

UNDERSTANDING BANK PERFORMANCE IN REGIONAL ECONOMIES: A MIXED-METHODS INVESTIGATION OF FINANCIAL AND OPERATIONAL DRIVERS WITH IMPLICATIONS FOR SUSTAINABLE FINANCE

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ABSTRACT

This study examines the macroeconomic and internal drivers of bank profitability in the Ethiopian banking sector with the use of panel data from eight commercial banks from 2010 to 2023. Return on Assets (ROA) and Return on Equity (ROE) served as measures of performance, whereas explanatory variables included bank-specific determinants like loan to deposit ratio, bank size, loan growth, operating efficiency ratio, and capital adequacy ratio, along with macroeconomic determinants like GDP growth and interest rate. The analysis was conducted using STATA 17 with the random effects model being tested using the Hausman test. Results indicate that bank size and loan growth have a statistically significant and positive effect on ROA, highlighting that large banks could generate more earnings. On the other hand, the capital adequacy ratio was highly negatively associated with ROA and ROE, indicating the presence of a trade-off between profitability and financial safety. From the macroeconomic factors perspective, GDP growth has a positive effect on bank performance, while high interest rates have a negative impact on profitability by raising the costs of borrowing and reducing interest margins. Although the study attempted to integrate sustainable finance issues such as green lending, the lack of a regulatory framework and credible data within the Ethiopian banking sector made quantitative analysis impossible, revealing a fundamental gap in the financial system that necessitates urgent action to establish sustainable finance infrastructure. The study recommends that policymakers pursue regulatory reforms to enable ESG integration and promote sustainable banking practices, which can enhance profitability and align Ethiopia's financial sector with international standards and trends.

Keywords: bank profitability, sustainable finance, internal factors, macroeconomic, Ethiopia

JEL codes: G21, G32, Q01

INTRODUCTION

Banks play a fundamental function in socio-economic development by marshalling unused funds and directing them into productive investments, thus promoting economic growth and national development (Huang *et al.*, 2023; Zavadka, 2018;

Schenk, 2021). Their core functions—accepting deposits and providing loans—not only stimulate economic activity but also make up a major portion of their operating earnings through lending (*Rajindra et al.*, 2021). Moreover, by efficiently helping capital flows to key sectors and infrastructure, banks contribute to economic stability and expansion. As *Čibák et al.*, (2012) emphasize, this is achieved through the effective distribution of excess and/or surplus funds to their most productive uses. In this context, bank profitability becomes a vital indicator of financial health and operational efficiency, enabling organizations to continue their intermediary function and development role (*Berger et al.*, 2020). Accordingly, understanding the drivers of bank profitability and sustainability is necessary for supporting enduring financial progress.

Given this context, this study targets to empirically analyse the key elements of bank profitability, integrating traditional economic and operational factors as well as sustainability-oriented variables. Specifically, the study examines Loan to Deposit Ratio (LD), Capital Adequacy Ratio (CAR), Bank Size (BS), Operational Efficiency Ratio (EFR), and Loan Growth (LG), alongside Green Lending and ESG principles. In this case, profitability is assessed through Return on Equity (ROE) and Return on Assets (ROA), offering a holistic view of how both financial strength and sustainability considerations shape bank performance.

Many studies (eg. *Isayas*, 2022; *Kohlscheen et al.*, 2018) conclude that bank success is influenced by a mixture of macroeconomic and bank-specific factors, including credit growth, interest rates, and exchange rates. However, much of the existing literature primarily focuses on macroeconomic determinants and only a few bankspecific factors while failing to comprehensively address key financial and operational factors such as bank size and efficiency. Moreover, sustainability-related determinants, including green lending practices and ESG performance, remain largely overlooked, despite their growing recognition as key drivers of long-term bank profitability in the changing financial environment. Previous research like (*Tibebe & Gujral*, 2022; *Torre Olmo et al.*, 2021) has primarily measured bank performance using Return on Assets (ROA) or Return on Equity (ROE) as standalone metrics, neglecting a more holistic approach that integrates both traditional profitability drivers and sustainability-linked variables. The absence of a thorough examination of the microeconomic and sustainability-related determinants of bank profitability in Ethiopia presents a critical gap in the literature. In particular, understanding how sustainable finance practices, such as ESG-based risk assessments and green credit policies, impact financial performance is essential for promoting both economic growth and sustainability. However, research on sustainable finance in Ethiopia remains minuscule, highlighting the need for further empirical investigation. This study aims to solve these limitations by examining both conventional financial and operational efficiency-related microeconomic determinants, alongside sustainability-linked factors, in influencing bank profitability in Ethiopia.

