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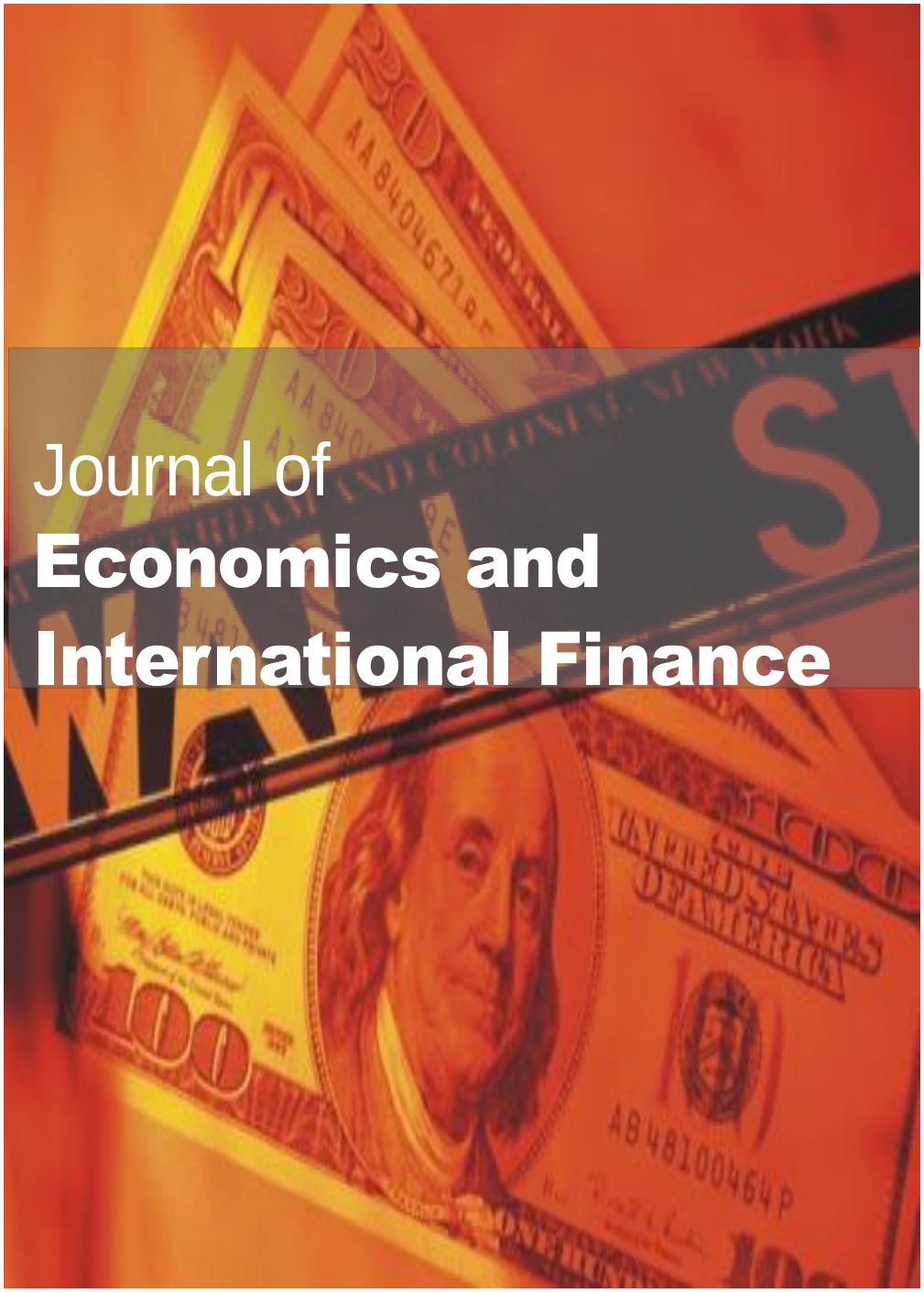

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Full Length Research Paper

Assessment of monetary policy transmission mechanism in Tanzania

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This study aims to assess the effectiveness of alternative monetary policy transmission channels in Tanzania. Theoretically, monetary policy transmission is expected to differ between developed and developing countries due to varied structural and institutional features. The empirical work undertaken by this study suggests that the sensitivity of output and prices to changes in monetary policy are generally weak and slow. Moreover, the study found a significant contribution of monetary policy in explaining the dynamics of the supply of credit to the private sector which matters in fostering the growth of the economy. And lastly, it appears that inflation and exchange rate dynamics in Tanzania are highly influenced by developments in international oil prices. There are potentially three policy implications, the first one being sustaining financial sector reforms geared towards eliminating the remaining structural impediments that hinder financial deepening, the Bank may choose to switch to an alternative monetary policy framework that has proved to be successful in attaining price stability, the Bank of Tanzania should continue with close monitoring of the global developments especially the movements in the international oil prices and react appropriately to safeguard the domestic macroeconomic stability.

Key words: Monetary policy, central banks and their policies.

INTRODUCTION

The concern about the impact of monetary policy on the economy has received enormous attention in macroeconomic theory and among central banks in the world. It is generally agreed that the monetary policy affects output and prices by influencing key financial variables such as interest rates, exchange rates and monetary aggregates (Mishkin, 1996).

Changes in monetary policy are “proliferated” through the economy by means of a transmission mechanism, normally referred to as the monetary transmission mechanism.

Since 1995, the Bank of Tanzania implements a monetary policy framework that is directed towards attaining low (Low and stable inflation is defined as inflation of 5.0 percent in the medium term) and stable inflation (price stability) conducive to the balanced and sustainable growth of the economy (Bank of Tanzania (BOT) Act, 2006). In the current framework, the Bank targets monetary aggregates (the extended broad money-M3) as a nominal anchor (Reserve money or base money is used as operational/policy variable in realizing extended broad money targets) in attaining the

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policy objectives. However, the Bank is currently contemplating moving into the inflation-targeting framework (The move is also justified by the unstable money demand following financial innovations) as part of its commitment to the implementation of the East Africa Monetary Union (EAMU) Protocol (Bank of Tanzania (BOT), 2018).

It is widely acknowledged that changes in the structure of the economy tend to alter the effectiveness of a given monetary policy transmission mechanism (Carranza et al., 2010; Mishra et al., 2012; Ma and Lin, 2016). There have been enormous developments in the financial sector in Tanzania, especially since the 2000s that were brought about by financial innovations mainly related to developments in payments systems and financial markets developments such as the introduction of new financial instruments. All these have enhanced the financial inclusion that involves an increase in access and usage of financial services (FSDT, 2017). These financial sector developments are expected to be sustained and ultimately impact the transmission mechanism of the monetary policy in Tanzania, either by changing the overall impact of the policy on key macroeconomic variables or by altering the channels through which it operates.

Similarly, the insensitivity of lending rates to changes in a monetary policy stance that has been observed in Tanzania together with the recent decline[1] in the growth of credit to the private sector despite monetary policy easing makes it important to re-assess the effectiveness of monetary policy transmission mechanisms to key macro-economic variables.

Along the same line, the decision by the EAC central banks to adopt the Monetary Union (EAMU) by 2024 makes it relevant for the central banks in the block to undertake a regular assessment of the effectiveness of the monetary policy transmission mechanism in their respective countries for harmonization of the monetary policies with the appropriate[2] framework.

In studying the monetary policy transmission mechanism two key issues usually emerge including, the effectiveness of monetary policy transmission channels such as money/interest rate, credit, exchange rate and asset price in transmitting policy shocks to output and prices as well as the timing and magnitude of the effects of the monetary policy shocks on selected macroeconomic variables. This is what Mishkin (1995) called the 'timing and effect' of monetary policy in the economy.

In the case of Tanzania, several studies on the monetary policy transmission have been conducted and yielded some conflicting views but agreed on the weakness of the monetary policy transmission in the country, see for example (Davoodi et al., 2013; Mbowe, 2015a; Montiel at al., 2012).

It is against this background that there seems a need for the Bank of Tanzania to re-assess the transmission mechanism regularly to first determine whether there is any change which could inform the Bank on how to adjust its policy actions to meet the intended results (Tahir, 2012). The understanding is expected also to enlighten the Bank on the appropriate choice of the monetary policy anchor. Lastly, the understanding of the monetary policy transmission mechanism is important for the Bank to guide on the type of financial sector/monetary reforms which are needed (Mukherjee and Bhattacharya, 2011).

Thus, this paper attempts to assess the impact of changes in monetary policy on key macroeconomic variables in Tanzania and explore the effectiveness of alternative monetary policy transmission channels.

The rest of the paper is structured as follows. Following the introduction section, section 2 gives an overview of the banking sector and monetary policy in Tanzania. Section 3 reviews both theoretical and empirical literature. The study's modelling approach, the model structure and data-related issues are described in Section 4. Section 5 provides the estimation results of the empirical model. Section 6 concludes the paper by summarizing the main findings and providing policy recommendations as well as areas for further research.

An overview of the financial sector developments and monetary policy in Tanzania

The effectiveness and efficiency of monetary policy depend on financial sector developments which facilitate the transmission of monetary policy actions to the real economy (Montiel et al., 2012). The financial sector in Tanzania has undergone various notable developments geared towards enhancing efficiency and inclusion.

Before the 1990s, the financial sector in Tanzania was characterized by financial repression, weak and unclear institutional framework, and dominance of state-owned financial institutions which performed poorly exacerbating Non-Performing Loans (NPL) to reach 65% in 1990. Fiscal and financial operations were intermixed, and the regulatory system was characterized by inefficiencies (Cheng and Podpiera, 2008). These challenges were caused mainly by the intervention by the government in the day-to-day operation of financial institutions on pricing and resource allocations coupled with a lack of competition among financial institutions (Nyorekwa and Odhiambo, 2014). Monetary policy performance in Tanzania (1961 to 2014): A review on Banks and bank systems, (9, Iss. 4), 8 to 15. During the period, the formulation and implementation of monetary policy were guided by the Bank of Tanzania (BOT) Act, 1965 with multiple goals; to regulate the money supply, to fix monetary variables (direct controls of interest rate and

1 For example, the growth of credit to the private sector in Tanzania averaged at 3.4 percent and 2.2 percent in 2018 and 2017 respectively compared with an average of 16.3 percent and 22.8 percent 2015 and 2016 respectively.

2 The appropriate framework that member countries agreed to embark on is the Interest Rate-Based Monetary Policy Framework.

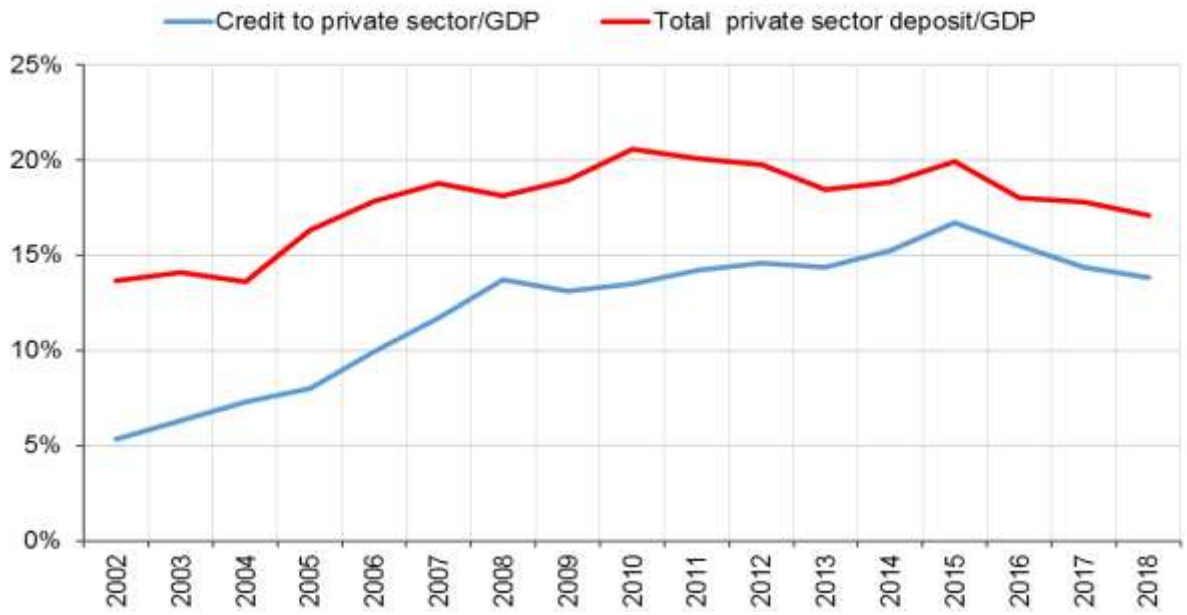


Figure 1. Financial Intermediation as measured by credit to the private sector and private sector deposit to GDP. Source: Bank of Tanzania.

exchange rate) and to provide for development finance. As a result, the Bank lacked autonomy in setting monetary policy targets. The period also exhibited underdeveloped financial markets with the absence of money and capital markets. These challenges necessitated the introduction of First-Generation Financial Sector Reforms (FGFSR) in 1991 following recommendations by the Nyirabu Commission and were followed by the Second-Generation Financial Sector Reforms (SGFSR) in 2003 following recommendations of the World Bank/IMF mission of Financial Sector Assessment Programme (FSAP) 2003.

The implementation of FGFSR allowed for the market determination of Interest rates and exchange rates; freedom of entry of the private banks (both domestic and foreign) into the banking business by enacting of BFIA 1991; enactment of Foreign Exchange Act 1992 and the Bank of Tanzania (BOT) Act 1995 (Nyagetera and Tarimo, 1997:71-77). These reforms strengthened the supervisory capacity of banks and with the BOT Act 1995, a new modality of monetary policy formulation and implementation was introduced. The Act mandated the BOT with a single objective of ensuring domestic price stability. Several indirect monetary policy instruments were introduced such as open market operations, repurchase agreements, discount and Lombard window, foreign exchange market operation as well as statutory minimum reserve requirements. The FGFSR succeeded in increasing the number of financial institutions in the market but did not succeed to make that service reach the majority of the people (financial inclusion) hence necessitate the SGFSR. The SGFSR were focused on financial inclusion, tackling the remnants of the reforms under FGFSR, including putting in place structures and institutional arrangements to support the functioning of the market economy and improve the business environment. More specifically, the SGFSR recommended, among others, continued privatization of financial institutions, removal of the main obstacles to lending, enhancement access to financial services including promotion of microfinance and creation of a credit registry.

Notable financial sector developments since the onset of SGFSR include among others, the increase in the number of participants in the financial sector. For instance, the number of banks and financial institutions increased from 26 in 2004 to 58 in 2017 (BOT, Banking Supervision Report, 2004 and 2017). This reflected the increase in the financial deepening and financial intermediation as measured by the private sector credit to GDP and the ratio of bank deposits to GDP which increased to 13.7 and 17.0% in 2018 from 5.3 and 13.6% in 2002 respectively (Figure 1), Meanwhile, the level of monetization of the economy as measured by Extended Broad Money (M3) to GDP increased to 20.0% in 2018 from 14.0% in 2002 (Figure 2). The increased number of banks and financial institutions also boosted competition which is important in providing consumers with a wide range of choices on financial services.

The on-going developments in the financial sector and its products have also helped to improve financial inclusion driven mostly by the use of digital financial services and other innovative platforms, which have increased access to financial services for the majority of the population. According to the FinScope survey 2017

Figure 2. Financial Deepening as measured by the trend of broad money to GDP**.**
Source: Bank of Tanzania.

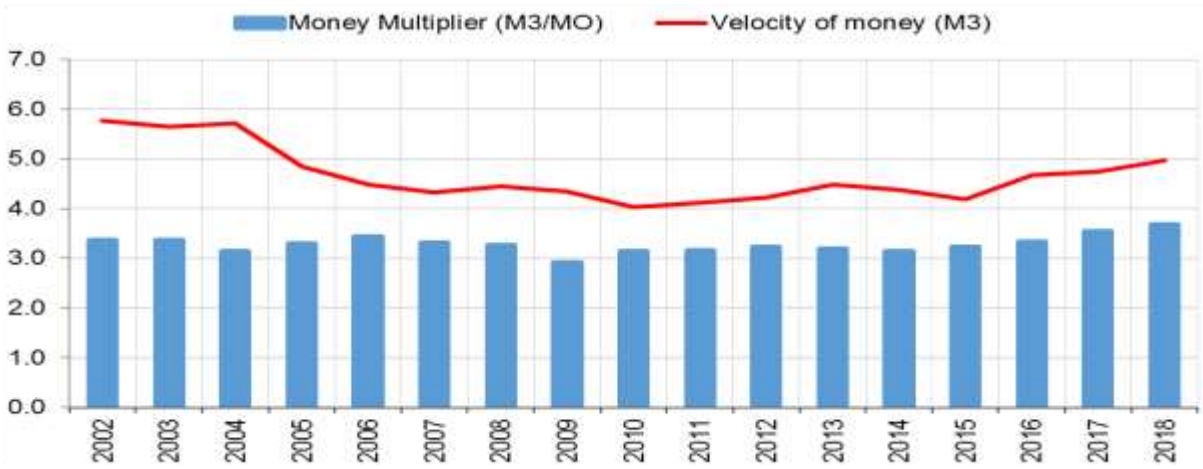


Figure 3. Trend of Reserve Money Multiplier and the velocity of money.
Source: Bank of Tanzania.

financial inclusion reached 65.05 from 11.2% in 2006 of the adult population in Tanzania.

The use of innovative platforms has also impacted the velocity of money in circulation and ultimately the stability of money demand (Figure 3). This has also necessitated the Bank to rethink the appropriate channel of monetary policy transmission. It is worth noting that, financial inclusion improves the sensitivity of macroeconomic variables to the interest rate as compared to the monetary aggregate.

Over the recent years, other developments have been registered in the financial sector including the capital account liberalization initiative which was carried out in 2014 to enhance the interlinkage of the domestic financial sector with the global financial system (Kessy et al. (2017). This increased number of cross-listed companies in the equities market and instruments together with the participation in the equity market by non-residents. Meanwhile, participation in government securities by EAC residents remained minimal probably a result of the existing speed bumps.

At the same time, the level of dollarization has significantly declined as indicated by the ratio of foreign currency deposits to extended broad money (M3) since a high level of dollarization indicates a lack of confidence in the local currency and hence affects negatively the effectiveness of monetary policy. In 2018, the ratio declined to 26.3% from 34.0% in 2002 (Figure 4).

Figure 4. The level of dollarization as indicated by foreign currency deposits/M3.
Source: Bank of Tanzania.

LITERATURE REVIEW

Theoretical literature review

According to Taylor (1995), the monetary policy transmission mechanism can be defined as the process through which monetary policy actions impact the key macro-economic variables. As a result, monetary policy plays a crucial role in influencing economic activity and prices through several channels. The effective functioning of a particular channel depends on the properties and structure of the economy. The respective channels include; the interest rate channel, the exchange rate channel, the asset price channel and the credit channel.

Interest rate channel

The basis for an interest rate as a transmission mechanism is basic Keynesian models, which view how monetary policy is transmitted to the real economy. According to Taylor (1995), the monetary transmission mechanism lies in two key assumptions that underlie most financial market price models; rational expectations and temporary rigidities of prices and wages. For example, a rise in the nominal interest rate will cause a rise in the real interest rate if the rationally expected inflation rate does not increase by the same value. Because of the slow adjustment of goods prices, the expectation of changes in goods prices over short time horizons will also adjust slowly if expectations are rational. Hence, an increase in the nominal interest rate results in a change in the real interest rate, over the period where prices and expectations are adjusting.

$$M \downarrow \Rightarrow i \uparrow \Rightarrow I \downarrow or\ C \downarrow \Rightarrow Y \downarrow \Rightarrow \pi \downarrow$$

Assuming a monetary contraction pursued by the Bank (M↓), lead to the increase in real interest rate (i↑), which in turn increases the cost of capital and decreases investment (I↓) or consumption ($C \downarrow$) leading to declining in aggregate demand (Y↓) and ultimately inflation (π↓).

