Mulungushi University Multidisciplinary Journal
(MUMDJ)

Effects of Monetary Policy Changes on Loan Supply to Various Economic Sectors in Zambia

Mulungushi University Multidisciplinary Journal
Vol. 2 no. 1

https://research.mu.ac.zm/research/index.php/mu

Nsama Musawa
nsama.musawa@yahoo.com
Mulungushi University, School of Business Studies,
Kabwe, Zambia

Mwaanga Clement
cmwaanga@mu.ac.zm
Mulungushi University, School of Business Studies
Kabwe, Zambia

Drayton Muchochoma
dmuchochoma@mu.ac.zm
Mulungushi University, School of Business Studies
Kabwe, Zambia

Abstract
In this study, we demonstrate how monetary policy changes in Zambia influences loan supply to different sectors of the economy. We also investigate the link between lending base rates changes and loan supply to commercial banks in the short and long run. The Weighted Lending Base rate was used as a proxy for monetary policy while loans and advances by commercial banks as a proxy for loan supply. Monthly data ranging from 2009 to 2018 was analysed using Cointergrated and Error correction model. The cointegration analysis has revealed that the change in the lending rate has a long run effect on the total lending to various sectors. On the other hand, the Error Correction Model has revealed that there is no significant impact of changes in lending rates on loan supply to economic sectors in the short run. The most negatively affected sectors are Agriculture, Forestry, Fishing, Hunting, Mining, Querying and Construction respectively. This implies that the rising lending rate slows down the growth in the production sectors, which in turn slows down economic growth. There is need to consider offering concessionary lending rates to the production sector.

Keywords
Monitory policy, Weighted Lending Base rate, Loan Supply

INTRODUCTION
The relationship between monetary policy and economic performance has attracted a lot of attention among scholars, economists and policy makers since the seminal work of Freidman and Scharwz (1963) and Friedman and Meiselman (1963) in the field of monetary economics. In the recent past, there has been an increase in agreement among economists, scholars and policy makers that monetary policy has significant effects on loan supply in a short run (Mensor, 2005). Monitory policy is one of the significant tools governments in the world uses to manage the economy. It is a combination of policy actions taken by the central bank of a country to influence money supply, interest rate, availability and cost of credit in an economy (Okwu et al, 2011). Monetary policy is a deliberate action of the monetary authorities to influence the quantity, cost and availability of money and credit. This is done in order to achieve desired macroeconomic objectives of internal and external balances (Adeniyi et al, 2018). Locally, the Zambian government through the central bank of Zambia uses monetary policy tools like the Weighted Lending Base rate and the cash reserve ratio to regulate commercial banks. Recently, the bank of Zambia announced the increase in the Weighted Lending Base rate as one of the measures to stabilize the Zambian economy. This could have an effect on the demand and supply of loans. Studies have shown that loan supply and policy rate are negatively correlated, implying that following monetary policy tightening loan supply shrinks (Abuka et al., 2019; Simpasa et al., 2015; Chileshe, 2017). One such effect is the potential negative impact that very low interest rates have on the profitability of banks and other lending financial institutions. Once banks are not profitable, they are constrained of the ability to make new loans, making credit less available to borrowers who depend on bank financing (Amidu, 2006). In the short term, very

low levels of interest rates are less effective in stimulating bank lending growth (Borio & Gambacorta, 2017).On the other hand the rise in interest rates may lead to a reduction in borrowings by interest sensitive borrowers. Although scholars and economists have reached a consensus on the effects of monetary policy on economic development in a short run, the question of how monetary policy effects economic performance remains inconclusive (Freidman, 1963).

The review of empirical literature on Zambia reveals that very few studies have been done to assess the effect of monetary policy on the lending patterns. A study conducted by Simpasa et al. (2015), investigated the effect of monetary policy on lending behaviour of commercial banks. Another study conducted by Chileshe (2017), investigated the effects of monetary policy changes on loan supply by commercial banks. Although these studies have, revealed that loan supply is negatively correlated with policy rate, there are limited studies that show how changes in the lending base rate effects the loan supplied by commercial banks to various economic sectors in Zambia. Therefore, this study extends this line of research on how changes in lending base rate affects loan supply and commercial banks' lending to various economic sectors like agriculture, construction and manufacturing a case of a developing country Zambia.

