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# Gaps from the Cap: Implications for Financial Inclusion in Kenya

Rogers Ochenge and Samuel Tiriongo

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23

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# Gaps from the Cap: Implications for Financial Inclusion in Kenya

By Rogers Ochenge and Tiriongo Samuel*

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## Abstract

*This main objective of this paper is to quantify the credit gaps that possibly arose following the introduction of interest rate caps in September 2016 in Kenya. To achieve this objective, we employ two approaches. First, we use a statistical procedure – the HP filter to extract the historical trend over the sample period January 2000 to April 2017 and compute the credit gap as the difference between actual credit and the HP trend. The HP filter indicates that the capping of interest rates led to an average decline of aggregate private sector credit of about 3.5%. Second, is an econometric approach that takes into account other macroeconomic variables that may be important in influencing bank credit extension. The study estimates a credit supply function using a multivariate ARDL model over the period January 2000 to August 2016; just before interest rate capping, then project credit outturn over the period September 2016 to April 2017 conditional on the parameters of estimated ARDL. Similarly, the credit gap is estimated as the difference between the actual credit and the projected trend. On average, the ARDL-based estimates indicate that the interest rate capping led to an aggregate private sector credit decline of about 2.3% (or about Ksh.51 billion). Focusing on sectoral credit, the ARDL-based estimates indicate that household sector experienced a relatively large decline in credit flow of about 5% (or about Ksh.27 billion) while credit to agriculture declined by about 4.9% on average. The credit exclusion of these sectors may have huge adverse implications for financial inclusion both in the short- and long-run. In this regard, there is need to reassess the interest rate law and possibly consider alternative approaches of addressing high cost of credit, which may include enhancing competition among banks.*

* *Rogers Ochenge is affiliated with Centre for Applied Economics Strathmore University, Kenya. Tiriongo Samuel is affiliated with Department of Economics University of Dar es Salaam, Tanzania*

# 1.0 Introduction

**Interest rate caps have often been a key part of selective credit policies. Historically, governments have used interest rate ceilings to address the concern about high costs of borrowing and predatory lending or as a form of subsidy to economically and politically important groups.**

Many countries, especially those in Latin America, experimented with some forms of interest rate controls in 1980s and 1990s. However, the number of countries with interest rate caps has been declining since then. Today, some countries still impose interest rate caps on loans to protect consumers from usury and what is perceived as excessively high interest rates, while only a small number of countries are using interest rate caps to support priority sectors of the economy (Maimbo & Gallegos, 2014). Latin American economies, especially Paraguay and Bolivia are among the few countries that have some controls on interest rates aimed at achieving equitable distribution of credit. Similarly, in Asia, loans to agriculture, Small and Medium-sized Enterprises (SMEs), export-oriented industry, and technology are capped at 2 percentage points above the deposit rate ceiling. Experience from many countries shows that interest rate caps, if set well below the average market rate, can limit supply of credit since they impede pricing of risk by lenders, reduce transparency, and decrease product diversity and competition (Dam, 2009). This can potentially affect overall and sectoral credit access, thus financial inclusion.[1]

To meet the interest rate ceiling, financial institutions often increase loan size and shift their commercial operations away from rural areas, which often face higher operational costs, to urban areas, thereby reducing services to rural and small borrowers (Miller, 2013). In early 2000s many countries such as Nicaragua, a number of West African countries including Mali witnessed significant credit market contractions after the introduction of interest rate ceilings to specific types of lenders (CGAP, 2004).

1 In this paper, we narrowly define financial inclusion to imply access to credit.

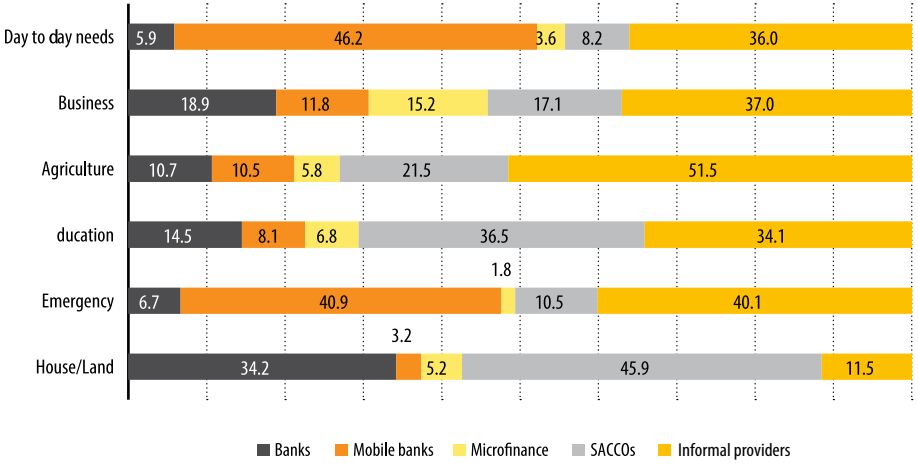
Moreover, interest rate ceilings can often drive borrowers back to more expensive informal markets where they generally have no or little protection. Financial institutions would also tend to lend more (increase loan size) to clients with higher collateral or generally better risk profiles. And when the definition of interest rate in the capping law is not clear, financial entities may have scope to charge fees and commissions. When the interest rate ceiling is too low, this can reduce bank's profitability, lowering the expansion capacity of the financial sector and thus limiting financial development. While the increase in loan size to highly collateralized segments can help recover the cost, this can increase concentration risks as banks compete for a narrow base of existing customers. This is because of banks' risk aversion and limited information to assess and take on risks of new borrowers.

From the foregoing, it implies that interest rate caps can potentially affect financial inclusion processes. Its key indicators generally range from access and usage of financial services to delivery of financial services at affordable costs to disadvantaged and low-income segments of society. It can also include the number of bank branches and Automated Teller Machines (ATMs) per 100,000 adults, credit access, the numbers of bank accounts, financial products, and the share of adults using accounts for financial transactions (Sahay et al. 2015; World Bank, 2014). In this paper, we focus on credit access considering that it costs more to lend and collect a given amount of money in many small loans than in fewer big loans. In an environment with interest rate caps, international experience in a number of countries (such as Armenia, Nicaragua, and South Africa) points to a number of consequences, including: reduction in credit flows as a result of withdrawal of financial services from the poor and those perceived to be highly risky segments, an increase in illegal or informal lending, an increase in the total costs of the loan through additional fees and commissions and a decrease in product diversity (Maimbo & Gallegos, 2014).

Kenya's financial inclusion landscape prior to the introduction of the interest rate caps in September 2016 was characterized by growth in the number of financially included population across different segments. For instance, between 2006 and 2016, the economy had recorded over 50 percent growth in the proportion of population that is financially included (using formal financial services) to stand at 83 percent by 2016. The reasons for accessing credit as well as its sources however vary. **Figure 1** depicts the reasons and sources of credit uptake by the population as observed in 2016.

It is evident from **Figure 1** that by 2016, banking sector seemed to be a major source of credit for predominantly collateralized loans (such as for purchase of land or houses) as informal providers provided credit for day to day needs, agriculture, businesses, education and emergencies. In this regard, there was still scope prior to the introduction of the interest rates caps for the banking sector to penetrate the key economic sectors as a main

**Figure 1: Reasons and Sources of Credit in Kenya (%)**




Source: FSD (2016)

source of credit. The introduction of the interest rate caps in late 2016 that is known to limit the pricing of risk can only imply a further impediment to the objective of enhancing adoption of formal banking system as a main source of credit especially for the economic activities such as businesses and agriculture that contribute significantly to the growth of the economy.