Exchange rate channel

This channel works through cross-border trade. Monetary policy contraction by the central bank (M↓), leads to an increase in interest rate (i↑), which causes an increase in the value of the domestic currency (appreciation of exchange are (E↑)), the higher value of domestic currency makes domestic goods expensive than foreign goods, causing fall in net exports (NX↓) and aggregate output (Y↓) as well as inflation (π↓)

$$M \downarrow \Rightarrow i \uparrow \Rightarrow E \uparrow \Rightarrow NX \downarrow \Rightarrow Y \downarrow \Rightarrow \pi \downarrow$$

Asset price channel

This channel is based on Tobin's q theory (1969) of investment and wealth effects on consumption. It provides mechanisms through which monetary policy affects the economy through the valuation of equities. Q is defined as the market value of firms divided by the

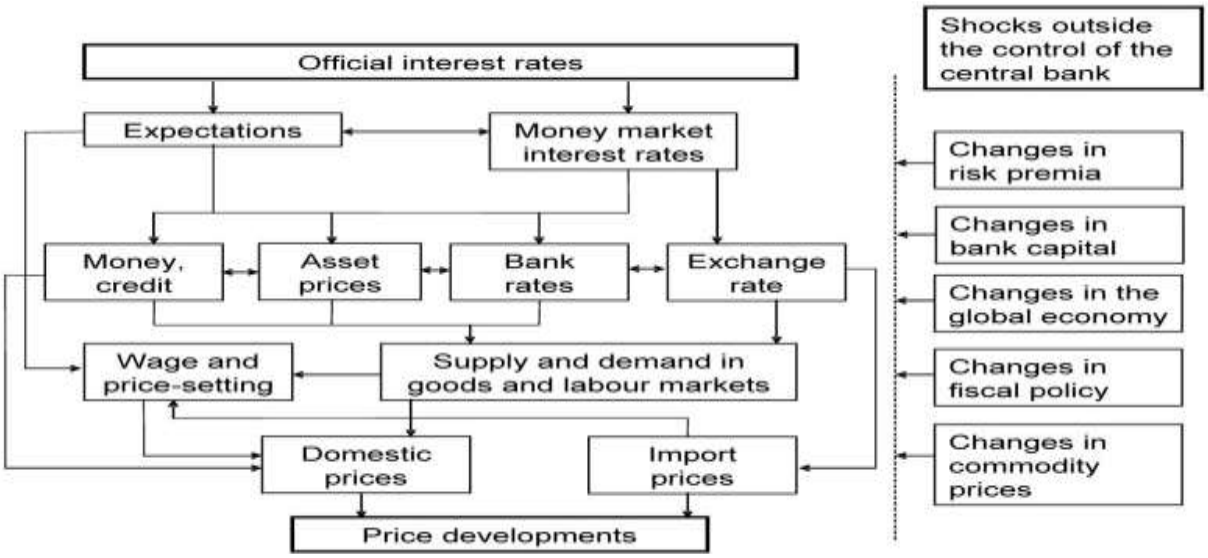


Figure 5. Summary of monetary policy transmission channels.
Source: Taylor (1995) and European Central Bank (2022).

replacement cost of capital. If q is high means, the market value of a firm is high relative to the cost of acquiring a new plant, and investment capital is cheap compared to the market value of the business firm. Linking to monetary policy, when money supply falls (M↓), causes interest to rise ($i\uparrow$), making bonds more attractive than equity, thereby causing price of equity to fall ($Pe\downarrow$) and subsequently lowers q (q↓) and thus decreasing investment (I↓), output (Y↓) and Inflation (π↓).

$$M\downarrow \Rightarrow i\uparrow \Rightarrow Pe\downarrow \Rightarrow q\downarrow \Rightarrow I\downarrow \Rightarrow Y\downarrow \Rightarrow \pi\downarrow$$

Another way to look at this is through the channel advocated by Franco Modigliani (1971) in his life cycle model. He explained that consumption spending is determined by the lifetime resources of consumers, which are made up of human capital, real capital and financial wealth. Financial wealth is composed largely buy stock. When stock price fall the value of financial wealth decreases, decreasing the lifetime resources of consumers and consumption should fall as well.

$$M\downarrow \Rightarrow i\uparrow \Rightarrow Pe\downarrow \Rightarrow Wealth\downarrow \Rightarrow Consumption\downarrow \Rightarrow Y\downarrow \Rightarrow \pi\downarrow$$

Credit channel

Monetary policy transmission through the credit channel affects the economy through the bank lending channel and balance sheet channel. In the bank lending channel; the central bank's contractionary monetary policy decreases banks' deposits and affects banks' loans, investments and output.

$$M\downarrow \Rightarrow Bank\ deposits\downarrow \Rightarrow Bank\ loans\downarrow \Rightarrow I\downarrow \Rightarrow Y\downarrow \Rightarrow \pi\downarrow$$

On another hand, the balance sheet channel operates through the net worth of business firms as described in the asset price channel. Low net worth means borrowers have less collateral for the loans, hence a decrease in demand for loans and therefore low investment and output.

$$M\downarrow \Rightarrow Pe\downarrow \Rightarrow I\downarrow \Rightarrow Y\downarrow \Rightarrow \pi\downarrow$$

On the other hand, monetary policy, which leads to an increase in interest rate also causes a deterioration in the firm's balance sheet by reducing cash flow. On the consumption side, contractionary monetary policy leads to a decline in equity prices, which reduces the value of financial assets, consumer spending and aggregate output.

Expectations channel

This channel works via the expectations that households and firms form about key macroeconomic variables, such as the GDP. There is an agreement amongst economists that expectations impact economic activity (Taylor, 1995). For example, expectations of depreciation in Tanzanian Shilling are likely to increase consumer prices, thus exerting inflationary pressure on overall prices. A rise in consumer prices will spur economic agents' expectation of higher interest rates in the future to mitigate inflationary pressures, a situation which may lead to increased spending and amplified inflationary pressures in the short run. Figure 5 depicts the primary channels via which monetary policy decisions are transmitted (Taylor, 1995).

EMPIRICAL LITERATURE REVIEW

The review of the empirical literature indicates that several studies have been done in different countries with respect to the subject matter. In this study, however, the review is done for some selected studies that were done in developing countries, East African countries and Tanzania, in particular.

A review of the studies which assess the effectiveness of monetary policy transmission mechanisms agrees largely on the weakness of transmission mechanisms in developing countries (Mishra et al., 2010). The reasons cited are an underdeveloped financial system, limited international capital movements and the exchange rate regime which weakens the effectiveness of the interest rate, the asset, or the exchange rate channel. Credit channel remains the only channel presumed to work in these economies due to the dominance of the banking sector in the financial system.

However, due to underdeveloped institutions leading to high-cost financial intermediation, banks tend to hold a large percent of their deposits as reserves at the central bank and in the form of short-term foreign assets; Sacerdoti (2005). This again could weaken the transmission through the credit channel.

Buigut (2009) applied structural VAR methods to annual data from 1984 to 2005 for EAC countries. The results indicated that the effects of monetary policy on output were relatively similar for the three EAC countries in terms of the pattern and timing however, the magnitude of the impact was insignificant. In the case of inflation, the effects were different in terms of speed and direction for all countries, but the impact was also small and insignificant.

Montiel et al. (2012) using a recursive VAR model employed monthly data from Tanzania from January 2002 to September 2010 and found that reserve money had a statistically significant effect on the price level, but the effect was not economically significant. He further employed a structural VAR model and found monetary policy expansion increased lending rates and reduction in prices. He also found out that the monetary policy had negative effects on output in the first eight months and a shock. The authors attributed the counterintuitive responses of monetary policy shock to the weak monetary policy transmission in Tanzania.

Davoodi et al. (2013) used a recursive VAR model and estimated for 2000 to 2010, to study the monetary transmission mechanism in the East African Countries and concluded that the precise transmission channels and their importance differ across EAC. For Tanzania, the authors found out that, the positive shock to reserve money increases inflation in the first year and a half though the effect was not statistically significant. However, when he applied VAR for a longer period, the results were highly significant. Similar conclusions were obtained using BVAR and FAVAR. Also using similar sample periods, they found out that a positive shock to the interest rate increases inflation, a “price puzzle” however the impact was not statistically significant which indicates weak monetary transmission. The authors argue that a weak monetary transmission mechanism can be a result of an unstable money multiplier and velocity in the short run. The authors conclude that shocks to reserve money are transmitted to money, but transmission from money to prices or output is weak because shifts in velocity, caused perhaps by financial innovations, may attenuate any aggregate demand effects. The other reason for the weak monetary transmission mechanism in Tanzania was cited as the presence of capital controls, especially on the exchange rate channel.

Mbowe (2015a) investigated the pass-through of the monetary policy rate to banks' retail rates in Tanzania using an error correction model. The study aimed at providing insight into the pass-through of the monetary policy rate to the interbank rate and retail bank interest rates in Tanzania. The study concluded that the effectiveness of monetary policy transmission to the economy through the interest rate channel may be limited due to weak and lagged pass-through of the interbank rate to deposit rate, though the pass through of the policy rate to interbank rate was generally strong.

A similar observation was noted by Berg et al. (2013) by using a narrative approach. The study also found that, the exchange rate was responding to the tightening monetary policy episodes, which is different from the findings from empirical studies by Montiel et al. (2012) and Davoodi et al. (2013) who found that this channel is weak due to controls imposed in the cross-border movement of capital. In the same vein, Balele et al. (2018) obtained a similar observation, where monetary policy seems to have a weak influence on core inflation.

On the other hand, the bank lending channel was noted to be strong in Tanzania, Mbowe (2015b); and Berg et al. (2013). However, Mbowe cautioned that the reaction by banks was asymmetric based on ownership structure, whereby lending channel was stronger through domestically-owned banks and privately-owned banks than foreign-owned banks and public-owned banks, possibly due to having other sources of funding.

METHODOLOGY

Model specification

The Vector Autoregression (VAR) model pioneered by (Sims, 1980) has been extensively used when assessing the monetary policy transmission mechanism. Structural VAR is an extension of VAR, which intends to remove the drawbacks in the VAR methodology, see for example (Pham, 2016).

In SVAR, there are several assumptions (grounded on economic theory) that have to be made with regard to the relationship among macroeconomic variables before estimation. Therefore, the SVAR approach helps to give several inferences for the model parameter and also describes the nature of the shock as whether transitory or

permanent, see for example (Nguyen, 2014) and (Pham, 2016). The current study employs structural VAR to assess the monetary policy transmission mechanism in Tanzania. The Structural VAR takes the following general representation:

$$A_0 Y_t = A_1(L) Y_{t-1} + B\varepsilon_t \quad (1$$

Whereby the Y_t is $n \times 1$ a vector of endogenous macroeconomic variables; A_0 and B are ($n \times n$) vector of parameters of the model; $A_1(L) = \sum_{i=1}^{n} A_{1i} L^i$ is the matrix of a polynomial in the lag operator, and ε_t is a $(n \times 1)$ vector of structural disturbances.

When multiplying equation (1) with A_0^{-1}, a reduced form VAR of the structural model in eq (1) is specified as;

$$Y_t = C(L) Y_{t-1} + u_t \quad (2)$$

Where $C(L) = A_0^{-1} A_1(L)$; u_t ε_t represent a vector of reduced form residual, that is $A_0^{-1} B\varepsilon_t$,

In condensed representation, an SVAR system relates to the following relations;

$$A_0 u_t = B\varepsilon_t \quad (3)$$

Equation (3) is known as the AB model where A_0 is $(n \times n)$ a matrix of contemporaneous relationships between endogenous variables; B is $(n \times n)$ that linearly relates SVAR residuals to the structural innovations, u_t is a vector of reduced-form residual, and ε_t is a vector of structural shocks. The residual u_t is presumed to be white noise. Therefore, we can estimate the AB model by Ordinary least squares.

Thus, the transmission mechanism of monetary policy in Tanzania is studied by modelling explicitly the contemporaneous relations among the endogenous macroeconomic variables.

SVAR specification

Grounded on earlier research about monetary policy transmission mechanism in Tanzania and research in other countries in the world, the following variables are chosen:

1) Foreign block: that represents international conditions: world oil price (OIL_BRENT), U.S. Federal fund rate (I_FED_US). The basic reason behind the inclusion of this foreign block in the model is the fact that Tanzania is a small open economy and is largely influenced by global developments. Thus, it means that changes in domestic conditions do not affect a change in the external environment. In contrast, changes in the foreign environment such as a change in international oil prices and a change in US monetary policy stance are expected to have a significant impact on the Tanzanian economy.

2) Domestic block: The first two variables are Gross domestic product (GDP) and consumer price index (CPI) which represent the overriding goal of the monetary policy of the Bank of Tanzania. Other domestic variables include the average reserve money (MB)[3] which is the *de facto* monetary policy variable of the Bank of Tanzania and a measure of policy stance, credit to the private sector (CRED_PRIV) to assess the credit channel, overall treasury bills rate (IR_TBILL_TOT), nominal effective exchange rate (NEER) that captures the exchange rate channel.

In this regard, the study specifies an eight-variable SVAR model as follows:

$$Y_t = (mb, ir\_tbill\_tot, cred\_priv, neer, cpi, gdp, i\_fed\_us, oil\_brent) \quad (4)$$

Identification of the SVAR Model

The fundamental concern in the estimation of the structural VAR model is the identification of the empirical model. The identification of monetary policy shocks requires adequate short-run restrictions on the SVAR model, Bernanke (1986) and Sims (1992). As a result, there is a need that equation (3) to be restricted with parameters that are theory-consistent. The canonical SVAR model is represented as follows:

$$A_0 \begin{bmatrix} u_{oil\_brent} \\ u_{i\_fed\_us} \\ u_{gdp} \\ u_{cpi} \\ u_{mb} \\ u_{cred\_priv} \\ u_{ir\_tbill\_tot} \\ u_{neer} \end{bmatrix} = B \begin{bmatrix} \varepsilon_{oil\_brent} \\ \varepsilon_{i\_fed\_us} \\ \varepsilon_{gdp} \\ \varepsilon_{cpi} \\ \varepsilon_{mb} \\ \varepsilon_{cred\_priv} \\ \varepsilon_{ir\_tbill\_tot} \\ \varepsilon_{neer} \end{bmatrix} \quad (5)$$

The identification scheme of the contemporaneous matrix (A_0) is represented in Table 1:

The first identification is about foreign variables whereby we assume that the international oil prices are completely exogenous in the sense that they are contemporaneously affected by factors outside the specified model. In the second identification, US monetary policy (Fed's fund rate) is assumed to react contemporaneously to changes in international oil prices.

The exchange rate (the most endogenous variable in the model) is assumed to be contemporaneously affected by all variables in the model. Prices and supply of credit to the private sector are assumed to be instantaneously driven by output and in the case of money demand behaviour. The money equation (M), represented as real money balance, follows the traditional money demand that is contemporaneously influenced by the level of output (GDP), and prices (CPI).

[3] In the alternative formulation, the overnight interbank cash market rate (IBCMR) was added to see the relative strength of the interest rate-based framework in attaining the policy objectives instead of reserve money.

Table 1. Identification scheme of the SVAR model.

	oil _ brent	*i _ fed _ us*	*gdp*	*cpi*	*cred _ priv*	*mb*	*ir _ tbill _ tot*	*neer*
oil _ brent	1	0	0	0	0	0	0	0
i _ fed _ us	C(1)	1	0	0	0	0	0	0
gdp	0	0	1	0	0	0	0	0
cpi	0	0	C(4)	1	0	0	0	0
cred _ priv	0	0	C(5)	0	1	0	0	0
mb	0	0	C(6)	C(9)	C(12)	1	0	0
ir _ tbill _ tot	0	0	C(7)	C(10)	C(13)	C(15)	1	0
neer	C(2)	C(3)	C(8)	C(11)	C(14)	C(16)	C(17)	1

Source: Author's own computations.

And lastly, interest on treasury bills is assumed to be driven by GDP, prices and shock to monetary aggregates both credit and the monetary base.

Data and variables

The study uses quarterly data covering the first quarter of 2002 to the fourth quarter of 2018. As in many VAR studies, the analysis is done in the first difference of the variables which are seasonally adjusted. All the variables are expressed in logarithms.

Before the estimation of the model, the time-series properties of each of the variables in the model was examined, two widely-used unit root tests were performed: the augmented Dickey-Fuller (ADF) test and the Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test. The overall results suggest that most variables under consideration have a unit root in a level form but are stationary in the first-order log-difference form.

Having specified the model, the appropriate lag length of the VAR model was decided using the Akaike information criteria (AIC). There is an advantage of selecting optimal lag length since choosing a relatively too large lag length will typically result in poor and inefficient estimates of the parameters while a too-short lag length, will lead to biased estimates, as unexplained information will be left in the error term. The adjustment was made to allow for more lags to ensure the residuals are white noise.

EMPIRICAL RESULTS AND DISCUSSION

Unit root test for model variables

Results of the ADF and PP unit root tests are reported in Annex 2. Except for credit to the private sector and reserve money, all other variables have unit root in level. However, after differencing, the null hypothesis of unit root is rejected for all variables at all significance levels implying all variables are I (1) (Annex 1).

Selection of lag length

The results of lag length based on various lag selection criteria are provided in Annex 3. The results indicate that Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ) supported a lag length of 1 while sequentially modified LR test statistic and Final prediction error (FPE) proposed a lag length of 2. On the other hand, the Akaike information criterion (AIC) recommended a lag length of 5. The study picks a lag length of 2 in the baseline model and a lag length of 3 in the robustness check.

Model estimation results

Contemporaneous coefficients

Table 2 presents the coefficients of the SVAR identification restrictions[4] that were estimated using the OLS method. The results indicate that 4 out of 17 estimated structural contemporaneous parameters are statistically significant. The majority of the parameters appear to be statistically insignificant meaning that there exists no meaningful instantaneous relationship between the variables in the SVAR model (Annex 4).

The first significant parameter is C (1) which captures the contemporaneous effect of the changes in international oil prices on the US fed fund rate. The coefficient carries a negative sign, implying that the Fed fund rate reacts negatively to the rising global oil prices.

The second parameter is C (2) which captures the contemporaneous pass-through of the international oil prices to the nominal exchange rate of the Tanzanian Shilling against a basket of currencies. Again, the coefficient carries a negative sign, which means that an increase in global oil prices leads to an appreciation of the currency; this is counter-intuitive since Tanzania is not an oil-exporting country.

The third coefficient is C (6) which captures the

[4] see section 4.3: Identification of the SVAR model on page 13-14

Table 2. Contemporaneous structural VAR estimates.

Restriction	Coefficient	Std. error	z-Statistic	Prob.
C(1)	-0.004195	0.002126	-1.973361	0.0485
C(2)	-0.055716	0.029110	-1.913971	0.0556
C(3)	-0.610605	2.067091	-0.295394	0.7677
C(4)	-0.037474	0.072263	-0.518578	0.6041
C(5)	0.073777	0.224802	0.328185	0.7428
C(6)	-0.426548	0.198385	-2.150100	0.0315
C(7)	-0.073092	0.126854	-0.576185	0.5645
C(8)	0.558958	0.278644	2.005991	0.0449
C(9)	-0.190033	0.348639	-0.545072	0.5857
C(10)	0.019394	0.215791	0.089875	0.9284
C(11)	-0.627533	0.454013	-1.382190	0.1669
C(12)	0.160826	0.112070	1.435048	0.1513
C(13)	0.071618	0.070310	1.018598	0.3084
C(14)	-0.224398	0.199520	-1.124687	0.2607
C(15)	-0.008148	0.077190	-0.105556	0.9159
C(16)	-0.027624	0.178176	-0.155040	0.8768
C(17)	0.177712	0.279222	0.636454	0.5245

Source: Author's own computations.

instantaneous reaction of monetary policy (through the monetary base) to aggregate demand shock (output). The coefficient is negative implying that, the monetary policy responds negatively to a positive demand shock (increase in output). This is counter-intuitive based on the quantity theory of money (Friedman and Schwarts, 1963).

