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Assessing the Impact of Private Sector Credit on Economic Growth in Kenya

Benson Kiriga, Terry Chacha and
Daniel Omanyoo

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Kenya Institute for Public Policy
Research and Analysis

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Abstract

In many economies, private sector credit plays a critical role by efficiently allocating resources for investment and is considered to be an engine of economic growth. This study examined the impact of the interest rate cap on credit uptake by different sectors and also the impact of private sector credit on economic growth. The HP filter, ARDL approach to cointegration are used to assess these impacts. The results show that capping of interest rates led to an average decline of total credit by about 4.3 per cent per month from its pre-capping level. In terms of sectoral credit uptake, the ARDL estimates reveal that, on average, the agriculture sector experienced the largest decline of about 5.4 per cent relative to other sectors. The study finds that there is a positive and significant long-run and short-run relationship between access to private sector credit and real GDP growth in Kenya. The elasticity of real GDP growth with respect to private sector credit is about 0.25 and is statistically significant and economically important. This relationship suggests that the short fall in private sector credit (of approximately 4.3%) following the introduction of interest rate caps is associated conservatively with a shortfall in real GDP growth of about 1.1 per cent relative to the baseline (pre-capping period). This is a massive drag on growth and jobs, holding back the country from making progress in promoting inclusive growth. The findings from this paper go a long way in plugging a huge information gap on the part of policy makers on the impact of interest rate caps on growth in Kenya. Policies to enhance access to private sector access remains top priority, including during the COVID-19 pandemic. Accelerating private sector's contribution is extremely important especially at a time when public sector investment is constrained and the economy reeling from the impact of corona virus. Policies to support firms to access liquidity and credit remain very critical both during the crisis phase and more importantly during the recovery phase.

Abbreviations and Acronyms

AIC	Akaike Information Criterion
ADF	Augmented Dickey-Fuller
ARDL	Autoregressive Distributed Lag
CBK	Central Bank of Kenya
CBR	Central Bank Rate
EAC	East Africa Community
FSS	Financial Sector Services
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
HP Filter	Hodrick Prescott Filter
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
KNBS	Kenya National Bureau of Statistics
LICs	Low-Income Countries
MICs	Middle-Income Countries
MSME	Micro, Small and Medium-sized Enterprise
NBFI	Non-Banking Financial Institution
NPL	Non-Performing Loan
OECD	Organization for Economic Co-operation and Development
SAP	Structural Adjustment Programme
SME	Small and Medium Enterprises
SSA	Sub-Saharan Africa
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
UK	United Kingdom
WAEMU	West African Economic and Monetary Union

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1. Introduction

1.1 Background

The nexus between credit and economic growth has been an ongoing debate for decades. Schumpeter (1911) emphasized the importance of a developed financial sector in determining economic growth trajectory through its role in moving financial resources to enterprises that need them. Similar sentiments are expressed in McKinnon (1973) and Shaw (1973). According to Spratt (2013), growth of private sector has positive effects on growth for developing countries up to a threshold of 80 per cent of private sector credit to GDP ratio, beyond which further development of the sector becomes detrimental due to increased resource mis-allocation and instability. Griffith-Jones et al. (2014) support this view by noting that rapid growth of financial sector can have adverse effects on growth and output volatility.

Nevertheless, it is widely accepted that the private sector, through its demand for investment and consumption, is the engine of growth (OECD, 2007). The private sector plays a crucial role in generating wealth, delivering jobs, and reducing poverty. A key ingredient to the successful exploitation of economic opportunities by the private sector is the availability of financing that includes adequate credit. Thus, to sustain private sector investment and a desired level of GDP growth, the private sector requires enough credit.

In jurisdictions where capital markets are not well developed, private sector credit growth has been identified as fundamental in stimulating economic growth. In addition, securities' market requires significant fixed access cost, which might be difficult for small and medium-sized enterprises to raise. Josephine (2009) asserts that a fundamental pillar of financial intermediation is extension of bank credit to economic agents who can productively invest the credit. This is also echoed by Khamis and Klossifov (2009) who claim that credit availability enables firms to undertake investments that they would not have undertaken with their own funds. They also demonstrate the macroeconomic impact of higher credit availability; as credit availability increases, consumption and investment demand also increases and this raises the level of output and employment.

The financial sector is one of the country's growth pillar in the Kenya Vision 2030 through its role in mobilization and allocation of investment funds that are required to propel the economy towards achieving a growth rate of an average 10% GDP per annum beginning in 2012. The vision for the Financial Sector Services (FSS) is to create a vibrant and globally competitive financial sector that will create jobs and promote high levels of savings to finance Kenya's overall investment needs (Republic of Kenya, 2008). This will bolster macroeconomic stability, promote private sector development and in turn generate employment and reduce poverty.

Activities by the private sector are important in driving the outcomes in economic growth especially in developing countries. Therefore, the private sector requires sufficient credit to support a desired level of investment and consumption (aggregate demand). Insufficient credit is associated with weak aggregate demand, a slowdown in investment and limited jobs. Official statistics from Kenya National Bureau of Statistics (KNBS) indicate that private sector credit grew by just 3.4 per cent by end of February 2019, in real terms this growth is negative (given an average inflation rate of about 4.7%) before it began to rise. In addition, reduced private sector investment can curtail long-term growth objectives envisioned under the "Big Four" agenda, whose delivery is expected to reduce poverty and raise well-being for all Kenyans. It is therefore vital to revive credit to the private sector as it would support the recovery of the economy.

Recent data shows that there has been an increase in credit uptake by the private sector in 2019. Policy makers have also been looking for ways in which they can encourage credit to the SMEs. This includes innovation of products such as Stawi which is a digital platform that offers loans below the market rates. With SMEs accounting for over 80 per cent of established businesses in Kenya, their performance is very important for the growth of the economy and also in terms of providing job opportunities.

Against this backdrop, this study aims to examine the impact of interest cap on credit uptake by different sectors of the economy, thereby establishing the link between private sector credit and real GDP growth in Kenya. The overall research question is, how did the introduction of interest rate caps affect credit uptake across different sectors of the economy? And what is the relationship between private sector credit access and GDP growth in Kenya?

Private sector credit is an important policy issue and as Lawrence (2011) opines, trends in the past two decades indicate a strong positive correlation between private sector credit and economic growth where countries that reported higher private sector to GDP ratio showed stronger performance in economic growth. Consequently, this paper will provide evidence to policy makers on the need for improving access to credit especially to MSMEs. In addition, the study will give a lead on reforms that can be instituted to spur development in the financial sector and economic growth. The study will also be important for future researchers and scholars especially in the area of finance-growth nexus.

1.2 Kenya's Private Sector Credit Situational Analysis

The Kenyan financial system is relatively developed compared to other countries of the same income level in Sub-Saharan Africa (SSA). The sector comprises of the

Central Bank of Kenya (CBK), which is the regulatory authority, commercial banks (both domestic and foreign), micro-finance banking institutions (MFBIs), exchange bureaus, credit reference bureaus, remittance providers, the Nairobi Stock exchange and insurance companies.

The growth in the banking sector post-independence can be characterized by several phases. The first phase, (*Harambee*), from 1963 to 1980 saw the creation of government-owned banks. The next phase, (*Nyayo*) witnessed growth in the number of banks and Non-Banking Financial Institutions (NBFIs). Banks grew from 17 in 1980 to 24 in 1990 while NBFIs grew from 20 to 53 over the same period. Most of these institutions were owned by local entrepreneurs and were meant to cater for small and medium-sized enterprises from their own communities (Nasibi, 1992). In the early eighties, the banking system financed large budget deficits and there were direct controls on private sector credit due to negative interest rates. The controls caused slower growth in credit to the private sector especially during stabilization period. In the third phase, 'Liberalisation', 1990 to 1999, there was also an increased growth in the number of banks. However, this period was also characterized by bank failures that led to instability. The next phase, 'Transformation', 2000-2018 can be characterized by changes in the regulatory environment. Upadhyaya and Johnsonn (2012) note that some of the fundamental reforms that marked this period included increase in minimum capital requirements, restriction of insider lending and bolstering of limits for single borrowers, and implementation of International Reporting Standards 9.

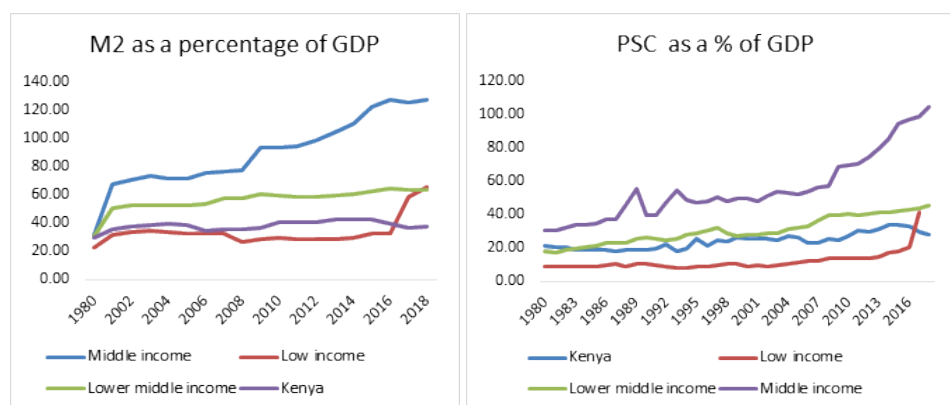
In the early 1990s, a tightening of the monetary policy causing high interest rates in treasury bills led to a contraction in private sector credit. This was accompanied by low private investment and restrained consumer spending which limited the expansion of the economy. The period 1980-1993 was characterized by the second oil shock; declining terms of trade due to falling commodity prices, a rising debt burden and financial repression. After 1993, there were several changes in policies that were towards a path of liberalization. These include raising of tariffs to cover revenue shortfall and allowing the currency to float freely. The financial sector also went through reforms that were aimed at liberalizing interest rates, strengthening the banking sector by introducing new financial instruments and deregulating financial markets.

According to Griffith-Jones et al. (2013) as cited in Mwega (2014), over the 2000 to 2010 period, growth in credit to the private sector was modeled at 19.5 per cent. This compares to Sao Tome and Principe (709%), Sudan (505.6%), Sierra Leone (384.2%), Mali (284.7), Tanzania (274.4%), Malawi (215.6%), Niger (174.4%), Nigeria (173.0%), Angola (154.5%) and Uganda (152.8%), all of which had remarkable growth in credit expansion during the decade. As earlier noted, rapid

growth in credit can, however, be detrimental if not accompanied by stricter and tighter regulations.

