



The Impact of Bank-Specific and Macroeconomic Factors on the Performance of Selected Private Banks in Ethiopia: An FMOLS Approach.

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Abstract

This study investigates the impact of internal bank-specific and external macroeconomic factors on the profitability of commercial banks in Ethiopia. A panel FMOLS regression model was applied. Ten years of data were gathered from audited financial statements of six selected banks, the National Bank of Ethiopia, and World Bank sources. The findings indicate that the mean values of profitability for the banks, measured by ROA and NIM, indicate a “very healthy” condition, while ROE indicates a “healthy” condition. The CAR has a positive and significant impact on the ROA, ROE, and NIM, highlighting the importance of capital reserves in maintaining profitability and financial stability. GDP shows mixed results for profitability indicators. It positively influences ROE and NIM but negatively impacts ROA, indicating inefficient asset utilization during economic expansion. IFL has a positive and significant impact on ROE and NIM, suggesting that the banks may adjust interest rates during inflationary periods to maintain profitability. Although the LLPTL has no statistically significant effect on profitability, strong credit risk management remains crucial to maintaining financial stability. The Granger tests reveal that IFL has a *unidirectional impact on CAR and ROA*. *GDP and IFL exhibit a bidirectional relationship*. The study forwarded the recommendations to the banks’ managements and the policy regulating authorities. The management required reinforcing minimum capital requirements to maintain stable financial operations and risk resilience. The policymaking authorities continued to enhance economic development to mitigate the negative impact of GDP on ROA, while closely monitoring inflation as a crucial factor in preventing its adverse effects on profitability.

Keywords: Commercial banks, financial performance, Bank-specific, Macroeconomic factors, Panel FMOLS

1. Introduction

The global financial system is geared toward banks [1] because the banks serve as the backbone of economic activity by providing credit, facilitating transactions, and managing risk. The performance of commercial banks plays a significant role in the overall economic development of a country. As key financial intermediaries, banks are essential institutions in developing countries [2] like Ethiopia, where financial markets remain underdeveloped and banks serve as the primary source of finance. The banks perform three core functions: an intermediation between depositors and borrowers, money creation by providing loans to businesses and individuals, and implementation of monetary policy set by regulatory bodies to stabilize the economy. The sustainability of such functions largely depends on efficient and sustainable performance. The performance of commercial banks has primarily focused on profitability to sustain operations and maintain financial stability in the system [3]. Moreover, the banks should perform efficiently to bring development to the entire economy of a country; however, many internal bank-specific and external macroeconomic factors



affect their performance [4]. The internal factors are related to the management and have economic effects on the performance of the banks; whereas, external factors such as GDP, inflation, interest rate, foreign exchange rate, and so on have no direct impact on management, but they have a direct or indirect effect on the banking environment as well as the entire economy [2]. The internal factors categorized under managerial control, such as capital adequacy, asset quality, operational efficiency, earning capability, and liquidity management [5], directly affect banks' ability to generate income while mitigating financial risks [7].

However, this study aimed to examine how Capital Adequacy Ratio (CAR), Asset Quality, Gross Domestic Product (GDP) growth, and Inflation (IFL) impact the financial performance of Ethiopian private commercial banks. A well-capitalized bank is more stable in operation, able to absorb losses, resilient to financial shocks, and brings economic development. The quality of assets is measured through the Loan Loss Provision to Total Loan (LLPTL) ratio, which is particularly relevant, as non-performing loans can severely undermine bank stability. It has a substantial inverse association with the performance of banks [6]. Similarly, macroeconomic factors shape financial sector performance, with GDP growth influencing business expansion and demanding more credit funds. Economic growth indicates year-by-year increases in the total value of domestically produced commodities in an economy. Inflation affects purchasing power. It is the general increase in prices of commodities and services in the economy over a certain period [8]. Understanding these relationships is very important to policymakers, banks, and regulatory bodies in crafting strategies that enhance banks' performance and financial stability and the sustainable economic growth of the country [9]. Finally, the study tried to identify the key determinants of the financial performance of banks measured by profitability indicators: Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). So, the study aims to provide actionable insights that will guide risk management practices, regulatory frameworks, and strategic decision-making in the Ethiopian private banking sector.