OVERVIEW OF THE MONETARY POLICY IN ZAMBIA

Before 1990s, the monitory policy in Zambia was influenced by a number of objectives such as supply of cheap credit to state owned enterprises, promotion of economic growth through initiatives and incentives and the financing of the nation budget through borrowing from the Central bank (Zgambo & Chileshe, 2014). The monitory policy depended so much on the use of direct instruments like interest control, direct credit allocation as well as call liquid assets and statutory reserve rations (Kalyalya, 2010). The direct monetary policy instruments employed was based on the prevailing economic situation, dominated by the state. However, the central bank had little control over the money supply because foreign financial institutions, which used to supply loans to foreign firms without paying attention to countries economic and financial situation, dominated the financial sector (Kalyalya, 2010).

Due to lack of clear focus, the macroeconomic conditions worsened towards the end of 1990 and this was partly influenced by the use of the central bank to finance deficit and the failure to control money supply resulting into high inflation (Bigstern & Mugerwa, 2000). The effects of these factors mentioned above created discomfort among citizens and resulted into the change of government in 1991, which was followed by economic reforms in 1992, resulting in to the creation of market based economic systems driven by the private sector (Zgambo and Chileshe, 2014).

In 2006, Zambia's macroeconomic environment improved by the changes in monetary policy framework supported by the money growth, single digit inflation and the liberalization of the lending rates stabilized at about 5% (Kalyalya, 2010). Later in 2012, the Central Bank introduced a policy rate to provide a credible and stable anchor to financial market participants in setting their own interest rates.

LITERATURE REVIEW

For some time now, a body of studies has focused on explaining the effects of monetary policy using instruments such as money, income and price of different assets (Jiminez et al., 2012; Matemilola et al., 2015). This discussion has been extended to the role of banks in economic development. It was observed that monetary policy can be translated into real economy through a number of channels such as direct transmission (cash), interest rate channel credit or bank lending channels (loan supply), balance sheet channels (net worth) and expectations and uncertainty (inflationary and uncertainty) as suggested by Boeschoten & Van Els (1995) and Mishkin (1996)

Earlier studies conducted on monetary policy have shown that lending rates adjust faster when the policy rate increases than when it decreases, suggesting that lending rates exhibit rigidity to the decrease in monetary rates (Payne & Waters, 2008; Wang & Thi, 2010; Tai et al., 20120). Later, Jimenez et al. (2012) conducted a similar study and found that the change in monetary policy has no significant impact of the lending rates. Additionally, similar studies conducted on the effects of monetary policy on lending rates revealed mixed results (Mishra & Montiel, 2013; Davoodi et al., 2013). A study by Bluedorn et al. (2013) suggested that monetary contraction significantly weakens the bank's lending responses. The mixed results from these studies are not because of methodological limitation. It was observed also that the increase or decrease in monetary policy rate results in lending rates adjusting asymmetrically (Leuvensteijn et al., 2013). According to Matemilola et al. (2015), the asymmetric adjustment is supported by two theories namely, collusive behaviour of banks and customer reaction theory. Collusive behaviour refers to the extent of competition among banks and how the retail market is concentrated, while the customer reaction theory related to the extent to which customers are sophisticated in line with financial markets together with the search and the switching costs of taking up alternative sources of financing (Matemilola et al., 2015). Some authors like Mishra et al. (2014) found a strong positive

relationship between monetary policy and lending rates in developing countries with strong financial institutions, organized financial markets and banking systems.

