The Impact of Capital Adequacy and Operational Efficiency on Bank Profitability: A Study With Reference To Private Commercial Banks in Ethiopia

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Abstract

The aim of this study was to examine the impacts of capital adequacy and operational efficiency on profitability of commercial banks in Ethiopia. The study used Return on Assets to measure bank profitability. CAR and EF were explanatory proxies used. The study also used bank size and bank age as a control variable. The research population was all commercial banks currently operating their business in Ethiopia and 9 banks were purposively selected. The study employed secondary data from annual audited financial reports of sampled commercial banks and National Bank of Ethiopia's website; and descriptive statistics, correlation and regression analyses were applied to analyse the data. The results from regression analysis revealed that the CAR had been reported positive and statistically insignificant relationship with return on assets. On the other hand, ER had a negative and statistically significant relationship with return on assets. Moreover, the bank size had negative and statistically insignificant relationship with profitability of commercial banks. Finally, banks' age had insignificant negative effect on profitability of private commercial banks in Ethiopia for study period. Findings suggest that banks should properly manage its operating expenses relative to its revenue; it has been significantly draining the profitability of banks and may it poses a hindrance on banks' capital investment if it not managed closely. Furthermore, banks should manage their operations, risks, and lending activities in response to regulatory requirements since the relationship between capital requirement ratios and bank profitability is multifaceted and depends on different factors.

Keywords: *Capital Adequacy, Operational Efficiency, Return on Assets, Commercial banks, Ethiopia.*

1. Introduction

A bank is a financial institution that operates as an intermediary between parties who have extra funds and parties who require funds Farras Brastama & Yadnya, 2020). Banks, as intermediary institutions, help to stimulate economic growth by generating capital and channelling them to the actual economy. As a result, banks transform into institutions that have an impact on a country's economic growth (Farras Brastama & Yadnya, 2020; Margono et al., 2020; and Jati, 2021). The banking industry has the capacity to drive a country's economic growth because it acts as a financial intermediary, collecting monies in the form of deposits and distributing them back to the public in the form of credit. As a result, banks must be able to sustain consistent performance in order to perform their tasks properly within the economic system (Wahyuni & Choirul Umam, 2023; Al-Sharkas & Al-Sharkas, 2022; and Chandrasegaran, 2020)

A bank's primary measure of success is how well it performs its duties as a financial intermediary. Consequently, the bank needs to raise the calibre of its operations in addition to attempting to uphold public confidence. (Tangngisalu et al., 2020). In terms of regulation and bank supervision, bank profitability and stability among financial institutions are becoming more and more crucial (Al-Matari, 2023); a profitable and stable banks are resilient to shocks, and the banking sector helps keep the financial system stable, which boosts the nation's economic growth (Nguyen, 2020). If a bank operates effectively, people are more likely to use credit, save money, or make time deposits. In contrast, if a bank performs poorly, the public would refuse to entrust their money to it. The bank's profitability value shows good results (Wahyuni & Choirul Umam, 2023). Moreover, bank inefficiency and insolvency contributed to the financial crisis (Rahman et al., 2020).

Every business uses its financial performance as a benchmark to assess a company's profitability and accomplishments (Syafrizall et al., 2021). Similarly, (Jadhav et al., 2021) mentioned financial performance as an assessment of the financial conditions or profitability of a bank in order to gain insight into the health of the bank using an index that relates two pieces of financial data, called financial ratios. ROA is a ratio that measures how efficient a company is in managing its assets to generate profits over a period. ROA can help management and investors see how well a company is able to convert its investment in assets into profit or profit (Syafrizall et al., 2021).

Bank capital is commonly recognized as the most important factor impacting bank risk and profitability (Nguyen, 2020). Similarly, capital is an important aspect for banks to build businesses and their ability to withstand losses (Tangngisalu et al., 2020). The Capital Adequacy Ratio is the ratio of bank performance to evaluate the adequacy of the bank's capital to cover the decrease in its assets as a result of bank losses caused by risky assets and to support assets that retain or earn profits, such as financing given (Syafrizall et al., 2021). When it comes to covering loans, the capital adequacy ratio (CAR) is used to measure capital and reserves for write-offs, especially the risks associated with non-payment of interest (Luh Shintya Anggari & Made Dana, 2020).

Operating efficiency, or the capacity to successfully manage expenses, is considered the most significant indicator of a bank's productivity, profitability, and long-term survival because a bank's total performance is largely determined by how well it uses its resources (Mehzabin et al., 2023). The operational efficiency ratio is calculated by dividing operational costs by operating income. It measures how accurately funds are spent on operating costs, and a lower operational expense ratio indicates stronger bank profitability because operating costs may be covered by operating profits (Wahyuni & Choirul Umam, 2023).

Commercial banks in Ethiopia offer services such as deposit acceptance, business loan financing, client base management, and branch network building. Previous study in Ethiopia has mostly focused on determinants influencing bank profitability, with little emphasis on operational performance and capital sufficiency. However, capital adequacy is a sensitive issue that affects all financial institutions, which is why standards for its management have been devised. The Basel Committee has developed three consecutive guidelines for banking operations and supervision in response to several worldwide financial crises and scandals. According to the Basel I guidelines, which were announced in 1996, banks must maintain a minimum capital adequacy rate of 8% of risk weighted assets to protect against portfolio losses. Following the global financial crises of 2007 and 2008, Basel II was released, and the minimum capital holding rate was increased to 10% of risk-weighted assets.

However, commercial banks in Ethiopia continue to use the old Base I guidelines. Furthermore, Ethiopia's financial system is weak, with no capital market from which banks can raise funds; banks are heavily reliant on public deposits and are subject to stringent oversight by the National Bank of Ethiopia. In today's globalized corporate battle, following international regulations and using technology to aid operations offer a substantial advantage. The global banking industry is becoming more and more risky, as numerous financial crises have shown. As a result, it is strongly advised to preserve adequate capital to guard against a variety of losses. Therefore, this study's goal was to assess how capital adequacy affects bank profitability. Furthermore, the study felt it was essential to examine how banks manage operating expenses because it directly affects a bank's profitability. This study was aimed to address the following two objectives:

- To assess the impacts of capital adequacy on banks' profitability and
- To examine the effects of operational efficiency of profitability of banks'.

