



INFLUENCE OF CAPITAL ADEQUACY REQUIREMENT REVIEWS ON COMMERCIAL BANKS' FINANCIAL PERFORMANCE IN TANZANIA

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ABSTRACT

Tanzania has undergone various amendments in capital adequacy regulations and policies at various time periods, such as in 1998, 2008, and 2014. However, despite these reviews, some banks have shown good performance while others have collapsed and merged with other strong banks. This study, therefore, aimed at assessing the influence of reviews of capital adequacy requirements on the financial performance of commercial banks in Tanzania. To achieve the main objective, the study specifically intended to analyse the extent to which commercial banks in Tanzania complied with capital adequacy requirements amendments, and compare the effect of capital adequacy requirements reviews on the financial performance of commercial banks in Tanzania before and after regulatory reviews. Panel secondary data were collected for only 24 sampled commercial banks out of 36 targeted banks. Data obtained from the study were descriptively analysed and inferentially using a random effect regression model. Results from the field reveal that, after regulatory amendments on capital requirements in 2014, Tier I, Tier II, GDP, and SIZE were observed to have a higher significant influence on the financial performance (ROE and saving mobilisation) of selected banks in Tanzania as compared to the period before capital requirements reviews. The study concludes that high compliance with capital adequacy requirements helps banks to improve their financial performance. Therefore, the study recommends that banks should further diversify their income sources to ensure that they hold more capital adequacy.

Keywords: Capital adequacy, Return on equity, Saving mobilisation, Commercial banks, Random effect.

Paper type: Research paper

Type of Review: Peer Review

1. Introduction

In the World over, banks play a significant role in contributing to economic growth by facilitating monetary and fiscal policies through the provision of financial resources to production sectors in the form of deposits, savings, and loans (Okoye, Ikechukwu, Lwonaard, Chinyere and Christian, 2017; Masood and Ansari, 2016). In order to maintain optimal performance, banks need to adhere to capital adequacy requirements (Kale, Eken and Selimler, 2015). The concept of capital adequacy necessitates that financial institutions hold sufficient capital to protect against bank collapse, mitigate unforeseen losses, and instill confidence and trust among stakeholders regarding the banks' operations (Musyoka, 2017). The Basel Committee on Banking Supervision has issued the Banking Supervision Accords, which set a minimum of 4.5% and 8.0%



of core capital and total capital to total weighted risk assets, respectively, along with a minimum liquidity ratio of not less than 20% of its liabilities. These requirements aim to promote stability and prevent banks from insolvency (Basel, 2013). Capital adequacy requirements have become a critical subject of discussion due to their vital role in the banking sector, where banks with sufficient capital can weather periods of insufficient returns.

Banks' performance is commonly measured using various indicators, including qualitative and quantitative measures (Kori et al., 2020). In this study, quantitative measures were preferred as financial indicators offer precise information to facilitate informed decisions by investors (Kijewska, 2016). The study utilises financial return on equity (ROE) and Saving Mobilisation Ratio (SMR) as performance measures for Tanzania's commercial banks. ROE reflects the income generated from ordinary shares invested, while SMR assesses the banks' ability to mobilise deposits. Given the crucial role of banks in the economy, regulatory bodies maintain strict standards to ensure the stability and soundness of banks (Chortareas et al., 2012). Governments closely monitor banks' performance, recognising the potential impact of their failure on the country's economy. As such, capital adequacy regulations are subject to regular scrutiny and enforcement (Chakrabarty, 2013). Banks that fail to comply with these regulations face penalties commensurate with the severity of their non-compliance.

The Bank of Tanzania (BOT) has taken measures to enhance the stability, efficiency, and performance of financial institutions, including commercial banks. Notably, the BOT reviewed capital adequacy regulations in 2008 and 2014, resulting in increased minimum core capital (Tier I) and total capital ratio (Tier II) requirements, as well as enhanced regulatory reserves and minimum required capital amounts. These reviews have had mixed consequences, benefiting some banks while not providing the same advantages to others. For instance, large banks such as CRDB, Exim, NBC, Diamond Trust Bank, Standard Chartered, Barclays, NMB, and Stanbic experienced notable improvements in profitability, total deposits, total assets, number of ATMs, branches, and liquidity value as a result of the reviews (BoT, 2018). On the other hand, some banks in Tanzania have shown unsatisfactory performance, particularly smaller banks, which reported declining profits and losses. For instance, Return on Assets (ROA) declined to 2.49% from 2014 to 2015 and further to 2.09% from 2015 to 2016, while Return on Equity (ROE) declined to 12.16% from 2014 to 2015 and to 9.26% from 2015 to 2016 (BoT, 2016). Moreover, net profit decreased from TZS 438 billion in 2014 to TZS 423 billion in 2015 and further declined to TZS 286 billion in 2016. The capital adequacy amendments in 2014 also had adverse effects on some banks, leading to the closure of five banks for failure to meet the requirements, while others merged their assets and liabilities with stronger existing banks. Twiga Bancorp, for example, was amalgamated with Tanzania Postal Bank, and Bank M merged with Azania Bank (BoT, 2018).

