
LIQUIDITY CREATION AND TESTING IN THE ZAMBIAN BANKING SECTOR: AN APPLICATION OF CAPITAL ADEQUACY, CUSTOMER DEPOSIT BASE AND RETURN ON ASSETS

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Abstract

The paper focuses on liquidity creation and testing of financial variables which would lead to the formation of a macro model to be used by Zambian commercial bank regulatory bodies such as Bank of Zambia when coming up with rules or interventions to help manage liquidity in the Banking Sector. The study further focused much on both the market and funding risks banks might face and demonstrated how the macro pressure-testing model would be designed and implemented. The research was done by reviewing the financial statements of all commercial banks in Zambia from 2008 to 2018. All Zambian banks were selected to ensure more accurate finding that represent the entire banking industry as different bank's face unique liquidity challenges. It was thus important to appreciate the unique challenges so that a model is developed that addresses all such liquidity encounters. This was purely a quantitative study as it required the review of a huge quantity of financial data. It was generally found that high capital and deposit base position has a positive impact on liquidity of banks. It was further established that return on assets among the two other reviewed variables namely capital adequacy and customer deposit base did not have a significant impact on the liquidity of banks in Zambia divergent to other studies done in developed countries.

Keywords: Liquidity-testing Model, Liquidity Risks, Non-probability Sampling, Macroeconomic Factors, Financial Exchange.

1.0 INTRODUCTION

Large scale pressure testing, for example testing the budgetary framework in general, is an instrument of national banks and supervisory specialists to determine the effect of market-wide situations and conceivable second round impacts. This is particularly required in Zambia on account of the country's geographical position which has implications on its economic performance. Zambia is a landlock country and has to depend on other countries to either import or export goods. As of 1st January 2018, the country had 18¹ commercial banks which are all regulated by the Bank of Zambia.

¹ These are: AB Bank Zambia Ltd, Access Bank Zambia Ltd, Atlas Mara Ltd, Bank of China, ABSA Bank Zambia Plc, Cavmont Bank Ltd, Citibank Zambia Ltd, Ecobank Zambia Ltd, First Alliance Bank Zambia Ltd, First Capital Bank Zambia Ltd, First National Bank Zambia Ltd, Indo-Zambia Ltd, Investrust Bank Plc, Stanbic Bank Zambia Ltd,

The country experienced some economic challenges in 2019. GDP growth was revised down to 2 percent, from an initial projection of 4 percent in 2020 (BOZ, 2020). This has been attributed to the poor weather conditions, limited agricultural output and inadequate electricity generation. The contraction in the energy sector in turn led to a slowdown in most sectors of the economy including manufacturing, and wholesale and retail trade. Further, liquidity constraints associated with the higher debt servicing payments and the accumulation of domestic arrears, stifled private sector economic activity. All these factors limited economic growth as they had a negative impact on liquidity in the Banking Industry as the liability held by most organizations that hold accounts with banks reduced owing to the aforesaid economic challenges.

When the Finance Minister updated the nation in July 2019, the stock of external debt at end-June 2019 was US\$10.23 billion. The stock has since increased to US\$11.2 billion as at end-December 2019 (IMF 2020). This was on account of new disbursements on existing loans mostly earmarked for infrastructure development. The stock of Government securities at end-2019 was K80.2 billion from K60.3 billion at end-June 2019 (BOZ 2020). The increase is explained by the issuance of Government securities to finance the budget deficit for 2019. The stock of domestic arrears, excluding VAT, amounted to K26.2 billion at end-September 2019 from K20.2 billion at end June 2019 (Economic Times 2020).

It is clear from the above levels of borrowing that government has had liquidity challenges as at end of year 2019 before Covid-19. With the onset of Covid 19, the financial pressure experienced by the country remains extreme considering that the government needs to pay its first Euro Bond instalment in 2022. The government foresees some challenges in fully paying this debt and thus they have engaged an international consultant to assist in restructuring this debt. It is critical that this debt is paid or successfully restructured as it might have a serious impact on the credit rating on the country should there be default. This might in turn reduce investor confidence and thus negatively affecting bank liquidity emanating from reduced money in circulation.

