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Determinants of Bank Credit to the Private Sector in Zambia

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Abstract

This study examines the determinants of bank credit to the private sector across 17 commercial banks in Zambia covering the period 2008 Q1- 2017 Q4. Using the fixed effects panel approach and bank-level data, results show that both bank-specific variables (lag of bank credit, capitalisation, NPL ratio, liquidity ratio, investment in securities ratio, cash reserve ratio, foreign funding, domestic deposits, and bank size) and macroeconomic variables (BoZ policy rate, total government debt, inflation, and GDP growth) significantly affect bank credit to the private sector. However, varied results emerge when bank credit determinants are analysed by bank category (small and big). Specifically, NPL ratio is more problematic in constraining bank credit in small banks as opposed to big banks. Results also indicates that while ROE, total government debt and inflation seem significant in influencing bank credit in big banks, they do not matter in small banks. The study suggests that Zambian commercial banks minimize their excess liquidity holdings, pay extra attention to reducing non-performing loans and focus on mobilizing more domestic deposits as this enhances their lending performance. This study also render support to the use of rigorous capital requirements under the Basel II and Basel III. In addition, fiscal consolidation efforts to reduce the governments' deficit and accumulation of debt stock could support financial intermediation. The results further provide basis for credit growth modeling often used by central banks within the stress test methodology. Thus, stable macroeconomic conditions, sound economic growth and financial sector policies leading to lower credit cost, lower risk of lending to the private sector, and stimulated banking sector funding remain essential for robust credit growth in Zambia.

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[1]Corresponding author. E-mail address: tfunyina@boz.zm. The study also benefitted from comments received from the editors of the BoZ Working Paper Series and the Technical Committee discussions held with Bank of Zambia staff. The findings and opinions expressed in this paper are entirely those of the author and do not in any represent the views or position of the Bank of Zambia.

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1.0 Introduction

Commercial banks have been at the centre of stimulating economic activity world over evidenced by their provision of credit to the private sector. According to Beck, Demirguc-Kunt and Maksimovic (2004), if bank credit is not available, the expansion of productive investments in manufacturing, agriculture, real estate development, distribution, fishing, trade, tourism would, in many cases, be impossible. Mishkin (2007) also suggests that a better functioning bank credit system can ease the external financing constraints that impede credit expansion and the growth of firms and industries. This argument favors a well-developed bank-based financial system. Thus, the banking industry is one critical element of the financial system in developing countries capable of facilitating capital accumulation and economic development. This is made possible through efficient financial intermediation.

Banks mobilize funds from the surplus spending units (savers) and transfer to borrowers at reduced financial costs. In addition, banks mostly transform liquid assets like deposits into illiquid assets like loans (Diamond and Rajan, 1998). It is also argued that bank loans are typically the largest asset and the predominant source of income for banks. Further, banks accept customer deposits and use the funds to grant loans to borrowers or invest in other assets that yield a return higher than the amount banks pay the depositor (Boot and Thakor, 2000).

Credit is crucial to the economy, especially for sub-Saharan African countries that have gone through several stages of development after the change of economic and political regimes. Given the importance of bank credit (bank loans) for funding the private sector, developments in bank credit have far-reaching implications for economic stability. A rapid increase in domestic credit availability often spurs economic growth enabling savings to be channeled into investment. However, a rapid growth in credit raises apprehensions about prudential risks as it may increase non-performing loans (NPLs), systemic risk, and degrade bank soundness (Obstfeld and Rogoff, 2010). Besides, excessive credit growth often leads to the build-up of systemic risks to financial stability, which may result in systemic banking crises (Alessi and Detken, 2014). Thus, policymakers use credit data as a main source of information about the state of the economy. Obstfeld and Rogoff (2010) reveal that rapid growth of domestic credit supply could play a significant role in predicting subsequent financial or economic crises while a sharp decline in domestic credit can result in a recession and financial instability. According to Mishkin (2010), the 2007/2008 global financial crisis reflected one type of asset price bubble, which can be considered as a "credit-driven bubble".

Due to the crucial role of bank credit in economic activity, understanding loan supply and demand mechanisms require recognising the determinants of bank credit growth. Therefore, this study examines the determinants of bank credit in Zambia by employing a set of bank-specific and macroeconomic variables using a panel analysis approach. There exists vast empirical literature on the determinants of bank credit, which may be demand or supply driven. Some studies consider both kinds of factors in the same model while others distinguish them into two separate models. Imran and Nishant (2012) and Olokoyo (2011) investigate the determinants of bank credit growth to the private sector based on supply-side approach (i.e. bank-specific variables) while Abuka and Egesa (2007) and Ljubaj (2007) base their studies on the demand-side approach (i.e.

macroeconomic variables). Guo and Stepanyan (2011), Amidu (2014) and Ivanovic (2015) identified both demand and supply factors that affect credit growth.

Notwithstanding a general awareness of the factors determining bank credit to the private sector, there is limited empirical evidence provided in the literature on Zambia. Chileshe (2017a) and Simpasa et al. (2015) are the only studies on Zambia partly considering a limited number of bank-specific and monetary policy variables as determinants of bank credit though with a specific focus on bank lending channel of monetary policy. However, the subject of bank credit determinants has not been addressed in Zambia considering bank-specific and macroeconomic variables. There is, therefore, a knowledge gap to be filled in the present study.

The main objective of this study is to examine the determinants of bank credit in Zambia by employing a set of literature informed bank-specific and macroeconomic variables in a panel setting. This paper contributes to the literature on several fronts. Firstly, the study covers all the banks irrespective of their size for the purpose of drawing cross-bank lessons from the empirical results. Secondly, the study covers a longer period (2008Q1–2017Q4) across 17 banks than most sub-Saharan African papers have thereby permitting us to capture the boom periods (2008-2013) and bust cycle (2014 -2017) in which GDP growth rates averaged 7.6% and 3.7%, respectively. This helps to circumvent the problem of estimation results being driven only by the boom or the bust. It also helps to identify the underlying factors that contribute to the boom and bust cycle and thus could offer valuable information vis-à-vis how to lower the risk of such cycles in future. Thirdly, this study considers both demand and supply side factors, unlike other studies that are one sided. This is because the literature has shown that bank credit dynamics is a blend of both internal (bank-specific variables) and external (macroeconomic variables) factors to the bank. Lastly, the empirical results provide basis for credit modelling often used by central banks within the stress test methodology.

This paper has seven sections. Following the introduction are stylised facts on the banking system and bank credit to the private sector in Zambia. Section 3 provides an overview of the literature. Model specification, estimation methodology and data are presented in section 4. Section 5 discusses the empirical results. Section 6 concludes and offers policy implications.

2.0 Stylised Facts About Bank Credit to the Private Sector in Zambia
Bank credit to the private sector in Zambia and other countries has been defined as the loans and advances extended to the private sector only comprising firms and households (Dembiermont et al., 2013). It does not include lending to government[2]. Credit is essential for the economy to function well as it funds new investments and allows people to purchase houses, cars, and other items. However, excessive lending and borrowing generally ends up in financial crises. In principle, credit availability is good for economic development. If the banking credit to the private sector is about 70% of GDP and more, then the country has a relatively well-developed financial system (Dembiermont et al., 2013).

