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The Bank Lending Channel of Monetary Transmission Mechanism in Malawi: Evidence from Bank level Panel Data

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Abstract

This paper assesses the bank lending channel of monetary policy transmission mechanism in Malawi, using a dynamic panel data framework applied to a generalized method of moment (GMM) dynamic panel estimator. The results indicate that the policy rate (or monetary policy) is statistically significant and positively related to supply of loans for all banks in Malawi, suggesting that banks benefit from higher interest margins during tight monetary policy stance. Similar results are found for big banks while the policy rate is negative and insignificant for small banks. In terms of bank specific factors, results also reveal that asset base and capital levels significantly increase supply of loans. However, liquidity levels of banks are negatively related to supply of loans implying that banks tend to turn to their liquid assets to offer more loans during a contractionary monetary policy cycle. Furthermore, the policy rate when interacted with bank specific factors for big banks does not have a significant impact on their supply of loans while the result is positive and significant for small banks.

Taken together, these results suggest that the impact of tight monetary policy stance is contrary to a prior expectation that tight monetary policy stance tightens credit conditions, and that for the bank lending channel of monetary policy to be effective, monetary policy actions should be able to impact the reserves of both large-sized banks and small banks. It is therefore important that the Reserve Bank of Malawi explores the set of tools in its purview to ensure that policy changes affect loan portfolios of banks as intended.

Key Words: Bank lending channel, monetary policy, panel data, generalized method of moment, loan supply
JEL Classification: E52, C33.

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I. Introduction

Theoretically, there are several transmission mechanisms channels; interest rate channel; asset channel; exchange rate channel; and credit/Bank lending channel. Bernanke and Gertler (1995) further break credit channel into two possible mechanisms: balance-sheet channel (BSC) and bank-lending channel (BLC). The BSC focusses on the effect of adjustments of the monetary policy stance on the borrower's balance sheet, while the BLC looks at the possible effect of monetary policy actions on the supply of loans by the banking system. BLC plays an important role in affecting economic activity because any changes in the monetary policy stance will affect the bank behavior in both the assets and liabilities side (Opolot, 2013).

How monetary policy actions are transmitted to the real economy are to some extent dependent on the structure of the economy. In most developing economies, there is dominance of the banking sector in the financial system while capital and money markets remain significantly underdeveloped. Clearly, Malawi's financial system remains largely bank based as opposed to market based financial system since financial and capital markets are considerably underdeveloped. Therefore, the understanding of the monetary transmission mechanism and the role of the banking system is key for monetary authorities and policy makers, especially in the bank dominated financial system. It is imperative that a better understanding of the transmission mechanism would help monetary authorities and analysts to interpret and predict movements in financial aggregates better. Besides, more information about the transmission mechanism might lead to a better choice of intermediate targets (Farnha L. et al, 2001). More so, if the bank lending channel is an important part of the transmission mechanism in Malawi, then the banks' asset items should be the center of attention and monitoring. Given the foregoing, it would therefore be interesting to investigate the efficacy of banking lending channel in Malawi.

The mechanism by which monetary policy is transmitted to the real economy remains unresolved debate in economics. Even so, debate on efficacy of bank lending channel transmission mechanism remains unsettled owing to varied empirical findings. Following Sims' (1980) seminal work, extensive research on the subject matter have utilised Vector Autoregression (VAR) in modelling of monetary policy transmission (Borys and Hovarth, 2007). Empirical work on bank lending channel has been significantly covered (Kashyap and Stein, 1995; Kashian and Opiela, 2000; Kashyap and Stein, 2000; Favero et al, 1999; Ashcraft, 2006; and Matousek and Sarantis, 2009). However, previous work on monetary policy transmission mechanism in Malawi has primarily focused on the estimation of aggregate money demand relations, generally used macro level data and largely focused on time series analysis (Phiri, 2001), using VAR estimations (Mangani, 2010), using SVAR (Ngalawa and Viegi, 2011), using the VECM (Lungu, Simwaka, Chiumia, Palamuleni and Jombo, 2012) and using ARDL framework (Mangani, 2013). This study therefore, assesses the banking lending transmission mechanism using micro level bank specific data, plugged in a panel framework, and as such represents a methodological shift from the popular VAR framework approach known for macro level data.