This paper examines the combined effects of capital adequacy, customer deposit base and return on assets on liquidity creation in the banking sector of Zambia with a view of developing a Macro Liquidity Pressure Testing Model that simultaneously applies the three variables. It is expected that the Liquidity Pressure Testing Macro Model will assist regulatory bodies to come up with appropriate interventions during a liquidity crisis like the one caused by the Covid-19 where there have been limitations in money in circulation owing to reduced business activities arising from the effects of the Pandemic. The Liquidity Pressure Testing Macro Model is thus a critical tool that the Central Bank can use to manage liquidity in the industry by way of policy formulation especially given the high number of banks being regulated.

2.0 LITERATURE REVIEW

Liquidity creation is an essential service that banks provide to the economy. The theoretical literature regarding the impact of bank market power on liquidity creation suggests two opposing hypotheses. The “fragility channel” view by Petersen and Rajan (1995) who argue that increased competition reduces credit supply, as banks are less likely to grant credit to clients. The idea is that decreased market power reduces incentives for banks to establish long-term relationships with new borrowers, or relationships that could create future surpluses to be shared. Banks’ propensity to lend and invest in information production may be more limited in competitive environments because competition reduces the possibility that banks can recoup the costs involved in building and nurturing long-term relationships with borrowers.

The second hypothesis, the “price channel” view by Boot and Thakor (2000), suggests that increased competition influences bank pricing policies, leading to diminished loan rates and increased deposit rates. As a consequence, demand for both loans and deposits rise. The more dominant view suggests that competition tends to be associated with lower loan rates, which makes credit more affordable and increases lending and access to finance. More broadly, this view argues that competition promotes credit availability. Several studies provide empirical support for a link between competition and low lending rates (Pería, 2015). Liquidity creation follows what financial intermediation assumes: that banks traditional and core business is to “borrow short and lend long”, so they gather deposits and then lend these out.

Berger and Bouwman (2009) report two opposing hypotheses on the link between capital and liquidity creation. “The financial fragility-crowding out” theory states that higher capital reduces liquidity creation. Contrary, the “risk absorption” theories state that higher capital increases liquidity creation. For instance, Casu (2016) finds that higher capital requirements may result in reduced liquidity creation in the Eurozone. Similarly, Horváth (2014) find Czech banks have a negative and significant relationship between liquidity creation and capital. Furthermore, Distinguin (2013) find similar results when analysing commercial banks in 14 Asia-Pacific economies and a sample containing African and US banks, respectively.

2.1 Bank-Specific Determinants of Liquidity

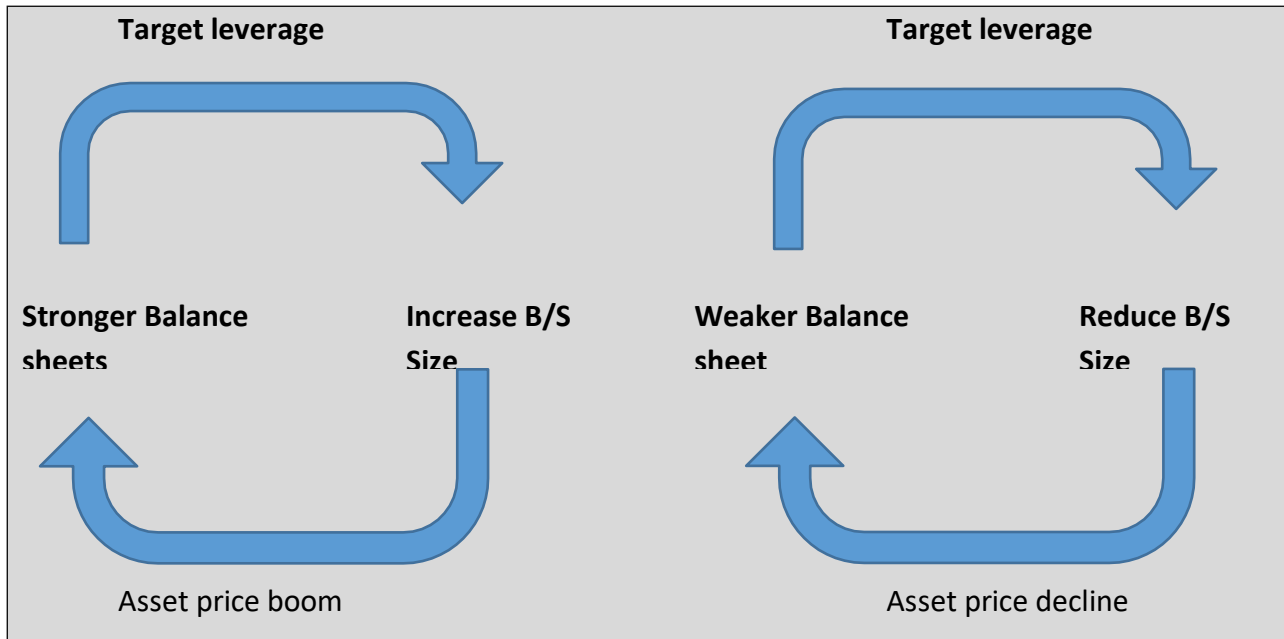
The studies which were conducted either to explore the main factors of liquidity risk, or to find out why bank is more liquid or less liquid than another, did not lead to the same explanatory factors. Boner and Eijffinger (2016) showed also that the most capitalized banks, with high capital adequacy, have low exposure to liquidity risk. De Young et al. (2013), Lee (2005), Murnane and Willet (2010), Galati and Moessner (2013), showed that the most successful banks are those that keep a high level of capital relative to their assets.