It remains uncertain whether the observed performance of banks, both positive and negative, is a direct result of the BoT's amendments to capital adequacy requirements or if there are other contributing factors. Therefore, this study aims to address this empirical gap by assessing the influence of capital adequacy requirements reviews on the financial performance of commercial banks in Tanzania. To achieve this objective, the study specifically intended to analyse the extent to which commercial banks in Tanzania complied with capital adequacy requirement amendments, and compare the effect of capital adequacy requirements reviews on the financial performance of commercial banks in Tanzania before and after regulatory requirements reviews in Tanzania.

2. Literature Review

The review of the related literatures is organised under the following sub-heading:

2.1 Guiding Theory

This study was guided by the capital buffer theory, as proposed by Rob and Calem (1996). The theory posits that when banks approach the minimum required capital threshold, they should promptly increase their capital to ensure they are on a safe footing and mitigate risks arising from potential violations of statutory capital requirements, which could adversely impact profits. Almazari and Alamri (2017) further support

this theory, suggesting that banks with a high capital buffer (above the minimum required) are better positioned to seize emerging investment opportunities, expand their branch network, and withstand shocks from risks. As a result, such banks may experience fluctuations in their capital adequacy ratios. Therefore, the theory recommends that banks maintain a buffer of capital above the minimum required (Von Thadden, 2004). Additionally, Berger and Udell (2006) observe that banks with ample capital may also invest in shares of other companies, government bonds, and financial institutions. The capital buffer theory is highly relevant to this study because the Bank of Tanzania (BOT) regulates commercial banks, requiring them to hold a minimum prescribed capital to avoid penalties and the risk of bank failure while enhancing bank stability and profitability. Failure to comply with capital requirements may result in more severe consequences, such as higher penalties, suspension of banking operations, or restricted services. By maintaining a capital buffer above the minimum required, banks can instill confidence and trust in their customers.

2.2 Capital Adequacy Requirements and Financial Performance of Commercial Banks

Okoye et al. (2017) and Nyawira et al. (2017) conducted research examining the relationship between capital requirements and the performance of commercial banks in Nigeria and Kenya, respectively. They observed that higher capital requirements significantly contributed to improved profits of the banks in the aforementioned countries. Another study by Siliban (2017) noted that amendments made to capital regulations significantly influenced an increase in bank returns in Indonesia. However, studies by Musyoka (2017) and Ndolo (2017) found that capital requirements positively influenced the performance of banks, but the relationship was not statistically significant. They argued that excessively strict minimum capital requirements exposed banks to a high risk of opportunity cost. According to Almazari and Alamri (2017), higher capital levels enable banks to be more stable and efficient, and explore profitable emerging investment opportunities. Well-capitalised banks can open more branches, agencies, Automatic Teller Machines (ATMs), and are better protected against risk shocks. A study conducted by Olalekan and Adeyinka (2013) on the influence of capital requirements on the performance of deposit-taking banks in Nigeria, using questionnaire distributed to a sample of 518 bank staff, showed that reviews of capital requirements significantly improved banks' profitability in Nigeria. Their findings and arguments are supported by Chan and Vong (2010), Dietrich and Wanzenried (2009), and Athanasoglou et al. (2006), who similarly observed a positive and significant relationship between measures of capital requirements and banks' profitability.

Another study by Igbiosa et al. (2017) aimed to determine the impact of financial regulation on the performance of the banking sector in Nigeria. The study collected time series data from 1993 to 2014 and analysed them using Johansson co-integration and error correction model (ECM) statistical techniques. The study revealed that Nigerian banks had low compliance with financial regulations, evidenced by low capital adequacy and high non-performing loans (NPL). A study by Kale et al. (2015) conducted from 1997 to 2013 in Turkish banks found that having tighter restrictions, policies, regulations, and conditions on banks' operations positively impacted banks' efficiency and stability. A study by Hellmann and Murdock (2000) noted that financial performance of banks improved significantly after banks achieved compliance with capital adequacy regulations. Their study suggested that banks should not overly rely on running their institutional activities, as doing so increases debts in the bank's capital structure and raises the financial risk and the risk of bankruptcy.