Broad money supply (M2) as a share of GDP and private sector credit to GDP ratio are the fundamental indicators of financial deepening and financial coverage, respectively. The first panel of Figure 1.1 shows that financial deepening (as measured by M2/GDP) in Kenya over the years closely mirrors the trends in low income countries (LICs) and low-middle income countries, but greatly diverges from that of middle income countries (MICs). The second panel of Figure 1.1 exhibit similar trends where private sector credit to GDP ratio in Kenya closely follows the trend in LICs and low-middle income countries and diverges from that of MICs.

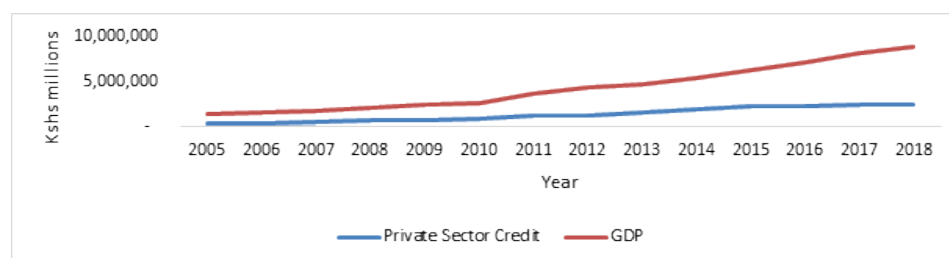
Figure 1.1: Financial depth measures



Source: KNBS (Various), Economic Survey; and World Bank (2019)

The M2/GDP ratio increased from an average of 33.8 per cent during the 'Nyayo' period to an average of 44.2 per cent during the 'liberalization' period. Looking at the phases during the structural adjustment programmes, the M2/GDP ratio increased from 30.7 per cent in the first phase of structural adjustment to 38.2 per cent and 44.19 per cent in 1985-1991 and 1992-1995.

On private sector credit flows and nominal GDP movements, growth in credit has been anchored on the movements in projected nominal GDP. This is clearly espoused in Figure 1.2 where there is close movement in the two indicators. In 2010-2011 period, there was accelerated growth in private sector credit mirroring the renewed investor confidence in the economy after the promulgation of the Constitution of Kenya of Kenya 2010. These gains were, however, reversed in 2012 due to the spillover effects of the global financial crisis.

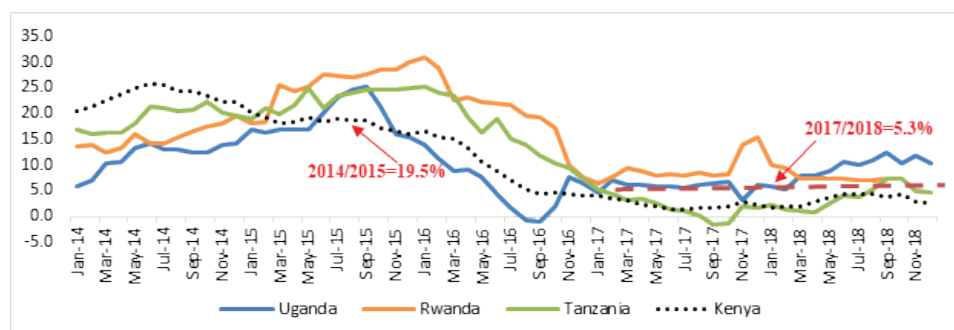
Figure 1.2: Private sector credit flows versus nominal GDP

Source: KNBS (Various), *Economic Survey*

However, beginning 2014, there was a significant slowdown in the year-on-year growth in private sector credit. The decline in credit was broad-based, affecting all the East Africa Community (EAC) peers (Uganda, Tanzania, and Rwanda) (Figure 1.3). While there are no unique factors explaining the synchronized decline in credit, some of the factors are specific to Kenya. In general, private sector credit growth dropped from 19.5 per cent in 2014/2015 to about 4.6 per cent in 2018/19.

The slowdown in credit since mid-2015 has been attributed to both demand and supply factors. The supply-side was affected by a diminished liquidity following large capital outflows in emerging and frontier markets (including the banking sector) and the turmoil in the sector, which saw three banks being placed in receivership. In addition, banks changed their business models to limit their exposure to credit risks. These factors show that supply conditions are very strong in explaining the decline in credit to the private sector. On the demand-side, spiked inflation in the first half of 2017 (up to 11.7% in May) reflecting increased prices in food. This could have caused a decline in demand for credit as firms and households cut output and consumption. Further, the introduction of interest caps made a tougher lending environment worse by making it harder for banks to price risk resulting into rationing out of riskier borrowers, such as Small Medium Enterprises (SMEs).

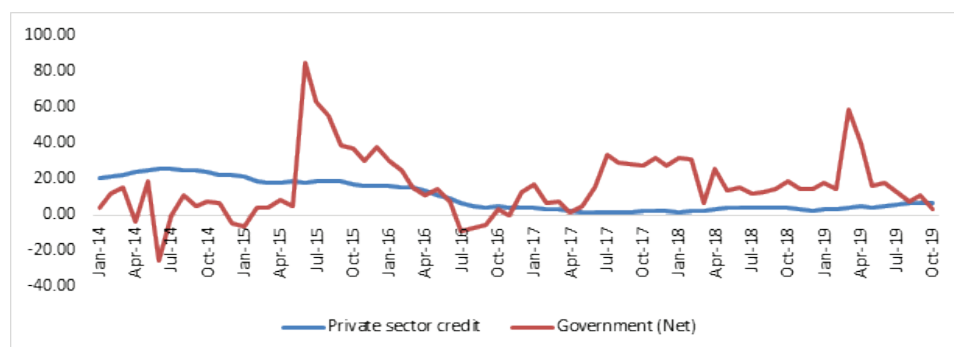
Figure 1.3: Collapse of year-on-year growth in private sector credit in EAC (%)



Source: Central Bank of Kenya (Various) Data

Looking at the trend of credit by the bank, there was a clear shift in lending from the private to the public sector (Figure 1.4). In 2019, credit growth to the government (net)¹ averaged at 19.0 per cent as opposed to 5.1 per cent of credit growth to private sector. With the risk-free 364-day treasury bills at about 9.9 percent and 10-year bond at about 12.5 per cent compared to a cap of 14.0 per cent, banks preferred to invest in government securities at the expense of lending to the private sector. However, the interest rate cap was repealed in November 2019. Its effects in terms of improving credit to the private sector are expected to be gradual.

Figure 1.4: Credit growth to the private and public sector (%)



Source: Central Bank of Kenya

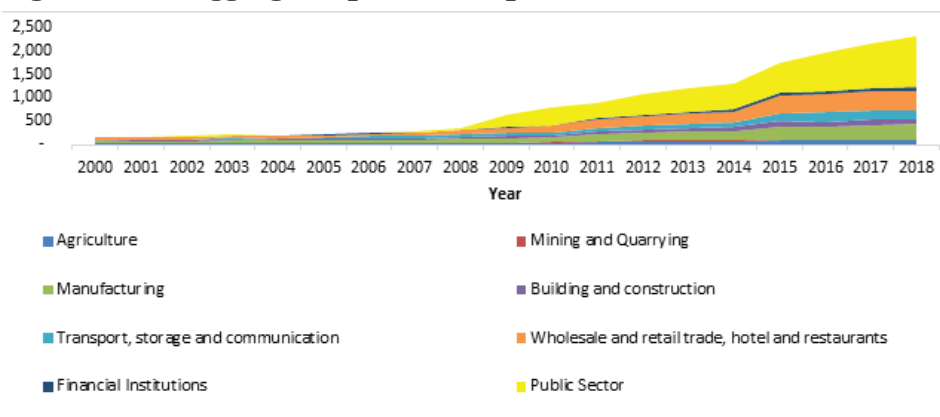
1.2.1 Sectoral trends in private sector credit growth

A close look at private sector credit trends between 2000 and 2018 (Figure 1.5) shows that overall private sector credit uptake has been growing steadily to

¹ The balance between government borrowing and its deposits at the Central Bank of Kenya.

most sectors. In terms of sectoral allocations, on average, the highest absorbers of private sector credit over the 2007-2015 period were households (24%), real estate (19%) and manufacturing (12%).

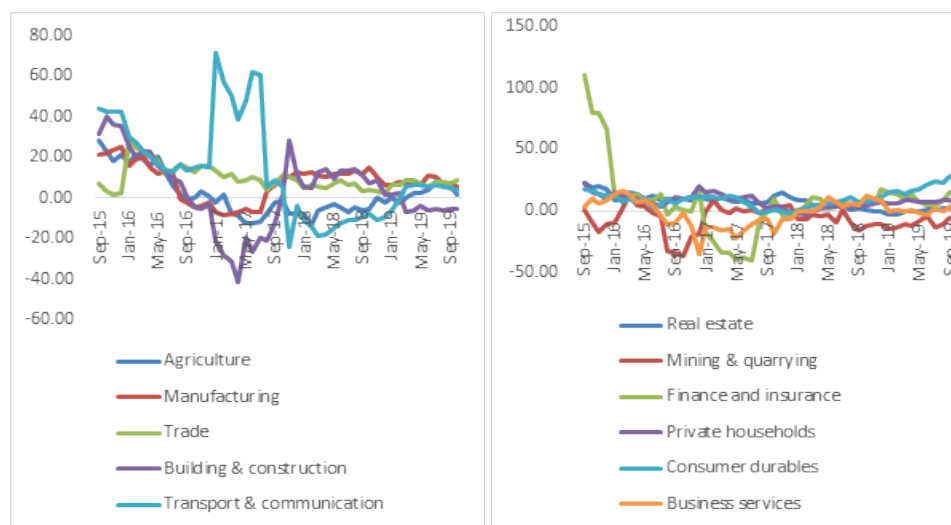
Figure 1.5: Disaggregated private and public sector credit (Ksh billions)



Source: KNBS (Various), Economic Survey

Figure 1.6 shows trends in the growth of private sector credit. It is noticeable that slowdown in credit growth was recorded across all sectors following the introduction of interest rate caps. This decline was occasioned by drastic fall in loan accounts during the October 2016 to June 2017 period, which resulted in a 37.6 per cent rise in average loan size (Central Bank of Kenya, 2018). Furthermore, there was low access by small borrowers (SMEs), while larger firms enjoyed preferential rates because blue chip companies are able to borrow at rates lower than the Treasury bill rates.

Figure 1.6: Sectoral trends in private sector credit - Growth (%)



Source: Central Bank of Kenya

It can be observed that the aggregate trend of slower growth in private sector credit is also reflected in key sectors of the economy. In particular, mining, manufacturing and agriculture have recorded negative growth in credit. Manufacturing and mining are typically credit-intensive and the decline in credit could be associated with the slow performance of the sector in 2017 as the economy was held back by drought, prolonged electioneering period and political uncertainty. Similarly, trade, real estate, personal and transport sectors experienced a slower growth credit. Demand for credit remained subdued in most sectors in the third and fourth quarter of 2018 apart from the trade sector, which reflected an increase in demand which can be attributed to demand for consumer goods and services.

