knowledge on the application of interest rate controls in influencing credit growth.

Scope of the Study

Interest controls manifest in different forms across economies. Second, the thesis was constrained to interest rate. It would be equally useful if other policy measures were tested to assess their impact on economic performance. However, due to the limited study period, it would not have been possible to consider all the variables.

Organization of the study

Subsequent sections of the study looks into both theoretical and empirical literature on LR controls across economies including DCR-GDP nexus, study methodology, findings of the study and finally summary, conclusion and recommendations.

II. Literature Review

Introduction

Theoretical review on rate of lending-credit growth relationship, in particular with respect to macro-economic policy on interest rate regulation and empirical literature on financial sector and wealth creation is presented.

Theoretical Literature

Interest rate theories and models provide a basis upon which macroeconomic policies can impact economic performance. Such a foundation is important in evaluating policy alternatives that can positively impact economic growth. Given diverse nature interest rate caps, a number of theories shall be analyzed.

Adverse Selection and Adverse Incentive.

Interest rate fluctuations results into two types of responses; adverse selection and adverse incentive. Controversy exists as firms are assumed certain of the risks associated with projects while on the other hand banks are unable to differentiate these projects. Information asymmetry creates adverse selection implications in the money market, as higher interest rates tend to attract riskier customers.

Risk associated with borrower results into adverse selection effect thereby reducing credit worthy borrowers in the credit market. On the other hand, adverse incentive effect occurs when risk-loving borrowers choose risky projects, that is, projects characterized by higher chances of failure (Stieglitz, 1992).

In an event of interest rate reduction through capping, credit uptake and extension, holding other factors constant tend to be independent of riskiness of a project but is instead, based on expected returns from various projects.

Keynesian Theory of Interest Rate Determination

In this theory, interest represents compensation for use of capital. The level of this reward is set by supply of and demand for assets, proxies into which wealth can be held. Money as a store of value is one of these assets.

Money is demanded for a number of reasons; first, transaction motive, which is an increasing, Y^d (Scholz, Rochdi&Schaefers, 2015). Second, precautionary motive. Human are often subjected to uncertainty; a share of income must therefore be set aside to cover any unforeseen eventuality. Precautionary motive varies from one individual to another, depending on individual risk averseness. Finally, individuals hold money balances in anticipation of changes in economic environment.

Given Friedman' demand function,

$$M_d/_P = f(Y^d, r.P^e, u) \quad \text{.....2.1}$$

Where $^{M_d}/_P$ is the demand for real money balance, Y^d is permanent income, a proxy for wealth or budget constraint, r is the rate of returns on assets, and a proxy for interest rate, P^e is the expected inflation and U is the individual tastes and preferences for holding money.

The model postulates that responsiveness of demand for $\frac{M}{P_e}$ to price level is greater than one. That is, a significant change in interest rate results into a more proportionate change in quantity demanded for $^{M_d}/_P$ (real money balances). A reduction through capping of lending rates should therefore result into a more than proportionate increase in money demand.

Loanable Funds Theory of Interest Rates

Just like goods market, loanable funds theory postulates that price of credit is the main set by demand and supply for loanable funds (Mukherjee, 2010)

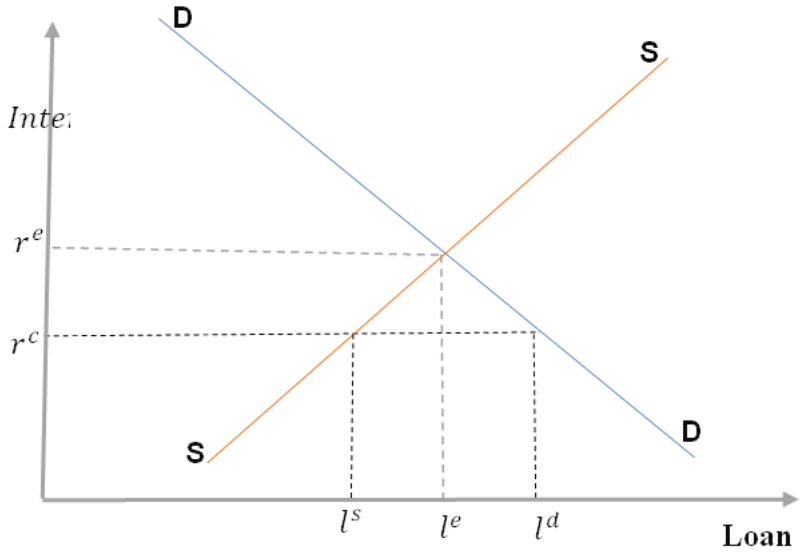
Interaction between borrowers and lenders following a change in amount of money circulating in an economy is significant in altering the level of economic performance. A reduction in the money circulating in the economy as result of a tight monetary policy reduces the level of transaction balance held by individuals. Given an a greater demand for investment funds (investment) relative to the supply, coupled with commercial banks' inability to innovate ways of reversing the falling trends in deposits, credit rationing becomes the only viable option. Consequently, only large firms with significant asset holdings are given access to loans and smaller firms which contract loans to finance their investments are dispossessed of their main source of finance. Developing countries' economies are consists of a significant number of small businesses. Given greater small businessesin respect to medium size firms, inaccessibility of credit by small businesses significantly impedes economic growth.

Equilibrium interest rate is at a point demand for and supply of credit loanable funds show no tendency to deviate from. That is level of interest rate that matches quantity of loanable funds and supply for loanable funds. A lower rate of interest attracts demand for loanable funds and subsequently resulting into increase in investment. This implies an indirect relationship between demand for investment funds and cost of credit.

Demand for credit can as well be due to desire for current consumption for future payment. This demand comes from individuals who spend beyond their earning capacity. Similarly, it is negatively related to interest rate.

Figure 2.1 depicts supply for and demand of credit. At interest rates below the equilibrium level, credit supply is in short of credit demand.

Figure 2.1: The Loanable Funds Model



Source: Author

Where SS is the supply curve, DD the demand curve and R the lending rate.

Demand curve in Figure 2.1 represents borrowers who include; first, individuals' borrowing in form of; home mortgages, auto loans, credit cards, auto loans, instalment credit and auto loans. Second, businesses for example corporate borrowing, farm credit, trade credit, etc. Finally, government purchase of securities such as bonds and treasury bills. Loan applications and sale of interest-bearing financial assets constitute credit demand.