2. Literature Review and Hypothesis Development

This section presents a large body of literature synthesised regarding to the impacts of capital adequacy and operational efficiency on bank profitability. Based on the existed empiric evidences possible hypotheses were developed to establish an association between capital adequacy and operational efficiency with profitability of private commercial banks.

2.1.Capital Adequacy Ratio (CAR)

Capital is a very important factor for the development of bank progress and maintaining public trust. ; and the use of bank capital is intended to meet all the needs that support its operational activities, the operation will be said to be good if the bank has good capital adequacy (Wahyuni & Choirul Umam, 2023). Adequacy Ratio (CAR),

reflects the bank's ability to cover the risk of loss from its activities and the bank's ability to fund its operational activities (Farras Brastama & Yadnya, 2020). Syafrizall et al., (2021) mentioned capital adequacy as the ratio of bank performance to measure the adequacy of the bank's capital to cover the decline in its assets as a result of bank losses caused by risky assets and to support assets that contain or generate profits such as financing provided.

Capitalization is referred to as an assessment tool for capital adequacy and for determining the bank's general soundness, representing its capitalization level. The capitalization of banks has been extensively adopted for the analysis of their financial power and strength, and in the case of developing nations, a robust capital structure is required by financial institutions to face financial crises difficulties and to ensure depositors' safeguarding during trying times (Al-Matari, 2023). One of the ratios used by a bank to measure its minimum capital requirement is the Capital Adequacy Ratio; and is a comparison of total capital with risk-weighted assets (Luh Shintya Anggari & Made Dana, 2020). Banks characterized by weak capital structure are expected to buckle beneath risky situations and as such, it is essential to maintain a higher capital structure level to be able to counter losses and steer clear of risk of insolvency during times of crisis (Al-Matari, 2023).

2.2. Capital Adequacy Ratio (CAR) and Bank Profitability

The nexus between capital adequacy and bank profitability is an important one that concerns banks. Particularly, how bank capital affects bank performance after the financial crisis is of supreme importance for banking policymakers anticipating micro-and macro-wise banking regulations (Le & Ngo, 2020). While better banking sector capitalization reduces default risk and contagion effects, it can also harm profitability due to higher funding costs. Several studies have shown that capital can improve bank performance (Coccorese & Girardone, 2021). Previous studies (Luh Shintya Anggari & Made Dana, 2020; Wahyuni & Choirul Umam, 2023; Sofie Abdul Hasan et al., 2020; Syafrizall et al., 2021; Le & Ngo, 2020; Farras Brastama & Yadnya, 2020; Margono et al., 2020; Sunaryo, 2020; Ramadhanti & Hidayati, 2019; Jati, 2021; and Kumer Datta & Al Mahmud, 2018) have revealed positive and significant relationship between capital adequacy and profitability of banks. (Wahyuni & Choirul Umam, 2023) also found the positive relationship between capital adequacy and bank profitability but statistically insignificant. However, Syafrizall et al., (2021), noted that capital adequacy ratio has no effect on bank profitability. Therefore, based on the above discussion the following hypothesis is developed to establish the relationship between capital adequacy ratio and the profitability of banks.

H1: Capital adequacy ratio (CAR) has positive and significant effect on bank profitability.

2.3. Operational Efficiency Ratio (ER)

The term efficiency is concerned with achieving the greatest possible results while using the fewest resources and generating the least amount of waste; thus, efficiency is an indicator that displays a firm's ability to keep the pace of revenue growth above the rate of increasing operating costs (Folorunso Ayinuola & Ibrahim Gumel, 2023). Operating efficiency ratio is the ratio between operating costs and operating income; and it is used to measure the ability of bank management to control operational costs against operating income (Syafrizall et al., 2021). Similarly, Wahyuni & Choirul Umam, (2023) also mentioned that efficiency ratio is used to measure the level of efficiency and ability of banks in carrying out their operations.

Bintoro & Rahmadhani, (2021) argue that the ratio of a company's running expenses to its revenue is known as its operational costs. The more money that the business can make from its operational activities, the less money it needs to spend. Folorunso Ayinuola & Ibrahim Gumel, (2023) argue that creating value and gaining a competitive edge requires increasing the productivity and operational efficiency of banking institutions. Banking efficiency is critical because it affects the stability of financial systems and, ultimately, the economy. Consequently, bank managers have placed a greater emphasis on cutting operational costs and providing more effective goods and services.

2.4. Efficiency Ratio and Bank Profitability

For decades, economic and finance researchers have debated the relationship between bank efficiency, competitiveness, and profitability (ODURO, 2020). Operating efficiency is considered as a vital factor influencing the bank profitability. Operating efficiency refers to a firm's effective management of expenses. In fact, operational efficiency is regarded to be the most significant predictors of a bank's long-term viability, profitability and productivity because the overall performance of a bank is largely dependent on how effectively the organization is utilizing its resources (Mehzabin et al., 2023). However, few prior studies found on the relationship between efficiency ratio and bank profitability. Wahyuni & Choirul Umam, (2023) found that operational efficiency has a significant effect on banking financial performance proxy of ROA. The study conducted by (Mehzabin et al., 2023) also revealed that the operating expenses and managing of costs effectively can boost the profitability of bank. However, studies (Syafrizall et al., 2021; Folorunso Ayinuola & Ibrahim Gumel, 2023; and Bintoro & Rahmadhani, 2021) noted negative and significant effect of efficiency ratio on bank profitability. Based on the above empiric evidences the following hypothesis is developed to link efficiency ratio with bank profitability.
H2: Operational efficiency enhances the profitability of bank.

2.5. Bank Size, Age and its effects on Bank Performance

Kwashie et al., (2022) evaluated the influence of credit risk on the financial performance of Ghanaian commercial banks (as assessed by return on asset and economic value added). The size and age of the bank have a considerable favourable impact on both financial performance measurements. (Sulaiman AlAli, 2021) assessed the effect of bank size on financial performance on commercial banks in Kuwait. The results showed that bank size had a statistically significant positive effect on bank performance. Gupta & Mahakud, (2020) also assessed the effect of bank size on financial performance of banks in Indian. The result of the study revealed that Bank size has an adverse effect on bank profitability. Therefore, based on the available literature reviewed, the study has developed the followed hypothesis to establish the relationship among bank age, bank size and profitability of commercial banks in Ethiopia.
H5: Bank size has a positive and significant effect on bank performance.
H6: Bank age has positive and significant effect on bank performance.