The rest of the study is organized as follows. *Chapter 2* outlines the research issue. *Chapter 3* covers a brief review of the literature while *chapter 4* spells out the methodology adopted for the study as well as the data used. *Chapter 5* discusses the empirical results and *chapter 6* draws some conclusions and policy implications.

# 2.0 Research Issue

**The Kenyan economy, over the last eight years remained robust amid shocks from both domestic and external economic environment. This has been achieved partly through a strongly performing financial system, which is dominated by the banking sector.**

The stock of credit to private sector maintained a stellar growth trajectory between 2008 and the third quarter of 2016. Moreover, several financial sector reforms[2] during the period appear to have enhanced financial inclusion as evidenced by the simultaneous increase in the uptake of credit by almost all the main sectors of the Kenyan economy (*see appendix A1*). However, in September 2016 interest rate controls were introduced following an amendment of the banking Act. The amendment capped lending rates charged by institutions licensed under the Banking Act at a maximum of 4% over the benchmark rate, that is, the Central Bank Rate (CBR). The first round effect of the rate cap seems to have been a dramatic drop in credit extended to the private sector since the fourth quarter of 2016 (*appendix A1*). Most commentators, though without adequate empirical evidence, have associated the credit contraction to the introduction of interest rate capping law (see for instance De Young & Phillips, 2009).

Prior empirical evidence in other economies shows that interest rate caps can introduce adverse effects on financial inclusion, by instituting an exclusion of the poor or those segments perceived as highly risky; spurring the growth of informal lending and /or increasing the cost of bank services through higher fees and commissions (De Young & Phillips, 2009). Besides, a number of studies, for instance, Osman, 2014 and Timsina *et al.*, 2014), argue that there is a strong link between growth of credit to private sector and economic growth. In addition, due to the fact that credit

2 Notable developments include the introduction and dramatic growth in mobile money and mobile banking, expansion of non bank financial institutions and growth of bank branches to serve the previously unbanked and under-banked segments. Credit reference bureaus were also licensed to bridge information symmetry gaps in processing of loans with an objective of enhancing credit uptake and at the same time minimise cases of nonperforming loans.

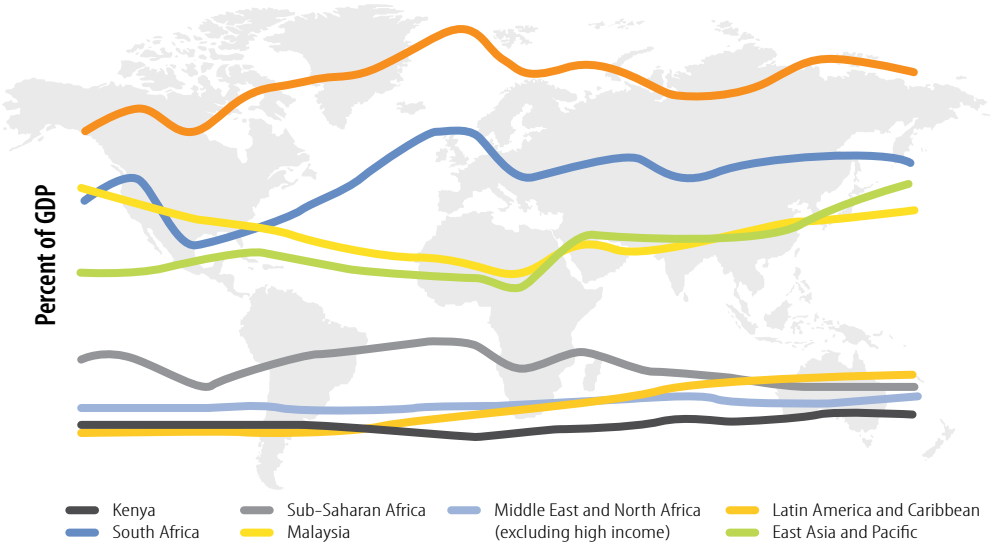
caps enhance credit profiling of the different borrower segments, there would be differentiated effects on overall credit expansion outcomes. This study therefore hypothesizes that the introduction of interest rate caps triggered heterogonous credit adjustments across the sectors.

Against this backdrop, this study seeks to quantify the aggregate and sectoral credit gaps arising from the institution of interest rate controls in September 2016. In particular, the study seeks to identify the sectors that experienced greater adjustment in credit since this has direct implications on financial inclusion.

## Stylized Facts of the Credit Market in Kenya

In comparison to both emerging and advanced economies, the credit depth in Kenya is quite low (**Figure 2**). For example, over the period 2000-2015, the average credit to private sector (% of GDP) for Kenya was about 27 percent while the Sub-Saharan average was about 54 percent. While this reflects a relatively shallow financial system, it implies a greater need to deepen the sector and enhance its role in financing economic activity.

**Figure 2: Domestic Credit to Private Sector (Percent of GDP)**



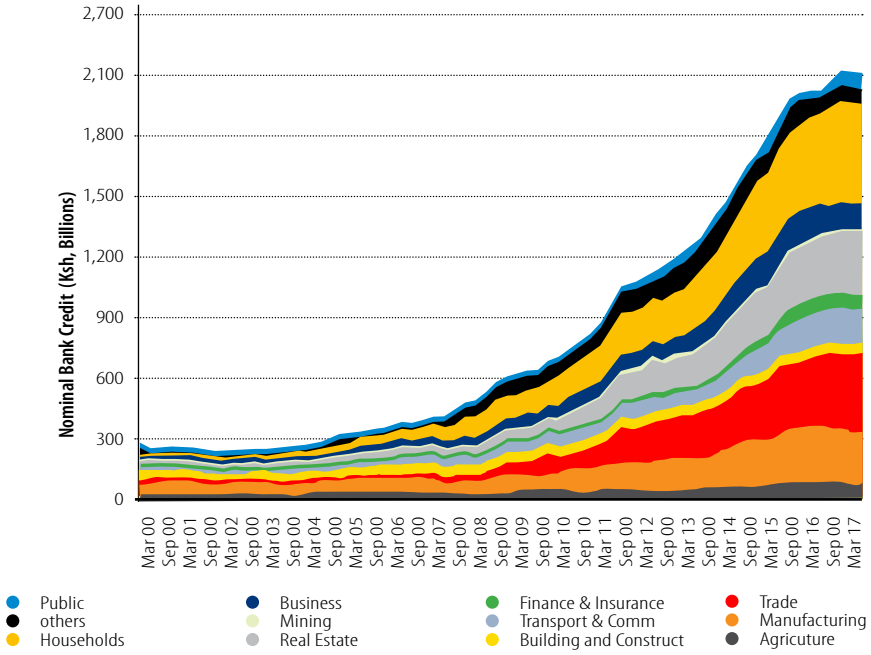

Source: WDI

As assessment of the distribution of bank credit shows that overall, between mid 2007 and September 2015, while private sector credit grew steadily, credit uptake by public sector remained largely subdued until mid 2016 when it increased notably (**Figure 3**). Over the sample period, households[3], real estate and manufacturing sectors absorbed the highest proportions of private sector credit, on average at 24%, 19% and 12%, respectively.

Although the objective of this study is to examine the impact of the interest rate capping law on credit uptake, the preliminary analyses in this section show that credit slowdown seems to have begun prior to the introduction of the interest rate control. While the decline could be associated with the historical cyclical behaviour of credit, we hypothesize that any further deviations from the cyclical behaviour can be attributed to the interest rate capping law. In this regard, it would be important to compare credit adjustments prior to and after the interest rate controls were introduced.