On the other hand, institutions such as banks, mortgage companies, equipment leasing companies and credit card companies constitute lenders.

Assume rate of interest regulation that seeks to lower lending rate tor^c below the market clearing point r^e. In Figure 2.1, a reduction in interest rate from $r^e$to r^c, leads to a subsequent incrementin demand for investment fundfrom l^e to l^d, and a reduction in credit supply from l^e to l^s. The implication is that a reduction in lending rate below the market clearing point may not necessarily result into economic growth as it triggers reduction in supply of credit.

The reduction in loanable funds supply, based on the theory, could be as a consequence of in-action of authorities to take into consideration the bank's real rate of return, customer credit worthiness amongst other factors.

Loanable funds theory implies that an optimum price is set at the interaction between supply of and demand for credit. Thus, government regulation on interest rates such as caps distorts market mechanism of interest rates determination. Market operations distortion may thus impede economic growth and development.

The theory is however partial in examining determinants of interest rate. It assumes demand and supply for loanable funds are the soul determinants of interest rate and ignores other aspects such as market conditions.

New Classical Theory of Interest Rate

Classical economists argue that economic agents are rational beings. They distribute their resources in such a way that maximizes the level of satisfaction. For example, households allocate their resources in such a way that maximizes their utility, firms aim at maximizing profits and government and non-government authorities aim at ensuring optimal societal welfare (Snowdon and Howard, 2005). They further argue that decision makers are not affected by the problem of money illusion hence only real variables matter for optimal decision making.

New Classical theories are based on: natural rate of unemployment, instantaneous market clearing and rational expectations. Anticipated changes in aggregate demand have no effect on real output, hence only unpredictable movements in aggregate demand affect real variables. According to the new classical economists, monetary policy and fiscal policy are ineffective in altering the equilibrium level of output and interest rate in the economy unless they were sprung as a surprise on an unsuspecting public.

In a free market economy, investors' courses of action are often subject to uncertainty due to fluctuating market conditions for example prices (Ng'etich, 2011). Variance in expected returns on an investment based on current market rates is likely to be high in a free market economy relative to a restricted market. Real return on investment is a function of cost of investment, interest rate and return on investment. An economy characterized by a significant proportion of pessimists may encounter fluctuations in economic performance. The variations can therefore be reduced by ensuring stable economic conditions over a period of time through regulations such as lending rate capping.

In the face of lending rate controls, there is certainty on expected future date lending rate. Consequently, relatively lower interest rates may attract demand for credit, banks may however limit loan advancement to low rate credit individuals. In addition, to enhance profitability given lending rate caps, banks may employ austerity measures such as staff-layoffs, shutting down some branches, reduction in unsecured loans amongst others. These in effect reduces the aggregate lending to the economy.

Interest rate changes have significant impact on economic activity assuming given the fact that a significant proportion of source of investment funds is from commercial banks (Apir, 2014). Commercial banks profitability is interest rate and, credit level and customer deposits.

Review Of Empirical Literature

This section explores empirical information on the impact of cost of lending on credit growth, causal relationship of credit growth and economic growth, implications of interest rate regulations and effectiveness of interest rate regulations across economies.

Lending Rate and Credit Growth

Kiseu (2017) on the impact of lending rate capping on the quantity of loans extended by financial institutions in Kenya. Descriptive statistics and data for three quarters before effecting interest rate cap and after the capping were adopted to achieve the research objectives. A statistically insignificant effect of capping on commercial bank lending was established.

Perez (2017) established the determinants of supply and demand for credit using the following model;

Loan Supply = 0.022 (IRLENDING - IRDEPOSIT) + 0.078 Equity - 0.005 LRR …….2.2

The supply equation(2.2) shows a direct relationship between lending, interest margin and equity while the LRR is inversely related to loan supply. This implies that credit supply and interest rate spread are positively related and that a proportionate change in interest rate spread changes loan supply by 0.022, other factors held constant.

Zachary and Lydiah (2013) determined the influence of interest on demand for loanable funds by MSMEs in Kenya, using data for 43 commercial banks. The results showed an insignificant causal relationship between high interest rates demand for credit. Repayment index was however found to be directly related to interest rate variations.

Gill and Khan (2009) on finding out the impact of public sector borrowing on private investment in Pakistan. Data for 1971 to 2006 was used. An error correlation and Johansen co-integration were adopted to achieve study objectives. A positive causal relationship between public sector borrowing and private investment was established.

Credit Growth and Economic Growth.

Guo and Stepanyan (2011) studied the relationship among banking sector domestic credit, banking sector private credit and deposit rate using quarterly series data. A direct relationship between domestic funding and credit growth among emerging market economies was found. The findings further showed a direct effect on economic performance due to demand for credit and uptake. The study also established that expansionary policies increase credit and vise versa

Koivu (2002) assessed the impact of variations in banking sector performance on growth of real Gross Domestic Product. The finance-growth nexus was analyzed using unbalanced panel data and fixed effects panel model for 25 medium developed states for the year 1993 – 2000. The results showed that, in the emerging countries, the credits granted to the private sector did not fast track growth, as the causality between them was unclear and the value of credits from the previous period was inversely related to growth in output from the current period.

Dudian and Popa (2013) studied the impact of financial efficiency on economic performance in Eastern Europe and Central Europe. Data for eight states for the year 1996 to 2011 was used. The study established that: First, both non-performing loans and interest rate both have negative effect on GDP. Second, the relationship between changes in broad money and economic performance is statistically insignificant.

Akpansung and Aniekan (2011) on the relationship between commercial bank credit and GDP in Nigeria using data for 1970 – 2008 and a two-stage estimation technique found that private sector lending impacts output positively. The study recommends a financial market system that favors DCR and a minimum interest to stimulate economic growth.

Impact of Interest Rate on Demand for Credit

Zachary and Lydiah (2013) undertook a study on the effect of lending rates on demand for credit by SMEs, in Nairobi County, Kenya. To achieve the research objectives, correlation research design and both inferential and descriptive statistics were used to analyze 48 responses collected. The study found out increment in interest results into subsequent increase in credit, owner's equity and profitability.

According to the study, 86.7% demand for loan was explained by lending rate. The study established that demand for loans is explained by annual profit, optimal interest rate and owner's equity.