3. Methodology

This study was designed to assess the impacts of capital adequacy and operational efficiency on commercial banks in Ethiopia through bank size; and it adopted the panel data methodology and it employed the use of secondary data obtained from respective private commercial banks annual report and National Banks of Ethiopia (NBE) website for the period 2017 to 2022. The purposive sampling method was used to select sampled banks from the entire population. For this study 9 private commercial banks were considered. These 9 banks include Awash Bank, United Bank, Wogagen Bank, Cooperative Bank of Oromia, Nib International Bank, Lion International Bank, Berhan International Bank, Addis International Bank, and Abay Bank. Statistical Package for Social Science (SPSS) was used and descriptive and inferential statistics were employed to analyse the data. Importantly, correlation and regression analysis techniques were applied. This study has two independent variables used namely CAR and OER. Bank size and bank age were used as a control variables. In the regression model, bank profitability, which is the dependent variable, was measured by Return on Equity (ROA). The model adapted was correlation analysis and multiple linear regression techniques to assess the significance of the association between CAR, OER and profitability of private commercial banks in Ethiopia via the existence of bank size as mediating variable. The regression model employed is presented as follow;

$$ROA = \alpha + \beta_1 CAR + \beta_2 OER + \beta_3 BS \; \beta_4 BA + \mathcal{E}$$

Where;   BS = Bank size;
ROA = Return on assets   BA = Bank age,
CAR = capital adequacy ratio, α = constant and
OER = Operational efficiency ratio, $\mathcal{E}$ = error term

Table 1: The Study Variables and their measurement

Variables	Symbols	Measurement
Independent variables		
Capital Adequacy Ratio	CAR	Bank capital to total risk weighted assets
Operating Efficiency Ratio	ER	Operating expenses to gross operating income
Control variables		
Bank Size	BS	Natural Logarithm of the book value of total assets
Bank Age	BA	Number of years since establishment
Dependent variable		
Return on Assets	ROA	Net income to total assets

4. Data analysis and Discussion

Both descriptive and inferential statistical way of data analysis was applied in this study to measure the impacts of capital adequacy and operational efficiency ratio on profitability of banks in Ethiopia. The results of both analysis are presented as follow.

4.1.Descriptive Analysis

The descriptive statistics comprise of mean, standard deviation and the trends of the dependent and independent variables. Table 2 presented the descriptive analysis results.

Table 2: Descriptive analysis table
Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ROA	54	.0027	.0387	.022195	.0069176
CAR	54	.0843	.2600	.159744	.0392108
ER	54	.2173	.9274	.543407	.1282850
BS	54	21.9592	25.9349	24.034485	.8332506
BA	54	7	29	17.39	6.233
Valid N (listwise)	54				

Source: SPSS out put

Table 2 shows that the impacts of CAR and ER with the mean score and the standard deviation from the means of each of the data points. As it displayed in the table the standard deviation recorded by ER was high than the standard deviation of CAR. This indicates that there was maximum variation in management of operating expenses among private commercial banks in Ethiopia. The mean value of 54.34% implies that private commercial banks considered in this study have only 45.66% to cushion their non-operational expenses. Generally, bank OPR should not be more than 50%. The OPR value of 54.34% indicates that the banks are not very efficient in managing their operational costs. This in turn drain out their level of profitability unless proper management to curve its effect wisely.

The standard deviation logged by CAR was minimum when compared to the standard deviation noted by ER but the value shows that there have been investigated wide range of gaps in maintaining CAR among banks. To solidify this the minimum value of CAR NBE declared all commercial banks have to maintain is 8% but this study investigated the gap ragging form 10% to 26%.

4.2.Inferential analysis and Hypothesis testing

As mentioned in the methodology part, this study has adopted a cross-sectional multiple linear regression on firm characteristics over the period 2017–2022 for six years on 9 selected private commercial banks in Ethiopia. The study purposely selected the period beyond 2017 because it was a year of accounting method change from local GAAP to IFRS standards. The following sections present the outputs of these multiple linear regression analysis on dependent variable return on assets (ROA) and independent variables CAR and operational efficiency ratio (ER). Bank size and bank age included as a control variables.

Table 3: Diagnostic test table

Variables Entered/Removed^a			
Model	Variables Entered	Variables Removed	Method
1	BA, ER, CAR, BS^b	.	Enter
a. Dependent Variable: ROA			
b. All requested variables entered.			

Source: SPSS regression out put

Table 3 shows that variables entered and removed during the entire study work from beginning to the end. As depicted in the table independent variables CAR, ER, BS and BA are entered in column two and the dependent variable ROA is presented in the bottom of the table. The third column used to present the removed variable in this study and it is empty since no variables removed.

Table 4: Linearity of variables

Model Summary^b									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.660^a	.436	.390	.0054035	.436	9.466	4	49	.000
a. Predictors: (Constant), BA, ER, CAR, BS									
b. Dependent Variable: ROA									

Source: SPSS regression out put

Table 4 demonstrates the linearity of the variables. The value of R is a measure of the strength and direction of the linear relationship between the independent and dependent variables in the model. It ranges from -1 to 1, where 1 indicates a perfect positive relationship, -1 indicates a perfect negative relationship, and 0 indicates no linear relationship. The positive R-value (0.660) in this study indicates a strong positive linear relationship between the independent and dependent variables.

The R-squared value, also known as the coefficient of determination, indicates the proportion of the variance in the dependent variable that is predictable from the independent variables. It ranges from 0 to 1, with 1 indicating a perfect fit. So, in this study the R-square shows how much CAR and ER explained by ROA. As the table indicates, the independent variable explained the dependent variable by 43.6%. This means that the model using two predicted variables (CAR and ER) explain about 43.6% variance of dependent variable (ROA).

Right next to R square we get adjusted R square. If sample size small, the R square value in the sample tend to be a little over estimated and little optimistic over estimation of what probably really happening in the population. So, Adjusted R square corrects this value to provide a better estimation of what actually happening in the population. In case of this study adjusted R square is 0.390.