A study conducted in Uganda by Abuka et al. (2019) using the supervisory dataset of loan applications and granted loans for the period of 2010 to 2014 revealed that negative relationship between interest rates and supply of credit. The results indicated that an increase in interest rates reduces the supply of bank credit implying the lending behaviour of banks with a huge capital and liquidity different from the behaviour of a bank with little capital and liquidity. However, a number of studies conducted in developing countries on monetary policy channels have revealed a weak bank lending channel base on aggregate data applied (Abuka et al., 2019).

DATA AND METHODOLOGY

This study investigated the effects of monetary policy changes on Loan Supplied to Various Economic Sectors. Like in similar studies (Salmanov et al., 2015, Matemilola et al., 2015), monetary policy changes was measured by Weighted Lending Base rate while loan supply was measured by the volume of loans and advances lent to various economic sectors by commercial banks. It is generally agreed in the literature that in developing economies, there is high-level of credit risk, it is common for banks to profile their clients according to their risks characteristics when granting loans (Chileshe 2017, Simpasa et al., 2015). Hence, credit risk measured by non-performing loans was used as a control variable. Monthly data ranging from 2009 to 2018 obtained from Bank of Zambia was analysed using Cointergration and Error correction model.

Non stationarity and cointegration

Gujarati (2003) pointed out that a stochastic process is stationary if its mean, variance and auto covariance at various lags remain constant overtime. This means that a non-stationary time series has a time varying mean or a time varying variance or both. Yule (1926) was the first to discover the importance of establishing the nature of integration of variables and this was extended by Granger and Newbold (1974). They showed that regression analysis between two non-stationary time series could lead to a spurious or nonsense result. This means that one could find statistically significant relationship whereas a priori there should be none. It is therefore necessary to test for the stationarity or the order of integration before any regression analysis is conducted.

The concept of cointegration, developed by Granger (1981) and Engle and Granger (1987), is based on the principle that even though two non-stationary time series may, individually, not be stationary but there exists a linear combination of them that is a stationary stochastic process. Again, for cointegration to exist, the two non-stationary time series have to be stationary after the same number of differencing, that they are integrated of the same order. If a given time series Y_t becomes stationary after first differencing, it is integrated of order one (i.e.$Y_t \sim I(1)$). Similarly, If the time series becomes stationary after second differencing, it is integrated of order two (i.e.$Y_t \sim I(2)$). In general, if a (non-stationary) time series Y_t has to be differenced *d* times to make it stationary, it is integrated of order *d*, (i.e., $Y_t \sim (d)$). If however, a time series Y_t is stationary at level, it is integrated of zero (i.e.,$Y_t \sim I(0)$) (Gujarati, 2003).

In this present paper, the augmented Dickey-Fuller (ADF) unit root test stationarity test was used to investigate the integration order of the model series. The ADF test assumes no structural breaks in the generating process of the series.

A linear combination of two $I \sim (1)$ series is also$I \sim (1)$. However when a linear combination of two $I \sim (1)$ series is stationary (i.e. $I \sim (0)$), then the two time series are cointegrated. This implies that the two series have a long-term, or equilibrium relationship between them. Engle and Granger (1987) also demonstrate that a vector of cointegrated variables has always an error correction representation (ECM). This means that it is always possible to construct a linear model in which differences and levels of the variables are used. This class of model has the desirable property of retaining not only short-run information (contained in differences) but also long-run one (contained in the levels). Hence, from a practical point of view, ECM enables us to model both short and long-run effects separately in the same model.

Long-run Relationship

To investigate long run relationship between monetary policy changes and loan supply to various sectors of the economy, we adopt the following cointegrating regression model:

$$LS_t = \beta_0 + \beta_i LBR_t + \ldots\ldots \varepsilon_t$$

Where LS_t is the dependent variable at time t, LBR_t is the monthly observations of the monetary policy changes at time t, β_i is the coefficient of ***LS*** and shows its impact on money supply. ε_t is the stochastic error term at time *t*. In this study Johansen Cointegration was used to test for long-run

relationship between monetary policy Changes and Loan Supply by commercial.