Odhiambo (2013) studied the influence of lending rate on repayment on and demand for loans by SMEs in Kenya. Data from forty-three banks and a number of firms under SMEs in Kenya were used. CBK data reports on financial statements for the period 2008-2012 was obtained and analyzed. Adopting descriptive approach and using SSPS and Excel analytical tools, it was established that high interest levels did not necessarily influence uptake of loans.

Summary of Literature Review

The reviewed literature implies that both interest rate and credit growth are portrayed both as determining and determinant policy tools. Zachary and Lydiah (2013) and Perez (2007) show an indirect correlation between lending rate and credit growth.

A studies by Khan and Gill (209) and Zachary and Lydiah (2013) shows that other than interest on loans charged by commercial banks, other factors such as access to credit facilities, intent for funding amongst others have impact on loan intake by potential borrowers. For example if cost of investment is relatively lower than prospective return from an investment, a borrower will proceed with loan uptake. Interest rate is also of insignificant consideration when the funding is needed for financial smoothing purposes.

A number of the reviewed literature reveal positive causal relationship between gross domestic product and money market. There is therefore possible correlation between financial sector liquidity and economic development.

Gaps from Literature

A number of studies including; Khan and Gill (2009), Koivu (2002), Armeanu, et al. (2015) amongst others show correlation between interest and growth in borrowing. They however don't reflect the causal effect

of interest rate controls on credit growth and subsequent economic development. In addition, there is limited empirical studies on causal relationship between corporate uptake of credit and interest rate reduction through ceiling. It is further interesting to determine proportionate share of private sector and corporate sector in gross domestic product. Such will help establish the net impact of interest control on credit growth and consequently economic growth. It would therefore be imperative to conduct studies focusing on credit growth and how the accruing credit influences the general economy.

III. Methodology

Introduction

This section discusses theoretical model, empirical model, Data sources, meaning and respective measurement of both explained and explanatory variables and data validity as well as analysis.

Theoretical Model

From the reviewed literature, the findings of a number of studies; Perez (2017), Gill and Khan (2009), Guo and Stepanyan (2011), Dudian and Popa (2013), Murty et al (2012), Zachary and Lydiah (2013) and Odhiambo (2013) looked into causal relationships between interest-credit growth and credit growth-economic development. This study set out to establish the causal relationship between interest control and economic growth. The relationship between the variables used in this study can thus be given by:

$GDP = f(Lending\ Rate, Credit\ Growth)$ ……3.1

This study focuses on interest rate channel of transmission mechanism. Commercial banks play a key role in fund accumulation from depositors and transfer of those funds to investors for investment in feasible projects. Policies geared towards influencing availability and access to credit are of great concern. Such policies aim towards improving access of agents to credit, which increases their spending and investment ability, ultimately resulting into increase in aggregate output. Variations in interest rate impacts household spending and firm investment decisions on both investment and final consumer goods. These changes consequently translate into final product. The credit channel transmission mechanism tends to influence the economic performance by determining the amount of loanable funds economic agents have access to (Davoodi, *et al*. 2013).

Empirical Model

VAR model was employed to answer the research questions. From the theoretical model and empirical review, there was high likelihood that variables were correlated and this implied that using a simple linear equation would be inappropriate due to eminent endogeneity problem.

VAR is useful in addressing research questions such as:

i. How does one variable respond to shocks from other variables?
ii. What is the impact of different shocks to a variable?

Impulse responses were generated to address the first objective. That is how a shock in monetary policy affects LR, how a shock in LR affects DCR, a proxy for credit growth and how a shock in DCR impacts GDP, a proxy for economic growth.

To address the second objective, cointegration among GDP, DCR and lending rate was tested.

Reduced Form Vector Autoregression Representation

This study used generalized VAR process of the form:

$A_0 Y_t = ⅂_0 + ⅂_1 Y_{t-1} + \ldots + ⅂_p Y_{t-p} + Ɛ_t$ …….. 3.2

Where A_0 is a m ×n matrix containing contemporaneous effects with 1s in the leading diagonal. Y_t is a $m \times 1$ vector of endogenous variables in the model for $t = 1,2,\ldots,T$, which in this case are the GDP, DCR and LR. $⅂_0$ is a $m \times 1$ column vector of intercepts. $⅂_1$ and $⅂_p$ $m \times n$ matrices containing coefficients for lagged variables. p lag length and Ɛ is the serially uncorrelated $(m \times 1)$ vector of errors with zero mean and a constant positive definite variance-covariance matrix.

Multiplying Equation 3.2 by A_0^{-1} we obtain reduced Vector Autoregression of the form;

$Y_t = \beta_0 + \beta_1 Y_{t-1} + \ldots + \beta_p Y_{t-p} + ɵ_t$ …… 3.3

Expressing equation 3.3 into a vector error correlation model:

$\triangle Y_t = \alpha ecm_{t-1} + \sum_{i=1}^{\rho-1} \beta_i \triangle Y_{t-j} + ɵ_t$ ……3.4

Where:

αecm_{t-1}: The error correction term.

Equation 3.4 is the Vector Error Correlation Model, VECM which was estimated.

Pre-estimation Test

To improve on the predictive accuracy of the model time series properties of gross domestic product, DCR and lending rate tests were estimated.

Unit Root Tests

The classical regression techniques assume that variables are stationary. To avoid the problem of spurious regression, this study adopted the ADF test and the PP test.

Given AR(1) model:

$Y_i = \rho y_{i-1} + e_i$ 3.5

The OLS estimate for a sample size of n is:

$\rho_n = \frac{\sum_{i=1}^{n} Y_{i-1} Y_i}{\sum_{i=1}^{n} Y_i^2}$ 3.6

If the null hypothesis is not rejected, we difference once to make the variable stationery.

Order of Integration.

A variable is integrated of order d, denoted by I(d)and contain d roots if it must be differenced d times to make it stationery.

Cointegration Tests

Credit demand models imply cointegration between income, interest rate amongst others.

In order to estimate Equation 3.4, it was essential to test for cointegration. Cointegration tests for bivariate models is often conducted by means of the Engle-Granger two stage procedure and the Engle-Granger-Yoo three stage procedure. This study is however a multivariate time series analysis, cointegration was therefore determined using Johansen Max Eigenvalue Statistics and Trace Statistic tests of the forms;

$J_{trace} = -T(sum(ln(1 - Li))$ 3.7

$J_{max} = -T\ ln(l - Lr + 1)$ 3.8

Where:

T: the sample size, and

L: largest canonical correlation.