Standard error of the estimate is basically gives an idea of how much the prediction might be off; and if the number is large the more variability it indicates. As indicated in table 4, the standard error of the estimate is 0.001 which is very small and good. Therefore, R square is significant at 5 % level of significance as SE <.05.

Table 5: ANOVA table

ANOVAᵃ					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	.001	4	.000	9.466	.000ᵇ
Residual	.001	49	.000		
Total	.003	53			
a. Dependent Variable: ROA					
b. Predictors: (Constant), BA, ER, CAR, BS					

Source: SPSS regression out put

In table 5 above, the sum of squares due to regression is 0.001 while the mean squares is 0.000 with 4 degrees of freedom. The sum of squares due to residual is 0.001 while the mean squares due to residual is 0.000 with 49 degrees of freedom. The p value is 0.001. Since the p value is less than 0.05 implies that the relationship is significant at 95% level of significance, the model is therefore is significant for the study and prediction.

Table 6: Collinearity Diagnostics Test Table

Collinearity Diagnosticsᵃ								
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	CAR	ER	BS	BA
1	1	4.809	1.000	.00	.00	.00	.00	.00
	2	.113	6.535	.00	.07	.02	.00	.20
	3	.061	8.912	.00	.20	.45	.00	.01
	4	.018	16.496	.00	.31	.44	.00	.13
	5	.000	201.038	1.00	.42	.09	1.00	.65
a. Dependent Variable: ROA								

Source: SPSS regression out put

Table 6 displays statistics that help to determine whether there are any problems with collinearity or not. Collinearity or multicollinearity is the undesirable situation where the correlations among the independent variables are strong. Eigenvalues proved an indication of how many different dimensions are there among the independent variables. When several Eigen values are close to zero, the variables are highly interring correlated and small changes in the data values may lead to large changes in the estimates of the coefficients. Condition index are the square roots of the ratios of the largest eigenvalue to each successive Eigen value.

A condition index greater than 15 indicates a possible problem and an index greater than 30 suggests a serious problem with collinearity. So in this study, since conditional index value scored around 1, 6, and 8, from this ground it is possible to say that there is no multicollinearity among independent variables.

Table 7: Residual and predicted value

| **Residuals Statistics[a]**					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.008796	.029939	.022195	.0045672	54
Std. Predicted Value	-2.934	1.696	.000	1.000	54
Residual	-.0137416	.0123885	.0000000	.0051956	54
Std. Residual	-2.543	2.293	.000	.962	54
a. Dependent Variable: ROA					

Source: SPSS Residual Out put

Table 7, indicates about the residual and predicted value. The mean residual is 0.000, which is a good sign because mean close to zero indicates that, on average, the model is unbiased in its predictions. In addition, the standard deviation of the residuals is 0.0051956, representing the spread of the residuals around the mean. A lower standard deviation suggests that the residuals are relatively tightly clustered around the mean.

Moreover, the mean standardized residual is 0.000, which is expected for standardized residuals. The standard deviation of the standardized residuals is 0.962. A standard deviation close to 1 is generally acceptable. The range of residuals from the minimum -0.2147309 to the maximum 0.0123885 is small, suggesting that almost all residuals are within a reasonable range. Furthermore, the range of standardized residuals from the minimum -2.934 to the maximum 1.696 indicates that there is no much influential observations with large residuals.

4.3. Test of Normality of Residuals

One of the assumptions of linear regression analysis is that the residual is normally distributed, at the mean of zero and standard deviation of one. All of the results from the examiner command suggest that the residual or the error terms are normally distributed. The skewness and kurtosis are near to 0. As one can observe from the histogram and p-p plot it looks normal. Based on these results, the residuals from this regression appear to conform to the assumption of being normally distributed.
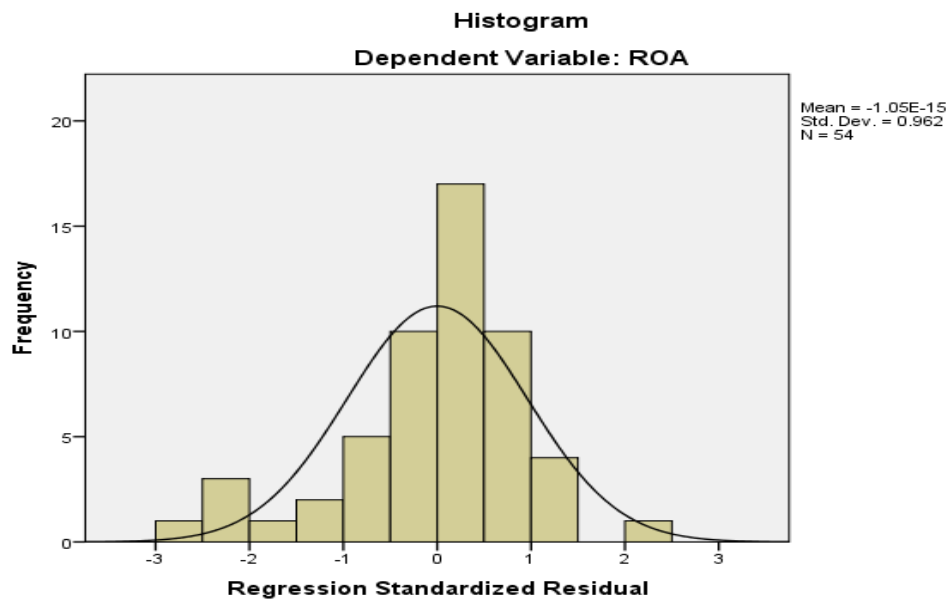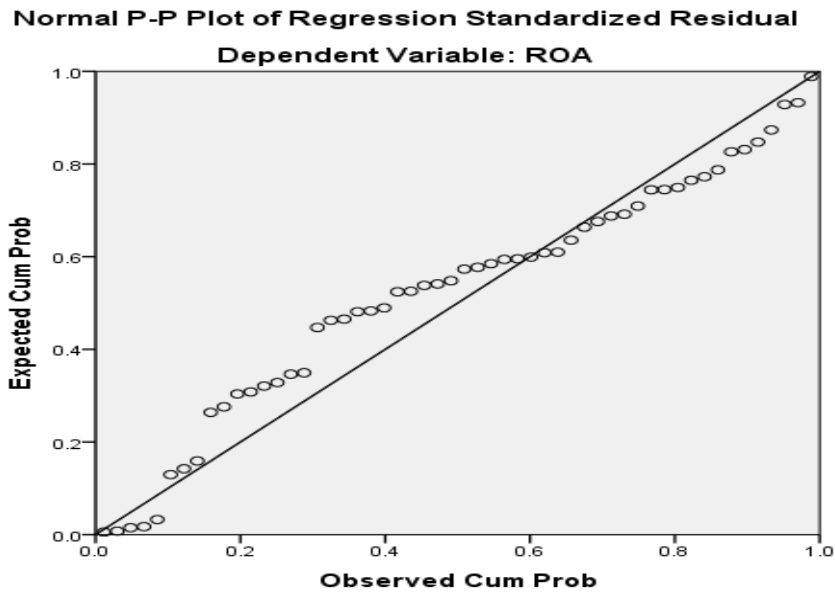
Source: SPSS regression out put