The main objective of this paper is to assess the bank lending channel of monetary transmission mechanism in Malawi. Specifically, this study tries to answer the following questions:

i) Do monetary policy actions have an impact on supply of loans?

ii) Do bank specific factors such as size, liquidity and capital levels have effect on supply of loans?

iii) Does monetary policy impact on supply of loans depend on bank specific factors?

The rest of the paper is organized as follows: Chapter 2 presents financial system and monetary policy in Malawi. Chapter 3 reviews the relevant literature on BLC. Chapter 4 presents the methodology and describes the data and their sources. In Chapter 5, results are presented and discussed. Finally, Chapter 6 provides conclusion and policy recommendations on the main findings of this study as well as suggest areas for future research.

II. Financial System and Monetary Policy in Malawi

2.1 Landscape of the Malawi Financial System

The Malawian financial system is among the least developed in the world and mainly consists of commercial banks, insurance companies, discount houses, foreign exchange bureaux and a growing microfinance industry. The financial system is dominated by commercial banks, which and as of October 2017, totaled 10 accounting for over 66 percent of financial sector assets (Table 1). The banking system is dominated by two major banks, which, as of August 2017, had a combined asset share of 49.7 percent of the banking sector assets.

Table 1: Malawi Financial System Assets (in Million Malawi Kwacha)

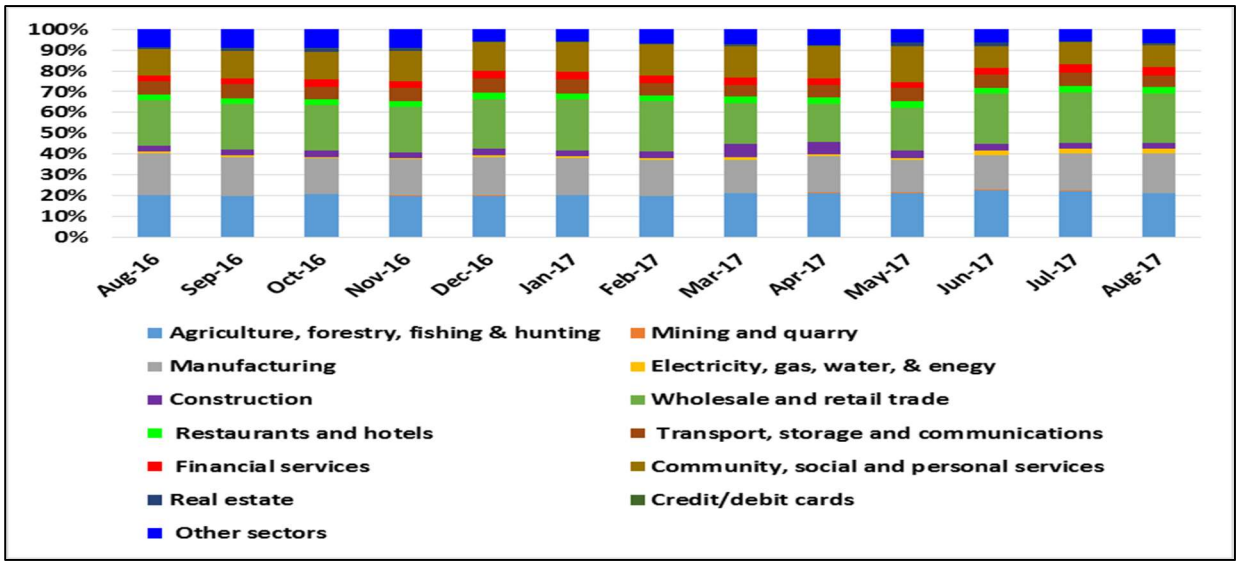
	2011	2012	2013	2014	2015	2016
Commercial Banks	390.5	523. 7	722.0	947.4	1,265.2	1,503.3
Insurance Companies	81.0	103.4	192.8	251.7	314.2	374.4
Pension Funds			167.1	247.5	308.5	380.5
Microfinance	13.9	10.8	11.6	30.3	21.5	21.2
Total	**485.5**	**37.8**	**1,093.5**	**1,477.0**	**1,909.3**	**2,279.4**

Source: Reserve Bank of Malawi

Following the composition of the country's financial system, commercial banks are a major source of credit in Malawi and as of 2014 accounted for over 95 percent of all credit extended to the economy, with the remaining 5 percent provided by Microfinance institutions. Government is the main client of the banking sector, with deposits accounting for 6.7 percent of the total deposits at the commercial banks and the government holding 29.7 percent of the banking system credit in August 2017. Furthermore, government securities form a considerably substantial share of total assets of the banking system in Malawi. As of August 2017, government securities accounted for 10 percent of the total assets of the banking system.