2. Related literature

2.1. Theoretical Review

In this study, the performance of the banks is influenced by internal bank-specific and external macroeconomic factors. Several financial theories provide a foundation for understanding how these factors impact bank performance. This study is grounded in three key theories.

2.1.1. Capital Buffer theory

Basel III aimed to improve the resilience of the global financial system. The new capital requirement was developed with two components: a minimum buffer and numerous buffer overhead thresholds. The buffer requirement objectives are to ensure that banks absorb losses without breaching the minimum capital requirement and to support the flow of credit to the real economy by lending to creditworthy persons [10]. According to Noreen et al. [11], the buffer is a risk-weighted capital ratio minus the regulatory requirement. The theory suggests that the banks may prefer to hold a 'buffer' of excess capital to reduce the probability of failing under the legal capital requirements, especially if their capital adequacy ratio is volatile [12]. As predicted by Calem and Rob (1996) cited by Aliela & Miroga [13], the minimum capital ratio may be incentivized to boost capital and reduce risk. However, low-capital banks may be tempted to take a higher risk, hoping that they can benefit from the returns that will support them in increasing their capital. Generally, this theory suggests that well-capitalized banks can endure profitability while safeguarding financial stability.

2.1.2. Efficiency Structure (ES) theory

The theory emphasizes that profitability and more concentration can be achieved through an improved management system and high-scale efficiency performance [14]. Improved management efficiency [15] to a certain level will lead to greater attention to perform well, further resulting in better profits. The ES hypothesis suggests that banks earn more profit due to their improved efficiency level as compared to others [16]. The ES theory is further divided into two different approaches, such as the X-efficiency and Scale-efficiency hypotheses.

- a. The X-efficiency version of the ES hypothesis suggests that managerial concentration leads to efficiency [17]. If firms are more efficient, they are more profitable since they lower their cost of operations. So, such firms are apt to increase their large market share. On the other hand,
- b. The scale-efficiency approach's main focus is on economies of scale, in which large firms benefit from better market shares rather than focusing on differences in management or production technology. Due to economies of scale, larger firms increase their profitability by lowering the unit costs. The existence of a large market share may also enable firms to manifest a greater concentration that increases their profits [18].

2.1.3. The balanced portfolio theory (BPT)

This theory suggests that Olweny & Mamba, Alshantti, and Ayele [16,19,20]. The decisions of management and the overall policies of banks determine portfolio composition, the amount of profit, and the rate of return to shareholders. The policy decisions of banks involve asset diversification, maintaining a minimum holding of each asset in the owners' portfolio, managing risks associated with financial assets, and determining the portfolio size. The management decisions of banks, on the other hand, focus on portfolio diversification and the appropriate composition of commercial banks' portfolios. Furthermore, the composition of assets and liabilities in banks' financial statements, along with the unit cost incurred in producing each constituent of assets, determines their capability to achieve maximum profitability. ES theory and BPT generally presume that banks' internal efficiency and sound managerial decisions could influence banks' performance [21].

2.2. Empirical literature

The existing empirical works on the financial performance of the banks so far have revealed different results with various factors that are unable to come to a concrete conclusion. According to the studies conducted on ROA by Magoma et al., [22] showed that CAR has a positive and significant impact on ROA, whereas the studies conducted by Ongiti, Geoffrey Nyakundi, and Mutembei [23], Lelissa [24] and Pinto et al., [26], Indicated no significant impact on profitability in terms of ROA.

The studies conducted by Nuhui et al. [2], and Orando et al. [27], the asset quality proxied by LLPTL has positive and significant impacts on ROA; whereas, the studies conducted by Ongore & Kusa [28] Akhtar & Ali, [30], Dunia [31], Ongiti, Geoffrey Nyakundi, and Mutembei [23] and Lelissa [24] have negative and significant impacts on ROA. However, the studies conducted by Alemu [33] and Zergaw, et al. [35] Have no impact on ROA.