3 Includes spending on consumer durables

**Figure 3: Disaggregated Private and Public Sector Credit**



# 3.0 Review of Literature

There exists an expansive literature related to interest rate restrictions and its effects on the economy. Most importantly, literature is articulated based on risk management and financial inclusion. This involves analyses of adjustments in risk profiling of borrowers following interest rate controls, which has direct implications on financial inclusion from the perspective of credit access (Dam, 2009).

This section briefly reviews both the theoretical as well as the empirical literature on the role of interest rate restrictions on credit market outcomes.

Miller (2013) argues that the theoretical explanations on the role of interest rate restrictions on credit market outcomes starts with the proper understanding of the composition of interest rates (price of credit) charged by lenders. The dominant classical view decomposes interest rate into three major elements; operational costs, profit margins, and compensation for default risk. Operational costs for lenders include all the costs related to providing credit services such as general administration overheads, loan assessment costs, etc. Typically, lenders set interest rates in a way to cover these operational costs. In this regard, interest rate restrictions reduce interest rate margins forcing the lender to exploit other sources of income so as to maintain the required returns while at the same time cover the other operational costs. For example, lenders may increase fees or even introduce some hidden charges.

Based on the risk adjustment view, lenders in their interest rate models incorporate some element of risk premium to protect themselves from the likely losses in the event the borrowers default. In this regard, borrowers with higher likelihood of default are charged higher interest rates relative to those with low probability of default. Thus, if legal regulation imposes interest rate restriction, lenders can only charge interest rates which compensate up to a certain level of risk. This

implies that borrowers beyond this level of risk will be excluded from accessing credit. Additionally, if demand for credit for both high-risk and low-risk borrowers remains the same, then the exclusion of high-risk borrowers will lead to a disequilibrium in the credit market. This ultimately leads to a decline in total credit extended in the economy (Dam, 2009). The underlying assumption in this case is that lenders are able to discriminate between high-risk borrowers and low-risk borrowers.

However, this might not necessarily be the case. Due to information gaps lenders may not fully observe the quality of borrowers. As a result, lenders cannot price discriminate among the borrowers. In this setting, lenders will charge an average market clearing interest rate. However, the low-risk borrowers will be unwilling to borrow at this average interest rate. Consequently, only high-risk borrowers will be attracted by this average rate, compounding an adverse selection problem. To circumvent this problem, lenders may choose to keep the interest rate low to attract low-risk borrowers but then adopt credit rationing on loans extended. Alternatively, the lenders may choose to minimize information asymmetry by, for instance, requiring borrowers to provide collateral. It is probable that low-risk borrowers will choose credit contracts with strict collateral arrangements while high-risk borrowers are likely to choose contracts with weak collateral arrangements. Such dissimilar contracts can enable lenders to price discriminate and hence increase credit supply. However, in the presence of interest rate restrictions, lenders lack the ability to differentiate the borrowers and hence cannot price discriminate (Stiglitz & Weiss, 1981). As a result, total credit supply is likely to decline.

In summary, the theoretical considerations suggest a number of testable implications regarding the effects of interest rate restrictions on credit market outcomes. First, if we assume that banks can fully differentiate between high-risk and low-risk borrower types, then in the presence of interest rate restrictions, lenders will credit ration the low-risk borrowers (often the low-income people or the small businesses). Second, since some sub-groups of economic agents are excluded from accessing credit, the overall credit supply falls. Third, legal and binding interest rate restrictions can reduce the number of loan products offered by lenders. For instance, imposition of interest rate controls may imply that lenders are not able to cover some fixed operating costs of small-sized loans. Thus, lenders are likely to offer big-sized loan products relative to small-sized loan products. Fourth, since interest rate restrictions may lead to exclusion of the poor and small businesses from formal credit access, these agents may try to find other unregulated sources such as illegal lending institutions (Chari *et al*., 2014).

Several studies have empirically tested the hypothesized relationships between interest rate restrictions and the lending behavior of banks. Bodenhorn (2007) analyzed the effects of a binding interest rate ceiling for one bank in New York, USA. The study correlated monthly levels of total number of loans, volume of loans, loan size, and loan

maturities with the difference between the market rate of an exchange traded commercial paper and the legally binding interest rate ceiling. Two key effects of the enforcement of the interest rate ceiling are documented. First, illegal lending increased following the interest rate cap institution, and second, there was a significant change in loan portfolio. Particularly, not only did the average loan size offered increase (to the detriment of small and subprime borrowers) but the loan maturity period also shortened. Heng (2015) reports a similar finding for the case of Bolivia.

Termin and Voth (2007) examine the reaction of a British bank to a change in usury law in early 18th century. They find that the usury law reduced the maximum chargeable interest rate from 6.0 to 5.0 percent and the bank as a response resorted to engage only in well collateralized transactions. To achieve this, the bank reduced lending to low quality borrowers. The authors observe that there appears to have been significant discrimination in lending in favor of the wealthy and politically connected elites. They also document that after the change in usury law, the average loan size more than doubled. To further cushion themselves, banks tightened their collateral requirements. The authors conclude that interest rate restrictions are not social insurance as thought by its proponents but a means of rent extraction and have adverse effects on loan allocation especially to the disadvantaged segments. This result is consistent with findings of Ellison and Forster (2008b) who surveyed the usage of interest rate capping in a number of developed economies with the aim of drawing implications for Australia. Among the key findings include the fact that; interest rate ceiling does not necessarily reduce the cost of credit, but it leads to credit exclusion especially of segments such as households that cannot borrow to meet cash emergencies or spread their major purchases.

Benmelech and Moskowitz (2010) examine the political economy of interest rate ceilings and its implications on financial and economic activity across 20 states of America during the 19th century. Specifically, they explore the impact of interest rate ceilings on lending activity, economic activity and whether the ceilings serve public or private interests. On lending activity, they find that binding interest rate ceilings result in significant decrease in lending volumes in most of the sample states. On economic activity, significant negative impact of interest rate ceilings on several measures of economic activity is reported. Most specifically, considering the agricultural sector, the authors note that small farms are severely impacted by the interest rate ceilings. Additionally, the authors conclude that interest rate ceilings mainly benefit private interests. Particularly, the authors cite that well organized and powerful political elite impose interest rate ceilings so as to credit ration their competitors who have no access to finance besides bank credit. The elite group can finance new projects through their accumulated earnings or by accessing capital markets by virtue of their reputation. Thus this powerful group benefit from interest rate ceilings if such restrictions discourage entry from others who cannot access finance easily.

Mambo and Gallegos (2014) conduct a global stock taking exercise to determine the extent to which interest rate controls are used around the world. They observe that although the number of countries using interest rate caps has been declining, still about 76 countries have these caps on force with about 50% of these countries in Sub-Saharan Africa. These authors further note that although interest rate caps are introduced to foster financial inclusion, the caps generally lead to banks withdrawing financial services from rural to urban areas, to illegal lending (that is mostly costly), to increased lending costs through additional fees and commissions, and to decreased product diversity and innovation all of which leads to financial exclusion. Instead of interest rate caps, these authors suggest some alternative policy options of lowering the cost of credit such as; enhancing financial competition and innovation, increasing financial literacy, and promoting the use of credit bureaus. Miller (2013) drawing experiences from Zambia also highlight the adverse effect of interest rate caps on financial inclusion. The study also advocates for different ways of addressing high cost of loans other than interest rate controls.