Understanding the key drivers of bank profitability is important for financial institutions, regulators, and policymakers in fostering a resilient and efficient banking system. This study contributes to the empirical analysis of bank profitability by examining financial, operational, and sustainable finance-related factors, with a particular focus on the Ethiopian banking sector.

Review of related literature

The performance of banks, often weighed through metrics like Return on Assets (ROA), and Return on Equity (ROE), is shaped by both bank-specific and external macroeconomic factors (Horobet *et al.*, 2021; Lamothe *et al.*, 2024; Abate & Kaur, 2023; Rehman *et al.*, 2018; Yuan *et al.*, 2022). Internal factors, shaped by management decisions, encompass efficiency, risk management, and resource allocation.

Capital adequacy is another critical internal factor ensuring financial stability and resilience, as well-financed banks are better placed to endure economic shocks and sustain profitability (Olawale, 2024; Kohlscheen *et al.*, 2018). This underscores the link between traditional profitability metrics and sustainable finance principles, which enhance strength and long-term value creation (Patel *et al.*, 2022). Empirical studies highlight the association between capital adequacy ratio (CAR), credit risk, operational efficiency, loan growth, and bank size in influencing profitability (Anantiputeri *et al.*, 2023; Christaria & Kurnia, 2016; Gautam, 2019). For instance, a higher CAR is positively correlated with profitability, reinforcing the importance of robust capital buffers for financial stability (Dietrich & Wanzenried, 2014). Additionally, bank-specific factors like non-interest income and capital ratios significantly affect ROA (Al-Harbi, 2019).

External factors, including GDP growth, inflation, exchange rates, and interest rates, also play a fundamental role in bank performance (Yuan *et al.*, 2022). Several studies emphasize that bank profitability is shaped by a combination of bank-specific, industry-specific, and external elements (Busch *et al.*, 2021; Friede *et al.*, 2015; O'Connell, 2023). Among internal determinants, capital adequacy, operational efficiency, and asset quality play a crucial role, as they indicate a bank's ability to manage costs, generate sustainable income, and withstand financial shocks (Athanasoglou *et al.*, 2008; Dietrich & Wanzenried, 2011).

These days, integrating sustainability considerations into financial decision-making has gained significant attention due to its implications for long-term stability and performance (Haessler, 2020). Banks that incorporate ESG factors into their lending and investment strategies tend to experience improved financial stability and risk-adjusted returns (Gangi *et al.*, 2019; Liu & Xie, 2024; Voicu Dan *et al.*, 2022). Awareness of the importance of sustainability issues is crucial for maintaining business interests: sustainability is not only important for the environment, but also for the economy and society (Ahmad *et al.*, 2023). As for the financial industry, and especially the banking industry, it performs a key role in promoting sustainability practices within companies (Andaiyani *et al.*, 2023). As one of the key pillars of the financial industry, the banking sector has great potential to support ESG (environmental, social and governance) practices within companies, which is an important step towards sustainable development (Andrieş & Sprincean, 2023). Sustainability issues that may affect a company's financial performance have only recently been empirically investigated and are still being debated (van Bommel, 2023).

However, despite its growing importance, research on sustainable finance in Ethiopia remains limited, particularly in understanding its impact on bank profitability. Previous studies have primarily measured bank performance using standalone metrics like Return on Assets (ROA) and Return on Equity (ROE), without a comprehensive

exploration of the microeconomic and sustainability-linked determinants of profitability (Lelissa, 2014; Tibebe & Gujral, 2018; Torre Olmo et al., 2021). This leaves a critical gap in assessing how ESG-based risk assessments, green credit policies, and other sustainable finance practices influence bank performance.