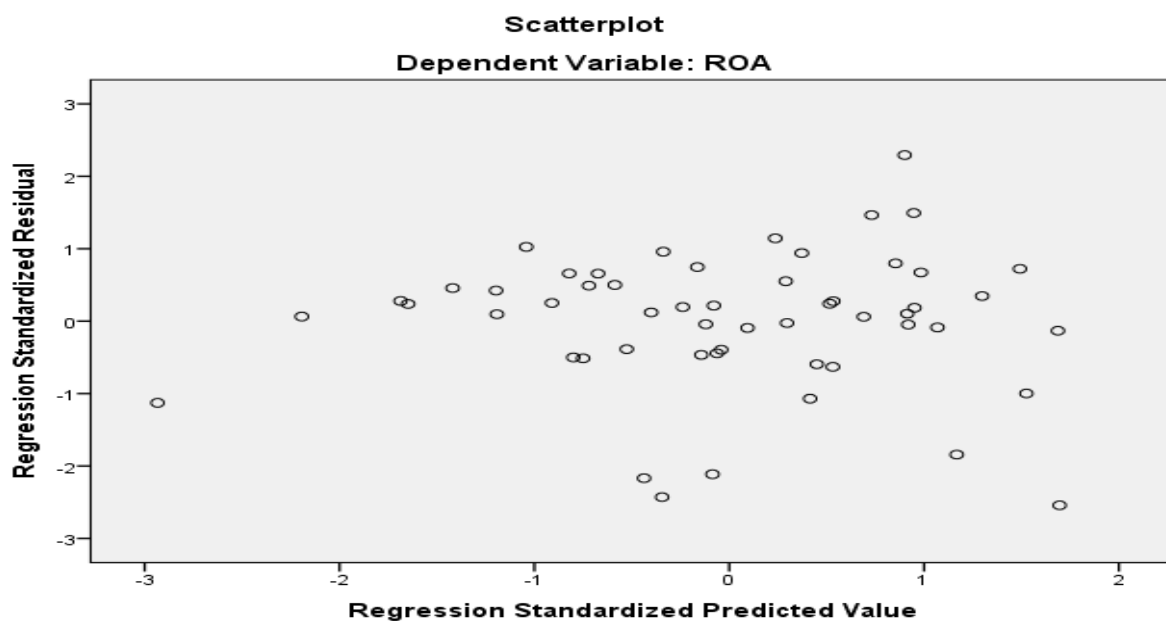**Figure: 1 Normal p-p plot of Regression Standardized Residual**

The following figures show whether the data are normally distributed or not. The mean value of -1.05E-15 represents the average value of the residuals. In this case, the mean is extremely close to zero (specifically, it is a very small number in scientific notation). This suggests that, on average, the residuals sum to nearly zero. It's essentially indicating that, across all observations, the model is, on average, neither consistently overestimating nor underestimating. On the other hand, the standard deviation measures the spread or variability of the residuals. A standard deviation of 0.962 means that the residuals, on average, deviate from the mean by approximately 0.962 units. This gives a sense of how much individual residuals tend to differ from the average residual. A standard deviation close to 1 suggests that the residuals are relatively tightly clustered around the mean.

The mean being close to zero is a positive sign, suggesting that, overall, the model is providing unbiased predictions. On average, the residuals are centred around zero, indicating that the model is not systematically overestimating or underestimating the dependent variable. The study also looked at the following two figures and confirmed same.

Source: SPSS regression out put

Figure: 2 Normal p-p plot of Regression Standardized Residual

Source: SPSS regression out put

Figure: 3 Normal p-p plot of Regression Standardized Residual

Additionally, the standard deviation 0.962 provides information about the variability of individual residuals. A standard deviation close to 1 indicates that the residuals are moderately dispersed around the mean, suggesting a relatively consistent level of unpredictability. Finally, on average, the model is providing unbiased predictions, and the individual residuals are moderately dispersed around the mean.

Table 8: Collinearity Diagnostics Test Table

Coefficients[a]						
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.072	.048		1.508	.138
CAR	.027	.025	.154	1.071	.289
1 ER	-.031	.006	-.572	-5.041	.000
BS	-.002	.002	-.183	-.771	.445
BA	-5.945E-005	.000	-.054	-.265	.792
a. Dependent Variable: ROA					

Source: SPSS Regression Out put

Table 8 presents the results of the regression test for predictors and their effect on return on assets as dependent variable in the study. According to the model, the unstandardized beta coefficient for CAR is 0.027. This suggests that, holding other variables constant, a one-unit increase in CAR is associated with a 0.027 unit increase in ROA. While, the unstandardized beta coefficient for ER is -0.031. This implies that, holding other variables constant, a one-unit increase in ER is associated with a decrease of 0.031 units in ROA. That means one unit inefficiencies in operation will reduce 0.031 units in assets.

The standardized beta coefficient for CAR is 0.154, indicating that CAR has a relatively low standardized impact on ROA compared to with ER; whereas, the standardized beta coefficient for ER is -0.572. This suggests that ER has a high negative standardized impact on ROA, and its impact is larger than the impacts CAR. The P value of BA and BS are 0.048 and 0.050 respectively, which means these values are below and equal to 0.05. Therefore, BS and BA have statistically positive insignificant effect on profitability of private commercial banks in Ethiopia.