Heng (2015) examines the impact of financial laws (relating to credit quotas and interest rate capping) on financial stability and inclusion in Bolivia over the period 2010 to 2015. The key finding here which has a direct bearing in this study is that, interest rate capping adversely affected financial inclusion in Bolivia. Specifically, the author notes that small and poorer borrowers were hurt most by interest rate capping. This is because, after the introduction of the capping, the average loan size to microfinance institutions increased while the number of microfinance borrowers declined significantly.

Overall, the empirical literature appears to support the hypothesis that interest rate restrictions distort loan allocation process and thus reduce social welfare. This is in contrast to the proponents of interest rate restrictions who argue that such restrictions may act as social insurance to the poor. In light of this, the current study seeks to quantify the impact of recent enforcement of interest rate capping in Kenya as a first step towards understanding the lending behavior in the presence of interest rate restrictions.

# 4.0 Methodology

**The address the objective of this study, we use both statistical and econometric approaches. First, we employ the Hodrick-Prescott (HP) statistical tool to filter nominal credit into trend and cycles. In this regard, the trend is taken to represent potential credit. Consequently, we obtain credit gap as the difference between actual credit flow and its potential (trend).**

Particularly, our main focus lies in identifying the gap that arose after the implementation of the interest rate cap (between October 2016 to June 2017). One shortcoming of this statistical model is that it ignores the developments of the macroeconomic environment within which credit flows occur. This is despite its role providing an indication of the underlying trend in the data.

For this reason, we proceed to estimate an econometric model and then compare the results from the two techniques. The study specifies a credit supply function, where stock of private credit is assumed to be dependent on the macroeconomic conditions (captured by nominal exchange rate (*exchrate*) and inflation (*Inf*), nominal stock of government debt (*debt*), and nominal lending rate (*lendrate*). Here, we assume that the lending rate not only captures return on funds but also embodies risk characteristics. Stock of government debt captures the possibility of government borrowing crowding out the private sector. Apriori, we expect inflation and exchange rate to negatively influence credit supply. The credit supply function is specified in **Model (1)** as follows:

$$Credit_t = a_o + a_1 exchrate + a_2 debt_1 + a_3 lendrate_1 + a_4 inf + v_t \quad \text{..... (1)}$$

Where; credit captures both aggregate and sectoral credit. Thus, **model (1)** is estimated for aggregate as well as sectoral credit between January 2000 and August 2016. Once model parameters are established to be valid, projections are generated for the period September 2016 to April 2017. The projections represent that path that credit flows would have taken assuming no interest rate controls. The difference between the projected and the actual realized credit flows define the respective aggregate and sectoral credit gaps. Sectors with significantly wide gaps in the controlled interest rates regime would be those heavily financially excluded.

The study uses monthly data spanning January, 2000 to April 2017. The main variable of interest is aggregate as well as the sectoral credit flow. However, some control variables are introduced to parsimoniously explain variations of credit flow. The definitions of the variables are provided in *appendix (A2)*.

# 5.0 Empirical Results

**Statistical Approach: HP Filter-Based Estimates**

**Comparing actual credit flows to their historical trends reveals that there are occasions when actual credit flows deviated substantially from their long run trends (*see Figure A.2 in the appendix*). However, the deviations vary across various sectors.**

Given that the main objective of this study was to examine the role of the interest rate capping on credit, we therefore analyzed average credit deviations (from trend) before and after the capping law was implemented. **Table A.2** in the appendix shows the total and sectoral credit deviations (gaps) over the two sub-sample periods. The following observations are notable. First, prior to the interest rate capping, total credit was on average above its trend by about Ksh 3.2 billion. However, after the interest rate capping, credit appears to be below trend on average by about Ksh 79.4 billion. The credit deviation post-capping period represents an average decline of 3.5% per month from its pre-capping level.

Second, focusing on sectoral credit uptake, we note that there exist substantial differences in the deviations across the sectors. For instance, in the post-capping period, whereas credit to trade recorded a positive average deviation of Ksh 1.5 billion (or 0.40% of pre-capping nominal credit), business sector credit uptake declined on average by Ksh 14.4 billion (representing 8.7% of its pre-capping level). Third, it is evident that the three sectors that experienced the highest levels of credit decline post interest rate capping are Businesses (by 8.7%), Manufacturing (6.5%) and Agriculture (4.9%). Finally, contrary to what was experienced in the rest of the sectors, credit uptake estimates by Households based on this statistical approach remained largely unchanged after the capping. The HP filter estimates provide a general guide on how data deviated from the cyclical pattern over the period. The estimates, however, need to be corroborated by an econometric analysis that accounts for changes in other macroeconomic variables that possibly affect credit supply.

**Econometric Approach: Autoregressive Distributed Lag (ARDL) Model Estimates**

Prior to estimation of **model (1)**, we first examine the statistical properties of the variables of interest. Particularly, a plot of the variables of interest (**appendix A1**) shows that with the exception of lending and inflation rates, all other variables have trends. Consequently, our first step in the analysis involves checking the stationarity of the variables. Stationarity conditions of the variables were established based on Phillips-Perron test that accounts for possible structural breaks in the data. The unit root test results indicate that credit (both at aggregate and sectoral), exchange rate, government debt and lending rate are all integrated of order 1, while inflation is integrated of order 0.

It is evident that the variables of interest have mixed orders of integration, but most importantly, the dependent variables are all integrated of order 1, i.e. are I(1)s. The mixed nature of stationary conditions of the variables guided our analysis towards the Auto-Regressive Distributed Lag (ARDL) model for purposes of analysis, as proposed by Pesaran *et al*., (2001). In this case, the study considers the ARDL bounds test approach to determine the cointegrated credit supply function. The ARDL model that is specified as follows:

$$\Delta \ln(credit)_t = \phi_0 + \sum_{i=1}^{p} \alpha_i \Delta \ln(exchrate)_{t-i} + \sum_{i=1}^{q} \beta_i \Delta \ln(debt)_{t-i} + \sum_{i=1}^{m} \vartheta_i \Delta(lendrate)_{t-i}$$

$$+ \sum_{i=1}^{n} \vartheta_i \Delta(\inf)_{t-i} + \delta_1 \ln(credit)_{t-1} + \delta_2 \ln(exchrate)_{t-1} + \delta_3 (debt)_{t-1} + \delta_4 (lendrate)_t$$

$$+ \delta_5 \inf_{t-1} + \upsilon_t \qquad (2)$$

In equation (2), represents first differences and represents the error term. In ARDL models, Pesaran et al. (2001) demonstrates how to conduct a cointegration test among the variables (regardless of whether variables are I(0) or I(1)) through a bounds test which is based on an F-statistic test. The null hypothesis (Ho) of no cointegration and an alternative hypothesis (HA) of cointegration using, for instance equation (2) respectively, are expressed as

$$H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$$

$$H_A : \delta_1 \neq 0, \delta_2 \neq 0, \delta_3 \neq 0, \delta_4 \neq 0, \delta_5 \neq 0$$

In the bounds test above, cointegration would be present if the null hypothesis is rejected, i.e. if the F-statistic is greater than the upper bound I(1) critical value. If the F-statistic is smaller than the critical values of the lower bound I(0) then cointegration does not exist. However, there would be inconclusive evidence on cointegration if the F-statistic is between I(0) and I(1) critical values. When cointegration is confirmed, then both long- run and short-run results can be obtained where the short-run parameters are generated from an Error Correction Model specification. Cointegration bounds testing confirmed that all the credit models are cointegrated with the specified determinants. In this regard, we proceeded to estimated ECM-based ARDL models for the period before interest rate capping was introduced.

