Effects of Monetary Policy on Lending Behavior of Commercial Banks in Tanzania

Amanda M. Semu and Michael O.A. Ndanshau[†]

Abstract
This study is on the effects of monetary policy on lending behavior of commercial banks in Tanzania. Arellano-Bond Generalized Method of Moments (GMM) technique was used to fit quarterly panel data of 27 commercial banks in Tanzania over the period 2012: I to 2017: II. The Pearson's correlation matrix suggested existence of a positive linear relationship between the discount rate and the interbank cash market rate. The GMM estimation revealed the lagged lending rate, the interaction term of reserve ratio, lagged bank size, and the interaction term of lagged discount rate and lagged capitalization have a positive relationship with the lending behavior of commercial banks, while, reserve ratio and the interaction term of discount rate and lagged capitalization have a negative relationship with the lending behavior of commercial banks. The findings revealed the quantity-based monetary policy was stronger during the sample period but its effect was varied with the size and level capitalization of the banks.

Key Words: Monetary policy; Commercial banks; Credit; GMM; Tanzania
JEL Classification Codes: E44, E58

[†] The authors are, respectively, part time Lecturers and research associates of the School of Economics (SoE) at the University of Dar es Salaam and Tumaini University Dar es Salaam College (TUDARCo). All correspondences to michaelndanshau@gmail.com and semuamanda10@gmail.com.

1.   Introduction

Lending is one of the main business activities of banks (De Young and Rice, 2004). The lending behavior of banks, the commercial banks in particular, is determined partly by own characteristics and state of the economy and partly by central banks behavior expressed in its deployment of indirect instruments of monetary policy, including open market operations (OMO), reserve requirement and the discount (bank) rate. In the context of the so-called lending (credit) channel of the monetary transmission mechanism (MTM), implementation of a contractionary (expansionary) monetary policy framework would decrease (increase) the reserves available for lending to firms in the private sector which rely on bank loans (Peek and Rosengren, 1995; Kashyap and Stein, 1994; Apergisa, Miller, Alevizopoulou, 2012). Consequently, the contractionary (expansionary) monetary policy will not only cause a fall (increase) in interest income and profits of the banks but would also lead to a fall in real output in the economy (Bernanke and Blinder, 1995; Gibson, 1995; Bernanke and Blinder, 1988).

It follows that prudent monetary policy regime demands for better understanding of its instruments on, among others, the lending behavior of the commercial banks. Notable, however, there is a dearth of empirical literature on the impact of monetary policy instruments on the lending behavior and profits of banks, in developing countries on the other.[1] Study by Omorokunwa and Adegboye (2011) found the discount rate had a significant impact on lending behaviour of the banks in Nigeria both in the short-run and long-run. The study, however, failed to establish existence of reserve ratio effect on the lending behaviour of the banks in Nigeria. Kimani (2013) also found open market operations (OMO), the reserve ratio and, more significantly, the central bank rate had theory consistent effects on the lending behaviour of five banks sampled in Kenya. Moreover, a study on Nepal by Dhungana (2016) found the OMO and the reserve ratio had theory consistent effects on banks' lending behaviour. The study, however, found the effect of central bank rate was inconsistent with theory, simply stated the effect was positive. Furthermore, Ayodele (2014), use time series data from 1988 to 2008 to study the effect of monetary policy on commercial banks' lending in Nigeria. Money supply, interest rate, exchange rate and liquidity ratio were used as monetary policy variables. Findings revealed that, increase in money supply, liquidity ratio and exchange rate, failed to increase the volume of bank loans, whereas, interest rate had a positive relationship with banks' lending. The researcher concluded that, interest rate played a crucial role in encouraging the volume of bank loans and suggested that, central banks should use indirect monetary policy instruments to influence the economy.

In Tanzania, in particular, there also exist a dearth of empirical studies on the effects of monetary policy instruments on the lending behaviour of the banks and macroeconomic outcomes. The only closely related study by Minja and Mgina (2009) investigated the effect of monetary policy instruments on the banks' lending behaviour over the period 1995-2007. The study, however, first, used aggregated but not a panel data set of the banks covered by the study. In that aggregation the effect of bank specific characteristic on lending became compromised. Second, the study used uncommon monetary policy instruments: reserve money

---

[1] Studies on developing countries are quite few, seemingly because fiscal policy rather than monetary policy was dominant in economic development strategies implemented in developing countries which were incidentally characterized unorganized financial markets.

(M0) and money supply (M2), which respectively are operating and intermediate targets of monetary policy in Tanzania. Other studies focused on the relationship between monetary policy and inflation dynamics, for example Ayubu (2013) and Ndanshau (2010).

The purpose of this study is to fill the gaps in the literature and inform policy by analyzing and presenting evidence on the extent to which monetary policy instruments, specifically how the reserve ratio and discount rate, affect the lending behavior of commercial banks in Tanzania. The value addition of this study is two-fold. First, it addresses the dearth of empirical studies on bank lending behaviour in Tanzania. To the extent that the bank lending impinge upon the transmission mechanism of monetary policy it shed light on the scope for its effectiveness in Tanzania.

The rest of this paper is organized as follows. Section 2 gives an overview of monetary policy and the banking system in Tanzania. Section 3 explores the theoretical literature and empirical literature on the effects of monetary policy on lending behavior of commercial banks, as well as gaps in literature. Section 4 present methodology of the study; and, Section 5 present and discusses the empirical results. Section 6 concludes the paper by presenting the main findings, their policy implications and areas for future research.