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[2] Commercial banks extend credit in form of loans to Government (central and local). However, the share of such lending is very small in relation to the loans extended to the private sector. Commercial bank's direct lending to the Government could be less than or about 1% of the total (Simpasa et al., 2015).

Access to credit remains extremely low in Zambia with credit to the private sector (% of GDP) fluctuating substantially in recent years. Between 2000 and 2008, bank credit to the private sector, measured as a percentage of GDP, increased from 7.3 % to 12.2 % (Figure 1). Following a sharp decline in 2009 - 2010, bank credit to the private sector increased, reaching 15.7% of GDP in 2015, the highest ever recorded. However, bank credit to the private sector decreased from 2016 through to 2017 period ending at 11.1 % in 2017. Although credit to the private sector has steadily increased, it remains far below the level in sub-Saharan African peers (Figure 1). This could reflect high risk aversion of the banks operating in Zambia despite large liquidity hoardings (Simpasa and Pla, 2016).

In terms of volume, at the end of 2010, 73%of the total loan portfolio of banks was composed of loans granted to private firms while 27% went to individuals and households. In the case of loans to private firms, about 61%-69% of credit was concentrated in the following sectors: agriculture; forestry and fishing; wholesale and retail trade and manufacturing (Table 1).
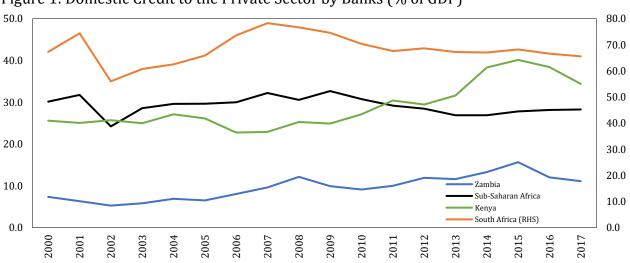
Figure 1: Domestic Credit to the Private Sector by Banks (% of GDP)

Authors' computations using data from World Bank

Table 1: Sectoral Distribution of Loans (%), 2008 – 2017

Sector	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Personal Loans	29.1	30.7	27.2	29	34.4	33.2	35.4	29.3	27.3	27.6
Agriculture, forestry, fishing and hunting	14.7	18.7	17.3	17.9	23.2	20.2	16.6	17.3	17.0	20.3
Wholesale and retail trade	9.6	10.1	10.6	10.5	6.8	9.1	7.8	10.8	10.2	11.3
Other sectors	7.0	6.3	9.3	7.3	3.7	8.0	8.5	8.3	12.5	10.9
Manufacturing	10.7	12.3	12.8	12.4	11.6	9.5	11.5	13.5	12.8	7.8
Mining and quarrying	4.7	4.1	3.2	4.3	5.8	6.6	5.0	6.4	6.3	6.3
Transport, storage and communication	6.8	6.2	4.9	5.4	4.7	4.5	5.6	5.1	4.6	4.6
Construction	4.0	3.2	5.8	4.4	3.8	3.5	3.4	3.4	3.9	4.4
Electricity, gas, water and energy	2.4	1.7	1.6	1.7	2.1	1.7	2.2	1.7	2.2	3.1
Financial Services	7.9	5.2	2.7	5.2	1.9	2.1	2.5	2.7	1.8	2.2
Restaurants and hotels	3.1	1.5	4.6	1.9	2	1.6	1.5	1.5	1.4	1.3
Total	100	100	100	100	100	100	100	100	100	100

Source: Bank of Zambia

In Zambia, bank credit to the private sector is not only scarce but also extremely expensive. The average annual interest rate on loans was 48% in 2005 compared to a sub-Saharan Africa's average of 17.6%. A World Bank survey by Martinez (2006) based on selected banks revealed that only large firms borrowed at rates below the average (prime rate was 20% in 2005). The severity of credit constraints in Zambia is especially acute for small and medium enterprises, which are faced with higher lending rates, thereby increasing the cost of compliance escalating the probability of default.

In Zambia, salary-backed loans dominate consumer lending. Such personal loans (Table 1) are extended to employees of public institutions and large private sector companies. The monthly obligation is directly deducted from the worker's salary by the employer and remitted to the commercial banks. While there are other forms of consumer credit offered by some commercial banks (i.e. credit cards, car loans and mortgages), the aggregate volume of such is still low (Martinez, 2006).

For a long time, the banking sector has been exhibiting reluctance to lend to the medium, small, and micro sectors of the economy perhaps largely on account of the elevated levels of risk allied with this sector. The high interest rates and weak currency that characterise the economy imply that borrowers find it difficult to service loans, which lead to poor repayment rates. This is aggravated by legal barriers[3] which makes it problematic to seek redress through the courts, and by the small-value transactions that make it uneconomical to do so (Martinez, 2006).

The asset structure of banks contributes to bank credit extension. Loans dominate the asset structure of banks followed by investment in government securities and balances with financial institutions abroad. During the review period, the banking sector recorded a growth rate in assets of 82% between 2010 and 2013, 55% between 2013 and 2016 and a 10.9% between 2016 and 2017 (Table 2). The increase was fundamentally attributed to the eased monetary policy measures that resulted in increased liquidity for commercial banks and thus, growth in commercial bank's balance sheets. While loans dominate banks' asset side, they declined steadily from 2013. On the converse, investments in government securities and balances with financial institutions abroad rose. Government securities' investments grew by 28.6% to K19.2 billion in 2017 compared to growth rate of 24.2% in 2013 while balances with financial institutions abroad rose by 20.9% to K14.0 billion from 11.9%. The rise in banks' investments in government securities aided by a reduction in statutory reserves can be attributed to numerous factors. First, the persistent slowdown in economic activity since 2013 could have weakened private sectors' loan demand thereby contributing to the rise in banks' investments in securities. Second, the persistent higher yield rates induced by heavy government borrowing could have made securities more attractive relative to private sector lending. Third, a portfolio rebalancing of banks towards risk-free and more liquid public assets as the quality of private sector loans deteriorated in a weak economic environment (2013 -2017) constrained private sector credit availability and growth.

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[3] The legal barriers which obstruct the clean-up of private sector balance sheet includes overloaded court systems and lengthy proceedings that delay collateral execution (Martinez, 2006).

Table 2: Asset Structure (%), 2008-2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Loans	44	45	38	43	49	46	46	42	36	33
Investment in Government Securities	14	22	20	26	23	24	21	15	17	29
Balances with Foreign Financial Institutions	14	15	17	18	11	12	12	19	20	21
Balances with Bank of Zambia	16	15	20	8	13	13	16	17	19	10
Other	12	4	4	5	5	5	5	6	7	8
Total Assets	100	100	100	100	100	100	100	100	100	100

Source: Bank of Zambia

The liability side of the bank balance sheet also plays a role in bank credit. Banks' liability side is dominated by deposits which is the largest source of funds. While the greater part of deposits is attributed to the private sector, banks also hold substantial balances with foreign institutions and government deposits, which provide a buffer against swings in private sector deposits. Specifically, total deposits accounted for the largest share at 75.2% in 2017 from 73.5% in 2012, followed by other liabilities at 5.3% in 2017 and balances due to financial institutions abroad of 3.5% (Table 3). Extant studies highlight that the growth in domestic deposits (banks' funding measure) stimulates an upsurge in loans and advances, all other things equal (Imran and Nishat, 2012; Cucinelli, 2015). Further, Guo and Stepanyan (2011) show that as banks get more loans from foreign institutions, they boost their assets as well as their liquidity position allowing them to extend more loans and advances to the private sector.

