Relationship between Lending Interest Rate, Inflation Rate and Capital Formation in Kenya

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Abstract

The study seeks to understand the relationship between lending interest rate, inflation rate and capital formation in Kenya. Time series from World Bank for the 1988 to 2018 is employed. Development of literature is guided by expectation theory, classical theory of interest rate and the institutionalist theory of capital formation. The study finds capital formation, lending interest rate ad inflation rate time series data to be stationary at the 5% level of significance. This leads to the selection of the lag order for Vector Autoregression (VAR). The study employs VAR method in determining the relationship between variables of interest. The results indicate that, current year’s; capital formation, inflation rate and lending interest rate are insignificant in determining next year’s level of capital formation. First lag of inflation rate is found positively significant in influencing lending interest rates as well as the first lag of lending interest rate is found significant on influencing itself. Capital formation first lag is found to be negatively significant in determining inflation rate. Lastly, inflation rate first lag is found to be positively important in determining itself. The study recommends for the need of encouraging investment on capital formation to curb the adverse effects of inflation rate.

Key words: Lending Interest Rate, Inflation Rate, Capital formation and VAR model

1. Introduction

Interest rates are one of the most important drivers of the economy in that it tends to set the pace for investment markets. Lending interest rate changes can influence the market place. According to Mishkin (2010), a fall in lending interest rate attracts capital inflows and thus strengthening the local currency. Interest rate reform, a policy under financial sector liberalization in Nigeria, was meant to achieve efficiency in the financial sector and enhance financial deepening (Ikhide and Alonade, 2001). According to McKinnon (1973) and Shaw (1973), financial repression arises mostly when a country imposes ceiling on deposits and lending nominal interest rates at a lower level relative to inflation. The resulting low or negative interest rate discourages savings mobilization and channeling of the mobilized savings through the financial system. This has a negative impact on the quantity and quality of investments and hence capital formation. Boyd, Levine and Smith (1995), for example, in a cross-sectional analysis, divide countries into quartiles according to their average rates of inflation. The lowest inflation quartile has the highest level of financial market activity, and the highest inflation quartile has the lowest financial market activity. However, the two middle quartiles display only very minor differences. According to Rutherford (2012), in his quote of literary works by Adam Smith, building up capital is an essential condition for economic progress. By saving some of what we produce instead of immediately consuming it, we can invest in new, dedicated, labor-saving equipment. The more we invest, the more efficient our production becomes. Krieckhaus (2002) suggests that a higher level of national savings leads to a higher investment and consequently higher output. He acknowledged that Savings and investments have been believed to be very instrumental towards the growth of any country’s economy world over. Capital formation is a critical concern for many developing economies. When

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investment is taken to include expenditures on capital goods, expenditures on technology enhancement and human capital formation, investment portrays a case of increasing marginal returns (Nabende, 1997).

**Objective of the Study**

To determine the relationship between lending interest rate, inflation rate and capital formation in Kenya

**2. Literature Review**

**2.1 Theoretical Review**

The development of literature is guided by the following theories; expectation theory, classical theory of interest rate and the institutionalist theory of capital formation. Expectation theory which is based on the expectations that people will have in regard to future conditions. If investors expect future interest rate to be high, they will prefer to hold long term securities and if vice versa, they will prefer short term securities. Other expectations that will influence securities demand include expected inflation rate. Classical theory of interest rate is one of the oldest theories which was developed during the nineteenth and twentieth centuries by a number of British economists and elaborated by Irving Fisher (1930). It is concerned by the determinants of pure or risk-free rate and argues that the interest rate is determined by two forces namely the supply of savings determined from the household, and demand for investment and capital mainly from the business sector. Institutionalists report that capital is formed by the activity of net investment, meaning producing goods faster than they are replaced. Institutional Economists termed capital as objects considered genuinely productive, from which barren money might derive income yielding ability (Baldwin, 1987).