Previous literature including Okay et al. (2017), Nyawira et al. (2017), and Olalekan and Adeyinka (2013) show that capital adequacy requirements significantly and positively influence bank financial performance, while on the other hand, studies including the study by Musyoka (2017) and Ndolo (2017) have observed a positive but insignificant relationship between the variables. It is still unclear in Tanzania whether the reviews made have a significant or insignificant contribution to the performance of banks, or if they are simply for compliance purposes. Most of the reviewed studies including the study by Okay et al. (2017) and Musyoka (2017) have focused solely on the effect of capital regulations on bank performance using a single period of time, without examining how capital adequacy requirements affected bank performance before reviews were made. Additionally, the majority of these studies were conducted outside of Tanzania,

and generalising their results to Tanzania might not provide a clear picture due to differences in financial regulations, guidelines, and policies. The few studies conducted in Tanzania on the banking sector, such as those by Pastory and Marobhe (2015), Ally (2014), Tiisekwa (2013), and Pastory and Qin (2012), did not concentrate on capital adequacy requirements. Only a study by Lotto (2018) intended to investigate whether capital requirement regulations improved banks' operating efficiency in Tanzania from 2009 to 2015. Furthermore, with the collapse of some banks in Tanzania and the merger of others with strong banks in 2018 due to failure to fulfill the reviewed capital regulations, the importance of conducting this study was evident. Based on the identified gaps in previous studies, this study was intended to fill these gaps by assessing the influence of capital adequacy requirements reviews on the financial performance of commercial banks in Tanzania before and after regulatory reviews, utilising a panel research design spanning twelve years from 2008 to 2019.

3. Methodology

This research was carried out in Dar es Salaam region in Tanzania, where the headquarters of most banks are located. The region was chosen due to its convenience and guarantee of obtaining relevant data from many registered banks, which may not be available in other regions in the country (BoT, 2018). The study employed a panel research design as the data were in the form of panel data covering 24 commercial banks over a period of 12 years (2008-2019). This design was chosen because of its strengths in analysing trends based on secondary panel data (Alanazi and Liu, 2013). Additionally, the design facilitated the comparison of the influence of capital requirements reviews on commercial banks' performance across the time period. The comparison was necessary to determine whether the performance of banks improved after the reviews, or if the amendments were made solely for compliance purposes.

Secondary data were collected from banks' financial statements and organised into a panel format. The panel secondary data were obtained through individual banks' websites, while other data were sourced from the Bank of Tanzania (BoT) website and through physical visits to individual banks to obtain any missing data. A sample of 24 commercial banks, with a history of more than 12 years of existence from 2008 to 2019, was purposively chosen from a target population of thirty-six banks, resulting in a total of 288 observations. The year 2008 was selected as the base year for obtaining the sample size of banks, as significant amendments in bank regulations, including capital adequacy regulations, were made in Tanzania during this period. Therefore, a sample of 24 commercial banks were purposively selected, based on the criteria of being in existence from 2008 up to the period of this study. Descriptive analysis was used to analyse specific objective one of this article, while specific objective two was analysed using random effect regression, and the p-values were compared across the time period.

3.1 Operationalisation of Research Variables

All the variables in this study, including the dependent, independent and control variables were operationalised as shown on Table 1.

Table 1: Operationalisation of Research Variables

Variable	Nature	Operationalisation	Measurement
CCRW (Tier I)	Independent	The ratio of core capital to risk weighted assets	Ratio
TCRW (Tier II)	Independent	The ratio of total capital to risk weighted assets	Ratio
GLTD	Independent	The ratio of total loan to total deposit;	Ratio
RRTD	Independent	The ratio of regulatory reserve to total deposits	Ratio
Return on Equity (ROE)	Dependent	The ratio of Net Income to total equity	Ratio
Saving Mobilisation Ratio (SMR)	Dependent	The ratio of customers' deposits to total liabilities	Ratio
IFN	Control	Annual inflation rate (%) of a country	Ratio
GDP	Control	Annual GDP growth rate (%) of a country,	Ratio
SIZ	Control	Logarithm of total assets of a bank	Ratio

Source: Author and Literature Review (2020)

3.2 Diagnostic Tests

The study conducted various diagnostic tests including normality, multicollinearity, heteroscedasticity, Hausman test and test for outliers. Kolmogorov-Smirnov test for normality as shown in Table 2 was conducted at a level of 1%, and found that since the p-values are larger than 1% significance level; the result implies that all variables are normally distributed. The normality test was conducted in order to check whether data are normally distributed or not.