In addition, the banking sector has remained well capitalized over the years, with shareholders' capital approximately about 9.7-12.7% of total liabilities. This level of capitalisation signifies the robustness of the regulatory framework instituted in the aftermath of systemic bank failures in the mid-1990s (Chileshe, 2017b). The robust banking sector capital position has also been reinforced by the Bank of Zambia (BoZ) upward adjusted regulatory capital as at April 2012 (GRZ, 2012). The minimum capital requirement for local banks was raised to K104 million while that for foreign banks was raised to K520 million from K12 million for all banks. Literature highlight that higher bank capital levels reflects the ability to undertake additional business and absorb risk (Makri et al., 2014). Thus, it can be inferred that well-capitalised banks are likely to have more capacity to extend credit to the private sector.

Table 3: Liability Structure (%), 2008-2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Deposits	71.2	72.2	75.5	75.6	73.5	73.8	71.9	73.0	72.4	75.2
Shareholder's Capital	9.7	10.1	9.7	9.8	11.6	14.1	15.0	12.2	13.1	12.9
Other Liabilities	6.0	6.1	5.3	4.8	5.4	5.3	5.3	4.8	5.9	5.3
Balances Due to Foreign Institutions	9.5	7.9	5.9	5.0	5.9	3.5	4.1	5.4	5.1	3.5
Other Borrowed Funds	2.4	2.8	2.4	3.5	2.7	2.4	2.4	2.6	2.5	2.1
Balances Due to Domestic Institutions	1.1	0.9	1.2	1.2	0.9	0.9	1.2	2.0	1.0	1.0
Total Liabilities	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Bank of Zambia

3.0 Literature Review

As postulated by different theories, bank lending behaviour is a blend of several factors, both external and internal to the bank. For instance, the bank lending channel theory examines the effects of reserve requirements while pro-concentration theory focuses on how bank capitalization affects bank lending behaviour. Kashyap et al. (1993) argue that bank lending reduces with contractionary monetary policy as posited by the Keynesian theory.

The Keynesian theory posits that monetary policy actions play a key role in determining bank loan supply and demand dynamics. Bernanke and Gertler (1995) point out the interest rate and credit as the transmission channels through which monetary policy actions influence loan supply and demand dynamics. While the interest rate channel emphasizes a shift in loan demand, the credit channel stresses a shift in supply, which stems from a monetary policy-induced decline in real activity. The interest channel works on the notion that an increase in money supply leads to a decrease in the real interest rate due to the Keynesian assumption of sticky prices thereby inducing an increase in investment and consumption spending and thus aggregate demand (Mishkin, 1996). This channel implicitly assumes that monetary policy actions influence short term market rates such as the interbank rate and treasury bill rates, which in turn, have a pass-through effect on long term market rates to influence loan demand (Cheong and Boodoo, 2008).

The credit channel posits that monetary policy actions could have disproportionate effects on bank-dependent borrowers (Bernanke and Gertler, 1995). Tight monetary policy tends to drain reserves from the banking system, which reduces bank aggregate supply of loans. The ability of monetary policy to decrease bank loan supply emerge due to the direct effects of monetary policy on interest rates and is amplified by endogenous changes in the external finance premium, which is the difference in cost between funds raised externally (by issuing equity or debt) and funds generated internally (by retaining earnings). The size of the external financing premium reflects credit market flaws, which drive a wedge between lenders' expected returns and potential borrowers' costs. The credit view posits that a change in monetary policy that increases or decreases open-market interest rates tends to change the external financing premium in the same direction. The influence of monetary policy on the cost of credit, and hence on real spending and real activity, is amplified because of this additional effect of policy on the external finance premium. As a result, monetary policy actions may be determined to play a substantial role in affecting bank credit by restraining loan demand and supply through increased interest rates and reduced banking system reserves.

Distinct from the Keynesian interest rate and credit channels of monetary policy is the neoclassical credit market theory which postulates that the terms of credits clear the market. Given that loan collateral remains unchanged, in this model, the interest rate is the only mechanism that clears the credit market. The higher the default risks of the borrower, the higher the interest premium to compensate against any possible losses (Ewert et al., 2000). Berger (1995) in the confines of the signalling and bankruptcy hypotheses, argues that higher capital and volume of deposits in banks reflect positively on the banks in terms of capacity to provide credit. He postulates that, according to the bankruptcy theory, more equity is held by a bank to avoid distress periods where

bankruptcy costs are suddenly high. In this case, both the signalling and bankruptcy cost hypotheses maintain the existence of a positive relationship between capital and resources (assets) owned by commercial bank (Tomola, 2013). In support of the two hypotheses, Olokoyo (2011) and Ladime et al. (2013) found that lending behaviour is significantly and positively influenced by bank capital and deposits.

In another attempt to characterise the bank credit supply dynamics, the market power theory postulates the relationship between bank size and profitability. Under this theory, Berger (1995) argued that only large commercial banks, characterized by differentiated products, can influence interest rates, mobilise more deposits, lend more and consequently earn more profits. Therefore, commercial banks in this case can practice market power and earn non-competitive returns (Athanasoglou et al., 2008). Similarly, the efficiency structure hypothesis posits that commercial banks that are large in terms of capital or assets size tend to occupy larger market shares, which allows them to extend more credit and get high profits due to increased economies of scale (Olweny and Shipho, 2011). It is further argued that banks which may be foreign owned or with majority foreign shareholding tend to be highly liquid compared to locally owned banks, putting such banks at a position of advancing more loans at lower interest rates to large segments of small and medium enterprises and thus earn more profits.

Several studies have analysed the determinants of bank credit to the private sector, capturing both demand and supply side factors. Worth noting is that there is no standard model examining the determinants of credit demand and supply. The frequently used bank-specific variables to characterise bank credit supply dynamics across studies are bank size, deposit, liquidity ratio, cash required reserves, bank capitalization, NPLs, investment in government securities, and foreign liabilities with commercial banks. Macroeconomic variables include gross domestic product (GDP), inflation, interest rate, exchange rate, and government debt (Bernanke and Blinder, 1992; Kashyap et al., 1993; Berger, 1995; Olokoyo, 2011; Tomola, 2013; Imran and Nishat, 2012; Ladime et al., 2013; Baoko et al., 2017 and Chileshe, 2017a).

Imran and Nishat (2012) used the autoregressive distributed lag (ARDL) approach to identify the factors that explain the flow of bank credit to businesses in Pakistan for the period 1971-2008. With the major focus on supply side, the empirical results indicate that foreign liabilities, domestic deposits, economic growth, exchange rate, and monetary conditions are significantly associated with bank credit to the private sector, particularly in the long run. This study, however, does not statistically distinguish the behaviour of bank credit during non-financial (1971-1989) and financial reforms periods (1990-2008) in Pakistan.