2. Monetary Policy in Tanzania: An Overview

Since the attainment of political independence in 1961, Tanzania has been characterized by several shifts in macroeconomic policy regimes. In the 1961-65 period of liberal macroeconomic environment, the stance of macroeconomic policy was quite conventional, but more dominated by use of fiscal rather than monetary actions that were targeted to rapid economic growth. The central bank, that is the Bank of Tanzania (BoT), was legally charged with "promotion of credit and exchange conditions conducive to the rapid growth of the economy, due regard being had to the desirability of fostering domestic and external monetary stability" (Bank of Tanzania Act, 1965: 9).

Under the Bank of Tanzania Act of 1965, the mandate of BoT was to carry out all the traditional functions of a central bank, among others, to produce and supply money, and use traditional indirect instruments of monetary policy to achieve designated monetary policy objectives chief of which is price stability. Nonetheless, the Self Reliance Policy which was adopted by the government after promulgation of the Arusha Declaration in 1967, first, led to nationalization of all private financial institutions and establishment of a single state owned commercial bank (BoT, 2011). Second, the policy re-oriented the role and function of the BoT from its traditional role of regulating the economy by using indirect instruments of monetary policy to that of promoting macroeconomic outcomes by using direct instruments of monetary policy. Specifically, consistent with the Self Reliance Policy the government instituted a central monetary policy instrument, that is, Annual Finance and Credit Plan (AFCP) that set interest rate ceilings for concessionary lending by banks to preferred key sectors of the economy designated by the government; centrally allocated foreign exchange; and, in addition, established the Foreign Exchange Plan (FEP) to regulate the use of foreign exchange consistent with national priorities. In addition, the government amended the Bank of Tanzania Act in 1978, first, to accommodate establishment of funds for guaranteeing lending by development finance banks to key sector of the economy, specifically, agriculture and industry; and,

secondly, to give mandate to the BoT to supervise and inspect all the development finance institutions and commercial banks in the country.
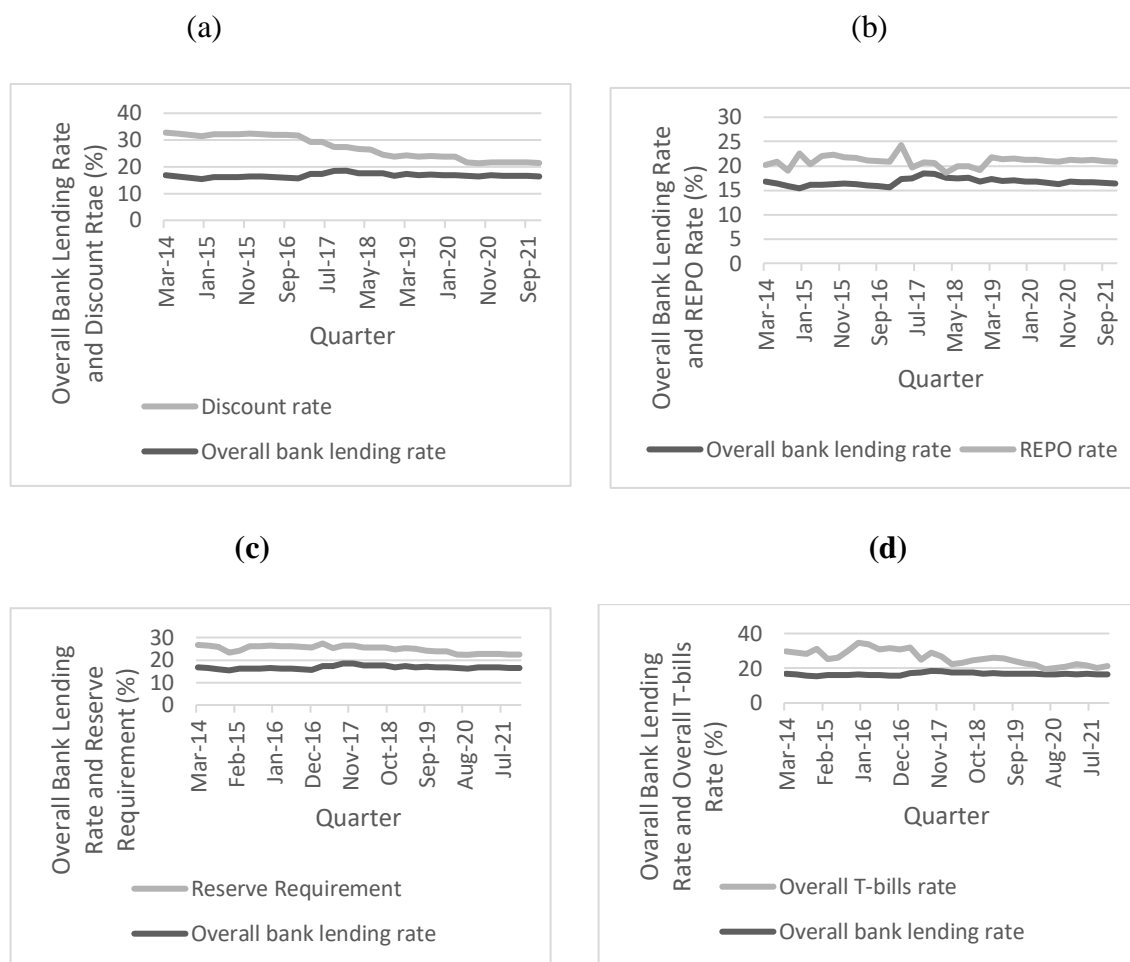
The direct instruments of monetary policy, that is, the AFCP and also the FEP, undermined the legal right and ability and independency of the BoT to deploy the traditional indirect monetary policy instruments in macroeconomic management. Instead, the central bank virtually became an executive arms of the government that guaranteed bank lending to the sectors and institutions that were preferred by the government virtually at the expense of macroeconomic stability.