In terms of the private sector, commercial banks' lending is mainly to the wholesale and retail trade, agriculture and manufacturing sectors and concentrated in a few large borrowers. As of August 2017, the three sectors accounted for 67.9 percent of the outstanding credit to the private sector (Chart 1).

Chart 1: Sectoral Allocation of Credit



Source: Reserve Bank of Malawi

The Malawi capital market remains relatively underdeveloped compared to other sub-Saharan countries with a limited number of trading instruments, a few listed companies, and low participation by retail investors.

2.2 Monetary Policy in Malawi

Traditionally, Malawi has conducted monetary policy under monetary aggregates targeting framework, although of late, there has been a shift towards interest rate targeting framework. The monetary policy targeting framework is based on Fischer's Quantity Theory of Money (QTM) which postulates that there is a direct relation between movement in monetary aggregates and price developments, given stability of the money multiplier and velocity (Fisher, 1911). In terms of the actual conduct of monetary policy in Malawi, the growth and price objectives are set by the government from which the commensurate money supply target is derived. The Reserve Bank of Malawi is charged with ensuring that target money supply is met. To achieve this, Net Foreign Assets (NFA) and Net Domestic Assets (NDA) targets are set and the trajectory of these is closely monitored and altered to affect liquidity levels in the banking system. Mostly, this is done under the IMF's extended credit facility (ECF) arrangement.

A number of studies have been conducted to evaluate the effectiveness of monetary policy in Malawi under the monetary aggregates targeting framework (Phiri, 2001; Mangani, 2010; Ngalawa and Viegi,2011; Lungu.et.al, 2012 and Mangani, 2013). The general conclusion from these studies is that monetary policy is less effective in Malawi. Other studies (Jombo et.al, 2014) have established a pass-through from exchange rate to inflation in Malawi.

Given the existence of unclear relationship between monetary aggregates and inflation, there is a shift from the monetary aggregates framework of monetary policy towards interest rate targeting. Under this framework, a change in the policy stance is communicated by the central bank through revision

of the Policy rate. A change in the Policy rate is usually followed by corresponding change in the interest rate structure of the banking system and average yields on government securities follow the same direction. Ultimately, this will affect inflation and real sector activities.

III. Literature Review

3.1 Theoretical

Theoretically, there is no agreement on how monetary policy impacts the real economy. The transmission mechanism theory holds that monetary policy can influence real sector activity through several channels, namely: interest rate channel, exchange rate channel, other asset price channel, and credit channels. Credit lending channel is broadly broken down to bank lending channel (BLC) and balance sheet channel (Bernanke and Gertler, 1995). Work on what is now referred to as the BLC of the monetary policy transmission, which is the focus of this paper was pioneered by Bernanke and Blinder (1988). They argued that monetary policy works by shifting both the supply of bank assets (loans) and bank liabilities (deposits). This ultimately leads to a decline in investment spending as well as economic activity.

The bank lending channel assumes that (a) banks cannot shield their loan portfolios from changes in monetary policy, (b) commercial banks will not adjust deposit interest rates to match other market interest rates, at least not instantaneously and (c) borrowers cannot fully insulate their real spending from changes in availability of bank credit. The BLC indicates the importance that banks play in the economy through facilitating the savings-investment process. It is argued that monetary policy can affect the bank portfolio behavior through the bank asset in terms of loans, securities and bank reserves (Bernanke and Gertler, 1995). The BLC therefore plays an important role in affecting economic activity because any changes in the monetary policy stance will affect the bank behavior in both the assets and liabilities side. Specifically, contractionary monetary policy will force banks to devote more reserves to back up deposits leading to contraction of bank loan supply followed by drop in investment and consumer spending which will in turn reduce aggregate demand. The converse is also true; expansionary monetary policy will cause the level of banks' reserves necessary to back up deposits to decline leading to an expansion of bank loan supply. The result will be a rise in investment and consumer spending leading to an increase in aggregate demand.