Model Estimation

Based on the results of cointegration tests, Equation 3.4 (VECM) was estimated. The outcome is outlined in form of impulse response graphs and Granger causality tests.

Impulse Response Functions

Impulse response functions study the interaction between variables in a vector autoregressive model. Impulse response was adopted to trace response of GDP to shocks from lending rate. Impulse response traces how a shock in interest rate influences DCR and how a shock in DCR influences gross domestic product. Impulse response was therefore individually conducted for lending rate, DCR and gross domestic product.

Consider rewriting Equation 3.3, the reduced form VAR process as follows;

$Y_t = A_0 + A_1 Y_{t-1} + \cdots A_P Y_{t-p} + \varepsilon$ 3.9

Where Y_t contains $n \times 1$ measurable characteristics and $A_1 Y_{t-i}, i = 1,2, \ldots, p,$. are lagged dependent variables. Upon selecting the optimal order for the VAR(.) process, Equation 3.9 Can be rewritten as follows;

$Y_t = \mathrm{U} + \varepsilon_t + \psi_1 \varepsilon_{t-1} + \psi_2 \varepsilon_{t-2} + \ldots,$ 3.10

The impulse response can then be calculated. The element of $\psi_s$in row $i$and column j can be expressed as follows;

$\psi_{i,j} = \frac{\partial Y_{i,t+s}}{\partial \varepsilon_{jt}}$ 3.11

Where $\varepsilon_{jt}$is the j[th]variable's disturbance at date t, and $Y_i, t + s$ is the i[th]variable at date t+s. The impulse response function shows how much the i[th] variable at date t + s will change $\psi_{i,j}$. units, when the j[th]variable disturbance increases by one unit at date t.

Granger Causality

In analyzing time series data, it was necessary to determine whether changes in one variable are as a result of changes in another variable. Whether changes in LR causes variations in DCR and whether changes in DCR causes changes in gross domestic product.

To find out that interest does not granger cause DCR;

$DCR_t = \sum_{t=1}^{k} a_1 GDP_{t-1} + \sum_{t=1}^{m} \beta_1 LR_{t-1}$ 3.12

If $\beta_1 + \beta_2 + \beta_3 \ldots + \beta_m$ using the F-test on LR are statistically significant, we would reject the null hypothesis. Similarly we can test for reverse Granger causality that DCR does not granger cause lending rate. This can be illustrated as shown in Equation 3.13 as follows;

$LR_t = \sum_{t=1}^{k} \psi_1 LR_{t-1} + \sum_{t=1}^{i} \mathrm{e}_1 DCR_{t-1}$ 3.13

If $\mathrm{e}_1 + \mathrm{e}_2 + \mathrm{e}_3 + \cdots + \mathrm{e}_i$, using the F-test on LR are statistically significant, we would asssume the null hypothesis: LR does not granger cause DCR. This test was conducted for all variables.

Data Analysis

Data was analyzed to answer the research questions. Causal relationship of interest rate capping in influencing GDP in the long run was determined. To ensure appropriate findings, data was systematically organized in spreadsheet.

Tools of Analysis

This study used STATA 13 to determine the statistical property of the variables in the model, to estimate the VAR model and its components.

Data Sources

In order to establish the relationship between GDP, loan advancement and LR, the study used quarterly data for April 2000 to March 2017; to cover pre-implementation of interest capping law and January 2018 to March 2019 to cover post implementation period.

The research was based on information obtained from KNBS, Quarterly GDP Statistical Releases, WDI and WB.

Definition and Measurement of Variables

Dependent and independent variables, their symbols, proxies and measurement scales is as outlined in Table 3.1.

Table 3.1: Variables used in the Model.

Variable	Definition	Measurement
Economic Growth, GDP_t	Economic growth refers to the value of increase in final output of an economy adjusted to inflation usually over a one year period. Economic growth rate refers to instantaneous rate of change in economic growth (Romer, 2018).	Economic growth is proxied by GDP growth. Quarterly GDP values at market prices in millions given in economic surveys at time‘t’.
DCR, DRC_t	According to Palane (2012), a loan is an amount lent to another party, borrower, with an expectation of repayment within a given time period at a price, interest.	Quarterly DCR.
Lending Rate, LR_t	Just like goods market, interest rate represents price paid for borrowed money. It could also mean price paid for use of a borrowed asset. Interest can then be said to be periodic payments to use or in possession of an asset (money inclusive being the most liquid asset) thus "rent of money”. As a price, its variation signals market information with respect to possible fluctuation in purchasing power. (Ng‘etich&Wanjau, 2011).	Commercial banks’ lending rates as given in Central Bank of Kenya Reports at time‘t’. The pre and post interest rate cap regimes shall reflect the impact of interest rate policy on economic growth.