The ARDL results are presented in **Table 1**. Model diagnostic results indicate that the models are fairly well-fitted (based on adjusted R-squared and Ramsey Reset tests), generally significant (based on F-test), model parameters are fairly stable across the sample period (based on CUSUM and CUSUMSQ tests) and depict minimal serial correlation (based on LM test). According to the results presented in **Table 1**, aggregate credit to private sector seems to be significantly driven by the stock of public debt. For example, in the short run, a one percent increase in government borrowing reduces credit to private sector by about 0.1 percent. In the long run however, government borrowing does not appear to crowd out private sector credit. One plausible explanation for this result could be that government borrowing promotes productivity which in turn promotes private sector demand for credit. Yet another important observation from **Table 1** is that, exchange rate, public debt, lending rate and inflation appears to be cointegrated with both aggregate as well as sectoral credit flows. There however, seems that the credit adjustment to equilibrium is fairly slow at less than 5 percent per quarter for most of the models.

Having established fairly parsimonious credit functions for the pre-capping period (January 2000 to August 2016), we generate projections for credit (overall and sectoral) for the period September 2016 to April 2017. The projections are then compared with actual credit levels to generate the credit gaps. To examine the impact of the interest rate capping law, we compare the average credit gap (in percent) based on the ARDL model estimation before and after the law, as shown in **Table 2**.

**Table 1: ARDL Cointegrated Credit Model Estimation Results (Jan 2000 – August 2016)**

| | Aggregate | Agric' | Manfg' | Trade | Real Estate | Transport | HHolds | Business |
|---|---|---|---|---|---|---|---|---|
| **Short Run Coefficients** | | | | | | | | |
| Dlog(EXCHRATE) | 0.059 | 0.266* | 0.346*** | 0.350** | 0.318** | 0.228 | -0.240*** | -0.007 |
| Dlog(DEBT) | -0.090* | -0.190 | -0.101 | 0.024 | -0.203* | 0.360** | 0.076 | -0.051 |
| D(LENDRATE) | -0.002 | -0.004 | -0.003 | -0.012* | 0.014** | 0.011 | 0.012 | 0.002 |
| D(INFL) | 0.001 | -0.002 | -0.000 | -0.001 | -0.002 | 0.001 | 0.005 | 0.002 |
| CointEq(-1) | -0.012*** | -0.154*** | -0.054*** | -0.028*** | -0.066*** | -0.053*** | -0.120*** | -0.026*** |
| Dlog(AGRIC(-1)) | | -0.233*** | | | | | | |
| Dlog(MANF'G(-1)) | | | -0.208* | | | | | |
| Dlog(TRADE(-1)) | | | | -0.221*** | | | | |
| Dlog(REALESTATE(-1)) | | | | | -0.181*** | | | |
| Dlog(TRANS(-1)) | | | | | | -0.266*** | | |
| Dlog(HHOLDS(-1)) | | | | | | | -0.356*** | |
| Dlog(BUSIN(-1)) | | | | | | | | -0.201*** |
| **Long-Run Coefficients** | | | | | | | | |
| Log(EXCHRATE) | -1.965 | -1.660*** | 0.340 | -2.644 | 0.556 | -0.379 | -2.301 | -5.229 |
| Log(DEBT) | 1.897* | 0.477*** | 0.941*** | 1.784** | 1.346*** | 1.364*** | 1.935*** | 1.656*** |
| LENDRATE | -0.140 | -0.014 | 0.015 | 0.012 | 0.027 | -0.060* | -0.047*** | 0.011 |
| INFL | 0.038 | -0.002 | 0.032* | 0.065 | 0.007 | 0.020 | 0.016* | 0.034 |
| C | -7.006* | -9.625*** | -9.666*** | -7.571 | -15.835*** | -11.456*** | -9.973*** | 5.177 |
| Adj. R-Squared | 0.95 | 0.94 | 0.89 | 0.90 | 0.92 | 0.86 | 0.91 | 0.95 |
| F-Stat. | 86238 (0.0000) | 3545 (0.0000) | 10990 (0.0000) | 10666 (0.0000) | 1533 (0.0000) | 8662 (0.0000) | 11790 (0.0000) | 6157 (0.0000) |
| Ramsey Reset | 1.141 (0.2870) | 0.163 (0.687) | 0.008 (0.930) | 3.110 (0.080) | 9.303 (0.003) | 2.268 (0.134) | 0.046 (0.830) | 0.008 (0.936) |
| CUSUM | stable ~ | stable | stable | stable | stable | unstable | stable ~ | stable |
| CUSUM SQ | stable ~ | stable ~ | stable | stable ~ | stable ~ | stable ~ | stable ~ | stable |
| LM | 2.236 (0.109) | 1.172 (0.312) | 4.431 (0.013) | 0.073 (0.484) | 0.330 (0.719) | 2.886 (0.058) | 3.222 (0.042) | 1.468 (0.232) |

*,** and *** indicate significance at 10%, 5% and 1% levels of significance, respectively. The stable~ shows results that display general stability but with short-lived stabilities. The full ARDL model results are available upon request.

The credit gaps generated by ARDL are qualitatively similar to those obtained using the HP filter. In particular, both approaches show that credit gaps widened after the institution of the interest rate controls. However, the approaches yield quantitatively different estimates for credit gaps. Generally, credit gap estimates based on ARDL are higher than those of HP filter. For instance, while HP filter estimates aggregate credit gap post-capping to have declined on average by 3.5 percent; ARDL estimates the decline at 2.3 percent. The ARDL estimates can be considered more superior to those generated by the statistical-based HP filter approach because ARDL incorporates more information that influence credit flows.

**Table 2: Monthly Average Credit Gap Variations Pre- and Post-Interest Rate Capping (ARDL)**

| | Aggregate | Agric | Manfg | Trade | Real Estate | Transport | Households | Business |
|---|---|---|---|---|---|---|---|---|
| Pre-Capping (Kshb) | 1.25 | 0.28 | 0.32 | 0.51 | 0.32 | 0.20 | 0.14 | 0.33 |
| Post-Capping (Kshb) | -51.04 | -4.67 | -4.75 | -5.24 | -11.49 | -5.28 | -27.03 | -2.47 |
| Post-Capping (% of Pre-Capping Nominal Credit) | -2.26% | -4.90% | -1.70% | -1.41% | -2.67% | -2.72% | -5.07% | -1.67% |

Based on the ARDL sectoral credit gap estimates, credit to Households sector appears to have declined by the highest magnitude (5.1%) followed by agriculture sector (4.9%) after the interest rate controls were introduced. Credit to the rest of the sectors indicate minimal adjustments (of below 2.7%) after interest rate controls were implemented. The relatively large decline in credit flows to households and agriculture has adverse implications on financial inclusion from the perspective of access to credit by these sectors.

# 6.0 Conclusions and Implications

**The objective of this study was to quantity credit adjustments following the institution of interest rate controls in Kenya in September 2016. It adopts both statistical and econometric approaches to estimate credit gaps at both aggregate and sectoral levels-using seven sectors, namely agriculture, manufacturing, trade, real estate, transport, households and business. From the stylized facts, we established that overtime, the sectors that proportionately absorb most of the private credit include households, real estate, trade, and manufacturing, which together account for about 70% of total credit.**

Findings based on HP filter and ARDL show larger credit reductions post-interest rate capping relative to pre-interest rate capping. Further, both approaches indicate differentiated sectoral credit adjustments over the two periods. In particular, HP filter showed a post-capping average credit decline of Ksh. 79 billion, while ARDL indicates an average decline of about Ksh 51 billion. In recognition of the limitations in the univariate statistical HP filter approach, the study recommends the adoption of the estimates generated by the multivariate ARDL model.