It is acknowledged that the direct monetary policy regime since the early 1970s led to financial repression that, among others, adversely affected saving, investment, growth and macroeconomic stability in the country (Nyirabu, 1990). As a result, the Nyirabu (1990) commission of enquiry recommended liberalization of the financial sector started in Tanzania gradually in mid-1986 and more effectively after the establishment of Financial Institutions Act (BFIA) in 1991. On the one hand, the early liberalization was directed to establishment of real interest rate by a shift from interest rate ceiling that climaxed to total market based interest rates in 1993. On the other hand, the BFIA of 1991 provided for participation of foreign and local private banks in the financial sector. To better manage the financial system in a market-based economy, the government replaced the BoT Act of 1965 by a new Bank of Tanzania Act of 1995 which was subsequently amended into Bank of Tanzania Act of 2006. The BoT Charter ostensibly designated price stability as the primary objective of monetary policy. The Charter also provided for the use of indirect instruments of monetary policy in management of monetary affairs to achieve price stability and related macroeconomic objectives in the country.
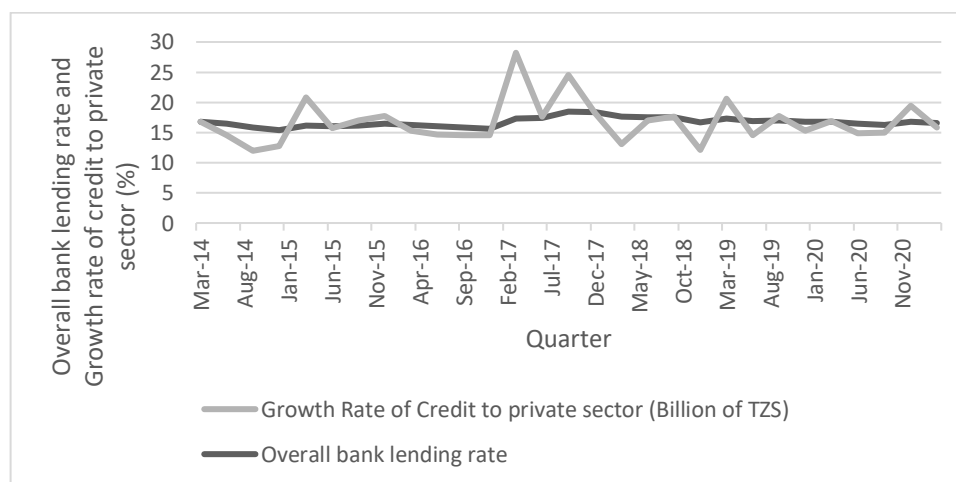
Consistent with its new mandate, the BoT since 1995 was on quantity-based monetary policy regime in which the central bank has been using reserve money or monetary base as an operating target and monetary aggregates as an intermediate target. Under this framework, central bank normally controls the monetary base through the use of various instruments of monetary policy, in order to influence the targeted monetary aggregate (M2), which directly affects money supply. However, the use of quantity-based monetary policy has had negative effects on interest rate charged by banks when there are economic volatilities (Mirondo, 2018). Therefore, to prevent banks from the negative effects of economic volatilities resulting from the use of quantity-based monetary policy, the BoT stated its intention of adopting a price-based monetary policy as indicated in the monetary policy statement of June 2017.

Therefore, currently, monetary policy targets interest rate, particularly, the interbank cash market rate (the rate at which banks lend to each other), which either increases or reduces liquidity in the banking sector.

Figure 1:   Plots of Overall Lending Rate Against Policy Instruments

(a)

(b)

(c)

(d)

Figure 2:   Overall Bank Lending Rate and the Nominal Growth Rate of Private Credit 2014:I – 2021:I

Since 1995 the BoT has more actively put to use indirect instruments of monetary policy to achieve the designated objective of monetary policy, namely price stability. The Open Market Operations (OMO) has been the most common instrument put to use; and, the most common government security traded in the OMO has been the treasury bills (TB), which is issued with different maturities.