Source: Author

IV. Data Analysis And Interpretation

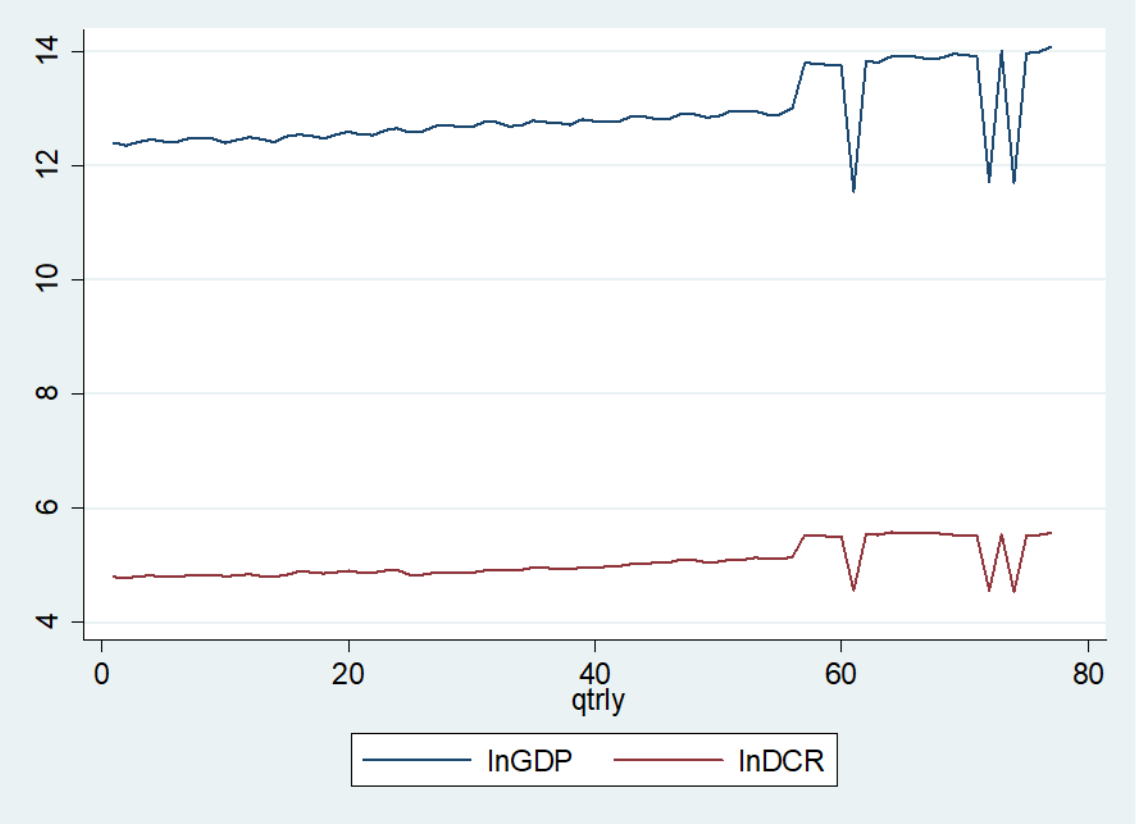
Introduction

The study was to assess the long-term impact of interest rate cap on economic growth and ultimately economic development. Quarterly data for the year 2000 to 2019 from Kenya National Bureau of Statistics Quarterly GDP Statistical Releases, WB and WDI were used. In order to achieve the study objectives, the following tests were conducted; unit root tests, impulse response, cointegration, JarqueBera and vector error correlation model diagnostics.

Unit Root Tests

Stationery tests were conducted to ascertain whether data was stationery or not. For stationarity and order of integration; ADF and PP tests were conducted. However, a spurious regression was done before the test for stationarity and the results are as shown in Figure 4.1.

Figure 4.1 DCR and Gross Domestic Product Two Line Graph.



In Figure 4.1, both the log of GDP (Gross Domestic Product) and log of DCR (DCR) trend constantly upwards from quarter zero to quarter eighty, thus data generation process doesn't revolve around zero, a constant is therefore employed in the specifications when running the tests. Table 4.1 shows R^2 for spurious regression between log GDP and log DCR and Durbin-Watson d-statistic.

Table 4.1: Spurious Regression of Gross Domestic Product and DCR and Respective D-Watson Statistic

Source	ss	df	MS	Number of observations = 77
Model	26.83324	1	26.83324	F(1, 75) = 3251.54
Residual	0.618935	75	0.008252	Prob > F = 0.0000
				Adj R-squared = 0.9775
				Root MSE = .09084

Log GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Log DCR	2.02194	.0354588	57.02	0.000	1.951303	2.092578
Constants	2.703248	.1793114	15.08	0.000	2.346042	3.060455

Durbin-Watson d-statistic(2, 77) = .8954757

Source: Author' calculations.

In Table 4.1, since adjusted R^2 (0.9775) is greater than Durbin-Watson d-statistic (0.8954757), we accept the alternative hypothesis that the series is stationery at 95% level of confidence. The regression can therefore neither be used for forecasting nor prediction.

Augmented Dickey Fuller and Phillip Perrons Tests.
Table 4.2 presents the results for unit root tests.

Table 4.2:Augmented Dickey Fuller and Phillip Perrons Unit Root Test Results for Log GDP, Log LR and Log DCR.

VARIABLE	Test Statistics			Critical Values at		Conclusion	
	ADF Test	PP Test		ADF Test	PP Test	ADF Test	PP Test

Log GDP	-4.614	-9.050	1%	-4.095	-4.093	Stationery	Stationery
			5%	-3.475	-3.474	Stationery	Stationery
			10%	-3.165	-3.164	Stationery	Stationery
Log LR	-2.794	-2.543	1%	-4.095	-4.093	Non-Stationary	Non-Stationery
			5%	-3.475	-3.474	Non-Stationery	Non-Stationery
			10%	-3.165	-3.164	Non-Stationery	Non-Stationery
Log DCR	-4.145	-8.284	1%	-4.095	-4.093	Stationery	Stationery
			5%	-3.475	-3.474	Stationery	Stationery
			10%	-3.165	-3.164	Stationery	Stationery

Source: Author

Where PP is Phillip-Perrons Unit Root Test and ADF is the Augmented Dickey-Fuller tests.

Results of Table 4.2 show that based on ADF and PP tests, both log GDP and log DCR are stationery at 1%, 5% and 10% levels of significance. Log LR is however non-stationery at 1%, 5% and 10% levels of significance.

Table 4.3: Augmented Dickey Fuller and Phillip Perrons Unit Root Test Results for First Difference of Log GDP, Log LR and Log DCR.

VARIABLE	Test Statistics		Critical Values at			Conclusion	
	ADF Test	PP Test		ADF Test	PP Test	ADF Test	PP Test
ΔLog GDP	-8.956	-21.290	1%	-4.097	-4.095	Stationery	Stationery
			5%	-3.476	-3.475	Stationery	Stationery
			10%	-3.166	-3.165	Stationery	Stationery
ΔLog LR	-5.326	-4.984	1%	-4.097	-4.095	Stationary	Stationery
			5%	-3.476	-3.475	Stationery	Stationery
			10%	-3.166	-3.165	Stationery	Stationery
ΔLog DCR	-8.828	-20.708	1%	-4.097	-4.095	Stationery	Stationery
			5%	-3.476	-3.475	Stationery	Stationery
			10%	-3.166	-3.165	Stationery	Stationery

Source: Author

The results of Table 4.3 show that first difference of Δlog GDP, Δlog LR and Δlog DCR are stationery at 1%, 5% and 10% levels of significance for both ADF test and PP test.

Vector Autoregressive (VAR) Estimates.