5. Findings of the Study

Descriptive statistics has revealed that the ER logged high deviation across all the banks under study. The standard deviations recorded by ER was maximum showing an indication that there was maximum variation among banks managing their operating costs. The ER measures the percentage of operating income left after catering for the operating expenses. The mean value of 54.34% therefore implies that the selected banks has a balance of 45.66% to cushion their non-operational expenses. Generally, banks' ER should not be more than 50%. The ER mean value of 54.34% indicates that the banks are not very efficient in managing their operational costs.

The standard deviations recorded by CAR was minimal showing an indication that there was minimal variation in capital management practices in private commercial banks in Ethiopia. ROA has a mean of 22.195% with a minimum and maximum value of 0.27% and 3.87% respectively. The implication of this is that most of the selected banks make good investment decisions which earned them a good profit.

From the findings of the model summary, 43.6 percent of the returns of commercial banks in Ethiopia were explained by the independent variables (CAR and ER) investigated in this study. The study also found that, the sum of R squares due to regression is 0.001 while the mean sum of R squares is 0.000 with 4 degrees of freedom. The sum of R squares due to residual is 0.001 while the mean sum of R squares due to residual is 0.000 with 49 degrees of freedom. The p value is 0.001. Since the p value is less than 0.05, implies that the relationship is statistically significant at 95% level of significance, and the model therefore is significant for the study and prediction.

From the coefficient table, during the study period, taking all factors (CAR and ER) constant at zero, returns will be 0.072. The analysed data finding also revealed that taking all other independent variables at zero, a one-unit increase in CAR is associated with a 0.027 unit increase in ROA. However, a one-unit increase in ER is associated with a decrease of 0.031 units in ROA. Bank size and bank are had insignificant effect on bank profitability.

6. Hypothesis testing

Based on the findings of the regression analysis, this part offers the decision on whether to accept or reject the hypothesis derived from the existing empirical data. This judgment is also necessary to reach probable conclusions on the same topics.

6.1. Hypothesis testing on Capital Adequacy Ratio (CAR)

From the findings of multiple linear regression model in table 8 above CAR is found with the p-value of 0.289, which is more than significance level of 0.05, which means it is statistically insignificant at significance level of 0.05. Furthermore, the coefficient of 0.027 of CAR means that CAR had statistically positive effect on profitability of commercial banks in Ethiopia. It also means that as CAR increases by 1 unit, profitability of commercial banks in Ethiopia increase by 0.289 on its average value, assuming that other explanatory variables that are held constant. Therefore, the alternative hypothesis that capital adequacy ratio (CAR) has positive and significant effect on profitability of commercial banks in Ethiopia is rejected. The findings of the study is consistent with Wahyuni & Choirul Umam, (2023) who concluded that CAR had positive relationship with the profitability of banks but it is insignificant.

6.2. Hypothesis testing on operational Efficiency Ratio (ER)

Referring to the findings of multiple linear regression model in table 8 above, ER is found with p-value of 0.001, which is below significance level of 0.05, which means it is statistically significant at significance level of 0.05. Moreover, the coefficient of ER -0.031 means that ER has statistically significant negative effect on profitability of commercial banks in Ethiopia. This also means that as operational risk (inefficiency in managing costs) increases by 1 unit, profitability of commercial banks in Ethiopia decreases by 0.031 on its average value, assuming that other explanatory variables kept constant.

Therefore, the alternative hypothesis that operational efficiency enhances the profitability of commercial banks in Ethiopia is accepted. The fining of the study is consistent with findings of Syafrizall et al., 2021; Folorunso Ayinuola & Ibrahim Gumel, 2023; Bintoro & Rahmadhani, 2021; Wahyuni & Choirul Umam, 2023 and Mehzabin et al., 2023) revealed that the operating expenses and managing of costs effectively can boost the profitability of bank.

6.3. Hypothesis testing on Bank Size

Referring to the findings of multiple linear regression model in table 8 above, bank size is found with p-value of 0.445, which is above the significance level of 0.05, which means insignificant at significance level of 0.05. However, the coefficient of bank size is -0.002, means that bank size has statistically insignificant negative effect on profitability of commercial banks in Ethiopia. Therefore, the alternative hypothesis that bank size has positive and statistically significant effect on profitability of commercial banks in Ethiopia is rejected. The fining of the study is consistent with findings of Gupta & Mahakud, (2020) that the size of the bank had adverse impact on financial performance of banks in India.

6.4. Hypothesis testing on Bank Age

Based on the findings of multiple linear regression model in table 8 above, bank age is found with p-value of 0.792, which is above significance level of 0.05, which means statistically insignificant at significance level of 0.05. Moreover, the coefficient of bank age is -0.00005945 means that bank size has statistically insignificant negative effect on profitability of commercial banks in Ethiopia. Therefore, the alternative hypothesis that bank age has positive and statistically significant effect on profitability of commercial banks in Ethiopia is rejected. This may confirms that the majority of commercial banks included in sample was established across same periods..

7. Conclusion

The current study examined the impact of capital adequacy and operational efficiency on the profitability of commercial banks currently working their business in Ethiopia, employing the Multivariate Linear Regression Model (MLRM) to assess the relationship between capital adequacy ratio (CAR), Operational efficiency ratio (ER) and profitability of banks. CAR and ER are explanatory variables, whereas return on assets is used to gauge the profitability of banks, with bank size and age serving as control variables. There was no collinearity (multicollinearity) among the independent variables in the model, meaning that each independent variable explained the dependent variable independently. Additionally, there was no correlation between the independent variables.

Regarding to CAR, a positive and statistically insignificant relationship had been reported with profitability of commercial banks in Ethiopia for the entire study period. This implies that banks are practicing good capital management policy (8% maintenance of minimum capital requirement bay imposed by National Bank of Ethiopia). However, the level of CAR hold by banks were vary from 10% to 26%; for competitive purpose banks that hold high CAR may be stable and secure and can attract more customers and invertors. But the associated cost of capital, that may possibly drain profit, will not be disregarded. In summary, the relationship between capital requirement ratios and bank profitability is multifaceted and depends on how banks manage their operations, risks,

and lending activities in response to regulatory requirements. While higher capital ratios contribute to financial stability, they may also introduce challenges and trade-offs that can influence a bank's profitability.