Table 2: Kolmogorov-Smirnov test of Normality

Variables	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	Observation	Sig.	Statistic	Observation	Sig.
CCRW	0.169	288	0.124	0.931	288	0.107
TCRW	0.194	288	0.236	0.872	288	0.208
GLTD	0.185	288	0.158	0.860	288	0.227
RRTD	0.175	288	0.243	0.971	288	0.312
INF	0.306	288	0.506	0.784	288	0.104
GDP	0.207	288	0.143	0.890	288	0.118
SIZ	0.141	288	0.135	0.920	288	0.156

Source: Survey Data (2020)

Multicollinearity situation was checked using tolerance values and Variance Inflation Factor (VIF) = $\left(\frac{1}{1-r^2}\right)$ whereby r^2 is the coefficient of determination of explanatory variables. VIF and tolerance tests were conducted in order to determine whether there is a problem of multicollinearity among the collected data. In this method, VIF values > 10 and tolerance less than 0.1 signal the presence of multicollinearity as also suggested by Kori et al. (2020). The VIF for all variables in either ROE/SMR were less than 10 while the tolerance for all variables in either ROE/SMR were greater than 0.1 indicating that the study variables did not have the problem of multicollinearity (Table 3). The same approach was also used in the study by Lotto (2018) and Lotto and Mwemezi (2016) who performed the same test and found that the collected data did not have the problem of multicollinearity.

Table 3: Variance Inflation Factor Test of Multicollinearity

Variables	ROE		SMR	
	Tolerance	VIF	Tolerance	VIF
CCRW	0.164	6.078	0.303	3.324
TCRW	0.205	4.917	0.204	3.622
GLTD	0.152	4.581	0.615	5.931
RRTD	0.330	5.492	0.643	6.128
INF	0.408	3.276	0.231	3.886
GDP	0.207	4.297	0.319	6.319
SIZ	0.407	6.704	0.137	4.097

Source: Survey Data (2020)

The heteroscedasticity was tested using the Levene's test, as recommended by Nordstokke and Zumbo (2010). To determine the most appropriate model for the study between fixed and random effect models, the Hausman test was conducted. In the Hausman test, the null hypothesis was that "the preferred model is not random effects," as advocated by Greene (2008). The Hausman test assesses whether the unique errors are correlated with the regressors; the null hypothesis was that they are not correlated. If the probability of the chi-squared value in the Hausman test output was less than 0.05, the fixed effects model was preferred; otherwise, the random effects model was preferable. Upon conducting the Hausman test, the probability for the chi-squared value was as follows: Hausmann test chi2 ROE (12.97; p-value = 0.0729) and for SMR, the results showed: Hausmann test chi2 14.10; p-value = 0.3414). In both cases, the p-value (probability) is greater than 0.05, as shown in Table 4. The results of the Hausman test for ROE and SMR, as seen in Table 4, indicate that the p-values were both larger than 5%. Therefore, there were sufficient grounds to reject the null hypothesis that the preferred model was not random, hence, accepting the alternative hypothesis that the preferred model was the random effects model. Thus, this study employed the random-effects

regression model. The study did not opt for the OLS (Ordinary Least Squares) test because all the requirements for random effects were met at the earlier stage, as also proposed by Lotto (2018) and Lotto and Mwemezi (2016), who also settled on the fixed effects regression model after obtaining a probability of the chi-squared value in the Hausman test output being less than 0.05.

Table 4: Hausman Fixed Random Test Results

Coefficients	ROE			SMR		
	(b) fixed	(B) random	(b-B) Difference	(b) fixed	(B) random	(b-B) Difference
CCRW	-0.0706	-0.3953	0.3247	-0.0355	-0.0431	0.0076
TCRW	0.1975	0.3425	-0.1450	0.9351	2.7961	-1.8610
GLTD	-0.3650	-0.0119	-0.3531	1.3210	-0.0722	1.3932
RRTD	-0.2976	-1.6984	1.4008	-0.4225	-0.4211	-0.0014
INF	0.5642	0.0167	0.5475	0.8093	1.0861	-0.2768
GDP	0.0161	0.1372	-0.1211	1.8765	0.5512	1.3253
SIZ	0.9071	0.1720	0.7351	2.9736	0.8621	2.1115
R-square	0.8425	0.7561		0.8615	0.4292	
adjustedR ²	0.7980	0.7521		0.8268	0.4191	
F-statistic	19.563	54.8		15.32	39.15	
Prob(F-statistic)	0.0016	0.0000		0.0000	0.0000	

b=consistent under HO; and H1; obtained from a regression command (xtreg)

