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Monetary policy, bank lending, and inflation in the post-pandemic recovery era: A case of the East African Community

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Monetary Policy, Bank Lending, and Inflation in the Post-Pandemic Recovery Era: A Case of the East African Community.

Ronald Ochen

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Monetary Policy, Bank Lending, and Inflation in the Post-Pandemic Recovery Era: A Case of the East African Community.

Ronald Ochen

Abstract

This paper investigates the underlying dynamic relationships between monetary policy, bank lending, and inflation during the post-pandemic recovery era in the East African Community. To achieve this, I analysed monthly macroeconomic data on central bank rates, consumer price index, lending interest rates, commercial bank foreign assets, net foreign assets, bank loans, and the US Fed funds rates from January 2021 to June 2023 using a panel Vector Autoregressive model. Empirical results from the East African Community as a bloc and in specific countries indicate that when the central bank rate increases by one standard deviation, there is a decrease in the bank loans available for lending. Additionally, there is a decline in the consumer price index, although it remains positive. Also, a one standard deviation shock in consumer price index leads to a decrease in bank loans in first periods but later, bank loans pick up and gain a positive stance while central bank rates remain positive throughout the 12 periods. Conversely, commercial bank lending interest rates increase when the central bank rate increases by one standard deviation. Moreover, when the US Fed funds rate increases by one standard deviation, there is a decrease in commercial bank foreign assets (loans and deposits), but an increase in the central bank rate and lending interest rates. These findings emphasize that the bank lending channel of transmission of monetary in EAC is susceptible to domestic and external shocks thus commercial bank's capacity to create credit is compromised in response to a tight monetary policy stance.

Keywords: Monetary Policy, Bank Lending, Inflation, Post-Pandemic Recovery Era, PVAR; East African Community.

1.0 Introduction

Recent global economic events, such as the Russia-Ukraine war and the increase in aggregate demand after the pandemic, have led to a rise in inflation in the East African Community (EAC). This has prompted central banks to adjust monetary policy to subdue it, which may reduce bank credit. Modugu and Dempere (2022) argue that in Sub-Saharan Africa (SSA), weak financial system stability, inconsistent monetary policies, and a lack of alignment between fiscal and monetary policies are hindering access to loanable funds that are necessary for the real economy to grow.

Numerous studies (Babarinde & Gidigbi 2022; Modugu et al., 2022; Bangura et al., 2021; Abuka et al., 2019; Matemilola et al., 2014; Odior, 2013) conducted across different countries in SSA have established strong empirical evidence of a negative and significant impact of monetary policy rates and inflation on bank lending. Nevertheless, as far as I am aware, there is no existing empirical evidence on the impact of monetary policy and inflation on bank lending during the post-pandemic recovery period, particularly in SSA. This period is of immense importance to study as it is mainly characterized by an unprecedented surge in inflation and central bank rates. Additionally, none of the reviewed studies have explored the effects of shocks from the global environment such as US Fed Funds rate on domestic bank lending and monetary policy in the context of SSA, particularly the EAC, which presents a novel aspect to this research. Further, since the EAC is on its path to forming a monetary union which requires convergence of macroeconomic variables like monetary and inflation. This study could be the bedrock for providing empirical evidence on the structural issues that affect the transmission of monetary policy in EAC.

This study also sheds light on the effect of shocks from the global environment such as the US hawkish monetary policy on domestic bank lending in the EAC. Previous studies (Lee and Bowdler, 2022; Jasper et al., 2022; Adedeji et al., 2019; Avdjiev and Hale, 2018) conducted elsewhere have shown that higher

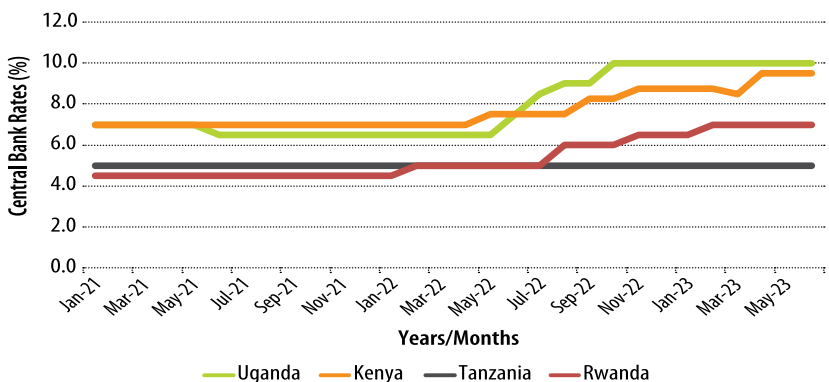
rates resulting from the hawkish policy of the US Federal Reserve or inflationary pressures have a more disruptive impact. They also reduce the supply of bank loans denominated in US dollars. However, there is currently no research available on the impact of the US monetary policy on domestic bank lending in Sub-Saharan Africa (SSA), especially in the context of the EAC.

The primary aim of this study is to explore the connections between monetary policy, bank lending, and inflation in the EAC during the post-pandemic recovery period. To accomplish this goal, the study answered this research questions. How has the contemporary domestic monetary policy and inflation affected bank lending in the EAC?

2.0 Evolution of Monetary Policy and Inflation in EAC

Considering the recent inflationary surge, EAC countries central banks responded by pursuing a tight monetary policy, to bring inflation back to its target regimes. From Figures 1 and 2, it is evident enough that inflation in the East African region spiked around the same period from the beginning of January 2022 and it began easing towards the mid of 2023. While we observe that the EAC counties responded to inflationary pressures at different intervals. Illustratively, Rwanda responded immediately, followed by Kenya and then Uganda albeit Tanzania maintained a uniform policy rate throughout. I can therefore conclude that the EAC countries attempted to pursue a contractionary monetary policy to achieve their inflationary targets.

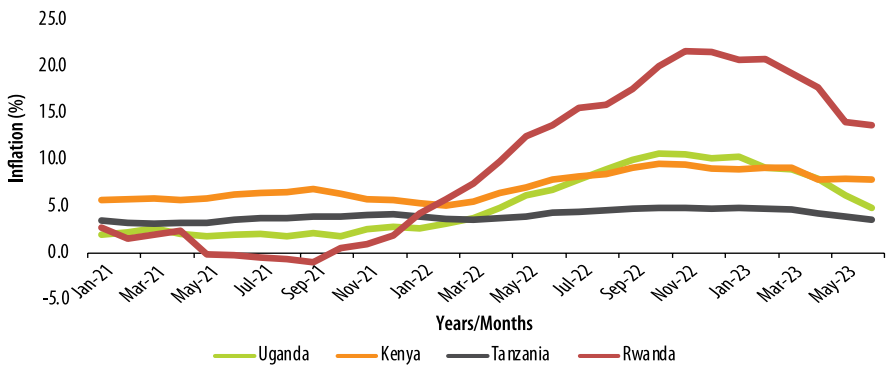
Figure 1: Trends of Central Bank Rates in selected countries of the East African Community



Source: Authors construction using data from the Central Banks of each country.

The paper is further organized as follows: **Chapter 2** provides a literature review, **Chapter 3** describes the methodology and data used in the study, **Chapter 4** presents the results and discussion, and **Chapter 5** summarizes the conclusions and highlights policy recommendations.

Figure 2: Trends of inflation in the selected countries of the East African Community



Source: Authors construction using data from the National Bureaus of Statistics of each country.

3.0 Review of Literature

In this section, I review both theoretical and empirical literature on the monetary policy transmission mechanism of bank lending. I later provide literature on the effect of international monetary policy spillovers on domestic bank lending and interest rates.

3.1 Theoretical literature

Irving Fisher's classical quantity theory of money laid the first foundation for explaining the monetary policy transmission mechanism of bank lending. Fisher's equation of the quantity theory of money is as follows: $MV=PT$ or $P=MV/T$, where M is the quantity of money in circulation, V is the velocity of money in circulation, the frequency at which money changes hands, P is the general price level prevailing in the economy and T is the transaction carried out. In other words, MV is the total volume of money supplied or demanded that is in circulation at a certain period determined by the current prices.

This was followed by monetarists who propagated the effect of monetary policy transmission mechanism on bank lending. For instance, monetarists like Friedman, (1968), argued that in the short run, an expansionary monetary policy increases in bank lending and credit and vice versa. Equally, (Freidman and Schwartz, 1963) argued that an expansionary monetary policy via open market operations raises the stock of money in commercial bank reserves and, increases the ability of banks to create credit via the multiplier effect. They further argued that a restrictive monetary policy affects the liquidity and the ability of banks to lend. This is substantiated by Ozekhome, (2018) who argued that an expansionary monetary policy rate represents increases in bank deposits and the volume of money that banks must lend, and vice versa for a tight monetary policy. On the other hand, the Keynesians advanced the thought that change in the money supply impacts activities in the financial markets, interest rate, credit, investment, output, and prices. For instance, Modigliani, (1963) argued that the transmission mechanism affects banks' willingness to lend. Berger and Udell, (1992) and Borio, (1995) argue that the scarcity of funds in the banks is due to a credit squeeze triggered by the contractionary monetary policy. Finally, Mishkin, (1995) argued that a contractionary monetary policy can reduce the value of bank assets through high-interest rates and vice versa.

3.2 Empirical literature

Several studies (Goh *et al.*, 2007; Matemilola *et al.* 2014; Adali and Bari, 2017; Abuka *et al.* 2019; Bangura *et al.*, 2021; Babarinde & Gidigbi, 2022; Modugu and Dempere, 2022) conducted in different countries and using various macro-econometric models exhibited overwhelming evidence of an inverse relationship between the prevailing monetary policy stance and bank lending. Goh *et al.*, (2007) used the autoregressive lags model to investigate the bank lending channel for the transmission process of monetary policy in Malaysia. They found that bank deposits tend to fall following contractionary monetary policy shocks. Also, Matemilola *et al.* (2014) used an autoregressive lags model to investigate the long-run interest rate pass-through of the money market rate to the bank lending rate and asymmetric adjustment of the bank lending rate in South Africa. They found that commercial banks adjust their Lending interest rates during periods of monetary expansion or easing but do not adjust during periods of monetary contraction or tightening. Adali and Bari, (2017) used a Vector autoregressive model to evaluate whether the bank lending channel exists or not in Turkey. They found that a positive shock on policy rates negatively affects bank credit implying that an increase in the policy rate causes credit to shrink. Abuka *et al.* (2019) adopted a linear probability model to examine the effect of monetary policy and bank lending using bank loan applications, rates real effects in Uganda. They found that a contractionary monetary policy reduces bank credit supply which increases loan application rejections and tightening of loan volumes and rates especially for banks with sovereign debt exposure. Bangura *et al.*, (2021) used the Generalized Methods of Moments to investigate the presence of a bank lending channel of monetary

policy in Sierra Leone. They found that an increase in the monetary policy rate significantly and negatively influences banks' loan supply. Babarinde & Gidigbi, (2022) used an autoregressive lags model to examine the monetary policy nexus with the lending behaviour of deposit money banks in Nigeria. Their study found that in both the short and long run, the monetary policy rate has a negative and significant impact on bank lending. Modugu and Dempere, (2022) used generalized methods of moments to examine monetary policies and bank lending in the emerging economies of Sub-Saharan Africa. They discovered that expansionary monetary policy such as an increase in money supply stimulates bank lending, while contractionary monetary policies like an increase in the monetary policy rates by the central banks lead to credit contraction. However, none of the studies provides empirical evidence of the effects of monetary policy on bank lending in the post-Pandemic recovery era. Also, this study incorporates the effects of US Fed funds rate bank commercial bank foreign assets and in the model differs from the above studies.

Elsewhere, several studies (Berg, 2010; Canova *et al.* 2012; Ciccarelli *et al.* 2012; Avdjiev and Hale, 2018; Adedeji, *et al.* 2019; Moder, 2021; Lee and Bowdler, 2022; Jasper *et al.*, 2022) conducted in various countries with different macro-econometric models provide overwhelming evidence that hawkish in policy rates such as US Fed Funds rate often generate adverse spillovers to other countries bank assets (loans and deposits) and positive effects on the interest rates structures. However, all the reviewed do not contextualize the effects of monetary policy spillovers on a developing country with an underdeveloped financial system.



In conclusion, the bulk of the theoretical and empirical literature reviewed allude to a negative and positive effect depending on the transmission monetary policy stance on bank lending. Specifically, expansionary, and contractionary domestic and international monetary policy greatly influences the ability of banks to create credit.

4.0 Methodology and Data

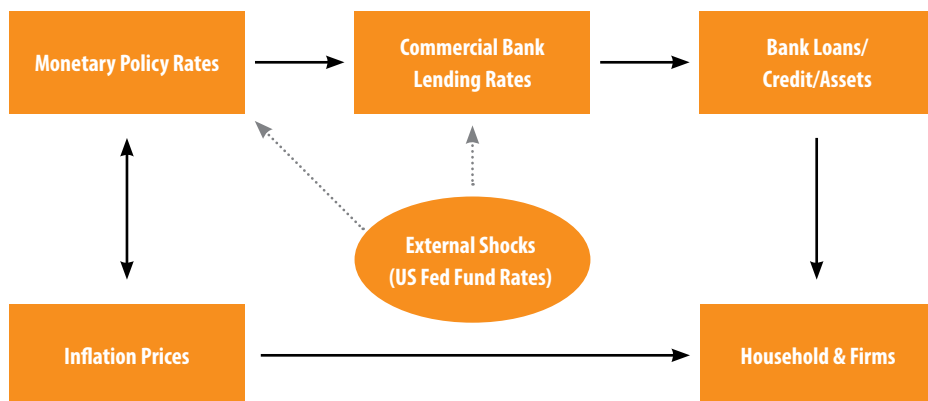
4.1 Theoretical Framework

The Covid-19 pandemic period affected both money multiplier and velocity as well as the overall monetary policy transmission mechanism. This has implications on monetary policy transmission mechanism largely from a change in the central bank rates to bank lending rates and to other financial and asset markets and from financial markets to household spending behaviour and cost of capital to firms. However, this attempts to reinforces bank lending transmission of monetary policy in the EAC. Post pandemic ear wis characterized by surges in inflation which induced central banks to tighten their monetary policy.