The plots in Figure 1 shows (a) the lending rate was impacted upon by the discount rate: serve for the period between September 2016 and July 2017, the lending rate trended the discount rate. Similarly, serve for the period between March 2014 and January 2015, the lending rate trended the REPO rate, which is the interest rate charged by the central bank on securities lent to commercial banks-- the lower the rate, the higher the demand for securities and hence, the higher the liquidity in the financial sector. Figure 1(c) also shows the lending rate trended the reserve ratio. Even though the T-bills rate decreased from 18.25% in December 2015 to about 4.8% in December 2021, Figure 1(d) shows lack of close relationship between the T-bills rate and the lending rate.
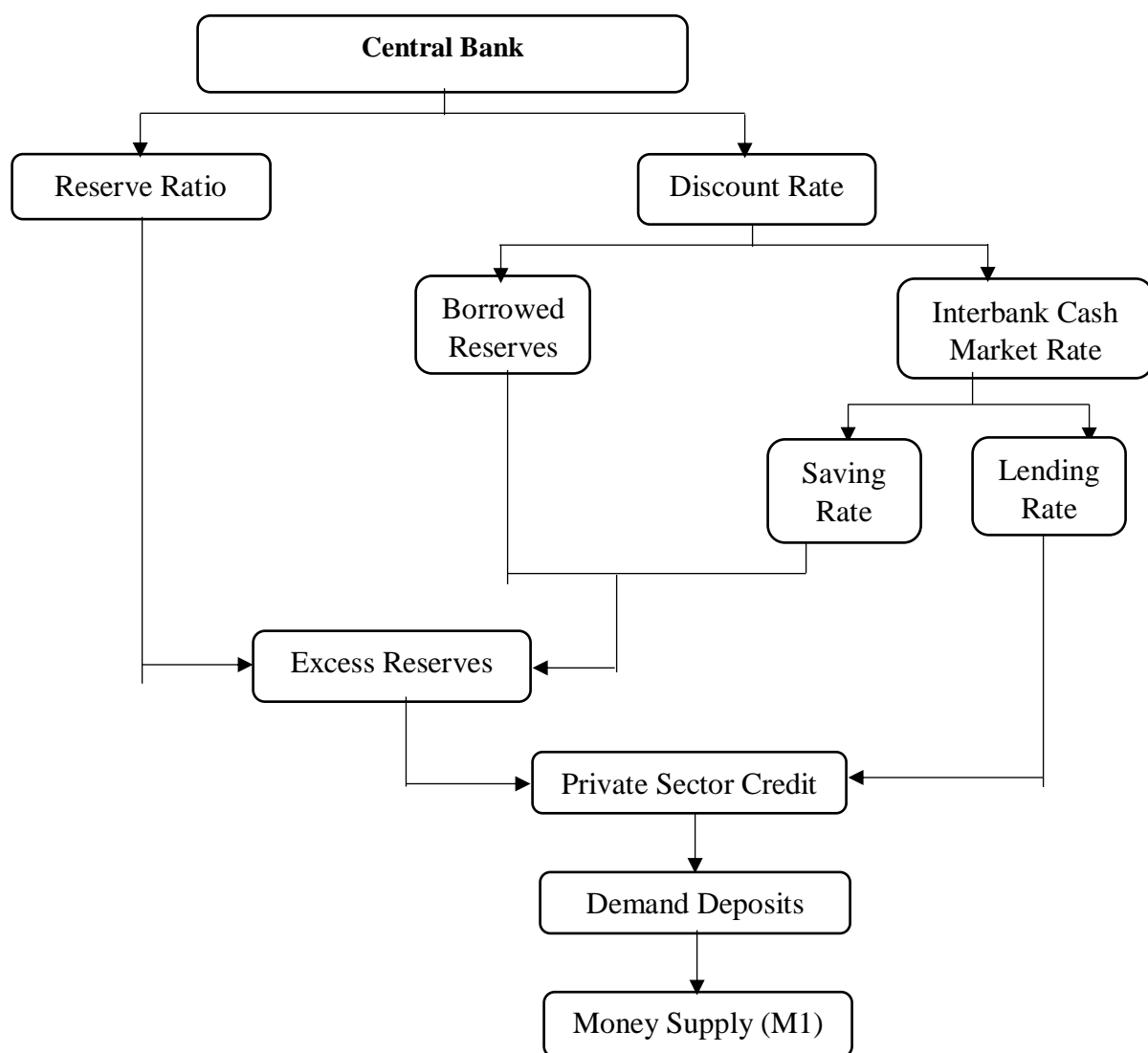
The plot in Figure 2 also shows lack of strong relationship between the lending rate and nominal rate of growth in bank credit to the private sector during the sample period. The estimated correlation coefficient between the lending rate and growth in bank credit was also very low (about 0.35).

3.   Methodology
3.1   Analytical Framework
Figure 1 present conceptual framework on how lending by bank is, in theory, affected by two indirect instruments of monetary policy, namely reserve ratio and discount rate. In the context of the credit (lending) channel of monetary transmission mechanism and also Figure 1, a tight monetary policy action marked by increase of the reserve requirement ratio, *ceteris paribus*, directly reduce un-borrowed reserves available for lending by the banks such that bank credit decrease and its cost relative to interest rate on bonds increase that choke investment by firms that rely on bank loans (Kashyap and Stein, 1994).

Figure 3: Conceptual Framework

Source: Authors' (2019) construction.

On the other hand, contractionary monetary policy action characterized by increase of the discount (bank) rate partly cause direct effect on both borrowed reserves and partly on the cost of "intermediate loans", that is, the interbank market rate, that in unison adversely affects the lending capacity of banks (Figure 3).

3.2 The Estimation Model

In the context of the conceptual framework for this study the analysis of banks' lending behavior in Tanzania is based on a model developed by Bernanke and Blinder (1988) and used Ehrmann *et al.* (2002) which reads as:

$$\Delta ln(L_{i,t}) = \alpha_i + \beta_1 \Delta ln(L_{i,t-1})$$
$$+ \sum_{j=0}^{1} c_j \Delta rr_{t-j} + \sum_{j=0}^{1} \delta_j \Delta dr_{t-j} + f_1 x_{i,t-1}^j + \sum_{j=0}^{1} \Omega_j X_{i,t-1}^j \Delta rr_{t-j}$$
$$+ \sum_{j=0}^{1} \omega_j x_{i,t-1}^j \Delta dr_{t-j} + \sum_{j=0}^{1} \gamma_j \Delta p_{t-j} + \sum_{j=0}^{1} \lambda_j \Delta g_{t-j} + \varepsilon_{i,t}$$