B=inconsistent under (H1), efficient under (HO); obtained from regression command (xtreg)

Ch2 (7) = (b-B) [(V_b-V_B)-1] (b-B)

Chi2 (7) =12.97, P-value=0.0729for ROE and chi2 (7) =14.10, P-value=0.3414 for SMR

Random effect regression model was developed and specified as follows:

$$Y_{ij} = \beta_0 + \sum_{i=1}^n \beta_i X_i + \mu + \mu_j + \epsilon_{ij}.$$

Where:

Y_{ij} = Dependent variables (ROE/SMR), ROE= total net income divides by total equity and SMR= total deposits divide by total liabilities

X_i = whereby ($i = 1, 2, \dots, n$) are independent variables: β_i = whereby ($i= 0, 1, 2, \dots, n$) are regression coefficients

ϵ_{ij} = whereby ($i= 0, 1, 2, \dots, n$ and $j = 1, 2, 3, \dots, m$) error terms with distribution $\epsilon_{ij} | \mu_j \sim (0, \sigma_\epsilon^2)$

β_0 = constant terms: $Y_{ij} = \mu + \mu_j + \epsilon_{ij}$

Whereby μ_j is the random variability with the distribution that follows $\mu_j \sim (0, \sigma_\mu^2)$

4. Findings and Discussion

Descriptive statistics was used to analyse the compliance level of commercial banks on capital adequacy requirements before and after regulatory reviews so as to know in which time periods commercial banks complied well with capital adequacy reviews. This study compared the influence of capital adequacy requirements on financial performance of commercial banks before and after regulatory reviews using random effect regression model. This was done purposely in order establish time period in which capital adequacy reviews had more influence. Tables 5, 6 and 7 illustrate the findings of the study.

4.1 Compliance Level on Capital Adequacy Requirements before and after Regulatory Reviews

In order to know the exactly period in which commercial banks complied well with the regulatory requirements reviews between the period before and/or after, the mean, minimum and maximum values for each time period were computed. Table 5 illustrates the study findings.

Table 5: Capital adequacy requirements before and after regulatory reviews

Var	Before regulatory reviews (2008-2013)					After regulatory reviews (2014-2019)				
	Obs	Mean	Min	Max	BOT std	Obs	Mean	Min	Max	BOT std
CAPA	144	31.85	5.0	421.8	5/=bill	144	56.45	8.9	711.2	15/=bill
CCRW	144	20.95	7.3	64.02	10.0	144	23.16	7.0	50.97	12.5
TCRW	144	24.55	9.37	66.08	12.0	144	25.44	7.5	56.32	14.5
GLTD	144	55.63	23.7	85.16	20.0	144	63.21	24.1	85.24	20.0
RRTD	144	13.74	1.93	48.19	5.0	144	12.80	5.21	46.32	7.0

Source: Survey data (2020)

Key: CAPA- Capitalisation amount in TZS billions; CCRW-core capital divide by risk weighted assets; TCRW- Total capital divide by risk weighted asset ratio, GLTD-The Gross loan divide by total deposit, and RRTD-regulatory reserve divide by total deposits.

The findings presented in Table 5 highlight a difference in the extent to which banks complied with capital requirements before and after the implementation of new capital regulations. The results indicated a rise in the Capital Adequacy Portfolio Amount (CAPA) from TZS 31.85/= billion to TZS 56.45/= billion following regulatory reviews, with some banks reporting a minimum capital amount of Tanzanian shilling 8.9/= billion. Additionally, the findings reveal an improvement in the Capital-to-Credit Risk Weighted (CCRW) ratio by 2.21%, increasing from 20.59% before reviews to 23.16% after regulatory reviews, although some banks reported CCRW ratios of 7.3% and 7.0%, below the required standard.

Considering the Total Capital Ratio (TCRW), the study found an increase of 0.89%, rising from 24.55% to 25.44% after reviewing capital adequacy requirements. As for the Gross Loan-to-Total Deposit Ratio (GLTD), the findings demonstrate that before regulatory reviews, commercial banks had an average GLTD ratio of 55.63%, while after regulatory reviews, the average GLTD ratio increased to 63.21%, surpassing the levels before regulatory reviews. Throughout both periods, all sampled commercial banks demonstrated higher compliance above the BOT's minimum requirement of 20.0%, implying that these banks had sufficient liquid assets to meet short-term financial obligations when due.