**2.2 Empirical Review**

Modigliani (1966) defined the investments as the expenditures made during the respective period of time for the purposes other than the procurement of consumption goods. This is the process of channeling loanable funds from savers to borrowers. The efficiency and the institutional characteristics of financial markets where this intermediation takes place are likely to influence the type and the volume of assets savers opt to hold when foregoing present consumption. According to Defina (1983) savings is crucial to any growing economy because it makes resources available for the product ion of physical capital and for the research and development needed to fuel economic growth and enhance our standard of living. According to Igbatayo and Agbada (2012), in their investigation of the relationship between Inflation, Savings and Output in Nigeria, employing Vector Autoregression (VAR) approach, in their analysis, they expressed the variables in percentages but used Total private Savings as the basic source of capital accumulation for investments and economic activities. The coefficient of determination is high at 0.905. This indicates that over 90 percent of the variations in output for the estimation period were captured by the explanatory variables. The model also had high overall significance with an F-statistic value of 152.3 while their DW stood at 0.52. From their conclusion, they said that inflation is one of the most fundamental macroeconomic variables that transcend the economies of both the developed and developing countries of the world. Owing to its consequences, it is a concept that attracts the attention of stakeholders in an economy and regulatory authorities in particular. In their study, they concluded that inflation may not have stimulated nor sufficiently responded to output growth or savings in Nigeria over the period of analysis.

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According to the Kenya banker (2013), Central Bank of Kenya (CBK) always lowers its benchmark lending rate, to give more hopes that lenders (commercial banks) will follow suit although they are always reluctant and offer credit to their customers at a reduced rate. Many lenders even up to date have not lowered their lending rates and are still lending at exorbitant rates thus fleecing Kenyans.

3. Methodology

Christopher A. Sims (1980) suggested that vector autoregressions (VARs) are useful statistical devices for evaluating alternative macroeconomic models. The view taken by Sims was that models based on identification assumptions were not useful. He proposed VARs as an alternative to standard econometric models with their doubtful exclusion restrictions. In defining VAR, Lawrence J. Christiano (2012), lets the N × 1 vector $y_t$ denote the set of variables that is of interest in the analysis. The assumption that $y_t$ follows a pth-order VAR means that it can be expressed as

$$ y_t = B_0 + B_1 y_{t-1} + \cdots + B_p y_{t-p} + u_t, \quad E(u_t u_1) = V, $$

where $u_t$ is not correlated with $y_{t-1}, \ldots, y_{t-p}$. It is assumed that $p$ is assigned a large enough value so that $u_t$ is not autocorrelated over time. The VAR disturbances, $u_t$, are assumed to be a linear transformation of the economically fundamental shocks, $\varepsilon_t$

in this study, therefore, we have capital formation (KF), inflation rate (INF) and lending interest rate (LINT) as the variables. The VAR models will be as follows;

$$ KF_t = \sum_{i=1}^{p} \beta_{3i} KF_{t-i} + \sum_{i=1}^{p} \beta_{2i} LINT_{t-i} + \sum_{i=1}^{p} \beta_{1i} INF_{t-i} + c_1 + \mu_{1t} \quad (2) $$

$$ LINT_t = \sum_{i=1}^{p} \beta_{2i} LINT_{t-i} + \sum_{i=1}^{p} \beta_{1i} KF_{t-i} + \sum_{i=1}^{p} \beta_{3i} INF_{t-i} + c_2 + \mu_{2t} \quad (3) $$

$$ INF_t = \sum_{i=1}^{p} \beta_{3i} INF_{t-i} + \sum_{i=1}^{p} \beta_{2i} LINT_{t-i} + \sum_{i=1}^{p} \beta_{1i} KF_{t-i} + c_3 + \mu_{3t} \quad (4) $$

Where: KF is Capital formation,
INF is inflation rate
LINT is lending interest rate
B and c are the parameter estimates
$\mu$ is the error term

3.1 Data Analysis

The aim of the study is to determine the relationship between lending interest rate, inflation rate and capital formulation. The study checks for the integration properties of stationarity on time series. VAR model with p lags obtained from lag order selection criteria is estimated.
4. Results And Discusion

4.1 Stationarity Test

Kwiatkowski – Phillips-Schmidt-Shin (KPSS) test is used to examine the null hypothesis, that a given times series is stationary. The tests are carried out at the 5% level of significance.

Table 1 Stationarity Test for Capital Formation
Null Hypothesis: KF is stationary
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptotic critical values*: 1% level</td>
<td>0.216000</td>
</tr>
<tr>
<td></td>
<td>5% level</td>
</tr>
<tr>
<td></td>
<td>10% level</td>
</tr>
</tbody>
</table>

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Results from table 1 above show that the null hypothesis is not rejected given that the KPSS test statistic, 0.105232, is less than the asymptotic critical LM statistic, 0.146000, at the 5% level of significance. Therefore, capital formation is treated to be stationary.

