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The impact of macroeconomic developments on financial stability in Zambia

by

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Abstract

This study investigates the impact of macroeconomic variables on commercial bank non-performing loans and profitability while controlling for bank specific factors, using a unique bank-level panel dataset from 17 commercial banks covering the period 2006Q1 to 2019Q1 and fixed effects linear model. The paper found that both NPLs and ROE are strongly correlated with their one period lagged value. Regarding NPLs, the study found that exchange rate, size and level of capitalisation have impact on NPLs. Surprisingly however, we did not find statistically significant results on the impact of GDP gap on NPLs and inflation on NPLs despite respective coefficients carrying intuitive signs. Additionally, we found that the exchange rate has no statistically significant impact on bank profitability. However, estimation results indicate that GDP gap positively, strongly affect ROE and inflation negatively, and strongly affect ROE. Bank size in statistical terms was found to matter for bank profitability while capitalisation and ownership did not matter for bank profitability despite carrying expected signs.

Keywords: Macroeconomic developments, financial system stability, Pooled ordinary least squares (OLS), Fixed and Random Effects estimation

JEL: C33, E32, G21

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I: Introduction

Since the 2007/8 global financial crisis, achieving and maintaining stability of the whole financial system has gained prominence among policy makers. This is because the crisis revealed that an event outside the financial system¹ could severely impair some of its functions, and in turn stifle economic growth. The event that triggered the financial crisis, and great recession, was the sub-prime mortgage crisis which consequently led banks to cap their lending to firms and individuals, thereby limiting their intermediation capacity. Considering that this crisis had a global reach, indicating the interconnectedness within global finance and trade, Zambia was not spared. But besides external economic developments, how can the macroeconomic performance affect the stability of the financial system in Zambia?

The Zambian financial system has occasionally been confronted with domestic and foreign disturbances, ranging from demand to financial², fiscal and commodity price shocks. Because these shocks threaten to dislocate the financial system's core tasks - intermediation, transmission of payments, pricing of assets and redistribution of risk – economic growth is in turn constrained. As such, sustained stability of the financial system becomes vital to supporting economic prosperity. Rajaraman & Vasishta (2002) and Kroszner (2007) have indicated that the stability of the financial system is the basis of modern macroeconomic policy and, at the same time, a prerequisite for strong economic growth.

Banks are at the center of the financial system due to their ability to perform all its core tasks. Because of the vital role it plays in the economy, the banking sector has been singled out for special protection and it is clear why such great emphasis is placed on regulation and supervision of the banking sector (Barth et al., 2006). It is for this reason that Zambia has and continues to strengthen its prudential policy framework, although the impact of macroeconomic events on financial stability are not fully understood.

While macroeconomic developments, both domestic and foreign, have seemingly posed systemic risk to the Zambia financial system and raised financial stability concerns, little or no research has been done on this subject so far. This is despite the growing prominence of financial stability and going need for evidence-based policy response to macroeconomic shocks. Therefore, this forms the basis to undertake a study to appreciate the ramifications of macroeconomic developments on financial stability from the Zambian perspective.

The remainder of this paper is structured as follows: The second section discusses stylized facts relating to macro-economic and financial conditions in Zambia while section 3 covers the highlights of the theoretical and empirical literature on the interaction of macroeconomic developments and financial stability. Section 4 looks at the data and then section 5 presents the methodology, specifying the econometric models. Section 6 discusses key results. And Section 7 concludes and provides recommendations.

¹ A financial system comprises financial institutions, markets and infrastructure which covers payments systems and regulations.

² Interest rates and exchange rates

II: Stylized facts: Zambia's macroeconomic conditions and financial system stability

Unfavorable developments in the macroeconomic environment could trigger financial crises. Economic policies³, gross domestic product (GDP), inflation, commodity prices, interest and exchange rates are among key macroeconomic variables that affect financial system stability. They may affect the financial system by changing its resilience to shocks and ability to perform its core tasks. For example, a downward shift in GDP could stifle the growth in deposits, suppress banks' appetite to underwrite new loans and impair borrowers' ability to repay the existing loans. Consequently, banks would face a rising stock non-performing loans (NPLs) and declining return on equity (ROE), which could have dire ramifications on their solvency. Although the rise in NPLs is not immediately viewed as a destabilising factor, the feedback effects from the financial system to the whole wide macroeconomic environment may undermine a sustained recovery and re-enforce macroeconomic vulnerabilities going forward. Schumpeter (1969) noted that just as a strong financial system promotes economic growth, a weak financial system grappling with non-performing loans (NPLs) and insufficient capital could undermine growth. Therefore, heightened credit risk resulting from unfavourable macroeconomic developments can cause a financial crisis or instability for a country such as Zambia.