On the other hand, ER had a negative and statistically significant relationship with profitability of private commercial banks in Ethiopia for study period where banks who can manage the cost of their operating activities can improve their profitability. This is because ER is a financial metric that assesses a bank's efficiency in managing its operating expenses relative to its revenue. The operational efficiency ratio is expressed as a percentage, and a lower ratio is generally considered more favourable, indicating higher efficiency. The relationship between the operational efficiency ratio and bank profitability is inverse: as the operational efficiency ratio decreases, indicating improved efficiency, profitability tends to increase. Similarly, a lower operational efficiency ratio suggests that a bank is effectively managing its operating expenses relative to its revenue. This indicates cost control and operational discipline, which can contribute to improved profitability.

More importantly, banks with lower operational efficiency ratios may have a competitive advantage over peers and efficient operations signal effective management, which can boost investor confidence.

However, it's important to note that while a lower operational efficiency ratio is generally associated with improved profitability, other factors such as risk management, macroeconomic conditions, and the competitive landscape also play significant roles in a bank's overall financial performance. In summary, an efficient use of resources and effective cost management, as reflected in a lower operational efficiency ratio, is typically conducive to higher bank profitability. Therefore, according to statistical result of this study, the operational efficiency of private commercial banks in Ethiopia were no efficient because ER computed was 54.34% which shows higher ER.

According to regression results, the bank size had insignificant and negative impact on profitability of commercial banks in Ethiopia. It's essential to note that the relationship between bank size and profitability is not uniform across all situations. While larger banks may have certain advantages, smaller banks can thrive in niche markets and exhibit agility that larger institutions may lack. Larger banks may benefit from economies of scale, which can lead to lower average costs per unit of output. This efficiency can contribute to higher profitability as larger banks spread their fixed costs over a larger asset base. Larger banks often have more diversified portfolios, including a broad range of products and services. Diversification can help mitigate risks and enhance overall profitability by reducing the impact of losses in any single area.

Larger banks may also have greater market power, allowing them to negotiate more favourable terms with customers, suppliers, and other counterparties. This negotiating power can positively impact the bank's profitability. Larger banks may have easier access to capital markets, enabling them to raise funds more efficiently. This access to capital can support strategic initiatives and contribute to profitability. But this is not workable for Ethiopian banks due to lack of capital markets. In this study, the coefficient of bank size is negative; that may signifies larger banks may experience diseconomies of scale, where the cost per unit of output increases as the size of the bank grows. This could lead to lower profitability.

Similarly, large banks may face challenges in managing complexity, and inefficiencies associated with increased size could negatively impact profitability.

As per regression output Banks' age had insignificant negative effect on private commercial banks in Ethiopia for study period. The relationship between bank age and bank profitability is a complex and context-dependent matter. It's important to note that various factors can influence the relationship, and the correlation between bank age and profitability is not uniform across all situations. Older banks may have accumulated experience and expertise in managing risks, making strategic decisions, and adapting to market changes. This experience could positively influence profitability. Established banks may have gained the trust of customers over time, leading to a stable customer base and potential cross-selling opportunities. Customer trust can positively impact profitability. Younger banks may face challenges in competing with more established institutions, while older banks may need to adapt to new entrants and changing market dynamics. Finally, the main conclusion of this study is ER is the main influencer of profitability of commercial banks in Ethiopia with the highest coefficient compared to the CAR. However, CAR had a positive but insignificant effect on profitability of commercial banks in Ethiopia.

8. Recommendation for Practice and Future Research

Based on the findings and conclusions of the study the following recommendations are given. The researchers suggests that banks should properly manage its operating expenses relative to its revenue; it has been significantly draining the profitability of banks and may be it poses a hindrance on banks' capital investment if it not managed closely. It is crucial to note that an efficient use of resources and effective cost management, as reflected in a lower operational efficiency ratio, is typically conducive to higher bank profitability. In addition, banks better continuously review their level of resource utilization and manage them effectively and efficiently to reduce the operating costs. It is also researcher's suggestion that banks should manage their operations, risks, and lending activities in response to regulatory requirements since the relationship between capital requirement ratios and bank profitability is multifaceted and depends on different factors. Furthermore, the researchers recommend that future studies should consider more explanatory variables and a longer period of study to have more accuracy in the determination level of commercial banks' profitability and to make their results more generalized as the current study analysed two independent factors for 6 years.

9. Limitation of the study

The study focused to investigating the impact of capital adequacy and operational efficiency on bank profitability. The investigation was restricted to secondary data obtained from the Banks Annual Financial reports and the National Bank of Ethiopia website. Although the data received from Banks publications was reliable, it remains susceptible to potential limitations such as earnings manipulation. The study focused only on assessing the impact of three specific financial risk management strategies on the financial performance of commercial banks in Ethiopia. But there are also other factors to take into account, such as market and capital adequacy risks, which were left out because certain institutions lacked the necessary data.

The research focused on just 9 commercial banks over a ten-year span, from 2017 to 2022. A longer duration should be taken into consideration for the dependability of secondary data results.

References

Al-Matari, E. M. (2023). The determinants of bank profitability of GCC: The role of bank liquidity as moderating variable—further analysis. International Journal of Finance & Economics, 28(2), 1423-1435.

Almazari, A. A., & Alamri, A. M. (2017). The effect of capital adequacy on profitability: a comparative study between samba and saab banks of saudi arabia. International Journal of Economics, Commerce and Management, 5(11), 86-102.

Al-Sharkas, A. A., & Al-Sharkas, T. A. (2022). The impact on bank profitability: Testing for capital adequacy ratio, cost-income ratio and non-performing loans in emerging markets. Journal of Governance and Regulation/Volume, 11.

Anggari, N. L. S., & Dana, I. M. (2020). The effect of capital adequacy ratio, third party funds, loan to deposit ratio, bank size on profitability in banking companies on IDX. American Journal of Humanities and Social Sciences Research (AJHSSR), 4(12), 334-338.

Ayinuola, T. F., & Gumel, B. I. (2023). The Impact of Cost-to-Income Ratio on Bank Performance in Nigeria. International Journal of Multidisciplinary and Current Educational Research, 5(2), 125-137.