The implication of this policy direction is that it pushes banking lending rates upwards and then constrains credit for households and firms. This economic apriori is upheld by many scholars. For instance, Freidman and Schwartz, (1963) argued that a restrictive monetary policy affects the liquidity and the ability of banks to lend. Berger and Udell, (1992) and Borio, (1995) argue that the scarcity of funds in the banks is due to a credit squeeze triggered by the contractionary monetary policy. Mishkin, (1995) found that a contractionary monetary policy can reduce the value of bank assets through high-interest rates. Goh et al, (2007) investigated the bank lending channel for the transmission process of monetary policy in Malaysia. They found that bank deposits tend to fall following contractionary monetary policy shocks.

Similarly, the external shocks have spillover effects on the domestic bank assets denominated in foreign currencies. Scholars (Lee and Bowdler, 2022; Jasper et al., 2022; Adedeji et al., 2019; Avdjiev and Hale, 2018) found that higher rates resulting from the hawkish policy of the US Federal reduce the supply of bank loans denominated in US dollars.

Figure 3: Conceptual Framework for the bank lending channel of transmission of Monetary Policy



Source: Authors own construction

4.2 Model Specification and empirical strategy

To investigate the objective and research question of this study, I adopted an unrestricted panel VAR model (PVAR) first developed by Holtz-Eakin et al. (1988) that involves running a Vector autoregression (VAR) model using panel data. Why the PVAR approach? Koengkan and Fuinhas, (2020) document the following merits of using a panel VAR model: (a) considers all study variables endogenous simultaneously, allowing for endogenous interaction between variables. (b) PVAR is useful in instances where there is little theoretical information about the relationship between variables to guide the model specification. (c) PVAR model addresses the problem of endogeneity between variables. (d) Due to its potential cross-sectional performance, the PVAR model is also suitable for small samples. In

addition, Love and Zicchino, (2006) allude that the PVAR procedure allows for unobserved individual heterogeneity for all the variables by introducing fixed effects which enhances the consistency of the estimation. More so, they found also the PVAR suitable in the identification of the possible causal relationship between the variables. Finally, PVARs are suitable for analysing the transmission of idiosyncratic shocks across units and time (Canova and Ciccirelli and Valderrama, 2012). This has been vindicated by studies (Canova et al., 2012; Ciccirelli and Valderrama, 2012) that have investigated the transmission of shocks across different countries. This is also in tandem with one of the central questions of this study which investigates the effects of the US Fed hikes on bank lending in the EAC.

Therefore, the unrestricted PVAR model is illustrated below:

$$y_{it} = A_{i0} Y_{t-0} + A_{i1} Y_{t-1} + A_{i2} Y_{t-2} + \dots + A_{ip} Y_{t-p} + \mu_{it} \dots \dots \dots (1)$$

Where; y_{it} is a $G \times 1$ vector of endogenous variables used in the study including central bank rates, Lending interest rates, commercial bank foreign assets, Consumer price index, US federal funds rates, net foreign assets, and bank loans. $A_{i0} Y_{t-0}$ is a fixed vector, $A_{ip} Y_{t-p}$ denotes a polynomial matrix from 1 up to p lags and μ_{it} is the model random disturbance term which is identically independently distributed with zero mean and covariance matrix. $i = 1 \dots N$ denotes cross-sectional panel of EAC countries, $t = 1 \dots T$ denotes timeseries from January 2021 to June 2023.

From **equation 1** above, I model the study's PVAR model as follows:

$$\begin{aligned} \text{Central Bank Rate}_{it} = & A_{01} Y_{it-0} + A_{11} \text{Lending Rates}_{t-1} + A_{12} \text{Commercial Bank} \\ & \text{Foreign Assets}_{t-2} + A_{13} \text{Consumer Price Index}_{t-3} + A_{14} \text{US Fed Funds Rate}_{t-4} \\ & + A_{15} \text{Net Foreign Assets}_{t-5} + A_{16} \text{Bank Loans}_{t-6} + \varepsilon_{1t} \dots \dots \dots (2) \end{aligned}$$

$$\begin{aligned} \text{Lending Rates}_{it} = & A_{02} Y_{it-0} + A_{21} \text{Central Bank Rate}_{t-1} + A_{22} \text{Commercial Bank} \\ & \text{Rate}_{t-2} + A_{23} \text{Consumer Price Index}_{t-3} + A_{24} \text{US Fed Funds Rate}_{t-4} \\ & + A_{25} \text{Net Foreign Assets}_{t-5} + A_{26} \text{Bank Loans}_{t-6} + \varepsilon_{2t} \dots \dots \dots (3) \end{aligned}$$

$$\begin{aligned} \text{Commercial Bank Foreign Assests}_{it} = & A_{03} Y_{it-0} + A_{31} \text{Central Bank Rate}_{t-1} + A_{32} \\ & \text{Lending Rates}_{t-2} + A_{33} \text{Consumer Price Index}_{t-3} + A_{34} \text{US Fed Funds Rate}_{t-4} \\ & + A_{35} \text{Net Foreign Assets}_{t-5} + A_{36} \text{Bank Loans}_{t-6} + \varepsilon_{3t} \dots \dots \dots (4) \end{aligned}$$

$$\begin{aligned} \text{US Fed Funds Rates}_{it} = & A_{04} Y_{it-0} + A_{41} \text{Central Bank Rates}_{t-1} + A_{42} \text{Lending Rates}_{t-2} + \\ & A_{43} \text{Commercial Bank Rates}_{t-3} + A_{44} \text{Consumer Prices Index}_{t-4} \\ & + A_{45} \text{Net Foreign Assets}_{t-5} + A_{46} \text{Bank Loans}_{t-6} + \varepsilon_{4t} \dots \dots \dots (5) \end{aligned}$$

$$\begin{aligned} \text{Net Foreign Assets}_{it} = & A_{05} Y_{it-0} + A_{51} \text{Central Bank Rates}_{t-1} + A_{52} \text{Lending Rates}_{t-2} \\ & + A_{53} \text{Commercial Bank Rates}_{t-3} + A_{54} \text{Consumer Price Index}_{t-4} \\ & + A_{55} \text{US Fed Funds Rates}_{t-5} + A_{56} \text{Bank Loans}_{t-6} + \varepsilon_{5t} \dots \dots \dots (6) \end{aligned}$$

$$\begin{aligned} \text{Bank Loans}_{it} = & A_{06} Y_{it-0} + A_{61} \text{Central Bank Rates}_{t-1} + A_{62} \text{Lending Rates}_{t-2} \\ & + A_{63} \text{Commercial Bank Rates}_{t-3} + A_{64} \text{Consumer Price Index}_{t-4} + \\ & A_{65} \text{US Fed Funds Rates}_{t-5} + A_{66} \text{Net Foreign Assets}_{t-6} + \varepsilon_{6t} \dots \dots \dots (7) \end{aligned}$$

4.3 Data

The study used high-frequency secondary monthly data from January 2021 to June 2023 and 4 cross-sectional country panels. The study covers 4 countries namely Uganda, Kenya, Tanzania, and Rwanda out of 7 EAC countries due to the inaccessibility of the study data variables from the other 3 countries (Democratic Republic of Congo, South Sudan, and Burundi). Nevertheless, the period of the study is important because it captures the Post-Pandemic Recovery era that the study focused on. This period is also characterised by an unprecedented surge in the consumer price index and the central bank rate not experienced in a long time in the EAC region. However, it is noted that the Bank of Tanzania held the central bank rate unchanged at a 5% rate throughout the same period. Data on the variables including bank loans, central bank rates, and consumer price index are obtained from the EAC respective Central Banks, Finance Ministries and National Statistics Bureaus while data on the US federal funds rates was obtained from the Federal Reserve Bank of St. Louis. Some variables including consumer price index, net foreign assets, commercial bank net foreign assets and bank loans were

converted into natural logarithms for normalization and the rest were left in percentages (see Annex 6 for more details). Furthermore, variables such as bank loans, net foreign assets and commercial bank assets were first standardized into constant US dollars across the countries. Besides, some of the selected variables used in this study are reinforced by empirical literature from scholars (Matemilola et al. 2014; Bari, 2017; Abuka et al. 2019; Modugu and Dempere, 2022; Lee and Bowdler, 2022; Jasper et al, 2022).

4.3.1 Descriptive Statistics of the data

From **Table 1**, in the selected EAC countries, over the scope of the study, central bank rates averaged about 6.5 percent, Lending interest rates averaged about 16 percent, commercial bank foreign assets averaged about 1 percent, the US Fed Funds rates averaged 1.44 percent, net foreign assets averaged 0.49 percent, and bank loans averaged 1.82 percent. Following the Jarque-Bera test for normality, most variables were not normal except for Consumer price index at 83 percent. The data is averagely spread except for commercial bank net foreign assets with a standard deviation of 0.22 percent.

Table 1: Summarized descriptive statistics of the study (January 2021 - June 2023)

	Central Bank Rates	Lending Rates	Comm Bank Foreign Assets	Consumer price Index	US Fed Fund Rates	Net Foreign Assets	Bank Loans
Mean	6.46	15.92	0.38	1.67	1.44	0.49	1.82
Median	6.50	16.29	-0.29	1.65	0.20	0.58	1.34
Std. Dev.	1.58	2.39	1.48	0.69	1.77	0.22	2.02
Skewness	0.73	-0.35	1.14	-0.11	0.84	-0.82	0.77
Kurtosis	2.75	2.21	2.71	3.19	2.06	2.14	2.09

	Central Bank Rates	Lending Rates	Comm Bank Foreign Assets	Consumer price Index	US Fed Fund Rates	Net Foreign Assets	Bank Loans
Jaque-Bera	9.57	4.89	23.33	0.39	16.51	15.18	14.14
Probability	0.00	0.09	0.00	0.82	0.00	0.00	0.00
Obs	106	106	106	106	106	106	106

Source: Authors construction using data from EAC Central Banks, National Bureau of Statistics and St. Louis Federal Reserve Bank.

3.2.2. Correlation Matrix

From **Table 2** below, the correlation matrix shows that the study variables pose mixed results of both negative and positive significantly positive and correlation with each other, and the off-diagonal elements are unitary.

Table 2: Correlation matrix of the study variables

	Central Bank Rates	Lending Rates	Comm Bank Foreign Assets	Consumer price Index	US Fed Fund Rates	Net Foreign Assets	Bank Loans
Central Bank Rates	1.00	-0.02	-0.43	0.37	0.48	0.20	-0.34
Lending Rates	-0.02	1.00	0.09	-0.11	0.10	0.08	-0.05
Comm Foreign Assets	-0.43	0.09	1.00	-0.22	-0.11	0.42	0.86
Consumer Price Index	0.37	-0.11	-0.22	1.00	0.62	-0.35	-0.34
US Fed Funds Rates	0.48	0.10	-0.11	0.62	1.00	-0.20	-0.00
Net Foreign Assets	0.20	0.08	0.42	-0.35	-0.20	1.00	0.59
Bank Loans	-0.34	-0.05	0.86	-0.34	-0.00	0.59	1.00

Source: Authors construction using data from EAC Central Banks, National Bureau of Statistics and St. Louis Federal Reserve Bank.

3.2.3. Panel Stationarity Test

In **Table 3**, I carried out panel stationarity tests of the data using the Pesaran & Shin test, ADF-Fisher, and PP-Fisher. The rationale of undertaking a panel stationarity test is to establish whether the data has got unit roots with and without lags. Results indicate that at 5% level of significance, all the variables used in the model are stationary after the first difference and not in levels, thus, they are integrated of order one I(1).

Table 3: Panel stationarity results for the study variables using different tests.

Variables	Levels			First Difference		
	Pesaran & Shin W-stat	ADF Fisher	PP Fisher	Pesaran & Shin W-stat	ADF Fisher	PP Fisher
Central Bank Rates	3.46	0.30	0.23	-7.36**	52.18**	52.17**
Lending interest rates	1.38	19.11	19.68	-8.72**	75.64**	87.85**
Commercial Bank Foreign Assets	-0.86	11.78	10.99	-11.71**	93.74**	92.83**
Net Foreign Assets	0.77	4.03	3.72	-7.98**	64.69**	75.15**
US Fed Funds Rate	3.30	0.40	0.02	-0.97	9.55**	8.94**
Bank Loans	0.73	16.89	36.16	-7.38**	59.59**	81.91**
Consumer Price Index	-2.31	19.07	3.72	-2.45**	18.84**	17.70**

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors construction using data from EAC Central Banks, National Bureau of Statistics and St. Louis Federal Reserve Bank.

5.0 Empirical Results and Discussions

In this section, I explore the different analyses to provide answers to the central questions of the study. These include PVAR impulse responses, variance decomposition and VAR Granger causality, as elucidated below.

5.1 Impulse responses analysis

Figures 4, 5, and 6 show the impulse response functions of the aggregated PVAR of the EAC countries.