Ivanovic (2015) examined the determinants of credit growth in Montenegro, paying particular attention to supply-side factors. Using a panel fixed effects linear model, the results confirm that positive economic developments and an increase in banks' deposits lead to higher credit growth. In addition, banking system soundness is decisive for promoting bank`s lending activities. The study provides evidence that the weakening of banks' balance sheets, in terms of high non-performing loans and low solvency ratio has a negative effect on credit supply. Further, the study provides a nuanced analysis of the determinants of credit growth by allowing these to be different before and after the global financial crisis. The post-crisis model reveals that credit supply indicators gained

in importance in explaining credit growth while the model in pre-crisis period provides evidence that both demand and supply indicators matter in explaining credit growth.

Olokoyo (2011) examined the determinants of commercial banks' lending behavior in Nigeria for the period 1980-2005. Using the Johansen multivariate cointegration technique, the study reveals that the volume of deposit and the lagged volume of commercial banks' loan and advance, investment portfolio, GDP, and foreign exchange are significant and have positive relationship with loans and advances. In addition, the study shows that while lending rates, cash reserve requirement and liquidity reserve have a positive sign, they do not have statistically significant influence on loans and advances. The reason for the low influence of cash reserve requirement on loan and advance is that commercial banks may not necessarily convert lower proportion of banks' funds available for lending.

By employing the vector error correction model, Shijaku and Kullaci (2013) examine the determinants of bank credit in Albania spanning 2001–2011. The results show that in the long run, credit supply is positively influenced by the exchange rate, financial intermediation, and bank deposits. Conversely, lending to the private sector is constrained by rising lending rates and higher public debt consistent with Cottarelli et al. (2003).

Ladime et al. (2013) investigate the determinants of bank lending behavior in Ghana using panel data, which involved pooling of 17 banks over the period 1997- 2006. Using the GMM-System estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998), the study found that bank size and capital structure have a statistically significant and positive relationship with bank lending behavior. The study also finds evidence of negative and significant impact of some macroeconomic indicators (central bank lending rate and exchange rate) on bank lending behavior. In addition, competition in the industry was found to have a positive and significant impact on bank lending behavior. Previous bank lending relationship was found to have a positive correlation with bank lending behavior in Ghana. Thus, they recommend that policies aimed at maintaining stable macroeconomic fundamentals would greatly accelerate bank lending decision.

Using the ARDL framework and annual time series data for the period 1970-2011, Baoko et al., (2017) examined the relevant factors influencing the allocation of bank credit to the private sector in Ghana. The results show that money supply, bank assets, real lending rate, and bank deposits are significant determinants of bank credit in both the short and long run. Inflation also exerts significant positive impact only in the short-run. The study infers the lack of successive governments' commitment to pursue policies that boost the supply of credit to the private sector. Their findings further reveal that increases in deposits mobilization by banks does not necessarily translate into supply of credit to the private sector. A plausible deduction from the findings is that reduced government domestic borrowing, lower cost of borrowing, and lower central bank reserve requirements in Ghana are needed to stimulate higher lending and credit demand.

Amidu (2014) examined the micro and macroeconomic determinants of bank lending relying on data of 264 banks across 24 countries in SSA using a panel random effects model. At the micro level, bank size, growth and efficiency positively influence bank

credit. Where banks are heavily concentrated, credit supply is low. However, the level of bank stability, risk adjusted profit and high non-performing loans do not affect bank lending in SSA. At the macro level, Amidu (2014) found a negative nexus between policy–induced interest rate and bank lending suggesting bank credit supply increases when the monetary policy stance is relaxed. This evidence is, however, inconsistent with Assefa (2014) who found a positive nexus between bank credit and lending rate. Further, the results from Amidu's (2014) study reveal that the level of economic activity sufficiently affects banks' lending behaviour, especially, in a well reformed financial sector coupled with high bank density.

Malede (2014) attempted to analyse the main determinants of commercial bank lending in Ethiopia using panel data of eight commercial banks for the period 2005-2011 using the Ordinary least square (OLS) method. The result reveals that there is significant relationship between commercial bank lending and its size, credit risk, gross domestic product and liquidity ratio. However, deposits, investment in securities, cash required reserves and interest rate do not affect lending for the study period. The study recommends that commercial banks must give more emphasis to credit risk and liquidity ratio because it weakens banks loan disbursement and leads to bank insolvency. However, the OLS method used ignores the heterogeneity in bank-specific characteristics and thus the results might have been compromised.

Assefa (2014) examined the short and long run impact of bank-specific and macroeconomic variables on bank credit to private sector in Ethiopia using the ARDL method over the period 1978-2011. In the long run, domestic deposits, real lending rate, GDP, inflation, and previous year's lending positively influence banks credit to the private sector. In the short run, domestic deposits do not matter in credit behaviour of banks suggesting that banks do not immediately lend to the private sector from their deposits. The study recommends that efforts should be geared towards keeping the inflation rate low and stable.

The review of empirical literature on Zambia shows little or no studies specifically on the determinants of bank credit. Chileshe (2017a) investigated the effects of monetary policy changes on loan supply as well as the effect of bank-specific factors on loan supply. The results from the dynamic panel data approach developed by Arellano and Bond (1991) reveal that the bank lending channel is relevant in Zambia. In particular, the results show that loan supply is negatively correlated with the policy rate, implying that loan supply contracts following monetary policy tightening. Further, bank size has negative effect on credit supply while liquidity and bank market power are positively correlated with credit supply. Bank capitalization has no significant effects on credit supply. Most importantly, the results showed that bank-specific factors and bank competitiveness are responsible for the asymmetric response of banks to monetary policy. Large banks, banks with more market power, well-capitalized banks and liquid banks respond less to monetary policy tightening and vice-versa.

4.0 Model Specification, Methodology and Data Description

4.1 Model Specification

A modified bank balance sheet approach in line with Pham (2015) and macroeconomic variables as stated in Gambacorta and Mistrulli (2004), Ivanovic (2015) and Cucinelli (2015) is used to determine the drivers of private sector credit in Zambia. Balance sheet factors are bank-specific variables which refer to supply-side factors and are internal to the bank or micro financial statement variables under the bank management's control (Athanasoglou et al., 2008). Macroeconomic variables refer to demand-side factors which are external to the bank and relate to development in macroeconomic conditions that have direct impact on bank credit. The variables explored under macroeconomic conditions relate to total government debt, GDP growth, inflation and BoZ policy rate. These macroeconomic variables are included to take into account the effects of business cycle environment (Chileshe, 2017b).