The GDP has a positive and significant impact on ROA, as studied by Nuhui et al., [2] and Isayas [37]; however, GDP has no significant impact on the ROA, according to the studies conducted by Ongore & Kusa [28] and Saeed [38]. The study conducted by Onyancha et al. [8] The GDP and inflation have no significant impact on ROA.

Regarding the study conducted by Nuhui et al. [2] on the financial performance measured using ROE as the proxy for profitability, asset quality measured by LLPTL has a positive and significant impact on ROE; whereas, studies conducted by Ongore & Kusa [28] Akhtar & Ali [30] and Dunia [31] showed a negative and significant impact on ROE. However, the study conducted by Alemu [33] showed no significant impact on ROE.

The CAR positively and significantly impacted the ROE according to the studies conducted by Gicharu et al. [15] and Reddy & Prasad [40]. However, the study conducted by [25] showed a positive and significant impact on ROE. The GDP has a negative and significant effect on ROE, according to the study conducted by Ongore & Kusa [28] whereas the studies conducted by Nuhui et al. [2] and Saeed [38] have no significant effect on ROE.

In conclusion, mixed findings were revealed on CAR, whereas LLPTL shows a predominantly negative relationship. This study aims to clarify this relationship. The contrary results on GDP and inflation further investigate the macroeconomic influences on Ethiopian banks. Most studies rely on traditional regression models. However, this study applied panel FMOLS estimation and Granger causality tests to reach more robust conclusions and provide new insight into the Ethiopian banking sector.

2.3. Variable definitions and hypotheses development

2.3.1. Financial performance

Financial performance is measured in terms of profitability. Then, profitability is further measured by the ROA, ROE, and NIM in the extensive literature. The ROA is a metric used to evaluate the banks' management efficiency and effectiveness in generating profit using all resources across all operations. The higher the ROA ratio, the better the performance of the banks, which results in the attraction of investors in the future [41], indicating that the banks get higher profits with less asset investment. ROA values from 5% to 20% are considered good [37].

ROE measures the owner's investment return and its effect on dividends and future investments. The higher the ratio, the better the performance achieved by the institutions. A ROE range from 6% to 10% indicates intermediate performance, and above 10% is considered best [42]. ROA is the ratio of Net profit after tax to total assets. According to Ntb et al. [43] The profitability of Banks of NTB Syariah has been evaluated using ROA, ROE, and bank operating profitability, which, by analogy, is used as a benchmark for this study.

All financial institutions, including banks, typically use NIM to assess and decide on investments of their capital in profit-generating operations [1]. Net Interest Margin (NIM) is a crucial indicator of banks' performance in terms of efficiency and effectiveness. It reflects the extent to which banks generate revenue from interest income and represents the difference between interest earned on loans provided and interest paid on borrowed funds. A larger NIM generally signifies stronger performance and greater financial stability. However, higher profitability may also increase risk exposure, particularly in lending practices that could lead to substantial loan loss provisions (LLP) [45, 7].

Based on the above studies, the performance measurement of banks is gauged around ROA, ROE, and NIM, which are used as dependent variables for this study. The average threshold of risk rating criteria [43] indicate in Table 1.

Table 1: The Threshold of the healthiness of banks' profitability

<i>Description/Criteria</i>	<i>ROA</i>	<i>ROE</i>	<i>NIM</i>
Very healthy	<i>Greater than 2%</i>	<i>Greater than 20%</i>	<i>Greater than 6.5%</i>
Healthy	<i>between 1.25% & 2%</i>	<i>between 12.5% & 20%</i>	<i>2% & 6.5%</i>
Average healthy	<i>between 0.5% & 1.25%</i>	<i>between 5% & 12.5%</i>	<i>between 1.5% & 2%</i>
Somehow healthy	<i>between 0 & 1.25%</i>	<i>between 0% & 5%</i>	<i>between 0% & 1.5%</i>
unhealthy	<i>Less than 0%</i>	<i>Less than 0%</i>	<i>Less than 0%</i>