To bridge these gaps, this study undertakes an analysis by investigating both traditional financial determinants and sustainability-related factors affecting banking profitability in Ethiopia. Additionally, it integrates some information on sustainable finance principles to evaluate how profitability aligns with long-term ESG objectives, providing a more thorough perception of the evolving role of sustainability in the economic sector.

Based on the preceding literature review and the objectives of this study, the following hypotheses are proposed for testing:

- H1:* The Capital Adequacy Ratio has a significant positive impact on Return on Equity (ROE).
- H2:* Bank Size is positively associated with profitability metrics (ROA and ROE), considering the role of sustainable investment portfolios.
- H3:* Loan Growth has a statistically significant impact on ROA and ROE, and this growth can be directed toward sustainable economic activities.
- H4:* Operational Efficiency, measured by the cost-to-income ratio, significantly affects bank profitability.
- H5:* Loan-to-deposit ratio (LTD) has a significant impact on bank profitability (ROA and ROE).
- H6:* Green Lending contributes positively to bank profitability, and banks strategically balance financial performance with sustainability objectives when allocating credit to environmentally friendly projects.
- H7:* GDP growth rate (GDPGR) has a significant impact on bank profitability (ROA and ROE).

MATERIALS AND METHODS

The main aim of this article is to analyse the determinants of financial performance of commercial banks in Ethiopia, incorporating some ideas and findings of sustainable finance into its discussion. It seeks to identify and understand the effect driven by a specific cause relationship between performance indicators and bank profitability, emphasizing how responsible management of these variables can contribute to both financial profitability and sustainability objectives.

The research methodology aligns with the general and specific objectives of the study, employing random effect regression analysis to quantify the influence of the determinants on the dependent variables, Return on Assets (ROA) and Return on Equity (ROE). Both quantitative and qualitative approaches are utilized to investigate the effects of variables like Loan to deposit ratio, Bank Size, Loan Growth, Operational Efficiency, Capital Adequacy, GDP growth, and Inflation rate, on the financial performance of Ethiopian commercial banks.

Additionally, this study integrates sustainable finance considerations by examining how responsible lending practices can enhance profitability. This perspective aims to

provide actionable insights for policymakers and practitioners to balance profitability with sustainability in the banking sector.

A non-probabilistic purposive sampling method is employed to select a sample of nine commercial banks from the 44 operating commercial banks in Ethiopia. The selection criteria included a focus on banks with a tenure of 10 years and above in the industry. The chosen sample banks comprise Awash Bank, Bank of Abyssinia, Commercial Bank of Ethiopia (a state – owned bank), Cooperative Bank of Oromiya, Dashen Bank, Hibret Bank, Lion International Bank, Nib International Bank, and Wegagen Bank. The study primarily relies on secondary data gathered from the selected banks' websites, focusing on the analysis of annual reports spanning the years 2010 to 2023. The research employs various statistical methods, including multiple regression modeling, descriptive statistics, multicollinearity tests and other diagnostic tests.

Model specification

To examine the influence of internal bank factors' profitability determinants on the performance of commercial banks in Ethiopia from 2010 to 2023 using an econometric approach, the following panel data regression equation is formulated to explain the influence of each factor on the financial performance of Ethiopian commercial banks.

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \dots + \beta_k X_{kit} + \varepsilon_{it} \quad (1)$$

Where:

- Subscript i denotes the cross-sectional dimension (firms). Subscript t refers to the time-series dimension (year).
- Y_{it} represents the dependent variable. β_0 is the intercept (constant) term. β_k is the parameter to be estimated for the explanatory variables.
- X_{kit} represents the observations on the determinant factors for $k = 1, N$ and $t = 1, \dots, T, i = 1, \dots, N$.