The last coefficient is C (8) which captures the contemporaneous reaction of the exchange rate to an aggregate demand shock. The coefficient is positive implying that, an increase in output causes depreciation of the nominal exchange rate.

The nature of causality between macroeconomic variables present in the model was also assessed by using the Granger causality test as reported in Annex 5.

Although the SVAR is a very reliable method in econometric analysis, it is challenging to interpret the coefficients of the contemporaneous relationships straight. As a result, Stock and Watson (2001) suggested the impulse response functions and forecast error variance decomposition as more powerful explanatory techniques to understand the relationship among the variables.

Structural impulse response function

Figure 6 reports the results of the structural impulse response functions for all variables in the SVAR model. The impulse response functions show the dynamic response of output, prices, exchange rate, credit to the private sector and nominal exchange rate to a positive monetary policy shock (increase in reserve money) over 20 quarters. The reserve money is chosen as a proxy for monetary policy shocks since it is regarded as a de facto operating target in the monetary policy formulation and implementation by the Bank of Tanzania. Point estimates (the solid line) and the 90% confidence intervals (the dashed lines) are graphed for all the variables (Annex 6).

i) Initially, the monetary policy easing lowers output marginally in the first two quarters, which is inconsistent with the economic theory before starting to increase in the succeeding quarters. The maximum impact of the monetary policy shock is attained after three quarters. This finding is consistent with the study by Montiel et al. (2012) and perhaps indicates the dominance of supply factors in explaining output variation in Tanzania.

ii) Similarly, as a result of the initial decline in output, prices fall slightly in the first two quarters consistent with economic theory. Thereafter, prices start to increase. The peak effect of monetary policy shock on prices is attained after four quarters. This finding is also consistent with the study by Montiel et al. (2012).

iii) Following monetary policy easing, the supply of credit to the private sector responds positively peaking in the second quarter and remaining positive throughout the period. This signals the effectiveness of the credit/bank lending channel in line with the findings of the study by Mbowe (2015b).

iv) As expected, following the monetary policy shock, the treasury bills rate responds negatively in the first two quarters before starting to increase in successive quarters.

v) As a result of monetary policy easing, the exchange

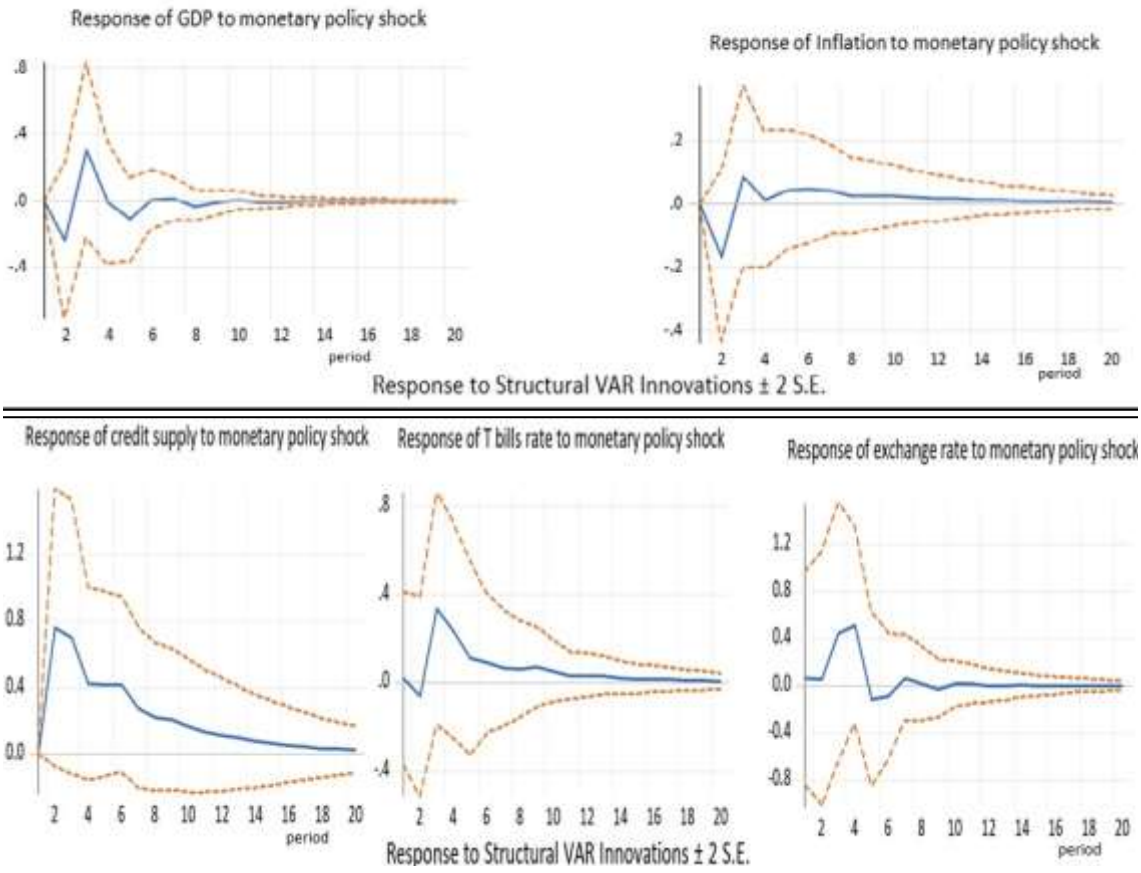


Figure 6. Structural impulse response functions.
Source: Authors own computations .

rate depreciates and remains so for about five quarters consistent with economic theory.

Forecast error variance decomposition

The results of forecast error variance decompositions for GDP, Inflation, the supply of credit to the private sector and nominal effective exchange rate are illustrated in Figure 7 and Annexes 7 and 10. The variance decompositions are computed using the Monte Carlo approach of Runkle (1987). The forecast error variance decomposition splits the variation in an endogenous variable into the component shocks to the SVAR. Therefore, the variance decomposition gives information about the comparative importance of each shock in affecting the variables in the SVAR model.

The results of the variance decomposition of the SVAR model show that the variation in output is mostly by itself. The fluctuations due to reserve money are not so large indicating that the transmission of the monetary shocks into the real economy is rather weak (Twinoburyo and Odhiambo (2018). Innovations in the monetary policy account for almost 3.7% of fluctuations in GDP after 4 quarters and 4.0% after 8 quarters (Annex 10). The GDP dynamics is mainly explained by changes in the global oil prices and changes in the nominal exchange rate that account for 4.7 and 4.0% respectively in variation in output after four quarters. The high contribution of international oil prices on output may be explained by the fact that changes in global oil prices impact production costs domestically.

About 77.1% of inflation dynamics after four quarters are mostly due to its innovations, indicating a relatively high degree of inflation persistence. After four quarters, inflation dynamics are mainly explained by variations in global oil prices (8.2%) and domestic demand conditions (5.5%) while monetary policy explains only 2.3%. The results imply that the role of monetary policy in explaining GDP dynamics is relatively much stronger compared to inflation dynamics.

Thus, the forecast error variance decomposition results with regard to the effectiveness of monetary policy in explaining the ultimate policy variables indicate that the transmission is weak. On the other hand, results indicate that the money supply is relatively stronger in explaining variation in output compared to inflation dynamics.

The results also indicate that the contribution of

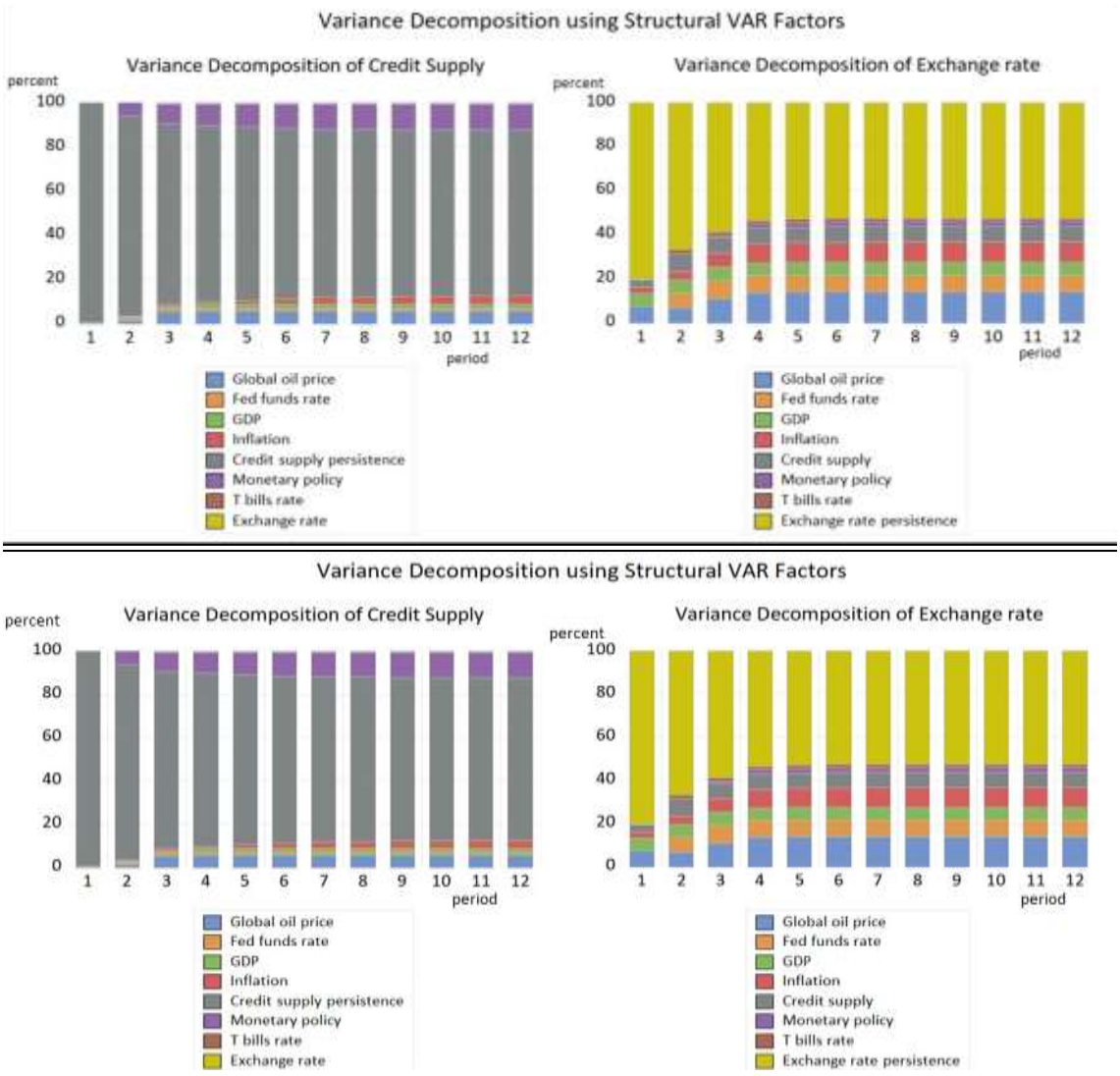


Figure 7. Forecast error variance decomposition.
Source: Authors own computation.

monetary policy in the variation of the supply of credit to the private sector is the largest among all variables in the model. It contributes about 10% after four quarters.

It can also be noted from the results of the forecast error variance decomposition that the significance of the variables' own innovations may imply the importance of structural factors such as exogenous supply shocks, terms of trade and productivity shocks and expectations in explaining the dynamics of the model variables.

Variance decomposition using interbank rate as an operating target

Figure 7 shows the forecast error variance decomposition using the interbank rate as a monetary policy operating target. The results indicate that the interbank bank rate is relatively weaker in explaining output and inflation variations than the monetary base. The weakness of the interest rate can be attributed to the fact that; the monetary base has been used as a monetary policy operating target while the interest rate was taken exogenously. Table 3 show the forecast error variance decomposition using interbank rate as the operating target.

Robustness checks

For robustness purposes, two approaches are used. In the first approach, the results of forecast error variance decomposition using structural identification are compared with Cholesky identification using the same number of lags. The results are broadly identical confirming that

Table 3. Forecast Error Variance Decomposition using interbank rate as the operating target.

Varance decomposition of GDP									
Period	**S.E.**	**Global oll prices**	**Fed fund rate**	**GDP**	**Inflation**	**Credit supply**	**IBCM rate**	**Tblll rate**	**Exchange rate**
1	16.620	0.000	0.000	100.000	0.000	0.000	0.000	0.000	0.000
2	17.265	2.471	1.382	92.668	0.005	0.075	0.337	0.121	2.941
3	17.279	5.352	l.S31	87.4S2	1.139	0.091	0.495	0.296	3.313
4	17.296	5.331	l.S63	86.447	1.351	0.351	0.995	0.358	3.304
5	17.296	5.317	2.005	86.173	1.343	0.435	1.048	0.373	3.303
6	17.296	5.452	2.004	85.927	1.398	0.481	1.045	0.389	3.304
7	17.296	5.459	2.025	85.S51	1.397	0.503	1.064	0.399	3.302
8	17.296	5.458	2.031	85.S29	1.396	0.504	l.On	0.407	3.304
9	17.296	5.459	2.030	85.SU	1.399	0.516	1.071	0.409	3.303
10	17.296	5.461	2.034	8S.792	1.399	0.527	1.073	0.410	3.304
11	17.296	5.462	2.035	85.785	1.399	0.529	1.073	0.411	3.304
12	17.295	5.452	2.037	85.7S4	1.400	0.529	1.073	0.412	3.304
Variance decomposition of Inflation									
Period	**S.E.**	**Global oll prices**	**Fed fund rate**	**GDP**	**Inflation**	**Credit supply**	**IBCM rate**	**Tblll rate**	**Exchange rate**
1	0.291	0.000	0.000	0.951	99.049	0.000	0.000	0.000	0.000
2	0.319	5.555	0.135	0.740	86.764	3.544	0.144	2.049	0.957
3	0.338	6.641	0.425	5.627	S0.735	3.060	0.125	2.000	1.357
4	0.346	9.805	0.401	5.094	77.048	4.315	0.17S	1.795	1.354
5	0.350	10.555	O.525	4.957	75.271	5.006	0.317	1.721	1.338
6	0.351	10.S23	0.978	4.942	74.623	5.255	0.313	1.745	1.320
7	0.352	10.SS9	1.032	4.925	74.373	5.408	0.312	1.745	1.315
8	0.352	10.925	1.076	4.918	74.152	5.553	0.315	1.739	1.311
9	0.352	10.970	1.116	4.906	73.985	5.660	0.317	1.735	1.313
10	0.352	10.985	1.140	4.900	73.900	5.712	0.317	1.735	1.312
11	0.352	10.986	1.152	4.897	73.860	5.743	0.317	1.734	1.311
12	0.352	10.987	1.159	4.895	73.832	5.765	0.317	1.733	1.311
Factorization: Structural									

Source: Author's own computations.

the structural identification was robust in identifying responses to the monetary policy shock (Annex 8). In the second approach, the results of the forecast error variance decomposition using structural identification with two lags are compared with forecast error variance decomposition using structural identification with one lag (Annexes 9 and 10). Likewise, the results are broadly the same, confirming that the baseline specification of the model was appropriate.

Comparison with other studies

The results of the study are broadly similar to those of Montiel et al. (2012), Mbowe (2015a) and Berg et al. (2013) on the weaker role of monetary policy for macroeconomic stabilization. Also, the strength of the bank lending channel is similar to the findings by Mbowe (2015b)

CONCLUSIONS AND POLICY IMPLICATION

This study endeavoured to assess the monetary policy transmission mechanism in Tanzania over the period 2002 to 2018. The study used the average reserve money as a measure of the stance of the monetary policy.

Generally, consistent with other studies in developing countries; the empirical findings indicate that the effectiveness of monetary policy in explaining GDP and inflation variations is relatively weak. This implies that the responsiveness of output and prices to changes in monetary policy are generally limited and slow.

Nevertheless, it appears that the impact of monetary policy in Tanzania is relatively stronger in explaining the

dynamics of credit supply and output than in the case of inflation. Inflation dynamics are highly influenced by developments in international oil prices. The global oil prices also explain much of the variations in the nominal exchange rate.

The result portrays two major policy implications, the first one being sustaining financial sector reforms geared towards eliminating the remaining structural impediments[5] that hinder financial deepening.

Secondly, to enhance price stabilization, the Bank may opt to switch to an alternative monetary policy framework. The alternative framework could be inflation targeting using interest as an operating target. The inflation-targeting framework has proved to be successful in other countries and is also set to be the de facto framework under the envisaged East African Monetary Union (EAMU) in 2024.

Regarding the weak transmission of monetary policy to prices, the study recommends the Bank of Tanzania embark on an inflation-targeting framework using the interest rate as an operating target to enhance price stabilization.

Also, the Bank of Tanzania should continue monitoring global developments, especially the movements in international oil prices to constrain the impact of the shocks and safeguard domestic macroeconomic stability.

Concerning areas for further research, the study might benefit from further research in the following lines of enquiry.

The first inquiry should base on an investigation of the relative importance of fiscal policy in driving price and output dynamics. This might be achieved by the inclusion of the overall deficit to GDP ratio in the model to capture the stance of the fiscal policy.

Another interesting area for further research is to analyse whether the weak effects of monetary policy on key macroeconomic variables are present also in other East African countries.

Lastly, it is also recommended to do another study that will split the sample between two periods, that is, the period before and after financial innovations which started in 2013/14 to gauge the relative strength of the monetary policy in the two episodes. This was not done in the current study due to data limitations, particularly after the financial innovations.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Balele N, Kessy N, Mpemba Z, Aminiel F, Sije G, Mung'ong'o E (2018). Financial Sector Reforms and Innovations and their Implications on Monetary Policy Transmission in Tanzania, Bank of Tanzania working paper, Dar es salaam.

Bank of Tanzania (BOT) (1965). Bank of Tanzania Act. Dar es salaam. Tanzania.

Bank of Tanzania (BOT) (1995). Bank of Tanzania Act. Dar es salaam. Tanzania.

Bank of Tanzania (BOT) (2004). Banking Supervision Report. Dar es salaam. Tanzania.

Bank of Tanzania (BOT) (2006). Bank of Tanzania Act. Dar es salaam. Tanzania.

Bank of Tanzania (BOT) (2017). Banking Supervision Report. Dar es salaam. Tanzania.

Bank of Tanzania (BOT) (2018). Monetary Policy Statement 2018/19. Dar es salaam. Tanzania.

BFIA (1991). Banking and Financial Institutions Act 1991, Cap 342 (the "BFIA '91"). https://www.findevgateway.org/sites/default/files/publications/files/mfg-en-paper-banking-and-financial-institutions-act-1991-the-united-republic-of-tanzania-1991.pdf

Berg MA, Charry ML, Portillo MRA, Vlcek MJ (2013). The monetary transmission mechanism in the tropics: A narrative approach. International Monetary Fund.

Bernanke BS (1986). Alternative explanations of the money-income correlation, Econometric Research Memorandum No. 321.