In **Figure 4**, the following dynamic interactions were observed with one standard positive shock in the central bank rate: A one standard deviation positive shock in the central bank rate leads to an increase in commercial bank Lending interest rates. This is observed from the fourth month onwards. This was expected since the commercial bank's responsiveness to the central bank rate hike is often positive and fast. A one standard deviation positive shock in the central rate eased inflation, as observed by the consumer price index in the fourth month preceding an increase in the beginning months. Albeit Consumer price index remains positive throughout the study. Contrarily, a positive shock on the Consumer price index pushes the central bank rates upwards. This is expected because the Monetary Policy Committees in the EAC countries have been reacting to the rising Consumer price index with an adequate policy rate to subdue it. Then, a one standard deviation positive shock on the central bank rate leads to a surge in the US fed funds rate throughout the months. However, a one standard deviation positive shock on central bank rates pushes bank loans downwards causing a reduction in the amount of credit available for lending. This is consistent with the findings of (Adali and Bari, 2017; Abuka *et al.* 2019; Bangura *et al.*, 2021; Babarinde & Gidigbi, 2022; Modugu and Dempere, 2022) who asset that the prevailing monetary policy stance (contractionary/expansionary) leads to a decrease/increase in bank loans and eventually lending. The findings further are consistent with the theoretical evidence provided by monetarists like (Friedman, 1968; Freidman and Schwartz,

1963), and the Keynesians like Modigliani, (1963; Berger and Udell, 1992; Borio, 1995; Mishkin, 1995).

In **Figure 5**, a one standard deviation shock in consumer price index led to increase in the central bank rate. This is expected as central bank raised their monetary policy rates to curb inflation so as prices were rising, also central bank raised the monetary rates. Further, a standard deviation shock in consumer price index leads to an immediate negative reduction in the bank lending. This finding is alluded to by scholars (Babarinde & Gidigbi 2022; Modugu et al., 2022; Bangura et al., 2021; Abuka et al., 2019; Matemilola et al., 2014; Odior, 2013), but in the fifth period the bank lending rises positively.

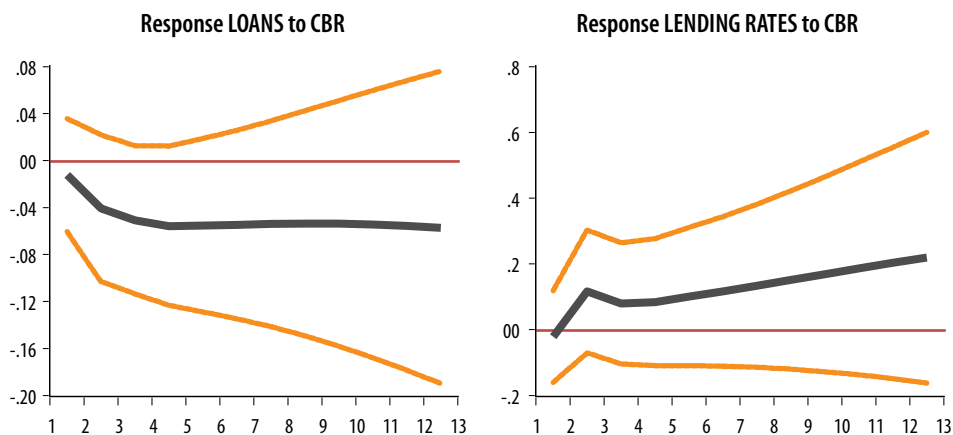
Figure 5 shows the dynamic interactions with a one standard deviation positive shock of the US fed funds rate. A one standard deviation positive shock in the US

Fed funds rate leads to an increase in the central bank rate. This implies that the EAC central banks responded to the hawkish US fed fund rate by also raising their policy rates, as coping mechanism for mitigating the depreciation of their local currencies against the US dollar.

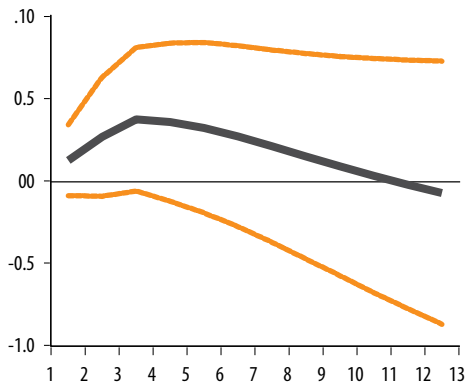
Similarly, a positive shock on the US Fed funds rate led to an increase in the commercial bank Lending interest rates as seen rising from the fourth month.

Elsewhere, there is a more resounding negative effect on domestic bank's foreign assets (loans & deposits), both net foreign bank assets and commercial bank foreign assets with one standard deviation positive shock on the US fed funds rate. These findings underpin the findings of scholars (Avdjiev and Hale, 2018; Adediji, et al. 2019; Moder, 2021; Lee and Bowdler, 2022; Jasper et al, 2022).

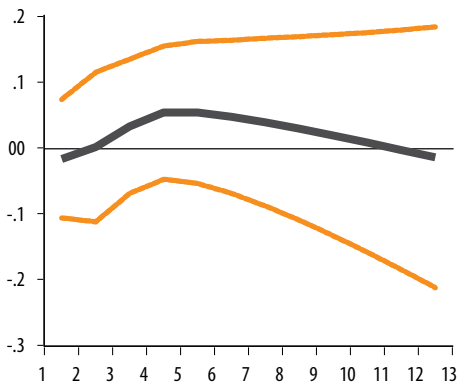
Figure 4: Impulse response of Cholesky decomposition to a one standard deviation Central Bank Rate shock in the East African Community



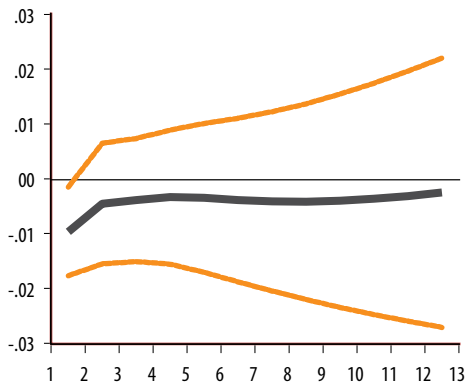
Response CPI to CBR



Response COMMERCIAL FOREIGN ASSETS to CBR



Response NET FOREIGN ASSETS to CBR



Response FEDERAL FUNDS EFFECTIVE to CBR

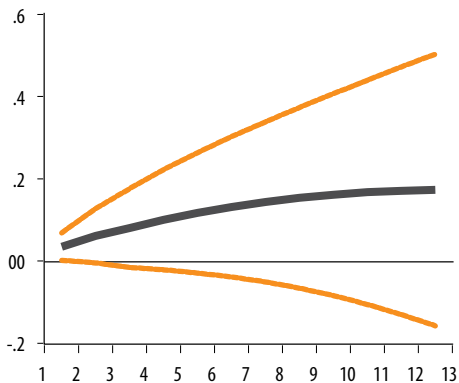
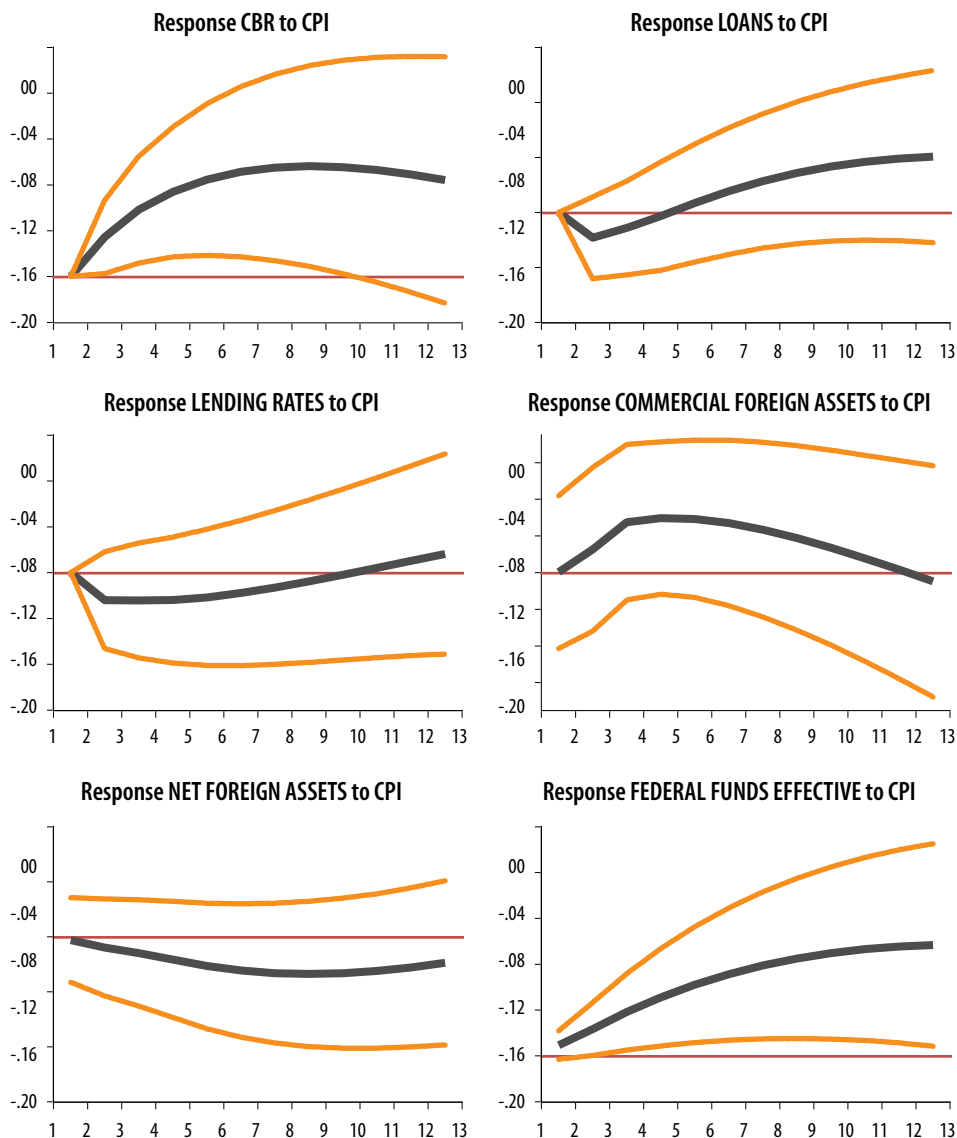
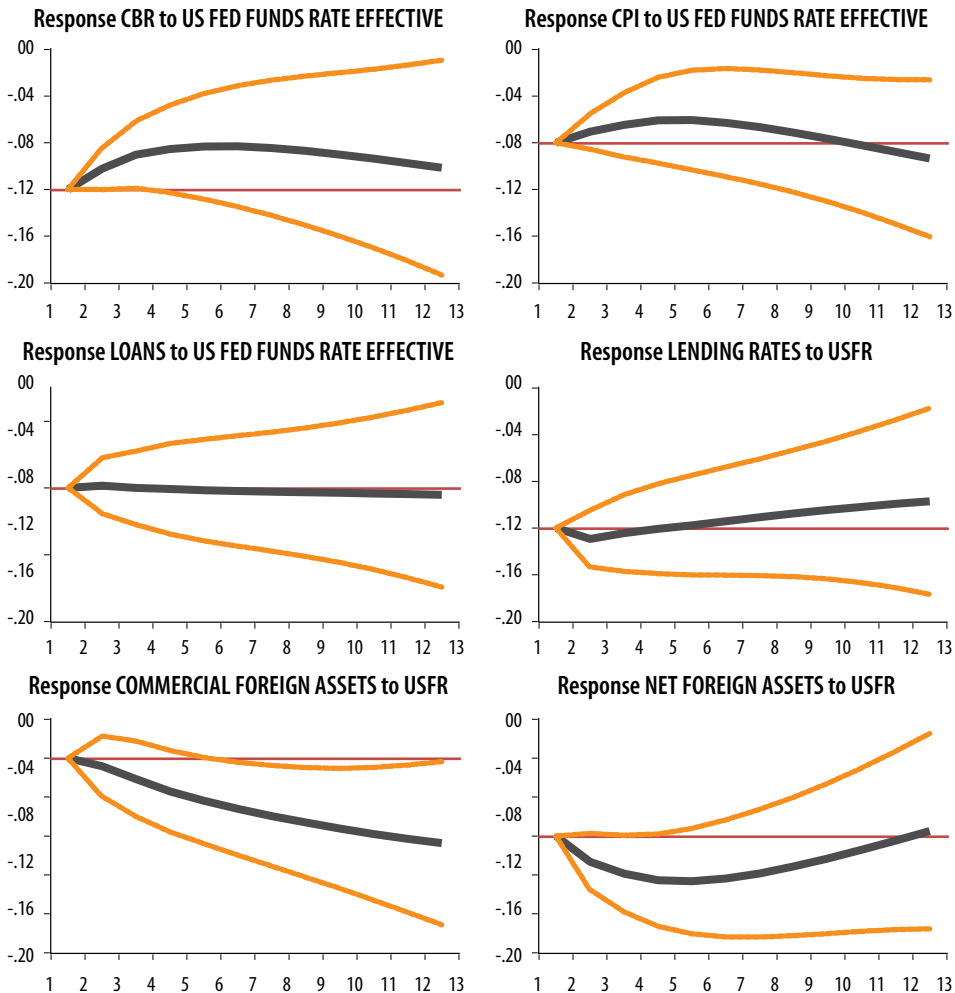


Figure 5: Impulse response of Cholesky decomposition to a one standard deviation Consumer Price Index in the East African Community.