Table 2 Stationarity Test for Lending Interest Rate
Null Hypothesis: LINT is stationary
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptotic critical values*: 1% level</td>
<td>0.216000</td>
</tr>
<tr>
<td></td>
<td>5% level</td>
</tr>
<tr>
<td></td>
<td>10% level</td>
</tr>
</tbody>
</table>

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Results from table 2 above indicate that the null hypothesis is not rejected given that the KPSS test statistic, 0.082540, is less than the asymptotic critical LM statistic, 0.146000, at the 5% level of significance. Hence, lending interest rate is treated to be stationary.

Table 3 Stationarity Test for Inflation Rate
Null Hypothesis: INF is stationary
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptotic critical values*: 1% level</td>
<td>0.216000</td>
</tr>
<tr>
<td></td>
<td>5% level</td>
</tr>
<tr>
<td></td>
<td>10% level</td>
</tr>
</tbody>
</table>

Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)
Kwiatkowski-Phillips-Schmidt-Shin test statistic 0.094109
Asymptotic critical values*:
   1% level       0.216000
   5% level       0.146000
   10% level      0.119000
*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Results from table 3 above shows that the null hypothesis is not rejected given that the KPSS test statistic, 0.094109, is less than the asymptotic critical LM statistic, 0.146000, at the 5% level of significance. Therefore, inflation rate is treated to be stationary.

4.2 Lag Selection
The VAR model estimation require an optimal lag selection. Therefore, an optimal lag must be chosen to fit the model and this is done, through the available lag selection criteria; logL, LR, FPE, AIC, HQ and SC lag selection criteria.

Table 4. VAR Lag Order Selection Criteria
Endogenous variables: KF LINT INF
Exogenous variables: C
Date: 09/05/21   Time: 21:57
Sample: 1989 2018
Included observations: 25

<table>
<thead>
<tr>
<th>Lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-254.0553</td>
<td>NA</td>
<td>171256.8</td>
<td>20.56442</td>
<td>20.71069</td>
<td>20.60499</td>
</tr>
<tr>
<td>1</td>
<td>-225.5750</td>
<td>47.84687*</td>
<td>36340.54*</td>
<td>19.00600*</td>
<td>19.59106*</td>
<td>19.16827*</td>
</tr>
<tr>
<td>2</td>
<td>-222.0585</td>
<td>5.063722</td>
<td>58521.15</td>
<td>19.44468</td>
<td>20.46854</td>
<td>19.72866</td>
</tr>
</tbody>
</table>

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The results in table 4 above indicate that the lag order selected by all criteria to be lag 1. Therefore, the VAR will be estimated with the first lag.

4.3 VAR Estimates
Table 3 below shows the results for the model functions 2, 3 and 4 subjected to the order of lag 1. Significance of parameter estimates will be checked at the 5% level of significance, where the t-statistic is +1.96 to -1.96 for a two tailed test.

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Table 5. Vector Autoregression Estimates
Date: 09/06/21   Time: 20:39
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments
Standard errors in ( ) & t-statistics in [ ]

<table>
<thead>
<tr>
<th></th>
<th>KF</th>
<th>LINT</th>
<th>INF</th>
</tr>
</thead>
<tbody>
<tr>
<td>KF(-1)</td>
<td>0.009080</td>
<td>-0.086535</td>
<td>-0.382147</td>
</tr>
<tr>
<td></td>
<td>(0.20049)</td>
<td>(0.05287)</td>
<td>(0.12513)</td>
</tr>
<tr>
<td></td>
<td>[ 0.04529]</td>
<td>[-1.63673]</td>
<td>[-3.05389]</td>
</tr>
<tr>
<td>LINT(-1)</td>
<td>-0.073924</td>
<td>0.816228</td>
<td>-0.294160</td>
</tr>
<tr>
<td></td>
<td>(0.33854)</td>
<td>(0.08928)</td>
<td>(0.21130)</td>
</tr>
<tr>
<td></td>
<td>[-0.21836]</td>
<td>[ 9.14267]</td>
<td>[-1.39214]</td>
</tr>
<tr>
<td>INF(-1)</td>
<td>0.059570</td>
<td>0.169097</td>
<td>0.611209</td>
</tr>
<tr>
<td></td>
<td>(0.23806)</td>
<td>(0.06278)</td>
<td>(0.14858)</td>
</tr>
<tr>
<td></td>
<td>[ 0.25023]</td>
<td>[ 2.69353]</td>
<td>[ 4.11354]</td>
</tr>
<tr>
<td>C</td>
<td>6.852511</td>
<td>1.972897</td>
<td>12.80389</td>
</tr>
<tr>
<td></td>
<td>(6.95661)</td>
<td>(1.83453)</td>
<td>(4.34196)</td>
</tr>
<tr>
<td></td>
<td>[ 0.98504]</td>
<td>[ 1.07542]</td>
<td>[ 2.94887]</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.003556</td>
<td>0.821974</td>
<td>0.503175</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>-0.116017</td>
<td>0.800611</td>
<td>0.443556</td>
</tr>
<tr>
<td>Sum sq. resid</td>
<td>3320.155</td>
<td>230.8937</td>
<td>1293.408</td>
</tr>
<tr>
<td>S.E. equation</td>
<td>11.52416</td>
<td>3.039038</td>
<td>7.192797</td>
</tr>
<tr>
<td>F-statistic</td>
<td>0.029741</td>
<td>38.47626</td>
<td>8.439846</td>
</tr>
</tbody>
</table>