$$(1)$$

where L is volume of bank loans, which measures the banks' behaviour as determined by three groups of factors, first, is monetary policy instruments that include reserve ratio (rr) and the discount rate (dr). In theory, a positive linear relationship is expected between the discount rate and the interbank cash market rate (imr); and, a negative and significant impact of reserve rate on lending behavior of commercial banks is expected; and, a negative and significant impact of discount rate on lending behavior of commercial banks is expected. Second, is characteristic of banks (X_i^j), including a) bank size, measured by total assets; b) liquidity, measured by the ratio of the total liquid assets to the total assets of each bank; and, c) banks' capitalization, measured by the ratio of shareholders' equity to the total assets. Third, is the group of macroeconomic factors, including inflation (τ) and real rate of economic growth (g), which were, respectively, measured as growth rates of real Gross Domestic Product (GDP) and the Consumer Price Index (CPI) of Tanzania.

The $X_i^j \Delta rr$ and $X_i^j \Delta dr$ in the estimation model respectively captures how the banks characteristics respond to changes in reserve ratio and the discount rate. The other characteristics in the estimation model are thus: i is number of banks ($i = 1, 2, \dots, N$); t is the quarterly time signature; α is a bank specific intercept, which allows for fixed effects; β is coefficient of speed of adjustment in the range $0 < \beta < 1$; ε is an error term of bank i at quarter t ($\varepsilon_{i,t} = v_t + u_{i,t}$, where v_t denotes an unobserved time-specific effect, and $u_{i,t}$ is an idiosyncratic error term.

The estimation model was fitted by using quarterly panel data of twenty-seven (27) commercial banks for the period spanning from 2012: I to 2017: II, that is, the period which preceded adoption of price-based monetary policy regime. The bank level data were obtained from respective quarterly financial statements. The monetary and price data in level were obtained from diverse publications of the Bank of Tanzania (BoT) and the sampled commercial banks. Aside the data which were manually computed, other sources were the National Bureau of Statistics (NBS) and World Development Indicators (WDI). It is noteworthy that the dataset was unbalanced because of unavailability of financial statements of some banks in certain quarters.

A priori, the statistical test by Pearson correlation method revealed absence of severe multicollinearity problem in the data set: Pearson coefficient was below 0.8; and, the mean Variance Inflating Factor (VIF) was 1.36 which is less than 10, suggesting inexistence of multicollinearity problem in estimation (Table 1, Table 2). However, tests of normality of residuals by using Kernel density, Pnorm, and Qnorm plots and also the Shapiro-Wilk and Shapiro-Kurtosis tests suggested the residuals of the estimation model were not normally distributed.

Table 1:   Pearson's Correlation Matrix

Variable	L	rr	dr	Size	Cap	Liq	τ	g	imr
L	1								
rr	-0.03	1							
dr	0.08	-0.04	1						
Size	0.99	-0.04	0.08	1					
Cap	-0.1	-0.03	-0.02	-0.11	1				
Liq	0.09	-0.04	-0.02	0.17	-0.01	1			
τ	-0.12	0.25	-0.66	-0.11	-0.01	-0.05	1		
g	0.04	0.09	0.36	0.04	-0.01	-0.02	-0.42	1	
imr	0.01	0.23	0.11	-0.004	0.02	-0.09	0.23	-0.13	1

Notes: L=lending; rr=reserve ratio; dr=discount rate; Size=bank size; Cap=bank capitalization; liq=bankliquidity; τ=inflation; g=real economic growth; and, imr=interbank market rate.

Table 2:   Variance Inflating and Tolerance Factors

Variable	VIF	1/VIF
rr	1.15	0.87
dr	1.84	0.54
Size	1.06	0.95
Cap	1.01	0.99
Liq	1.04	0.96
τ	2.15	0.47
g	1.29	0.77
Mean VIF	**1.36**	na

The absence of normal distribution in data used in the analysis is mainly explained by the varied sized of the sampled banks: some were large, others were medium or small banks. Granted, the sampled banks had varying levels of performance that created outliers in the dataset used in the analysis. Noteworthy, the normality in data set was a non-starter because the Generalized Method of Moments (GMM) used in estimation produce robust estimates. In

addition, presence of heteroscedasticity was tested by using White's test. The result suggested the residuals were heteroscedastic (Semu, 2020). Since the GMM estimation, which converts the heteroscedastic standard errors to robust standard errors was used, the problem of heteroscedasticity was not troublesome. Furthermore, presence of autocorrelation was investigated by plotting graphs of the residuals against time period (quarters). The plots suggested autocorrelation was a problem in the data. However, since the analysis is based on a dynamic panel model with lagged dependent variable, the problem of autocorrelation was expected and of little concern.

4.   Empirical Results

The data set was estimated by using Arellano-Bond Generalized Method of Moments (GMM) estimator, mainly because the analysis is based on a panel data with large number of commercial banks observed over a short period of time and a single equation with autoregressive dynamics and endogenous independent variables. In order to decide whether to use in estimation the difference GMM or system GMM, the rule of thumb proposed by Bond (2002) by which, first, the model was estimated by using Pooled Ordinary Least Squares (POLS) to obtain the coefficient of the lagged dependent variable which is likely to be upward biased (Blundell and Bond, 1998), and hence considered as an upper bound estimate; secondly, the model was estimated by using a fixed effect model, whose coefficient of the lagged dependent variable is likely to be downward biased (Arellano and Bond, 1991), and hence considered as a lower bound estimate. Thirdly, in order to address the presence of endogenous regressors and the lagged dependent variable, the model was estimated by using one-step difference GMM as suggested by Arellano and Bond (1991). Since the coefficient of the lagged dependent variable from one-step difference GMM estimation was between the fixed effects estimate and the pooled OLS estimate, the one-step difference GMM estimate was considered unbiased and consistent.