Error correction model

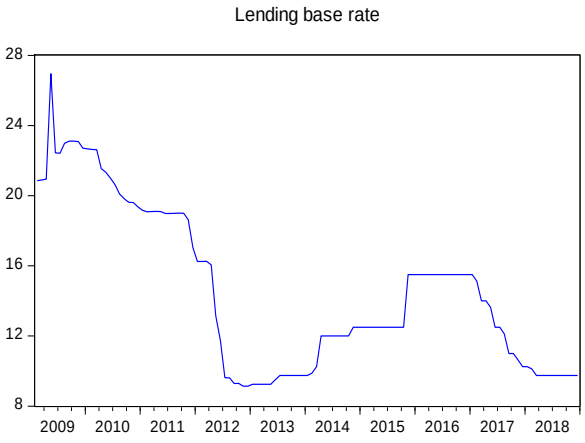
Error correction model (ECM) can lead to a better understanding of the nature of the short run dynamics among different component series. Existence of cointegration between series is an indication of a long-term equilibrium relationship between them. As a result, one can apply ECM in order to evaluate the short run properties of the cointegrated series. The estimates of error correction parameters are important because they measure speed of return to equilibrium after a deviation. The coefficients of the error correction parameters are expected to be significantly negative. Positive and significant coefficient of the error correction parameter implies that the lagged dependent variable is above its equilibrium value and will fall in the next period to correct equilibrium error (Gujarati, 2003). Large values of the error correction parameter indicate faster adjustment to long-run equilibrium after a shock to the system. All tests were conducted at the 5% significance level.

RESULTS

The aim of this study was to investigate how the changes in lending base rate affects loan supply and commercial banks' lending to various economic sectors in Zambia.

The findings of this study have reported (Figure 1) lending base rate as exhibiting a downward trend with the highest rate being in 2009 and the lowest being in 2013.

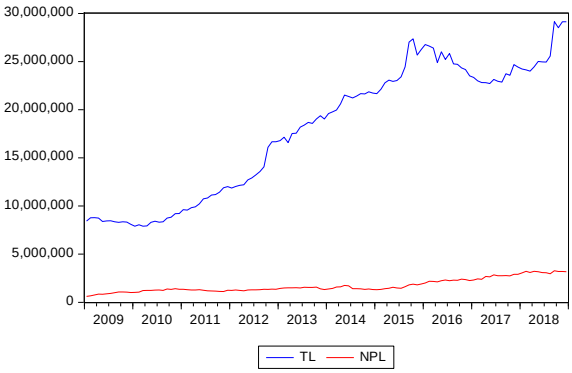
Figure 1: **Trend of lending base rate for the period 2009 to 2018**



Total loans and Non-performing loans

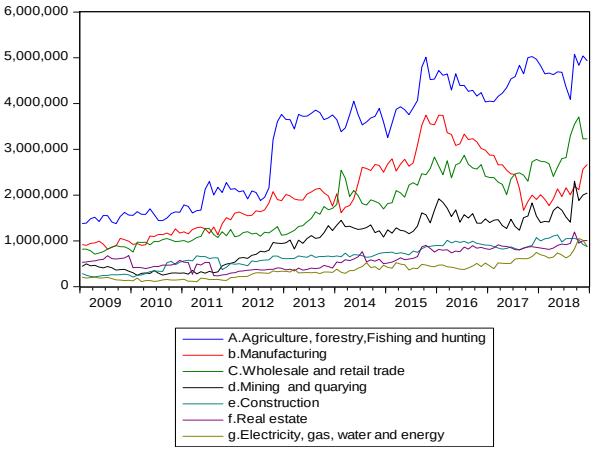
Figure 2 below shows the trend of total loans and Non-performing loan from 2009 to 2018. It can be observed that the total loans had shown an upward trend over time while the non-performing loans are almost constant.

Figure 2: *Trend of total loans and Non-performing loan for the period 2009 to 2018*



Lending to various sectors

Figure 3*: Lending to various sectors for the period 2009 to 2018*



According to figure 3, it can be seen that during the period under review, most of the lending was done to the Agriculture, forestry, fishing and hunting and manufacturing industry which is an indication of growth in the production sector of Zambia. However it is important to note that the lowest sector is the electricity energy and water development an indication that there is need for more investment in the energy sector which is said to be the engine that supports all the other sectors.