Buigut S (2009). Monetary Policy Transmission Mechanism: Implications for the Proposed East African Community (EAC) Monetary Union, available at: http://www.csae.ox.ac.uk/conferences/2009-EdiA/paperlist.htm

Carranza L, Galdon-Sanchez JE, Gomez-Biscarri J (2010). Understanding the relationship between financial development and monetary policy. Review of International Economics 18(5):849-864.

Cheng K, Podpiera R (2008). Promoting Private Sector Credit in the East African Community: Issues Challenges and Reform Strategies. Washington DC: World Bank.

Davoodi HR, Dixit S, Pinter G (2013). Monetary Transmission Mechanism in the East African Community: An Empirical Investigation, IMF Working Paper 13/39.

Friedman M, Schwarts AJ (1963). Money and Business Cycles. Review of Economics and Statistics.

FinScope Survey (2017). 'Insights That Drive Financial Inclusion'. Dar es Salaam: FinScope Tanzania. Available at: www.fsdt.or.tz/wp-content/uploads/2017/09/FinScope-Tanzania-2017-Insights-thatDrive-Innovation.pdf (accessed 10 May 2021).

FSAP (2003). The 2003 Tanzania FSAP report is available online at http://www.imf.org/external/pubs/ft/scr/2003/cr03241.pdf

FSDT (2017). State of The Financial Sector: are Financial Services Meeting the Needs of the Market? Supply-Side Report.

Kessy PJ, Nyella J, Stephen AC (2017). Monetary Policy in Tanzania. Africa: Policies for Prosperity Series P 241.

Ma Y, Lin X (2016). Financial development and the effectiveness of monetary policy. Journal of Banking and Finance 68:1-11.

Mbowe WEN (2015a). Monetary Policy Rate Pass-through to Retail Bank Interest Rates in Tanzania. Bank of Tanzania working papers.

Mbowe WEN (2015b). The Bank Lending Channel of Monetary Policy Transmission: Estimation using Bank-Level Panel Data on Tanzania, Bank of Tanzania working papers.

Mishkin F (1995). Symposium on the Monetary Transmission Mechanism: Journal of Economic Perspectives 9(4).

Mishkin F (1996). The Channels of Monetary Transmission: Lessons for Monetary Policy, NBER Working Paper no. 5464.

Mishra MP, Montiel MP, Spilimbergo MA (2010). Monetary Transmission in Low Income Countries, IMF Working Paper. https://books.google.com/books?hl=en&lr=&id=IJUYEAAAQBAJ&oi=fnd&pg=PA4&dq=Mishra+MP,+Montiel+MP,+Spilimbergo+MA+(2010).+Monetary+Transmission+in+Low+Income+Countries,+IMF+Working+Paper,+http://www.imf.org/external/pubs/ft/wp/2010/wp+10223.pdf&ots=Oe33FK6A_T&sig=NNE-eCqwvpguPu4ht2AjNgYVhTA

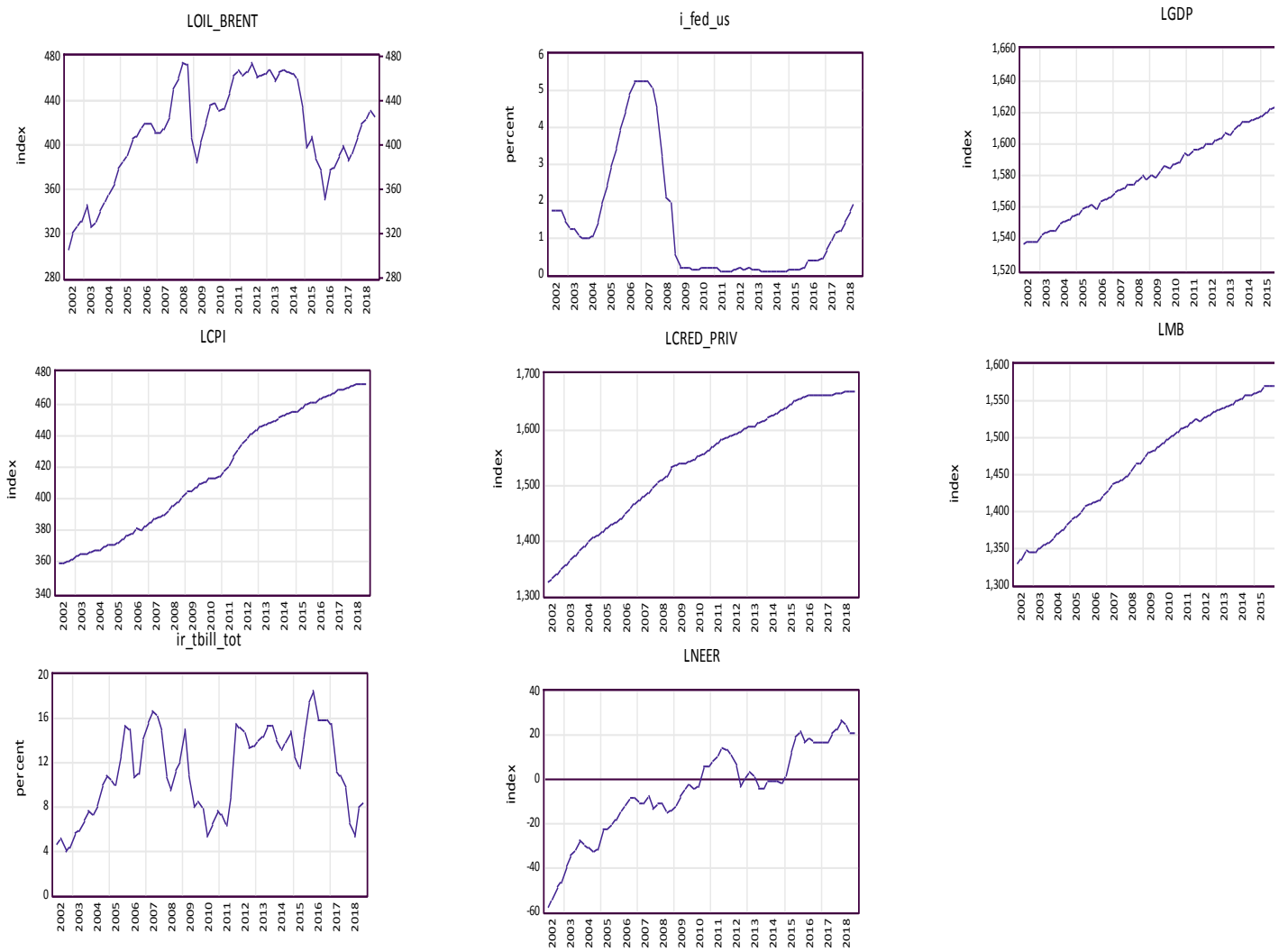
Mishra P, Montiel PJ, Spilimbergo A (2012). Monetary transmission in low-income countries: effectiveness and policy implications. IMF Economic Review 60(2):270-302.

Modigliani F (1971). Consumer Spending and Monetary Policy: The Linkages. Federal Reserve Bank of Boston Conference Series 5.

[5] Include among other, large informal sector, high cost of financial services, limited financial education.

Montiel P, Adam CS, Mbowe W, O'Connell S (2012). Financial Architecture and the Monetary Transmission Mechanism in Tanzania, CSAE Working Paper, WPS/2012-03.
Mukherjee S, Bhattacharya R (2011). Inflation Targeting and Transmission Mechanisms in Emerging Economies, IMF working Paper no. 11/229.
Nyagetera BM, Tarimo B (1997). 'Financial and Monetary Sector Management During and After Reform in Tanzania'. In D. Bol, et al., (eds.). Economic Management in Tanzania, Dar es Salaam, Economic Research Bureau and Department of Economics.
Nguyen HT (2014). Monetary transmission mechanism analysis in a small, open economy: The case of Vietnam. PhD thesis, University of Wollongong.
Nyorekwa E, Odhiambo N (2014). Monetary policy performance in Tanzania (1961-2014): A review. Banks and Bank Systems 9(4):8-15.
Pham TA (2016). Monetary policies and the macroeconomic performance of Vietnam. PhD Thesis. Queensland University of Technology. Available from: https://eprints.qut.edu.au/95942/1/Tuan_Pham%20Anh_Thesis.pdf
Runkle DE (1987). Vector Autoregressions and Reality, Journal of Business and Economic Statistics pp. 437-442.
Sacerdoti E (2005). Access to bank credit in Sub Saharan Africa: Key Issues and Reform Strategies. Washington DC: IMF.
Sims CA (1980). Macroeconomics and Reality, Econometrica 48:1-49.
Sims CA (1992). Interpreting the macroeconomic time series facts: The effects of monetary policy. European Economic Review 36:975-1000.
Stock JH, Watson MW (2001). Vector Auto regressions. Journal of Economic Perspectives 15:101-115.
Tahir MN (2012). Relative Importance of Monetary Transmission Channels: A Structural Investigation; A case of Brazil, Chile, and Korea. University of Lyon Working Paper Series.
Taylor JB (1995). The Monetary Transmission Mechanism: An Empirical Framework. Journal of Economic Perspectives 9(4):11-26.
Tobin J (1969). A General Equilibrium Approach to Monetary Theory. Journal of Money, Credit and Banking 1(1):15-29.
Twinoburyo EN, Odhiambo NM (2018). Can Monetary Policy drive economic growth? Empirical evidence from Tanzania. Contemporary Economics 12(2):207-222.

APPENDIX



Annex 1. Graphical presentation of variables.
Source: Authors' computations

Annex 2. Unit root test results.

UNIT ROOT TEST RESULTS TABLE (ADF)

Null Hypothesis: the variable has a unit root

At level

		LOIL_BRENT	I_FED_US	LGDP	LCPI	LMB	LCRED_PRIV	IR_TBILL_364	LNEER
With constant	t-Statistic	-2.3728	-3.1174	-0.0631	-0.6133	-4.5136	-6.1593	-2.4483	-2.5789
	Prob.	*0.1533*	*0.0303*	*0.9485*	*0.8600*	*0.0005*	*0.0000*	*0.1329*	*0.1024*
		n0	**	n0	n0	***	***	n0	n0
With constant and trend	t-Statistic	-2.1706	-3.6747	-7.3667	-1.1981	2.4063	0.7360	-1.9097	-3.3450
	Prob.	*0.4976*	*0.0315*	*0.0000*	*0.9025*	*1.0000*	*0.9996*	*0.6381*	*0.0680*
		n0	**	***	n0	n0	n0	n0	*
Without constant and trend	t-Statistic	0.3681	-1.8044	8.8586	3.5770	2.4794	3.5223	-0.4258	-2.5604
	Prob.	*0.7880*	*0.0679*	*1.0000*	*0.9999*	*0.9965*	*0.9998*	*0.5258*	*0.0111*
		n0	*	n0	n0	n0	n0	n0	**

At first difference

		d(LOIL_BRENT)	d(I_FED_US)	d(LGDP)	d(LCPI)	d(LMB)	d(LCRED_PRIV)	d(IR_TBILL_364)	d(LNEER)
With constant	t-Statistic	-6.2202	-3.5390	-13.3584	-4.4808	-3.7248	-4.8262	-7.3504	-6.1645
	Prob.	*0.0000*	*0.0099*	*0.0000*	*0.0005*	*0.0058*	*0.0002*	*0.0000*	*0.0000*
		***	***	***	***	***	***	***	***
With constant and trend	t-Statistic	-6.2726	-3.5299	-13.2526	-4.4509	-7.5443	-7.2296	-7.5923	-6.2653
	Prob.	*0.0000*	*0.0445*	*0.0001*	*0.0036*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
		***	**	***	***	***	***	***	***
Without constant and trend	t-Statistic	-6.2225	-3.5667	-0.4549	-1.5179	-1.3401	-1.3027	-7.4018	-5.8016
	Prob.	*0.0000*	*0.0006*	*0.5136*	*0.1201*	*0.1652*	*0.1761*	*0.0000*	*0.0000*
		***	***	n0	n0	n0	n0	***	***

UNIT ROOT TEST RESULTS TABLE (PP)

Null Hypothesis: the variable has a unit root

At Level

		LOIL_BRENT	I_FED_US	LGDP	LCPI	LMB	LCRED_PRIV	IR_TBILL_364	LNEER
With constant	t-Statistic	-2.4722	-1.7031	-0.0419	-0.2982	-4.0147	-5.5226	-2.4799	-2.4719
	Prob.	*0.1268*	*0.4251*	*0.9508*	*0.9190*	*0.0024*	*0.0000*	*0.1249*	*0.1268*
		n0	n0	n0	n0	***	***	n0	n0
With constant and trend	t-Statistic	-2.1328	-1.7816	-7.3667	-1.5030	3.6067	0.6605	-2.2180	-3.0089
	Prob.	*0.5183*	*0.7025*	*0.0000*	*0.8190*	*1.0000*	*0.9995*	*0.4719*	*0.1376*
		n0	n0	***	n0	n0	n0	n0	n0
Without constant and trend	t-Statistic	0.5994	-1.2888	31.2834	7.2771	5.5548	6.4865	-0.4789	-2.9141
	Prob.	*0.8434*	*0.1803*	*1.0000*	*1.0000*	*1.0000*	*1.0000*	*0.5047*	*0.0042*
		n0	n0	n0	n0	n0	n0	n0	***

Annex 2. Contd.

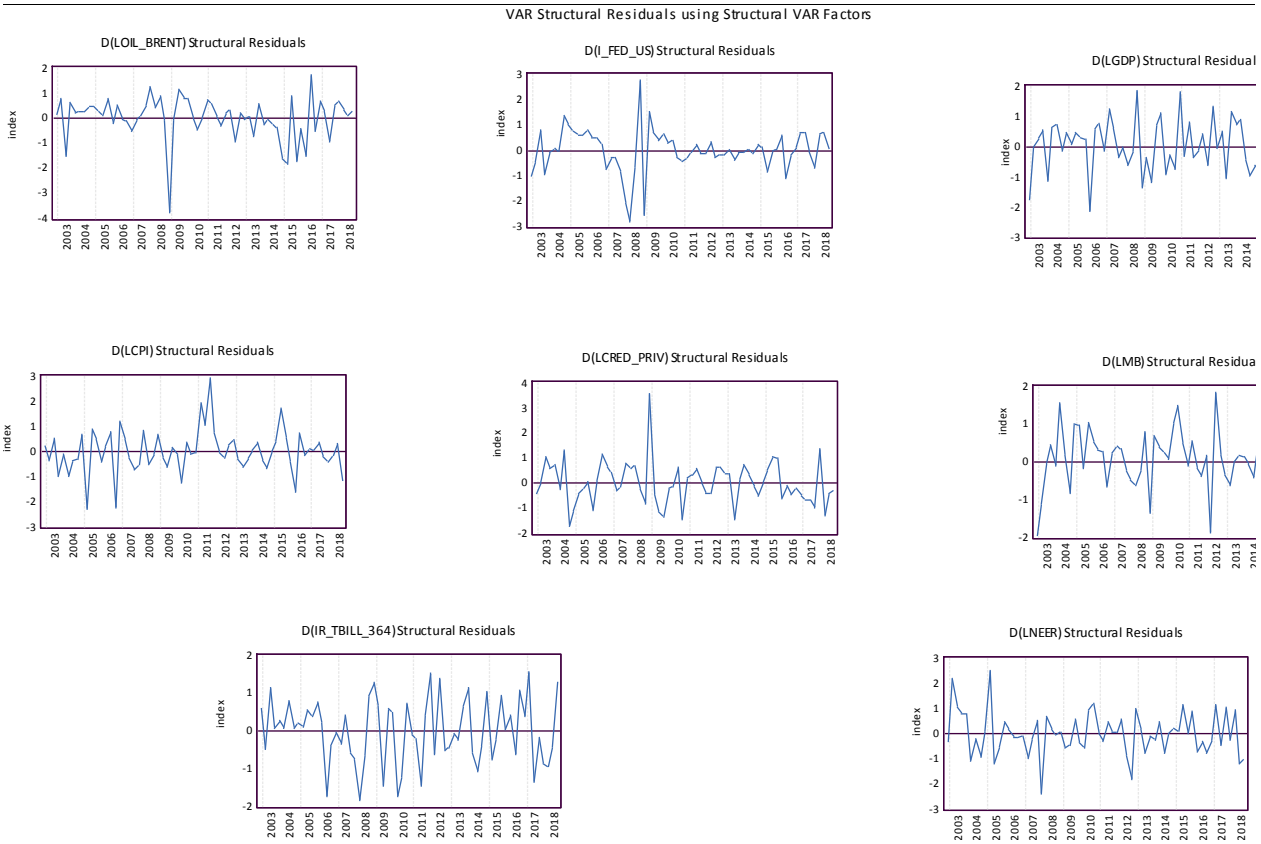
		At first difference							
		d(LOIL_BRENT)	**d(I_FED_US)**	**d(LGDP)**	**d(LCPI)**	**d(LMB)**	**d(LCRED_PRIV)**	**d(IR_TBILL_364)**	**d(LNEER)**
With constant	t-Statistic	-6.0501	-3.7090	-39.5311	-4.5967	-5.8246	-4.8297	-6.5575	-6.0477
	Prob.	*0.0000*	*0.0061*	*0.0001*	*0.0004*	*0.0000*	*0.0002*	*0.0000*	*0.0000*
		***	***	***	***	***	***	***	***
With constant and trend	t-Statistic	-6.0800	-3.7064	-39.4180	-4.5566	-7.5443	-7.2382	-8.8499	-6.1473
	Prob.	*0.0000*	*0.0289*	*0.0001*	*0.0026*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
		***	**	***	***	***	***	***	***
Without constant and trend	t-Statistic	-6.0754	-3.7359	-7.5008	-1.8073	-3.1033	-2.1217	-6.6061	-5.7649
	Prob.	*0.0000*	*0.0003*	*0.0000*	*0.0675*	*0.0024*	*0.0335*	*0.0000*	*0.0000*
		***	***	***	*	***	**	***	***

a: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1% and (no) Not Significant; b: Lag Length based on SIC; c: Probability-based on MacKinnon (1996) one-sided p-values.
Source: Author's own computations.

Annex 3. Lag length selection.

VAR lag order selection criteria						
Endogenous variables: LGDP LCPI LMB LCRED_PRIV IR_TBILL_364 LNEER						
Exogenous variables: C LOIL_BRENT I_FED_US						
Sample: 2002Q1 2018Q4						
Included observations: 62						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-1635.000	NA	1.44e+13	53.00001	53.27448	53.10777
1	-946.7623	1176.665	26286.39	32.86330	35.33352*	33.83317*
2	-871.5075	109.2408*	20179.31*	32.50024	37.16622	34.33222
3	-812.5319	70.39026	31182.50	32.66232	39.52404	35.35641
4	-734.3235	73.16269	35507.10	32.20398	41.26146	35.76018
5	-628.3408	71.79477	29368.94	30.84970*	42.10293	35.26800

* 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 Source: Author's own computations.



Annex 4. Structural residuals.

Annex 5. Inverse Roots of the SVAR model.

Roots of Characteristic Polynomial	
Exogenous variables: C GFIN	
Lag specification: 1 2	
Root	**Modulus**
0.829512	0.829512
0.683949	0.683949
0.041086 - 0.680557i	0.681796
0.041086 + 0.680557i	0.681796
0.673581	0.673581
-0.177248 - 0.619648i	0.644501
-0.177248 + 0.619648i	0.644501
0.342637 - 0.372705i	0.506270
0.342637 + 0.372705i	0.506270
-0.406151 - 0.006740i	0.406207
-0.406151 + 0.006740i	0.406207
-0.226229 - 0.312303i	0.385633
-0.226229 + 0.312303i	0.385633
0.140634 - 0.318484i	0.348152
0.140634 + 0.318484i	0.348152
-0.211567	0.211567
No root lies outside the unit circle.	
VAR satisfies the stability condition.	