The effect of monetary policy on the supply of bank loans depends on the characteristics of the banking sector. The stronger the banking sector, in terms of having larger banks, the weaker the expected impact of policy movements will be since balance sheets of large, healthy banks are not sensitive to policy because their reserves contraction can be readily offset with alternative forms of financing without involving reserve requirements. A stronger BLC exists in a banking sector with relatively small banks with low liquidity and capitalization and weak bank market concentration, since such banks are more exposed to market imperfections and will face more difficulties in attracting non-deposit financing.

3.2 Empirical Review

Empirical findings on the efficacy of the BLC in the monetary transmission mechanism are rather mixed. Walker (2012) investigated the existence of bank lending channel in countries of the East African Community (EAC) namely Burundi, Kenya, Rwanda, Tanzania and Uganda. The study applied differenced generalized method of moments (GMM) technique to micro-level data for the period 1993 to 2008. The results revealed stronger evidence of BLC for well- capitalized banks and smaller banks as compared to better-capitalized banks and larger banks. Furthermore, it established that this particular outcome was of a more economically significant magnitude. The findings alluded to the common supposition that a BLC of monetary policy transmission exists for EAC countries when considered as a whole, and the study considered this as fundamental to a proposed creation of a monetary union. Nevertheless, liquid asset ratios were found to be of less significance in explaining bank credit supply or the extent to which credit supply react to contractionary monetary policy.

Opolot (2013) and Matousek and Solomon (2017) using Genaralised Method Moments (GMM) on bank specific panel data confirm the existence of bank lending channel in Uganda and Nigeria respectively. Both studies found that individual bank characteristics such as liquidity and capitalization influence loan supply. More liquid and highly capitalized banks in Uganda were found to react less strongly to monetary policy changes than less liquid, less capitalized banks supporting the findings by Walker (2012) for Uganda. In Nigeria however, bank characteristics were found to be more responsive to changes in money supply other than interest rates.

The BLC was also confirmed to be effective in South Africa by Siichei (2005). Results showed that an increasing repo rate was associated with decreasing supply of loans. However, loan supply of large and highly capitalized banks was found to be more resilient to adjustments in monetary policy confirming the session by Bernanke and Gertler (1995). Work by Kashia and Opiela (2000), Kayshap and Stein (1997), Kashyap and Stein (1995) also report the existence of bank lending channel with small, less liquid undercapitalized banks being most responsive to monetary policy.

Using micro-firm level data from Bank-Scope and macro country level data from World Development Indicators databases, Amidu (2014) investigated broad determinants of credit supply in 26 sub-Saharan African (SSA) countries for the period 2000 to 2007. The study, which employed a two-step system GMM estimator, found that real interest rates significantly reduced bank lending in SSA in general but only for EAC when the study considered regional groupings. The analysis also found that bank size had significant positive effects on credit supply in ECOWAS, EAC SADC and SSA in general. However, the results found significant adverse effects of capitalization only for ECOWAS and EAC where a reduction in capitalization translated into a decrease in credit supply. Macroeconomic condition as expressed through GDP per capita growth was found to influence bank lending significantly only in SSA in general and SADC in particular, but not for other economic blocs.

Motivated by the lack of assessment of the financial reforms, deregulation, consolidations, financial innovations and joint payment systems, Lungu (2007) assessed the process of monetary transmission mechanism by investigating evidence of a bank lending channel in SADC during the period 1990–2006 using data from the banking sector. The study applied a vector autoregression (VAR) model to data from a panel of banks in order to identify shifts in the loan supply curve in response to changes in monetary policy. Findings revealed mixed results but overall the study found evidence of the

existence of a bank-lending channel in all SADC countries in the sample. Further, the study found that the take-off point for monetary policy effects differs from one country to another.

Another study on bank lending channel involved a transition economy—Poland. Specifically, Havrylehyk and Jurzyk (2005) investigated whether banks' loan supply during monetary policy shocks depended on individual bank's characteristics such as size, liquidity, capitalization and ownership structure as Poland was integrating into European Monetary Union. Their results generally disagree with the bank lending channel hypothesis although they find some evidence of bank lending channel based on size characteristic. The findings of the study further reveal that there were significant differences between foreign and domestic banks in their responses to changes in short term interest rates as foreign banks reacted more strongly than domestic banks.