The estimated model is as follows:

$BC_{it} = \beta_0 + \beta_1 BC_{it-1} + \beta_2 Cap_{ratio_{it}} + \beta_3 NPLs_{ratio_{it}} + \beta_4 Liquidity_{ratio_{it}} + \beta_5 IS_{ratio_{it}} + \beta_6 Crr_{ratio_{it}} + \beta_7 Fl_{ratio_{it}} + \beta_8 Dd_{ratio_{it-1}} + \beta_9 logBSize_{it} + \beta_{10} ROE_{it} + \beta_{11} BoZ\ Policy\ Rate_t + \beta_{12} Total\ Debt_{ratio_t} + \beta_{13} Inflation_t + \beta_{14} logGDP_{t-1} + \varepsilon_{it}$ .... (1)

where BC_i, $Cap_{ratio_{it}}$, $NPLs_{ratio_{it}}$, $Liquidity_{ratio_{it}}$, $IS_{ratio_{it}}$, $Crr_{ratio_{it}}$, $Fl_{ratio_{it}}$, $Dd_{ratio_{it}}$, $logBSize_{ratio_{it}}$ and ROE_{it} represents bank-specific variables while $BoZ\ Policy\ Rate_t$, $Total\ Debt_{ratio_t}$, $Inflation_t$ and $logGDP_{t-1}$ are the macroeconomic variables defined in table 5 under section 4.3. β_0 is an intercept and $\beta_1\ to\ \beta_{14}$ are coefficient estimate of the independent variables and ε_{it} is the error term. In addition, to allow for the possibility of partial adjustment of actual bank credit to its steady-state value and remedy for serial correlation, our linear model include the lag of the dependent variable (Cucinelli, 2015 and Ivanovic, 2015).

4.2 Estimation Procedure

To estimate the panel model in equation 1, in line with Amidu (2014), Ivanovic (2015) and Chileshe (2017b), we make a choice between the fixed effect and random effect approaches using the Hausman test (Hausman, 1978).

The structure of the general econometric model for panel data is as follows:

$y_{it} = \alpha + X'_{it}\beta + \mu_{it}$ .... (2)

i=1,..., N; t=1,... ,T

where the left-hand variable y_{it} is the dependent variable, X'_{it} is a 1 × k vector of observations on the explanatory variables, β is a k×1 vector of parameters to be estimated on the explanatory variables, subscript i denote the cross-section, t represents the time-series dimension and μ_{it} denotes the unobservable factors effect in the panel data modelling stated above or an error structure defined below[4]:

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[4] Torres-Reyna, O. (2007), Panel Data Analysis; Fixed and Random Effects Using Stata (v. 4.2). Data & Statistical Services, Princeton University.

$$\mu_{it} = \mu_i + v_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

μ_{it} is the disturbance with μ_i the unobserved bank-specific effect and v_{it} the idiosyncratic error.

Given that the data set under this study is a panel, the first possible regression method in this case is the Ordinary Least Squares method (OLS). However, because the cross-sections (i.e. the banks) included in our sample are widely dispersed in terms of efficiency, size, technological infrastructure, the OLS method is not suitable, as it is not able to tackle these differences. The fixed effects and random effects approaches solves this OLS shortcoming and consider the bank-specific effects in the regression estimates. The fixed effects model assumes that the unobserved individual effects are correlated with the variables included in the model while the random effects model does not (Hansen, 2002: pp.135). Using the Hausman test, the fixed effect is selected as an appropriate model to characterise our panel dataset. As a case in point, Greene (2008) notes that the fixed effects model is deemed superior over the random effect model because there is little justification in treating the unobserved individual effects to be uncorrelated with the other variables as in the random effects and hence, the random effects may suffer from inconsistency due to this correlation (Chileshe, 2017b).

The selected fixed effects model controls for unobserved heterogeneity across banks as it includes individual intercepts for each cross-section. The fixed effects method controls for all time-invariant differences between the cross-sections, and the estimated coefficients of the fixed effects models are not biased because of the omitted time invariant characteristics (Hsiao, 2003). In this case, the term "μ_i" is a parameter which is assumed to be fixed and is estimated for the purpose of inference in panel data. The remaining unobservable factors are stochastic with "v_{it}" which are independent and identically distributed with zero mean and constant variance as iid $(0, \sigma_v^2)$ and changes with individual and time invariants. It is further assumed under the fixed effects model that for all "i" and "t", the "X'_{it}" does not depend on "v_{it}" for the purpose of inference. Thus, the econometric model for fixed effects in panel data take the following form:

$$y_{it} = (\alpha + \mu_i) + BS'_{it}\beta + MAC'_t\gamma + v_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

where y_{it} represents bank credit of bank i to the private sector at a given period, t, BS'_{it} is a vector of bank-specific variables and MAC'_t is a vector of macroeconomic variables. The variables α, β, and γ are vectors of estimators or coefficients and v_{it} is an error term.

4.3 Data Sources and Description

This study uses quarterly panel data, which involves pooling of seventeen (17) commercial banks over the period 2008Q1 to 2017Q4. To gain more insights, the study disaggregates banks into small and big (Appendix I)[5]. Due to data unavailability particularly in the case of three small banks, we miss few data points at the start of the sample, and for this reason our panel data is weakly balanced. The data used in this

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[5] The decision rule regarding a bank being either big or small follows the approach by Mbao (2017). It is computed as a ratio of individual bank's total assets to industry total assets in this study. Therefore, if the average bank size is at least five percent (0.05) then such a bank is considered a big bank, otherwise it is a small bank. The big banks dominate the banking sector in Zambia accounting for over 80 percent of the market share in terms of assets, loans, and deposits.

study was collected from three sources. Data on quarterly BoZ policy rate was collected from the Bank of Zambia while quarterly GDP and inflation were sourced from Zambia Statistics Agency. The data on bank-specific variables relating to private sector gross loans and advances, bank assets, cash reserve requirements, regulatory capital, total deposits, foreign liabilities with commercial banks, liquid assets, NPLs and investment in securities was sourced from the prudential returns submitted by all licensed deposit taking commercial banks to the Bank of Zambia. The prudential returns are submitted monthly by all commercial banks and largely consist of comprehensive income statements and bank balance sheets. Table 5 reports the bank-specific and macroeconomic variables used in the regression, their description, the sources of the data and the expected sign.

Table 5: Variable Description

Variable symbol	Definition	Source	Expected Sign
BC_{it}	Ratio of bank loans and advances to total assets of bank i at time t granted to the private sector. The trend in this ratio thus captures the behavior of banks' lending over time.	Bank of Zambia	
$Cap_{ratio_{it}}$	Ratio of total capital to risk weighted assets of bank i at time t. Bank capital is a measure of banks solvency and ability to absorb risk. A well-capitalised bank is expected to have higher capability to provide more loans and advances	Bank of Zambia	Negative/Positive
$NPL_{ratio_{it}}$	Credit risk proxied by ratio of non-performing loans to total gross loans and advances of bank i at time t. An increase in the value of the ratio means a worsening of the credit quality and this could lead banks to decrease their lending activity.	Bank of Zambia	Negative
$Liquidity_{ratio_{it}}$	Ratio of total liquid assets to total deposits and short-term liabilities with bank i at time t. The ratio depicts bank's ability to absorb liquidity shocks.	Bank of Zambia	Negative/Positive
$IS_{ratio_{it}}$	Ratio of investment in government securities to total assets by bank i at time t. The ratio captures the crowding effect from the supply-side.	Bank of Zambia	Negative
$Crr_{ratio_{it}}$	Ratio of cash required reserves to total assets of bank i at time t. The ratio is crucial in banks' capacity to give out loans and advances. The assumption here is that the higher the ratio, the lower the amount of loans and advances a bank will give to the private sector.	Bank of Zambia	Negative
$Fl_{ratio_{it}}$	Ratio of foreign liabilities to total deposits with bank i at time t. The ratio represents loans banks get from foreign institutions to grow their assets as well as their liquidity thereby permitting them to lend more at domestic level.	Bank of Zambia	Positive
$Dd_{ratio_{it}}$	Ratio of domestic deposits to total assets with bank i at time t. An increase in domestic deposit is likely to improve banks' ability to lend more to the private sector.	Bank of Zambia	Positive