2.3.2. Independent variables:

Capital adequacy is the level of own capital that minimizes distress in banks, sustains banks amid risks, absorbs potential losses, and guarantees debtors [15]. It has the capital required to maintain the credit, transactions, and operational risks to which it is exposed [7]. Capital adequacy measures the performance of banks, proxied by the capital adequacy ratio. According to various scholars, the capital adequacy ratio can be determined by considering many factors, Bateni et al. [46] and Baral [48]. The CAR is measured in terms of a percentage of its total capital (Tier 1 + Tier 2) to risk-weighted assets (RWA) [23], which implies the ability of the banks to meet their obligations and risks. As a regulatory framework introduced in the 1988 Basel I guideline, the CAR requirement for commercial banks stipulated a minimum of 8% [49]. Later, Basel III proposed the minimum CAR requirement of 10.5% (12). The higher the CAR ratio, the better the banks mitigate credit, market, and operational risks [50]. A higher CAR is considered safer and more likely to fulfill its obligations. The main essence of the Capital Buffer theory is that banks maintain extra capital to absorb potential risks. So, the banks could ensure financial stability, regulatory compliance, and management of financial risks and credit supply. On the contrary, the same ratio indicates a negative effect on profitability; so, banks are considered conservative in investing their capital. A CAR can be calculated using the following formula (50).

$$CAR = \frac{\text{Tier 1} + \text{Tier 2 capitals}}{RWA} \%$$

Ha1: CAR has a positive and significant impact on the financial performance of private commercial banks in Ethiopia.

Banks play an intermediary role by efficiently mobilizing public money and disbursing it back to economic sectors in the form of advances and loans [51]. The performance of the banks could be determined by the quality of assets they hold. Loans and advances are the main components of the total assets of the banks in Ethiopia. Asset quality measures the performance of banks since the majority of their sources of revenue come from interest income. Hence, the healthiness of the loan portfolio directly affects a bank's performance. However, non-performing loans adversely affect the quality of assets. As a result, non-performing loans are the prominent threats to the lending financial institutions in general and to the commercial bank in particular [14,15]. A non-performing loan is a loan in which a borrower fails to pay back the principal and interest in a specified period. The credit quality of a bank is measured by the non-performing loan ratio [31]. The asset quality is determined by non-performing loans and measured by different factors; however, in this study, it is proxied by the loan loss provision to total loans (LLPTL) ratio [27].

Ha2: LLPTL has a negative and significant impact on the financial performance of the banks in Ethiopia.

GDP indicates an overall growth in the economy, which is anticipated to have a positive association with the performance of the banks, since its growth would increase banking activities [51]. Most works of literature

have shown significant effects and positive relationships between GDP and the financial performance of the banks [52,38]. However, some studies have indicated negative as well as no significant effects [53,54,55].

Ha3. GDP has a positive and significant impact on the financial performance of the banks in Ethiopia.

The increases in the price of goods and services over time in one country are reflected in inflation (IFL). An inverse relationship is expected between inflation and bank performance since high inflation discourages saving and investment, which could further negatively affect the performance [14,7]. A higher inflation rate diminishes ROA, which further decreases the quality of banks' assets and negatively affects the earnings of the existing borrowers, thereby impairing previously extended loans [6]. In some studies, inflation showed a positive relationship with profitability [56]. However, the findings of various studies show insignificant results [57]. The relationship and its significance are not yet conclusive [58].

Ha4. IFL has a negative and significant impact on the financial performance of the banks in Ethiopia.