Available data does not disaggregate credit between large and small firms. However, the micro, small and medium-sized enterprise (MSME) sector is estimated to account for 33.8 per cent of GDP in 2015 and 80 per cent of employment (KNBS, 2016). This shows that this sector is important and that is why Kenya's Vision 2030 has also prioritized the same. In terms of financing the MSME, Table 1.1 shows that total lending by banking to the SME sector in 2018 was Ksh 393 billion representing a Ksh 20.9 billion decline from 2017.

Table 1.1: MSME lending compared to total banking sector loan portfolio (Ksh billion)

Period (as at December)	MSMEs Loan Portfolio	Total Banking Sector Loan Portfolio	MSMEs Loans/ Total Loan Portfolio
2009	133.0	682.05	19.5
2011	225.0	1,076.56	20.9
2013	332.0	1,418.80	23.4
2017	413.9	2,155.73	19.2
2018	393.0	2,487.34	15.8

Source: Central Bank of Kenya (2018)

In 2009, bank lending to MSMEs as a share of total loan portfolio stood at 19.5 per cent. This increased to 20.9 per cent in 2011 and 23.4 per cent in 2013 before reversing slightly to 19.2 per cent in 2017 and further to 15.8 per cent in 2018. Nonetheless, financial institutions in the country have widened their product basket to attract MSMEs market. The products range from enterprise-specific accounts to digital banking and finance systems. According to CBK (2015), lending to MSMEs in the construction sector constitutes between 6.5 per cent and 7.8 per cent of aggregate loans advanced to that sector. In real estate sector, the range is wide, spanning from 0.8 per cent to 20.0 per cent while in manufacturing the range is 6.8 per cent to 15.2 per cent.

According to a survey done by the CBK in 2015, SME lending is mostly driven by domestic banks rather than foreign banks. The share of loans extended to SMEs by foreign banks decreased to 27.0 per cent in 2013 from 40.0 per cent realized in 2009. The scaling down can be attributed to the financial crisis. Kenyan banks SME lending has been higher than other African counterparts. As noted earlier, in 2013 the SME lending accounted for 23.4 per cent of the total loan portfolio compared to 5.0 per cent in Nigeria, Tanzania (14%), Rwanda (7%) and 8% in South Africa (FSD, 2015). The largest domestic SME lending comes from medium-sized banks (46%) and large banks (38%) rather than smaller banks (18%). Berg and Fuschs (2013) opine that in Kenya, domestic banks are largely exposed to microfinance clients while foreign banks are dominated by mid-corporate and corporate clients.

1.2.2 Potential factors associated with observed trends in private sector credit in Kenya

In this section we discuss further the factors that were potentially associated with decline in private sector credit in Kenya beginning 2015. The factors that have

been cited to have contributed to decline in credit include diminished liquidity in the banking system, segmented interbank market and interest rate cap. These are discussed below.

Liquidity in the banking system

Emerging and frontier markets experienced global capital outflows in the second half of 2014 and early 2015. This was caused by a strong US dollar that drove emerging market currencies into a swoon and a prospect of tightening US monetary policy. This made investors nervous and therefore opting to find a safer home for their investments back in developed countries. This affected Kenya as liquidity in the banking sector fell, hence restricting credit supply.

In addition, between 2015 and 2016, three Kenyan banks collapsed, namely: Dubai Bank, Imperial Bank and Chase Bank. Banks with similar profiles as Imperial Bank faced a period of panic when anxious depositors withdrew their funds and transferred them to larger, safer institutions. This run on the bank prompted another bank crisis with Chase Bank being placed on receivership. These events resulted in reduced confidence in the banking system causing a slowdown in liquidity in the banking sector.

Segmented interbank market

The role of an interbank market is to ensure that there is stability in the banking sector by allocating liquidity from banks with surplus to banks facing liquidity deficits. Analysis of the Kenyan interbank market has shown that the market is inefficient and segmented (see Oduor et al., 2014; Alper et al., 2016). The Kenyan interbank market is highly segmented by size: small, medium and large markets. It has been noted that large banks tend to discriminate against small banks in terms of interest rate charged and credit extended (Sichei, et al., 2012). Due to this segmentation, banks liquidity management strategy is not effective. The banks that collapsed in the 2015-2016 period are considered to be small. Their collapse revealed that during the crisis, the interbank market experienced a shift in liquidity cost rather than a change in loan supply and demand. This implies that with limited liquidity in the small banks, they have to mobilize funds at higher rates and can only lend out within stipulated margins.

Interest rate cap

In an economy that is financially liberalized, interest rates are determined by market forces. This allows interest rate spreads (lending rate minus deposit rate) to be narrow due to competition. However, this has not been the case in Kenya. Limited competition resulted in a few large banks enjoying interest rates spreads

of around 11 per cent compared to a world average of 6 per cent. This suggests that there are some market inefficiencies that could warrant government intervention either through legislation, or by government becoming a direct player in the market by issuing government securities.

Consequently, in August 2016, Members of Parliament passed a bill that capped the lending rates at 4 per cent above the Central Bank Rate (CBR) and put a floor on the deposit rate at 70 per cent of the CBR (although this was removed through the Finance Act 2018). The law was implemented due to concerns from the public regarding the high cost of credit. Interest rate caps have been used by both developed and developing economies. The caps on loans have been used to support borrowers from predatory lending and excessive rates; support a specific industry or sector; protect consumers from usury and exploitation; make loans affordable and reduce the risk-taking behaviour of credit providers.

This was not the first time that interest rate control was introduced in the Kenyan financial sector. In 2001, the Kenyan Parliament introduced a bill that sought to place a ceiling on commercial banks interest rates to the rate of the 91-day Treasury bill with a margin of 4 per cent. Consequently, in 2013, the Parliamentary Budget Office proposed to cap interest rates to be in line with the CBR. Both measures were not implemented as a free market structure was advocated for.

Evidence suggests that introduction of the interest rate cap had adverse effects on the economy. These include borrowers being shunned away by banks as banks preferred investing in government securities, leading to an increase in investment in government securities, banks' increased share of their income from fees and commissions an increase in loan size in the tourism and hotel sector, and a decline in the average loan size in personal household loans.

Following the unintended consequences the interest rate cap had on the economy including reducing credit to the private sector and weakening the effects of monetary policy, it was repealed in November 2019 following the signing into law of the Finance Act 2019 by the President. Section 33b of Cap 488 provided for the repeal of the interest rate cap (Government of Kenya, 2019).

1.3 Trends in Economic Growth in Kenya

Upon attaining independence in 1963, Kenya adopted the market economy anchored on private sector development and foreign investment. During the first decade and a half, economic growth averaged 5.0 per cent while overall balance of payments and fiscal deficit was 6.0 per cent of GDP and 3.0 per cent of GDP, respectively. In the 1980s, Kenya adopted and implemented the Structural

Adjustment Programmes (SAPs) to reverse the declining trend in economic performance experienced in the mid-1970s onwards.

The SAPs did not meet the expectations as economic growth averaged 4.2 per cent in the 1980-1990 decade compared to the 1970s decade when growth averaged 8.2 per cent. Kenya experienced further decline in the 1990s to 2.2 per cent (World Bank, 2014). The economic growth began to recover after change in government in 2002, with real GDP growth of 5.2 per cent between 2003 and 2007. However, post-election violence in 2007 and drought slowed growth to 3.8 per cent between 2008 and 2012. From 2013-2018, the economy rebounded and grew at an average of 5 per cent.

Figure 7: GDP growth



Source: *Economic Survey (Various)*

2. Literature Review

2.1 Theoretical review

Myriad growth models exist and make attempts to explain sources and drivers of growth. These include two-gap model Marxian theory of growth, Schumpeterian growth theory, Harrod and Domar theory, Neoclassical theory and Endogenous growth models.

The Neoclassical theory of growth as proposed by Solow (1956) emphasizes that growth increases in the short-run due to sustained increase in capital investment while in the longer-run the growth is modest due to diminishing marginal product of capital. Accordingly, the theory vouches for increasing investment in both labour and capital to achieve longer-term growth.

Over the years, endogenous growth theory has evolved as a critique to the neoclassical growth model. Notable proponents of this theory includes Romer (1986), Lucas (1988), Rebelo (1991), among other economists. The core of this theory is that internal policy direction greatly influences long-term economic growth. In other words, internal forces are the fundamental drivers of growth and not external forces. This implies that improving productivity is directly anchored on increased innovations and human capital investment by both public and private sector institutions.

Neoclassical growth literature view on the role of financial sector services in economic growth process was passive. However, later economic literature provided evidence of the active role played by financial sector services in economic growth. Schumpeter (1911) emphasizes finance sector-led growth, arguing that financial intermediation bolsters technical innovation, which is important for economic growth. McKinnon (1973) and Shaw (1973) further the perspective provided by Schumpeter, arguing for financial sector liberation. They stress that financial sector controls on credit, interest rates and high reserve requirement for banks may limit financial sector deepening and access to credit, with adverse effects on economic growth. This view is also supported by alternative literature on endogenous growth theory such as Romer (1994). Moreover, Levine (1997) provides evidence of strong link between financial sector growth and economic growth.

2.2 Empirical Review

This empirical literature review is structured as follows. First, we examine literature on the relationship between private sector credit and economic growth

and then we will examine the impact of interest rate capping on private sector credit growth.

2.2.1 Impact of interest rate cap on private sector credit

Evidence on the effectiveness of use of interest rate caps gives mixed indications. Countries implement such caps for different objectives; however, most countries use these caps to control extreme borrowing and lending as opposed to narrowing interest rate spread. Maimbo and Gallegos (2014) conducted a study to establish countries that use interest rates caps and how effective they have been. The study finds that some 76 countries used interest caps with differing objectives. In some countries, caps are used for consumer protection from higher interest rates on loans (e.g. France, Poland and Spain) while in other countries the objective is to enhance credit access by making credit cheap (e.g. in Thailand). In some other countries, the objectives of the caps included protecting weakest parties (Portugal); controlling indebtedness (Estonia); stopping abuses arising from too much freedom (Greece) and to reduce the risk-taking behaviour of lenders (The Netherlands).