Variable symbol	Definition	Source	Expected Sign
$logBSize_{it}$	Bank size proxied by log of total assets of bank i at time t. Big banks have capacity to provide a large variety of financial services to their clients since they can mobilize more funds.	Bank of Zambia	Negative/Positive
ROE_{it}	Return on equity of bank i at time t. The ratio is a measure of banks` profitability. Banks are more capable to extend credit with better profitability.	Bank of Zambia	Negative/Positive
$Boz\ Policy\ Rate_t$	Quarterly monetary policy rate at time t. Represents the central bank overall monetary policy stance.	Bank of Zambia	Negative
$Total\ Debt_{ratio_t}$	Ratio of total government debt to GDP at time t. Represents the amount of debt taken by government from internal as well as external sources to meet out its deficit. The ratio captures the crowding effect from the demand-side.	Ministry of Finance	Negative
$Inflation_t$	Quarterly inflation rate at time t. Inflation is generally the persistence increase of price level of goods and services in an economy over a period. An increase in inflation may raise interest rates and decrease loan demand.	Zambia Statistics Agency	Negative/Positive
$logGDP_t$	Log of quarterly gross domestic product at time t. GDP growth measures the overall health of the economy, and thus can reflect the demand for credit. Higher GDP growth should translate into higher credit growth. Lagged GDP is used in the model estimation to avoid reverse causality.	Zambia Statistics Agency	Positive

Source: Computations by the author

5.0 Empirical Results and Discussion

Before carrying out the empirical analyses, the correlation among the independent variables was checked. From the correlation results in table 6, the variables are both positively and negatively correlated with each other and the highest correlation is about 0.74 or 74%. This is expected as is the case in related studies like Fernández et al. (2016) and Ozili (2018). Considering the perspective of Hair et al. (2006), they expressed that multicollinearity problem exists if the correlations exceed 0.75, 0.80 and 0.90. So, we can safely say that there is no multicollinearity problem present among the variables. In addition, to validate the robustness of "multicollinearity not being a serious problem" in this study, the variance inflation factor (VIF) test for each variable entering the regression model was conducted. Appendix II represents the (VIF) results for our model. As can be seen, the average of VIF for all the variables included in the analysis was 0.205 less than 10 suggesting that multicollinearity is not a problem in this study (Gujarati, 2004).

Table 6: Correlation Matrix

	BC (-1)	Cap	NPL	Liquidity	IS	Crr	Fl	Dd	Bsize	ROE	BoZR	T. debt	Infla	GDP
BC (-1)	1													
Cap	-0.340	1												
NPL	0.233	-0.170	1											
Liquidity	-0.516	0.736	-0.203	1										
IS	-0.420	0.195	0.029	0.173	1									
Crr	-0.342	0.662	-0.134	0.601	0.028	1								
Fl	0.186	-0.062	-0.082	-0.099	-0.292	-0.111	1							
Dd	0.235	-0.250	0.098	-0.259	-0.069	-0.046	-0.340	1						
Bsize	0.339	-0.249	0.074	-0.237	-0.081	0.005	-0.173	0.659	1					
ROE	-0.047	0.098	-0.203	0.297	-0.146	0.052	0.099	-0.199	-0.018	1				
BoZR	-0.022	0.140	0.082	-0.085	-0.172	0.257	-0.019	-0.099	0.051	-0.145	1			
T. debt	0.118	-0.074	0.247	-0.102	-0.142	0.019	-0.023	0.113	0.347	0.079	0.472	1		
Infla	-0.058	0.100	0.004	-0.033	-0.171	0.239	-0.025	-0.093	-0.031	-0.112	0.691	0.417	1	
GDP	0.258	-0.187	0.223	-0.141	-0.083	-0.178	0.015	0.214	0.435	0.222	0.019	0.736	-0.142	1

Source: Computations by the author

Further, to assess the robustness of the results, a few checks were made. The robust test for the serial correlation indicates that the model is well specified with respect to within-group residual autocorrelation. The Durbin Watson statistics (DWstat = 1.9165) indicate no presence of serial correlation in the residuals and show evidence of predictive power as the overall F-statistics (F-stat = 235.27) is statistically significant. Further, we tested for cross-sectional dependence /or contemporaneous correlation in the residuals using the Breusch-Pagan LM and the Pesaran scaled LM tests of independence. According to Baltagi (2008), cross-sectional dependence is a problem in macro panels with long time series (over 20-30 years). This is not much of a problem in micro panels (few years and large number of cases). Cross-sectional dependence can lead to bias in tests results (also called contemporaneous correlation). The null hypothesis in the Breusch-Pagan LM and the Pesaran scaled LM tests of independence is that residuals across entities are not correlated. Results indicate no cross-sectional dependence (Appendix III).

The main results presented in table 7 below largely confirm that both bank-specific and macroeconomic variables are significant determinants of bank credit to the private sector.

Table 7: Results from the Fixed Effects Linear Model

		(1) All Banks	(2) Small Banks	(3) Big Banks
	Variables			
Bank-Specific Variables	Intercept	-22.013	-35.687*	-54.665
		(13.412)	(19.158)	(19.806)
	Bank Credit (-1)	0.565***	0.566***	0.599***
		(0.026)	(0.034)	(0.037)
	Capitalisation	0.037***	0.040***	0.032**
		(0.006)	(0.008)	(0.014)
	NPL Ratio	-0.119***	-0.190***	-0.094
		(0.040)	(0.046)	(0.103)
	Liquidity Ratio	-0.060***	-0.067***	-0.062***
		(0.012)	(0.017)	(0.018)
	Investment in Securities	-0.292***	-0.275***	-0.258***
		(0.033)	(0.041)	(0.060)
	Required Reserve Ratio	-0.246***	-0.229***	-0.309***
		(0.043)	(0.056)	(0.070)
	Foreign Liability	0.028***	0.021***	0.152***
		(0.007)	(0.007)	(0.022)
	Deposit Ratio (-1)	0.121**	0.134***	0.110**
		(0.022)	(0.027)	(0.043)
	Bank Size	2.116***		
		(0.652)		
	Return on Equity	-0.005	-0.008	-0.016***
		(0.004)	(0.006)	(0.005)
Macroeconomic Variables	BoZ Policy Rate	-0.331***	-0.318**	-0.367**
		(0.106)	(0.137)	(0.165)
	Total Debt (% of GDP)	0.058***	-0.012	0.111***
		(0.021)	(0.027)	(0.032)
	Inflation	0.186**	0.059	0.349***
		(0.085)	(0.115)	(0.122)
	Log of GDP (-1)	1.554	5.137***	6.756***
		(1.381)	(0.724)	(1.739)
	Hausman's Test Result: Chi-square statistic =145.16; P-Value=0.000***			
	Observations	663	351	312
	Number of Banks	17	9	8
	R-squared	0.917	0.919	0.922
	Adjusted R-squared	0.913	0.914	0.917
	F-Statistic	235.273	179.403	174.276
	Prob (F-Statistic)	0.000	0.000	0.000
	Durbin-Watson stat	1.916	1.624	2.246

Notes: Standard errors in parentheses. The asterisk ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively.