Therefore, the debate of the existence of BLC remains inconclusive given mixed empirical findings. It is worth emphasizing that the majority of reviewed empirical literature report the existence of bank lending channel, more generally dependent on the health and size of the banking sector. The healthier and bigger the sector, the weaker the expected effect of monetary policy actions; the weaker the banking sector the stronger the expected impact of monetary policy movements.

IV. Methodology

4.1 Model Specification

The study employs the system Generalized Method of Moments (GMM) dynamic panel estimator proposed by Arellano and Bond (1991), Arellano and Bover (1995) and recently extended by Blundell and Bond (1998). The advantage of the framework is that it helps to control for potential biases induced by endogeneity (the correlation between the lagged dependent variable and the error term). More recently, this paper adopts Ehrmann et al. (2003) found in Opolot (2013) in specifying a model of BLC transmission mechanism.

The model holds that demand for bank loan is a function of the level of economic activity (GDP), inflation $(\inf)$ and the short-term nominal interest rate $(lrate)$ specified as:

$$L_i = \beta_1 GDP + \beta_2 \inf + \beta_3 lrate \quad \text{.....(1)}$$

Where $\beta_1 > 0, \beta_3 < 0$. There is no apriori sign for inflation due to the lack of consensus as the findings by researchers are mixed (Cukierman and Hercowitz, 1989; De Gregorio and Sturzenegger, 1997 and Huybens and Smith, 1999).

The loan supply by an individual bank i is a function of the available amount of money or deposits (D), the short-term nominal interest rate ($lrate$), and of the monetary policy instrument (MPS). The supply of loans is expected to be positively related to the loan nominal interest rate and negatively related to the monetary policy instrument. Meanwhile, monetary policy instrument can either be the interest rate set by the Central Bank or the reserve requirements rate on deposits or both. The direct impact of the policy interest rate represents the opportunity costs for banks when banks make use of the interbank market as a liquidity source. The loan supply function for bank i therefore is:

$$L_i^s = \phi_i(x_i)D_i + \beta_4 lrate + \beta_5 MPS \text{ ....(2)}$$

At the individual bank level, loan supply is also influenced by bank specific characteristics, such bank size $(Size_i)$, liquidity (Liq_i) and bank capitalization (Cap_i). These bank characteristics are interacted with the monetary policy variables. For example, interacting bank-liquidity with a monetary policy variable will help explain how the bank-loan supply responds with the bank-liquidity after monetary policy tightening. Therefore, the augmented loans equation in the dynamic panel data is specified as given in equation (3).

$$\log(L_{it}) = \beta_i + \sum_{j=1}^{t}\phi \log(L_{it-1}) + \sum_{j=1}^{t}\lambda_j MPS_{t-j} + \sum_{j=1}^{t}\alpha_j Inf_{t-j} + \beta X_{it-1} + \sum_{j=1}^{t}\varphi_1 X_{it-1} MPS_{t-j} + \mu + v_{it} \text{...(3)}$$

Equation (3) is the dynamic panel equation where the supply of bank loans (L_{ti}) is determined by the supply of loans in the previous period, monetary policy stance defined by (MPS), inflation (Inf), bank specific characteristics (X_i), and the interaction term of bank characteristics and monetary policy variable $(X_i.MPS)$, $\mu_i(\mu_i \sim IID(0, \sigma_\mu^2))$ is the bank specific effect while $v_{ti}(v_{ti} \sim IID(0, \sigma_v^2))$ is the idiosyncratic error term such that the total error term is $\xi_{it} = \mu_i + v_{it}$.

The model presented in equation (3) has two sources of persistence over time which are autocorrelation caused by the existence of a lagged dependent variable among the regressors, and the panel level effects μ_i, which illustrates heterogeneity among the cross-section units (Baltagi, 2009).

The endogeneity results in biased estimates (Greene, 2012). By construction, the lagged dependent variable ends up correlating with the panel level effects in the composite error term, resulting in biased and inconsistent estimates. Baltagi (2009), and Greene (2012), considerably discussed how the use of either fixed effect (FE) or random effect (RE) estimators would also result in biased and inconsistent estimates. For this reason, Burgstaller (2010) suggests estimating equation (3) using an instrumental variable technique such as the difference GMM.