2.2 Industry-Specific Determinants of Liquidity

Another strand of literature emphasizes the importance of market structure and bank specific variables in explaining performance heterogeneities across banks. This literature is based on the structure-conduct-performance (SCP) paradigm and is also applicable to contestable markets, firm-level efficiency, and the roles of ownership and governance in explaining bank performance (Berger, and Bouman, 2017)

Extensive empirical evidence does not provide conclusive proof that bank performance and liquidity is influenced either by concentrated market structures and collusive price setting behavior or superior management and production techniques. Bank efficiency levels vary widely across banking sectors (Acharya and Mora, 2007). While some studies have questioned the relationship between bank ownership status and market power to profitability and analysis of other determinants to liquidity or not, there is contrasting evidence on the role of market power on bank performance, El-katiri (2016).

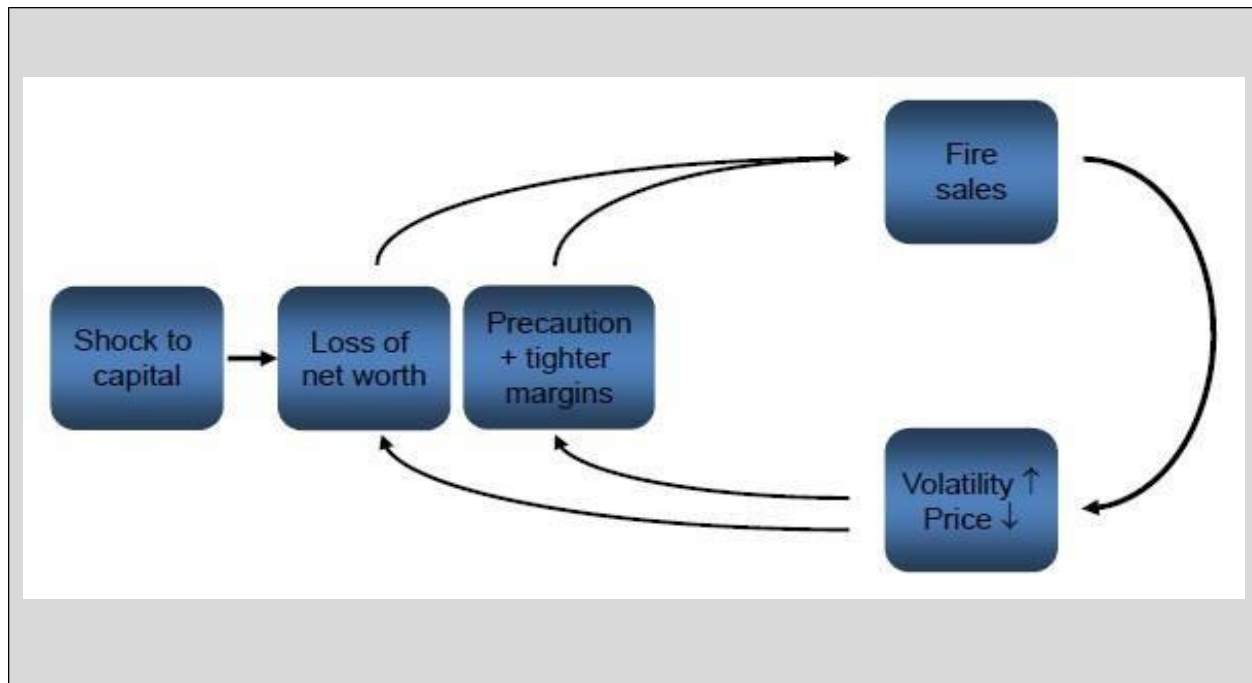
Figure 1: Liquidity spiral I



Source: Adrian and Shin (2008)

Liquidity spirals are categorized by Brunnermeier and Oehmke (2013) into two effects that are said to exacerbate the initial credit problem. The first is the loss spiral, which is shown by the outer circle of Figure 1. This is triggered by the decrease in asset prices as a result of forced selling resulting in the erosion of capital. The second is the margin spiral, which is shown in the inner circle in Figure 1. The margin spiral is the result of increased volatility during a crisis (Lewis, 2017).