The parameter estimate on the lag of bank credit tests the persistence in bank credit growth. As expected, lagged bank credit is statistically significant with a positive sign. The previous quarter's lending activity influences the next quarter's credit expansion; a one percentage increase in the previous quarter's bank credit provided to private sector increases bank credit by 0.566% in the following quarter. This result is in line with Ladime et al. (2013) and Assefa (2014). This implies that a good rapport among banks and borrowers could be further reinforced by previous lending relationship, giving high probability that banks will lend more in a current period.

The health of banks in terms of loan quality and capitalisation appear to be critical in determining credit to the private sector. Credit risk, proxied by NPL ratio, is negatively correlated with bank credit. This entails that the high proportion of the NPLs weakens bank balance sheet thereby reducing credit facilities granted to the private sector. This is in line with Guo and Stepanyan (2011) who have reported that the rise in the ratio of NPLs leads to a decline in the strength of the banking sector and the volume of the credit granted. Further analysis reveals that credit risk is more problematic in hindering credit extension in small banks than in big banks.

On the other hand, bank capitalisation is positively related with bank credit, suggesting that well-capitalised banks are likely to expand lending to the private sector. This result corroborates the findings on Latin America and US by Carlson et al. (2013) who document that commercial banks' loan growth was more responsive to capital ratios, banks with higher capital ratios were able to extend more loans. While the effect is strongly statistically significant, the economic importance of bank capital appears small. However, this result seems to confirm that, since the implementation of Basel I and some capital components on Basel two, Zambian banks perhaps have increased risk-weighted minimum capital requirements and thus expanded the size of their loan portfolios.

Liquidity ratio is negatively associated with bank credit, with a slope coefficient of -0.06% in all bank's categories in line with Loutskina (2011). This result, however, is contrary to the findings of Chileshe (2017a) and Malede (2014). The negative impact of liquidity ratio on banks' credit is in line with the hypothesis based on the argument of taking loans as illiquid assets of banks. According to this argument, when the amount of loans provided by banks increase, the amount of illiquid assets in the total assets' portfolio of banks increase and lead to a reduction in the level of liquid assets held by banks.

Investment in government securities has a negative relationship with bank credit. The result indicates that a one percent increase in the ratio of investment in securities would reduce bank credit by about 0.258% - 0.292% on average. This implies that when banks invest huge resources in securities (Treasury bills and bonds), their ability to extend credit to the private sector is constrained. This result further highlights banks' huge appetite for risk-free assets (government securities) at the expense of extending credit to the private sector.

Consistent with expectations, cash reserve ratio is negatively associated with bank credit at 1% level of significance. The result indicates that a percentage increase in cash reserve ratio decreases bank lending capacity by about 0.229% - 0.247% on average. This result is in tandem with Montoro and Moreno (2011).

Results on funding show that both foreign liabilities ratio and the deposit ratio contribute positively to bank credit. This seems to suggest that as banks access funding from foreign financial institutions and mobilise more domestic deposits, their assets and liquidity increases, thus allowing them to lend more to the private sector. Though positive, the coefficient on foreign liabilities is very low relative to domestic deposits. Further analysis shows that on a comparative basis, the influence of foreign liabilities on bank credit seems stronger in big banks than in small banks. The stronger effect of foreign liabilities on credit in big banks is testament to the high presence of foreign-owned banks in the big bank category with access to cheap funding from their parent banks abroad. The lagged deposit ratio, on the converse, could signal that banks do not issue loans and advances immediately from the currently deposited amount by account holders but in the subsequent period. Overall, this result lends support to the loanable funds theory and the empirical results by Guo and Stepanyan (2011), Imran and Nishat (2012) and Assefa (2014).

Further, result on size show that bank size is positively related with bank credit. Specifically, the coefficient value indicates that a percent increase in bank size results in 2.116% increase in bank credit– suggesting that the larger the asset base the more loans a banks' balance sheet can accommodate. This finding perhaps seems to confirm that large banks provide more loans and advances in Zambia. The result is in tandem with existing studies by Chernykh and Theodossiou (2011) who have shown that bank size indeed contributes significantly to loan supply. Overall, this result lends support to the market power hypothesis on which Chernykh and Theodossiou (2011) base their arguments that large and complex banks are more diversified, have access to huge funds and more accessibility to borrowers from large companies and use their inherent comparative advantage and expertise to acquire sufficient knowledge about the factors affecting credit performance.

Unexpectedly, the results indicate that return on equity (ROE) is negatively related with bank credit to the private sector. However, this result is only significant in big banks category, suggesting that there is no evidence of interaction between bank profitability and bank credit in all banks and small banks category. Moreover, the negative sign recorded is somehow fascinating, and calls for further interrogations.

Bank credit is also positively associated with inflation in line with Guo and Stepanyan (2011). This could be because higher inflation rates lower real interest rate, and consequently the cost of borrowing, which boosts demand for nominal bank credit. In relative terms, inflation seems to matter in big banks than in small banks. On the other hand, higher GDP growth leads to more demand for bank credit (significant atleast in small and big banks) consistent with Guo and Stepanyan (2011) and Ivanovic (2015). This elastic and significant influence on bank credit confirm that commercial banks make out more loans when the economy is in a boom cycle (with rising household and firm's incomes) and reduce lending in recession.

The BoZ policy rate, a monetary policy variable, as expected, is negatively related with bank credit to the private sector. Specifically, for every percent increase in the BoZ policy rate, bank credit to the private sector falls by about 0.318% - 0.367% on average. The result is consistent with Chileshe (2017a), Simpasa et al. (2015) and Guo and Stepanyan (2011) who have also shown that tighter monetary conditions are associated with less

credit growth. Thus, when central bank raises the policy rate in Zambia, it constrains bank credit to the private sector.

The estimation results on total debt to GDP ratio is negative, suggesting crowding-out effect evidence on bank credit to the private sector. A one percent increase in the total debt to GDP ratio leads to a decrease of about 0.06% - 0.11% in bank credit. This is consistent with Cottarelli et al. (2003). Therefore, an increase in government borrowing (resulting from budget deficit) depresses available loanable funds to the private sector. This is because Zambian banks are a major investor in Zambian government securities[6]. Further interrogation by bank category (big or small), results reveal that higher government debt leads to significant decrease in demand for bank credit in big banks. This significant negative influence of government debt could be indicative of the higher interest rate premiums big banks price in on the back of increased sovereign debt which in turn chokes private sector demand for bank credit.