Going back into history, there are three episodes of somewhat financial crises that demonstrate the strength of macrofinancial linkages in Zambia. These episodes are;

- a) The banking crisis of 1994 to 2001
- b) The commodity crisis of 2008/9 and
- c) The foreign exchange crisis of 2015

Anecdotal evidence during these episodes justifies the case that financial system developments are not independent of macroeconomic developments in Zambia. All three crises showed that macroeconomic shocks could impact negatively on the functioning of the financial system.

2.1 The banking crisis of 1994 to 2001

The Zambian banking crisis happened during an era of economic liberalization, which began in 1991. Prior to 1991, there was heavy government involvement in the financial sector which resulted an inefficient and uncompetitive markets, which discouraged private savings and choked the growth of private financial institutions (Kalima, 2001). Interest rate controls, which translated in negative real interest rates amid high inflation, depressed profit margins for banks and reduced returns on financial assets for savers (Brownridge, 1998). In addition, a weak financial infrastructure system (an inefficient payments system, an inadequate legal framework, and weak accounting standards) constrained the financial system's ability to perform its financial intermediation function. Considering these entry barriers, a few private banks entered the sector, which only had 10 privately owned pre-1991.

³ Monetary and fiscal

With the liberalization of the economy, came the deregulation of the banking sector which saw the government's influence scale down. As the barriers to entry crumbled, more private banks joined the fray, with a total of ten new banks acquiring licenses between 1991 and 1994 (Martinez, 2006). Naturally, heightened competition ensued. But, as economic activity slumped post liberalization, deposits growth slowed. Government domestic borrowing rose as it sought to finance its budget deficit, leading to higher interest rates, banks' liquidity constraints and muted lending to the private firms and households. Besides, there weak institutional arrangements that made it difficult for banks to sustain their profitability and solvency. These included a weak supervisory and regulatory framework and rigidities in the land ownership system which made collateral handling difficult. To overcome losses, while taking advantage of regulatory and supervisory shortcomings, banks engaged in risky lending. Considering the harsh economic environment, high fiscal deficit, a liquidity crunch as well as weaknesses in the institutional framework, there were nine bank failures between 1995 and 2001 (see *Table 1*). These are estimated to have caused losses to taxpayers and depositors equivalent to 7 percent of GDP (Martinez, 2006).

Table 1: Bank Failures between 1995 and 2001

No	Name of bank	Liquidation date
1	Meridian Biao Bank	Sep-95
2	African Commercial Bank Limited	Feb-96
3	Zambia Export Import Bank Limited	May-97
4	Prudence Bank Limited	Feb-98
5	Credit Africa Bank Limited	Mar-98
6	Manifold Investment Bank Limited	Mar-98
7	First Merchant Bank Zambia Limited	Mar-99
8	Commerce Bank Limited	Jan-01
9	Union Bank Zambia Limited	Mar-01

2.2 The commodity crisis of 2008/9

The 2008/9 financial crisis had devastating consequences on global economic growth. What started in the sub-prime real estate market in the United States spread to other countries, with major banks failing. This compelled governments to commit colossal amounts of money to save the financial system, as well as central banks to adopt unconventional monetary policy regimes to instill stability in economies. Although there was international cooperation to resolve the financial crisis and curb its spillovers, financial conditions tightened to the extent that general demand and global economic growth slowed. There was limited direct financial impact on Zambia due to its's reliance on domestic financing and limited non-concessional foreign currency exposure at the time (Silumbe,2010). Indirectly, the slumping demand for commodities like copper, which Zambia is heavily dependent on⁴, caused disturbances in its economy.

After copper prices plunged 68% from an all-time high of US\$8,985 per ton during the second half of 2008 (*Chart 1*), export proceeds tumbled by 56% in the three months to March 2019 (*Chart 2*). This had a knock-on effect on the exchange rate, which depreciated by about 40% to USD/ZMW5.7266 (*Chart 3*) as foreign currency inflows dried up. The weak local currency induced inflationary pressures, pushing the annual inflation rate up to 16.6% by the end of 2008 (*Chart 4*). The

⁴ As at end of December 2018, copper exports account for over 70% of total export earnings.

central bank responded by tightening its monetary policy. Miners reacted by scaling back copper production, a move that led to mass retrenchments in the mining sectors.