3. Research Methods

3.1. Data and Data Collection Tools

This study uses empirical methods to gather data. It focused on six selected private commercial banks from Ethiopia. The banks are selected based on the following criteria: longer service years, higher total assets, higher loan provisions, and higher total equity capital. The banks selected were based on chosen criteria believed to be representative of the private banking sector in Ethiopia. The objective of the study is to assess the impact of capital adequacy, asset quality, and macroeconomic factors on the financial performance of banks. The data gathered for capital adequacy and asset quality assessment were from audited financial statements of the respective banks. The ten-year data from 2014 to 2023 were gathered. Macroeconomic data, including GDP growth and the inflation rate, were obtained from the World Bank database. Before conducting the analysis, unit root tests for stationarity and co-integration tests for long-run relationships were performed to ensure the model's fit. Then, the study is conducted using the panel Fully Modified Ordinary Least Squares (FMOLS) econometric technique. The panel FMOLS estimator is reliable in small-sample studies, and its ability to address endogeneity and serial correlation [59]. Finally, a pairwise Granger causality test was used to discover the causal relationships between variables.

3.2. Model specification

$$ROA_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 LLPTL_{it} + \beta_3 GDP_{it} + \beta_4 IFL_{it} + \varepsilon_{it} \dots \dots \dots \text{Equation 1}$$

$$ROE_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 LLPTL_{it} + \beta_3 GDP_{it} + \beta_4 IFL_{it} + \varepsilon_{it} \dots \dots \dots \text{Equation 2}$$

$$NIM_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 LLPTL_{it} + \beta_3 GDP_{it} + \beta_4 IFL_{it} + \varepsilon_{it} \dots \dots \dots \text{Equation 3}$$

Where, β_0 represents the intercepts, β_{1-4} represents coefficients, CAR= Capital Adequacy ratio, LLPTL= Loan Loss Provision to total loan, GDP= Gross Domestic Product, IFL=Inflation, t-time periods, i-cross sections, ε -error term

3.3. Unit root test

A unit root test was conducted to check whether there is stationarity or non-stationarity among the study variables to avoid spurious regression in the output [60]. There are many ways to test stationarity; however, in this study, the following tests are conducted and reveal unit roots at the level. The variables under study don't exhibit stationarity when tested by the panel unit root tests such as Levin, Lin & Chu, who assume a Common unit root process; the IM, Pesaran & Shin, Fisher ADF, and Fisher pp, who assume individual

variables are tested for unit root; and the Hardi tests. However, the data become stationary at the first difference. In the unit root test, there is no consistently better test. So, different tests were used to compare different results.

3.4. Panel Cointegration Test

When panel data is used, one of the central concepts is the co-integration test for non-stationary variables. The co-integration test is necessary to check the existence of a long-run relationship among the variables [61]. In the Pedroni residual co-integration test, two groups of panels cointegration tests exist, viz, cointegration between the variables across the groups and within-group cointegration [62]. The within-group cointegration presents four statistics of panel tests and four weighted statistics that pool the beta coefficients of the autoregressive and then reflect the problem of heterogeneity across the cross sections. Under the between dimension, there are 3 statistics panel tests. They are based on the average of individual auto-regressive coefficients associated with the tests of the unit root of the residuals for each cross-section across the panel of time series data [53]. The Pedroni cointegration results showed that the majority probability values of the statistics are significant (i.e., 6 out of 11), indicating the existence of cointegration among variables (see Table 2). Moreover, the Kao residual cointegration test p-value was the same as the Pedroni cointegration result (see Table 3). In both cases, the H_0 : there is no cointegration.

Table 1: Pedroni Residual Cointegration Test

Alternat. hypothesis: Common AR coefficients. (Within-dim.)				
	Statist.	Probably.	Weighted Statist.	Probably.
Pan. v-Statistic	1.428887	0.0765	0.677529	0.2490
Pan. rho-Statistic	2.472015	0.9933	2.438635	0.9926
Pan. PP-Statistic	-3.226127	0.0006	-2.872807	0.0020
Pan. ADF-Statistic	-2.251254	0.0122	-2.078117	0.0188
Altern. hypothesis: individual AR coefficients. (Between-dimension)				
	Statist.	Probably.		
Gr. rho-Statistic	3.411014	0.9997		
Gr. PP-Statistic	-2.794713	0.0026		
Gr. ADF-Statistic	-1.743280	0.0406		