Based on the ARDL sectoral credit supply models, households, agriculture, real estate and transport are the sectors identified as the segments that experienced large declines in credit flows after the interest rate capping law. In particular, the average monthly credit flows to households, agriculture, transport and real estate sectors were 5.1%, 4.9%, 2.7% and 2.7%, below their pre-capping levels, respectively. The drop in credit to households may perhaps be attributed to the existing lack of full information on the creditworthiness of the households. The information asymmetry makes lenders perceive households as riskier and thus less willing to lend to this sector at relatively depressed interest rates.

Similarly, the uncertainty inherent in rain-fed agricultural production could also contribute to high risk in this sector, hence low credit supply to this sector.

From financial access perspective, reduction in credit flows goes against the financial inclusion agenda. This is particularly important to the households sector that accounts for the largest proportion of private sector credit. In this regard, it would be important to reassess the stance on interest rate controls if financial inclusion, through enhanced credit flows to previously under-banked segments such as the households, is to be pursued. On the other hand, if interest rate controls are to be sustained, the overriding question would be, what options are available for enhancing credit flows to household and agriculture sectors of the economy?

# 7.0 Appendix

**Figure A.1: Sectoral Distribution of Bank Credit (2000m1-2016m12)**

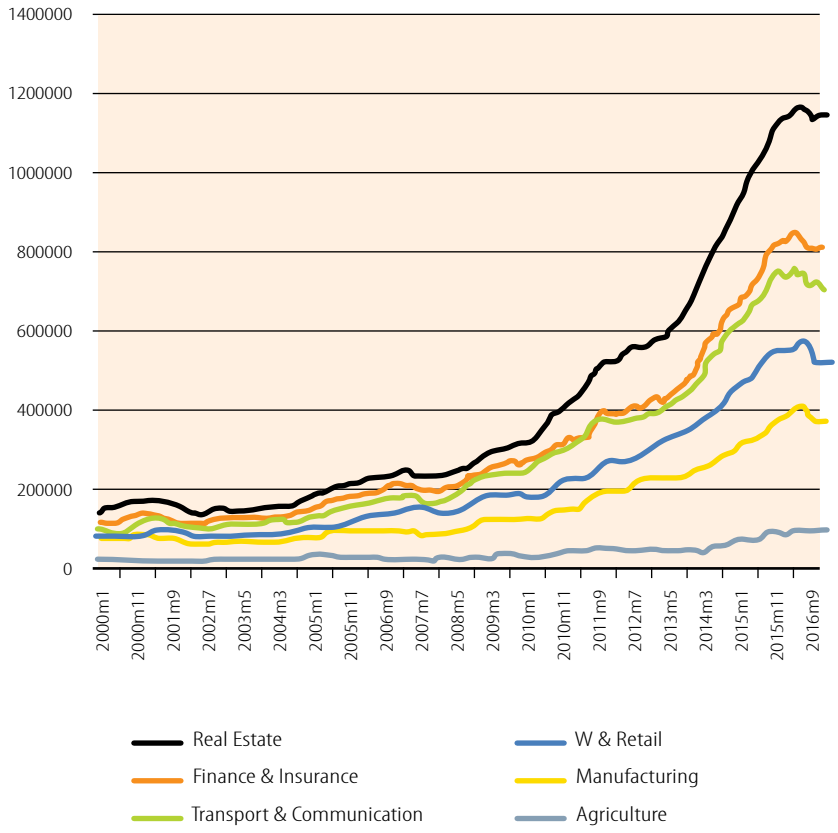


**Table A.1: Definition of variables**

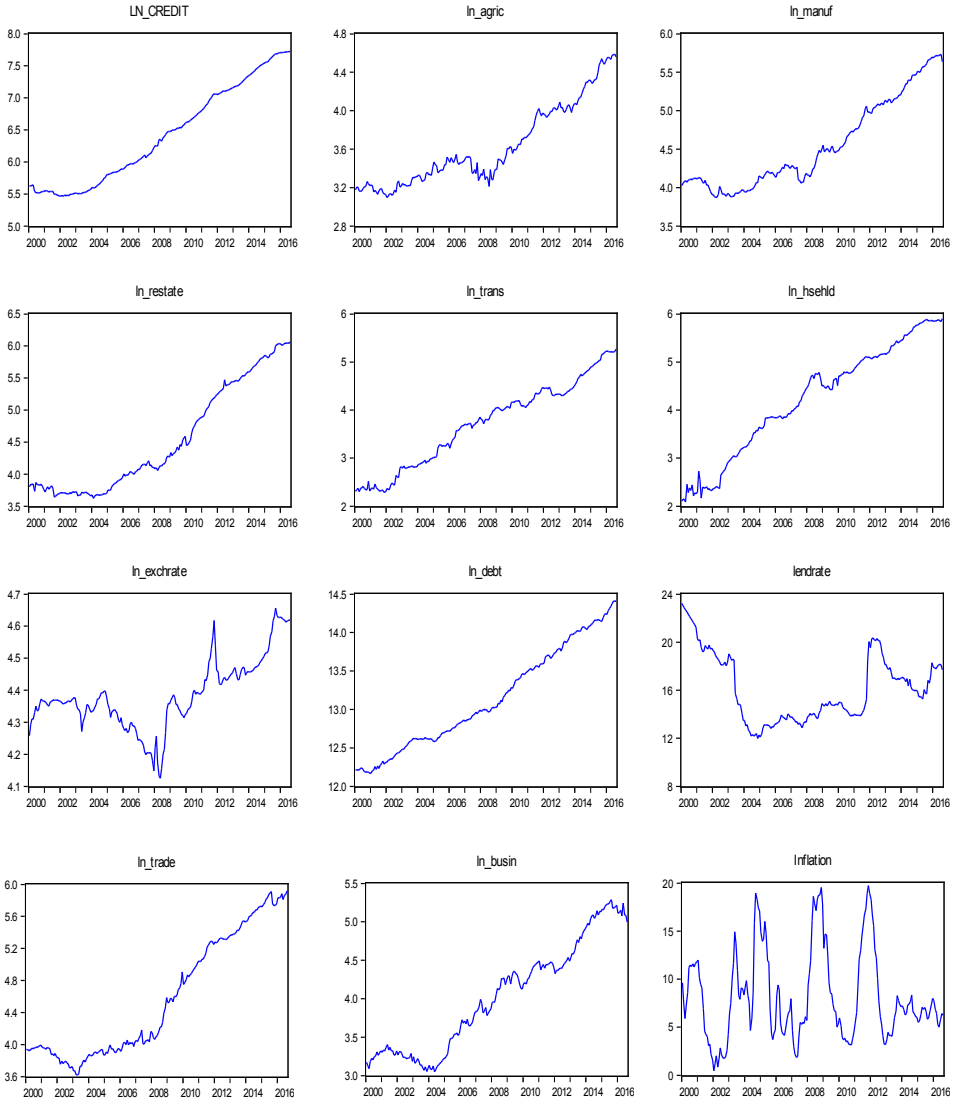
| Variable | Symbol | Transformation | Frequency | Period | Source |
|---|---|---|---|---|---|
| Nominal credit (Aggregate and sectoral) | | logarithmic | Monthly | 2000m01-2017m04 | CBK |
| Nominal Exchange | EXCHRATE | logarithmic | Monthly | 2000m01-2017m04 | CBK |
| Stock of public debt | DEBT | logarithmic | Monthly | 2000m01-2017m04 | CBK |
| commercial bank lending rate | LENDRATE | | Monthly | 2000m01-2017m04 | CBK |
| Inflation | INFL | | Monthly | 2000m01-2017m04 | KNBS |