The GMM estimation results suggest that the lending behavior of the sampled banks in Tanzania was significantly determined by three factors at least at the 10 percent test level of statistical significance. One is the lagged lending: its coefficient (0.33), which is positive and statistically significant at 1 percent level of significance test, suggests banks adjusted positively future lending by about 0.33 percent per quarter.[2] This finding is consistent with that obtained by Loupias, Savignac and Sevestre (2001) and Jusoh *et al.* (2014). It differs, however, with the negative relationship between current loans and last period's loans obtained by Boughrara and Ghazouani (2008) in a study on selected MENA countries. Second is the contemporaneous reserve ratio (-1.775), which is negative as expected and statistically significant at the 5 percent test level. Its size, significance and sign suggests monetary policy action based on reserve requirement effectively caused more than proportionate decrease in bank lending during the sample period.

---

[2] While OLS estimations gave only one significant and an upward biased variable, the fixed effects estimation produced four significant variables; and, the estimated coefficient of the lagged dependent variable was downward biased. This necessitated the use of the GMM, which is a more advanced technique estimating dynamic panel data. For detailed results, see Semu (2020).

Table 3: **One-Step Difference GMM Results**

Variable	Coeff.	Robust S.E	t	P > |t|
ln L $_{i,t-1}$	0.33 ***	(0.11)	2.85	0.01
rr $_t$	-1.77 **	(0.70)	-2.53	0.02
rr $_{t-1}$	0.86	(2.02)	-0.42	0.67
dr $_t$	0.18	(0.61)	0.30	0.77
dr $_{t-1}$	-0.98	(0.73)	-1.35	0.19
Size $_{i,t-1}$	-1.64	(1.81)	-0.91	0.37
Cap $_{i,t-1}$	0.25	(0.26)	-0.93	0.36
Liq $_{i,t-1}$	-0.17	(0.22)	-0.78	0.44
rr $_t$*Size $_{i,t-1}$	0.14 **	(0.06)	2.47	0.02
rr $_{t-1}$*Size $_{i,t-1}$	0.02	(0.14)	0.11	0.91
rr $_t$*Cap $_{i,t-1}$	0.0004	(0.005)	0.09	0.93
rr $_{t-1}$*Cap $_{i,t-1}$	0.02	(0.02)	0.84	0.41
rr $_t$*Liq $_{i,t-1}$	-0.005	(0.004)	1.16	0.26
rr $_{t-1}$*Liq $_{i,t-1}$	0.02	(0.02)	1.00	0.32
dr $_t$*Size $_{i,t-1}$	0.01	(0.04)	0.26	0.80
dr $_{t-1}$*Size $_{i,t-1}$	0.04	(0.05)	0.88	0.39
dr $_t$*Cap $_{i,t-1}$	-0.02 ***	(0.01)	-3.63	0.001
dr $_{t-1}$*Cap $_{i,t-1}$	0.02 ***	(0.01)	3.11	0.004
dr $_t$*Liq $_{i,t-1}$	-0.003	(0.005)	-0.51	0.61
dr $_{t-1}$*Liq $_{i,t-1}$	0.005	(0.01)	0.56	0.58
τ_t	-0.002	(0.01)	-0.14	0.89
τ_{t-1}	0.007	(0.02)	0.39	0.70
g_t	0.012	(0.01)	1.01	0.32
g_{t-1}	0.002	(0.02)	0.15	0.88

N = 503, Number of Groups = 27, F-Statistics = 614.88 ***
*, **, *** denote 10, 5 and 1 percent significance level respectively.

The results, which affirms the responsiveness of commercial banks to reserve requirement in the classical sense, is consistent with that obtained by Kimani (2013) in a study on Kenya and Dhungana (2016) in a study on Nepal. The finding for Tanzania differs, however, with the insignificant effect of cash reserve on banks' lending obtained by Nabassaga, Nandwa and Simpasa (2014) in Zambia. It is noteworthy, however, that the lagged effect of the reserve ratio on lending is positive and statistically significant at the 5 percent test level. This may suggest the banks leveraged reserves for lending due to contractionary monetary policy action of the central bank. Third, is discount rate: its contemporaneous coefficient is negative and statistically significant but its one period lagged coefficient unexpectedly positive but statistically significant at the 1 percent test level.[3]

---

[3] The lagged reserve ratio, discount rate and lagged discount ratio were statistically insignificant at the conventional test level—hence they have not been interpreted.

The results show the contemporaneous discount rate is statistically insignificant. The finding suggests lack of effect of the discount window on lending by banks in Tanzania during the sample period, seemingly because interest rates were not a target of the quantity-based monetary policy regime that existed during the sample period. Suffice it to note that this finding differs with that obtained by Omorokunwa and Adegboye (2011), Kimani (2013) and Nabassaga, Nandwa and Simpasa (2014), but similar to that of Amidu (2006) in Ghana.