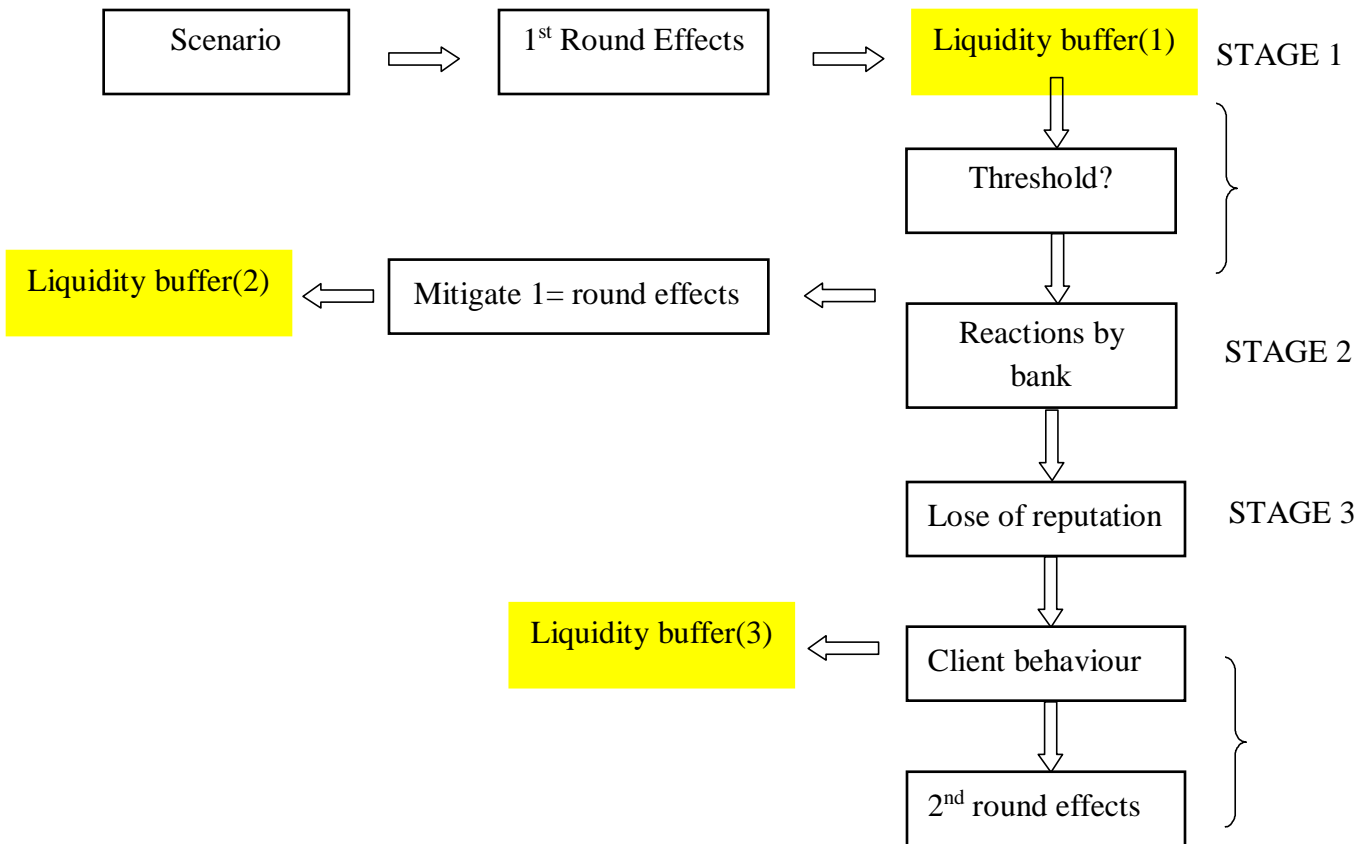
Figure 2: Liquidity spiral II



Source: Brunnermeier and Oehmke (2013).

In stylized form the Liquidity Stress-Tester model can be represented by Figure 1. Banks' liquidity profiles are modelled in three stages: after the first-round effects of a scenario, after the mitigating actions of the banks and after the second-round effects. In each stage, the model generates distributions of liquidity buffers (including tail outcomes and probabilities of a liquidity shortfall) by bank. The scenario horizon is set at six months but the model is flexible to extend it.

Figure 3: Flow Chart of Liquidity Stress-Tester



Source: Authors, Sikanda, Mpundu and Kapasa (2020)

While Liquidity Stress-Tester is a top-down model, it is run with bank level data. In case of the Zambian banks, the liquidity positions (both liquid stocks or non-calendar items and cash flows or calendar items) that are available from various Zambian banks liquidity reports on a monthly basis are used.

2.3 Theory Adopted for the Study

Of the stated theories shift ability theory is more applicable for explaining bank liquidity as it is easy for banks to liquidate assets through the secondary market Scanhel (2015). It is thus safer for banks to invest in instruments such as treasury bills as they can easily be liquidated to cover for liquidity shocks. The above said, the shiftability theory is more applicable for Banks as it helps them react more quickly to liquidity issues when they arise.

3.0 METHODOLOGY

There are three research approaches available in the social sciences: quantitative, qualitative, and mixed methods. In the quantitative approach data are collected in form of quantification (numbers) using standardized measurements and can be subjected to statistical analysis. In