The difference GMM as put forward by Arellano and Bond (1991) uses lagged values and lagged differences to estimate dynamic panel coefficients. This enables it to resolve the endogeneity and fixed effects problem by using the lagged levels of the explanatory variables, which are lagged for two or more periods as instruments. Arellano and Bond (1991) recommended GMM because it also ensures more efficient estimators. The efficiency gains are realized by making use of a larger set of moment condition units (Baltagi, 2009).

However, Arellano and Bover (1995) and Blundell and Bond (1998) contend that the instruments used in the difference GMM estimation become weak as the autoregressive process becomes too persistent or if the ratio of the variance of panel level effect to the variance of idiosyncratic shocks becomes larger (Etudaiye-Muhtar and Ahmad 2014). To overcome this challenge, Blundell, and Bond (1998), propose the use of system GMM. The system GMM uses extra instruments in difference which are presumed to be uncorrelated with the unobservable fixed effects in the level equation (Etudaiye-Muhtar and Ahmad 2014). The efficiency gains of the system GMM rests on the validity of the extra moment's condition which requires that the correlation between them and the unobservable fixed effects in the differenced equation be equal to zero (Etudaiye-Muhtar and Ahmad 2014; Matemilola

et al., 2013). Furthermore, Blundell and Bond (1998) show that the system GMM is a more efficient estimator in situations where the difference GMM's performance is compromised in a case of persistent data and short sample periods. Therefore, this study will employ the system GMM.

4.2 Data and Variable definitions

Due to data availability, the study utilises quarterly data for 12 Malawian banks spanning from 2010Q1 to 2016Q4 as defined in the Table 2 below. Data on bank specific characteristics was sourced from commercial bank call reports and macro level data is sourced from the Reserve Bank of Malawi (RBM) and National Statistical Office (NSO).

As specified in equation (3), the dependent variable is the size of bank loans. Independent variables include; inflation, monetary policy stance as represented by Policy rate, bank specific characteristics namely bank size, liquidity, bank capitalization and lagged values of the dependent and independent variables. Bank size is defined as the log of total assets. In order to control for the trend in size, total assets for each bank is normalized by subtracting the log of total assets for each bank from the sample average. Liquidity is defined as the ratio of liquid assets to total assets. Capitalization is defined as the ratio of equity to total assets. Liquidity and capitalisation are normalized by subtracting these bank characteristics of each bank from the sample average for each single period and over the whole period. The distributional effects of monetary policy on banks are captured by the interaction between the monetary policy indicators (interest rate and money supply) and the individual bank characteristics (Zulkefly, Ngah, Saini and Bakri (2010) in Opolot, 2013).

Table 2: Operational Definition of Key Variables

Variable	Name	Definition	Measurement
Bank Loans	lnloans	Total gross loans and leases in Malawi Kwacha for individual banks expressed as logarithms	Expressed as logarithm
Policy Rate	PR	This is the rate at which commercial banks borrow from the central bank of Malawi.	Percent
Deposits	lndeposits	Total bank deposits in Malawi Kwacha expressed as logarithm.	Expressed as logarithm
Inflation	infl	General increase in price level	annual percentage change
Tier 1	lntier1_n	Tier 1 capital is measured as the ratio of Bank's Core Capital which includes disclosed Reserves and Equity capital to Risk Weighted Assets	Percentage of GDP
Assets	lnassets_n	Total Assets for banks expressed as logarithm	Expressed as logarithm
Liquidity ratio	liquidityratio	Measured as a ratio of Liquid Assets to Total Deposits and Short-term Liabilities	Percentage
Policy rate x Assets	Pr*lntier1	This captures interaction effects between Policy Rate and Banking sector Assets	Number
Policy rate x liquidity ratio	Pr*lnliquidity	This captures interaction effects between Policy Rate and Liquidity of the Banking sector	Number

V. Empirical Results

The estimation results of system GMM on bank lending channel in Malawi are presented in Table 3 and 4. Table 3 shows the determinants of loan supply in the entire banking system in Malawi while Table 3 indicates determinants of loan supply by big and small banks in Malawi.