Aside from the global financial crisis indirectly causing the exchange rate to depreciate, inflation and unemployment to rise, there were spillovers to financial institutions. The most notable was the swelling share of non-performing loans, which had later rose above the prudential threshold and peaked at 15.8% in 2010 (Chart 5) following the mass loss of employment, depreciation of the kwacha and a tight monetary policy stance. The growing proportion of bad loans and high provisions pulled back banks' profitability (Chart 6) and weighed their solvency down, albeit it remained above the threshold of 10% (Chart 7). And there were perceived feedback effects to the real economy. Heightened credit risk made banks apprehensive to lend to private firms and household whilst their appetite to lend to the less risky central government increased (Chart 8). Commercial banks lackluster lending to the private sector coincided with lower economic activity, indicative of the gravity of the feedback effects.

2.3 The foreign exchange crisis of 2015

Reminiscent of 2008, the deterioration of banks health indicators coincided with the depreciation of the exchange rate - only this time the depreciation was excessive and unprecedented. Muted foreign currency supply from the mining sector, after copper prices plunged (see Chart 1 above), and fears surrounding government's seemingly insatiable appetite to increase borrowing, on non-concessional terms, stoked panic in the exchange rate market.

Kwacha weakened by 72% in 2015 as copper prices succumbed to the falling demand from the world largest consumer of industrial metals, China. On 28 September 2015, the local currency tumbled by 16% against the dollar, the largest intra-day loss of all time. Consequently, consumer price growth tripled to 21.1% at the end of 2015, and the central bank reacted by increasing its policy rate by 600 bps, restricting access to the overnight lending facility and tightened the statutory reserve requirement.