Regarding the Regulatory Reserve Ratio (RRTD), the findings indicate a rise of 0.94%, ranging from 13.74% before to 12.80% after capital regulations reviews. However, it is worth noting that in some years, some banks failed to meet the BOT's minimum requirement of 7.0% for the regulatory reserve ratio. Generally, the results show that the new capital adequacy requirements had a notable impact on the compliance of commercial banks, leading to increased capital amounts and improved ratios for key indicators such as CCRW, TCRW, GLTD, and RRTD. These findings indicate the banks' efforts to align with the regulatory changes and ensure financial stability and prudent risk management.

4.2 Influence of Capital Adequacy Requirements on ROE of Commercial Banks in Tanzania across Time Periods

For the purpose of knowing the time period in which the capital adequacy requirements reviews influenced the ROE performance of banks; the coefficients of each capital adequacy ratio were computed and then their p-values were compared between the two periods (before and after regulatory reviews) and then the decision was based on the score of the p-value that the lower the p-value the higher the ROE performance of commercial banks. Table 6 illustrates the findings

Table 6: Panel Data Regression Results (ROE)

Dependent Variable: ROE						
Method: Random Effect						
Total panel (288 balanced) = 144 observations before and after regulatory reviews						
Before regulatory requirements reviews				After regulatory requirements reviews		
Variable	Coefficient	Std error	p-value	Coefficient	Std error	p-value
CCRW	0.0413	0.0211	0.047**	0.0702	0.0131	0.022**
TCRW	0.1072	0.0134	0.033**	0.1121	0.0201	0.001**
GLTD	0.2032	0.0330	0.042**	-0.0066	0.0017	0.181
RRTD	-0.0281	0.0231	0.610	-0.1154	0.0652	0.082
SIZE	0.1256	0.0081	0.021**	0.2039	0.0851	0.010**
INF	-0.4189	0.2741	0.133	-0.0137	0.0046	0.171
GDP	0.2052	0.0859	0.049**	0.3111	0.1053	0.022**
R-squared	0.8327			0.8639		
Adjusted R-squared	0.8033			0.8403		
F-statistic	24.72			31.24		
Prob (F-statistic)	0.0011			0.0001		
Durbin-Watson stat	2.8728			2.9136		

Source: Survey Data (2020)

Note: **significant at 5% level

ROE-Return on Equity; CCRW-core capital to risk weighted assets ratio; TCRW- Total capital to risk weighted asset ratio; GLTD-The loan-to-deposit ratio; RRTD-regulatory reserve to total deposits ratio; INF-Annual inflation rate (%) of a country; GDP- Annual GDP growth rate (%) of a country, and SIZ- Logarithm of total assets of a bank

The random effect regression results presented in Table 6 indicate coefficients of determination (R-squared) equal to 0.8327 and 0.8639 before and after regulatory reviews, respectively. This suggests that before and after regulatory reviews, 83.27% and 86.39% of the changes in ROE were explained by the independent variables, while the remaining 16.73% and 13.61% were attributed to other factors not included in the regression model, respectively. The p-values of 0.0011 and 0.0001 before and after regulatory reviews, respectively, imply that the model was significant at a 5% level of significance. The Durbin-Watson statistics were used to check for autocorrelation in the data. The results show that the data lie within the bounds of $1.5 < d < 2.5$, indicating the absence of linear autocorrelation and validating the reliability of the data. The results in Table 6 reveal that the variable CCRW positively and significantly influenced ROE at a 5% significant level in both periods, aligning with expectations. Before regulatory reviews, the CCRW ratio had a coefficient of 0.0413 in ROE with a p-value of 0.047, while after regulatory reviews, the ratio had a coefficient of 0.0702 in ROE with a p-value of 0.022. Comparing the two periods, the p-values indicate that after capital requirements reviews, the ROE of commercial banks improved more than in the period before reviews. This implies that the increase in reserves, premiums, retained earnings, surplus, and equity shares after bank regulatory amendments facilitated banks to advance their performance.

Considering the other capital adequacy indicator, TCRW, the findings in Table 6 indicate that the TCRW ratio was positively and statistically significant at a 5% level of significance in all periods, in line with expectations. Before regulatory reviews, the TCRW ratio had a coefficient of 0.1072 in ROE with a p-value of 0.033, while after regulatory reviews, the variable had a ratio coefficient of 0.1121 in ROE with a p-value of 0.0001. Comparing the two periods, the p-values indicate that the ROE of commercial banks improved more after capital requirements reviews. This implies that the higher reserves, premiums, retained earnings, surplus, equity shares, and debts capital, and other borrowings raised by banks after regulatory requirements reviews enabled the banks to improve their profitability further. These findings are supported by studies by Osano and Gekara (2018), Eyo and Offiong (2015), and Pastory & Marobhe (2015) who observed similar results at different time periods. The results in Table 6 indicate that before regulatory requirements review, the variable Loan-to-Deposit Ratio (GLTD) had a positive and significant relationship with ROE with a p-value of 0.042, as expected. However, after regulatory reviews, GLTD had a negative

and insignificant relationship with ROE with a p-value of 0.1810, contrary to expectations. This result suggests that as commercial banks hold a high liquidity ratio, their profitability falls. This is because liquid assets are less risky and do not bear high rates of return. These results differ from those of Pastory and Marobhe (2015) who observed a positive relationship between liquidity and bank profitability.