**Table A.2: Monthly Average Sectoral Credit Gap Variations**

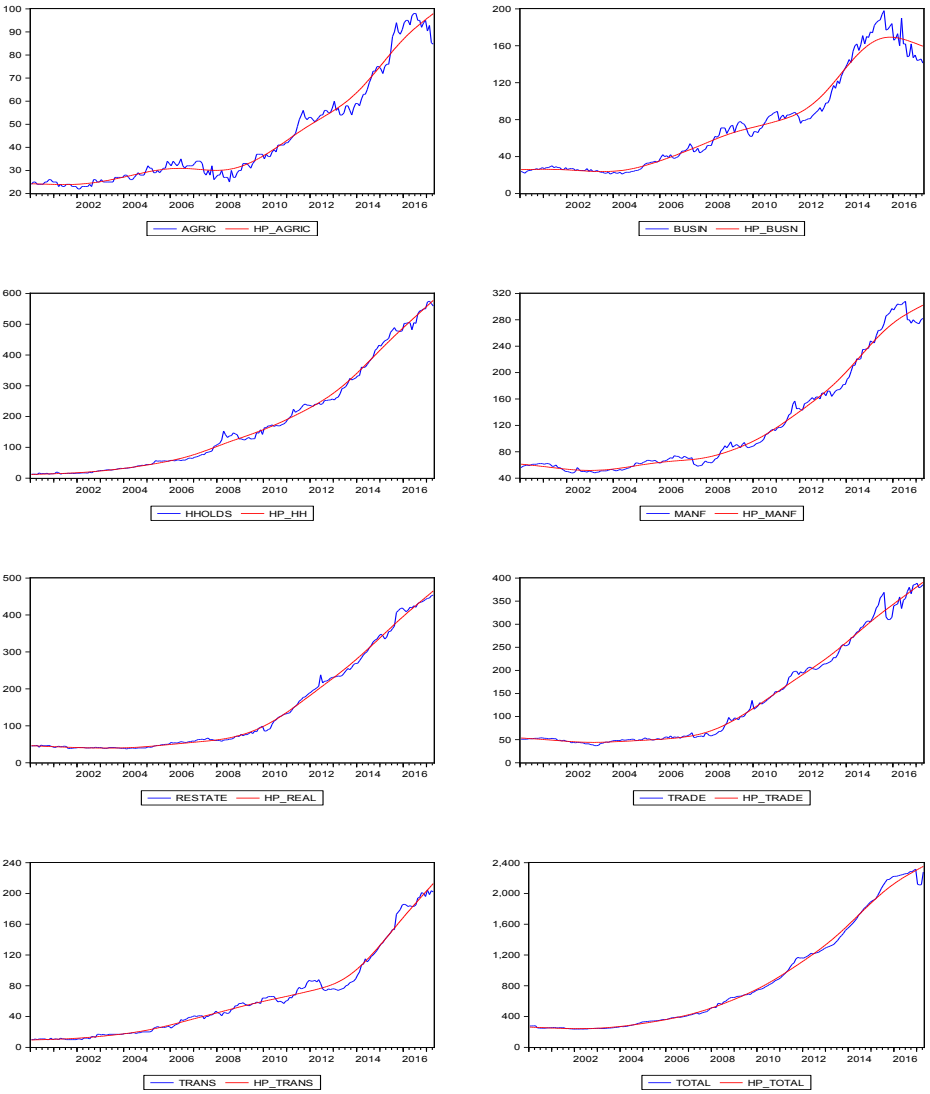
| | Total | Agric | Manfg | Trade | Real Estate | Transport | Households | Business |
|---|---|---|---|---|---|---|---|---|
| Pre-Capping (Kshb) | 3.16 | 0.16 | 0.72 | -0.04 | 0.28 | 0.09 | -0.02 | 0.58 |
| Post-Capping (Kshb) | -79.36 | -4.53 | -18.81 | 1.47 | -6.47 | -3.09 | 0.25 | -14.36 |
| Post-Capping (% of Pre-Capping Nominal Credit) | -3.54% | -4.89% | -6.50% | 0.40% | -1.50% | -1.62% | 0.05% | -8.67% |

Source: Authors' Computations

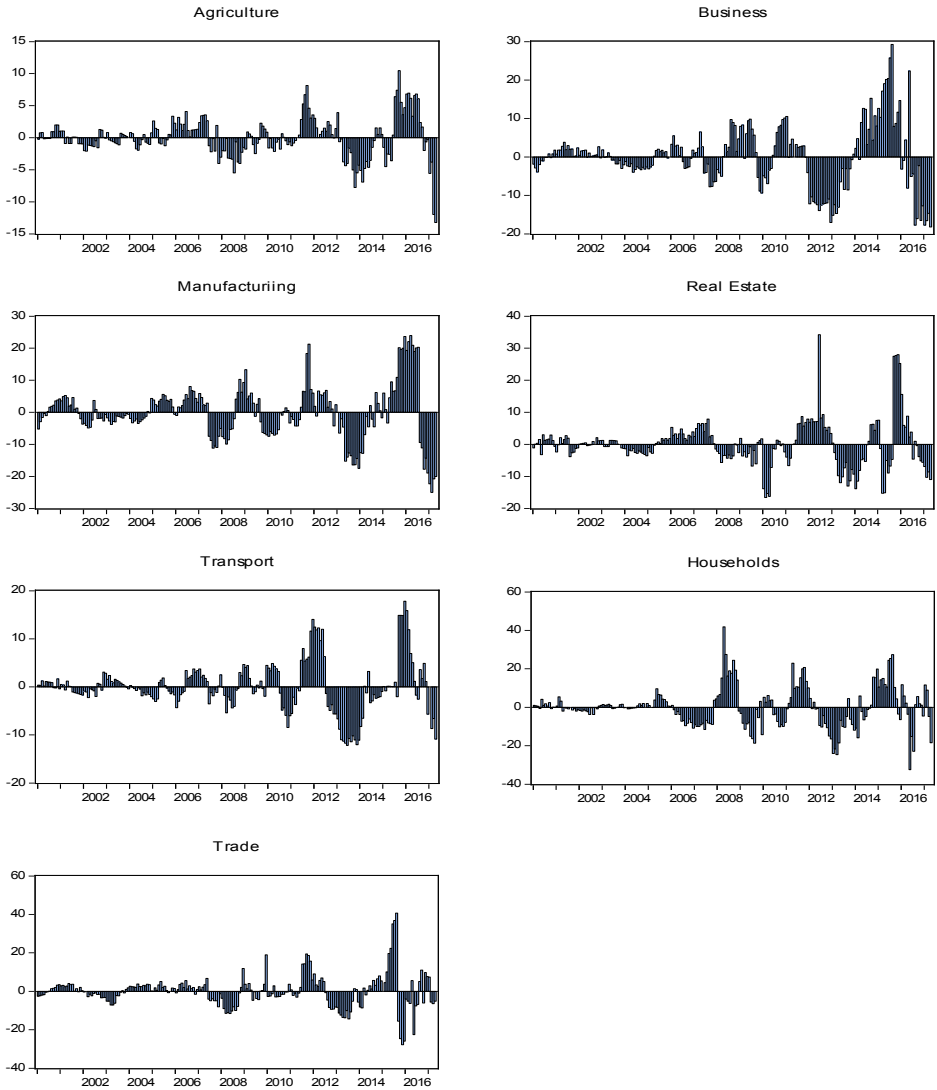
## Figure A.2: Time series Plots of Variables