6.0 Conclusion

This study examined the determinants of bank credit to the private sector in Zambia with a focus on bank-specific and macroeconomic variables. Using a sample of 17 commercial banks covering the period 2008Q1-2017Q4, the study employed a panel fixed effects linear model. The results of this study show that both bank-specific and macroeconomic variables significantly influence bank credit to the private sector. The results show that the lag of bank credit, bank capital, foreign funding, domestic deposits, bank size, GDP growth and inflation, all stimulate bank credit to the private sector whereas rising NPL ratio, liquidity ratio, cash reserve ratio, investment in securities, BoZ policy rate and total government debt may be detrimental to bank credit. However, varied results emerge when bank credit determinants are analysed on a big and small banks category. Precisely, NPL ratio is more problematic in small banks as opposed to big banks and is significant in constraining bank credit. Results also indicates that while ROE and total government debt seem significant in constraining bank credit in big banks, they do not matter in small banks. Inflation is found to stimulate bank credit in big banks and not in small banks.

The results of this study have several implications for policy and regulation. First, foreign capital (foreign liability with commercial banks) is a mixed blessing for bank credit in Zambia[7]. Given the volatility nature of bank flows to a developing country like Zambia, a

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[6] A higher debt-to-GDP ratio may induce banks to be regular holders of government securities. Greater portions of credit are absorbed by government liabilities rather than by the private sector, partly because countries with a large debt might also have an extensive general government sector 'crowding out channel. One example is the Japanese experience in the last two and half decades: a vast portion of the huge Japanese public debt was held by banks while credit stagnated since the 1990s (Hoshi and Ito 2012). Second, as shown by the recent euro-area sovereign debt crisis, high government debt might have adverse effects on private credit by raising the costs and reduce the availability of bank funding. This is the 'risk channel' of high public debt. Which channel is most likely to be in action in Zambia's case over the last three decades? Our tentative answer is both channels have been – the typical crowding out of loans to the private sector is perhaps the dominant one while the second potential channel – the risk channel – has probably been building up in the past four years.

[7] Countries that relied more heavily on foreign borrowing to finance domestic credit, notably some European EMEs, in general experienced the largest swings of credit growth before and after the crisis, while

banking sector that is dependent on foreign capital for funding may prove vulnerable to external shocks and could also be prone to boom-bust cycles. In this regard, macro-prudential policies should be particularly vigilant to foreign capital fuelled bank credit booms, which could reverse course rapidly. Thus, building a robust domestic deposit base could be vital for sustained and stable bank credit extension to the private sector.

Second, given that high NPLs are an obstacle for bank credit extension to the private sector, banks should pay attention to reducing the levels of NPLs. It is also paramount that banks minimize on excess holding of liquidity and seek to employ part of it in the extension of credit to the private sector. On the other hand, bank capital is found to support bank credit, implying that well-capitalized banking sector responds positively to increased demand for credit. Thus, the Bank of Zambia recapitalization policy[8] must be encouraged to help the economy prepare against any disastrous macro-financial shocks.

Third, while tight monetary policy would be deemed suitable in an inflationary period, it has negative implications on bank credit to the private sector. Thus, the central bank should critically weigh all the outcomes and the trade-off of tight monetary policy so as not to dampen bank lending to the private sector, which in turn would slowdown economic activity. Further, strong growth and low inflation are conducive to credit growth. Therefore, policies that improve fundamentals and lower inflation are not only beneficial on their own right, but they could also boost bank credit and strengthen economic activity. Moreover, results clearly show that prudent fiscal consolidation efforts could support lending to the private sector. This entails that government should find an optimal level of debt which promotes both private investment and economic growth.

By and large, our results indicate that the determinants of bank credit to the private sector could be crucial for bank stress tests and have further implications on macro-prudential policy. This implies that the statistically significant bank-specific and macroeconomic variables identified in this study can be incorporated in stress test models when calibrating the impact of shocks on the banking system's credit evolution.

In conclusion, the extent to which the banking sector can attract more deposits and promote greater financial intermediation would determine further extension in bank credit disbursements. A stable macroeconomic position, prudent policies leading to lower credit cost would instantaneously lower the risk premium attached to the private sector and enhance lending. On the other hand, fiscal consolidation efforts would be supportive of financial intermediation. Sound financial sector policies that stimulate banking sector funding and limit non-performing loans and excessively holding of liquidity remain essential for robust bank lending. Lastly, the overall health of the banking sector also matters, as a banking sector with a healthy balance sheet is desirable for not only financial stability, but also credit growth.

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countries that relied less on foreign borrowing, e.g., EMEs in Latin America and Asia, fared much better during the crisis Guo and Stepanyan (2011).

[8] In 2012, the minimum capital requirement for local banks was raised to K104 million while that for foreign banks was raised to K520 million from K12 million for all banks.

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Appendix

Appendix I: Bank Size and Type

Bank ID.	Bank Size	Bank Type	Percentage of Assets	Percentage of Loans	Percentage of Deposits
1	Small	Foreign	0.4%	0.7%	0.2%
2	Small	Domestic	1.1%	1.4%	1.2%
3	Small	Domestic	1.2%	1.5%	1.2%
4	Small	Foreign	1.5%	2.2%	1.4%
5	Small	Foreign	1.5%	2.4%	1.4%
6	Small	Foreign	1.6%	0.2%	1.6%
7	Small	Foreign	1.7%	2.9%	1.2%
8	Small	Foreign	3.1%	2.2%	2.7%
9	Small	Foreign	3.4%	1.5%	2.5%
10	Big	Domestic	5.7%	6.6%	5.4%
11	Big	Foreign	7.4%	6.8%	6.7%
12	Big	Foreign	8.0%	8.0%	7.7%
13	Big	Foreign	10.1%	3.7%	11.4%
14	Big	Foreign	11.2%	10.5%	12.4%
15	Big	Domestic	12.3%	14.3%	13.2%
16	Big	Foreign	14.6%	16.0%	14.8%
17	Big	Foreign	15.1%	19.0%	15.2%
		Total	100.0%	100.0%	100.0%

Appendix II: Variance Inflation Factor (VIF)

Variable	VIF
Bank Credit (-1)	0.000803
Capitalisation	5.14E-05
Credit Risk (NPL Ratio)	0.001739
Liquidity Ratio	0.00022
Investment in Securities	0.001354
Required Reserve Ratio	0.002437
Foreign Liability	5.77E-05
Deposit Ratio	0.000596
Bank Size	0.522565
Return on Equity	2.01E-05
BoZ Policy Rate	0.012932
Total Debt (% of GDP)	0.000569
Log (GDP (-1))	2.323468
Inflation	0.008979
Average	0.20541366

Appendix III: Cross-Sectional Dependence
Residual Cross-Section Dependence Test
Null hypothesis: No cross-section dependence (correlation)
in residuals
Periods included: 39
Cross-sections included: 17
Total panel observations: 663

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	157.2222	136	0.1029
Pesaran scaled LM	1.286784		0.1982
Bias-corrected scaled LM	1.063100		0.2877
Pesaran CD	0.750445		0.4530

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