the qualitative approach data are collected in form of words, images, pictures or movies. The interpretation of the data or the meanings attached to the data might vary from person to person on account of people's different experiences with reality. This entails that the researcher is interested in both the objective reality and the subjective reality. The current study employed the quantitative approach.

The data of this study consisted of all commercial banks in Zambia from 2008 to 2018.

Data were collected from financial reports submitted to the Bank of Zambia. The nature of the data was quantitative.

Multiple regression model

The study also used correlation analysis.

The model used for this study is thus shown below:

$$ROA = \beta_0 + \beta_1 LTAR + \beta_2 FS + \varepsilon \quad (1)$$

$$ROE = \beta_0 + \beta_1 LDR + \beta_2 LTAR + \beta_3 FS + \varepsilon \quad (2)$$

Where:

ROA = Return on Assets which represents banks profitability in equation 1,

ROE = Return on Equity which represents banks profitability in equation 2,

LDR = Loan to Deposits ratio as a measure of banks liquidity,

LTAR = Loan to Total Assets ratio as a measure of banks liquidity,

FS = Firm size, which is measured by log of total assets,

β_0 is a constant;

β_1, β_2 and β_3 are coefficients

ε = error term

Hypothesis

H_0 = Return on assets has no effect on Liquidity creation

H_1 = Return on assets has an effect on Liquidity creation

And

H_0 = Return on equity has no impact on Liquidity creation

H_1 = Return on equity has an impact on Liquidity creation

All data are analyzed and tested at 5% level of significance. Hence, if the p-value of the statistics is less than the significant level that is being tested, the Null hypothesis is rejected; if otherwise, it is accepted.