The coefficients of interaction terms explain differently the bank lending behaviour. The coefficient of the interaction term of reserve ratio with bank size is positive and statistically significant at 5 percent level. Specifically, its size (0.14) suggests asymmetries existed across banks in their response to changes in reserve ratio, that is, response of larger banks to high reserve ratio was not as strong as it was for smaller banks. This suggests that when reserve ratio was high, lending by smaller banks was highly affected than that by larger banks. This could be due to the fact that smaller banks do not have enough financial resources and are not able to access alternative sources of financing from capital markets. This finding is similar to Kashyap and Stein (1994), Kakes and Sturm (2001), Termos (2005), Boughrara and Ghazouani (2008) in Egypt, Jordan and Tunisia. However, it differs with the finding of Chang and Jansen (2005) who found that big banks respond greatly to monetary policy shocks than small banks. Also, in the findings of Ehrmann *et al.* (2001), Loupias, Savignac and Sevestre (2001) and Boughrara and Ghazouani (2008) in Morroco, the coefficient of the interaction term was statistically insignificant.

The interaction terms of discount rate with capitalization is statistically significant at the 1 percent test level. Also, its size suggests that the effect of discount rate on bank lending in Tanzania depended on their level of capitalization. The effect of discount rate due to capitalization seemed to vary from one period to another as shown by the coefficients of interaction terms. The coefficient of the interaction term of current discount rate with capitalization was negative and statistically significant at the 1 percent level of significance test, suggesting that well-capitalized banks responded strongly to increase in discount rate than poorly-capitalized banks, whereas, in the previous period, the coefficient of the interaction term was positive and statistically significant at the 1 percent level of significance test, implying that poorly-capitalized banks responded strongly to increase in discount rate than well-capitalized banks. This finding is similar to that of Boughrara and Ghazouani (2008) in Jordan and contrary to the finding of Loupias, Savignac and Sevestre (2001).

From the results, capitalization did not appear to affect the way commercial banks respond to changes in reserve ratio in Tanzania. This finding is consistent with those of Ehrmann *et al.* (2001), Loupias, Savignac and Sevestre (2001) and Boughrara and Ghazouani (2008) in Morroco and Tunisia. The result, however, differs with the results obtained by Peek and Rosengren (1995) and Jusoh *et al.* (2014).

Also, liquidity did not seem to affect the response of commercial banks to changes in reserve ratio and discount rate. This is consistent with the findings of Boughrara and Ghazouani (2008) in Egypt and Tunisia and Jusoh *et al.* (2014), but differs with the findings obtained by Ehrmann *et al.* (2001) and Loupias, Savignac and Sevestre (2001). Furthermore, bank size did not play

a significant role in influencing the response of commercial banks to changes in discount rate. This is contrary to the finding of Omorokunwa and Adegboye (2011) in Nigeria.

As for the macroeconomic variables, the empirical results show that the headline inflation rate and real GDP growth rate did not play a significant role in influencing lending behavior of commercial banks in Tanzania. The result is similar to Boughrara and Ghazouani (2008) in Jordan, but differs with the results obtained by Loupias, Savignac and Sevestre (2001) and Jusoh *et al.* (2014).

5.   Conclusion

This study aimed to establish empirically the effect of monetary policy actions on the lending behavior of commercial banks in Tanzania prior to the adoption of interest rate targeting regime in 2017:III. Quarterly panel data of twenty seven commercial banks in Tanzania for the period 2012: I - 2017: II were subjected to Arellano-Bond Generalized Method of Moments (GMM) estimation technique. The one-step difference GMM results suggested that lagged lending, reserve ratio, the interaction term of reserve ratio and lagged bank size, the interaction term of discount rate and lagged capitalization, and the interaction term of lagged discount rate and lagged capitalization determined the lending behavior of commercial banks in Tanzania. Other variables included in the model were statistically insignificant.

The findings suggest existence of a very significant role of commercial banks in Tanzania in transmitting monetary policy actions to real sector through the credit (loans) to the private sector. Specifically, the central bank in Tanzania can regulate the financial sector by affecting reserve ratio and discount rate in order to achieve the desired monetary policy. Nonetheless, the results also suggests that the effectiveness of the credit channel depend on bank characteristics, specifically the banks' size or rather capitalization.

The results have shown that the impact of discount rate on lending behavior of commercial banks was significant due to capitalization, implying its impact was weaker when compared to the impact of reserve ratio on lending behavior of commercial banks in Tanzania. This finding, however, require further qualification by more empirical studies on monetary policy effect on the lending behaviour of the commercial banks in Tanzania.

References

Amidu, M. (2006). The Link Between Monetary Policy and Banks' Lending Behavior: The Ghanaian Case. *Banks and Bank Systems*, 1(4), pp. 38-48.

Apergisa, N., Miller, S. and Alevizopoulou, E. (2012). The Bank Lending Channel and Monetary Policy Rules: Further Extensions. *Procedia Economics and Finance*, 2: 63 – 72.

Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application of Employment Equations . *The Review of Economic Studies*, Vol. 58, No. 2, pp. 277-297.

Ayodele, J. C. (2014). Effects of Monetary Policy on the Commercial Banks Lending in Nigeria. *Review of Public Administration and Management*, Vol. 3, No. 5, pp. 134-146.

Bernanke, B. S., & Blinder, A. S. (1988). Credit, Money and Aggregate Demand. The *American Economic Review*, Vol. 78, No. 2, pp. 435-439.

Bernanke, B. S., & Gertler, M. (1995). Inside the Black Box: The Credit Channel of Monetary Policy Transmission. National Bureau of Economic Research, NBER Working Paper No. 5146.

Blundell, R., & Bond, S. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics*, 87, pp. 115-143.