Maimbo and Gallegos (2014) find evidence that interest rate caps have a negative impact such as a withdrawal of financial institutions from the poor or from specific segments of the market (as in West African Economic and Monetary Union (WAEMU) countries and Nicaragua), an increase in illegal lending (Japan and the United States), a decrease in the licensing of new lending institutions (Bolivia), an increase in the total cost of the loan through additional fees and commissions (Armenia, Nicaragua, and South Africa), and a decrease in product diversity (France and Germany). Interest rate caps, however, have partially worked to lower interest rates in the credit union sector of the United States.

Ferrari et al. (2018) also take stock on global developments of interest rate caps. They study a panel of six countries, Kenya included, to establish the effects of interest rates caps. The other countries included in the panel are Zambia, Cambodia, WAEMU, India and the UK. The indication from the study is that certain forms of interest rate capping can be effective in reducing lending rates and limit lenders from exploiting their customers. However, the caps come with unintended effects on banking sector profitability, increased hidden costs, and reduction in credit uptake, among other effects.

An analysis by the Central Bank of Kenya found that capping of interest rates had perverse outcomes on the economy. These outcomes inhibit the autonomy of central banks and affect the execution of monetary policy, reduce financial intermediation by commercial banks, with banks shifting to lending to government

and large corporates (causing a decline to credit in the private sector). The structure of revenue from banks has shifted from interest incomes to increased fees in loans, and small banks experienced significant decline in profits following the introduction of the caps. The CBK found that by rationing credit to the MSMEs, growth was lowered by about 0.4 percentage points in 2014. The International Monetary Fund (IMF) estimates the impact of the caps on growth at about half a percent in foregone annual growth (IMF, Article IV 2018). This was found to also limit the transmission mechanism of monetary policy.

Safavian and Zia (2018) investigated the influence of interest rates on Kenya's financial sector. Their study used mixed techniques and found that the post-capping period showed decline in the usual portfolio lending, with skyrocketing non-performing loans (NPLs). Similar results are shown in Ochenge and Tiriongo (2018) who find a general decline in private sector credit with household sector and agricultural sector suffering the highest decline in credit access.

2.2.2 Interaction between private sector credit and economic growth

Several studies have examined the causal relationship between private sector credit and economic growth. The studies range from cross-country to specific, using cross-section data and some using time series. Studies have used different control variables and methodologies and so far results have been inconclusive.

The seminal work was undertaken by Goldsmith (1969) who observed a positive association between economic growth, and financial intermediary assets. Using panel data for 77 countries spanning the period 1960-1989, King and Levine (1993) provided evidence of positive association between financial development and economic growth. For financial development, they used ratio of liquid liabilities to GDP and ratio of private credit to GDP. They find a positive relationship between financial development and economic growth and that financial development predicts growth.

In the same vein, Mukhopadhyay and Pradhan (2010) use Johansen Cointegration test and Vector Error Correction Model (VECM) to establish the relationship between financial development and economic growth of seven Asian developing countries: China, India, Singapore, Indonesia, Malaysia, Thailand and the Philippines. Their results suggest that in the case of Singapore, Indonesia, China, the Philippines and India, financial development leads to growth while in Thailand there is a bidirectional causality between variables. For the case of Malaysia, they find that financial development does not seem to cause economic growth. Agbetsiafa (2004) investigates the relationship between financial development and economic growth for eight Sub-Saharan countries. He finds a unidirectional

causality starting from M2/GDP and heading towards economic growth for the case of Kenya.

For country-specific studies, Jedidia et al. (2014) investigate whether financial development can boost economic growth in Tunisia. Results from Autoregressive Distributed Lag (ARDL) model indicates that domestic credit to private sector has a positive effect on economic growth. Their study confirms a bidirectional relationship between credit and economic growth. Uddin et al. (2013) examine the relationship between financial development and economic growth in Kenya. Using ARDL, they find that in the long run, the development of the financial sector has a positive impact on economic growth. Bist and Bista (2018) also use ARDL to assess whether financial development in Nepal has an impact on economic growth. Their results indicate that financial development (measured by private sector credit) has significant positive impact on economic growth in the long-run and in the short-run.

Osman (2014) uses the ARDL model to investigate the relationship between private sector credit and economic growth in Saudi Arabia. He uses variables such as GDP, private sector credit, commercial banks' deposits, government expenditure, inflation rate and open economy over the period 1974-2012. His results indicate that there is both a short-run relationship and a long-run relationship between private sector credit and economic growth. On the other hand, commercial banks deposits contribute negatively to economic growth in the long-run. Arielo et al., (2013) also use ARDL to investigate the relationship between private sector credit and economic growth in Nigeria. They find that there is a long-run relationship between private sector credit and economic growth. However, there is no causality stemming from either real GDP or private sector credit. Kagochi (2013) finds that development of the financial sector especially the size of banking sector leads to enhanced economic growth. Other financial intermediaries including domestic credit provided by the banking sector, do not seem to explain economic growth.

Thierry et al. (2016) examine the causal relationship between bank credit and economic growth in Cameroon by considering domestic credit to the private sector by banks and bank deposit as proxies for bank credit development and gross domestic product per capita for economic growth. They use time series data from 1969-2013. The relationship between bank credit and economic growth was analyzed using VECM. The results reveal that there is a unidirectional causal relationship flowing from domestic credit to the private sector by banks and bank deposits to gross domestic product per capita.

Ono (2017) examines the finance-growth nexus in Russia using the Vector Autoregression (VAR) model, taking oil prices and foreign exchange rates into account. The study analyses the period of study into two and finds that in the first

sub-period, there is causality from economic growth to money supply and bank lending while in the second sub-period, the study finds that economic growth granger causes bank lending and there is no causality from money supply to economic growth. Odhiambo (2008) and Odhiambo (2009) examine the dynamic relationship between interest rate reforms, financial development and economic growth in Kenya and South Africa, respectively. Using a multi-variate causality model, the study concludes that the relationship between financial depth and economic growth exhibits a demand-following path. For the case of Tanzania, Odhiambo (2009) finds evidence to support a supply-leading hypothesis. On the other hand, Wolde-Rufael (2009) finds that neither demand-following nor supply-leading hypothesis are supported in Kenya. However, there is granger causality between domestic credit and economic growth, liquid liabilities and economic growth.

In Nigeria, several studies have been done to evaluate the impact of private sector credit on economic growth in Nigeria (Emecheta and Ibe, 2014; Akpansung and Babalola, 2011; Onuorah and Anayochukwu, 2013; Oluitan, 2012 and Yakubu & Affoi, 2014). The findings in these studies are unanimous that bank credit to private sector is positively related to economic growth. To improve on these works, Olowofes et al. (2015) examine the short- and long-run relationship of private sector credit and output in Nigeria by adding structural breaks. Using Gregory and Hansen (1996) cointegration test to account for structural breaks and endogeneity problems, the study finds a significant structural break occurring at 2012Q1. The results of the long-run model indicate there is significant and positive impact of private sector credit growth and output.

Adu et al. (2013), Adusei (2013) and Ofori-Abebrese et al. (2017) examine the impact of financial development on economic growth for the case of Ghana. By employing different econometric methods (Fully-Modified Ordinary Least Squares (FMOLS), Error Correction and the Generalized Method of Moments - GMM, ARDL and Granger Causality) and using different variables (real gross domestic product per capita, domestic credit to private sector, domestic deposit, gross capital formation, population growth, trade openness, government spending and broad money supply), the authors conclude that whether financial development is good or bad for growth depends on the indicator used to proxy for financial development.

Were et al. (2012) assess the impact of private sector credit on economic performance with a focus on key economic sectors for the period between 1998 and 2010 for Kenya. They used data such as real output (measured as value added of sectors), employment variable, lending rate and sector-specific effects (capturing unobservable effects). The empirical results show that credit has a statistically

significant and positive impact on sectoral GDP. However, once they controlled for labour employed and past economic performance of the sectors, the impact is reduced. In addition, the study finds that the labour variable is insignificant when interest rates are added to the model, at the same time controlling for heteroskedasticity.

Murty et al. (2012) examine the long-run impact of bank credit on Ethiopia's economic growth using a multivariate Johansen cointegration approach. In addition, the study establishes the study mechanism through which bank credit to the private sector flows to the economy. The study uses variables such as GDP per worker, deposit liabilities, domestic capital, government spending, openness to trade, human capital and inflation. The study finds that bank credit to the private sector affects economic growth through its role in efficient allocation of resources and domestic capital accumulation. Inflation and government spending have negative and significant impact in the long-run economic growth.

In Tanzania, Mwangóna et al. (2018) employed ARDL approach to study the relationship between financial development and economic growth. The study finds that for the period 1967-2011, financial development, measured by money supply to GDP ratio, negatively influenced economic growth. The study also found lack of causality between the two variables. Mhadhib (2014), Grassa and Gazdar (2014) and Ayadi et al. (2015) find similar results.

2.2.3 Overview of literature

The discussions about the importance of financial development and its role in economic growth have occupied a key position in literature. Various studies have mainly focused on financial inclusion, developments in broad money supply, financial technology among various aspects of financial developments. In addition, studies have especially focused on developed economies. Literature on developing and emerging countries particularly for African economies is limited particularly with bias on the effects of developments in private sector credit. Studies such as Akpansung & Babalola (2011); Emecheta & Ibe (2014); Jedidia, et al.(2014); Mamman & Yashim, (2013) and Odili, et al. (2015) have shown that indeed there is a significant relationship between private sector credit and economic growth.

Studies have also looked at the direction of causality between financial development and economic growth with conflicting results. Christopoulos and Tsionas (2004) promote the idea that financial development leads to economic growth while Jung (1986) advocate that economic growth leads to financial development. Other scholars like Shan et al. (2001) posit that economic growth and financial development cause each other while Lucas (1988) promotes the idea that neither

financial development nor economic growth cause one another. It should be noted that the direction of causality depends on variables used to proxy financial development and also the country.

It is clear from the literature review that studies have produced mixed results regarding the relationship between private sector credit and economic growth. Most of the studies reviewed seem to favour the supply-leading hypothesis with others confirming the existence of a long-run relationship between private sector credit and economic growth. The empirical results on the direction of causality are more mixed compared to co-integration analysis. In Kenya, there is no conclusive evidence on the causal relationship between private sector credit and economic growth. We therefore hope to add on to this literature bearing in mind the developments that have taken place in the Kenya financial sector that could affect this relationship. We add value to the previous studies by using more recent data and controlling for other factors that could affect growth.

Since the introduction of the interest rate cap in Kenya, studies done have shown that the cap has had an adverse effect especially on uptake of credit. However, this cannot be attributed to the cap only. This study seeks to add to the literature on interest rate cap by adding on to the period from the date when the caps were introduced. This will help us to confirm whether the negative effects have persisted.