Hence, the comprehensive models that encompass all variables to examine the correlation between independent variables and dependent variables (ROA and ROE) are provided below:

Model₁

$$ROA_{i,t} = \beta_0 + \beta_1 LD_{i,t} + \beta_2 BSZ_{i,t} + \beta_3 LG_{i,t} + \beta_4 CAR_{i,t} + \beta_5 OER_{i,t} + \beta_6 GDPGR_{i,t} + \beta_7 INTRATE + \varepsilon_{i,t} \quad (2)$$

Model₂

$$ROE_{i,t} = \beta_0 + \beta_1 LD_{i,t} + \beta_2 BSZ_{i,t} + \beta_3 LG_{i,t} + \beta_4 CAR_{i,t} + \beta_5 OER_{i,t} + \beta_6 GDPGR_{i,t} + \beta_7 INTRATE + \varepsilon_{i,t} \quad (3)$$

Where:

- $ROA_{i,t}$ = Return On Assets of i^{th} bank at year t
- $ROE_{i,t}$ = Return on Equity of i^{th} bank at year t
- $\beta_1 NPL_{i,t}$ = Non-Performing Loan Ratio of i^{th} bank at year t
- $\beta_2 BSZ_{i,t}$ = Bank Size of i^{th} bank at year t
- $\beta_3 LG_{i,t}$ = Loan Growth Rate of i^{th} bank at year t
- $\beta_4 CAR_{i,t}$ = Capital Adequacy Ratio of i^{th} bank at year t

- $\beta_5 OER_{i,t}$ = Operating Efficiency Ratio of the i^{th} bank at year t
- $\beta_6 GDPGR_t$ = Gross Domestic Product Growth Rate of Ethiopia at year t
- $\beta_7 INTRATE_t$ = Lending Interest Rate of Ethiopian Banks at year t
- $\varepsilon_{i,t}$ = Error Term Capturing Unobserved Effects

RESULTS AND DISCUSSION

As shown in *Table 1* below, on average, the banks in the study had a quite stable return on assets (ROA) of 2.8%, with a small variation in profitability from 1% to 5.2%. The 0.799 value of the loan-to-deposit ratio (LD) indicates that banks lend out about 80% of their deposits, although loan amounts vary among banks. Banks in the study were comparable in terms of their total assets, as evidenced by the mean value of 11.9 for the bank size variable in the summary statistics. Loan growth (LG) and bank efficiencies varied significantly, with banks expanding their loan portfolios by an average of 35.5% and exhibiting efficiency ratios ranging between 40.3% and 89.6%, respectively, indicating differences in risk, growth strategies, and operational efficiency.

Capital soundness or capital adequacy, as shown by the capital adequacy ratio (CAR) of 12%, is generally considered as a sign of financial stability and sound capital compared to the standard CAR level of 8%. Economic conditions were reasonably stable, with the GDP growth rate (GDPGR) averaging 8.6% and the interest rate (INTRATE) maintaining an average of 13%.

Overall, the descriptive statistics indicate a stable banking ecosystem with some fluctuations in certain variables like loan growth and efficiency, indicating variances in banks' strategies and risk management. These results provide ground for understanding the causes that influence the profitability of banks in Ethiopia, which will be further analyzed in the following sections of the article.

Table 1: Descriptive statistics of variables under study.

Variable	Obs	Mean	Std. Dev.	Min	Max
ROE	112	0.201	0.054	0.112	0.366
ROA	112	0.028	0.009	0.010	0.052
LD	112	0.799	0.088	0.600	0.969
lnBS	112	11.9	0.535	10.517	13.07
LG	112	0.355	0.124	0.202	0.722
EFR	112	0.551	0.100	0.403	0.896
CAR	112	0.120	0.016	0.070	0.149
GDPGR	112	0.086	0.017	0.061	0.114
INTRATE	112	0.130	0.011	0.119	0.150

Pairwise correlation analysis and multicollinearity diagnosis

From *Table 2*, we can observe that the ROE values in the sample range from 5.4% to 36.6%, with an average of 20.1%. The median ROE is 11.2%, which is lower than the mean, suggesting a right-skewed distribution where a few high-performing banks may be pulling the average upward. This spread indicates considerable variation in

profitability across the sampled banks, possibly reflecting differences in management efficiency, capital structure, or risk exposure.

The test was conducted to examine pairwise correlation to see the relationships between the most crucial variables: Return on Assets (ROA), Loan to Deposit Ratio (LD), Bank Size (lnBS), Loan Growth (LG), Efficiency Ratio (EFR), Capital Adequacy Ratio (CAR), GDP Growth (GDPGR), and Interest Rate (INTRATE).