ROE and the Regulatory Reserve Ratio (RRTD) showed negative and insignificant relationships in both periods with p-values of 0.610 and 0.082 before and after regulatory reviews, respectively. The negative relationship between ROE and RRTD implies that when banks have excess cash reserves with BOT, they miss an opportunity to generate additional returns, which lowers the return on assets and increases the cost of capital. This study aligns with findings by Ndolo (2017) who observed a negative relationship between bank financial performance and the cash reserve ratio. By considering control variables, the findings in Table 6 indicate that the size of the bank and GDP had a positive and significant impact on bank performance in both periods, as anticipated. The p-values for bank size were 0.021 and 0.010, and for GDP, the p-values were 0.049 and 0.022 before and after regulatory reviews, respectively. These p-values suggest that after regulatory reviews, most banks increased their total asset value, thereby improving their profits. These results are similar to the findings by Ongore and Kusa (2013) who found a positive and significant relationship between bank size and profitability. Additionally, the findings show that inflation had a negative and insignificant relationship with ROE.

4.3 Influence of Capital Adequacy Requirements on SMR of Commercial Banks in Tanzania across Time Periods

For the purpose of understanding time period in which the capital adequacy requirements reviews influenced the SMR performance of banks, the coefficients of each capital adequacy ratio were computed and then their p-values were compared between the two periods (before and after regulatory reviews) and then the decision was based on the score of the p-value. That, the lower the p-value the higher the influence on SMR performance of commercial banks. Table 7 illustrates the findings

Table 7: Panel Data Regression Results (SMR)

Dependent Variable: Saving mobilisation ratio (SMR)						
Method: Random Effect						
Total panel (288 balanced)= 144 observations before and after regulatory reviews						
Before regulatory requirements reviews				After regulatory requirements reviews		
Variable	Coefficient	Std error	p-value	Coefficient	Std error	p-value
CCRW	0.0386	0.7062	0.072	1.1031	0.2836	0.044**
TCRW	1.1805	1.0061	0.102	1.2311	0.8602	0.023**
GLTD	-0.0166	0.0045	0.071	-0.0110	0.0032	0.068
RRTD	-0.7162	0.0040	0.211	-0.4072	0.1911	0.071
SIZE	0.0814	0.0302	0.019**	1.3961	1.0051	0.011**
INF	-0.5541	0.1172	0.170	-1.6102	1.0041	0.201
GDP	0.4861	0.0721	0.042**	1.3427	1.1120	0.002**
R-squared	0.8116			0.8401		
Adjusted R-squared	0.7982			0.8009		
F-statistic	21.16			22.53		
Prob (F-statistic)	0.0021			0.0001		
Durbin-Watson stat	2.5821			2.7849		

Note: **significant at 5% level.

Source: Survey data (2020)

The results presented in Table 7 indicate that before regulatory reviews, CCRW and TCRW ratios had positive but insignificant relationships with SMR, with p-values of 0.072 and 0.102, respectively. However, after the regulatory reviews, both CCRW and TCRW ratios positively and significantly influenced SMR of banks. This finding implies that after regulatory reviews, most banks increased their capital adequacy ratios, which helped them mobilise more deposits from customers. The increase in capital enabled banks to

invest in opening more branches, agencies, and ATMs, resulting in higher customer deposits. Regarding the control variables, the findings from Table 7 indicate that the size of the bank had a positive and significant impact on the bank's deposit ratio in both periods, as anticipated. Therefore, banks with higher assets, especially larger ones, had a larger number of deposits, driven by an increase in capital adequacy. The p-values were 0.019 and 0.011 before and after regulatory reviews, respectively. These p-values suggest that after regulatory reviews, most commercial banks increased their total asset value, indicating that banks with more assets generally enjoyed economies of scale.