Table 2: Kao Residual Co-integration Test

	t-Stat.	Prob.
ADF	-3.598196	0.0002

3.5. Panel cointegration estimators

Most of the time, the FMOLS and Dynamic Ordinary Least Squares (DOLS) panel data estimators are modified versions of OLS, commonly chosen among several. The DOLS is a parametric approach where lagged first-differenced terms are estimated. Moreover, the residuals are augmented with lags, leads, and contemporaneous values of regression outputs. whereas the FMOLS is a non-parametric approach to cope

with corrections for serial correlation; [63] in the cointegration residuals and the endogeneity bias caused by the causal influence from the endogenous to the exogenous variables [64]. Though both models remove the small sample biases and endogeneity, FMOLS imposes additional requirements whereby all variables should possess the same order of integration, and that the regressors should not appear as cointegrated [64]. FMOLS is more flexible in handling residual correlation, which is common in banking. The decision to choose the model between FMOLS and DOLS in this study is based on the appropriateness of data fit. FMOLS provide more efficient estimates than DOLS when the model diagnostics suggest heteroscedasticity and autocorrelation. As a result, the FMOLS model was used in this study. The FMOLS stands out as an indispensable tool for estimating long-run relationships, especially in the presence of non-stationary variables and the existence of cointegration [65].

4. Data Analysis and Interpretation

4.1. Descriptive statistics

The descriptive statistics results are indicated in Table 4.2. The mean values of ROA, ROE, and NIM are 3.62%, 17.80%, and 8.98%, respectively, indicating that ROA and NIM are “very healthy” and the ROE is considered “healthy” conditions. They are above and between the threshold stated in Table 1. The mean value of CAR is above the regulatory requirements of the Basel I and Basel III guidelines, which prescribe a CAR greater than 8% and 10.5%, respectively. The CAR found above the minimum requirement ensures the banks have sufficient capital to absorb reasonable losses of the banks before they become bankrupt.

Table 4: Descriptive statistics

	ROA	ROE	NIM	CAR	LLPTL	GDP
Mean	0.0362	0.1780	0.0895	0.1870	-0.0038	0.0791
Median	0.0246	0.1720	0.0843	0.1566	-0.0035	0.0758
Maximum	0.1454	0.2743	0.2041	0.4545	0.0045	0.1039
Minimum	0.0032	0.0253	0.0602	0.0929	-0.0303	0.0530
Std. Dev.	0.0349	0.0419	0.0276	0.0809	0.0047	0.0182
Skewness	2.3267	-0.2963	2.8150	2.0421	-3.0544	0.0847
Kurtosis	7.0710	4.9083	10.9156	6.8151	18.7958	1.4075
Observations	60	60	60	60	60	60

	ROA	ROE	NIM	CAR	LLPTL	GDP	IFL
Mean	0.0362	0.1780	0.0895	0.1870	-0.0038	0.0791	0.1752
Median	0.0246	0.1720	0.0843	0.1566	-0.0035	0.0758	0.1480
Maximum	0.1454	0.2743	0.2041	0.4545	0.0045	0.1039	0.3390
Minimum	0.0032	0.0253	0.0602	0.0929	-0.0303	0.0530	0.0660
Std. Dev.	0.0349	0.0419	0.0276	0.0809	0.0047	0.0182	0.0941
Skewness	2.3267	-0.2963	2.8150	2.0421	-3.0544	0.0847	0.4977
Kurtosis	7.0710	4.9083	10.9156	6.8151	18.7958	1.4075	1.7962
Observations	60	60	60	60	60	60	60

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Observations	60	60	60	60	60	60

4.2. Regression output

In the study, three dependent variables were regressed with the four independent variables employing the panel FMOLS model. By applying this model, the researcher aimed to gain a comprehensive understanding of the factors that affect the financial performance indicators of the banks, and this helps to draw meaningful conclusions from the results obtained. According to Table 5;