3. Methodology

3.1 Theoretical Framework

3.1.1 Effect of interest cap law on credit flow to different sectors of the economy

To assess how the introduction of interest rate cap affected the uptake of credit in different sectors, we use a statistical approach. This study uses HP filter approach to decompose nominal private sector credit into trend and cycle. By doing this, we obtain a credit gap as the difference between actual credit flow and its potential (trend). The HP filter is a 2-sided moving average filter that smoothens series credit to private sector (S) around its trend (Y) by minimizing the variance of the difference ($Y-S$) subject to a penalty that constrains the second difference of S . The penalty parameter (λ) controls the smoothness of the series.

$$\sum (Y_t - S_t)^2 + \lambda \sum [(S_{(t+1)} - S_t) + (S_t - S_{(t-1)})]^2 \quad (1)$$

Where: The first term keeps S close to Y ; the second term is the penalty for abrupt movements in S and λ can be thought of as a smoothing coefficient. As λ approaches infinity, $S \rightarrow$ linear trend.

We define Credit Gap in a sector as:

$$CreditGap_{it} = (CreditCycle_{it} / CreditTrend_{it}) * 100 . \quad (2)$$

We then assess how imposition of interest rate caps has constrained credit growth to a given sector over time.

This approach has one major drawback; it does not take into account the macroeconomic ecosystem within which credit operations takes place. As a result, two estimations are made using the different techniques and comparison of results made. Stock of private sector credit (credit) is our dependent variable while explanatory variables include inflation (infl), lending rate (lendrate), government debt stock (debt) and exchange rate (exch). All variables are in nominal terms. The credit supply function is thus specified as:

$$credit_t = \alpha_0 + \alpha_1 debt_t + \alpha_2 lendrate_t + \alpha_3 infl_t + \alpha_4 exch_t + \varepsilon_t \quad (3)$$

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debt stock (debt) and exchange rate (exch). All variables are in nominal terms. The credit supply function is thus specified as:

3.1.2 The endogenous growth model

This study favours the endogenous growth theory because it can clearly explain the situation in developing economies such as Kenya. The general idea assumes that the financial sector services improve the efficient allocation of resources through capital accumulation and technological innovation and therefore long-run economic growth (see Levine 1997, Trew 2006). Research has also shown that financial institutions produce better information, improve resource allocation through financing firms with the best technology and thereby inducing growth (Greenwood and Jovanovich, 1990). The endogenous growth model argues that financial intermediaries affect economic growth by altering savings (Levine, 1997; Pagano 1993).

The transmission channels that link finance and economic growth are reducing the loss of resources required to allocate capital; increase in the savings ratio and raising capital productivity. The AK model assumes only one type of good, which is produced with capital as the only input factor.

We consider a simple endogenous model which is presented as:

$$Y_t = f(AK_t) \quad (4)$$

With Y_t being output produced in period t produced by capital K_t , A represents capital productivity. In this production function, real aggregate output growth is a function of total factor productivity, real aggregate capital stock (a composite of human and physical capital), savings rate and the efficiency of the financial sector (see Rebelo, 1991, Pagano, 1993, Jalil and Feridun, 2011).

The capital stock in the period $t+1$ is:

$$K_t = I_t + (1-d) K_{(t-1)} \quad (5)$$

Where d represents the depreciation rate and I the investment, which has to be equal to the non-consumed resources in each period. Further assumption made is with the savings ratio, s , the channeling of savings to investment implies the loss of a share of savings $(1- \delta)$ with $1 > \delta > 0$, therefore the funds available for investment are:

$$\delta * s * Y_t = I_t. \quad (6)$$

The growth rate g is $(Y_t/Y_{(t-1)}) - 1 = (K_t/K_{(t-1)}) - 1$, which implies a steady state of $g = [(A*\delta*s) - d] / [(1 - A*\delta*s) - d] \approx [(A*\delta*s) - d]$ for small values of $A*\delta*s$. These are the possible transmissions from finance to economic growth.

In practice, δ reflects the transaction costs, which include interest rate spreads between banks borrowing and lending rates and fees to financial intermediaries.

Generally, production functions are inconclusive in nature but encourage researchers to explore linkages between output and other macroeconomic variables. Therefore, studies use different models and apply different variables. For this study, based on theoretical review and following Christopoulos and Tsionas (2004), and Uddin et al. (2013), the relationship between economic growth and private sector credit is specified with some modifications as:

$$Y_t = \alpha_0 + \alpha_1 Z_t + \alpha_2 PSC_t + \alpha_3 DR_t + Dumo8 + \varepsilon_t \quad (7)$$

Where Y_t is real output proxied by real GDP per capita; Z denotes a vector of control variables of growth. Control variables are added to deal with omitted variable bias. These variables include labour (L) proxied by gross secondary enrolment; capital stock (K) which is proxied by real Gross Fixed Capital Formation; and Trade Openness measured by the sum of imports and exports. PSC denotes private sector credit; DR denotes the real deposit rate (3-month deposit rate calculated as nominal deposit rate minus the annualized inflation), $Dumo8$ represents a dummy for the year 2008 and ε denotes the error term.

Equation 7 can therefore be written as:

$$y_t = \alpha_0 + \alpha_1 L_t + \alpha_2 GFCE_t + \alpha_3 Trade_t + \alpha_4 PSC_t + \alpha_5 Deposits_t + \alpha_6 DR_t + \alpha_7 Enroll_t + \varepsilon_t. \quad (8)$$

3.2 Empirical Specification

To achieve the objectives of the study, cointegration with ARDL technique was utilized. Although this technique does not require initial testing for unit roots, it is imperative to determine that none of the variables are integrated of order two I (2).

3.2.1 Stationarity test

The modelling procedure of unit root test at their level is described as follows:

$$\Delta Y_t = \alpha_0 + \alpha_2 Y_{(t-1)} + \sum_{(i=1)}^p \delta_i \Delta Y_{(t-1)} + \varepsilon_t \quad (9)$$

Where Y is the variable of choice; Δ is the first-difference operator; α_i (for $i=1$ and 2) and δ_i (for $i=1, 2 \dots p$) are constant parameters; and ε_t is a stationary stochastic process. p is the number of lagged terms chosen by Akaike Information Criterion (AIC) to ensure that ε_t is white noise. The hypotheses for the stationarity test using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test are:

H_0 : $\alpha_2 = 0$, i.e, the time series is non-stationary

H_1 : $\alpha_2 \neq 0$, i.e, the time series is stationary

The order of integration of the variables in equation (8) was investigated using the ADF presented by Dickey and Fuller (1979) and Phillips-Perron (PP) (1988) unit root tests for the presence of unit roots.

3.2.2 Cointegration test

The study used the ARDL bounds test for cointegration that was advanced by (Pesaran et al., 2001) to estimate equation (3) and (8). This is because the ARDL approach is efficient and consistent in small and finite sample sizes of 30 or more (Samargandi et al., 2014; Zermeno et al., 2014). In addition, accurate long run parameters and valid t-values can be estimated regardless whether independent values are endogenous. The endogeneity bias tends to be irrelevant and very small. Another advantage of the ARDL approach is that it estimates the long-term and short-term parameters of the model simultaneously.

Once the cointegrating relationship is established, the long-term and error correction estimates are established. The long-term ARDL model for objective one was expressed as:

$$\Delta credit_t = \alpha_o + \sum_{(i=1)}^p \alpha_i \Delta(debt)_{(t-i)} + \sum_{(i=1)}^q \alpha_i (lendrate)_{(t-i)} + \sum_{(i=1)}^m \alpha_i (infl)_{(t-i)} + \sum_{(i=1)}^n \alpha_i (exch)_{(t-i)} + \delta_1 (credit)_{(t-1)} + \delta_2 (debt)_{(t-1)} + \delta_3 (lendrate)_{(t-1)} + \delta_4 (infl)_{(t-1)} + \delta_5 (exch)_{(t-1)} + \varepsilon_t \quad (10)$$

Where Δ represents first differences and ε_t represents the error term.

The long-term ARDL model for objective two was expressed as:

$$\Delta GDP_t = \beta_o + \sum_{(i=1)}^p \beta_{2i} \Delta GDP_{(t-i)} + \sum_{(i=1)}^p \beta_{3i} \Delta PSC_{(t-i)} + \sum_{(i=1)}^p \beta_{4i} \Delta DR_{(t-i)} + \sum_{(i=1)}^p \beta_{5i} \Delta GFCF_{(t-i)} + \sum_{(i=1)}^p \beta_{6i} \Delta Trade_{(t-i)} + \sum_{(i=1)}^p \beta_{7i} \Delta Enroll_{(t-i)} + \lambda_1 GDP_{(t-1)} + \lambda_2 PSC_{(t-1)} + \lambda_3 DR_{(t-1)} + \lambda_4 GFCF_{(t-1)} + \lambda_5 Trade_{(t-1)} + \lambda_6 Enroll_{(t-1)} + \varepsilon_t \quad (11)$$

Where p is the lag length, Δ is the difference operator and ε_t is the error term.

The short-run dynamics for the second objective were captured by the error correction term as follows:

$$\Delta GDP_t = \sum_{(i=1)}^p \theta_i \Delta GDP_{(t-1)} + \sum_{(i=1)}^p \phi_i \Delta PSC_{(t-1)} + \sum_{(i=1)}^p \gamma_i \Delta DR_{(t-1)} + \sum_{(i=1)}^p \varphi_i \Delta GFCE_{(t-1)} + \sum_{(i=1)}^p \vartheta_i \Delta Trade_{(t-1)} + \sum_{(i=1)}^p \delta_i \Delta Enroll_{(t-1)} + \alpha ECM_{(t-1)} + \mu_t \dots\dots\dots (12)$$

Where *ECM* is the residual obtained from equation (12) and is the speed adjustment parameter. The error correction model results show speed if adjustment back to long-run equilibrium after short-run shocks.

3.2.3 Residuals diagnostics

Post-estimation tests are performed to confirm the adequacy of the model and to ascertain the validity of the inferences made from the estimated results. Diagnostic tests to examine the normality, serial correlation, functional form and heteroskedasticity, together with stability tests help to ensure the fitness of the model. Stability test is done by cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ).

3.3 Data Sources, Definition of Variables and Expected Results

Our choice of variables was informed by the reviewed literature. For the first objective, we use monthly data on credit uptake by different sectors in the economy for the period between 2000 and 2019.

The economic growth variable used is real GDP per capita. This captures the average level of national income per person. The study uses private sector credit as the main financial indicator. Private sector credit is defined as a measure of the ability of the banking sector to provide finance-led growth. The assumption is that private sector credit generates increases in investment and productivity to a much larger extent than credit to the public sector.