Column 1 of Table 3 shows impact of monetary policy stance (policy rate) and effect of other key bank specific factors on supply of loans by banks in Malawi. Meanwhile, columns 2-4 include interaction effects of monetary policy stance and bank specific factors on supply of loans. Monetary policy stance as represented by Policy rate is statistically significant and positively related to supply of loans for all banks in Malawi (Table 3, except in column 4). This suggests that banks benefit from higher interest margins during tight monetary policy stance. In terms of bank specific factors, results reveal that asset base and capital levels are statistically significant and positively related to supply of loans. This implies that banks with bigger asset base and more capital are likely to extend more loans. However, liquidity levels of banks are found to be negatively related to supply of loans and statistically significant. The negative relationship may imply that banks may turn to their liquid assets to offer more loans, especially in a tight monetary policy, and thus maintaining their loan portfolio and the more the loans a bank disburse, the less the liquid assets it holds (Kabiro, 2014).

Table 3: System GMM Results (All banks)

VARIABLES	**(1)** lnloans	**(2)** lnloans	**(3)** lnloans	**(4)** lnloans
$lnloans_{t-1}$	0.443***	0.402***	0.434***	0.433***
	(0.0376)	(0.0365)	(0.0370)	(0.0370)
pr	0.0133**	0.0194***	0.0109*	0.00766
	(0.00536)	(0.00544)	(0.00597)	(0.00949)
lndeposits	0.176***	0.187***	0.173***	0.178***
	(0.0312)	(0.0300)	(0.0314)	(0.0311)
infl	-0.00778***	-0.00596**	-0.00788***	-0.00750***
	(0.00272)	(0.00267)	(0.00271)	(0.00275)
lntier1_n	0.110***	0.115***	0.176**	0.112***
	(0.0284)	(0.0272)	(0.0783)	(0.0284)
lnassets_n	0.229***	0.0659	0.233***	0.233***
	(0.0369)	(0.0602)	(0.0365)	(0.0367)
liquidityratio	-0.00710***	-0.00821***	-0.00715***	-0.00919***
	(0.000929)	(0.000919)	(0.000922)	(0.00278)
Pr*lnassets		0.00935***		
		(0.00270)		
Pr*lntier1			-0.00258	
			(0.00291)	
Pr*lnliquidity				9.74e-05
				(0.000133)
Constant	4.108***	4.285***	4.288***	4.300***
	(0.435)	(0.414)	(0.453)	(0.459)
Observations	241	241	241	241
Number of Bank_name	9	9	9	9

*, **, *** represent 10 percent, 5 percent and 1 percent significance level, respectively.

The interaction effect between policy stance and assets size of banks/bank size is positive and statistically significant. This implies that monetary policy stance in an environment of banks with adequate assets base will lead banks to extend more loans. Results for interaction between monetary policy and liquidity levels are insignificant and negative, meaning that interaction of policy rate with levels of liquidity does not influence supply of loans. Banks with more liquid balances can use their liquid asset to maintain their loan portfolio and are not significantly affected by a contractionary monetary policy stance (Ehrmann et al., 2003).

The impact of monetary policy stance on supply of loans may also depend on the size of the bank, thus we isolate banks into big and small banks in order to assess the impact of monetary policy stance. In Table 4, columns 1 and 5 show impact of monetary policy stance (policy rate) and effect of other key bank specific factors on supply of loans by big banks and small banks in Malawi, respectively. While, columns 2-4 and 6-8, include interaction effects of monetary policy stance and bank specific factors on supply of loans for big and small banks, respectively.

Table 4: System GMM Results (Big and small banks)