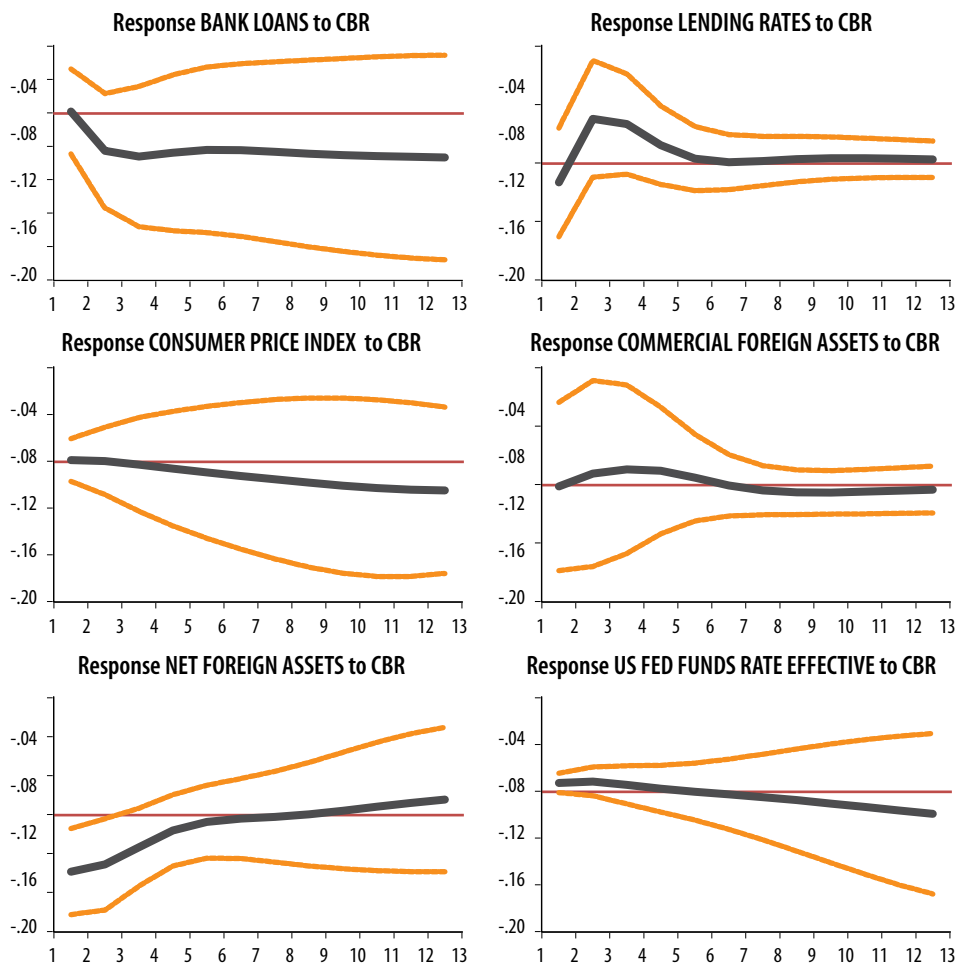


**Figure 6: Impulse response of Cholesky decomposition to a one standard deviation
US Fed Funds Rate shock in the East African Community.**



On the other hand, in **Figures 7** up to **18**, I attempt to disaggregate the impulse response analysis to show country-specific level for each EAC country. Importantly, this helps to tease the actual effects of the varying monetary policies rates and inflation on bank loans for individual countries.

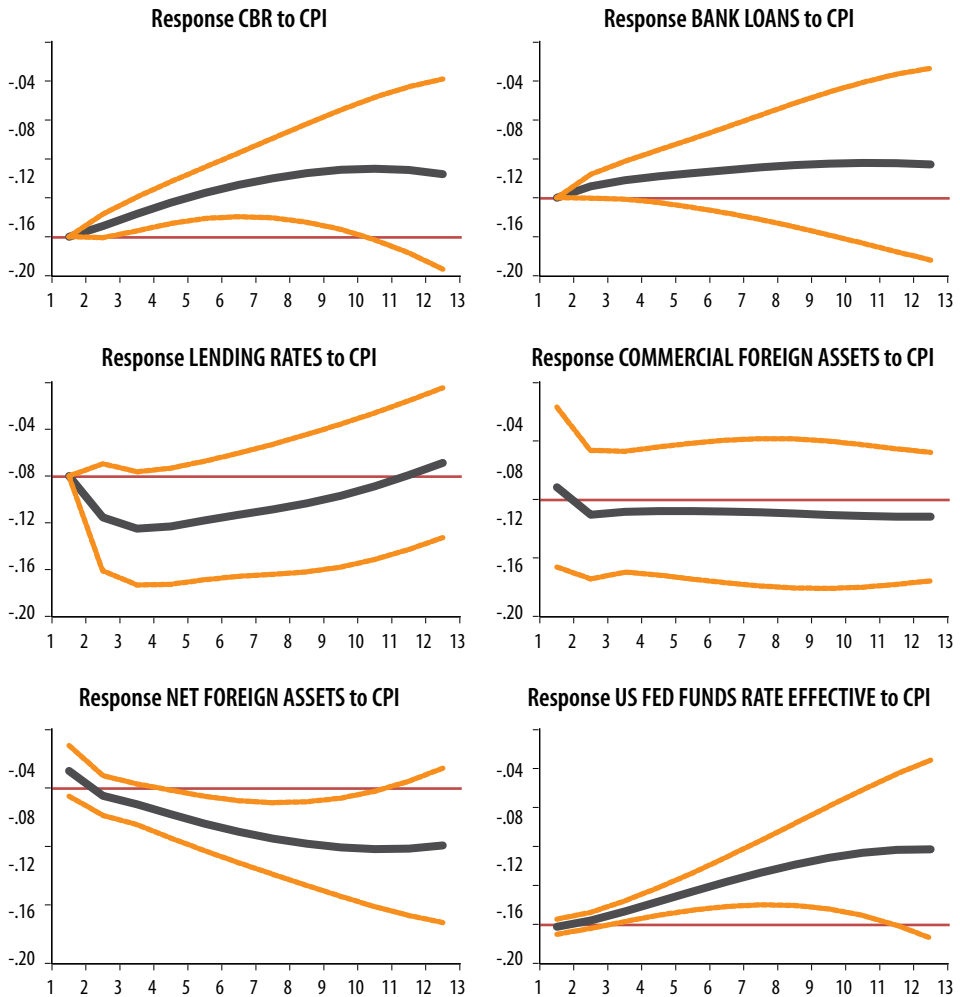
Figure 7: Impulse response of Cholesky decomposition to a one standard deviation Central Bank Rate shock in Uganda



That said, in **Figure 7**, a one standard deviation shock in the central bank rates in Uganda, led to an instant reduction in bank loans and a negative stance lasted throughout the 12 months. Lending rates responded to a rise in the central bank rates by rising until the third month when they started to descend although

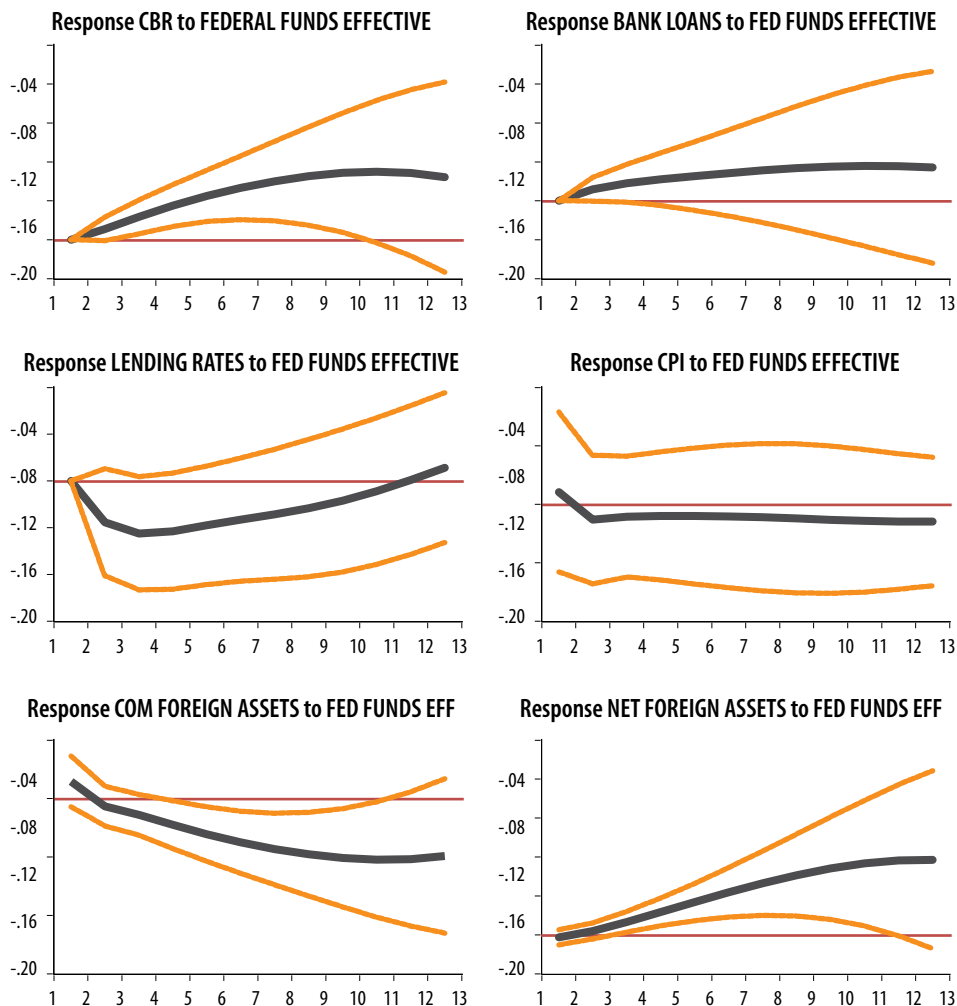
remained positive. These findings again reinforce the bank lending channel of transmission of monetary policy sought in this study. Initially, prices in Uganda took some time to react to a positive shock in the central bank rate but in the third period they impact was felt and they began to fall.

Figure 8: Impulse response of Cholesky decomposition to a one standard deviation Consumer Price Index shock in Uganda.



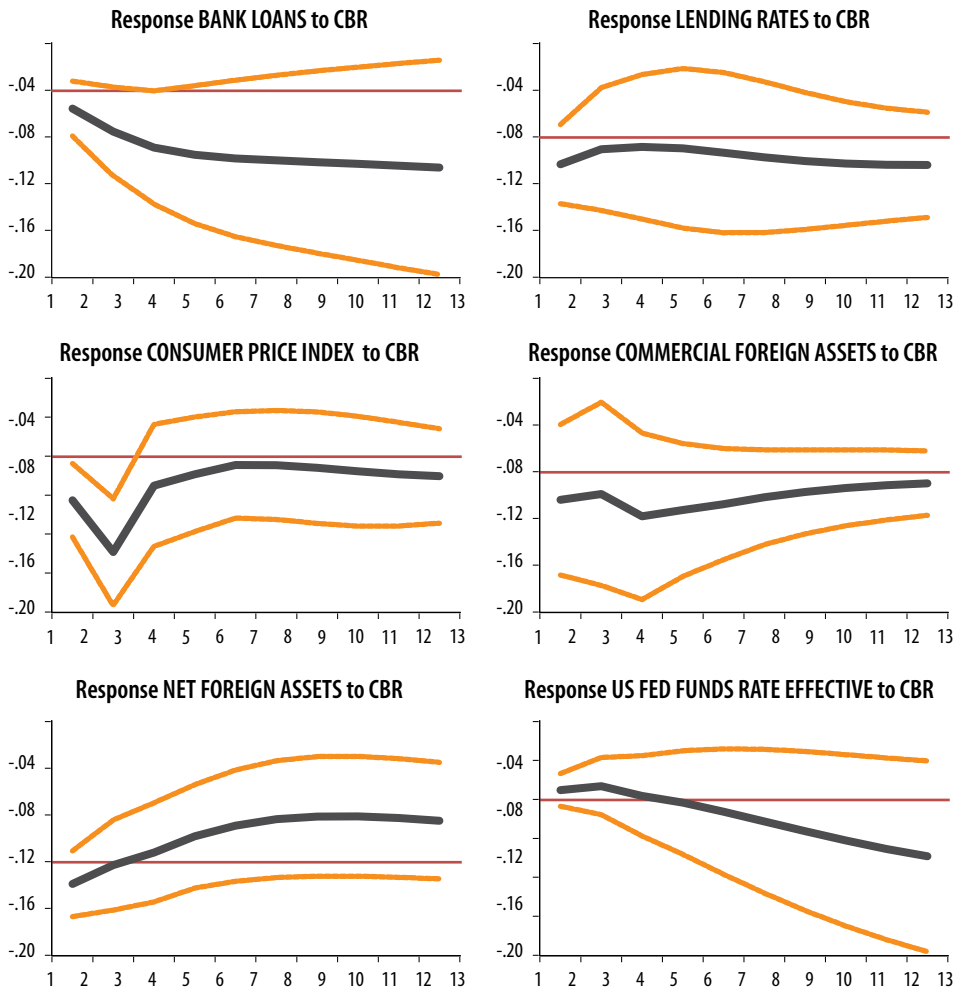
In **Figure 8**, a positive shock in consumer price index in Uganda pushed upward the central bank rates. The Bank Uganda reacted to a rise in prices in the country by tightening the monetary policy and this is the reason for a rise in the central bank rate. Bank loans also maintained a positive stance. However lending rates were negative until the eleventh period when they gained a positive stance.

Figure 11: Impulse response of Cholesky decomposition to a one standard deviation US Fed Funds Rates shock in Uganda.