Gross fixed capital formation is used to capture investment and it allows us to see how investment increases output, which eventually leads to economic growth. Trade openness is the sum of exports and imports and is expected to raise productivity through increased competition and transmission of technology from the rest of the world (Edwards, 1993). Trade openness will affect domestic capital through imports and exports. An increase in exports will lead to an increase in the supply of foreign exchange necessary for the purchase of imported capital goods and expands the market for domestic products. An increase in imports can accumulate domestic capital if it implies greater access to investment goods but it can also negatively affect domestic capital if it predominantly consists of

consumer goods, which may discourage domestic production.

The real deposit rate is the price paid to savers to postpone consumption to a future date. A positive real interest rate deepens financial intermediation through increased volume and value of savings, which induces real output growth through increased productivity of capital (Khan, 2008). High real interest rates could exert positive effect on the average productivity of physical capital by discouraging investors from investing in low return projects (World Bank, 1989; Fry, 1997). However, high interest rates have the negative effect of increasing the cost of borrowing and consequently limiting the level of aggregate investment and consumption and the overall economic growth in the country.

Romer (1989) notes that gross secondary enrolment is a human capital indicator and correlates strongly with economic growth. Accumulation of personal human capital produces individual economic (income) growth, which contributes to the growth of the economy.

A priori, we expect all variables to have a positive impact on economic growth.

4. Empirical Results and Discussion

4.1 Descriptive Statistics

Descriptive statistics results for the variables used in objective one are presented in Appendix Table A1. The characteristics presented show that all the variables are not normally distributed and therefore the variables were transformed to their natural logarithms (see Appendix Table A2).

Table 4.1: Summary statistics - Impact of private sector credit on economic growth

	GDP PER CAPITA	PSC	DEPOSIT	TRADE	GFCF	ENROLL
Mean	42,906.86	362,749	-4.871	701,623.1	1 014 703	1 081 967
Median	34,247.03	168,905	-3.06	328,960	544,374	713,300
Maximum	100,310.3	1,391,056	7.9	2,338,288	3,455,224	2942700
Minimum	193,28.94	31,055.17	-26.1	29,378	120,209.3	411000
Std. Dev.	22,116.48	435,097.1	7.812748	785,120.1	1,087,892	755613.4
Skewness	1.856	1.559	-0.837	0.995	1.354	1.261
Kurtosis	4.680	3.923	3.294	2.461	3.235	3.271
Jarque-Bera	26.983	17.175	4.693	6.913	12.007	10.459
Probability	0.000	0.000	0.096	0.032	0.002	0.005
Sum	1,673,368	14,147,210	-189.97	27,363,301	39,573,436	42,196,700
Sum Sq., Dev.	1.86E+10	7.19E+12	2319.483	2.34E+13	4.50E+13	2.17E+13
Observations	39	39	39	39	39	39

Source: Author's calculation, 2020

Based on characteristics presented in Table 2, none of the variables are normally distributed. This is because the null hypothesis of normally distributed values was rejected at the 5% level of significance as indicated by the Jarque-Bera p-value of less than 0.05. If variables are not normally distributed, it can be attributed to the presence of outliers. To remove outliers, the variables were linearized. In addition, transforming the variables to their natural logarithms eliminates issues of scale (some variables are in thousands while others are in millions).

Table 4.2: Summary statistics of linearized variables

	LNGDPC	LNPSC	DEPOSIT	LNTRADE	LNGFCF	LNENROLL
Mean	6.344	12.217	-4.871	12.594	13.352	13.698
Median	6.259	12.037	-3.060	12.704	13.207	13.478
Maximum	8.141	14.146	7.900	14.665	15.055	14.895
Minimum	4.823	10.344	-26.100	10.288	11.697	12.926
Std. Dev.	0.924	1.067	7.813	1.511	0.960	0.606
Skewness	0.399	0.418	-0.837	-0.162	0.474	0.670
Kurtosis	1.978	2.452	3.294	1.665	2.369	2.165
Jarque-Bera	2.730	1.622	4.693	3.068	2.109	4.046
Probability	0.255	0.444	0.096	0.216	0.348	0.132
Sum	247.433	476.463	-189.970	491.177	520.739	534.225
Sum Sq. Dev.	32.446	43.281	2319.483	86.703	35.000	13.969
Observations	39	39	39	39	39	39

Source: Author's calculation, 2020

The summary statistics presented in Table 4.2 shows that the dependent variable (GDP) had a mean of 6.34 with a standard deviation of 0.92. The resultant p values from the Jarque-Bera test were higher than the conventional p value of 0.05 for all the variables. This indicates that the null hypothesis is true. It therefore implies that the variables were normally distributed at 5% level. In terms of skewness, GDP, private sector credit, GFCF and school enrolment were positively skewed while trade and deposit rate were negatively skewed.

4.2 Pre-Estimation Tests

4.2.1 Testing the integration properties of time series

To check for the non-stationarity of the individual time series, the study utilized Augmented Dickey Fuller (ADF) presented by Dickey and Fuller (1979) and the Phillips-Perron (PP) test presented by Phillips and Perron (1988). The ADF was chosen since it maintains the reliability of the tests by ensuring errors are indeed white noise. The PP test was used for its robustness especially when applied to residual based cointegration determination. The results are summarized in Table 4.3.

Table 4.3: Unit root test results

Variables	ADF		Phillips-Perron		Inference
	Level	1st Difference	Level	1st Difference	
LN_GDPC	-1.5560	-5.3290	-1.5533	-5.3326	I (1)
LN_PSC	-0.4255	-6.1013	-0.3069	-6.1528	I (1)
DEPOSIT	-3.6981		-3.7769		I (0)
LN_TRADE	-0.7114	-5.8154	-0.7007	-5.8274	I (1)
LN_GFCF	-0.4392	-6.1457	-0.3085	-6.2011	I (1)
LN_ENROLL	1.4374	-6.0639	1.4374	-6.0639	I (1)

Source: Author's calculation, 2020

The results indicate that, for all the series save for deposit rate, the null hypothesis can be rejected at 5 per cent in levels, implying that the variables are non-stationary at level. For the first difference, the null hypothesis is not rejected at the 5 per cent significance level. We can therefore conclude that all the series are integrated of order one, I (1). However, deposit rate is integrated of order zero, I (0).

The order of integration of the variables suggests that cointegration tests can be explored and the appropriate model to use would be the ARDL, bounds test.

4.2.2 Lag length determination

To determine the lag length, the Akaike and Schwarz criterion is used as shown in Table 4.4. As a rule of thumb, determination of lag length requires that choice of lag length is based on the smallest critical value. From Table 4.4 we see that lag 1 has the smallest Akaike and Schwarz information criteria.

Table 4.4: Lag length selection

	Akaike information criteria	Schwarz criterion
0	7.527271	7.879164
1	-10.77311*	-1.975781*
2	-4.476893	1.505289
3	-2.994870	0.172168

Source: Author's calculation, 2020

4.2.3 Cointegration test results

Having detected the non-stationarity of all the series and chosen the optimal lag length, the study utilized the Bounds testing for cointegration analysis to test for the long run relationship between the variables.

Table 4.5: Bounds test for cointegration analysis – Impact of interest rate cap on credit uptake by sectors

Variable	F-Statistic	Conclusion
Debt	37.53	Cointegration
Exchange Rate	20.29	Cointegration
Inflation	14.08	Cointegration
Lending Rate	15.16	Cointegration
Critical Bounds		
Significance	I0 Bound	I1 Bound
10%	4.04	4.78
5%	4.94	5.73
1%	6.84	7.84

Source: Author's calculation, 2020

From Table 4.5 we see that cointegration is detected in all models. This means that credit has a long run relationship with the specified determinants.

Table 4.6: Bounds Test for cointegration analysis – Impact of private sector credit on economic growth

Variable	F-Statistic	Conclusion
PSC	9.07	Cointegration
Deposit Rate	0.18	No Cointegration
GFCF	7.93	Cointegration
Trade Openness	8.55	Cointegration
School Enrolment	8.72	Cointegration
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	4.04	4.78
5%	4.94	5.73
1%	6.84	7.84

Source: Author's calculation, 2020

From Table 4.6, we see that cointegration is detected for most of the models at 1% level of significance. This implies there is a long-run relationship between economic growth and private sector credit, GFCF, trade openness and school enrolment. However, there is no long-run relationship between deposit rate and economic growth.

4.3 Impact of Interest Rate Cap on Credit Uptake by Sectors

This section analyzes how interest capping has influenced private sector credit uptake. This is achieved by analysis of average credit trend deviations before and after interest rate capping. We use the HP Filter technique, which estimates how a series deviates from its cyclical pattern over time.

Comparing historical trends of the credit flows with the actuals exhibits episodes of huge deviations from long-term trend and these vary across sectors (Appendix Table A3). It is evident from these results that before introduction of the cap, on average credit surpassed its long-term trend by over Ksh 107.8 billion compared to the period after capping when the average credit performed below its long-term trend by over Ksh 83.4 billion.

Prior to the introduction of the cap, most of the sectors were above their trend, save for households, consumer durables and business services. However, once the cap was introduced, most of the sectoral credit was below the trend save for consumer durables. This shows that based on this approach, consumer durables were largely unaffected by the cap. In addition, the three sectors that experienced the highest levels of credit decline post-interest rate capping are business services (8.57%), agriculture (4.76%) and manufacturing (3.02%).

Since the HP Filter estimates provide a general guide on how data can deviate from cyclical patterns, the study went ahead to perform an econometric analysis that included other macroeconomic variables that can affect credit supply.

From the results, the study makes the following observations. All the dependent variables seem to drive private sector credit. For example, in the short run, a one percent increase in government borrowing results in a 0.03 per cent increase in credit to the private sector. The same positive relationship is observed in the long run where a one per cent increase in government borrowing increases private sector credit by about 1.2 per cent. This could imply that government borrowing does not crowd out credit to the private sector. A possible explanation for this is that government borrowing promotes productivity, which in turn leads to demand for credit by the private sector. Another observation is that inflation has a negative

effect on private sector credit both in the short-run and in the long-run. Table 4.5 shows that inflation, exchange rate, lending rate and debt are cointegrated with credit flows. Examining the speed of adjustment shows that credit adjustment to equilibrium is fairly slow at less than 5 per cent for most of the models.

Having established the credit supply model for the pre-capping period (January 2000-August 2016), we generate credit projections for the period between September 2016 and December 2018. The results are presented in Table 14. The gaps generated by ARDL are qualitatively similar to the estimates generated by the HP Filter. In both approaches, the credit gap seems to have widened after the introduction of the interest rate cap, with the estimates from ARDL approach seemingly lower than the HP Filter estimates. For example, HP Filter estimates show that total credit post-capping period had declined by 4.3 per cent while ARDL estimates show that credit had declined by 2.2 per cent. Since the ARDL approach incorporates variables that affect credit, it is considered to be more superior.