The results show that ROA is negatively related to LD (-0.035) and BS (-0.055), while it is positively related to LG (0.205) and GDPGR (0.265). Conversely, ROA is negatively related to EFR (-0.282), CAR (-0.483), and INTRATE (-0.245), which shows that higher capital adequacy, operational inefficiency and rising lending interest are associated with declining profitability.

The LD ratio has low correlations with the other variables, indicating low direct relations in the model.

Bank Size (BS) is positively and moderately correlated with EFR (0.408) and INTRATE (0.388), which means that larger banks have greater costs of operations and are more sensitive to changes in interest rates. However, BS is highly negatively correlated with GDPGR (-0.683), which suggests that large banks do not always benefit when the economy expands.

Loan Growth (LG) is weakly positively related to BS (0.073) and EFR (0.078) but negatively related to CAR (-0.139) and GDPGR (-0.281) and therefore has conflicting implications for macroeconomic performance and growth policies.

Efficiency Ratio (EFR) is weakly positively related to INTRATE (0.480), but negatively related to GDPGR (-0.441), and thus suggests that with improved economic performance and increased interest rates, efficiency in operations has the potential to decline.

Capital Adequacy Ratio (CAR) is always inversely related to other variables, most notably to ROE (-0.483) and BS (-0.243), such that more capitalized banks can be less profitable and of smaller size.

GDP Growth (GDPGR) reflects high inverse relations with BS (-0.683) and INTRATE (-0.691), and moderate inverse relations with LG (-0.281) and EFR (-0.441), underlining the relation between macroeconomic performance and bank performance.

Finally, INTRATE is positively correlated with BS (0.388) and EFR (0.480), but inversely correlated with GDPGR (-0.691) and CAR (-0.128), which means that increased interest rates are associated with larger bank size and reduced economic growth.

In general, the correlation matrix suggests strong correlations among financial, operating, and macroeconomic variables, which potentially have implications for bank performance and strategy.

With respect to multicollinearity problems, all independent variables apart from Bank Size possess low Variance Inflation Factor (VIF) values, suggesting few multicollinearity problems. VIF test results suggest that Loan to Deposit Ratio (1.02), Efficiency Ratio (1.21), Capital Adequacy Ratio (1.35), GDP Growth Rate (1.29), and Interest Rate (2.79) are considerably lower than the generally accepted level of 5, suggesting that none of the variables have a multicollinearity problem. However, Bank Size shows a relatively larger

VIF of 4.16, but still within limits. Being below the critical value of 10 for any of the variables, overall, multicollinearity is not a concern for the model.

Table 2: Correlation and multicollinearity diagnosis

Variable	ROE	ROA	LD	BS	LG	EFR	CAR	GDPGR	INTRATE
ROE	1.00								
ROA	0.89	1.00							
LD	0.05	-0.04	1.00						
lnBS	-0.07	-0.06	-0.02	1.00					
LG	0.24	0.21	0.01	0.07	1.00				
EFR	-0.18	-0.28	0.05	0.41	0.08	1.00			
CAR	-0.45	-0.48	-0.04	-0.24	-0.14	-0.05	1.00		
GDPGR	0.24	0.26	-0.05	-0.68	-0.28	-0.44	-0.07	1.00	
INTRATE	-0.24	-0.25	-0.03	0.84	0.07	0.48	-0.13	-0.69	1.00
Multicollinearity Diagnostics:									
VIF			1.02	4.16	1.21	1.35	1.29	2.79	3.94

Model estimation, assumptions and diagnostics

In this part, some tests of model assumptions and model fit diagnostics are conducted and presented as follows.

Table 3: Model estimation

Model	Random Effect (RE)		Fixed Effect (FE)	
	ROE	ROA	ROE	ROA
LD	0.00651 (0.0483)	-0.00368 (0.00727)	-0.00640 (0.0497)	-0.00704 (0.00760)
BS	0.0293 (0.0182)	0.00592** (0.00240)	0.0194 (0.0243)	0.00132 (0.00371)
LG	0.0901** (0.0385)	0.0147*** (0.00559)	0.0644** (0.0424)	0.0124* (0.00648)
EFR	-0.0396 (0.0499)	-0.0166** (0.00735)	-0.0465 (0.0533)	-0.0166** (0.00814)
CAR	-1.167*** (0.308)	-0.221*** (0.0450)	-0.910*** (0.338)	-0.166*** (0.0517)
GDPGR	0.544 (0.402)	0.0921 (0.0623)	0.453 (0.402)	0.0693 (0.0614)
INTRATE	-1.959** (0.825)	-0.320*** (0.116)	-1.550** (1.016)	-0.142 (0.155)
_CONS	0.185 (0.206)	0.0244 (0.0308)	0.250 (0.227)	0.0548 (0.0347)
Wald Chi2	42.75	77.73	-	-
Prob>F	0.000	0.0000	-	-
F-Statistics	-	-	3.55	5.31
Prob>F	-	-	0.0019	0.0000