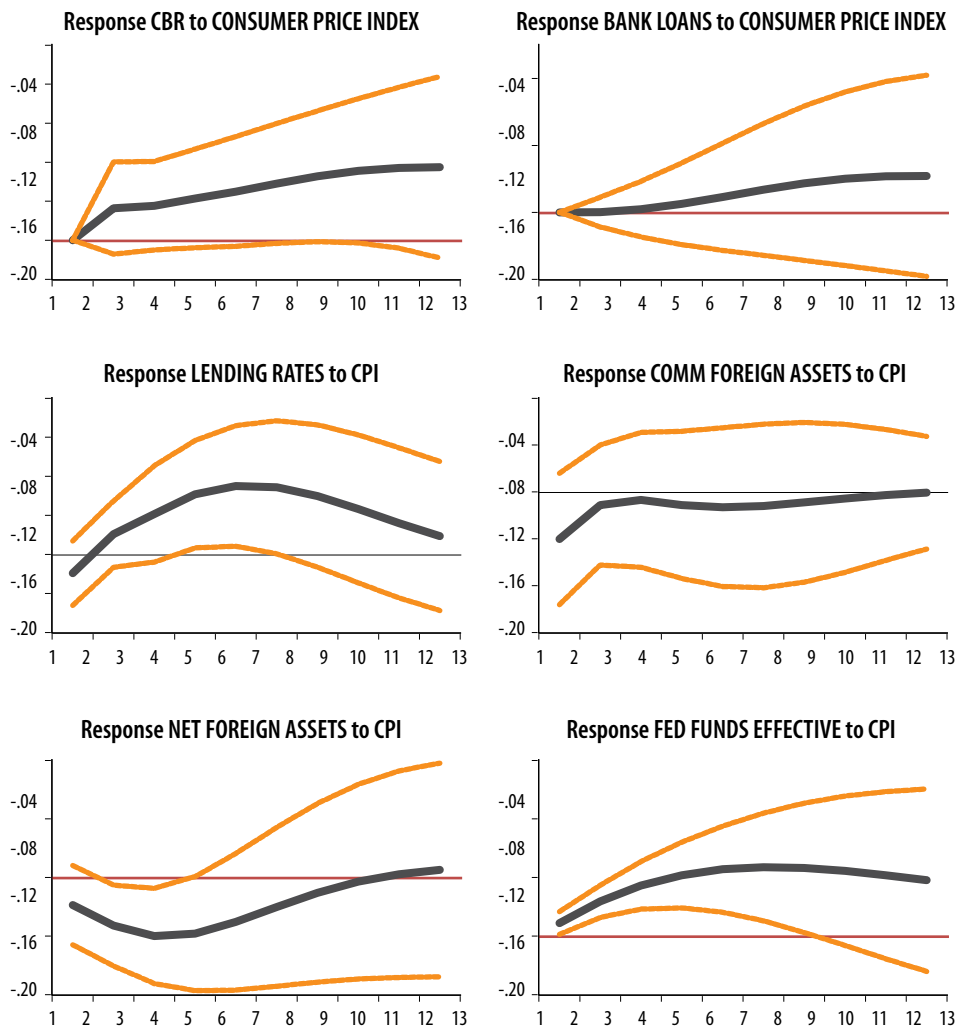
Similarly, in Kenya a one standard deviation positive shock in consumer price index pushed central bank rates as observed in Uganda. This confirms that both Kenya and Uganda have attempted to subdue inflation by central bank rates. Initially, a one standard deviation positive shock in consumer price index had no effect on bank loans but in third period it began to rise positively. Lending rates rose in the second period and started declining in the sixth period.

Figure 10: Impulse response of Cholesky decomposition to a one standard deviation Central Bank Rate shock in Kenya.



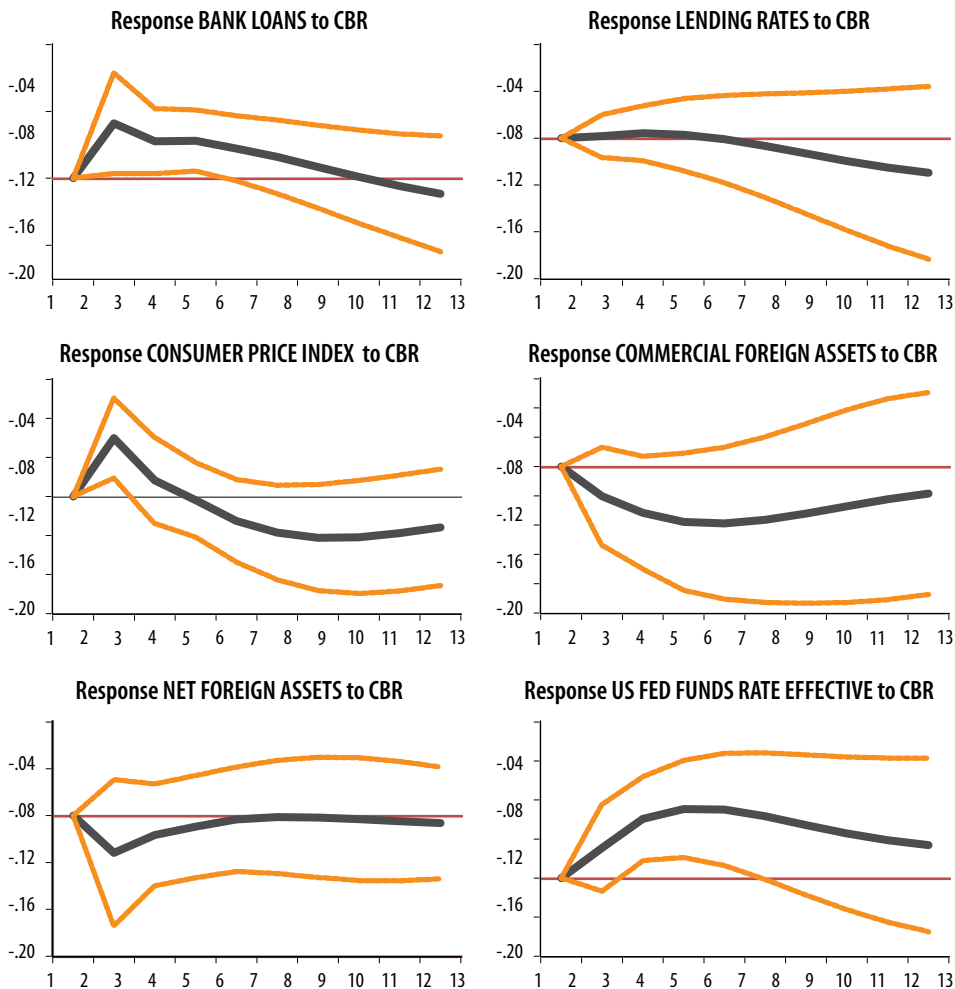
Figures 10, 11 and 12 show the effects of one standard deviation shocks in central banks, consumer price index and the US Fed funds rates in Kenya. Just like in Uganda, a one standard deviation shock of the central bank rate drove down bank loans and consumer price index in Kenya. However, the effect is different for lending rates as they exhibited a negative effect throughout the 12 months period. This phenomenon defies scholars like Goh et al, (2007) of the banking lending channel of transmission of monetary policy.

Figure 11: Impulse response of Cholesky decomposition to a one standard deviation Consumer Price Index shock in Kenya.



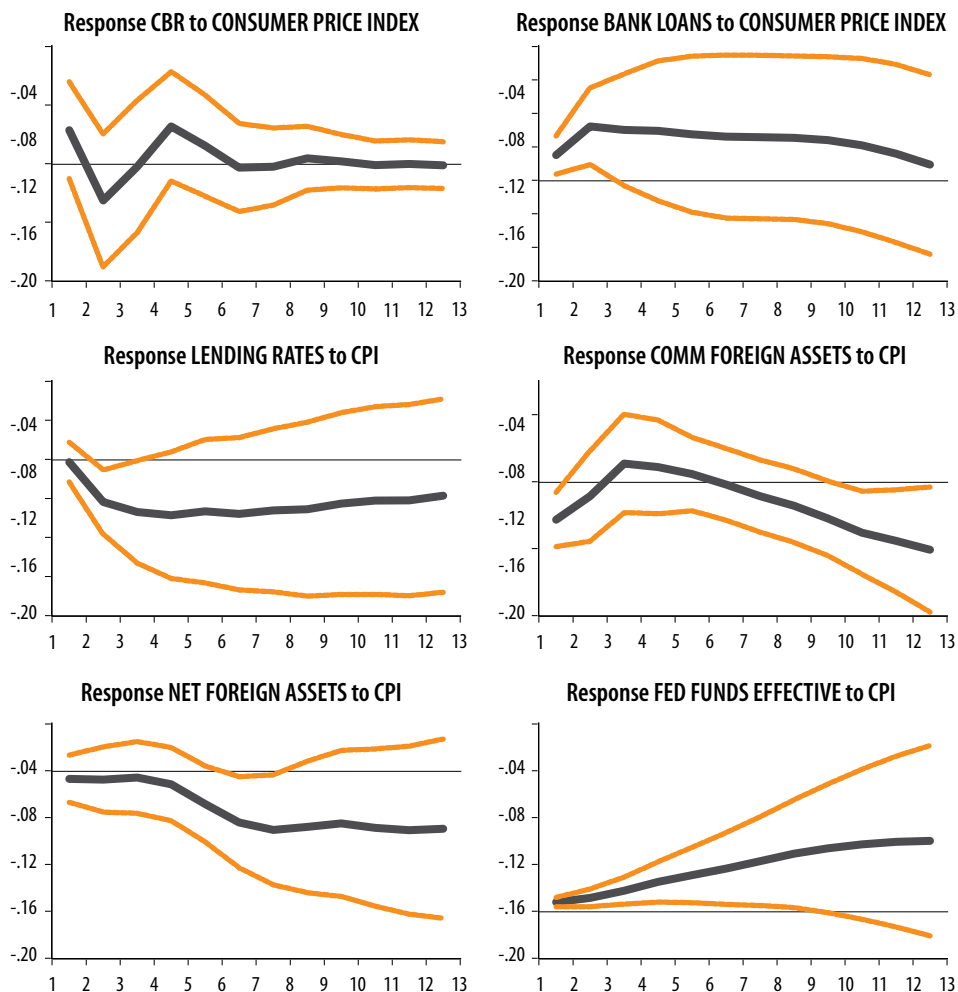
From **Figure 9**, a one standard deviation shock in the US Fed funds rate pushed central bank rates in Uganda during the first four months and then they began to decline. This effect was similar for bank loans however lending rates were first pushed down in the second month but regained a positive stance in the third month.

Figure 12: Impulse response of Cholesky decomposition to a one standard deviation US Fed Funds Rates shock in Kenya.



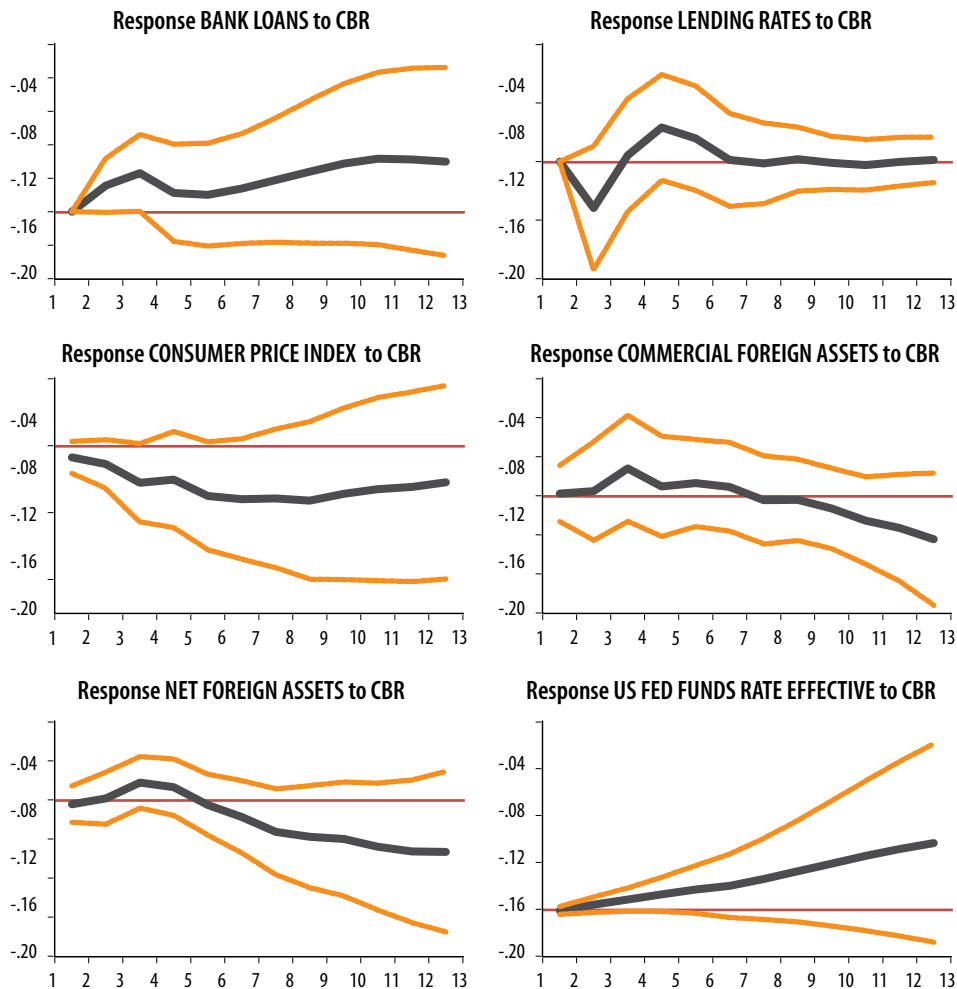
A positive shock in US Fed funds rates pushes up central bank rates, they maintain a positive stance but begin falling in the fourth period. Initially bank loans had no effect on a positive shock of the US Fed funds rates but in the second period they rise until the fifth period when they begin to fall. Similarly lending rate rise in the first period but declines in the second period. A positive shock in the US Fed funds rate pushes down consumer price index. Similarly in Kenya, a one positive shock in the US Fed funds rates leads to a decline in commercial bank foreign assets and a negative stance is more pronounced.