Variable Diagnostic Tests

The following diagnosis tests were done before the long and short run estimations were done. Among such was the stationarity test for the variables, the normality test for the dependent variable, multicollinearity of the independent variables.

A test for the stationary properties of the data was done sing the unit root. The unit root test was performed to confirm the stationary properties of the data and in order to understand the order of integration of the variables into the long run equation. The unit root test was done using the Augmented Dickey-Fuller (ADF) tests of eviews. Table I below gives a summary of the unit root results.

Table I: **Summary of ADF Unit Root Test Results.**

Description	Differencing				Order of Integration
	Levels		First Difference		
	t-Value	P-Value	t-Value	P-Value	
Lending Base Rate (LBR)	-1.2510	0.8946	-12.6180	0.0000	I(1)
Nonperforming loans(NPL)	-1.3685	0.8652	-12.005	0.0000	I(1)
Total loans	-1.6983	0.7461	-11.0502	0.0000	I(1)
Critical Value	1%	-4.0377			
	5%	-3.4483			
	10%	-3.1449			

Source: Generated by the authors (2019)

As can be observed from table 1 above, all the variables were not stationary at level because the ADF statistics t- values (1.251019, 1.3685, 1.6983) were not greater than the critical values (4.0377, 3.4483 and 3.1449) in absolute terms and the P values were not significant .After the first differencing all the variables become stationary as all the P values were significance.

A test for normality done using the Jarque-Bera statistics of eviews revealed that the dependent variable was not normally distributed hence it was transformed in to logarithms.

A test for multicollinearity showed that there was no excessive correlations between the independent variables lending base rate and the non-performing loans as the two variables had a correlation of less 0.9 (Field, 2005).

The Effect of the landing base rate changes on Loan Supply by commercial banks in the long run

Among the objectives of this paper was to assess the effect of monetary policy Changes on Loan Supply by commercial. The effect of monetary policy Changes on Loan Supply by commercial banks in the long run was done using Johansen cointegration analysis. Since the variables became stationery after the first difference, a cointegration test was performed. The test involved assessing the long run effect of the lending base rate on the total loans, the non-performing loans was incorporated as a control variable.

A lag length of two was selected as an appropriate based on the Akaike information criterion (AIC) and the Hannan-Quinn information criterion (HQ). Table 2 below shows the Cointegration Rank Trace Test Analysis results.

Table 2: Cointegration Rank Trace Test Analysis results

Cointegrated variable	**Hypothesized No .of CE(s)**	**Eigevalue**	**Trace Statistic**	**0.5 Critical Value**	**Prob**
1 Landing base rate ,Non-performing loans and total loans	None	0.1745	27.6029	29.7971	0.0877
	At most 1	0.04128	4.979322	15.49471	0.8110
	At most 2	3.9450	0.004646	3.841466	0.9447

Cointegrated variable	**Hypothesized No .of CE(s)**	**Eigevalue**	**Trace Statistic**	**0.5 Critical Value**	**Prob**
Landing base rate , total loans	None	0.138829	19.20300	15.49471	0.0132
	At most 1	0.013188	1.566510	3.841466	0.2107

Source: Generated by the authors (2019)

The results above indicates that when the non-performing loan were incorporated as a control variable, there was no cointgration between landing

base rate and the total loans as the trace statist value of 27.6029 observed was less than the critical value of 29.7971 and the probability value was 0.0877 which was not significant. However when the control variable was dropped, there was a cointgration between landing base rate and the total loans as the trace statist value of 19.2030 observed was more than the critical value of 15.4947 and the probability value was 0.0132 which was significant. The results show that the change in the landing base rate will have a long run effect on the Loan Supply by commercial banks indicating that there is a lending effect. This result reinforces finding by Simpasa et al., 2015 and Chileshe, 2017, Who found the similar result .Further the results show that the change in the landing base rate have no effect on the non-performing loans .