Chart 1: Copper prices in US\$ per ton

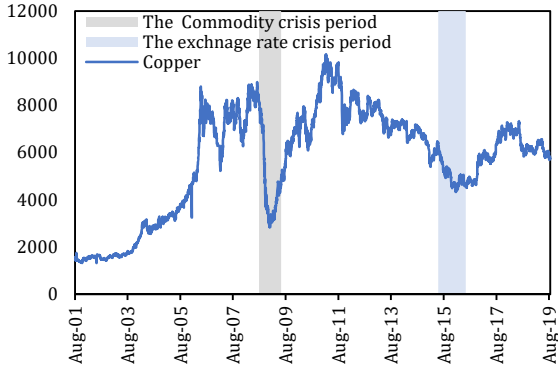


Chart 2: Copper exports in US\$' millions

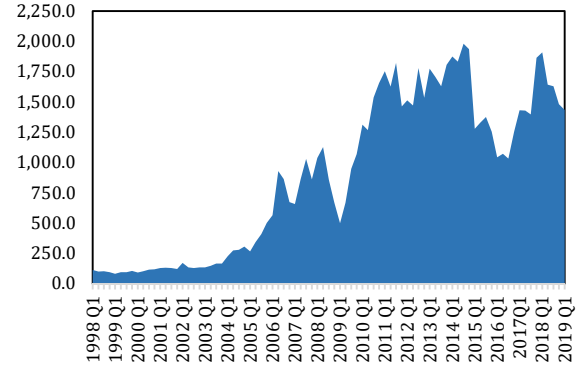


Chart 3: USD/ZMW exchange rate

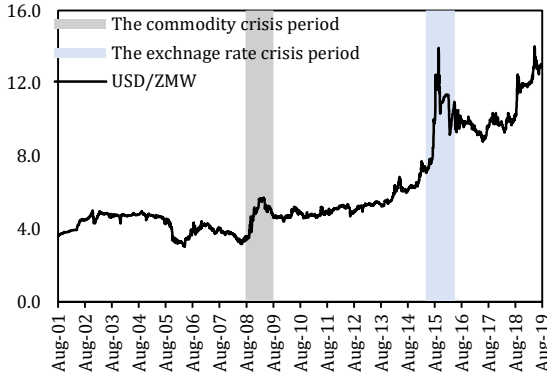


Chart 4: Annual Inflation rate

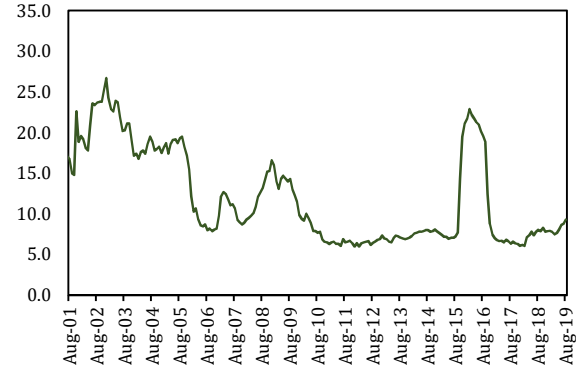


Chart 5: NPL to total gross loans

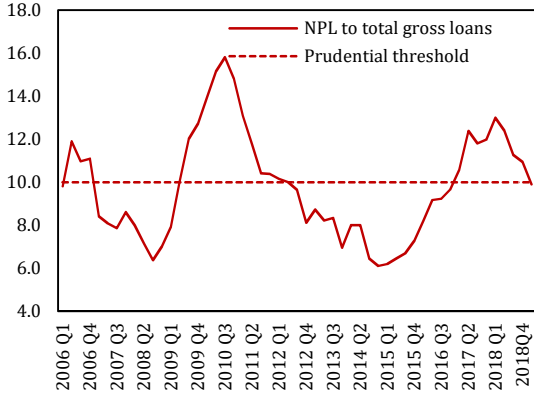


Chart 6: Profitability % (ROA and ROE)

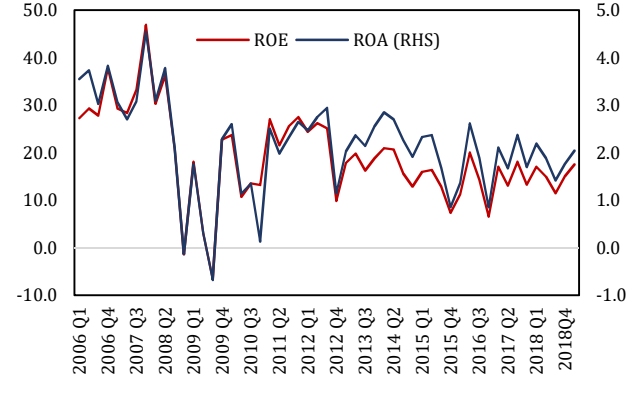


Chart 7: Total reg. capital to risk-weighted-assets (%)

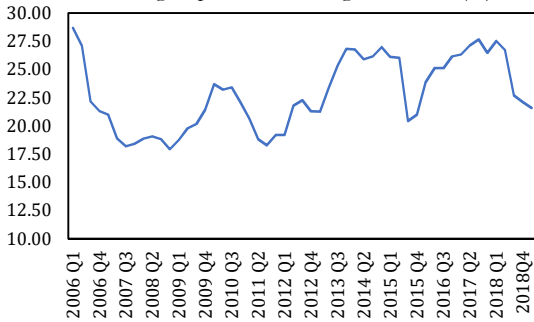
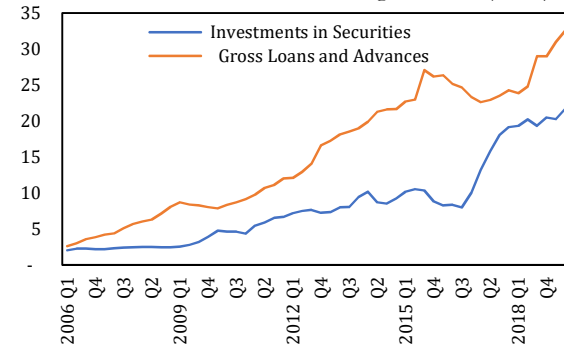


Chart 8: Banks invest. in securities and gross loans (K'bln)



These shocks were seemingly transmitted to financial institutions which experienced a deterioration in the quality of assets on their balance sheets, as well as downward pressure on their bottom line. The trend in commercial banks NPL ratio rebounded (see [Chart 5](#)) as tightening monetary conditions made meeting loan obligations increasingly difficult for firms and individuals. The growing stock of bad loans and high provisions pulled negatively affected profitability, with both ROA declining to a 4-year low of 0.8% and ROE to 6.6% (refer to [Chart 6](#) above)

The legacy of the 2015 financial conditions tightening has lingered. Even when banks NPL ratio declined to parity with the prudential ceiling of 10% during the first half of 2019, high credit risk appears to have been sustained as banks reluctance to lend to the private sector continued ([Chart 8](#)).

All in all, the interaction between the financial system and macroeconomic variables is notable and makes this subject an important one to researchers and monetary policy-makers alike.

III: Literature Review

Much of the literature on the relationship between macroeconomic variables and financial stability is empirical⁵ and focuses on how banks' health reacts to developments in economic fundamentals. But why is the health of banks usually taken as a barometer for financial stability? Perhaps this is because banks are at the center of the financial system, playing a key role in all its core functions relating to financial intermediary, facilitation of payments, pricing of instruments and redistribution of risk. And banks asset quality, usually proxied by NPLs, and solvency are among key indicators of banks health. Therefore, distortions or imbalances in banks operations could materially undermine financial system stability. In good economic times, banks tend to increase their lending but when growth slackens, NPLs are expected to increase.