Figure 13: Impulse response of Cholesky decomposition to a one standard deviation Central Bank Rates shock in Tanzania.



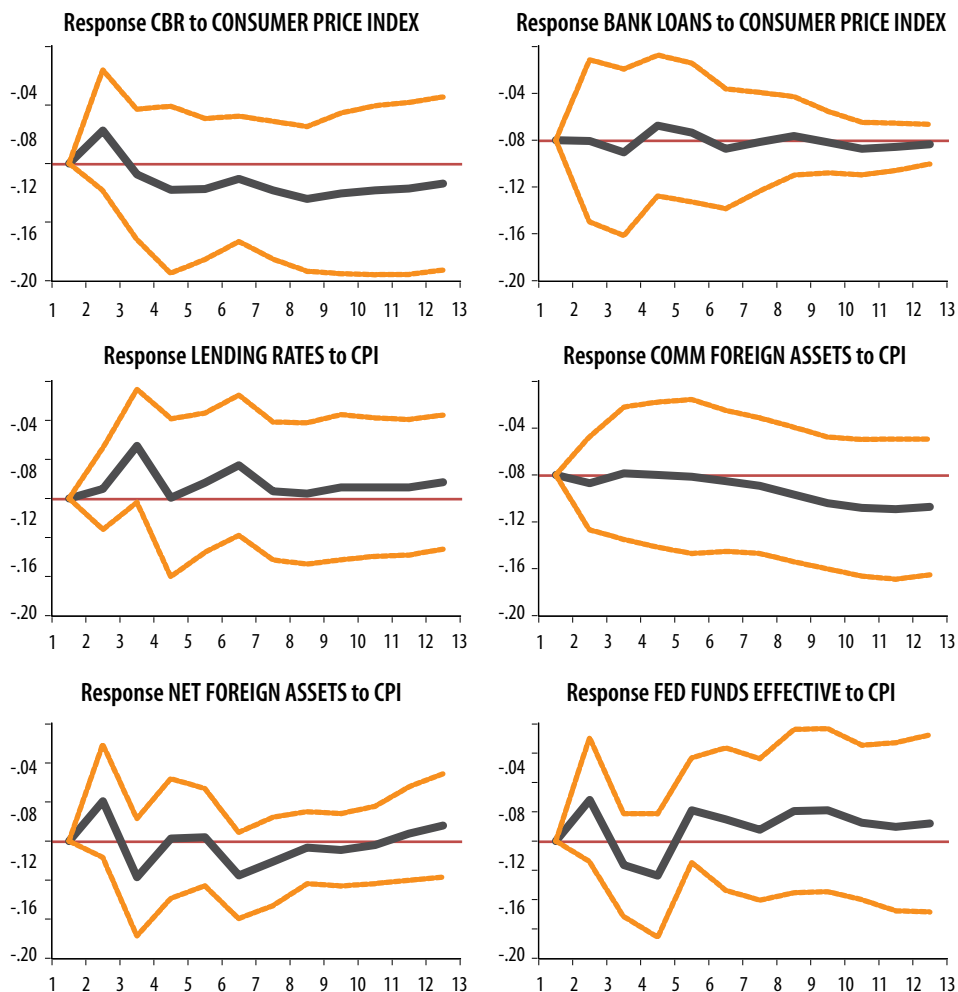
From Figure 13, a one standard deviation shock in the central bank rates led to up and down swings in bank loans until the ninth period when the pattern eased out. Consumer prices index was pushed upwards by a one standard positive shock in central bank rates and maintained a positive stance. Like in Kenya, a one standard deviation positive shock in central bank rates pushed down lending rates in Tanzania.

Figure 14: Impulse response of Cholesky decomposition to a one standard deviations Consumer Price Index shock in Tanzania.



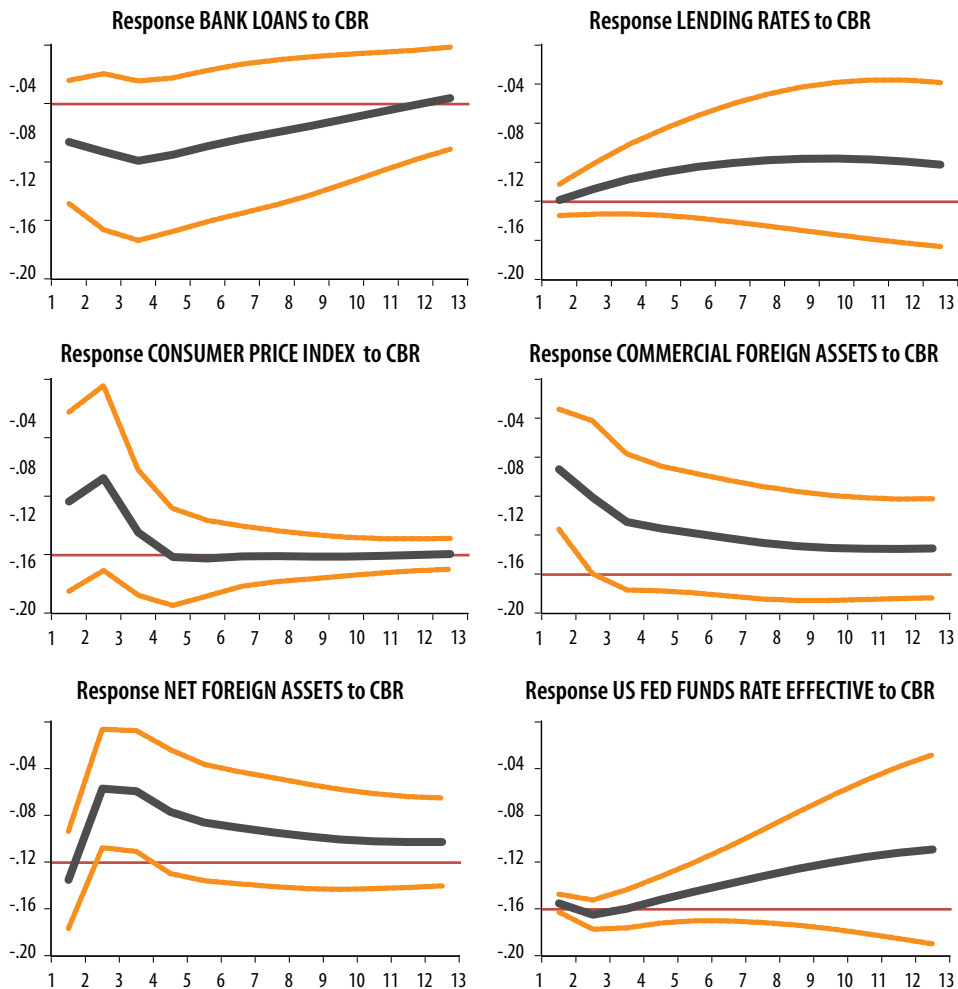
In Figure 14, a one standard deviation positive shock in consumer prices index pushes up central bank rate but pushes down lending rates. A one standard deviation positive shock in consumer price index pushes down bank loans in the second period but they resurge in the third period until it becomes insignificant in the sixth period.

Figure 15: Impulse response of Cholesky decomposition to a one standard deviation Central Bank Rates shock in Tanzania.



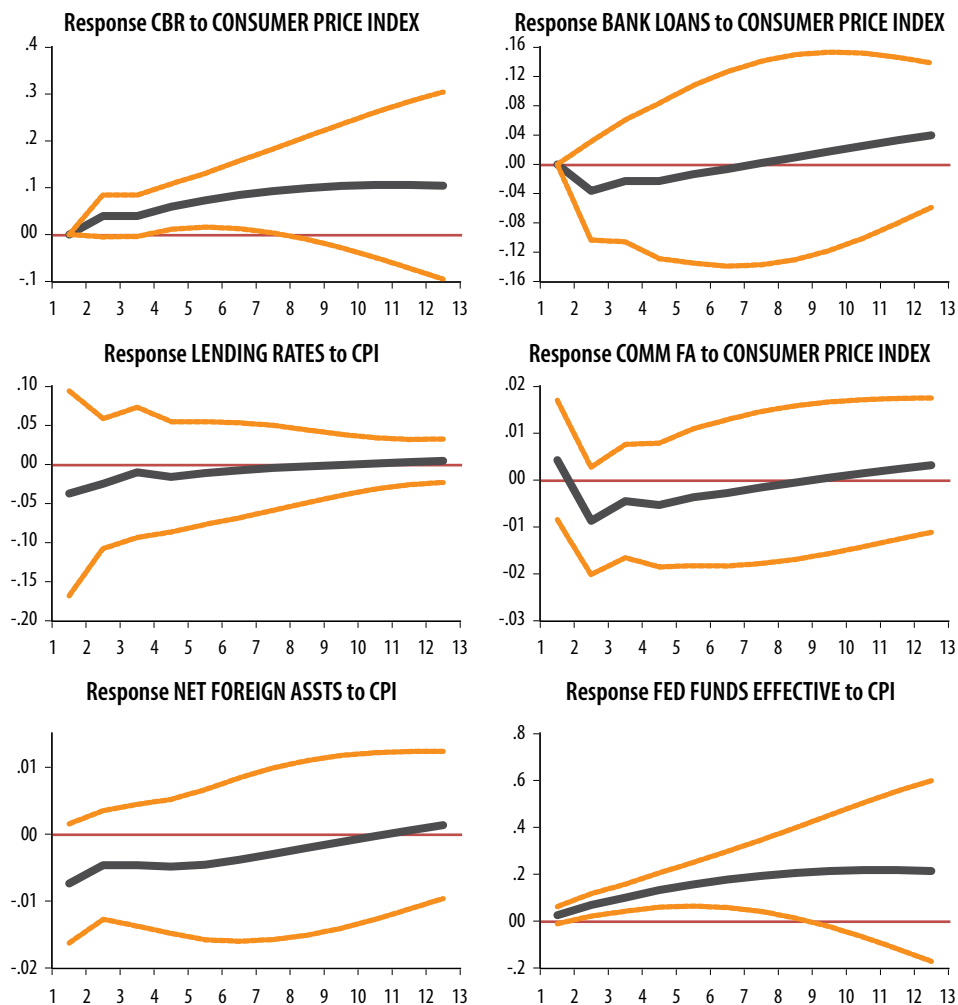
In **Figure 15**, a one standard deviation shock of the US Fed funds rate instantly pushes up central bank rates in the first period, but they decline in the second period negative wards throughout the 12 months. While a ones standard deviation shock in the US Fed funds rates leads to a more pronounced positive stance of the lending rates. A positive shock of the US Fed funds rate first pushes up commercial foreign assets in the first period but then they fall in the second period, that pattern is observed until the eleventh period.

Figure 16: Impulse response of Cholesky decomposition to a one standard deviations Consumer Price Index shock in Tanzania.



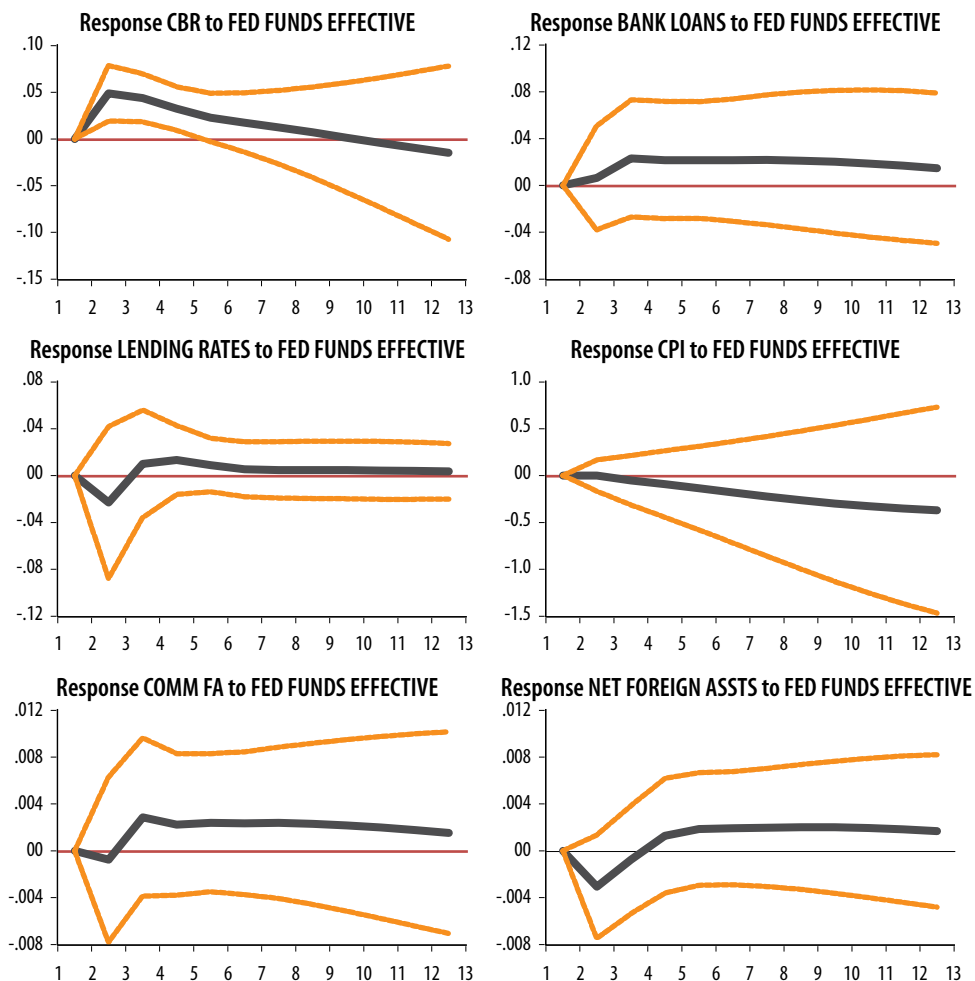
From **Figure 16**, a one standard deviation positive shock in central bank rates leads to a fall in bank loans to the negative region where it attempts to rise until the eleventh month where they become positive. Consumer price index is pushed upwards by a one standard deviation shock in central bank rates. Also, lending rates are pushed upwards in the first period, but they decline second period until the sixth period when they become insignificant.