Source: Author's own computations.

Annex 6. Residual correlation LM test.

VAR Residual Serial Correlation LM Tests
Sample: 2002Q1 2018Q4
Included observations: 64

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	79.12051	64	0.0965	1.278725	(64, 185.3)	0.1052
2	64.07568	64	0.4738	0.998264	(64, 185.3)	0.4901
3	64.31394	64	0.4655	1.002555	(64, 185.3)	0.4818
4	64.67251	64	0.4530	1.009023	(64, 185.3)	0.4693
5	56.69102	64	0.7300	0.867578	(64, 185.3)	0.7421

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	79.12051	64	0.0965	1.278725	(64, 185.3)	0.1052
2	121.3654	128	0.6481	0.910550	(128, 178.6)	0.7125
3	204.2218	192	0.2595	1.000839	(192, 129.8)	0.5021
4	305.9299	256	0.0176	1.024491	(256, 71.4)	0.4635
5	427.0023	320	0.0001	0.357032	(320, 9.9)	0.9975

*Edgeworth expansion corrected likelihood ratio statistic.

Source: Author's own computations.

Annex 7. Normality test.

VAR Residual Normality Tests
Orthogonalization: Estimated from Structural VAR
Null Hypothesis: Residuals are multivariate normal
Sample: 2002Q1 2018Q4
Included observations: 64

Component	Skewness	Chi-sq	df	Prob.*
1	-1.018332	11.06133	1	0.0009
2	-0.347180	1.285697	1	0.2568
3	-0.232375	0.575982	1	0.4479
4	0.137131	0.200585	1	0.6542
5	0.544210	3.159086	1	0.0755
6	-0.115692	0.142768	1	0.7055
7	-0.122260	0.159439	1	0.6897
8	0.122178	0.159227	1	0.6899
Joint		16.74412	8	0.0329

Component	Kurtosis	Chi-sq	df	Prob.
1	4.073059	3.070547	1	0.0797
2	3.188636	0.094889	1	0.7581
3	1.673766	4.690390	1	0.0303
4	2.669644	0.291028	1	0.5896
5	3.196060	0.102505	1	0.7488

Annex 7. Contd.

6	1.515157	5.879354	1	0.0153
7	1.241260	8.248441	1	0.0041
8	2.071020	2.301344	1	0.1293
Joint		24.67850	8	0.0018

Component	Jarque-Bera	df	Prob.
1	14.13188	2	0.0009
2	1.380586	2	0.5014
3	5.266372	2	0.0718
4	0.491613	2	0.7821
5	3.261591	2	0.1958
6	6.022123	2	0.0492
7	8.407880	2	0.0149
8	2.460570	2	0.2922
Joint	41.42261	16	0.0005

*Approximate p-values do not account for coefficient estimation
Source: Author's own computations.

Annex 8. Variance decomposition of Structural VAR model[6].

Variance decomposition of D(LGDP):

Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8
1	16.61964	0.000000	0.000000	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	17.26453	1.836757	0.456203	92.92994	0.141304	0.027676	1.535760	0.027896	3.044462
3	17.27870	4.540332	0.417184	85.26182	1.380243	0.188583	3.748444	0.503259	3.960140
4	17.29556	4.668033	0.780348	84.07909	1.815501	0.505335	3.687586	0.495197	3.968913
5	17.29604	4.688317	0.774573	83.69175	1.803239	0.544638	3.948833	0.617365	3.931315
6	17.29613	4.715849	0.773778	83.50256	1.844772	0.6:11181	3.939112	0.616106	4.00e645
7	17.29616	4.712470	0.797551	83.43798	1.846831	0.619005	3.937886	0.633461	4.014817
8	17.29616	4.720984	0.797022	83.38571	1.848574	0.619304	3.963430	0.633201	4.031774
9	17.29616	4.721537	0.797221	83.37112	1.848481	0.627076	3.964823	0.636207	4.033534
10	17.29616	4.731033	0.799364	83.34531	1.848594	0.642639	3.963657	0.636104	4.033431
11	17.29616	4.731007	0.799865	83.33948	1.849473	0.643635	3.966044	0.636271	4.034230
12	17.29616	4.730791	0.7999!6	83.33681	1.849904	0.644246	3.967999	0.636240	4.034055

Variance decomposition of D(LCPI):

Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8
1	0.291123	0.000000	0.000000	0.418434	99.58157	0.000000	0.000000	0.000000	0.000000
2	0.319095	6.065528	0.034455	0.342115	84.97302	3.234369	2.376945	1.823863	1.149700
3	0.338254	6.362254	0.080742	5.777286	7921571	2.787253	2.479452	1.574164	1.723139
4	0.346364	8.240481	0.287640	5.517086	77.11984	3.177941	2.289067	1.477393	1.890554
5	0.349789	8.468812	0.344436	5.924614	76.02569	3.632330	2.319439	1.459826	1.824856
6	0.351256	8.588920	0.344140	5.946211	75.71045	3.696173	2.429104	1.460010	1.824988
7	0.351923	8.573499	0.355408	6.106761	75.37831	3.757575	2.527718	1.457925	1.842808
8	0.352228	8.602750	0.358953	6.157805	75.14405	3.894372	2.550337	1.454662	1.837069
9	0.352367	8.658228	0.357981	6.156711	74.94612	4.015335	2.580051	1.453535	1.832035

[6] Shock 1 means Global oil prices, Shock 2 means Fed funds rate, Shock 3 means GDP, Shock 4 means inflation, Shock 5 means Credit supply, Shock 6 means monetary base, Shock 7 means T bills rate, Shock 8 means nominal exchange rate.

Annex 8. Contd.

10	0.352430	8.683643	0.357799	6.157882	74.83399	4.073240	2.612633	1.451357	1.829461
11	0.352458	8.688973	0.358261	6.163141	74.76328	4.116207	2.632164	1.450040	1.827938
12	0.352471	8.691423	0.358163	6.164246	74.71100	4.154890	2.644360	1.449265	1.82e648

Variance decomposition of D(LCRED PRIV):

Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8
1	1.600191	0.000000	0.000000	0.168007	0.000000	99.83199	0.000000	0.000000	0.000000
2	1.922956	0.922202	0.849942	0.844261	0.452307	90.72087	5.909633	0.292999	0.007728
3	2.017295	5.110976	1.117325	1.038048	1.010137	81.85794	9.044397	0.245044	0.576129
4	2034866	5.264483	1.033807	2.121684	1.224141	79.91539	9.658749	0.247941	0.533807
5	2.044810	5.359385	0.985161	2.064964	1.795883	78.61985	10.39068	0.280732	0.503343
6	2.047431	5.345967	0.944855	2.161011	2.452957	77.14737	11.17187	0.291274	0.484699
7	2048446	5.409273	0.920350	2.201757	2.849346	76.45939	11.40202	0.284806	0.473062
8	2.049260	5.450549	0.905118	2.192220	3.100121	76.07719	11.52832	0.282090	0.464391
9	2.049610	5.464092	0.8939n	2.191328	3.304071	75.72992	11.67256	0.285739	0.458308
10	2.049938	5.4n621	0.886064	2.193940	3.447210	75.49211	11.76053	0.287015	0.455508
11	2.050010	5.484943	0.881280	2.190126	3.548977	75.34673	11.80850	0.286312	0.453129
12	2.050070	5.483363	0.878021	2.188223	3.626481	75.23741	11.84915	0.286148	0.451201

Variance decomposition of D(LNEER):

Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8
1	0.927014	7.028739	0.223177	5.891144	2.593158	3.366248	0.032876	0.577817	80.28684
2	1.091981	6.310125	7.026458	5.718788	3.973900	7.994507	0.045560	1.8sn92	67.07287
3	1.194193	10.55987	8.464378	5.959433	6.245371	7.090478	1.047828	1.676475	58.95617
4	1.244597	13.48627	7.694739	5.774202	8.578862	7.083163	2.124504	1.538742	53.71952
5	1.26e855	13.67029	7.63729)	5.737388	8.972563	7.037263	2.165811	1.531913	53.24749
6	1.271392	13.49764	7.782317	5.851601	9.005163	7.127478	2.185929	1.532525	52.91735
7	1.274792	13.57074	7.812407	5.872965	9.098752	7.111614	2.201028	1.532803	52.79969
8	1.277123	13.56624	7.814313	5.8703e9	9.125653	7.108120	2.201018	1.534079	52.78021
9	1.278877	13.56790	7.821922	5.871365	9.127317	7.109993	2.203181	1.534122	52.76420
10	1.279836	13.57049	7.827226	5.871135	9.131046	7.108838	2203e98	1.535035	52.75253
11	1.280451	13.57036	7.828019	5.870628	9.134629	7.108220	2.204559	1.535291	52.74829
12	1.280911	13.57009	7.828715	5.870684	9.135764	7.108119	2.204540	1.535394	52.74669

Factorization: structural

Source: Author's own computations.

Annex 9. Variance decomposition using Cholesky decomposition.

Variance decomposition of GDP:

Period	S.E.	Global oil prices	Fed fund rate	GDP	Inflation	Credit supply	IBCM rate	Tbill rate	Exchange rate
1	15.314	4.254	5.353	89.393	0.000	0.000	0.000	0.000	0.000
2	15.785	3.327	10.298	81.803	0.147	0.008	2.012	0.007	2.397
3	15.814	3.223	10.989	81.033	0.144	0.064	2.072	0.110	2.355
4	15.815	3.209	10.986	80.905	0.155	0.086	2.159	0.110	2.380
5	15.815	3.208	11.025	80.842	0.155	0.111	2.157	0.111	2.381
5	15.815	3.208	11.020	80.825	0.155	0.122	2.175	0.111	2.380
7	15.815	3.209	11.021	80.818	0.155	0.129	2.177	0.111	2.380
8	15.815	3.209	11.020	80.813	0.155	0.132	2.179	0.111	2.380
9	15.815	3.209	11.020	80.811	0.155	0.133	2.179	0.111	2.380

Annex 9. Contd.

10	15.815	3.209	11.019	80.810	0.155	0.134	2.180	0.111	2.380
11	15.815	3.209	11.019	80.810	0.155	0.134	2.180	0.111	2.380
12	15.815	3.209	11.019	80.810	0.155	0.135	2.180	0.111	2.380

Variance Decomposition of Inflation:

Period	S.E.	Global oil prices	Fed fund rate	GDP	Inflation	Credit supply	IBCM rate	Tbill rate	Exchange rate
1	0.273	1.120	3.039	0.030	95.810	0.000	0.000	0.000	0.000
2	0.307	1.043	5.795	1.898	84.738	0.554	1.989	3.125	0.748
3	0.315	1.570	5.424	1.753	82.525	1.057	1.871	4.359	1.321
4	0.319	1.785	5.372	1.722	81.551	1.594	1.887	4.694	1.395
5	0.319	1.892	5.339	1.745	80.866	2.035	1.973	4.750	1.398
5	0.320	1.944	5.318	1.777	80.435	2.339	2.050	4.747	1.390
7	0.320	1.957	5.303	1.805	80.172	2.523	2.108	4.735	1.385
8	0.320	1.977	5.293	1.825	80.023	2.525	2.144	4.725	1.384
9	0.320	1.981	5.288	1.838	79.941	2.581	2.155	4.722	1.384
10	0.320	1.983	5.285	1.844	79.899	2.109	2.175	4.719	1.384
11	0.320	1.983	5.284	1.848	79.878	2.722	2.182	4.718	1.385
12	0.320	1.983	5.283	1.850	79.857	2.729	2.185	4.718	1.385

Cholelesky Ordering: D(LOIL_BRENT) D(_FED_US) D(LGDP) D(LCPI) D(LCRED_PRN) D(LMB) D(R_TBILL_354) D(LNEER)

Source: Author's own computations.

Annex 10. Variance decomposition of structural VAR model with one lag.

Variance decomposition of GDP:

Period	S.E.	Global oil prices	Fed funds rate	GDP	Inflation	Credit supply	IBCM rate	T bill rate	Exchange rate
1	15.314	0.000	0.000	100.000	0.000	0.000	0.000	0.000	0.000
2	15.785	1.587	0.588	92.855	0.100	0.123	2.347	0.007	2.392
3	15.814	1.905	0.667	92.136	0.038	0.316	2. 409	0.115	2.354
4	15.816	1.894	0.665	92.007	0.105	0.322	2.523	0.115	2.369
5	15.816	1.923	0.669	91.931	0.105	0.366	2.520	0.116	2.369
6	15.816	1.925	0.669	91.903	0.105	0.377	2.530	0.116	2.369
7	15.816	1.928	0.669	91.895	0.106	0.386	2.532	0.116	2.369
8	15.816	1.929	0.669	91.889	0.106	0.389	2.534	0.116	2.369
9	15.816	1.929	0.669	91.886	0.106	0.391	2.534	0.116	2.369
10	15.816	1.929	0.669	91.884	0.106	0.392	2.535	0.116	2.369
11	15.816	1.930	0.669	91.884	0.106	0.392	2.535	0.116	2.369
12	15.816	1.930	0.669	91.883	0.106	0.393	2.535	0.116	2.369

Variance decomposition of inflation:

Period	S.E.	Global oil prices	Fed fund rate	GDP	Inflation	Credit supply	IBCM rate	T bill rate	Exchange rate
1	0.273	0.000	0.000	0.243	99.757	0.000	0.000	0.000	0.000
2	0.307	5.160	0.127	4.854	81.551	2. 458	2.140	3.021	0.000
3	0.316	6.980	0.331	4.543	77.883	2. 948	1.975	4.146	1.196
4	0.319	7.814	0.371	4.418	76.117	3.637	1.976	4.415	1.252
5	0.319	8.171	0.390	4.352	75.169	4.156	2.059	4.454	1.250
6	0.320	8.329	0.400	4.324	74.625	4.500	2.137	4.443	1.241
7	0.320	8.392	0.407	4.317	74.322	4.702	2. 196	4.428	1.236
8	0.320	8.415	0.412	4.316	74.158	4.812	2.232	4.419	1.235

Annex 10. Contd.

9	0.320	8.423	0.415	4.317	74.073	4.870	2.254	4.414	1.234
10	0.320	8.425	0.417	4.318	74.030	4.898	2.265	4.411	1.234
11	0.320	8.425	0.418	4.319	74.003	4.912	2.271	4.410	1.235
12	0.320	8.425	0.419	4.320	73.999	4.918	2.274	4.410	1.235
Factorization: structural									

Source: Author's own computations.

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Impact of bilateral and multilateral aid on domestic savings of Sub-Saharan African countries: Mediating role of institutional quality

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This study examined the impact of bilateral and multilateral aid on domestic savings of SSA countries, taking into account the role of institutional quality. A balanced panel data set consisting of 28 SSA countries from 1996 – 2015 was used. Random effects techniques were also used. Bilateral aid was found to have negative significant impact on domestic savings of SSA countries, reflecting a crowding-out effect; while the impact of multilateral aid on domestic savings of SSA countries was found insignificant. When the bilateral and multilateral aid variables were interacted with institutional quality, the coefficient of interaction between bilateral aid and institutional quality was insignificant, while that between multilateral aid was positive and significant, implying that the impact of multilateral aid on domestic savings depends on good quality institutions. Therefore, bilateral aid is a disservice to SSA countries since it crowds-out domestic savings regardless of institutional quality; however, multilateral aid can be beneficial to SSA countries if good quality institutions exist.

Key words: Bilateral aid, multilateral aid, domestic savings, Sub-Saharan Africa.

INTRODUCTION

Foreign aid is widely regarded as an important ingredient of economic development particularly in less developed countries (Tarp and Hjertholm, 2000; Thorbecke, 2000), and one of the development outcomes attributed to foreign aid is domestic savings. However, the idea that aid buys growth through domestic savings is on shaky ground theoretically and empirically, Easterly (2003). Since the 1960s, Sub Sahara African (SSA) countries have been the largest net recipients of foreign aid relative to other aid recipient regions such as East Asia and Pacific, South Asia, Latin America and Caribbean, and Europe and Central Asia for the purpose of promoting desirable development outcomes including enhancing domestic savings. For instance, from 1996 – 2015, Net ODA receipts (% of Gross National Income) averaged 3.635 for SSA countries, 0.1 for East Asia and Pacific, 0.235 for Latin America and Caribbean, 0.72 for South Asia and 0 for Europe and Central Asia (WorldBank, 2017).

Further evidence shows that aid disbursements to the

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most aid-dependent countries coincide with significant increases in deposits held in offshore financial centers Andersen et al. (2022) while Easterly and Pfutze (2008) discuss best practice for which an ideal aid agency and the difficulties that aid agencies face because they are typically not accountable to their intended beneficiaries. In spite of this, these countries' savings performance has remained lowest relative to other aid-recipient regions. For instance, from 1996 – 2015, domestic savings (% of GDP) averaged 18.4 for SSA countries, 42.1 for East Asia and Pacific, 19.8 for Latin America and Caribbean, 27.8 for South Asia, and 25.9 for Europe and Central Asia (WorldBank, 2017).

The above conundrum has attracted widespread interest of researchers, who have since sought to study the relationship between foreign aid and domestic savings. However, their findings are largely mixed. For instance, some studies indicate that foreign aid enhances (crows-in) domestic savings (Abu and Karim, 2016; Kapingura, 2018), other studies indicate that foreign aid adversely affects (crowds-out) domestic savings (Lubbad, 2019; Ozekhome, 2017; Sabra, 2016; Ssemanda and Karamuriro, 2020), and still other studies indicate that no significant relationship exists between foreign aid and domestic savings. This implies that the debate on whether foreign aid impacts domestic savings is far from over. It is the author's considered view that the inconsistencies in these research findings may be attributed to using aggregate foreign aid variables in estimation models, which do not specify which exact form of aid impacts domestic savings. Yet, foreign aid is heterogeneous and can be classified differently according to different parameters, including according to source—bilateral or multilateral. Therefore, there is need for studies that disaggregate aid—say into bilateral and multilateral aid—and examine the impact of this disaggregated form of aid on domestic savings particularly among SSA countries.

Studying the impact of bilateral and multilateral aid on domestic savings is important in light of recent interest among donors seeking to understand the relative effectiveness of allocating aid using these two channels (Biscaye et al., 2017).

Furthermore, such studies are important in light of prevailing counter arguments pertaining to the relative effectiveness of these two aid delivery channels in achieving development goals. On the one hand, supporters of bilateral aid who argue that it leads to achievement of optimal development goals since it tends to promote greater accountability, and focuses on aid that is more strategically oriented (Dreher et al., 2011; Findley et al., 2017). However, its critics argue that it leads to achievement of sub-optimal development goals since it tends to follow more strategic and political considerations of donors (Findley et al., 2017; Rommel and Schaudt, 2020). On the other hand, are proponents of multilateral aid who argue that it leads to achievement of optimal development goals since it is less prone to fragmentation and its consequences and it focuses on initiatives that generate tangible transformation of recipient countries (Addison et al., 2015; Gulrajani, 2016; Nunnenkamp et al., 2017). Such counter arguments can only be put to rest through conducting further empirical studies.

Besides, the quality of institutions existing in aid recipient countries has long been identified as an important ingredient of sustainable development (Abderrahim and Mohamed, 2019). Countries that boast of good quality institutions tend to achieve superior growth and sustainable development because institutions provide mechanisms for ensuring resource allocation efficiency and effectiveness (Xiaosong and Siyuan, 2020). Moreover, recent research has shown that aid effectiveness particularly in less developed countries such as SSA countries is low due to widespread existence of poor quality institutions, characterized by corruption, low government effectiveness, political instability, lack of voice and accountability, and poor rule of law (Hassan, 2021; Iqbal and Daly, 2014; Maruta et al., 2020; Xiaosong and Siyuan, 2020). Burnside and Dollar (2000) attaches the significance of aid on presence of good monetary fiscal and trade policies. While, Abderrahim and Mohamed (2021) emphasize the role of institutional quality for sustainable development.