Empirical studies provide consistent evidence for this macro-financial linkage. While analyzing banks riskiness during business cycles, Quagliariello (2007), for instance, found that the state of the business cycle is a determinant of NPLs. Klein (2013) examined the relationship between NPL and changes in GDP, unemployment, and inflation. He found a strong negative relationship between NPLs and macroeconomic factors.

Using the Generalized Method of Moment (GMM) estimations, Dimitrios et al (2016) find that GDP growth and unemployment have a strong influence on financial stability. They also find that fiscal policy and business cycles have a significant influence on banks' resilience. Specifically, they find that banks' bad loans increase with increases in income tax as well as contractions in the output gap. Ghosh (2015) also leveraged GMM techniques to uncover economic determinants of NPLs. He noted that NPL decline with higher real GDP and consumer income growth, while the increase with increases in inflation, unemployment and public debt. Furthermore, the results showed that credit quality, liquidity

⁵ While we acknowledge that theoretical and empirical review is the most noble approach of presenting the literature review, it is however important to note that unlike other macroeconomic theories (growth theory, consumption theory etc) there is no theoretical framework in economic literature entirely dedicated to explaining all the intricate dynamics of macroeconomic shocks and their impact on financial stability – this may reflect to an extent how recent financial stability considerations are. Much of the literature on the linkage between macroeconomic developments on financial stability is empirical evidence inclined.

risk, inefficiency cost, larger capitalization and the size of the banking sector influence developments in bad loans.

Louzis *et al.* (2010) used dynamic panel data methods to examine the determinants of different NPLs categories, that is consumer, business and house loans. The results revealed that variations in GDP, unemployment, interest rates and public debt, and the quality of management, explain developments in NPLs for all categories. However, the paper finds discrepancies in the magnitude of the impact of macroeconomic factors among loan categories, with mortgage-related bad loans being the least responsive to macroeconomic shocks. Similarly, Beck *et al.* (2015) use dynamic panel estimates to investigate the relationship between macroeconomic conditions and NPL ratios. They discover that real GDP growth, share prices, the exchange rate, and the lending interest rate have a significant influence on banks' NPL ratios. For exchange rates, the direction of change is influenced by the magnitude of foreign-currency-denominated loans to unhedged borrowers. For stock prices, they find that the effect is larger in countries with deeper equity markets with larger market-capitalization-to-GDP ratios.

Nkusu (2011) found that a worsening macroeconomic environment has a knock-on effect on banks credit portfolio and improving macroeconomic conditions enhances their asset quality. He finds that slowing growth, increasing unemployment and rising interest rates (as proxied by falling asset prices) lead to growing stock of bad loans. He also finds that NPLs have strong macro-financial linkages as evidenced by their persistent feedback loop onto macroeconomic variables. A sharp rise in NPLs causes persistent negative effects on macroeconomic performance. Among all variables in the model, NPL is the only one that has both significant response to- and predictive power on- every other variable over a 4-year horizon period. Espinoza and Prasad (2010) also attempted to investigate the macro-financial linkages between macroeconomic variables and NPLs. Aside from establishing that growth has a positive impact with NPLs, while interest rates and fiscal and external deficits have negative effects on banks' asset quality, they find that swelling NPLs have strong feedback effects to the real economy. Contrary to Nkusu (2011), they find this feedback to be nonpersistent.

Investigating determinants of NPLs for a sample of 85 banks in three countries for the period of 2004-2008, Messai's (2013) findings reveal that macroeconomic variables have a significant relationship with specific bank variables. The paper shows that NPLs decline with improvements in GDP growth rate, rise with increasing unemployment rate and real interest rates. The paper also uncovers the negative influence of problem loans on banks' profitability.

Ozili (2015) tried to address the issue of the interaction between non-performing loans and the stage of the business cycle. He also investigated whether banks anticipate non-performing loans by making balance sheet adjustments. This study results indicate that banks adjust the level of loan loss reserves and loan growth to minimize the size of NPLs. Our results do not show evidence that loan diversification minimizes NPLs. Further, I find that banks in developing countries reduce loan growth when they expect high NPL while banks in developed countries do not anticipate the level of NPL by adjusting loan growth. Further, I find that post-crisis Basel regulation did not lead to a decrease in the size of NPLs among banks in developed countries but appear to minimize NPLs in some developing countries. Overall, the significance and predictive power of each bank-specific factor (excluding loan diversification), regulatory variable and macroeconomic indicator in explaining NPLs depends on regional factors (less significantly) and country-specific factors (more significantly).

There are also empirical studies done on macro-financial linkages in commodity-dependent countries. Hasanov et al (2017) investigated bank-specific and macroeconomic determinants of bank profitability in Azerbaijan, an oil-dependent economy. The study finds that bank size, capital, and loans, as well as economic cycle, inflation expectation, and oil prices were positively related to the profitability. The study further found that the bank profitability demonstrated moderate persistence.