Based on the ARDL estimates, credit to the agriculture sector seems to have declined by the highest magnitude (5.4%) followed by manufacturing (3.1%) and private households (3.1%). Decline of credit to the rest of the sectors seems to be minimal. The relatively large decline to agriculture, manufacturing and private households implies that these sectors are financially excluded, and this could be detrimental on the growth of the economy given that part of the "Big Four" agenda focuses on manufacturing and food security.

Access to finance has been cited as a challenge facing manufacturing firms in Kenya. The decline in credit to households could be attributed to existing lack of information on credit worthiness of households. This makes lenders perceive households as risky and therefore less likely to lend to them at depressed interest rates.

4.4 Impact of private sector credit on economic growth in Kenya

4.4.1 The Long-run results

The results for the long-run relationship are presented in Table 8. The results show that private sector credit has a positive and significant effect on economic growth. This is in line with a priori expectations. The residuals from the long-run equation is then included in our error-correction model. The model shows a positive and significant relationship between real GDP and private sector credit.

Table 4.7: Estimated long-run coefficients

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Probability
LN_PSC	0.462	0.157	2.934	0.007***
DEPOSIT	0.005	0.004	1.307	0.203
LN_TRADE	0.242	0.049	4.985	0.000***
LN_GFCF	0.547	0.200	2.738	0.011**
LN_ENROLL	1.176	0.205	5.744	0.000***
DUMo8	-0.295	0.245	-1.206	0.239
C	-0.605	1.381	-0.438	0.665

Note: *significant at 10%, **significant at 5%, ***significant at 1%

Source: Author's computation, 2020

4.4.2 The short-run results

The results of the short-run analysis are presented in Table 9. The error correction term (CORES (-1)) is negative and significant, representing the long run relationship between real GDP and private sector credit. This means there is a long-run causality running from the independent variables to the dependent variables. The negative sign of error correction term indicates a move towards equilibrium following a shock to the system in the following year at a rate of 59 per cent. This implies that 59 per cent of errors of previous year are corrected in the current year, which is a relatively quick adjustment to return to the long-run equilibrium relationship, following a shocks in the short-run.

Table 4.8: Estimated ECM short-run coefficients

Short Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LN_PSC)	0.257	0.106	2.418	0.022**
D(DEPOSIT)	0.004	0.002	1.709	0.099*
D(LN_TRADE)	0.315	0.134	2.347	0.026**
D(LN_GFCF)	0.218	0.118	1.843	0.076*
D(LN_ENROLL)	0.022	0.219	0.100	0.921
D(DUMo8)	-0.391	0.060	-6.481	0.000***
CORES1(-1)	-0.589	0.136	-4.345	0.000***
C	0.064	0.026	2.446	0.021
R-squared	0.710	Mean dependent var		0.031
Adjusted R-squared	0.627	S.D. dependent var		0.132
S.E. of regression	0.080	Akaike info criterion		-1.998
Sum squared resid	0.181	Schwarz criterion		-1.607
Log likelihood	45.972	Hannan-Quinn criter,		-1.860
F-statistic	8.573	Durbin-Watson stat		1.125
Prob(F-statistic)	0.000			

Note: *significant at 10%, **significant at 5%, ***significant at 1%

Source: Author's computation, 2020

4.5 Diagnostic Testing

To check the reliability of the model, the study applied residual diagnostic tests. The residuals fulfil basic hypotheses of multivariate no serial correlation, normal distribution and no heteroskedasticity as presented in Table 10.

Table 4.9: Diagnostic tests

	Co-efficient	p-value
Serial Correlation	0.0771	0.9260
Heteroskedasticity	0.9469	0.5509
Normality	1.3134	0.5186

Source: Author's computation, 2020

In addition, to check the stability of our estimates, the study used CUSUM² test. The results show that all the coefficients of the estimated model are stable over time within the critical bounds of 5 per cent. The model has a higher explanatory

² See Appendix

power of the variation in real GDP with an adjusted R-square of 0.63, implying 63 per cent of the variation in real GDP is explained by our model.

4.5.1 Discussion of results

The implication of the results is that a one percent increase in the supply of private sector credit is on average associated with a 0.26 per cent increase real GDP growth, holding all other factors constant. The results are significant at the 5% level of significance. This means that availability of sufficient private sector credit is critical for growth, which is essential for jobs creation and promoting citizen's well-being. Our results are similar in sign and the magnitude of the impact falls in the ball pack of results found by Uddin, et al. (2013) for the case of Kenya and Osman (2014) for the case of Saudi Arabia.

The coefficient of deposit rate is positive and significant at 10% level. An increase in the deposit rate is associated with creation of a pool of resources that are intermediated by financial institutions and therefore positive for growth. Nonetheless, the magnitude is very small, showing that a 1 per cent increase in the deposit rate is associated with 0.04 per cent increase in real GDP growth, *ceteris paribus*. This finding is also in line with results from Uddin et al. (2013) who find real deposit rate to be a key determinant of growth for Kenya, and Mwang'onda, et al. (2018) for the case of Tanzania. As McKinnon (1973) shows a rise in interest rates will attract savings from household allowing financial intermediaries to accumulate loanable funds facilitate investment in the economy.

Gross Fixed Capital Formation (GFCF), which was a proxy for investment, has a positive and significant impact on economic growth. Investment drives growth through increase in productivity levels. Our results show that a one percent increase in investment will on average lead to a 0.22 percent increase in real GDP growth, holding all other factors constant. This magnitude is also in line with the results obtained by Uddin, et al. (2013) but both studies agree that investment is a stimulus for economic growth.

Trade openness has the expected sign and is significant. Trade can enhance economic growth by providing access to goods and services, achieving efficiency in the allocation of resources, and improving total factor productivity through technology diffusion and knowledge dissemination (Romer, 1994). The results show that a one per cent increase in trade openness is, on average, associated with a 0.32 per cent increase in real GDP growth. These findings are consistent with results found by Bist and Bista (2018), Osman (2014) and Adusei (2013).

School enrolment has a positive but non-significant impact on economic growth. This is through learning ability, accumulation of knowledge and general increase

in productivity of resources. It is presumed that an educated workforce is better at creating and implementing new technologies thereby generating growth (Benhabib and Spiegel, 1994). Uddin et al. (2013) also find the relationship between real GDP growth and school enrolment to be positive and insignificant. Finally, the 2008 dummy is negative and significant to account for the year specific shocks associated with both domestic (contested elections) and external (global financial crisis) shocks faced in that year.

To conclude, there is a positive and significant relationship between access to credit and real GDP growth. The shortfall in private sector credit (of approximately 4.3%) following the introduction of interest rate caps is associated with a shortfall in real GDP growth of about (1.1%) assuming an elasticity of real GDP growth with respect to private sector credit of about 0.25. This is a massive drag on growth and jobs and goes a long way in plugging a gap in understanding the impact of interest rate caps on the Kenyan economy.

5. Conclusion and Policy Recommendations

The objectives of this study were to assess the impact of the interest rate cap on credit uptake across the different sectors of the economy, and the impact of private sector credit on economic growth. Monthly data on private sector credit for the period between January 2000 and December 2018 to all sectors was used to address the first objective, while time series data for the period 1980-2018 was used to answer the second objective.

The introduction of interest caps starved credit to key sectors and led to an average decline in credit to the entire sector of about 4.3 per cent relative to pre-capping. The HP Filter and an ARDL model were used to analyze the average credit deviations before and after the introduction of interest rate controls. The HP Filter showed, on average, a decline in total credit in the post-capping period of Ksh 72.9 billion (or a decline of about 4.3%) relative to the baseline (before capping). This is also corroborated by the ARDL method that accounts for other macroeconomic variables by showing a decline of Ksh 83.4 billion (5.4%) relative to the baseline (pre-capping).

Furthermore, there were larger and significant credit reductions across sectors. The results show that agriculture, manufacturing, private households and transport experienced the largest declines in credit flows after the interest rate cap was introduced. In particular, credit flows to agriculture, manufacturing, private households, and transport were 5.4, 3.1, 3.0 and 2.8 per cent, respectively, lower than their pre-capping levels. The financial exclusion experienced by these sectors could have dragged down overall contribution to growth. To test for this, an ARDL approach was used to assess the impact of private sector credit on economic growth.

The study finds that there is a positive and significant long-run and short-run relationship between access to private sector credit and real GDP growth in Kenya. The elasticity of real GDP growth with respect to private sector credit is about 0.25 and is statistically significant and economically important. This relationship suggests that the shortfall in private sector credit (of approximately 4.3%) following the introduction of interest rate caps is associated conservatively with a shortfall in real GDP growth of about 1.1 per cent relative to the baseline (pre-capping period). This is a hindrance on growth and jobs, holding back the country from making progress in promoting inclusive growth.

The findings from this paper go a long way in plugging a huge information gap on the part of policy makers on the impact of interest rate caps on growth in Kenya. Policies to enhance access to private sector access remains top priority, including during the current COVID-19 pandemic. Accelerating private sector's

contribution is extremely important, especially at a time when public sector investment is constrained and the economy reeling from the impact of corona virus. Policies to support firms to access liquidity and credit remains very critical both during the crisis phase and more importantly during the recovery phase. It is vital to expand financial access to MSMEs to enhance dynamic efficiency for which new products, industries and services can be created to deliver welfare gains over time. In addition, this can create a competitive environment conducive for growth. One of the challenges that has been cited by the MSMEs is access to finance to support their entrepreneurial pursuits. Therefore, policy makers could work on how to improve the competitiveness of banks and pricing of loans to the MSMEs. In addition, measures to ensure that banks price loans competitively should continue to be explored.