Specification test for models (Hausman Test for RE against FE)

As shown in *Table 4*, a Random Effects (RE) panel regression model was estimated to examine the determinants of bank profitability. The choice between Fixed Effects and Random Effects models was examined by applying the Hausman test, which yielded a p-value of 0.8326 and 0.117 for ROE and ROA, respectively, supporting the suitability of the Random Effects specification.

Table 4: Hausman test results

	ROE	ROA
Chi2 (7)	3.52	11.52
Prob > chi2	0.8326	0.1173
Model Chosen	Random Effect	Random Effect

Furthermore, as shown in *Tables 5 and 6*, diagnostic tests were conducted to validate key regression assumptions. The manual Wooldridge test for autocorrelation in *Table 6* confirmed the presence of first-order autocorrelation (coefficient = 0.2184; p = 0.018). Additionally, the Breusch–Pagan/Cook–Weisberg test for heteroskedasticity in *Table 7* indicated significant heteroskedasticity in both ROA ($\chi^2 = 11.59$; p = 0.0007) and ROE ($\chi^2 = 3.38$; p = 0.0330) models.

Regarding normality of errors, although the residuals showed no significant skewness, the kurtosis component of the normality test was significant, suggesting serious tails than a normal distribution. Given the sample size, this mild deviation is unlikely to severely impact the reliability of the regression estimates, and robust standard errors have been used to ensure valid inference (*Table 8 and Table 9*).

Table 5: Skewness and Kurtosis tests for normality

Variable	Observation	Prob (Skewness)	Prob (Kurtosis)	Adj.	Prob>Chi2
Residuals	112	0.092	0.0311	6.92	0.0315

Table 6: Autocorrelation test

Method	Variables	Coefficient	P – Value	Result
Manual Wooldridge test	Uhat_lag	0.2184	0.018	Autocorrelation
	_Cons	-0.00018	0.758	

Table 7: Breusch–Pagan/Cook–Weisberg test for Heteroskedasticity

	Fitted Values for ROE	Fitted Values for ROA
chi ² (1)	3.38	11.59
Prob > chi ²	0.0330	0.0007

Table 8: Random effects regression (Robust standard errors for ROA)

ROA	Coef.	St.Err.	Sig
LD	-0.004	(0.007)	
lnBS	0.006	(0.002)	**
LG	0.015	(0.006)	**
EFR	-0.017	(0.007)	
CAR	-0.221	(0.045)	***
GDPGR	0.092	(0.062)	**
INTRATE	-0.320	(0.116)	***
Constant	0.024	0.031)	

Robust standard errors are in parentheses. $p < 0.01$ (***), $p < 0.05$ (**), $p < 0.1$ (*).

Table 9: Random effects regression (Robust standard errors for ROE)

ROE	Coef.	St.Err.	Sig
LD	0.007	(0.030)	
lnBS	0.029	(0.019)	
LG	0.090	(0.052)	*
EFR	-0.040	(0.097)	
CAR	-1.167	(0.421)	***
GDPGR	0.544	(0.240)	**
INTRATE	-1.960	(0.776)	**
Constant	0.185	(0.249)	

Robust standard errors are in parentheses. $p < 0.01$ (***), $p < 0.05$ (**), $p < 0.1$ (*).