However, there remains a grey area in empirical literature that needs to be filled, that is, whether the impact of bilateral and multilateral aid on domestic savings of SSA countries depends on the quality of institutions existing in these countries. Thus, the overriding purpose of this study was to examine the impact of bilateral and multilateral aid on domestic savings of SSA countries, and to determine whether the impact depends on the quality of institutions existing in these countries. The findings of this study may benefit donors by enabling them decide on the appropriate channels of delivering aid. Further still, the study findings may alert policy makers in aid-recipient countries pertaining to the kind of institutions they must build in order to maximize value from aid.

The rest of the paper is organized into three sections, one is the methodology discussing theoretical framework and data sets used, the results are discussed in the second last section while conclusions and recommendations presented in the last section of the report.

MATERIALS AND METHODS

Theoretical framework

Studying the impact of bilateral and multilateral aid on domestic savings of SSA countries, and determining whether the impact depends on institutional quality was premised on Harrod Domar's model with its modifications by previous researchers (Shields, 2007; Taslim and Weliwita, 2000). According to Shields (2007) and Taslim and Weliwita (2000), aid serves the purpose of filling the savings

gap. Therefore,

$$A_0 = I_0 - S_0 \quad (1)$$

where A_0, I_0 and S_0 represent initial foreign aid, initial investment, and initial savings respectively.

Keynes contends that savings is a linear function of income, that is:

$$S_t = sY_t \quad (2)$$

Also, in Harrod Domar's model, the capital-output ratio is assumed to be constant, that is:

$$\frac{K}{Y} = k \quad (3)$$

where K stands for capital stock and Y stands for output. By extension, equation (3) can be transformed to mean:

$$\frac{\Delta K}{\Delta Y} = k \quad (4)$$

The target growth rate of the economy is represented by the following equation:

$$\frac{\Delta Y}{Y} = g \quad (5)$$

It is also known from economic theory that investment is a measure of change in capital stock, that is:

$$\Delta K = I \quad (6)$$

Using the definitions of savings, capital-output ratio, target growth rate of the economy, and change in capital stock in equations (2), (4), (5) and (6), equation (1) can now be specified as:

$$F_0 = (kg - s)Y_0 \quad (7)$$

From equation (7), the higher the savings rate relative to the product of target growth rate of the economy and capital output ration, the lower the foreign aid requirements. On the other hand, the lower the savings rate relative to the product of target growth rate of the economy and capital output ration, the higher the foreign aid requirements.
Integrating a time factor, investment at time *t* is becomes:

$$I_t = kgY_t \quad (8)$$

while savings at time *t* becomes:

$$S_t = sY_0 + s'(Y_t - Y_0) \quad (9)$$

Therefore, the net foreign aid requirements at time t will be represented by:

$$F_t = (kg - s')Y_t + (s' - s)Y_0 \quad (10)$$

Where *s'* represents the marginal rate of savings with time. Equation (10) implies that with time, foreign aid requirements will reduce with increase in the savings rate. Subtracting equation (9) from equation (10) yields:

$$F_t - F_0 = (kg - s')(Y_t - Y_0) \quad (11)$$

Equation (11) implies that foreign aid requirements will reduce if the marginal savings rate exceeds the product of capital-output ration and the required growth rate. Therefore, it is important that countries seek for foreign aid to fill the savings-investments gap. From equation (11), the marginal savings rate at time *t* is given as:

$$s' = kg - \left(\frac{F_t - F_0}{Y_t - Y_0}\right) \quad (12)$$

$$\frac{\partial s'}{\partial F_t} = -\frac{1}{Y_t - Y_0} < 0 \text{ and } \frac{\partial s'}{\partial Y_t} = \frac{1}{(Y_t - Y_0)^2} > 0$$

Equation (12) implies that the marginal savings rate at time *t* is inversely related to increases in foreign aid, and directly related to increases in income as highlighted by the partial derivatives. In essence, equation (12) is consistent with Shield's (2007) that foreign aid crowds-out domestic savings and investments particularly in developing countries because it often acts as incentive for promoting rent-seeking behaviors.

Empirical model

To estimate the impact of bilateral and multilateral aid on domestic savings of SSA countries, the study adopted a savings-foreign aid model from previous research, which was modified to suit the current study. Besides, the adopted model was consistent with equation (12). To begin with,

$$S = \propto + \beta A + \theta Y \quad (13)$$

where *A*, *S* and *Y* represent total aid, total savings and output respectively. Disaggregating foreign aid into bilateral and multilateral aid and integrating a variable that represents other correlates of domestic savings yields a more specific estimation model as follows. Starting with a simple saving aid function,

$$S = \alpha + \beta A + \theta Y \quad (14)$$

where; A is total aid received, S is total savings, and Y is output. Disaggregating foreign aid into two components (bilateral and multilateral aid) and including a variable representing other determinants of savings, this yields a more specified estimation model. Besides, the study relied on panel data; therefore, it was prudent to specify a model that takes into account the nature of data. Accordingly, the estimation model is specified as follows:

$$GDS_{it} = \propto + \delta BA_{it} + \emptyset MA_{it} + \beta' Z_{it} + \mu_{it} + \varepsilon_{it} \quad (15)$$

Where GDS represents Gross Domestic Savings, BA represents bilateral aid, MA represents multilateral aid, Z represents a vector of control variables including inflation, income growth, trade openness, population growth and financial development. That is;

$$Z' = \left(GDPg, INF, OPEN, \frac{M2}{GDP}, POPg\right) \quad (16)$$

Letting $x' = (BA, MA, Z')$, $y_{it} = GDS_{it}$, and $\theta' = (\delta, \emptyset, \beta')$, equation (15) can be reduced as follows:

$$y_{it} = \alpha + \theta' x_{it} + \mu_{it} + \varepsilon_{it} \quad (17)$$

In estimating equation (17), two major hypotheses will be tested,

which are:

i) Bilateral aid negatively impacts on domestic savings of SSA countries, and the impact depends on institutional quality.
ii) Multilateral aid negatively impacts on domestic savings of SSA countries, and the impact depends on institutional quality.

Definition, measurement and expected signs of variables

Gross Domestic Savings (GDS)

This is Gross Domestic Product (GDP) less consumption expenditure. It includes household savings, private corporate sector savings, and public sector savings. In the estimation model, it is expressed as a percentage of GDP.

Bilateral Aid (B_Aid)

This refers to assistance given by a Government directly to a Government of another country. It consists of net bilateral aid inflows from Development Assistance Countries (DAC). In the estimation model, bilateral aid is expressed as a percentage of GDP.

Multilateral Aid (M_Aid)

This refers to assistance given by a Government of one country and delivered through formal institutions such as the International Monetary Fund and World Bank. It is calculated as the difference between total aid and net bilateral aid inflows from Development Assistance Countries (DAC). Also, in the estimation model, it is expressed as a percentage of GDP.

GDP growth (GDPg)

This is a measure of the percentage growth in real GPD from one period to another. The higher the GDP growth rate, the higher the domestic savings; and the lower the GDP growth, the lower the domestic savings. According to the Keynesian hypothesis, which states that savings is a fixed proportion of income; therefore, an increase in income leads to an increase in savings (Blinder, 2012). Research is also abound to supporting the existence of a positive relationship between GDP growth and domestic savings (Siaw et al., 2017). Overall, the coefficient of GDP growth is expected to be positive.

Inflation (INFL)

It is a measure of the rate of increase in general price level in an economy. The impact of inflation on gross domestic savings is two-way. On the one hand, inflation may increase Gross Domestic Savings since the phenomenon may create uncertainty, which could compel risk-averse consumers to set aside resources as a way of safeguarding themselves against possible adverse changes in future income (Nagawa et al., 2020). On the other hand, inflation may reduce Gross Domestic Savings through its adverse effect on disposable income (Nagawa et al., 2020). Therefore, the coefficient of inflation is expected to be either positive or negative.

Financial sector development (M2/GDP)

It is a measure of the degree of monetization of the economy expressed as a ratio of broad money (M2) to national output (GDP) (Otchere et al., 2017). The ingredients of financial sector development include: availability of financial assets, accessibility to banking services, and accessibility to credit facilities. Gross Domestic Savings may increase with increased availability of financial assets and increased accessibility to banking facilities (Shoko and Dube, 2021).

However, increased accessibility to credit facilities may provide an incentive for increased consumption, thereby reducing Gross Domestic Savings (Shoko and Dube, 2021). Therefore, the coefficient of financial sector development is expected to be either positive or negative.

Trade openness (TOPEN)

This is a measure of the ratio of the sum of exports and imports to national output (GDP). Trade openness may increase gross domestic savings since it provides firms with incentives to innovate, expand production, and improve productivity leading to higher income (Umer and Alam, 2015). Therefore, the coefficient of trade openness is expected to be positive.

Population growth (POPg)

A high population growth rate increases the dependence burden, and this reduces gross domestic savings (Cruz and Ahmed, 2016). Therefore, the coefficient of population growth rate is expected to be negative.

Gross fixed capital formation (GFCF)

It refers to fixed asset acquisitions of less disposals by resident producers. The larger the fixed asset acquisitions which are effectively transformed into productive investments, the higher the income, and ultimately the higher the Gross Domestic Savings (Razack et al., 2015). Therefore, the coefficient of Gross fixed capital formation is expected to be positive.

Institutional quality (INSTQ)

It measures the extent to which a country's governance systems are of good quality. It comprises of six indicators adopted from the World Bank including: rule of law, government effectiveness, control of corruption, government effectiveness, voice and accountability, and political stability. These indicators are integrated into an index representing institutional quality, with values ranging from -2.5 to +2.5. The movement from -2.5 to +2.5 indicates improvement in institutional quality. Overall, the coefficient of institutional quality is expected to be positive since good quality institutions enhance resource allocation efficiency and effectiveness, while poor quality institutions compromise resource allocation efficiency and effectiveness (Xiaosong and Siyuan, 2020).

Data type and sources

The study was based on data collected from 28 SSA countries for the duration ranging from 1996 – 2015. In addition, the study employed panel data because of its advantages over pure time series or cross-sectional data. Such advantages include the following facts: it considers the heterogeneous nature of individual countries, and besides, it comprises more information and more information variability. Overall, all the data was sourced from the World Bank's Development Indicators Database.

Table 1. Descriptive analysis results.

Variable	Obs	Mean	Std. Dev.	Min	Max
GDS	560	14.31	12.03	0.192	60.43
B_Aid	560	5.336	4.428	-0.307	35.77
M_Aid	560	2.532	2.339	-3.408	11.41
GDPg	560	4.769	3.824	-12.67	33.74
POPg	560	2.618	0.775	0.132	7.989
INFL	560	7.064	8.976	-8.975	132.8
M2/GDP	560	0.130	0.154	0.0047	1.478
GFCF	560	13.31	14.38	0	112.0
TOPEN	560	0.710	0.305	0.158	2.094
INSTQ	560	-0.535	0.522	-1.619	0.853

Source: Author's Computations.

Estimation procedure

Since the data used in the study contained time series and cross-sectional elements, a panel data unit root test was undertaken to determine whether the panel data attributed to the study variables were stationary. The advantage of using panel unit root tests is that their power is significantly greater than the low-power attributed to standard time-series unit root tests found in finite samples. Two widely applied panel unit root tests were used for this purpose including: Levin, Lin and Chu (LLC) which assumes homogeneous coefficients attributed to study variables; and Im, Pesaran and Shin (IPS) which assumes heterogeneous coefficients attributed to study variables.

RESULTS AND DISCUSSION

This section presents the results of the study followed by their analysis. The analysis of the findings is categorized into: descriptive analysis, correlational analysis, panel unit roots, and panel estimates.

Descriptive analysis

Table 1 presents results of descriptive analysis of selected correlates of Gross Domestic Savings (GDS) including: bilateral aid (B_Aid), multilateral aid (M_Aid), GDP growth (GDPg), inflation (INFL), financial sector development (M2/GDP), trade openness (TOPEN), population growth (POPg), gross fixed capital formation (GFCF) and institutional quality (INSTQ).

From Table 1, all variables except INFL and GFCF had standard deviation values which were less than the corresponding mean values. This implies that the mean values were deemed good estimators of the parameters. The high standard deviations for INFL and GFCF were attributed to existence of outliers in the data series. Inflation registered a maximum value of 132, which was attributed to Sudan in 1996. However, this value is less surprising given that during this time, the country witnessed unprecedented increase in commodity prices, and this eventually led to widespread political unrest.

Correlation analysis

Before undertaking regression analysis, it is important to first establish whether independent variables in a regression model are highly correlated with one another (multicollinearity) as this may undermine the statistical significance of the independent variables. This is normally done through subjecting variables under consideration to correlation analysis.

Correlation analysis was undertaken on study variables including: bilateral aid (B_Aid), multilateral aid (M_Aid), GDP growth (GDPg), inflation (INFL), financial sector development (M2/GDP), trade openness (TOPEN), population growth (POPg), gross fixed capital formation (GFCF) and institutional quality (INSTQ). Table 2 presents a summary of results of correlation analysis.

From Table 2, all variables except GDPg, GFCF and M2/GDP are significantly related to Gross Domestic Savings. The results also indicate that the correlation coefficients for all the other variables under consideration are less than 0.8, which according to econometric theory, suggests that muliticollinearity is not a serious problem to worry about (Gujarati and Porter, 1992).

Panel unit roots

The study was executed using panel data. However, before undertaking estimation of the panel data, it was important to examine the data's stationarity properties in order to determine the correct panel data analysis method. Accordingly, Table 3 presents summarized results of panel unit root test.

The conclusion derived from Table 3 is that all panels are stationary. This is because for every variable, at least, there is one test that indicates stationarity, and this is seen from the p-values which are less than 0.05.

Panel estimates

The major goal of this study was to examine the impact of bilateral and multilateral aid on domestic savings of SSA countries, and to determine whether the impact depends on institutional quality. To achieve this goal, two approaches were used. The study first determined the impact of bilateral and multilateral aid on domestic savings of SSA countries, and then the latter approach examined whether the impact of bilateral and multilateral aid on domestic savings of SSA countries depends on institutional quality.

With regard to the first approach for achieving the study's major goal, it has been established that the panels were found stationary; therefore, the traditional Fixed Effects and Random Effects models were estimated, and the Hausman test was employed in selecting the preferred model. Since the p-values for the test exceeded 0.05, Random effects were identified as

Table 2. Correlation analysis results.

Var	GDS	INSTQ	B_Aid	M_Aid	GDPg	POPg	INFL	M2/GDP	GFCF	TOPEN
GDS	1									
INSTQ	-0.148*	1								
B_Aid	-0.370*	0.006	1							
M_Aid	-0.433*	0.009	0.693*	1						
GDPg	-0.033	-0.032	0.217*	0.171*	1					
POPg	-0.169*	-0.392*	0.445*	0.473*	0.171*	1				
INFL	-0.171*	-0.112*	0.086*	0.093*	0.473*	-0.027	1			
M2/GDP	-0.009	0.527*	-0.304*	-0.252*	0.093*	-0.541*	-0.028	1		
GFCF	-004	-0.102	0.120*	0.104*	-0.252*	0.178*	0.126*	-0.133*	1	
TOPEN	0.307*	0.153*	-0.284*	-0.292*	0.104*	-0.391*	-0.143*	0.253*	0.072	1

Source: Author's Computations.

Table 3. Panel unit root test results.

Variable	IPS		LLC	
	Coefficient	p-value	Coefficient	p-value
GDS	-3.4494***	0.0003	-1.0890	0.1381
GDpg	-9.4804***	0.0000	-7.2632***	0.0000
POPg	-0.5834	0.3787	-16.3379***	0.0000
AID	-5.8382***	0.0000	-3.9010***	0.0000
M-Aid	-7.2364***	0.0000	-3.2361***	0.0000
B-Aid	-4.9924***	0.0000	-3.7379***	0.0000
INFL	-10.5786***	0.0000	-7.0422***	0.0000
TOPEN	-0.4072*	0.0797	-2.5704***	0.0000
M2/GDP	1.7384	0.9589	-4.6660***	0.0000
INSTQ	0.0408	0.5163	-1.6494**	0.0000
GFCF	-9.7136***	0.0000	-8.0901***	0.095

*P<0.1;**P<0.05;***P<0.01.
Source: Author's Computations.

the preferred method for analyzing the impact of bilateral and multilateral aid on domestic savings of SSA counties. Table 4 presents summarized results of panel estimation using random effects.

From Table 4, when foreign aid was disaggregated into bilateral and multilateral aid, only the former was found to be a significant predictor of Gross Domestic Savings. The coefficient of bilateral aid in the third estimated Random Effects model is negative, implying that keeping other factors constant, an increase in bilateral aid by 1% point, leads to a decrease in Gross Domestic Savings by 0.25% points. This finding is consistent with the crowding-out notion which presupposes that foreign aid is counterproductive because by nature, it provides an incentive for rent-seeking behavior particularly in developing countries.

Among the control factors, GDP growth, inflation and trade openness were found to be significant predictors of Gross Domestic Savings across the three estimation models. The findings in regard to GDP growth imply that keeping other factors constant, an increase in GDP growth by one percentage point, leads to an increase in Gross Domestic Savings by about 0.3 percentage points across the three estimation models. These findings are consistent with the Keynesian hypothesis, which states that since savings is a fixed proportion of income, an increase in income leads to an increase in savings. The findings are also consistent with the life cycle/permanent income hypothesis, which presumes higher savings for countries with higher GDP growth rates compared to countries with lower GDP growth rates.

With regard to trade openness, the results in Table 4 indicate a positive and statistically significant coefficient across the three estimation models. This implies that keeping other factors constant, an increase in trade openness by one percentage point, would lead to an increase in Gross Domestic Savings by a range of 7.6 – 8.4% points. This finding supports the theoretical

Table 4. Impact of Bilateral and Multilateral Aid on Domestic Savings.

Variable	RE(1)	RE(2)	RE(3)
GDPg	0.309***	0.302***	0.307***
	(0.063)	(0.064)	(0.063)
POPg	-0.435	-0.529	-0.412
	(0.508)	(0.510)	(0.507)
INFL	-0.122***	-0.129***	-0.124***
	(0.030)	(0.031)	(0.030)
M2/GDP	1.820	2.083	1.648
	(2.579)	(2.595)	(2.576)
GFCF	-0.019	-0.019	-0.019
	(0.017)	(0.017)	(0.017)
TOPEN	7.631***	8.262***	7.640***
	(1.646)	(1.643)	(1.639)
INSTQ	-2.906**	-3.237**	-3.015**
	(1.286)	(1.295)	(1.279)
M_Aid		-0.189	
		(0.170)	
B_Aid			-0.253***
			(0.084)
Constant	9.325***	8.029***	9.149***
	(2.710)	(2.674)	(2.722)
Wald/F-stat	91.78	84.23	98.28
Prob (Wald/F-stat)	0.000	0.000	0.000
Observations	560	560	560
No. of pid	28	28	28

Standard errors in parentheses; *P<0.1; **P<0.05; ***P<0.01.
Source: Author's Computations.

argument that trade openness enhances domestic savings since it provides firms with incentives to innovate, expand production, and improves productivity leading to higher income and therefore higher savings (Umer and Alam, 2015). With regard to inflation, the results in Table 4 indicate a negative and statistically significant coefficient for inflation across the three estimation models. This means that keeping other factors constant, an increase in inflation by one percentage point leads to a reduction in Gross Domestic Savings by a range of 0.122 – 0.129% points. This finding supports the theoretical argument that inflation reduces real income leading to a decrease in savings (Nagawa et al., 2020).