Since the variables do cointegrate, the estimated long run cointegrating equation using Vector Error Correction is presented in equation

$LS_t = -564{,}093 - 26{,}739LBR_t + \ldots\ldots\ldots \varepsilon$

similar to Abuka et al. (2019). It is important to note that the error correction, variable has the negative sign and its statistically significant confirming the presence of the long run relationship among the variables. (Gujarati, 2003)

Table 3: Short Run Results

Variable	Coefficient	t-Statistic	Prob.
C	0.0099	3.897495	0.0002
Lending base rate	-0.0054	-1.8995	0.0600
Error Correction Variable	-1.7930	-2.461911	0.0153

Source: Generated by the authors (2019)

From the results, the estimated coefficient for LBR is negative and statistically significant indicating a unit increase in landing base rate will lead to a decrease of 26,739 in the loan supply.

The Error Correction term coefficient of the cointergrated model was negative and statistically significant indicting that there was Long run causality from landing base rate to loan supply. However, the Wald statistics test showed that there was no short run causality from landing base rate to loan supply.

The Effect of the landing base rate changes on Loan Supply by commercial banks in the short run.

The effect of monetary policy Changes on Loan Supply by commercial banks in the short run was done by estimating the Error Correction Model (ECM).The result in Table 3 shows that the landing base rate changes have a negative effect on the total loan supply although this is not significant as the coefficient of -0.005462 is not statistically significant. This result is

The Effect of the landing base rate changes on Loan Supply to Various Economic Sectors in Zambia

The effect that monitory policy has on the loan Supply to Various economic sectors was done using correlation analysis table 4 shows the correlation analysis between the landing base rate and the loans to various economic sectors.

Table 4: Correlation analysis between landing base rate and loans to various economic sectors.

	Lending base rate
Lending base rate	1
Total loan	-0.7032
Agriculture, forestry, Fishing and hunting	-0.7382
Mining and querying	-0.7050
Construction	-0.6684
Electricity, gas, water and energy	-0.6640
Wholesale and retail trade	-0.5691
Transport, storage and communications	-0.5606
Community, social and personal services	-0.5437
Restaurants and hotels	-0.5185
Manufacturing	-0.4942

Real estate	-0.2199
Financial services	-0.1981

As can be observed from the table, increasing the lending base rate has a negative effect across all the sectors but the most affected are the agriculture, forestry, Fishing and hunting followed by Mining and querying and Construction is the third the least affected are Real estate and financial services .The fact that productive sectors are move negatively affected indicates the negative effect that the increase in the lending base rate may have in the economy.

CONCLUSION AND POLICY IMPLICATION

This paper investigated the effect of Monetary Policy Changes on Loan Supply to Various Economic Sectors in Zambia by Commercial Banks. Monetary policy changes was measured by the landing base rate while Loan Supply was measured by the total loan lent by commercial banks to various sectors. The cointegration analysis has revealed that the change in the lending rate has a long run effect on the total lending to various sectors. On the other hand the Error Correction Model has also revealed that there is no significant impact in the short run.

The most negatively affected sectors are Agriculture, forestry, Fishing and hunting followed by Mining and querying and Construction. This implies that the rising lending rates in Zambia slow down the growth of production sectors, which in turn slows down economic growth. There is need to consider offering concessionary lending rates to the production sectors.

REFERENCES

Abuka, C., Alinda, R. k., Minoiv, C. (2019). Monetary policy in a developing country: Loan application and real effects. International Monetary Fund Working paper.

Adeniyi, A. M., Kayode, A. K., Sakirat, S. O., & Olamide, F. T. (2018). Monetary policy and bank credit in Nigeria: A Toda-Yamamoto Approach. Acta Universitatis Danubius. Œconomica, 14(5).

Bluedorn, J.C., Bowdler, C., Koch, C. (2013). Heterogeneous bank lending responses to monetary policy: New evidence from a real-time identification, International Monetary Fund working paper (p.118).