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Appendix

Table A1: Summary statistics -impact of interest rate cap on credit uptake by sectors

	AGRI	MANUF	TRADE	BUILD	TRANSP	FIN	REALEST	MINING	HHOLDS	CONSDUR	BUZSERV	TOTAL	INF	LRATE	DEBT	EXCRATI
Mean	46 925,87	136 373,70	164 422,50	50 823,51	72 616,56	35 890,16	122 598,60	12 004,34	150 232,20	61 569,61	80 909,05	994 932,20	7,96	15,82	1 673 891,00	82,90
Median	34 014,37	88 831,13	99 356,03	36 578,82	57 129,22	27 139,79	43 412,92	13 444,17	108 140,60	42 395,05	70 745,11	682 827,60	6,73	14,79	1 058 018,00	78,95
Maximum	98 230,93	350 657,80	433 056,00	120 910,60	204 123,40	96 482,12	376 863,50	29 734,64	415 111,20	195 825,00	277 127,70	2 423 252,00	19,72	25,39	5 272 503,00	105,27
Minimum	22 163,45	47 956,57	37 368,44	18 007,81	9 888,17	13 287,00	19 371,95	1 492,51	8 052,91	2 559,97	21 137,59	236 590,40	0,46	11,97	503 554,00	61,90
Std. Dev.	23 763,49	93 492,18	132 260,60	32 168,21	59 759,24	23 452,27	124 330,20	9 389,75	135 474,50	60 558,30	54 861,81	766 932,70	4,51	2,83	1 316 960,00	11,25
Skewness	0,77	0,85	0,73	0,81	0,84	1,40	0,86	0,30	0,72	0,81	0,72	0,66	0,94	0,90	1,33	0,58
Kurtosis	2,11	2,21	2,01	2,23	2,38	3,50	2,22	1,30	2,04	2,32	2,52	1,90	3,15	3,18	3,63	2,26
Jarque-Bera Probability	30,38	33,15	29,68	30,40	30,31	76,78	34,20	24,79	28,21	29,07	21,87	28,16	34,04	30,95	71,39	18,10
Sum	10699099	31093209	37488328	11587760	16556576	8182957	27952476	2736989	34252941	14037871	18447265	2,27E+08	1815,807	3606,123	3,82E+08	18900,79
Sum Sq. Dev.	1,28E+11	1,98E+12	3,97E+12	2,35E+11	8,11E+11	1,25E+11	3,51E+12	2,00E+10	4,17E+12	8,37E+11	6,83E+11	1,34E+14	4610,469	1818,381	3,94E+14	28714,96
Observations	228	228	228	228	228	228	228	228	228	228	228	228	228	228	228	228

Source: Author's calculations, 2020

Table A2: Summary statistics of transformed variables

	LN_AGR1	LN_MANU	LN_TRADE	LN_BUILD	LN_TRANS	LN_FIN	LN_REAL	LN_MINEL	LN_HH	LN_CONS	LN_BUS	LN_TOTAL	LN_INF	LN_LRAI	LN_DEBT	LN_EXC
Mean	6.04	7.01	7.07	6.05	6.20	5.73	6.52	4.36	6.75	5.72	6.46	8.89	1.91	2.75	14.07	4.41
Median	6.06	6.95	6.98	6.03	6.30	5.76	6.17	4.36	6.98	6.04	6.48	8.81	1.91	2.69	13.87	4.37
Maximum	6.36	7.51	7.76	6.48	7.05	6.32	7.61	5.42	7.72	6.97	7.41	9.51	2.98	3.23	15.48	4.66
Minimum	5.60	6.57	6.43	5.64	5.21	5.00	5.58	3.23	5.15	3.90	5.78	8.50	-0.77	2.48	13.13	4.13
Std. Dev.	0.15	0.27	0.44	0.23	0.53	0.31	0.73	0.67	0.79	0.91	0.33	0.41	0.61	0.17	0.69	0.13
Skewness	-0.55	0.39	0.17	0.12	-0.27	-0.22	0.27	-0.05	-0.38	-0.20	0.07	0.18	-0.67	0.61	0.60	0.38
Kurtosis	3.52	1.88	1.48	1.93	1.99	1.99	1.38	1.61	2.15	1.43	2.60	1.48	4.40	2.40	2.04	2.25
Jarque-Bera	14.02	17.72	22.99	11.53	12.48	11.40	27.86	18.45	19.63	25.05	1.66	23.05	35.64	17.43	22.66	10.94
Probability	0.10	0.14	0.25	0.31	0.19	0.33	0.15	0.18	0.55	0.40	0.44	0.27	0.08	0.16	0.12	0.42
Sum	1378.03	1597.56	1611.69	1379.25	1413.78	1305.88	1483.74	994.85	1538.21	1305.08	1472.33	2026.04	43492	62.613	3208.73	1005.20
Sum Sq.																
Dev.	4.91	16.23	43.50	11.79	62.67	21.90	121.04	100.90	142.73	186.92	24.29	37.62	833.8	65.6	108.10	3.98
Observations	228	228	228	228	228	228	228	228	228	228	228	228	228	228	228	228

Source: Author's calculations, 2020

Table A3: Monthly average credit gap variations – HP Filter

	Total	Agriculture	Manufacturing	Trade	Building & construction	Transport & communication	Finance and insurance	Real estate	Mining & quarrying	Private households	Consumer durables	Business services
Pre-Capping (Ksh million)	107.16	2.53	20.22	47.96	158.39	85.47	39.45	130.78	26.74	-45.37	-154.96	-78.93
Post-Capping (Ksh M)	- 72.94	- 1.20	- 64.60	- 75.81	- 106.87	- 89.62	- 43.54	- 120.65	-36.74	- 15.79	54.96	- 63.45
Post-Capping (% of pre-capping nominal credit)	- 4.30%	- 4.76%	- 3.02%	- 2.0%	- 2.5%	- 1.97%	- 0.32%	- 2.89%	- 1.79%	- 2.49%	-0.08%	- 8.57%

Source: Author's calculations, 2020

Table A4: ARDL cointegrated credit model estimation results (Jan 2000 – August 2018)

	Total	Agric	Manuf	Trade	Building	Transport	Finance	Real estate	Mining	Hholds	Durables	Bussery
	Short-run coefficients											
D(LN_LINF)	(-0.020)***	(-0.034)**	(-0.019)**	(-0.040)***	(-0.034)**	(-0.032)**	(-0.009)	(-0.035)***	0.009	0.008	0.006	(-0.003)
D(LN_LRATE)	(-0.022)**	0.002	(-0.104)	0.001	0.0229	(0.260)*	(-0.457)	0.016	(0.947)*	(-0.136)**	(-0.018)	(0.401)**
D(LN_DEBT)	(0.0378)**	(-0.020)*	(0.023)*	(0.424)***	(0.031)**	(0.451)***	(-0.018)	(0.043)**	1.098	(-0.207)	(0.245)***	(0.092)***
D(LN_EXC)	(0.113)*	(0.198)***	(0.369)**	(0.356)**	(-0.026)	0.149	(-0.571)	(0.279)*	(-0.162)	(-0.374)***	(-0.392)**	0.192
CointEq(-1)	(-0.031)	(-0.101)***	(-0.060)**	(-0.039)	(-0.0789)***	(-0.072)	(-0.076)**	(-0.026)	(-0.088)***	(-0.119)***	(-0.118)***	(-0.099)***
D(LN_AGRJ)		(-0.019)										
D(LN_MANU)			(0.174)***									
D(LN_TRADE)				(0.089)***								
D(LN_BUILD)				(-0.065)***								
D(LN_TRANS)					(-0.037)*							
D(LN_FIN)							(-0.016)*					
D(LN_REAL)								(-0.095)***				
D(LN_MINING)									(0.011)**			
D(LN_HH)										(0.027)*		
D(LN_CONS)											(-0.001)	
D(LN_BUS)												(-0.046)*
D(LN_OTHER)												

Long-run coefficients												
LN_INF	(-0.005)	(-0.075)	0.114	0.113	(-0.009)	(-0.027)	(-0.124)	0.045	0.112	0.07	0.049	(-0.033)
LN_LRATE	(-0.690)	0.021	0.357	0.020	(0.291)	(-0.771)**	(-0.560)	0.609	0.386	(-1.139)***	(-0.156)	0.301
LN_DEBT	(1.205)***	(-0.194)**	(0.379)*	(0.948)**	(0.399)**	(1.069)***	(-0.232)	(1.626)*	(1.093)**	(1.80)***	(2.073)***	(0.934)***
LN_EXC	(-1.9224)**	1.953)***	0.408	(-0.974)	(-0.334)	(-1.664)**	2.299	(-0.657)	(-1.842)	(-3.141)***	(-3.316)***	(-2.621)***
C	2.519	0.266	(-1.314)	(-2.232)	(1.147)	0.766	0.659	(-14.890)	(-4.135)	(-1.502)	(-8.303)	4.179
Adjusted R-squared	0.998	0.929	0.982	0.992	0.943	0.990	0.860	0.996	0.935	0.991	0.976	0.969
F-stat	13424.34	430.1875	1343.657	3277.616	548.376	2391.795	174.959	7443.041	405.893	4012.696	1629.296	897.454
	0.0000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Ramsey Reset	1.309	0.669	0.127	1.731	0.257		0.326	4.107	1.369	0.349	0.162	2.150
	0.19	0.415	0.899	0.085	0.797		0.745	0.288	0.173	0.727	0.872	0.144
CUSUM												
CUSUM SQ												
LM					1.025	1.668	0.224	0.552	1.355	8.916	2.228	3.351
					0.410	0.101	0.979	0.458	0.227	0.267	0.153	0.259

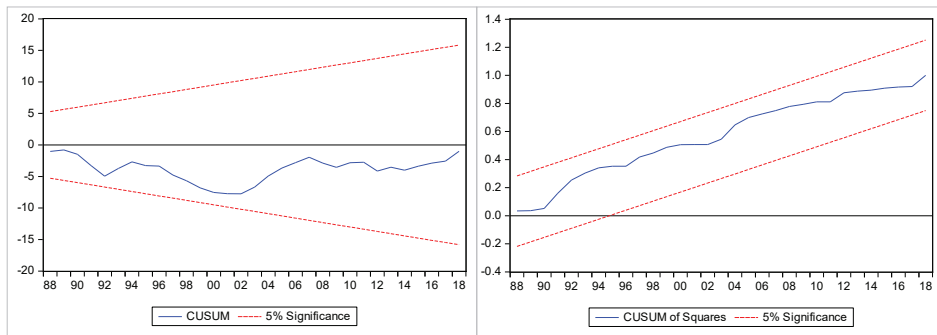
Source: Author's calculations, 2020

Table 15: Monthly Average Credit Gap Variations- ARDL

	Total	Agriculture	Manufacturing	Trade	Building & construction	Transport & communication	Finance and insurance	Real estate	Mining & quarrying	Private households	Consumer durables	Business services
Pre-Capping (Ksh M)	101.51	-3.41	26.81	-56.80	-100.27	-6.08	31.88	-136.66	21.37	-44.34	-104.96	-68.38
Post-Capping (Ksh M)	-83.38	9.06	-43.33	-75.58	-109.70	-77.26	-40.84	-129.12	-36.67	-13.45	69.34	-51.99
Post-Capping (% of pre-capping nominal credit)	-2.20%	-5.37%	-3.13%	-0.57%	-1.98%	-1.77%	-0.12%	-1.68%	-0.44%	-3.07%	-2.70%	-1.65%

Source: Author's calculations, 2020

Figure 8: CUSUM test



Source: Author's calculations, 2020

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