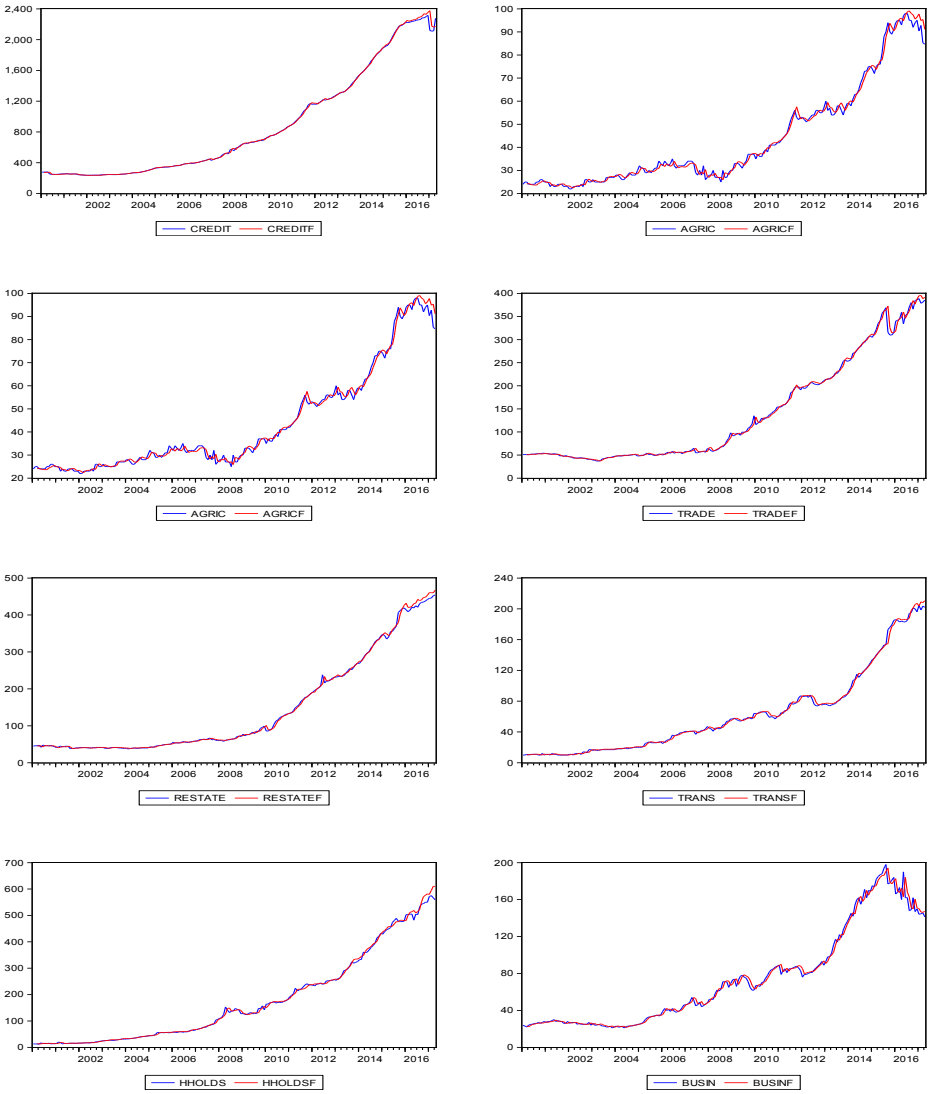
## Figure A.3: Actual versus HP-Filter Trend Aggregate and Sectoral Credit



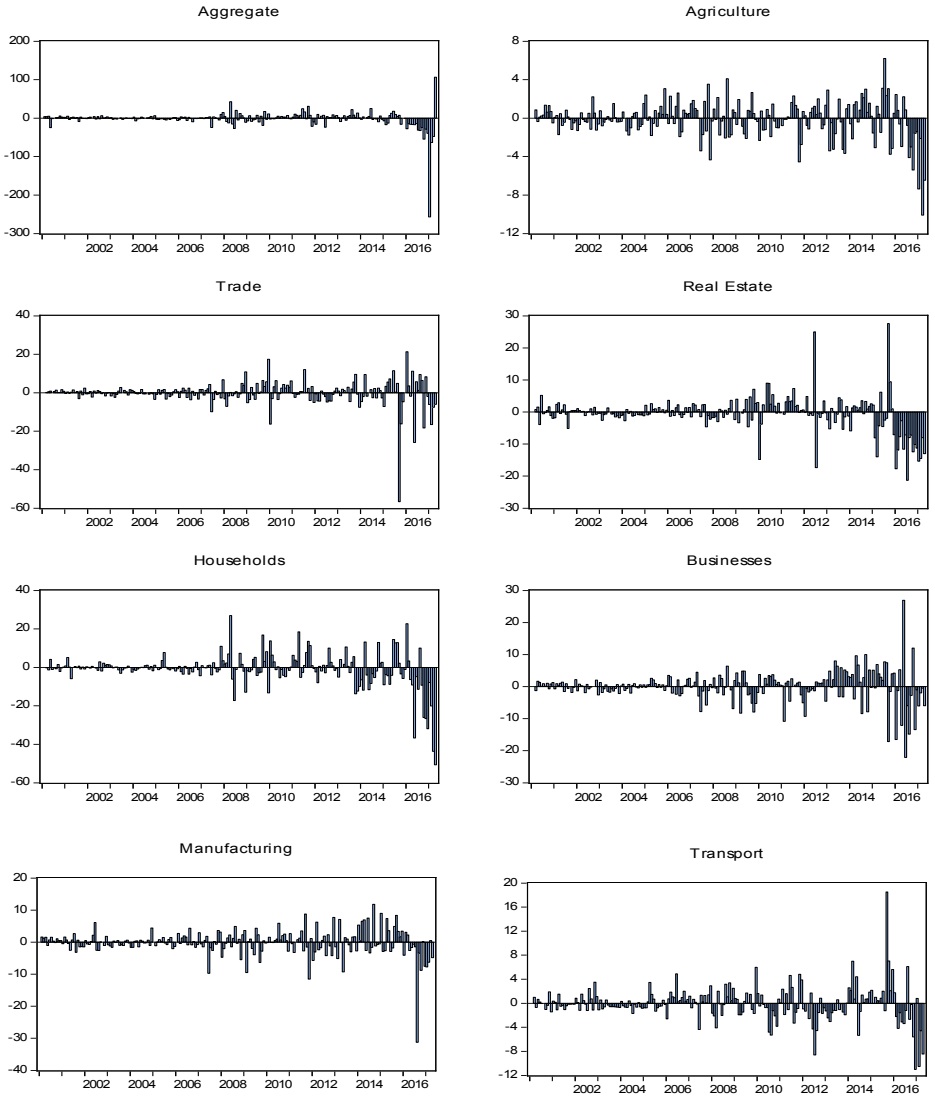
## Figure A.4: Sectoral Credit Gaps (Based on HP Filter)



## Figure A.3: Actual versus ARDL Trend Aggregate and Sectoral Credit



## Figure A.4 Sectoral Credit Gaps (Based on ARDL)



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**Kenya Bankers Association**
13th Floor, International House, Mama Ngina Street
P.O. Box 73100– 00200 NAIROBI
Telephone: 254 20 2221704/2217757/2224014/5
Cell: 0733 812770/0711 562910
Fax: 254 20 2221792
Email: research@kba.co.ke
Website: www.kba.co.ke

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