Bond, S. (2002). Dynamic Panel Data Models: A Guide to Micro Data Methods and Practice. CEMMAP Working Paper, CWP09/02, pp. 1-34.

Bonds News. (2017). Tanzania Central Bank Cuts Reserve Ratio to 8 pct. Retrieved from Reuters: https://www.reuters.com/article/tanzania-cenbank/tanzania-central-bank-cuts-reserve-ratio-to-8-pct-idUSL5N1GZ469, November 14, 2018.

BoT. (2006). Bank of Tanzania Act. Special Gazette of the United Republic of Tanzania, No. 3, Vol. 87, Dar es Salaam: Government Printer.

BoT. (2011). Tanzania Mainland's 50 Years of Independence: The Role and Functions of the Bank of Tanzania. Dar es Salaam: Mimeo.

Boughrara, A., & Ghazouani, S. (2008). Is There a Bank Lending Channel of Monetary Policy in Selected MENA Countries? A Comparative Analysis. Economic Research Forum 15th Annual Conference. Cairo, Egypt: *Equity and Economic Development*, pp. 1-31.

Chang, J., & Jansen, D. W. (2005). The Effect of Monetary Policy on Bank Lending and Aggregate Output: Asymmetries from Nonlinearities in the Lending Channel. *Annals of Economics and Finance*, 6, pp. 129-153.

Contessi N. (2013). The Role of Financial Intermediaries in Monetary Policy Transmission. *Journal of Economics and Financial Issues*, 4, 3, 95-107.

De Young, R., & Rice, T. (2004). How Do Banks Make Money? The Fallacies of Fee Income. *Economic Perspectives*, 4Q, pp. 34-51.

Dhungana, N. T. (2016). Effects of Monetary Policy on Bank Lending in Nepal. International *Journal of Business and Management Review*, Vol. 4, No. 7, pp. 60-81.

Ehrmann, M., Gambacorta, L., Mart´ınez-Pag´es, J., Sevestre, P., and Worms, A. (2001). Financial systems and the role of bank in monetary transmission in the Euro Area. European Central Bank Working Paper No. 105

Ehrmann, M., Gambacorta, L., Pages, J. M., Sevestre, P., & Worms, A. (2002). Financial Systems and the Role of Banks in Monetary Policy Transmission in the Euro Area. Notes D'etudes et de Recherche, NER No. 93, pp. 1-42.

Jusoh, M., Karim, Z. A., Shokr, M. A., & Zaidi, M. A. (2014). The Bank Lending Channel of Monetary Policy? The Panel Evidence from Egypt. *Gadjah Mada International Journal of Business*, Vol. 16, No. 3, pp. 255-274.

Kakes, J., & Sturm, J. (2001). Monetary Policy and Bank Lending: Evidence from German Banking Groups.

Kashyap, A.K. & Stein, J.C. (1994). Monetary Policy and Bank Lending. In G. N. Mankiw, ed., *Monetary Policy*. Chicago: The University of Chicago Press., Chapter 7, pp. 221-261.

Kashyap, A. K. and Stein, J. C. (1995). 'The Impact of Monetary Policy on Bank Balance Sheets. Carnegie-Rochester Conference Series on Public Policy, 42:151–195.

Kimani, J. (2013). Assessment of effects of monetary policies on lending behavior of commercial banks in Kenya. Research Project, School of Business: Kenyatta University.

Loupias, C., Savignac, F., & Sevestre, P. (2001). Monetary Policy and Bank Lending in France: Are There Asymmetries? European Central Bank Working Paper No. 101, pp. 1-50.

Minja, E.J. and Magina, N.G. (2009). An Assessment of the Bank Lending Channel of Monetary Policy Transmission in Tanzania. *Tanzania Economic Trends*, 20, No. 2, pp. 101-117.

Mirondo, R. (2018). BoT to Adopt Price-based Monetary Policy - VIDEO. Retrieved from The Citizen: http://www.thecitizen.co.tz/News/BoT-to-adopt-price-based-monetary-policy/1840340-4292508-myo023z/index.html, October 23, 2018.

Nabassaga, T., Nandwa, B., & Simpasa, A. (2014). Bank Lending Channel of Monetary Policy Transmission in Zambia: Evidence from Bank-Level Data. African Development Bank Group, Working Paper No. 211.

Ndanshau, M.O.A. (2010). Money and Other Determinants of Inflation: The Case of Tanzania, *Indian Journal of Economics and Business*, Vol. 9, No. 3, pp. 503-26.

Omorokunwa, O. G. and Adegboye, A. C. (2011). Monetary Policy and Bank Lending Habit in Nigeria. Retrieved from Research Gate: https://www.researchgate.net/publication/308332373, October 22, 2018.

Peek, J., & Rosengren, E. S. (1995). Bank Lending and the Transmission of Monetary Policy. Federal Reserve Bank of Boston, Vol. 39, pp. 47-79.

Semu, A. (2020), "Effects of Monetary Policy on Lending Behavior of Commercial Banks in Tanzania," Unpub. MA Dissertation, University of Dar es Salaam.

Termos, A. (2005). Banking Structure and the Effect of Monetary Policy on Bank Lending. A Dissertation Submitted to the Graduate Faculty of North Carolina State University.

The World Bank Group. (2018). The World Bank. Retrieved from Data Bank: World Development Indicators: http:// databank. worldbank.org/data/indicator/NY.GDP.MKTP.KD.ZG/1ff4a498/Popular-Indicators, December 16, 2018.