	Big Banks				Small Banks			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	lnloans	lnloans	lnloans	lnloans	lnloans	lnloans	lnloans	lnloans
$lnloans_{t-1}$	0.462***	0.460***	0.459***	0.461***	0.274***	0.257***	0.271***	0.275***
	(0.0537)	(0.0564)	(0.0538)	(0.0538)	(0.0388)	(0.0386)	(0.0389)	(0.0391)
pr	0.0134**	0.0132**	0.0151**	0.00421	-0.00120	0.00533	0.00182	-0.00340
	(0.00586)	(0.00605)	(0.00595)	(0.0140)	(0.00593)	(0.00610)	(0.00611)	(0.00945)
lndeposits	0.00488	0.00540	0.00299	0.00707	0.480***	0.568***	0.532***	0.479***
	(0.0235)	(0.0243)	(0.0236)	(0.0238)	(0.0688)	(0.0719)	(0.0733)	(0.0693)
infl	-0.00456	-0.00449	-0.00549*	-0.00414	0.000688	0.00456	0.00241	0.000733
	(0.00285)	(0.00296)	(0.00290)	(0.00291)	(0.00324)	(0.00336)	(0.00335)	(0.00327)
lntier1_n	0.406***	0.404***	0.562***	0.408***	0.0386	0.0634**	-0.228*	0.0390
	(0.0590)	(0.0614)	(0.105)	(0.0592)	(0.0258)	(0.0263)	(0.131)	(0.0260)
lnassets_n	0.0434*	0.0384	0.0369	0.0417*	0.253***	-0.170	0.236***	0.252***
	(0.0248)	(0.0581)	(0.0251)	(0.0249)	(0.0730)	(0.134)	(0.0735)	(0.0737)
liquidityratio	-0.005***	-0.005***	-0.006***	-0.009	-0.010***	-0.011***	-0.010***	-0.011***
	(0.00148)	(0.00149)	(0.00149)	(0.00591)	(0.000816)	(0.000828)	(0.000820)	(0.00245)
Pr*lnassets		0.000369				0.0161***		
		(0.00387)				(0.00430)		
Pr*lntier1			-0.00674*				0.0106**	
			(0.00376)				(0.00509)	
Pr*lnliquidity				0.000188				3.66e-05
				(0.000260)				(0.000122)
Constant	5.631***	5.642***	5.687***	5.805***	2.685***	1.751**	2.088***	2.727***
	(0.601)	(0.615)	(0.602)	(0.648)	(0.744)	(0.775)	(0.798)	(0.763)
Observations	109	109	109	109	132	132	132	132
Number of Bank_name	4	4	4	4	5	5	5	5

*, **, *** represent 10 percent, 5 percent and 1 percent significance level, respectively.

The estimated coefficient for monetary policy stance is positive and significant for large banks. This could imply that higher policy rate or tight monetary policy stance is beneficial to big banks as they are able to increase their interest margins with higher Policy rate and at the same time able to extend more loans given their adequate capital levels. However, the estimated coefficient for monetary policy stance is negative and insignificant for small banks in columns 5 and 8 while positive and insignificant for columns 6 and 7. This finding implies that tight monetary stance does not affect the loan supply of small banks.

After splitting banks into big and small banks, under big banks the results show that the interaction effect between policy stance and bank specific factors is positive and statistically insignificant, with exception of interaction of monetary policy stance and capital levels which is negative and albeit marginally significant. This implies that monetary policy stance when interacted with bank specific factors for big banks does not have impact on loan supply behavior of banks. Meanwhile, in terms of small banks the results show that the interaction effect between policy stance and bank specific factors is positive and statistically significant, except interaction of monetary policy stance and liquidity levels which is insignificant. The findings mean that as capital and asset size of small banks increase in face of tight monetary policy stance, small banks will supply more loan.

VI. Conclusion and Policy Implications

The paper investigated the existence of bank lending channel in Malawi using using a generalized method of moment (GMM). The bank lending channel suggests that banks play a special role in the transmission of monetary policy because monetary policy has an effect on banks' cost of funds. Further, the paper assessed whether banks' reaction to the monetary policy differs depending on bank's specific characteristics such as liquidity, asset base and capital. Results of the study suggest that tight monetary policy stance results into an increase in loan supply by banks in Malawi, suggesting that banks benefit from higher interest margins during tight monetary policy stance. Given the landscape of the banking system in Malawi where a few banks dominate, one possible explanation to this is that the dominant banks are still able to expand their loan portfolio despite increases in interest rates due to their bigger asset and capital base. In terms of bank specific factors, the study reveals that asset base and capital levels are statistically significant and positively related to supply of loans. However, liquidity levels of banks are found to be negatively related to supply of loans and statistically significant.

From a policy perspective, given the unconventional finding that tight monetary policy results into increase in loan supply by banks and vice-versa, there is weaker credence to the interest rate targeting framework of monetary policy in Malawi. Therefore, migration towards interest rate targeting should be done with caution. For the bank lending channel of monetary policy to be effective, monetary policy actions should be able to impact the reserves of both large-sized banks and small banks. We therefore recommend that the central bank should explore the set of tools in their purview to ensure that policy changes affect loan portfolios of banks as intended.

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