The multiple regression model used to establish the determinants of liquidity risk was of the specific form:

$$LDR = \alpha + \beta_1 CAR + \beta_2 LAR + \beta_3 OWNT + \beta_4 SIZE + \beta_5 LEV + \varepsilon$$

Where LDR = Loan to deposits ratio.

CAR = Capital adequacy ratio

LAR Liquid assets ratio

OWNT = Ownership type

SIZE = Bank size measured by total assets and

LEV = Leverage

α = constant

$\beta_1, \beta_2 \dots$ coefficients

ε = error term

Table 1: Operationalization of Variables

Variable	Measurement
Dependent: Loan to deposit ratio (LDR)	Total loans and advances divided by total customers deposit
Independent	
Capital adequacy ratio (CAR)	Core capital divided by total customer deposits.
Liquid assets ratio (LAR)	Liquid assets (cash and cash equivalents) divided by the total assets.
Ownership type (OWNT)	Zero if bank is locally owned (not a subsidiary of a foreign bank) and one if bank is foreign owned (subsidiary of a foreign bank).
Leverage	Total shareholders fund divided by total assets
Size	End of year total assets for the bank

Source: Authors, Sikanda, Mpundu and Kapasa (2020)

4.0 RESULTS AND DISCUSSION

4.1 Descriptive statistics

Table 2 presents information regarding descriptive statistics following preliminary analysis of the data.

Table 2: Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
	Statistic	Statistic	Statistic	Statistic	Statistic
ROE	40	.0927	.10487	0.0115	0.0955
LDR	40	.5962	.17927	0.1095	0.9661
LTAR	40	.4150	.10146	0.2949	0.5545
FS	40	10.8094	.70536		
ROA	40	.0195	.02491	0.0022	0.09550
Valid N (Listwise)	40				

The profitability ratios as measured by Return on Assets (ROA) and Return on Equity (ROE) have a mean of 0.0195 and 0.0927 respectively. The liquidity ratios as measured by Loan to Deposit ratio (LDR) and Loan to Total Assets ratio showed a mean of 0.5965 and 0.4150 respectively. Similarly, firm size which is the control variable introduced in the regression model showed a mean of 10. 8094. The minimum - maximum value for the profitability ratio are 0.0022 – 0.0955, while the Minimum – maximum value for the liquidity ratios are 0.1095 – 0.9661.

RELATIONSHIP BETWEEN CAPITAL ADEQUACY AND LIQUIDITY CREATION IN THE BANKING SECTOR OF ZAMBIA

Test of Hypothesis

Hypothesis 1: Ascertain the relationship between capital adequacy and liquidity creation in the banking sector of Zambia.

Table 3: Model Summary for equation 1: ROA

R	R ²	F test (P - Value)	Coefficients	T – test
0.500	0.207	(0.037)	Constant = 0.176 LDR = 0.111	2.783 2.624
			LTAR = -0.132 FS = - 0.014	-2.518 -2.382

Source: Research Output

In table 3, the coefficient of multiple determination (R² = 0.207 shows that 20.7% of the total variation in banks profitability can be explained by the predictor variables LDR, LTAR and FS. F-test showing the P- values of 0.037 clearly indicates that the three variables under consideration have a significant difference in their mean at 0.05 level of significance.

Table 4: Model Summary for equation 2

R	R ²	F test (P - Value)	Coefficients	T – test
0.500	0.204	(0.040)	Constant = 0.811 LDR = 0.036 LTAR = 0.017 FS = - 0.069	3.043 0.204 0.057 2.053

Source: Research Output

From the Table 4, R=0.500 shows that the variables under consideration have a moderate relationship. R Square = 0.204 shows that 20.4% of the total variation in ROE can only be explained by LDR, LTAR and FS. F-test showing the P-values is 0.040 which clearly indicates that the three variables under consideration have a significant difference in their mean at 0.05 level of significance.