IV: Data, Methodology and Econometric Model

4.1 Data

The analysis is conducted with a unique bank-level panel dataset covering 17 commercial banks, both domestic and foreign. All the data concerning individual commercial banks' balance sheet used in this research study was obtained from the Bank of Zambia. Our study uses quarterly panel data spanning the period 2006Q1-2019Q1. Of the 17 banks, four are classified local banks and the rest are classified as subsidiaries of foreign banks (foreign). The bank specific variables considered are size and ownership (foreign or local) while macroeconomic variables are inflation, exchange rates, interest rates and gross domestic product.

Table 2: Description of dependent and independent variables

		Variable	Measure	Notation
Dependent Variable		Profitability or Performance (Asset quality)	Equity/Non-performing loans	ROE/NPLs
Independent Variables	Bank Specific Variables	Size	Total assets	Size
		Subsidiary of foreign bank	Binary dummy variable equal to 1 for foreign banks	Ownership
		Capital	Total regulatory capital to risk-weighted assets	Capital
	Macroeconomic Variables	Inflation	Current period inflation rate	Inflation
		Economic Activity	Gross Domestic Product gap	GDP
		Exchange Rate	ZMW/USD exchange rate	Exchange rate

Research on the determinants of bank profitability has focused on both the returns on bank assets and equity, and net interest rate margins (Flamini et al, 2009). In order to estimate the impact of macroeconomic developments on financial stability, in this paper we employ two bank level indicators; Return on Equity (ROE) to proxy bank profitability and Non-Performing Loans (NPLs) to proxy bank performance and asset quality. ROE is a measure of a company's annual return (net income) divided by the value of its total shareholders' equity. Put differently, it measures the return to

shareholders on a unit of their capital. The use of ROE as a measure of profitability is not widely favored in literature. This is generally because banks with lower level of capital may generate relatively higher ratios. The alternative proxy for profitability, return on assets (ROA), on the other hand, has its own limitations as it may be biased due to off-balance-sheet activities (Flamini, et al, 2009). However, the problem with ROE may not necessarily apply in the case of Zambia because the regulation on capital is aimed at maintaining a minimum required level of capital. In light of this, we believe that our choice of ROE for profitability remains one that will fairly reflect the intrinsic characteristics of the relationship between macroeconomic factors and bank profitability in the sector. Regarding NPLs as a performance indicator, the choice is deeply entrenched in the vast literature on determinants of NPLs (Klein, 2013).

4.2 Methodology and Econometric Model

To assess the impact of macroeconomic developments on financial stability, we test the relationships between profitability/asset quality and macroeconomic and bank-specific variables. As alluded to above, we set up panel data analysis in E-views and apply various econometric techniques developed for such datasets, including Pooled OLS, Fixed and Random Effects estimation.

We first specify a general linear model of profitability/asset quality as follows:

$$\pi_{it} = \beta_1 + \beta_2 MAC_t + \beta_3 BSV_{it} + \varepsilon_{it}, \quad \varepsilon_{it} = v_i + u_{it} \quad \dots\dots\dots 1$$

Where the dependent variable π_{it} is the ROE of a bank or NPL of a bank, MAC_t is a vector of macroeconomic variables and BSV_{it} is a vector of bank specific variables. β_1 , β_2 and β_3 are vectors of coefficients and ε_{it} is an error term.

Since panel data relate to individuals, firms, states, countries, etc., over time, there is bound to be heterogeneity in these units. Some of these techniques of panel data estimation can take such heterogeneity explicitly into account by allowing for individual-specific variables. In using panel data, we expect to draw more information from the data, more variability, less collinearity among variables, more degrees of freedom and more efficiency. As such, we propose the following two baseline and specific econometric linear models:

$$NPL_{it} = \beta_1 + NPL_{it-1} + \beta_2 MAC_t + B_3 BSV_{it} + u_{it} \quad \dots\dots\dots \text{Performance/Asset quality equation}$$

And

$$ROE_{it} = \beta_1 + ROE_{it-1} + \beta_2 MAC_t + B_3 BSV_{it} + u_{it} \quad \dots\dots\dots \text{Profitability equation}$$

Where NPL_{it} represents non-performing loans and ROE_{it} represents return on equity of bank i at a given time period, t. NPL_{it-1} and ROE_{it-1} reflect lagged values of non-performing loans and return on equity, respectively MAC_t is a vector of macroeconomic variables and BSV_{it} is a vector of bank specific variables. β_1 , β_2 and B_3 are vectors of coefficients and u_{it} is an error term.