The optimal lag length is used to avoid the problems of heteroscedasticity and autocorrelation. Table 4.4 provides information on the optimal lag length of the vector-autoregression model.

Table 4.4: Optimal Lag Length for the VAR

lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	100.155				0.000224	-2.72652	-2.70134	-2.66328
1	130.029	59.749	4	0.000	0.000109*	-3.44525*	-3.36973*	-3.25553*
2	132.58	5.1008	4	0.277	0.000114	-3.40499	-3.27911	-3.08878
3	132.996	0.83308	4	0.934	0.000126	-3.30545	-3.12921	-2.86276
4	140.007	14.022*	4	0.007	0.000116	-3.38909	-3.1625	-2.81992

***** Signifies optimal lag length. FPE means final prediction error.

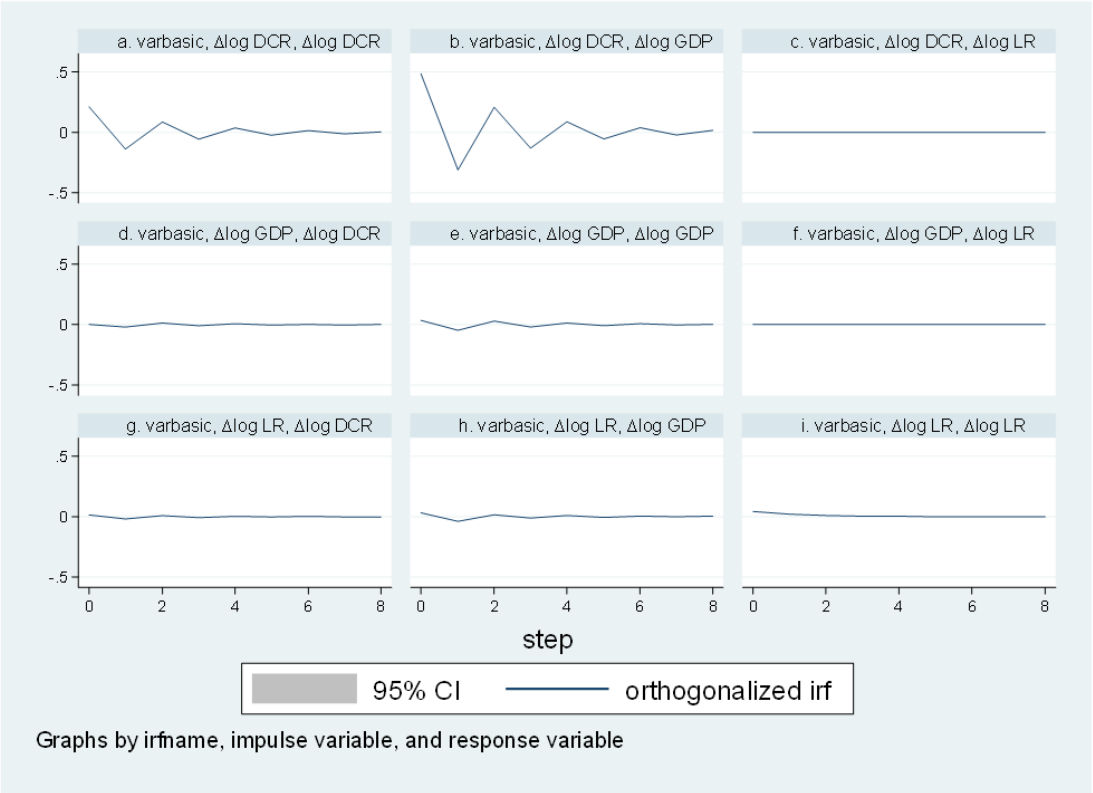
Too many lags leads to problems of multicollinearity, lose of d.o.f, and statistically insignificant coefficients. However relatively few lags may lead to specification errors. The results of Table 4.4 shows the highest absolute values for FPE (0.000109), AIC (3.44525), HQIC (3.36973) and SBIC(3.25553) thus the optimal lag length is 1 for AIC, HQIC and SBIC criteria.

Impact of Monetary Policy on Economic Activity through Lending Rate in Kenya.

The impulse Response Functions.

Figure 4.2 shows the response of DCR to shocks in in its lagged values, shock in the lending rates (interest rate cap monetary policy stance) and shocks in gross domestic product. Second, response of GDP to shocks in DCR, shocks of its own lagged values and shocks in lending rate. Finally, response of lending rate to shocks in DCR, shocks in GDP and shocks in its own lagged values.

Figure 4.2: Responses of Variables to Shocks from other Variables in the Model



Impulse Response of DCR, DCR.

Figure 4.2 (a) shows that a standard deviation shock to DCR causes a negative impact to itself between period 0 - 2, period 2- 3, and period 4 - 5 and a positive impact between periods 1 - 2 and 3 – 4 then it gets to a stables state between period 5-8. These results are consistent with impact of GDP shocks to DCR as shown in Figure 4.2 (b). Figure 4.2(c) however shows insignificant impact of lending rate shocks to DCR as DCR remains relatively stable between periods 0 and 8.

Table 4.5 reports the VAR coefficient level of significance of DCR as a relation of itself and other variables.

Table 4.5: Varbasic ΔLog LR ΔLog GDP ΔLog DCR

Response Variable		**Regressors**		
ΔLog DCR	Coefficient.	**ΔLog LR**	**ΔLog GDP**	**ΔLog DCR**
	Std. Err.	0.766998	-0.6140852	-0.3307153
	z	1.642212	0.7124484	1.102741
	P>|z|	0.47	-0.86	-0.30
		0.640	0.389	0.764

Table 4.5 shows that DCR shocks have a statistically insignificant impact on its own. z-statistic, 0.47 is less than P-value, 0.64 at 5% level of significance. Gross Domestic Product shocks have a statistically significant impact on DCR with z-statistics, 0.86 greater than P-value, 0.389. Finally at 5% level of significance, lending rates shocks have a statistically insignificant impact on DCR with z-statistic, 0.30 less than P-value, 0.764 as shown in Table 4.5.

Impulse Response of Gross Domestic Product, GDP.

Figure 4.2 (d) shows that a standard deviation shock to DCR causes a negative impact to Gross Domestic Product between period 0 and 1 followed by a positive impact between period 1 and 2. Beyond period two the response of GDP to DCR shocks is relatively highly inelastic. In the long run, variations in GDP remains relatively constant irrespective of shocks to DCR.