Figure 17: Impulse response of Cholesky decomposition to a one standard deviation Consumer Price Index shock in Rwanda.



In **Figure 17**, a one standard deviation positive shock in consumer price index pushed the central bank rates upwards. In otherwards the central bank responded to a rise in the consumer price index by raising the central bank rate in a bid to subdue inflation. More so, a one standard deviation positive shock in consumer price index pushed downwards bank loans in the negative region until the seventh month when they rose towards the positive region.

Figure 18: Impulse response of Cholesky decomposition to a one standard deviation US Fed Funds Rates shock in Rwanda.



In **Figure 18**, a one standard deviation positive shock of the US Fed funds rate instantly pushes the central bank rate upwards and it begin declining until the tenth month when it becomes negative. Bank loans remain afloat in the positive region with one standard deviation positive shock in the US Fed funds rate. Interestingly, lending rates, commercial bank foreign assets and net foreign assets only drop in the negative region in the second and pick up in the third period from where they remain positive throughout the twelve months.

5.2. Variance decomposition analysis

Tables 3 up to **9** show variance decomposition forecast errors produced from the PVAR with 100 Monte Carlo simulations. In the sixth lag period, which is six months since the study uses monthly data, 81.23 per cent variance in central bank rate is explained by 1.28 percent variance in lending interest rates, 0.70 percent variance in commercial bank foreign assets, 9.13 percent variance in consumer price index, 7.14 percent variance in US fed funds rate, 0.17 percent variance in net foreign assets and 0.05 percent variance in bank loans. In the tenth lag period, which is close to one year, 77.19 percent of

the variance in central bank rate is explained by 0.80 percent variance in ending Interest Rates, 1.26 percent variance in commercial bank foreign assets, 13.09 percent variance in consumer price index, 7.34 percent variance in US fed funds rate, 0.16 percent variance in net foreign assets and 0.16 percent variance in bank loans. This implies that with time, the hike in the central bank rate induced Lending interest rates to surge which diminished bank lending. On the same note, the central bank rate responded positively to the US fed funds rate with time (**Table 3**).

Table 3: Variance Decomposition of Central Bank Rates

Period	S.E.	Central Bank Rates	Lending interest rates	Comm Bank Foreign Assets	Consumer price index	US Fed Funds Rate	Net Foreign Assets	Bank Loans
1	0.23	100.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.34	94.30	2.28	0.01	1.40	1.86	0.02	0.14
3	0.43	89.75	2.04	0.15	3.68	4.19	0.09	0.09
4	0.51	86.16	1.73	0.35	5.76	5.80	0.13	0.07
5	0.59	83.37	1.48	0.54	7.58	6.83	0.16	0.05
6	0.66	81.23	1.28	0.70	9.13	7.41	0.17	0.05
7	0.72	79.70	1.12	0.85	10.44	7.66	0.18	0.06
8	0.78	78.56	0.99	0.99	11.51	7.66	0.18	0.08
9	0.83	77.75	0.89	1.13	12.39	7.56	0.17	0.11
10	0.87	77.19	0.80	1.26	13.09	7.34	0.16	0.16

In **Table 4**, in the sixth lag period, 93.01 percent variance in lending interest rates is explained by 3.37 percent variance in central bank rates, 2.22 percent variance in commercial bank foreign assets, 0.94 percent variance in the consumer price index, 0.25 percent variance in US fed funds rate, 0.04 percent variance in net foreign assets and

0.17 percent variance in bank loans. In the tenth lag period, an 88.38 percent variance in lending interest rates is explained by a 6.75 percent variance in central bank rates, 2.73 percent variance in commercial bank foreign assets, 0.68 percent variance in the consumer

price index, 1.14 percent variance in US fed funds rate, 0.10 percent variance in net foreign assets and 0.22 bank loans. Here, it's observed that lending interest rates are more driven by the central bank rates and least by net foreign assets.

Table 4: Variance decomposition of Lending Interest Rates

Period	S.E.	Central Bank Rates	Lending interest rates	Comm Bank Foreign Assets	Consumer price index	US Fed Funds Rate	Net Foreign Assets	Bank Loans
1	0.63	0.10	99.90	0.00	0.00	0.00	0.00	0.00
2	0.81	2.10	96.57	0.45	0.54	0.32	0.01	0.00
3	0.94	2.30	95.43	1.13	0.79	0.30	0.01	0.03
4	1.05	2.48	94.64	1.61	0.91	0.24	0.02	0.10
5	1.15	2.85	93.84	1.96	0.96	0.22	0.03	0.14
6	1.23	3.37	93.01	2.22	0.94	0.25	0.04	0.17
7	1.31	4.02	92.08	2.42	0.89	0.35	0.05	0.19
8	1.38	4.81	91.01	2.56	0.81	0.54	0.07	0.20
9	1.45	5.72	89.78	2.66	0.73	0.81	0.08	0.21
10	1.51	6.75	88.38	2.73	0.68	1.14	0.10	0.22

In the sixth lag period, the drivers of 73.39 percent variance of commercial bank foreign assets are 2.06 percent variance in central bank rates, 5.65 percent variance in Lending interest rates, 2.20 percent variance in the Consumer price index, 5.31 percent variance in US Fed funds rate, 7.35 percent variance in net foreign assets, and 4.03 percent variance in bank loans. While in the tenth lag period, a 58.63 percent variance in commercial bank foreign assets is driven

by 1.82 percent variance in central bank rates, 6.52 percent variance in Lending interest rates, 1.90 percent variance in the Consumer price index, 18.45 percent variance in US fed funds rate, 7.11 percent variance in net foreign assets and bank loan variance of 5.56 percent. Thus, I observe that US fed funds rates greatly influence the commercial bank foreign assets, and it widely disperses from the effect of other variables (Table 5).

Table 5: Variance decomposition of Commercial Bank Foreign Assets

Period	S.E.	Central Bank Rates	Lending interest rates	Comm Bank Foreign Assets	Consumer price index	US Fed Funds Rate	Net Foreign Assets	Bank Loans
1	0.40	0.16	0.53	99.31	0.00	0.00	0.00	0.00
2	0.49	0.11	1.02	95.33	0.37	0.01	3.02	0.13
3	0.55	0.45	2.64	89.49	1.08	0.30	5.17	0.87
4	0.59	1.20	4.04	83.39	1.63	1.32	6.35	2.07
5	0.63	1.77	4.97	78.04	1.99	3.03	7.01	3.18
6	0.67	2.06	5.65	73.39	2.20	5.31	7.35	4.03
7	0.71	2.15	6.11	69.24	2.26	8.09	7.49	4.66
8	0.74	2.10	6.39	65.47	2.20	11.27	7.46	5.10
9	0.78	1.98	6.52	61.96	2.06	14.76	7.33	5.39
10	0.81	1.82	6.52	58.63	1.90	18.45	7.11	5.56

Table 6 indicates that in the sixth lag period, 87.15 percent variance in the Consumer price index is explained by 6.29 variance in central bank rate, 0.39 percent in Lending interest rates, 0.14 percent in commercial bank foreign assets, 2.73 percent variance in US fed funds rate, 1.51 percent variance in net foreign assets and 1.78 percent variance in bank loans. Further, in the tenth lag period, 80.91 percent variance in the Consumer price index is explained by 5.37 percent variance in central bank

rates, 0.44 percent variance in Lending interest rates, 0.18 percent variance in commercial bank foreign assets, 2.73 percent variance in US fed funds rate, 6.59 percent variance in net foreign assets and 3.79 percent variance in bank loans. I observe that the Consumer price index is slowly descending from the first period lag while the central bank rate is increased from the same period albeit it eased in the tenth lag period. The implication is that the Consumer price index has been responsive to the monetary policy lever.

Table 6: Variance decomposition of Consumer Price Index

Period	S.E.	Central Bank Rates	Lending interest rates	Comm Bank Foreign Assets	Consumer price index	US Fed Funds Rate	Net Foreign Assets	Bank Loans
1	0.10	1.60	1.34	0.26	96.80	0.00	0.00	0.00
2	0.16	3.34	0.97	0.15	94.30	0.28	0.32	0.64

Period	S.E.	Central Bank Rates	Lending interest rates	Comm Bank Foreign Assets	Consumer price index	US Fed Funds Rate	Net Foreign Assets	Bank Loans
3	0.21	5.24	0.69	0.12	91.96	0.90	0.19	0.90
4	0.24	5.98	0.54	0.09	90.21	1.68	0.34	1.16
5	0.27	6.27	0.45	0.11	88.62	2.32	0.79	1.44
6	0.30	6.29	0.39	0.14	87.15	2.73	1.51	1.78
7	0.31	6.14	0.36	0.16	85.73	2.92	2.49	2.20
8	0.32	5.90	0.35	0.17	84.25	2.95	3.70	2.69
9	0.33	5.63	0.38	0.18	82.66	2.86	5.08	3.22
10	0.34	5.37	0.44	0.18	80.91	2.73	6.59	3.79

In Table 7, the sixth lag period shows that 79.53 percent variance of the US fed funds rate is explained by 7.59 percent variance in central bank rates, 0.04 percent variance in Lending interest rates, 0.20 percent variance in commercial bank foreign assets, 11.97 percent variance in Consumer price index, 0.52 percent variance in net foreign assets and 0.21 percent variance of bank loans. In the tenth lag period, 70.69 percent variance of the US fed funds rate is explained

by 9.66 percent variance in central bank rates, 0.15 percent variance in Lending interest rates, 0.10 percent variance in commercial bank foreign assets, 17.56 percent variance in Consumer price index, 1.52 percent variance in net foreign assets and 0.32 percent variance in bank loans. I observed that commercial bank foreign assets and bank loans diminished with the effect of the US Fed funds rate hike, but the central bank rates surged in tandem.

Table 7: Variance decomposition of the US Fed Fund Rates

Period	S.E.	Central Bank Rates	Lending interest rates	Comm Bank Foreign Assets	Consumer price index	US Fed Funds Rate	Net Foreign Assets	Bank Loans
1	0.15	5.27	0.28	0.10	1.69	92.66	0.00	0.00
2	0.30	5.71	0.14	0.32	3.89	89.73	0.14	0.07
3	0.44	5.91	0.08	0.35	6.18	87.15	0.20	0.12
4	0.58	6.43	0.05	0.31	8.27	84.52	0.27	0.15



Period	S.E.	Central Bank Rates	Lending interest rates	Comm Bank Foreign Assets	Consumer price index	US Fed Funds Rate	Net Foreign Assets	Bank Loans
5	0.71	7.01	0.04	0.25	10.17	81.98	0.38	0.18
6	0.83	7.59	0.04	0.20	11.97	79.53	0.52	0.21
7	0.95	8.15	0.05	0.16	13.52	77.19	0.70	0.23
8	1.05	8.69	0.08	0.13	14.98	74.94	0.93	0.26
9	1.15	9.19	0.11	0.11	16.33	72.77	1.20	0.30
10	1.25	9.66	0.15	0.10	17.56	70.69	1.52	0.32

In Table 8, I observe that in the sixth lag period, 66.57 percent variance in net foreign assets is explained by 2.65 percent variance in central bank rates, 1.30 percent variance in Lending interest rates, 1.68 percent variance in commercial bank foreign assets, 3.05 percent variance in Consumer price index, 17.13 variance in US fed funds rate and 7.63 percent variance in bank loans. More so, in the tenth lag period, a 63.76

percent variation in net foreign assets is explained by a 2.39 percent variance in central bank rates, 2.37 percent variance in Lending interest rates, 1.34 percent variance in commercial bank foreign assets, 5.07 percent variance in the Consumer price index, 15.69 percent variance in US fed funds rate, and 9.39 percent variance in bank loans.

Table 8: Variance decomposition of the Net Foreign Assets

Period	S.E.	Central Bank Rates	Lending interest rates	Comm Bank Foreign Assets	Consumer price index	US Fed Funds Rate	Net Foreign Assets	Bank Loans
1	0.04	6.58	0.09	4.12	0.04	3.93	85.25	0.00
2	0.05	4.79	0.11	3.89	0.46	8.09	80.91	1.75
3	0.06	3.89	0.38	2.79	0.97	11.80	76.57	3.61
4	0.07	3.24	0.73	2.21	1.67	14.53	72.18	5.49
5	0.07	2.85	1.03	1.89	2.34	16.27	68.86	6.76
6	0.08	2.65	1.30	1.68	3.05	17.13	66.57	7.63
7	0.09	2.54	1.56	1.55	3.70	17.33	65.09	8.24
8	0.09	2.48	1.81	1.45	4.26	17.06	64.24	8.70

Period	S.E.	Central Bank Rates	Lending interest rates	Comm Bank Foreign Assets	Consumer price index	US Fed Funds Rate	Net Foreign Assets	Bank Loans
9	0.09	2.44	2.08	1.39	4.72	16.48	63.83	9.07
10	0.10	2.39	2.37	1.34	5.07	15.69	63.76	9.39

Table 9 shows that in the sixth lag period, 64.99 percent variance of the bank loans is driven by 7.05 percent variance in central bank rates, 1.49 percent variance in Lending interest rates, 19.35 percent of commercial bank foreign assets, 3.65 percent variance in the Consumer price index, 0.72 percent variance in the US fed funds rates, and 2.75 percent variance in net foreign assets. In the tenth period, 60.65 percent variance in bank loans is driven by 8.55 percent

variance in central bank rates, 1.04 percent variance in Lending interest rates, 22.47 percent commercial bank foreign assets, 2.81 percent variance in Consumer price index, and 0.47 percent variance in net foreign assets. Thus, I observe that commercial bank foreign assets greatly drive bank loans and a hike in central bank rates has diminished bank lending as shown by descending bank loans over the period lags.