In the regressions above, MAC_t includes macroeconomic variables such as exchange rate, inflation, interest rates and GDP growth. The choice of macroeconomic variables is consistent with what one often time finds as common determinants of NPLs (Beaton, 2016; Klein, 2013; Nkusu, 2011 and

Beck, 2015). In this paper however, we appeal to intuition and introduce GDP in terms of gaps rather than GDP growth. This is simply a novelty in this paper meant to also capture boom-bursts cycles in output and therefore indirectly capture the impact of unemployment on NPLs during booms and recessions. A positive output gap occurs when actual output is more than full-capacity output. This happens when demand is very high and, to meet that demand, factories and workers operate far above their most efficient capacity. A negative output gap occurs when actual output is less than what an economy could produce at full capacity. A negative gap means that there is spare capacity, or slack, in the economy due to weak demand. BSV_{it} include bank size, bank capital and bank ownership (Mazreku, 2018; Beaton, 2016; Klein, 2013).

For testing the relationship between these variables, we use (1) Pooled Ordinary Least Squares, (2) the Fixed Effects model, and (3) the Random Effects model. We show all results from each specification in the interest of full disclosure, in order to assess the robustness of the findings, even though we attribute more weight to the model results preferred by Hausman test.

V: Empirical Results and Discussions

In this section, results of six estimated models are presented. In particular, three models (1 -3) pertain to assessment of the impact of both macroeconomic variables and bank specific factors on asset quality proxied here by non-performing loans (NPLs) while model 4 – 6 investigate the impact of macroeconomic variables and bank specific factors on profitability (ROE).

Table 3: Impact of macroeconomic variables and bank specific factors on NPLs and ROE

	NPL			ROE		
	POLS Model 1	FE Model 2	RE Model 3	POLS Model 4	FE Model 5	RE Model 6
AR(1)	0.9315*** (0.0152)	0.8526*** (0.02)	0.9264*** (0.0155)	0.8822*** (0.0164)	0.8544*** (0.0181)	0.8809*** (0.0165)
Exchange rate	1.0098** (0.4287)	1.7426*** (0.4995)	1.0622*** (0.424)	-0.7144 (11.1656)	-4.7181 (11.3894)	-0.7430 (11.1787)
GDP gap	-0.5883 (0.5576)	-0.3423 (0.5507)	-0.5786 (0.549)	9.0187*** (3.1573)	8.8957*** (3.1838)	9.0036*** (3.1611)
Inflation	-0.2031 (0.4151)	-0.3559 (0.4153)	-0.2338 (0.4094)	-8.1237*** (2.4198)	-8.5534*** (2.454)	-8.0633*** (2.4237)
Size	-2.12e-07* (1.19e-07)	-3.29e-07* (1.98e-07)	-2.29e-07* (1.18e-07)	1.6e-06** (6.68e-06)	2.76e-06** (1.02e-06)	1.52e-06** (6.75e-07)
Capital	-0.0128** (0.0062)	-0.0050 (0.0066)	-0.0130** (0.0061)	0.0326 (0.0348)	0.0233 (0.0389)	0.0319 (0.0349)
Ownership			0.4037 (0.3051)			-1.4561 (1.7372)
Constant	-7.9683** (3.8249)	-14.2294*** (4.4112)	-8.6027** (3.796)	-23.5981*** (6.1935)	-25.7245*** (6.3138)	-22.8737*** (6.2606)
	Hausman's Test Results: Chi-Square Test Statistic = 35.099; p-value = 0.000			Hausman's Test Results: Chi-Square Test Statistic = 13.34; p-value = 0.0375		

Note: ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively.

Results of the performance equations indicate that NPLs have high auto-correlation: the coefficient's size of the lagged NPLs ranges from 0.85 to 0.93, thus suggesting that a shock to NPLs is likely to have a prolonged effect on the banking system.

In addition, estimation results show that there is a positive and statistically significant relationship between the exchange rate and NPLs, which means that depreciation is concomitant with increasing NPLs. This finding means that increased loss of value of the domestic currency through depreciation against major foreign currencies raises credit risk, especially for foreign exchange denominated loans and therefore, reduces borrowers' ability to repay loans. This result is consistent with what others have found, for example, Chileshe (2018) found that increased exchange rate volatility has a negative effect on credit growth in Zambia. It is therefore, not surprising given what others have found, that commercial banks' quality of assets is adversely affected by unfavorable developments in the foreign exchange markets.