Bigstern, A. and Mugerwa-Kiyizza, S. (2000). "The political economy of policy failure in Zambia" Working paper in economics No 23/00 University of Gothenburg.

Boeschoten, W.C., Van Els, P.J.A. (1995). The importance of monetary transmission, quarterly bulletin, Mach, De Nedelandsche Bank, Amsterdam.

Davoodi, H., Dixit, S., Pinter, G. (2003). Monetary transmission mechanism in the East African Community. An empirical investigation. International monetary fund working paper, 13/39, Washington DC.

Emenike, K. O. (2016). How does monetary policy and private sector credit interact in a developing economy?. Intellectual Economics, 10(2), 92-100.

Field A. (2005). Discovering Statistics Using SPSS. London: SAGE Publication.

Friedman, M., Meiselman, D. (1963). The relative stability of monetary velocity and the investment multiplier in the United States, 1879-1958, in; Stabilization policies, commission on money and credit, 165-268.

Granger, C. W. J. (1981). Some properties of time series data and their use in econometric model specification. *Journal of Econometrics, 16* , 121–130 .

Gujarati, D. N. (2003). *Basic econometrics* (4th ed). Delhi: McGraw Hill Inc .

Jimenez, G., Steven, O., Jose-luis, P., Jesus, S. (2012). "Credit supply and monetary policy. Identifying the bank balance sheet with loan applications: American Economic Review, 102(5): 2301-2326.

Kalyalya, D. H. (2001). "Monetary policy framework and implementation in Zambia". Paper presented on the SARB conference on monetary policy frameworks.

Leuvenstenjn, M.V., Sorensen, C.K., Bikker, J.A., Van Rixtel, A.R.J.M. (2003). Impact of banking

competition on the interest rate pass-through in the Euro area. Applied Economic, 45 (11), 1359-1380.

Matemilola, B.J., Bany-Ariffin, A.N., Muhter, F.E. (2015). The impact of monetary policy on bank lending rates in South Africa. Borsa Istanbul Review: 1501, 53-59.

Mensor, H.I. (2005). Sectorial effects of monetary policy: Evidence from Malaysia. Asian economic Journal 19(1), 83-102.

Mishra, P., Montiel, P. (2013). How effective is monetary transmission in developing Countries? A survey of the empirical evidence. Economic systems, 37(2), 187-216.

Mishkin, F.S. (1995). Symposium on the monetary transmission mechanism, Journal of Economic perspective 9, 4, 3-10.

Okwu, A. T., Obiakor, R. T., Falaiye, O. B., & Owolabi, S. A. (2011). Empirical Analysis of the effects of monetary policy innovations on stabilization of commodity prices in Nigeria. European Journal of Economics, Finance and Administrative Sciences, 32, 64-79.

Payne, J.E., Waters, G.A. (2008). Interest rate pass-through and asymmetric adjustment: Evidence from the federal fund rate operating target period: Applied Economics, 40 (11), 135501366.

Salmanov, O., Zayernyuk, V., & Lopatina, O. (2015). An Analysis of the impact of monetary policy on bank lending in Russia. *Asian Social Science*, *11*(6).

Tai, P.N., Kun Sek, S., Har, W.M. (2012). Interest rate pass-through and monetary transmission in Asia. International Journal of Economics and Finance, 4(2), 163-174.

Wang, K., Thi, T.N. (2010). Asymmetric pass-through and risk of interest rate: An empirical explanation of Taiwan and Hong Kong. Applied Economics, 42, 659-670.

Yule, G. U. (1926). Why do we sometimes get nonsense correlations between time series? A study in sampling and the nature of time series. *Journal of the Royal Statistical Society*, *89* , 1–64 .

Zgambo, P. and Chileshe, P. M. (2014). Empirical analysis of effectiveness of monetary policy in Zambia. COMESA monetary institute.

https://www.boz.zm/monitory-policy-framework.htm. Accessed on 03/10/2020.