Another finding shown in Table 7 was related to inflation. The results indicate that inflation had a negative and insignificant relationship with the savings mobilisation ratio. This suggests that higher inflation rates led to lower deposit rates, as customers may have been cautious about depositing or saving more money with banks. Moreover, the variable GDP had a positive and statistically significant impact on the deposit ratio in both periods. The variable GDP had p-values of 0.042 and 0.002 before and after regulatory reviews, respectively. These p-values indicate that after regulatory reviews, the country's economy also experienced growth, resulting in an increase in the number of deposits among banks.

4.4 Implications of the Results on the theories and related Studies

The study was guided by the Capital Buffer Theory, which posits that when banks approach the minimum capital amount, they should take immediate action to improve it in order to reduce the risks associated with violating statutory capital requirements, which could negatively impact their profits. According to the theory, banks with a higher capital buffer (above the minimum required) are better positioned to explore emerging investment opportunities, open more branches, and mitigate risks, leading to improved performance. This situation may result in fluctuations in the capital adequacy ratio. Therefore, the theory suggests that maintaining a buffer of capital above the minimum required is crucial for compliance with capital regulations and enhancing banks' performance.

The study's findings confirmed the relevance of the Capital Buffer Theory, as improvements in core capital and total capital ratios led to statistically significant effects on ROE and SMR. These results align with a study by Lotto (2018) on Tanzanian commercial banks, which also found that high ROE is dependent on the amount of capital held by banks. Additionally, the findings of this study support the results of Osano and Gekara (2018), Eyo and Offiong (2015), and Pastory and Marobhe (2015), which demonstrated a positive and significant influence of capital adequacy ratios on ROE and ROA following regulatory amendments at different periods of time. Therefore, the current study provides statistical evidence to support the relevance of the Capital Buffer Theory in Tanzania.

5. Conclusion and Recommendations

The purpose of this study was to compare how amendments to capital requirements improved the performance of commercial banks in Tanzania before and after regulatory reviews. The study concludes that, after the regulatory reviews, most banks managed to comply well with the new capital requirements, with only a few banks reporting low compliance. Furthermore, the findings indicate a significantly higher relationship between capital adequacy requirements (core capital ratio and total capital ratio) and banks' financial performance, as measured by return on equity and saving Mobilisation ratio, after the capital adequacy reviews. Based on the findings and conclusions, the study makes the following recommendations:

- (i) Commercial banks in Tanzania that have failed to comply adequately with capital adequacy requirements should take serious measures to improve their financing sources. This will enable them to fully comply with the stipulated capital adequacy regulations, avoid penalties, and prevent insolvency.
- (ii) All banks should consider holding more capital adequacy far above the minimum statutory requirements of TZS 15 billion. The study observed that, in addition to improving banks' profits, a higher capital buffer provides trust and confidence to bank stakeholders, facilitates advancements in contemporary technology, diversification into viable projects, and the opening of more branches, agency offices, and ATMs.

- (iii) The supervisory body should re-evaluate liquidity and cash reserve ratio requirements and consider improvements to ensure that, apart from compliance purposes, they also enhance banks' profitability.
- (iv) The regulator should continue to assist small banks in improving their capital adequacy by facilitating mergers with other strong banks before they face collapse.

6. Limitations and Policy Implication of the Study

6.1 Limitations of the Study

The main limitation of this paper is the challenge of obtaining secondary data that were not available in the financial statements of some banks. To overcome this issue, the researcher physically visited banks' headquarters to request the missed data. Thus, the future research can explore non-commercial banks, such as Saving and Credit Cooperative Organisations (SACCOs), microfinance institutions, and community banks, which were also affected by the amendments to capital bank regulations in 2014. Additionally, studies on regulatory reviews related to risk management practices, interest rate regulations, and liquidity management requirements can be conducted in the same or different institutions. Other design and methodological approaches can also be adopted in future studies.

6.2 Implications of the findings

The findings of this study have significant implications for various bank stakeholders, including banks themselves and policy makers. Commercial bank management teams can utilise the findings to understand that high compliance with capital adequacy leads to improved performance in terms of profit and the number of deposits, despite the compliance costs they face. Policy makers can use these findings to develop and adjust policies and regulations related to capital and liquidity requirements, ensuring they benefit banks while minimizing burdensome and expensive regulations. Moreover, the study's findings align with Tanzania's Five-Year Development Plan (FYDP III-2021/2022-2025/2026), focusing on an industrialized economy and social development. This study contributes to the development of the financial sector, attracting investors to invest in Tanzania, and aligns with Sustainable Development Goals 8 (SDGs 8) under the National Development Plan of 2025, which aims to improve the wellbeing of people, end poverty, and provide banking services to a large number of people by 2030.

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