To determine whether the impact of bilateral and multilateral aid on domestic savings of SSA countries depends on the quality of institutions, two interaction terms were created, one composed of multilateral aid and an index representing institutional quality, and another composed bilateral aid and an index of institutional quality. These two interaction terms were regressed separately and Table 5 presents summarized results of the impact of bilateral and multilateral aid on domestic savings of SSA countries conditional on institutional quality.

From Table 5, the results in the second model indicate that before interaction, the coefficient of multilateral aid is insignificant, but after interaction, the coefficient of the interaction term turns out positive and significant. This implies that the impact of multilateral aid on domestic savings of SSA countries depends on the quality of institutions. That is, keeping other factors constant, changing the quality of institutions by one percentage point positively changes the impact of multilateral aid on Gross Domestic Savings by 0.59% points. The results in the third model indicate that before interaction, the coefficient of bilateral aid is significant, but after interaction, the coefficient of the interaction term turns out negative and insignificant. This implies that the impact of bilateral aid on domestic savings of SSA countries does not depend on the quality of institutions. As was the case in Table 4, among the control variables, only GDP growth, inflation and trade openness remain robust

Table 5. Impact of Aid on domestic savings conditional on institutional quality.

Variable	RE(1)	RE(2)	RE(3)
GDPg	0.308***	0.305***	0.301***
	(0.064)	(0.064)	(0.063)
POPg	-0.444	-0.410	-0.481
	(0.513)	(0.513)	(0.510)
INFL	-0.121***	-0.138***	-0.117***
	(0.031)	(0.031)	(0.031)
M2/GDP	1.795	2.358	1.429
	(2.588)	(2.594)	(2.581)
GFCF	-0.019	-0.017	-0.021
	(0.017)	(0.017)	(0.017)
TOPEN	7.632***	8.249***	7.639***
	(1.648)	(1.640)	(1.638)
INSTQ	-2.750	-4.932**	-1.632
	(1.745)	(1.605)	(1.707)
M_Aid		-0.201	
		(0.275)	
M_Aid*INSTQ		0.590*	
		(0.329)	
B-Aid			0.388***
			(0.138)
B-Aid*INSTQ			-0.210
			(0.172)
Constant	9.447***	6.619**	10.228***
	(2.863)	(2.804)	(2.850)
Wald/F-stat	91.64	87.72	94.89
Prob (Wald/F-stat)	0.000	0.000	0.000
Observations	560	560	560
No. of pid	28	28	28

Standard errors in parentheses; *P<0.1; **P<0.05; ***P<0.01.
Source: Author's Computations.

predictors of domestic savings across three estimated models.

Conclusion

Compared to other aid-recipient countries, SSA countries have been the biggest net recipients of foreign aid over the years for use in promoting various development outcomes including promoting domestic savings. In spite of this, SSA countries have performed abysmally relative to other aid recipient countries in terms of domestic savings. While researchers have previously studied this conundrum, their findings have been largely mixed. It is the author's considered view that this may be attributed to using aggregate forms of foreign aid in estimation models, which don't show which specific form of foreign aid impacts domestic savings. Furthermore, it has been argued in theoretical literature, that aid effectiveness is a function of institutional quality. However, empirical evidence in support of this notion remains far limited particularly among SSA countries. Therefore, the purpose of this study was to examine the impact of bilateral and multilateral aid on domestic savings of SSA countries, and determine whether it depends on the quality of institutions existing in those countries.

The study findings show that bilateral aid has a negative and significant impact on domestic savings of SSA countries, reflecting a crowding-out effect; while the impact of multilateral aid on domestic savings of SSA countries was found insignificant. However, when the bilateral aid and multilateral aid variables were interacted

with institutional quality, it was found that the coefficient of interaction between bilateral aid and institutional quality was insignificant, while that between multilateral aid was positive and significant, implying that the impact of multilateral aid on domestic savings of SSA countries depends on good quality institutions. Therefore, this study concludes that bilateral aid is a disservice to SSA countries since it crowds-out domestic savings regardless of institutional quality; however, multilateral aid can be beneficial to SSA countries especially if good quality institutions exist.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

REFERENCES

Abderrahim C, Mohamed CS (2019). Institutional Quality and Sustainable Development in Arab Countries: Empirical Study. Magallat al-Tanmiyat wa-al-Siyasat al-Iqtisadiyyat 21(1):7-54.

Abu N, Karim MZA (2016). The relationships between foreign direct investment, domestic savings, domestic investment, and economic growth: The case of Sub-Saharan Africa. Society and Economy 38(2):193-217.

Addison T, Niño-Zarazúa M, Tarp F (2015). Aid, social policy and development. Journal of International Development 27(8):1351-1365.

Andersen JJ, Johannesen N, Rijkers B (2022). Elite Capture of Foreign Aid: Evidence from Offshore Bank Accounts. Journal of Political Economy 130(2):388-425.

Biscaye PE, Reynolds TW, Anderson CL (2017). Relative effectiveness of bilateral and multilateral aid on development outcomes. Review of Development Economics 21(4):1425-1447.

Blinder AS (2012). Keynesian economics. The concise encyclopedia of economics. Library of Economics and Liberty 12(8):45-89.

Burnside C, Dollar D (2000). Aid, Policies, and Growth. American Economic Review 90(4):847-868.

Cruz M, Ahmed S (2016). On the impact of demographic change on growth, savings, and poverty. World Bank Policy Research Working Paper.

Dreher A, Nunnenkamp P, Thiele R (2011). Are 'new'donors different? Comparing the allocation of bilateral aid between nonDAC and DAC donor countries. World Development 39(11):1950-1968.

Easterly W (2003). Can Foreign Aid Buy Growth?. Journal of Economic Perspectives 17(3):23-48.

Easterly W, Pfutze T (2008). Where does the money go? Best and worst practices in foreign aid. Journal of Economic Perspectives 22(2):29-52.

Findley MG, Milner HV, Nielson DL (2017). The choice among aid donors: The effects of multilateral vs. bilateral aid on recipient behavioral support. The Review of International Organizations 12(2):307-334.

Gujarati D, Porter D (1992). Essentials of econometrics. McGraw-Hill.

Gulrajani N (2016). Bilateral versus multilateral aid channels. Strategic choices for donors. Overseas Development Institute.

Hassan AS (2021). Foreign aid and economic growth in Nigeria: The role of institutional quality. Studies of Applied Economics 39(3):10-13.

Karamuriro HT, Ssemanda EP, Bbaale E (2020). Foreign Aid Inflow and Domestic Savings in Uganda: Error Correction Modelling. Journal of World Economic Research 9(1):51-60.

Iqbal N, Daly V (2014). Rent seeking opportunities and economic growth in transitional economies. Economic Modelling 37:16-22.

Kapingura FM (2018). Relationship between foreign capital flows, domestic investment and savings in the SADC region. Development Southern Africa 35(4):554-568.

Lubbad MMM (2019). The Impact of Official Development Assistance, Foreign Direct Investment, and Remittances on Economic Growth in Selected MENA Countries Al-Azhar University-Gaza.

Maruta AA, Banerjee R, Cavoli T (2020). Foreign aid, institutional quality and economic growth: Evidence from the developing world. Economic Modelling 89:444-463.

Nagawa V, Wasswa F, Bbaale E (2020). Determinants of gross domestic savings in Uganda: an autoregressive distributed lag (ARDL) approach to cointegration. Journal of Economic Structures 9(1):1-19.

Nunnenkamp P, Öhler H, Sosa Andrés M (2017). Need, merit and politics in multilateral aid allocation: A district-level analysis of World Bank projects in India. Review of Development Economics 21(1):126-156.

Otchere I, Senbet L, Simbanegavi W (2017). Financial sector development in Africa-an overview. Review of development finance 7(1):1-5.

Ozekhome HO (2017). Foreign aid, foreign direct investment and economic growth in ECOWAS countries: Are there diminishing returns in the aid-growth nexus. West African Journal of Monetary and Economic Integration 17(1):61-84.

Razack S, Basavanagowda T, Indumathi S (2015). Savings, Investment and Growth in India: An Empirical Analysis. International Journal of Social and Economic Research 5(1):231-242.

Rommel T, Schaudt P (2020). First impressions: How leader changes affect bilateral aid. Journal of Public Economics 185:104-107.

Sabra MM (2016). Remittances impact on economic growth, domestic savings and domestic capital at the presence of ODA and FDI in selected MENA countries. International Journal of Regional Development 3(2):26-45.

Shields MP (2007). Foreign aid and domestic savings: The crowding out effect (No. 35-07). Monash University, Department of Economics.

Shoko J, Dube S (2021). The relationship between financial setor development and savings mobilization in Zimbabwe (1990 - 2018). JournalNX 6(09):102-113.

Siaw A, Enning KD, Pickson RB (2017). Revisiting domestic savings and economic growth analysis in Ghana. Theoretical Economics Letters 7:1382-1397.

Tarp F, Hjertholm P (2000). Foreign aid and development. London and New York.

Taslim MA, Weliwita A (2000). The inverse relation between saving and aid: an alternative Explanation. Journal of Economic Development 25(1):75-94.

Thorbecke E (2000). The evolution of the development doctrine and the role of foreign aid, 1950-2000. Foreign aid and development: Lessons learnt and directions for the future pp.17-47.

Umer F, Alam S (2015). Trade Openness, Size of Economy and the Saving–Investment Relationship: A Dynamic Analysis for Pakistan. South Asian Journal of Macroeconomics and Public Finance 4(2):233-257.

WorldBank (2017). World Bank Indicators 2017. Available at: http://pzacad.pitzer.edu/~lyamane/WDI2017.pdf

Xiaosong W, Siyuan T (2020). Institutional Quality, Foreign Aid and Economic Growth in Recipient Countries. China Economist 15(6):68-83.

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Financial risk and financial performance of deposit money banks in Nigeria

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The study examined the risk and stability of the Nigerian deposit money institutions. The study, which is a quasi-experimental one, examines how an independent variable that participants already had before the study's start influences a dependent variable, hence the ex post facto design was adopted. As of December 31, 2019, the population will consist of all Deposit Money Banks that have been listed on the Nigerian Stock Exchange throughout the last ten years (2010-2019). Ten Deposit Money Banks that were listed on the Nigerian Stock Exchange as of December 31, 2019, make up the sample size for this study, which was chosen at random and comprised of those ten institutions. Panel data with statistical information were employed in the study (STATA, 17). The proposed analysis was carried out utilizing STATA as it is the best system-based tool for evaluating panel data (version 17). Panel data regression analysis was also used in the study to evaluate the research hypotheses. According to the study, credit risk and liquidity risk have a substantial impact on the financial performance (ROE) of Nigeria's deposit money institutions. The results of the study indicate that financial risk adversely affects the financial performance of Nigerian deposit money institutions.

Key words: Deposit money banks, banking industry, Nigeria, financial risk, financial performance.

INTRODUCTION

To maintain the balance between the surplus and deficit units of the economy, Deposit Money Banks (DMBs) transfer deposits from the surplus unit to the deficit unit through loans and other financial services (Mamman and Hashim, 2014). DMBs are exposed to a range of risks because of the complexity and volume of their operations (such as financial risk, operational risk, market risk, reputational risk, etc.) that, if improperly managed, could endanger their capacity to generate revenue, uphold a positive reputation, and generally continue to exist (Central Bank of Nigeria, 2019). DMBs typically deal with a variety of financial risks in order to carry out their mandate and fulfill their obligation for financial intermediation. Oldfield and Santomero (1997) define financial hazards as any of the several types of risk related to finance, such as financial transactions. These risks frequently consist of a variety of different risk factors, the magnitude of which determines the potential financial loss to which a bank is exposed. These risk factors may eventually lead to volatility in a bank's

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reserves, costs, and corporate value. These specific risk elements include Credit/Default Risk, Insolvency Risk, Liquidity Risk, Market Risk, and others. Credit/Default Risk is the risk of defaulting on a debt. Insolvency Risk is the risk that DMBs won't be able to pay their debts, deposits, and other obligations. Liquidity Risk is the risk that DMBs won't be able to pay their short-term obligations while Market Risk is the risk of losses in treasury positions due to unfavorable price movement (Ajayi and Oseyomon, 2019). According to Vij and Bedi (2016), financial performance is an indicator of how successfully a corporation may use resources from its main line of business to generate revenue. In general, it relates to how successfully financial objectives have been attained. Because inadequate risk management can have an impact on profitability, solvency, and going concern, the financial performance and sustainability of a bank depend on the successful management of its financial risks. According to Muriithi and Muigai (2017), financial risks jeopardize the financial sector's stability and overall financial performance. In Nigeria, financial risks and DMB financial performance are quite problematic and unresolved, with issues ranging from low and insufficient profitability to sustainability concerns, an inability to create economic value for the shareholders, and meager returns on assets because of inefficient use of the banks' available assets (Clementina and Isu, 2016). Financial risk is separate from other hazards that DMB faces and is a little bit difficult to handle. Olalere et al. (2018) agreed that financial risk is both systemic and asymmetrical, which has an adverse effect on banks' financial and non-financial performances, results in substantial financial losses, and undermines investors' and depositors' confidence.

According to John (2020), a risk management framework is a group of components that serve as both the conceptual foundation and the organizational frameworks for developing, implementing, supervising, reviewing, and continuously improving risk management throughout the organization. To simplify decision-making and the accomplishment of organizational goals, a framework for financial risk management should be linked with an organization's operational policies and strategic planning. Pandey (2014) noted that a company's inherent risks do not have to be completely eliminated in order for risk management to be successful. Because they might charge interest for doing so, banks are able to make money by taking on the risk. For instance, inherent risks are associated with banks' role in providing credit to consumers, such as the possibility of a loan default or credit risk. Imola (2017) thinks that banks should only take on financial risk when it is absolutely necessary for them to be able to make a significant amount of money. Given the foregoing, taking risks is a crucial part of how bankers make money. Risk management has not had much of an impact on the Nigerian financial system in terms of improving financial performance because of issues brought on by bad judgment, insider loans and advances, insensitivity to economic and environmental trends, and inadequate risk management policies implemented by the banking operators (Christopher, 2019). Giving loans and advances to friends, relatives, politicians, and corporate directors without carrying out sufficient appraisals has long been a tradition in Nigerian banks. By engaging in this unethical action, these banks were unable to retrieve the loans and advances they had provided to these stakeholder groups, which resulted in a string of bad debts brought on by insufficient recovery procedures and added to financial distress. Imola (2017) highlighted further the fact that bank management's disregard and ignorance of the regulatory frameworks and standards necessary to reduce these risks leads to risk. Some management groups, including some bank employees in Nigeria, either are not aware of the dangers involved in conducting banking activities or completely disregard the regulations put in place to prevent potential losses. Performance and risk-related challenges are the most important ones facing the banking sector. Risk management "does not stand in isolation," according to Hoseininassab et al. (2018), and as banks are essential to the Nigerian economy, it is important to investigate its risk management procedures. Risk is a statistic that can affect the effectiveness and profitability of a business.

Statement of the problem

Throughout history, individuals and groups have had to handle a wide range of awful situations that were brought on by things like fire, theft, social upheaval, environmental degradation, and life itself. These are but a few illustrations of the dangers that individuals, groups, and institutions, such as banks, must manage. Additionally, there are hazards that apply specifically to banks' finances. Even though it is uncommon to be able to totally eliminate these risks, it is usually possible to lessen the possibility of a loss by altering some of the variables that lead to the loss. More so than ever before, banks must today successfully manage the many diverse risks they face, including but not limited to plug risk, credit risk, liquidity risk, rate of interest risk, and inflation risk. This is because financial institutions have a particular role in driving economic growth in a nation. In order to lower this risk, banks must develop risk management strategies that utilize a strong risk management framework. Nigerian banks are now having problems coming up with a long-term fix to the risk management issue facing the sector. The objective of this study is to assess the techniques employed by Nigerian commercial banks to control financial risk. Several very negative consequences of a bank failure can affect the general banking public, investors, and the economy as a whole. The demise of financial institutions surely has some very painful consequences for operators and regulators.

Generally speaking, bank failures impede efficient resource allocation and financial intermediation, which impedes both improving people's lives and accelerating economic growth. This study aims to clarify the effectiveness of financial risk management, which is often used in Nigerian banking systems to boost profitability in light of the aforementioned information.

Research objective

The primary objective of this study is to determine how financial risks impact Nigeria's Deposit Money Banks' financial performance.

Research hypothesis

$H_0$1: The financial performance of Nigeria's Deposit Money Banks is not significantly impacted by financial risk.

REVIEW OF THE LITERATURE

This section looked at the theoretical foundations of the study, including the ideas of risk, financial risk, and financial performance. The empirical evaluation of past studies on financial risk and performance was also discussed in this paragraph.

Concept of financial risk

Financial hazards have many different root causes, one of which is loan repayment defaults, which result in non-performing loans (NPL) for banks. These risks are some of the most significant and challenging ones that banks encounter when carrying out their legally mandated operating responsibilities (Mostafa et al., 2016). Financial risks include, but are not limited to, those related to credit, liquidity, markets, and insolvency. In a financial transaction, interest rate risk, currency risk, and business risk are additional potential financial problems (Ghenimi et al., 2017). Deposit Money Banks (DMBs) must put policies in place to manage the multiple risks that financial organizations like these confront. All of the aforementioned financial risks must be considered by banks, but it seems that credit and liquidity risks are the most important to their regular business operations. This is so that the bank's capacity to maintain its financial stability won't be significantly impacted by the bulk of other risks, which can be shifted to consumers. The links between credit and liquidity issues have a big influence on a bank's bottom line. When a business decides to invest, it exposes itself to a range of financial risks, both commercially and financially. Depending on the kind of financial instrument, these risks are available in various sizes (Yimka et al., 2015). A few possible financial hazards include market volatility, bankruptcy, rising inflation, and recession. The interaction between human factors and specific risk factors, according to Tsevisani (2017), emphasizes the need for close attention to both human factors and the main drivers for risk management: a change driver that derives primarily from the need to comprehend how people behave in dynamic environments and in the presence of risks.

Management of financial risk

Financial risk management may be described as a systematic technique for analysing, evaluating, and addressing financial risks. This increases the possibility that goals will be achieved and ensures that businesses, people, and communities remain sustainable. It also assists the company in keeping track of new customers. A full comprehension of the relevant dangers, an assessment of their relative importance, and a methodical monitoring and control strategy are necessary for risk management to be successful. To lessen or totally prevent the possible loss, it is vital to recognize potential risks, assess and analyze them, and take precautionary action. The objective of financial risk management is to lower risk. According to Res et al. (2016), risk management involves a variety of steps that set the context, recognize and assess deviations, monitor, and alert personnel to risks. Additionally, by taking these steps, decision-making may be continually improved. The primary goals of risk management in the financial sector include developing strategies to lower risk and, more crucially, monitoring the bank's profile (Soyemi, 2019). Risk management is vital in determining the total profitability of banks, according to researchers Oluwafemi et al. (2018), Kambi and Ali (2016), Stephen and Akele (2014), Yusuf (2019), Ghani (2015), Res et al., (2016), as well as Olamide et al. (2015).

A bank's ability to make timely payments on its debts or invest in asset expansion when it is necessary is subject to liquidity risk (Yusuf, 2019). Therefore, both a scarcity of resources and a surplus of underused ones pose a liquidity risk. For gap analysis and management in banks to be effective, a "reasonable fit between the average maturities of the sources and uses of funds" must be kept (Christopher, 2019). The danger of late loan payments, often known as credit risk, must be managed by banks. Credit risk may arise if a borrower is unable or unwilling to meet its obligations (Anthony and Shanise, 2018).