The bank-related internal variables studied, including loan-to-deposit ratio (LD), bank size (lnBS), loan growth (LG), efficiency ratio (EFR), and capital adequacy ratio (CAR), have mixed impacts on profitability. Bank size and loan growth contribute positively and significantly to ROA (p – values of 0.022 and 0.048, respectively), meaning that large banks and loan book-growing banks have better asset utilization and income generation. This is aligned with the findings of (Blatter & Fuster, 2022; Grzeta et al., 2023), who captured such benefits of economies of scale and increased loans. However, other studies have reported contrasting results, indicating that bank size negatively and significantly affects financial performance, with larger banks tending to underperform (Asongu & Odhiambo, 2019; Blatter & Fuster, 2022; Ojeyinka & Akinlo, 2021). The positive impacts of loan growth also contradict other studies like (Vithessonthi, 2023), who found that loan growth can have adverse effects on financial performance, particularly when banks fail to properly assess and manage the associated credit risk. Vithessonthi's study emphasized that aggressive loan growth could contribute to a higher level of non-performing loans (NPLs) and lower profitability, especially during periods of economic downturn or financial instability.

As shown in the regression summary, both LD ratio and efficiency ratio were observed to have statistically non-significant associations with ROA and ROE (p – values of 0.598 and 0.829, respectively), indicating that such liquidity and operating

determinants may not necessarily determine profitability in the Ethiopian context. This is consistent with (Suroso, 2022), who captured the potential risk of a high LD ratio but found its effect on profitability to be inconclusive. The CAR, however, indicated a strong negative correlation with both ROA and ROE (p - values of 0.00 and 0.006, respectively), indicating that while regulatory capital increases stability, it comes at the cost of reduced income potential. While this is supported by (Balami & Chalise, 2023; Silaban, 2017), who assumed that big capital cushions can reduce leverage and returns, the negative association between CAR and performance is not universally accepted. Several studies provide contrasting evidence, suggesting that strong capitalization enhances profitability by improving a bank's risk profile and investor confidence. For example, (Bitar et al., 2018; Spaseska et al., 2022; Sunaryo, 2020) all report a positive and significant impact of CAR on bank performance measured by ROA and ROE. Their findings emphasize that banks maintaining robust capital buffers are more capable of enduring market volatility, attracting funding at favorable rates, and expanding lending activities more securely, thereby improving their overall profitability.

Coming to macroeconomic variables, GDP growth (GDPGR) and interest rate (INTRATE) both contributed sizably to bank performance. GDP growth contributed sizably and positively to ROA and ROE (p – values of 0.028 and 0.023), indicating that a growing economy increases bank profits through increased lending possibilities and money movement. This finding is consistent with (Bikker, 2004), who emphasized the importance of economic cycles to the profitability of the bank, and (Vong & Chan, 2006), who proved GDP growth improves performance in the banking industry of Asian economies. In contrast, interest rates at a high level displayed negative and high correlation with profitability, as they were associated with diminished ROA and ROE (p = 0.006 and p = 0.012, respectively). The above supports (Dietrich & Wanzenried, 2011), who highlighted the detrimental role of high interest rates for banks' net interest margins. However, it goes against (Claessens et al., 2018), who argue that higher rates are sometimes in the best interests of banks, particularly where liabilities are repriced before assets. The converse evidence between contexts supports the necessity for country-specific evaluations when determining macro-financial linkages.

To conclude, the findings of this research corroborate that the internal and external determinants all significantly affect Ethiopian commercial banks' financial performance, although with different signs and magnitudes. Internal factors like bank size and loan extension have a positive effect on profitability, whereas excess capital (CAR) appears to constrain returns. Macroeconomic wise, growth in the economy enhances profitability, whereas rising interest rates dampen it. These findings support and contradict elements of existing literature, showing that although certain dynamics are universally apparent, their specific effects depend on institutional context, market structure, and regulatory regimes.

In *Table 10*, Summary of Hypotheses, Test Results, and Decisions is presented to enable readers to instantly and easily identify which hypotheses were accepted, which were rejected, and which could not be tested.

Thus, the study highlights the importance for policymakers and bank managers of adjusting policies that balance internal operational efficiency with external economic realities, as well as carrying out additional studies on emerging drivers like sustainable finance, which is understudied due to the lack of data in Ethiopia.