Table 5: Correlation Analysis

Variables	Correlation Values				P values		
	ROE	LDR	LTAR	FS			
LDR	-0.039				0.407		
LTAR	0.046	0.848			0.385	0.000	
FS	-0.445	0.246	0.050		0.220	0.061	0.380
ROA		-0.075	-0.085	-0.223	0.328	0.300	0.831
LDR			0.848	0.246	0.00	0.831	
LTAR				0.050	0.380		

Source: Research Output

Table 5, depicts the partial correlation among all the variables when other variables are held constant. ROE/LDR and ROA/LDR shows a negative relationship with correlation values of -0.039 and -0.075 respectively.

Hypothesis 2: There is a significant relationship between Capital Adequacy and Liquidity Creation.

Table 6: Correlation Result 1

Variables	Correlation Value	Coefficients
CA/LC	0.075	0.111

The multiple linear Regression equation is given by:

$$LC = 0.176 + 0.111$$

$$CA + 0.132$$

$$LTAR + 0.014FS$$

From table 6. there is a significant relationship between Capital Adequacy and Loan Creation loan

Table 7: Results of the Estimated Model

	UC		SC	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.073	.017		-4.182	.000
Liquidity management	.029	.004	.592	7.439***	.000
Capital Adequacy	.008	.050	.013	.161	.873
a. Dependent Variable: Financial Performance (ROA)					

Source: Research Output

Note: *Significant at 5% level.** UC = Unstandardized Coefficients, SC = Standardized Coefficients.

The results indicate that customer deposit base and capital adequacy have a positive and significant effect on financial performance (t-values (3.371), $p < 0.001$). Capital adequacy has a positive but statistically less effect.

Hypothesis 3: There is a significant relationship between customer deposit base (Market Power) and Liquidity Creation.

Table 8: Correlation Result 2

Variables		Correlation Value	Coefficients
CDB/LC		0.056	0.017

Source: Research Output

From the results there is a significant relationship between customer deposit base and liquidity creation.

The results indicate that customer deposit base and capital adequacy has a positive and significant effect on financial performance (t-values (3.371), $p < 0.001$). However, capital adequacy has a positive but statistically lesser effect. This shows that though both customer deposit base and capital adequacy have a positive effect on liquidity, customer deposit base is crucial. The constant term = -0.073. This implies that if customer deposit is zero, liquidity creation of commercial banks would be -0.073. This implies that if customer deposit base of the commercial banks in Zambia is zero, then the financial performance of the institutions would reduce by 7.3%. A unit increase in customer deposit base would lead to an increase in ROA by 0.029 while a unit increase in capital adequacy would lead to rise in ROA by 0.008.

CONCLUSION

The results showed that over the study period, there were fluctuations in liquidity creation while customer deposits and capital adequacy registered a steady growth. The above results are well aligned with the selected theory called Shift ability that states that liquidity management is best achieved by investing in assets that can be easily liquidated when in a liquidity crisis. This is true as most of the banks in Zambia invest in Treasury Bills and Interbank for assets meant for liquidity management. The study found a statistically significant positive relationship between liquidity management and financial performance of banks in Zambia. This implies that an improvement in liquidity management leads to a rise in financial performance. Furthermore, the study showed that liquidity management accounts for 34% of the variability in financial performance of the commercial banks. Therefore, liquidity management is a very important aspect of bank management

The study showed that an increase in liquidity management leads to an increase in financial performance. Second, liquidity management is a very important aspect of bank management. Based on these conclusions, the study has proposed the introduction of a Liquidity Pressure Testing Macro Model for testing the financial system as a whole. Such tests, with regard to

liquidity risk, can enhance insight into the systemic dimensions of liquidity risk. These exercises can also contribute to market participants' awareness of systemic risks.

The macro pressure-testing model can be looked at as an instrument of central banks and supervisory authorities to assess the impact of market-wide scenarios and possible second round effects. It critically reviews the state of the art in macro stress testing, assessing its strengths and weaknesses. It also reviews additional side benefits, stemming largely from the way such tests can discipline thinking about financial stability and suggests possible ways to improve their performance.

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