With respect to economic activity, holding all other things constant, estimation results of all models report negative but statistically insignificant coefficients. In statistical terms, this means that GDP gaps do not affect non-performing loans. Even though the signs suggest that positive GDP gap (booms) reduces NPLs, this result fails to validate the link between the business cycles and the banking sector's performance.

Like GDP gap, Inflation is also found to be statistically insignificant in influencing NPLs and this is despite the sign on the coefficient suggesting that inflation has a deterioration effect on the quality of commercial bank assets. Furthermore, estimation results indicate a negative and statistically significant coefficient on bank size, which means that the greater the size of the bank the lower the NPLs. This finding is consistent with Chernykh and Theodossiou (2011) who in their paper argue that large and complex banks are able, through financial expertise, to process soft information about small and medium sized firms, are more diversified and have large funds and more accessibility to borrowers from large companies with high credit card balances. This is further supported by the adequate resources they possess for development of advanced systems to manage and assess the credit risk.

In the pooled OLS and RE models, the coefficient on capital is negative and statistically significant at 5%, a result suggesting that well capitalised banks manage their loan portfolios better. And although statistically insignificant, the coefficient on the ownership dummy suggests that local banks have higher NPLs compared to banks which are subsidiaries of foreign banks.

Results of the profitability equations also indicate that ROE have high autocorrelation ranging from 0.85 to 0.88. Other results particularly on the effects of macroeconomic variables on bank profitability are mixed. Specifically, all estimated models indicate that depreciation has no significant effect profitability of commercial banks while GDP gap and inflation have statistically significant impact.

We find that economic activity, measured here in terms of GDP gap to reflect boom-burst cycles, has a positive and statistically significant coefficient indicating that banking sector profitability is sensitive to the performance of the economy. Growing real sector is expected to strengthen borrowers' repayment capacity, hence increasing banks' profitability.

Further, inflation is found to be negatively related to banks ROE, which may mean that during the period covered by our study, the levels of inflation were unanticipated by commercial banks

management. As such, their failure to anticipate inflation robbed the banks an opportunity to adjust the interest rates accordingly in order to cushion against the cost of inflation or increase profitability.

An assessment of the impact of bank specific factors shows mixed results of the relationship between bank specific factors and profitability. We find that bank size has a positive and significant coefficient, meaning that the bigger the bank, the higher the profitability. In literature, it is often argued that big banks tend to be highly reputable, reliable with a large customer base, which in turn support attainment of economies of scale. However, we find no statistical evidence to suggest that capitalization matters for profitability of a bank. This result is surprising and not consistent with our expectation that well capitalized banks are easily likely to expand their operations that may enable them to create more assets and amplify the scope of their profits. Similarly, we do not find evidence that ownership, foreign or local affects bank profitability even though the sign of the ownership dummy suggests that local banks are less profitable compared to foreign banks. Therefore, although the coefficient on the bank ownership dummy is insignificant in statistical terms, it has a sign that is consistent with the common perception that foreign banks are more efficient and benefit from wide expertise.

VI: Conclusion and Policy Recommendation

This study set out to investigate the impact of macroeconomic developments on financial stability. Specifically, it set out to gain insights into the effect macroeconomic variables have on the banking sector's non-performing loans and profitability while controlling for bank specific factors. NPLs and ROE are used as proxies for financial stability as an escalation of NPLs or reduction in ROE could adversely impair banks solvency and prevent them from performing their core functions. To do this, the paper analysed a unique bank-level panel dataset from 17 commercial banks covering the period 2006Q1 to 2019Q1. Between FE and RE analysis, Hausman Test indicated that fixed effects linear model results were preferable against random effects model results.

The paper study found that exchange rate has a positive impact on NPLs, and similarly GDP gap has also got a positive impact on ROE. With regards developments in consumer prices, the study shows inflation is negatively correlated with ROE. The results imply that an exchange rate depreciation leads to heightened credit risk through increases in NPLs whereas slower growth leads to lower income for banks. Additionally, inflationary pressures tend to cap banks' profitability. Therefore, there is evidence that adverse developments in the domestic macroeconomy does impair Zambia's financial system stability.

Policy considerations could include adoption measures that cap the depreciation of the exchange rate in terms foreign exchange sales by the central bank or adopting capital flow management measures which restrict the outflow of foreign exchange. Secondly, the central bank must strictly adhere to the tenets of its inflation targeting regime which would ensure that inflation is kept within its medium-term target band of 6-8%. This would help anchor the banks, corporates and households' inflation expectations. Thirdly, there is need for coordination between fiscal and monetary authorities to ensure that effective policies are implemented to stop the economy from overheating which could lead to higher inflation. Similarly, sound economic policies to be adopted to control for slower growth in the economy which could lead to lower profitability for banks.

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