Table 10: Summary of Hypotheses, Test Results, and Decisions

Hypothesis	Description	Test Result	Accept/Reject Decision
H1	CAR has a significant positive impact on ROE	Negative and significant	Rejected
H2	Bank size is positively associated with ROA and ROE	Positive on ROA (significant), ROE (not significant)	Partially supported
H3	Loan growth has a significant impact on ROA and ROE, and can support sustainability	Positive and significant for both	Accepted
H4	Operational efficiency significantly affects profitability	Significant negative impact on ROA	Accepted
H5	Loan-to-deposit ratio significantly affects profitability	Not significant	Rejected
H6	Green lending positively affects profitability and sustainability	Not tested (due to lack of data)	NA
H7	GDP growth rate significantly affects profitability	Positive but not statistically significant	Rejected

Despite the initial desire to incorporate sustainable finance-related variables in the empirical study, this study was largely limited since there was no credible and quantifiable data available in the Ethiopian banking industry. This drawback is primarily due to the absence of an official regulatory framework and uniform reporting methods for sustainable finance activities in the country, which is also mentioned by (Fufa, 2024). Therefore, a quantitative examination of the impact of sustainable finance—such as green lending—on bank profitability was not possible.

Nonetheless, this limitation reveals a fundamental gap in the Ethiopian financial system, particularly as international banking standards are increasingly inclined towards considering environmental, social, and governance (ESG) aspects. The integration of sustainable finance metrics is not only desirable but also mandatory to achieve long-term financial well-being, effective risk management, and inclusive economic development (Cantero-Saiz *et al.*, 2024). Therefore, even if empirical testing could not be carried out within the scope of this study, the findings strongly demand the imperative establishment of regulatory frameworks and institutional data infrastructures to enable subsequent research and implementation of sustainable finance in Ethiopia.

Other evidence demonstrates the actual benefits of sustainable finance instruments such as green lending. For example, (Sutrisno *et al.*, 2024) found that UAE banks that

offered greater credit to environmentally friendly projects recorded lower non-performing loan (NPL) ratios, which indicated better credit quality and lower risk exposure. In China, (Danye, 2020) reported that banks that extended green credit products not only enhanced their bottom line but also improved their public image, thereby indicating the twin advantage of profitability and corporate social responsibility. These international outcomes provide a compelling basis for Ethiopian decision-makers and financiers to support sustainable finance as a strategic thrust.

CONCLUSION

This study examined both internal and macroeconomic variables affecting the performance of banks in Ethiopia, revealing distinct patterns that offer practical insights for the banking sector. Among the internal factors, bank size and loan growth exhibited positive and statistically significant effects on profitability, as measured by return on assets (ROA). This suggests that larger banks and those expanding their loan portfolios are better positioned to utilize their assets effectively and generate income. However, the capital adequacy ratio (CAR) was found to have a strong negative association with both ROA and return on equity (ROE), indicating that holding excess capital, while beneficial for regulatory compliance and stability, may limit income-generating capacity. The loan-to-deposit ratio and efficiency ratio, by contrast, showed no statistically significant impact, implying that, within the Ethiopian context, these metrics may not be primary drivers of bank performance.

From a macroeconomic perspective, GDP growth positively influenced profitability, reinforcing the view that broader economic expansion creates favorable conditions for banks through increased financial activity, lending opportunities, and customer engagement. On the other hand, rising interest rates were associated with a significant decline in profitability, suggesting that higher borrowing costs may reduce demand for loans and compress net interest margins. These contrasting effects highlight the importance of aligning monetary policy and banking strategies with prevailing economic conditions to maintain sustainable performance.

While this research endeavored to investigate the role of sustainable finance, such as green lending, in influencing bank profitability, it faced significant data limitations. The absence of a formal regulatory framework and standardized reporting for ESG-related banking practices in Ethiopia meant that these variables could not be quantitatively analyzed. Nonetheless, this limitation brings to light a pressing institutional gap. As global financial systems increasingly integrate environmental and social considerations, Ethiopia's financial sector must also move in this direction. Sustainable finance holds clear potential to enhance profitability, improve risk management, and promote inclusive growth. The inability to measure these effects quantitatively in this study should be seen as a call to action for regulators and institutions to establish the necessary infrastructure to support future research and practice in this area. In doing so, Ethiopian banks can position themselves to benefit from emerging global trends and contribute to long-term national development goals.

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