Credit risk is primarily brought on by factors such: a lack of non-executive directors on the board; lax credit assessment practices; poor lending practices; a lack of capital and liquidity; directed lending; extensive bank licensing; subpar loan underwriting; reckless lending; and subpar credit assessment (Yimka et al., 2015). Other

forms of risk that are external to a bank include inflation risk, market risk, rate of exchange risk, and political risk.

Deposit money bank financial performance

A bank's financial performance has an impact on investors, stakeholders, and eventually the entire economy. The efficiency with which a bank can achieve its objectives given its available resources determines how profitable it is. Accurate assessment and evaluation of all resources, including people, tools, capacities, and talents, is necessary. To assess whether the company's objectives have been reached, this is done carefully (Amelia, 2017). Indicators of bank profitability include cost-to-income ratio, return on asset, return on equity, and interest rate spread. But in this study, ROE will have the biggest impact on bank profitability. Although there are other essential and crucial indicators of financial performance, ROE is one that is particularly pleasing since it demonstrates how expertly and efficiently a bank uses the shareholders' or owners' equity at its disposal. Additionally, most users of financial data, especially investors, are more concerned with the returns on their bank assets than with other factors. The financial success as a result of these factors is represented by ROE in the study.

Relationship between financial risk and banks' performance

The bank's financial success can be viewed from the shareholders' perspective as the difference between revenue and costs. It demonstrates that the bank's management seeks to increase sales and reduce costs in order to increase profit. Banking-specific issues such as the regulatory environment, the economy, political turmoil, and others can all change over time, making it difficult for banks to function as they were intended to (Bikker and Boss, 2018). Total profitability is used to gauge a bank's financial success and is associated with the risks that particular banks have taken (Olteanu, 2015). The interaction of gain and risk defines a bank's total financial performance. The capital adequacy ratio (CAR) is one financial indicator that is generated and disclosed in a bank's financial statements and is directly associated with the risk that the bank has assumed. Banks pay close attention to ongoing monitoring indicators that reflect the effectiveness of banking activities and analyze their effectiveness in close relationship with the bank's exposure to risks because the effectiveness of banking activities is closely correlated with the bank's exposure to risks or potential risks that can jeopardize the activity (Imola, 2017). Academics have, however, developed numerous definitions of financial performance. Finding out how a company's operations and policies will impact its financial outcomes is the process of doing this. Ajayi and Oseyomon (2019) contends that a company's financial performance is a good indicator of the management's efficacy, overall operational efficiency, and ability to make the most of its resources. Shrivastava et al. (2018) and Makokha et al. (2016) contend that a company's financial performance reflects how well it uses its resources to generate revenue. In order to maximize returns as displayed in a company's financial statements, resource utilisation is assessed using financial performance measurements.

A review of the gaps in the literature

Currently, there is debate on how financial risk affects banks' financial performance in most countries, but especially in Nigeria. The subject has been thoroughly examined, however depending on the factors utilized and the stage of the analyzed jurisdictions' economic life cycle, different findings could have been reached. The relationship between the risk management process and profitability has been the subject of numerous researches (Yusuf, 2019; Amelia, 2017; Thomas et al., 2014), with an emphasis on how the process influences profitability. In other studies, the impact of financial risk on the financial performance of banks in countries other than Nigeria was examined (Anthony and Shence, 2018; Imola, 2017). The study's results shed a great deal of light on how financial risks impact banks' bottom lines. In an effort to add to the corpus of earlier research on the subject, this study will exclusively employ financial risk variables, such as credit and liquidity hazards, as well as financial performance, or ROE. Additionally, it will be limited to Nigeria. This is expected to result in a better comprehension of how financial risks impact banks' financial performance.

EMPIRICAL REVIEW

Empirical researches have focused on financial risk management and the success/performance of deposit money institutions. Amelia (2017) reviewed empirical evidence on the profitability of Nigerian banks and financial risk management. An ex-post facto research design was used in the study to investigate data from 14 Deposit Money Banks. The results demonstrate a substantial inverse relationship between credit risk and return on asset (ROA), and a significant positive relationship between capital adequacy risk and liquidity risk and default risk (ROA). If liquidity and capital adequacy risk are appropriately managed, full-service banks are proven to have a higher possibility of quickly making a profit. Yusuf (2019) assessed the performance of Islamic banks during a 15-year span, from 2004 to 2018, utilizing risk management techniques. Results reveal a considerably unfavorable statistical impact on

performance and capital risk management strategies from methods for managing liquidity, credit, and operational risk. To determine the relevance of the connection between bank risk management techniques (credit, liquidity, operating, and capital risk) and their financial performance (ROA and ROE), cross-sectional data were analyzed (ROA and ROE). Kumar (2018) looked at how financial risk and performance have changed in the twenty-first century. The income statements and statement of the financial condition of the company were examined as part of the study undertaken to produce the performance and risk ratio estimations. Over a 17-year period, the information was acquired and reviewed (2000 to 2016). This aided in defending the choice to designate the financial crisis as an analytical turning point. According to the findings, the financial risk was in good financial standing and had a successful strict risk management plan. Anthony and Shence (2018) looked into how the credit risk component affected the financial performance of the Deposit Money Banks in Barbados using a multiple regression model as their analytical tool. The findings show that whereas capital risk and interest rate risk have large positive associations with return on equity (ROE), credit risk, liquidity risk, and operational risk have only weakly positive relationships with ROE. As a result of the study's findings, banks are advised to improve their risk management practices in order to boost profitability because risk factors frequently have a bigger influence than external factors. Imola (2017) examined credit risk analysis for banks in the Romanian banking sector using a descriptive research analysis as the research design. According to the analysis's results, there are negative correlations between interest rate risk and return on asset (ROA), negative correlations between liquidity risk and ROA, and positive correlations between return on asset (ROA) and credit risk (ROA). The study's findings demonstrate that banks are able to concurrently generate high revenue since their exposure to the main type of financial risk is well within acceptable limitations. In their study on risk management in the Nigerian banking sector, Thomas et al. (2014) used data from 23 full-service banks as the population and 1 commercial bank as the sample. The descriptive study was conducted using a questionnaire that was completed by a sample of 88 respondents. The findings demonstrated that bank fraud and forgeries endangered the bank's performance and adversely impacted its operations.

METHODOLOGY

The study's use of panel data to examine the financial risks and performance of Nigeria's Deposit Money Banks over a ten-year period is its main weakness (2010 to 2019). Typically, quantitative statistical inference techniques were used to create the model results. Ex post facto research often involves a quasi-experimental study that examines how an experimental variable that was present in the participants before the investigation on a variable affected that variable. The 50 Financial Services Companies registered on the Nigerian Stock Exchange made up the population as of December 31, 2019. The data was explicitly estimated using Panel Data Regression in STATA version 17 based on a panel data set. Ten Deposit Money Banks that were listed on the Nigerian Stock Exchange as of December 31, 2019, made up the study's sample size, which was determined using the sampling technique. First Bank of Nigeria Plc., Guaranty Trust Bank Plc., Zenith Bank Plc., Access Bank Plc., Stanbic IBTC, United Bank for Africa (UBA), Fidelity, First City Monument Bank (FCMB), Polaris, and Unity are among the financial institutions that take deposits. The only Deposit Money Banks whose annual financial reports were used as the secondary source for the data in this study were the ten Deposit Money Banks that were listed on the Nigerian Stock Exchange as of December 31, 2019. The only institutions that have access to data on the primary study variables are banks; hence accessing secondary sources of information is an alternative. Because a distinct audit firm audits the financial accounts, this source of information has the advantage of being much more trustworthy. Panel data multivariate analysis was employed in the study to check the research hypotheses. Because STATA (version 17) is the best system-based application for handling the panel data analysis, it was frequently employed to complete this task.

Model specification

A mathematical depiction of the economic connection between the dependent and independent variables is known as a "model specification" (s). Model specification aids in determining the link between the independent and dependent variables. The model was adapted from the research works of Kolapo et al. (2012).

Therefore, the regression model for this study is stated below:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad (1)$$

$$ROE = \alpha + \beta_1 LR + \beta_2 CR + \varepsilon \quad (2)$$

Where: Y= Dependent variable; ROE=Return on Equity; X_1 and X_2 = Independent variables; β_1 β_2 = Beta coefficients; LR=Liquid Risk;α = Intercept or constant term; CR=Credit Risk; ε = Error term

Apriori expectation

The apriori expectation for this study is that the beta coefficients, or the ratio of the liquid risk to the credit risk, should be more than zero, or that the beta coefficients will be bigger than zero.

Assessment of the variables

Return on Equity (ROE) is used to measure the dependent variable (financial performance), whereas Liquid Risk and Credit Risk are used to measure the independent variable (financial risk).

Justification of method employed

The study employed secondary data, namely information derived from the annual financial reports of the listed Banks, in order to assess the effect of financial risks on the financial performance of Deposit Money Banks in Nigeria. The Panel Data Regression technique was the most helpful analytical technique for the study since it allowed researchers to determine how financial risks affected the financial performance of Deposit Money Banks in Nigeria. The most efficient system-based tool for analyzing panel

Table 1. Regression results.

Variable	Coefficients	Z-statistics	P-value
Intercept	-3.47689	-6.04	0.000
Liquidity Risk	0.4234641	4.09	0.001
Credit Risk	0.3980345	0.24	0.000
R-square	26.82		
Wald chi2	73.76		
Prob.	0.000		

Source: Output from STATA.

data is STATA, which was used to do the necessary analysis.

Test of Hypothesis:

$H0_1$: Financial Risk has no significant impact on the Financial Performance of Deposit Money Banks in Nigeria.

The R-square represents the degree to which the explanatory variables explained the result variable. According to Table 1, the independent variables (liquidity risk and credit risk) have an overall R-square of 26.82% and a 26% influence on the financial performance (ROE) of listed Deposit Money Banks in Nigeria. The model fits, as indicated by the likelihood value of 5%. This evidence strongly suggests that the interaction of these factors has an impact on the financial performance of Nigeria's listed Deposit Money Banks. The data also show that the debt equity ratio and total leverage ratio are both significant at 5%. The study rejects the null hypothesis, which states that financial risk has no discernible impact on Deposit Money Banks' financial performance in Nigeria, and accepts the alternate hypothesis, which states that financial risk significantly affects Deposit Money Banks' financial performance in Nigeria, based on the aforementioned finding and its interpretation.

FINDINGS AND DISCUSSION

The results show a strong correlation between liquidity risk and the financial health of Nigeria's listed deposit money institutions. This is clear from the result, which displays the statistical significance of the association and a P-value less than 5%. Furthermore, the results demonstrate that a 1% increase in liquidity risk led to a statistically significant, but consistent with economic a priori predictions, 42% increase in the financial performance of Nigeria's listed deposit money institutions. In light of the possibility that a significant improvement in financial performance may be the reason for the rise in liquidity risk as a source of external funds, a positive correlation between liquidity risk and financial performance is therefore expected. This finding backs up Caleb's (2019) assertion that liquidity risk has a significant impact on financial performance measures (ROE). The study also showed that credit risk significantly (p=0.000) influences how profitable Nigerian Deposit Money Banks are. The result demonstrates a significant correlation between credit risk and financial performance for Nigeria's listed deposit money institutions. This is evident from the results, which show the statistical significance of the association and a P-value of less than 5%. The findings also show that a 1% increase in the credit risk ratio resulted in a statistically significant, though consistent with economic a priori predictions, 39% enhancement in the financial performance of manufacturing firms. This implies that a positive correlation between the overall leverage ratio and financial performance is reasonable to expect. This is because credit risk may be increasing as a source of outside funding due to Nigeria's rapidly rising deposit money bank profitability. The results support those of Anthony and Shanise (2018), who demonstrated that credit risk has an impact on financial performance.

Research and practice implications

The paper lists several theoretical, practical, and regulatory effects. Deposit Money Banks have a significant advantage in that they provide financial services to individuals and lend to them so they can start their own homes and businesses and thereby widen their branch networks. Deposit Money Banks may use the findings of this study to determine the best capital sources and methods of managing their funds. The results of this study would contribute to the body of knowledge because, despite the fact that there are numerous studies on financial risk and Deposit Money Bank performance around the world, there are few studies using data on Deposit Money Banks in Nigeria. The results of the study would therefore serve as both a foundation for future research in this area and as a manual for emerging scholars.

Conclusion

The results of the study indicate that financial risk adversely affects the financial performance of Nigerian deposit money institutions. The findings demonstrate that return on equity of Deposit Money Banks in Nigeria is positively and significantly (p=0.001) influenced by

liquidity risk, a measure of financial risk. Credit Risk significantly affects the return on equity of Nigerian Deposit Money Banks, according to the study's findings (p=0.000). The study concludes that, as measured by return on equity, financial risk, which includes credit risk and liquidity risk, has an effect on the financial performance of Deposit Money Banks in Nigeria. Based on the findings and conclusion, it is recommended that:

1. The management of Nigeria's publicly traded Deposit Money Banks should keep bad debt losses and other pertinent credit fees to a minimum while also maintaining a healthy level of overall and liquid assets. Businesses should put in more effort to find factoring agents.
2. The top managers of Nigeria's publicly traded Deposit Money Banks should develop strategic plans to draw in enough deposits to support their operations.

Recommendation

The study examined a small number of Nigerian Deposit Money Banks over a ten-year period. More time must be spent in Nigeria and more research is required in a number of different sectors. In order to provide finance managers in Nigeria with clear instructions on the ideal financing mix that would maximize a firm's value, researchers in the field can conduct comparable studies using other financial performance measures like return on asset, return on investment, and return on sales as their dependent variables. This is due to the fact that the vast majority of earlier studies mostly used data from other nations.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Ajayi MG, Oseyomon EP (2019). Credit risk management and performance of Deposit Money Banks in Nigeria. African Review of Economics and Finance 11(1):157-177.

Anthony W, Shanise C (2018). The impact of time factors on the financial performance of the commercial banking sector in Barbados. Journal of Governance and Regulation 7(1):20-25.

Amelia MR (2017). Financial risk management and profitability of banks in Nigeria. Journal of money, Credit and Banking 20(34):56-67.

Bikker J, Boss J (2018). Bank performance; a theoretical and Empirical Framework for the Analysis of profitability, competition and Efficiency, Routledge International Journal in Money and Banking 45(23):768-801.

Caleb OS (2019). Capital structure on the financial performance in Nigeria. International Journal of Business and Social Research 5(2).

Central Bank of Nigeria (2019). Guidelines for the Management of Reputational. Abuja: Central Bank of Nigeria.

Christopher U (2019). Loan Administration, Calabar: University of Calabar Printing Press.

Clementina K, Isu IG (2016). Security challenge, bank fraud and commercial bank performance in Nigeria: An evaluation. Journal of Business and Management 5(2):1-21.

Ghani RA (2015). Risk management practices and performance of micro-financing banks in malaysia. Academyia Journal UiTMT 4(2):26-33. Available At: http://Journal -Academiauitmt.edu.my/

Ghenimi A, Chaibi H, Omri MA (2017). The effects of liquidity risk and credit risk on bank stability: Evidence from the MENA region. Borsa Istanbul Review 17(4):238-248.

Hoseininassab E, Yavari K, Mehregan N, Khoshsima R (2018). Effect of risk parameters (credit, operational, liquidity and market risk) on banking system efficiency (studying 15 top banks in Iran). Iranian Economic Review 17(1):1-24.

Imola DS (2017). Financial risk analysis for a commercial bank in the Romanian banking system. Journales' Annales universitatis Apulensis Series Oeconomica 14(1):20-47.

John UA (2020). Financial Risks Management and Bank Profitability in Nigeria: Case of Access Bank of Nigeria Plc International Journal of Research and Innovation in Social Science (IJRISS) |Volume IV, Issue IX, September 2020|ISSN 2454-6186.

Kambi RS, Ali AI (2016). Effect of Financial Risk Management Practices on Financial Performance of Listed Banks at the Nairobi Securities Exchange in Kenya. The International Journal of Business and Management 4(4):19-36.

Kolapo TF, Jiménez JZ, Ayeni RK, Oke MO (2012). Credit risk and commercial banks' performance in Nigeria: a panel model approach, Australian Journal of Business and Management Research 2(2):31-38.

Kumar NS (2018). Business Distress Prediction Using Bayesian Logistic Model for Indian Firms. Risks 6(1):113-128.

Makokha PS, Mukanzi C, Maniagi M (2016). Influence of Financial risk on financial performance of deposit taking savings and credit co-operatives in Kakamega County. International Journal of Management and Commerce Innovations 4(2):509-518.

Mamman A, Hashim Y (2014). Impact of Bank Lending on Economic Growth in Nigeria. Research Journal of Finance and Accounting 5(18):174-182.

Mostafa SA, Mahmoud OS, Jalal KU, Elahe (2016). Financial risk management and the financial sector development: an overview. International Journal of Economics, Commerce and Management 3(3):2348.

Muriithi JG, Muigai RG (2017). Quantitative analysis of financial risk and profitability of Kenyan Deposit Money Banks using Cost Income Ratio. Journal of Economics and Finance 8(3):76-83.

Olalere OE, Aminu I, Yusoff WS, Shamsuddin ZA (2018). An investigation into financial risk in Deposit Money Banks: Empirical evidence from Nigeria. International Journal of Accounting, Finance and Business 3(12):49-62.

Oldfield GS, Santomero AM (1997). Risk Management in Financial Institutions. MIT Sloan Management Review. 39:1.

Oluwafemi S, Israel N, Simeon OS (2018). Risk Management and Financial Performance of Banks In. IOSR. Journal of Business and Management 14(6):52-56.

Olamide O, Uwalomwa U, Ranti UO (2015). The Effect of Risk Management on Banks Financial Performance in Nigeria. Journal of Accounting and Auditing 15(8):1-7.

Olteanu A (2015). Management of finance, Ed. New Delhi: Dareco Bucuresti publisher.

Pandey RW (2014). Sensitivity of bank stock returns to market and interest rate risks: An empirical investigation. NDIC, Quarterly Review 11(2):57-77.

Res IJ, Sa K, Gemechu DR (2016). Risk management techniques and financial performance of insurance companies. International Journal of Accounting Research 4(1):1-5.

Shrivastava A, Kumar K, Kumar N (2018). Business Distress Prediction Using Bayesian Logistic Model for Indian Firms. Risks, 6(1):113-128.

Soyemi KA (2019). Risk management practices and financial performance: evidence from the Nigerian Deposit Money Banks (DMBs). The Business and Management Review 4(4):345-354.

Stephen N, Akele AO (2014). Risk management and financial performance of banks in Nigeria. European Journal of Business and Management 6(31):336-343.

Thomas D, Ayodele AA, Raphael H, Oladele K, Alabi T (2014). Risk management in Nigeria Banking Industry. Research Journal of

Finance and Accounting 5(7):45-56.
Tsevisani M (2017). A Comparison of Financial Performance in the Banking Sector: Some Evidence from Omani Commercial Banks". International Research Journal of Finance and Economics 3:103-112.
Vij S, Bedi HS (2016). Are subjective business performance measures justified? International Journal of Productivity and Performance Management 65(5):603-621.
Yimka AS, Taofeek A, Abimbola C, Olusegun AS (2015). Management and Financial Performance of Selected Commercial Banks in Nigeria. Journal of Economic and Financial Studies 3(1):1-9.
Yusuf IS (2019). Risk Management Practices and Financial Performance in Jordan: Empirical Evidence from Islamic Banks. International Shari'ah Research Academy for Islamic Finance 6(5):1-24.

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