Equation 1, the CAR has positively and significantly impacted the ROA; the result is the same as in the study conducted by Magoma et al. [22]. As the capital Buffer trade-off suggests, the higher capital generally improves profitability. This ensures that banks comply with the regulations of the National Bank of Ethiopia (NBE) and Basel III, thereby reducing the likelihood of forced capital injections or related penalties. It also indicates that banks are well-capitalized, which contributes to lower borrowing costs, greater financial stability, improved investment strategies, reduced financial distress, and enhanced stakeholder confidence. The GDP has also significantly impacted ROA, but it has a negative coefficient sign. This counterintuitive result implies poor utilization of assets during economic expansion. GDP growth often increases in IFL, which causes high operational costs for the banks. The high operation costs further reduce the profitability of the banks. Moreover, inflation reduces the actual value of interest income earned from loans.

Equation 2, the CAR, GDP, and IFL have positively impacted the ROE. From the equity perspective, the study identified that factors such as CAR, GDP, and IFL contribute to improving the banks' performance. The positive impact of CAR on ROE reveals that a bank with a better CAR leads to a higher ROE. The positive effect of GDP on ROE implies that economic growth encourages business expansion, which in turn increases the demand for loans. Efficient loan provision enables banks to meet this demand, thereby enhancing interest income and ultimately improving returns on equity. As a result, profitability will be increased, and higher profit leads to higher deposits, more internal free sources of finance, and increased investment. The effect of CAR on ROE is supported by the studies conducted by Gicharu et al. [15] and Reddy & Prasad [40]. The justification behind the positive impact of IFL on ROE is that higher inflation increases interest income due to banks' adjustment of interest rates on loans. Lending loans at higher interest rates will increase the net interest margin. NIM will contribute to increased ROE, which is also revealed in equation 3.

Table 5: FMOLS regression output

Depend. Variab.: ROA					Depend. Variab.: ROE				Depend. Variab.: NIM			
Variable	Coef.	Std. Error	t-Stat.	Prob.	Coef.	Std. Error	t-Stat.	Prob.	Coef.	Std. Error	t-Stat.	Prob.
CAR	0.2774	0.0184	15.0979	0.0000	0.4577	0.1349	3.3940	0.0014	0.2330	0.0511	4.5604	0.0000
LLPTL	0.1454	0.1849	0.7861	0.4355	0.5335	0.6748	0.7906	0.4329	-0.1768	0.2884	-0.6131	0.5426
GDP	-0.2729	0.0450	-6.0585	0.0000	0.9575	0.2642	3.6244	0.0007	0.1805	0.1008	1.7897	0.0796
IFL	0.0064	0.0054	1.1889	0.2401	0.2342	0.0284	8.2367	0.0000	0.1584	0.0101	15.7443	0.0000
R-sq.	0.60644	Mean depend. var		0.0338	-1.196979	Mean depend. var		0.1761	0.57358	Mean depend. var		0.08896
Adj. R-sq.	0.58283	S.D. depend. var		0.0328	-1.328798	S.D. depend. var		0.041	0.548	S.D. depend. var		0.02641
S.E. of regr.	0.021181	Sum sq. resid		0.0224	0.062577	Sum sq. resid		0.1958	0.017753	Sum sq. resid		0.01576
Long-run variance	8.68E-06				0.000228				3.11E-05			

Equation 3, the variables CAR and the inflation rate impacted NIM. Both variables positively and statistically significantly impacted the NIM. Regarding inflation's effect on profitability, banks should adopt a dynamic interest rate policy approach and inflation hedging mechanisms to maintain profitability while securing against inflation-brought risks. The LLPTL has no statistically significant effects on the financial performance. The result is supported by Alemu [33] and Zergaw et al. [35]. However, asset quality monitoring given to LLPTL is critical to financial performance. Therefore, the banks should strengthen credit risk management frameworks to improve asset quality by minimizing non-performing loans.