The results of Figure 4.2(e) shows that a standard deviation shock to GDP causes negative impact to GDP in period 1 followed by a positive impact in period two. GDP is however stable from period 3 onwards (in the long-run) irrespective of its own shocks.

Figure 4.2(f) shows a perfectly inelastic response of GDP to shocks in lending rate. Gross domestic product is relatively stable in both periods.

Table 4.6 reports the VAR statistical significance of coefficients of ΔLog GDP as a function of ΔLog LR, itself and ΔLog DCR.

Table 4.6: Varbasic ΔLog LR ΔLog GDP ΔLog DCR.

Response Variable		Regressors		
		ΔLog LR	**ΔLog GDP**	**ΔLog DCR**
ΔLog DCR	Coef.	-0.733	-1.42	1.76
	Std. Err.	2.53	1.64	3.77
	z	-0.29	-0.87	0.47
	P>|z|	0.77	0.39	0.64

Table 4.6 shows that GDP is negatively related to lending rate shocks at 5% level of significance with Z-statistic, 0.29 less than P - value, 0.77. The is a statistically significant negative causal relationship outcome between GDP and its own shocks at 5% level of significance with z-statistic, 0.87 greater than P-value, 0.39. DCR shocks however positively impacts GDP at 5% level of significance at values shown in Table 4.6. From the findings, GDP responds positively to shocks from DCR. This implies that expansionary monetary policy targeting credit expansion could improve economic activity subsequently resulting into economic growth.

Impulse Response of Lending Rate.

Figure 4.2(g) shows that a standard deviation shock to DCR causes a negative impact to lending rate in period 1, a positive impact in period 2 followed by relatively stable lending rate in subsequent periods. Figure 4.2(h) shows that a standard deviation in GDP causes fluctuations in LR in the short run followed by relatively stable LR in the short run. Figure 4.2 however shows that lending rate shocks has highly inelastic impact on itself both in the short-term and in the long-term.

Table 4.7 reports the VAR coefficient level of significance of lending rate as a determinant of itself and other variables.

Table 4.7:Varbasic Varbasic ΔLog LR ΔLog GDP ΔLog DCR

Response Variable		Regressors		
ΔLog LR		**ΔLog LR**	**ΔLog GDP**	**ΔLog DCR**
	Coef.	0.485	0.485	-1.098
	Std. Err.	0.0995	0.0643304	0.148
	z	4.87	0.75	-0.74
	P>|z|	0.00	0.45	0.46

Table 4.7 shows a positive relationship between lending rate, lagged values of itself, gross domestic product and a negative relationship (-1.098) with DCR at 5% level of significance. This result is consistent with theoretical model of negative relationship between lending rate and growth in credit. This could imply economic performance stabilization measures for example through interest rate caps could stabilize economic performance in the long run. These findings are consistent with (Chebet, 2010).

In conclusion, the impulse response graphs show that monetary policy influences level of output in Kenya. According to the study, proportionate change in loan advances to proportionate change in lending rate is relatively inelastic. Lending rate as a monetary tool in influencing economic performance through credit growth would therefore be inappropriate.

Granger Casualty

Table 4.8 shows whether changes in GDP are as a result of shocks in DCR and LR. Whether shocks in GDP and DCR Granger cause LR and finally whether shocks in LR and GDP granger cause DCR in the short run.

Table 4.8: Granger Causality Wald Tests

Equation	Excluded	chi 2		Prob > chi 2
ΔLog GDP	ΔLog DCR	14.015	5	0.016
ΔLog GDP	ΔLog LR	10.4 4	5	0.074
ΔLog GDP	ALL	21.928	10	0.015
ΔLog DCR	ΔLog GDP	17.005	5	0.004
ΔLog DCR	ΔLog LR	9.9634	5	0.076
ΔLog DCR	ALL	24.39	10	0.007

ΔLog LR ΔLog LR ΔLog LR	ΔLog.GDP ΔLog DCR ALL	11.223 10.211 14.20 9	5 5 10	0.047 0.069 0.164

The Granger causality test results found independence between the following variables at 5% level of significance: gross domestic product and lending rate (P - value 0.074), DCR and lending rate and lending rate (P - value 0.076). A bidirectional casualty was found between the following variables: gross domestic product and DCR (P - value 0.016 and 0.004 respectively) at 5% level of significance. A unidirectional causality was found running from the following variables at 5% level of significance: lending rate to gross domestic product (P - value 0.047) and lending rate to DCR (P - value 0.069)

Cointegration Tests

Table 4.3 shows that the Equation 3.3 is integrated of order one. That is, to become stationary, the data has to be differenced once. Co-integration of non-stationery data was conducted to determine if there was a long-term relationship between the characterisctics. Co-integration helps determine whether economic growth, credit growth and lending rate have a causal relationship in the long run.

Table 4.9: Co-integration Test.

Maximum Rank	Trace Statistic	Max Eigenvalue Statistic	Critical Value 5%	
			Trace Statistic	Max Statistic
0	56.6818	47.9207	29.68	20.97
1	8.7611*	7.42	15.41	14.07
2	1.3412	1.3412	3.76	3.76

Source: Author

H_o: Max Rank=0, implies no cointegration among variables.
H_o: Max Rank = 1, implies there is one cointegration equation.
H_o: Max Rank = 2, implies there are two cointegration equations.

At 0 maximum rank, the value of trace statistic is 56.6818 > 29.68 at 95% level of confidence. This means that at 95% level of confidence, we accept alternative hypothesis and conclude that the variables are cointegrated. This finding is consistent with max eigenvalue statistic at 95% level of confidence as shown in the findings in Table 4.9.

At 1 max rank, the value of trace statistics is 8.7611 while critical value is 15.41 However, 8.7611 is less than 15.41, we therefore accept null hypothesis and conclude that the variables are cointegrated at 95% level of confidence. The finding from trace statistic is consistent with that of maximum eigenvalue statics as shown Table 4.9. This implies a long-run relationship between GDP, DCR and LR.

In Figure 4.2(g), there is a tendency of DCR deviation. It however traces its growth path in the long run. This implies that adopting the policy stance to influencing economic development is feasible in the long-run.

Given that the variables were found to be cointegrated, Vector Error Correlation Model was therefore run. The long run equations from which error correlation term is generated is shown in Table 4.10.