Bintoro, M. I., & Rahmadhani, F. (2021, January). The Influence of Capital Adequacy, Credit Risk, Liquidity, Operational Cost, Income Diversification, Firm Size and Ownership Structure on the Profitability of Bank. In 4th International Conference on Sustainable Innovation 2020-Accounting and Management (ICoSIAMS 2020) (pp. 128-132). Atlantis Press.

Chandrasegaran, L. (2020). Capital adequacy requirements and profitability: An empirical study on banking industry in Sri Lanka. Journal of Economics and Business, 3(2).

Coccorese, P., & Girardone, C. (2021). Bank capital and profitability: Evidence from a global sample. The European Journal of Finance, 27(9), 827-856.

Datta, C. K., & Al Mahmud, A. (2018). Impact of capital adequacy on profitability under Basel II accord: Evidence from commercial banks of Bangladesh. European journal of business and management, 10(8), 48-58.

Gardi, B., Hamawandy, N. M., Vian Sulaiman Hama Saeed, R. M. A., Sulaiman, A. A., Mahmood, S. A., & Al-Kake, F. A. (2020). The effect of capital competence on the profitability of development and investment banks in Turkey. Solid State Technology, 63(6), 12571-12583.

Gharaibeh, O., & Khaled, M. H. B. (2020). Determinants of profitability in Jordanian services companies. Investment Management and Financial Innovations.

Haris, M., Tan, Y., Malik, A., & Ain, Q. U. (2020). A study on the impact of capitalization on the profitability of banks in emerging markets: A case of Pakistan. Journal of Risk and Financial Management, 13(9), 217.

Hasan, M. S. A., Manurung, A. H., & Usman, B. (2020). Determinants of bank profitability with size as moderating variable. Journal of applied finance and banking, 10(3), 153-166.

HERSUGONDO, H., ANJANI, N., & Pamungkas, I. D. (2021). *The role of non-performing asset, capital, adequacy and insolvency risk on bank performance: a case study in Indonesia. The Journal of Asian Finance, Economics and Business, 8(3), 319-329.*

Jati, W. (2021). *The Effect of Non-Performing Loan and Capital Adequacy Ratio on Return on Assets in Bank Victoria International, Tbk Period 2009-2018. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Volume, 4.*

Kumar, V., Acharya, S., & Ho, L. T. (2020). *Does monetary policy influence the profitability of banks in New Zealand?. International Journal of Financial Studies, 8(2), 35.*

Le, T. D., & Ngo, T. (2020). *The determinants of bank profitability: A cross-country analysis. Central Bank Review, 20(2), 65-73.*

Le, T. N. L., Nasir, M. A., & Huynh, T. L. D. (2023). *Capital requirements and banks performance under Basel-III: A comparative analysis of Australian and British banks. The Quarterly Review of Economics and Finance, 87, 146-157.*

MARGONO, H., WARDANI, M. K., & SAFITRI, J. (2020). *Roles of capital adequacy and liquidity to improve banking performance. The Journal of Asian Finance, Economics and Business (JAFEB), 7(11), 75-81.*

Mehzabin, S., Shahriar, A., Hoque, M. N., Wanke, P., & Azad, M. A. K. (2023). *The effect of capital structure, operating efficiency and non-interest income on bank profitability: new evidence from Asia. Asian Journal of Economics and Banking, 7(1), 25-44.*

Nguyen, T. H. (2020). *IMPACT OF BANK CAPITAL ADEQUACY ON BANK PROFITABILITY UNDER BASEL II ACCORD: EVIDENCE FROM VIETNAM. Journal of Economic Development, 45(1).*

Rahman, H. U., Yousaf, M. W., & Tabassum, N. (2020). *Bank-specific and macroeconomic determinants of profitability: a revisit of Pakistani banking sector under dynamic panel data approach. International Journal of Financial Studies, 8(3), 42.*

Ramadhanti, C., & Hidayati, S. (2019). *The effect capital adequacy, liquidity and credit risk to profitability of commercial banks. Journal of Economics, Business, and Government Challenges, 2(01), 71-78.*

Saleh, I., & Abu Afifa, M. (2020). *The effect of credit risk, liquidity risk and bank capital on bank profitability: Evidence from an emerging market. Cogent Economics & Finance, 8(1), 1814509.*

Shen, B., Perfilev, A. A., Bufetova, L. P., & Li, X. (2023). *Bank Profitability Analysis in China: Stochastic Frontier Approach. Journal of Risk and Financial Management, 16(4), 243.*

Sunaryo, D. (2020). *The effect of capital adequacy ratio (CAR), net interest margin (NIM), non-performing loan (NPL), and loan to deposit ratio (LDR) against return on Asset (ROA) in general banks in Southeast Asia 2012-2018. Ilomata International Journal of Management, 1(4), 149-158.*

Swandewi, N. K. M., & Purnawati, N. K. (2021). *Capital adequacy ratio mediates the effect of non-performing loan on returns on assets in public commercial banks. American Journal of Humanities and Social Sciences Research (AJHSSR), 5(1), 651-656.*

Syafrizal, A., Ilham, R. N., & Muchtar, D. (2023). *Effect Of Capital Adequacy Ratio, Non Performing Financing, Financing To Deposit Ratio, Operating Expenses And Operational Income On Profitability At PT. Bank Aceh Syariah. Journal of Accounting Research, Utility Finance and Digital Assets, 1(4), 312-322.*

Tangngisalu, J., HASANUDDIN, R., Hala, Y., NURLINA, N., & SYAHRUL, S. (2020). *Effect of CAR and NPL on ROA: Empirical study in Indonesia Banks. The Journal of Asian Finance, Economics and Business, 7(6), 9-18.*

Ullah, S., Majeed, A., & Popp, J. (2023). *Determinants of bank's efficiency in an emerging economy: A data envelopment analysis approach. Plos one, 18(3), e0281663.*

Uralov, S. (2020). *The determinants of bank profitability: a case of central european countries. Management, 8(3), 8-16.*

Wahyuni, P. D., Umam, D. C., No, J. M. S., & No, J. S. K. *The Effect of Credit Risk, Capital Adequacy and Operational Efficiency on Bank*ing Financial Performance with a Profitability Approach.