Table 9: Variance decomposition of Bank Loans

Period	S.E.	Central Bank Rates	Lending interest rates	Comm Bank Foreign Assets	Consumer price index	US Fed Funds Rate	Net Foreign Assets	Bank Loans
1	0.22	0.32	1.97	6.91	3.34	1.49	0.18	85.78
2	0.28	2.38	2.02	10.60	5.44	1.35	0.78	77.44
3	0.33	4.07	2.10	13.64	5.47	1.14	1.19	72.38
4	0.37	5.47	1.92	16.04	4.92	0.97	1.74	68.94
5	0.41	6.39	1.70	17.91	4.24	0.83	2.26	66.66
6	0.44	7.05	1.49	19.35	3.65	0.72	2.75	64.99
7	0.47	7.52	1.31	20.44	3.22	0.63	3.18	63.69
8	0.49	7.90	1.18	21.28	2.96	0.57	3.53	62.58
9	0.52	8.23	1.09	21.94	2.83	0.52	3.81	61.56
10	0.54	8.55	1.04	22.47	2.81	0.47	4.01	60.65

5.3 VAR Granger causality exogeneity analysis

I also employed the VAR Granger causality test to determine causal relationships amongst the study variables at 5% level of significance. Results indicate that central bank rates have a Bi-directional causal relationship with commercial bank foreign assets and the Consumer price index. The relationship runs from central bank rates to commercial bank foreign assets and consumer price index. However, central bank rates have a Uni-directional relationship running from central bank rates to Lending interest rates, US Fed funds rates, net foreign assets, and bank loans (see Annex 4). Therefore, the implication is that monetary policy granger causes Lending interest rates, US fed funds rates, net foreign assets, Consumer price index, commercial bank foreign assets and bank loans.

5.4 Robustness checks

It is important to conduct robustness checks after estimating an unrestricted PVAR model to test for the strength and validity of the findings. Thus, in this study, I conducted the PVAR model stability condition check and serial correlation of the residuals. Results shown in Annex 1 by the AR characteristic table and polynomial graph indicate that the PVAR model satisfies the stability condition because no roots lie outside the unit circle. In addition, the serial correlation test done using the LM test indicates that the PVAR model is free of serial correlation from 1 up to 3 lags. Hence the null hypothesis of no serial correlation in the PVAR model is not rejected (Annex 2). Also, the graphical exposition of the VAR residuals is shown in Annex 5.

6.0 Conclusion and Policy Recommendations

Using a PVAR model, 4 East African Community countries and monthly time series data from January 2021 to June 2023, the study provides empirical evidence on the underlying dynamic relationships between monetary policy, bank lending, and inflation during the post-pandemic recovery era.

In this study, I sought to investigate the effects of the recent developments in domestic monetary policy affected bank lending and inflation. Also, to explore the effects of the external shock like the hawkish US monetary policy affect commercial banks' lending and interest rates in EAC? Results from the impulse response functions analysis indicate that a one standard deviation positive shock on central bank rates pushes bank loans downwards causing a reduction in the amount of credit available for lending. Similarly, a one standard deviation positive shock in the central rate eased inflation as seen by a reduction in the consumer price index albeit it remained positive. On the other hand, I observed that the US Fed funds rate had spillover effects on the domestic financial sector of the EAC. A standard deviation positive shock in the US Fed funds rate led to a reduction of domestic commercial bank's foreign assets (loans and deposits).

Further, a positive shock in the US Fed funds rate induced the EAC central banks to adjust their monetary policy upwards, this was followed by the commercial bank lending rates. These findings emphasize the bank lending channel of transmission of monetary in EAC is susceptible to domestic and external shocks thus commercial bank's capacity to create credit is compromised in response to a tight monetary policy stance. They further provide novel evidence on the effects of the US Fed funds rate on the financial sector of developing countries, in particular, the East African Community bloc.

Despite the central bank's primary objective being price stability, central banks should be cautious of the risks in the effectiveness of monetary policy that compromise bank lending and thus far stability. As such, there is need to



enhance supervision of bank capitalization in particular from a monetary policy perspective in order to assess the transmission of monetary impulses and negate bank instability.

In addition, central banks should monitor with caution external shocks that affect bank foreign assets. Having observed that the hawkish US Fed Funds rates has an effect on the foreign reserves held in US dollar at the commercial banks and subsequently credit creation in US dollars.

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Annexes

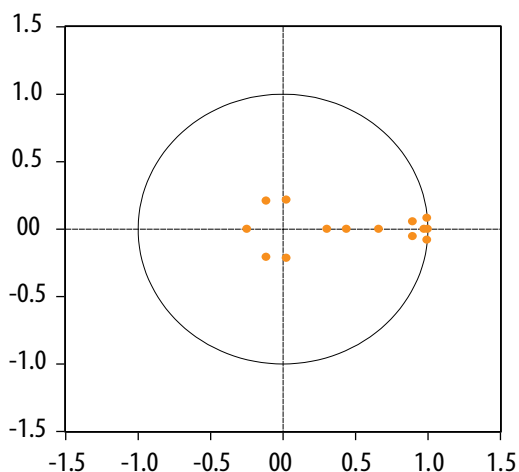
Annex 1: VAR model stability condition check using table and graph polynomials.

Root	Modulus
0.999738	0.999738
0.994383 - 0.081400i	0.997709
0.994383 + 0.081400i	0.997709
0.974845	0.974845
0.895893 - 0.054980i	0.897578
0.895893 + 0.054980i	0.897578
0.661008	0.661008
0.439890	0.439890
0.304333	0.304333
-0.248317	0.248317
-0.114582 - 0.208826i	0.238196
-0.114582 + 0.208826i	0.238196
0.024562 - 0.215074i	0.216472
0.024562 + 0.215074i	0.216472

No root lies outside the unit circle.

VAR satisfies the stability condition.

Inverse Roots of AR Characterestic Polynomia



Annex 2: VAR model residual serial correlation LM test

Lags	LM-Stat	Prob
1	45.79	0.60
2	42.19	0.74
3	45.13	0.63

Annex 3: VAR model lag order model selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-682.3202	NA	0.021614	16.03070	16.23047	16.11110
1	219.3179	1635.530	5.31e-11	-3.798091	-2.199911*	-3.154898*
2	274.4986	91.11236*	4.70e-11*	-3.941829*	-0.945242	-2.735841
3	300.4981	38.69685	8.48e-11	-3.406932	0.988062	-1.638151
4	334.5751	45.17184	1.34e-10	-3.059886	2.733515	-0.728310

Annex 4: VAR Granger Causality/Block Exogeneity Wald Tests

Dependent Variable: Central Bank Rates				Dependent Variable: Lending interest rates			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
Lending Interest Rates	4.79	2	0.09	Central Bank Rates	4.53	2	0.10
Commercial Bank Foreign Assets	0.28	2	0.87	Commercial Bank Foreign Assets	1.20	2	0.55
Consumer Price Index	4.54	2	0.10	Consumer Price Index	2.15	2	0.34
US Fed Funds Rates	4.68	2	0.10	US Fed Funds Rates	1.97	2	0.38
Net Foreign Assets	0.20	2	0.90	Net Foreign Assets	0.12	2	0.94
Bank Loans	0.33	2	0.85	Bank Loans	0.76	2	0.68
All	24.98	12	0.02	All	9.91	12	0.62

Dependent Variable: Central Bank Rates				Dependent Variable: Lending interest rates			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
Central Bank Rates	5.20	2	0.07	Central Bank Rates	2.43	2	0.30
Lending Interest rates	9.18	2	0.01	Lending Interest Rates	6.11	2	0.05
Consumer Price Index	9.81	2	0.01	Commercial Bank Foreign Assets	1.11	2	0.58
US Fed Funds Rates	13.40	2	0.00	US Fed Funds Rate	1.82	2	0.40
Net Foreign Assets	8.74	2	0.01	Net Foreign Assets	2.76	2	0.25
Bank Loans	13.32	2	0.00	Bank Loans	1.61	2	0.45
All	21.07	12	0.04	All	47.34	12	0.00

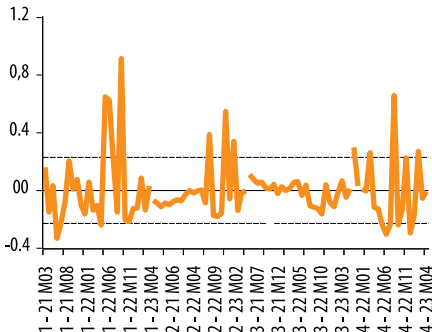


Dependent Variable: Central Bank Rates				Dependent Variable: Lending interest rates			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
Central Bank Rate	0.31	2	0.86	Central Bank Rates	3.23	2	0.20
Lending Interest Rates	2.37	2	0.31	Lending Interest Rates	6.84	2	0.03
Com Bank Foreign Assets	0.08	2	0.96	Com Bank Foreign Assets	4.69	2	0.10
Consumer Price Index	4.43	2	0.12	Consumer Price Index	0.70	2	0.71
Net Foreign Assets	0.49	2	0.78	US Fed Funds Rate	5.73	2	0.06
Bank Loans	0.50	2	0.78	Bank Loans	6.19	2	0.04
All	10.95	12	0.53	All	16.42	12	0.17

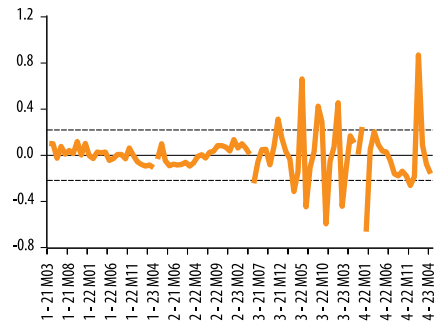
Dependent Variable: Bank Loans			
Excluded	Chi-sq	df	Prob.
Central Bank Rates	3.96	2	0.14
Lending Interest Rates	0.59	2	0.74
Commercial Bank Foreign Assets	2.19	2	0.33
Consumer Price Index	5.31	2	0.07
US Fed Funds Rates	1.53	2	0.47
Net Foreign Assets	4.0	2	0.13
All	18.70	12	0.10

Annex 5: Graphical exposition of the estimated VAR residuals.

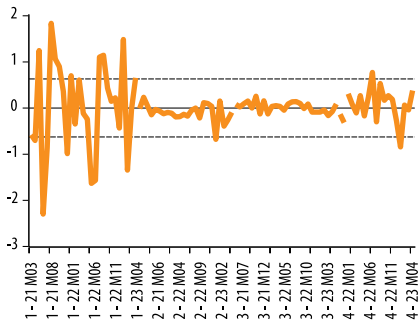
CENTRAL BANK RATES Residuals



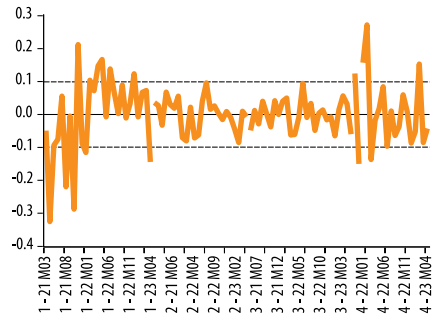
LOANS Residuals



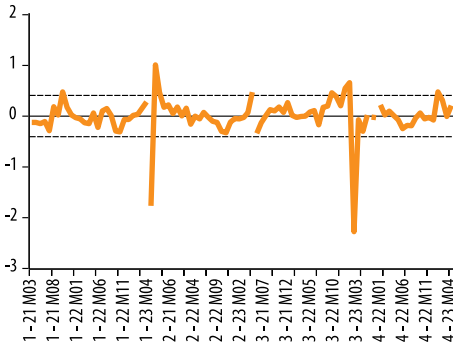
LENDING RATES Residuals



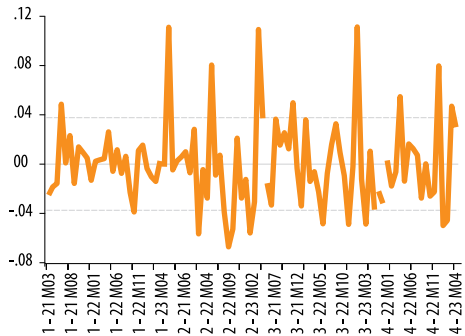
CPI Residuals



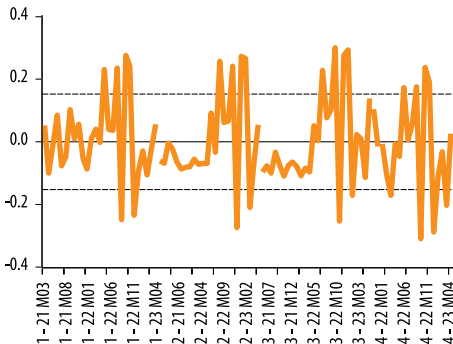
COMMERCIAL FOREIGN ASSETS Residuals



NET FOREIGN ASSETS Residuals



FEDERAL FUNDS EFFECTIVE Residuals



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