4.3. Pairwise Causality tests

The Granger causality modeling is quite popular in determining whether a change in one variable may cause a change in another variable, and this is common in empirical studies (67). Causality tests were applied to highlight the appropriateness of the directions and to draw the appropriate conclusions and suggestions for policies that will be imposed. Applying the lag 3 stacked test is indicated in Table 6. A unidirectional association of Granger causality runs from IFL to CAR and ROA. IFL has a unidirectional relationship with CAR and ROA, but CAR itself does not drive inflation at the macroeconomic level. IFL affects the actual value of capital reserves held by the banks. As inflation rises, the purchasing power of the banks' capital declines. In this case, the remedy is adjusting the CAR by increasing reserves or allocating risk-weighted assets. As a result, the banks could comply with the regulatory requirements by restructuring their balance sheets.

IFL is also a unidirectional Granger-Cause ROA. Inflation affects banks' profitability by influencing operating costs, loan demand, and interest income either positively or negatively. But ROA itself cannot Granger-cause inflation. ROA Granger-Cause CAR reveals a unidirectional relationship between them. Higher profit in terms of ROA increases the retained earnings, which boosts the capital reserves for further reinvestment and thereby increases CAR, but increases in CAR may not necessarily increase ROA in the short run.

Table 3: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
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IFL does not Granger-cause CAR	42	5.25064	0.0043
CAR does not Granger-cause IFL		0.42992	0.7328
ROA does not Granger-cause CAR	42	3.22849	0.0340
CAR does not Granger-cause ROA		1.59662	0.2077
IFL does not Granger-cause GDP	42	2.0E+26	0.0000
GDP does not Granger-cause IFL		2.9E+25	0.0000
ROA does not Granger-cause IFL	42	0.49837	0.6858
IFL does not Granger-cause ROA		5.02081	0.0053

IFL and GDP are both independent macroeconomic variables and have a bidirectional relationship. When IFL Granger-causes GDP, as IFL rises in excess affects GDP negatively due to the decline in the purchasing power of consumers and increased uncertainty. Moderate inflation stimulates the economy by encouraging borrowing and spending. When GDP Granger-causes IFL, the higher GDP growth pushes the price to rise due to the higher demand for goods and services, causing inflation to rise. Equally, the decline in GDP may lead to lower IFL due to reduced demand for goods and services. Generally, a bidirectional relationship between GDP and IFL influences each other, depending on economic cycles, monetary policies, and other external shocks.

5. Conclusion

This study examines the impact of capital adequacy, asset quality, and macroeconomic factors on the financial performance of banks in Ethiopia. Ten years of data from six selected private commercial banks were analyzed. The findings reveal that internal bank-specific factors, particularly the capital adequacy ratio (CAR), play a vital role in determining bank performance. In contrast, external macroeconomic factors such as GDP and inflation (IFL) exhibit mixed effects on different profitability indicators. While GDP has a positive impact on ROE and NIM, it exerts a negative influence on ROA, suggesting inefficient utilization of assets during periods of economic expansion in Ethiopia. Furthermore, the results reveal a bidirectional causality running from IFL to GDP, highlighting the interconnectedness of macroeconomic factors in shaping bank profitability. The Granger causality results strengthen and confirm these conclusions. To ensure robust long-run estimates in the presence of endogeneity and potential serial correlations, the Fully Modified Ordinary Least Squares (FMOLS) estimator was applied.

Based on the results, the study suggests that banks should prioritize maintaining adequate capital reserves to ensure financial stability and sustain profitability. In addition, they should adopt efficient asset management strategies during periods of economic growth. Policymakers are advised to closely monitor inflation to mitigate its adverse effects on banks' performance. Furthermore, to regulate the interplay between inflation (IFL) and GDP, appropriate monetary policies should be implemented to maintain inflation at a manageable level and sustain GDP growth. Finally, to overcome the limitation of generalizability in this study, future research should consider using larger sample sizes and broader datasets, and should incorporate both internal factors (such as bank size and number of branches) and external factors (such as interest rates and exchange rates).

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