The results in Table 5 above indicates that KF(-1), LINT(-1) and INF(-1) are insignificant in determining KF given that the calculated t-statistic (0.04529, -0.21836 and 0.25023 respectively) fall within the null hypothesis acceptance region of -1.96 to +1.96.

KF(-1) is insignificant in determining LINT as the calculated t-statistic, -1.63673, falls within the null hypothesis acceptance region (-1.96 to +1.96). However, LINT(-1) and INF(-1) are positively significant in determining LINT given that the calculated t-statistic (9.14267 and 2.69353 respectively) falls in the null hypothesis rejection region (outside -1.96 to +1.96). A 1 unit increase in the current year’s LINT leads to a 0.816228 increase in next year’s LINT levels. As well, a one unit increase in the current year’s INF leads to a 0.169097 increase in the next year’s LINT. The coefficient of determination for the model is 0.800611 indicating that 80.0611 % of the changes in LINT are explained by KF(-1), LINT(-1) and INF(-1).

The final model, KF(-1) is negatively significant and INF(-1) is positively significant in determining INF as the calculated t-statistics (-3.05389 and 4.11354 respectively) fall within the null hypothesis rejection region (outside -1.96 to +1.96). A one unit increase in the current year’s INF leads to a 0.169097 increase in the next year’s INF levels.
KF leads to a 0.382147 fall in INF as a 1 unit increase in the current year’s INF leads to a 0.611209 rise in INF in the next year. LINT(-1) is insignificant in determining INF as the calculated t-statistic, -1.39214, falls within the null hypothesis acceptance region ( -1.96 to + 1.96)

4.4 Impulse Response

Figure 1 below shows how variables respond to shocks of dependent variables over time. The study checked for responses over a period of five years.

![Impulse Response Graphs]

Figure 1. Impulse Response

5. Conclusions

5.1 Summary of Findings

The aim of the study is to determine the relationship between lending interest rate, inflation rate and capital formation. The study finds the time series to be stationary. The results indicate that first lags of; capital formation, inflation rate and lending interest rate are insignificant in determining the level of capital formation. The first lags of lending interest rate and inflation rate are positively important in determining the level of lending interest rate. Lastly, first lag of capital formation is found to negatively influence the level of inflation as inflation’s first lag is found to positively influence itself.

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The study concludes that, current year’s inflation rate and current year’s lending interest rate have a positive impact on next year’s lending interest rate. A combined effect of one unit increase in inflation rate in year t and one unit increase in lending interest rate in the same year will be 0.985325, that is \((0.816228+0.169097)\), increase in the lending interest rate in year \(t+1\). The study as well concludes that current year’s capital formation has a negative influence on the next year’s level of inflation rate, while, inflation rate’s first lag is positively significant in influencing itself. A combined effect of first lags of capital formation and inflation rate being 0.229062 increase in inflation rate, that is, \((-0.382147 + 0.6112098)\).

5.2 Recommendation

The study concludes that an increase in inflation in year \(t\) leads to a rise in lending interest rate in year \(t+1\). As well as, when lending interest rate increases in year \(t\) it leads to its increase in year \(t+1\). However, the study concludes that an increase in capital formation in year \(t\) leads to a fall in inflation in year \(t+1\). The study, therefore, recommends for encouragement of investment in capital formation as it will help curb the adverse effects of inflation rate. This is given that; the study concludes that current year’s inflation rate has a positive impact on itself in the next year. And an increase in current year’s inflation rate leads to an increase in lending interest rate next year. Finally, current year’s lending interest rate has a positive influence in its next year level. Therefore, investment in capital formation will help reduce the impact of inflation on lending interest rate and thus, of lending interest rate on itself in subsequent years.

REFERENCES


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