Table 4.10: Long-run Relationship Between Log GDP, Log DCR and Log LR.

Beta	Coef	Std. Err	Z	P>|z|	[95% Conf. Interval]	
Log GDP	1	.	.	.	.	.
Log DCR	-1.80401	0.07226	-24.97	0.000	-1.94563	-1.66238
Log LR	0.875794	0.258882	3.38	0.001	0.368394	1.383193
Constants	-3.1051	.	.	.	.	.

Source: Author

In table 4.10 a proportionate change in Log DCR causes 1.804 more than proportionate impact on Log GDP in the long-run. A proportionate change in Log LR causes a 0.8758 negative less than proportionate impact on Log GDP. The coefficients are statistically significant at the 1% level of significance as shown in Table 4.9. On average, Log DCR and Log LR has asymmetric effects on Log GDP. Taking Log GDP as the target variable:

$$\Delta \log \mathrm{GDP}_t = -0.0001681 + 0.071\Delta \log \mathrm{GDP}_{t-1} - 1.10\ \Delta \log \mathrm{DCR}_{t-1} - 0.46\ \Delta \log \mathrm{LR}_{t-1} - 2.25\ \mathrm{ECT}_{t-1} + u_{1t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4.1$$

The adjustment term (-2.246438) is statistically significant at 95% level of confidence, this could be an indication deviation from equilibrium for a year before is recovered currently at a convergence speed of 224.6%.

Post Estimation Diagnostic Test Results

Normality Test

Normality test was run using JB test. Table 4.11 shows the results for JB normality test.

Table 4.11: Jarque - Bera Test

Equation	Chi2	df	Prob > chi2
ΔLog LR	56.746	2	0.000
ΔLog GDP	81.635	2	0.000
ΔLog DCR	94.308	2	0.000
ALL	232.689	6	0.000

Table 4.11 shows that errors for ΔLog LR, ΔLog GDP and ΔLog DCR equations are normally distributed. Since probability values, $0.000 < 0.05$, we accept null hypothesis for normality and conclude that errors across all equations are normally distributed.

Stability Test

Table 4. 12:Eigenvalue Stability Condition

Eigenvalue	Modulus
0.4474492 + 0.7668067i	0.887808
0.4474492 - 0.7668067i	0.887808
-0.6047388 + 0.5987502i	0.851006
-0.6047388 - 0.5987502i	0.851006
0.6251745 + 0.5368279i	0.824031
0.6251745 - 0.5368279i	0.824031
-0.8091604 + 0.08465179i	0.813576
-0.8091604 - 0.08465179i	0.813576
-.3552445 + 0 .6720626i	0.760176
-.3552445 - 0 .6720626i	0.760176
0.7228539	0.722854
0.00399627 + 0 .7199853i	0.719996
0.00399627 - 0 .7199853i	0.719996
0.4126574	0.412657
0.00869968	0.0087

VAR complies with stability condition. All the eigen-values are within the unit circle.

V. Summary, Conclusion And Recommendations

Introduction

This chapter details the summary, the conclusion and policy implications of the study and recommendation for further studies. The outcome of the study is presented and discussed in proceeding sections.

Summary

The study was to find out the impact of interest rate cap on economic growth and ultimately development in Kenya. To achieve the study objectives, data from CBK, periodical report from Kenya Economic Surveys for 2000 to 2019, WB and WDI from the first quarter of 2000 to first quarter of 2019 were used. Using Stata statistical analysis tool, Vector Error Correlation Model was estimated to achieve the study objectives.

The study aimed to find out a long term relationship between credit growth and economic improvement. Results for cointegration both from Trace Statistic and Max Eigenvalue Statistics revealed that log of DCR, a proxy for credit growth and log of GDP, a proxy for economic growth both had long run relationship at 95% level of confidence. Second, to assess the impact of commercial bank interest rate control on level of credit and subsequently long run growth in economic activity. From the results, log of lending rate is negatively related to DCR, however it is not statistically different from zero at 95% level of confidence. It was observed that variations in lending rate seem not to impact economic growth as hypothesized. The two variables however move together in the long run.

Using data for first quarter of the year 2000 and first quarter of the year 2019 and Vector Error Correlation Model, VECM, it was found that irrespective of the relatively high deviations in the short trend, DCR traces its growth path in the long run. This implies that using monetary policy to influence economic growth through credit growth is appropriate in the long term.

The results from this study reveal relatively inelastic demand for loans to its price in Kenya. This makes it difficult for Central Bank of Kenya to influence credit growth through alterations in LR. However, changes in

credit growth majorly originate from variations in cost of and level of economic activity. Prudent macroeconomic policies should therefore be put into place to prevent too much volatility in growth of Gross Domestic Product.

Conclusion

The debate on whether the LR affects uptake of loans is alive and still ongoing. The proposition that high interest rates discourage loan uptake is inconclusive. The results of this study show insignificant response of DCR to shocks in LR.. DCR is however positively related to gross domestic product.

Limitations of the Study

The major short-fall is the fact that the study is primarily based on quantitative data. Inclusion of qualitative aspects for example the nature of investors' preference for equity verses debt in undertaking investment decisions would have shed some light on some significant factors influencing crediting growth other than own price.

Local studies related to interest rate caps was not adequately reviewed. This was due to limited empirical studies on the topic.

Recommendations

Policy Recommendations

With respect to the findings from the study, a number of policy recommendations emerge. First, given that demand for loans is relatively interest rate inelastic, variations in lending rates insignificantly affects demand for credit, there is therefore need to consider other factors that affect demand for credit. This will make monetary policy changes more effective in influencing economic growth. Second, the finding that the reaction of GDP to variations in DCR sector is positive,there is need to establish other factors influencing DCR in order to enhance economic growth. The Kenyan government initiate policies that improve access to credit. Such policies could for example be reduction in cash reserve requirement in order to increase bank liquidity, enacting policies that improve on information asymmetry in the credit market or lowering CBR further amongst others.

Suggestions for Further Research.

This study was limited to the long run impact of interest rate monetary policy capping on economic growth followed by analysis of credit growth, interest rate and gross domestic product. It would be interesting to explore how monetary policy affects economic growth through other channels other than credit channel. A study to establish the impact of interest rate cap across various sectors of the economy could also be of great value.

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