Effect of Inflation on the Profitability of Commercial Banks in Ethiopia

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Declaration

I declare that this is my original work and that it has not been presented to any university other than Addis Ababa University for examination.

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This is to certify that the Research Project prepared by Adeba Negassa Gage, titled: "*Effect of Inflation on the Profitability of Commercial Banks in Ethiopia"* and submitted in partial fulfillment of the requirements for the Degree of Master of Business Administration in Financial Services complies with the regulations of the University and meets the accepted standards for originality and quality.

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Abbreviation

CPI	Consumer Price Index
FE	Fixed Effects
GDP	Gross Domestic Product
MENA	Middle East and North Africa
NBE	National Bank of Ethiopia
NIM	Net Interest Margin
OLS	Ordinary Least Squares
RE	Random Effects
ROA	Return on Assets
ROE	Return on Equity

Abstract

Ethiopia has seen steadily climbing inflation in the past few years, with profound effects on many sectors of the economy, including the banking sector. Yet the exact impact of this recent, double-digit inflation on Ethiopian commercial banks' profitability remains open for further evaluation. For this purpose, using panel data from 2010 to 2022, this study analyses both macroeconomic and bank-specific factors that affect Ethiopian commercial banks' profitability - with particular attention to inflation. The study employed a panel data regression method. The panel data estimates show that the profitability of commercial banks (as determined by return on assets) is positively and statistically significantly impacted by inflation. The findings of the study emphasize the necessity for commercial banks in Ethiopia to diversify their revenue streams, keep an eye on the policy and real interest rates, and prioritize efficiency and competitiveness. To stabilize the inflationary pressure in the economy, the paper also recommends that the National Bank of Ethiopia keep implementing the required timely macroeconomic measures and properly manage its interest rate policy.

Keywords: Inflation, Profitability, Commercial Banks, Panel Data Regression, Ethiopia

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Ethiopia is not an exception to the widespread macroeconomic phenomenon of inflation, which affects practically every nation at some stage of its economic growth. Ethiopia's economy has seen substantial ups and downs in recent years due to both internal and international economic problems that have exacerbated inflationary pressures (Nuru, 2022).

Although it is widely believed that inflation harms bank profitability, there is continuous discussion on whether this is the case across all nations, regions, and economic conditions. Recent studies have shown that inflation can impair banking performance by increasing credit risk and reducing profitability. Awdeh et al. (2024) found that high inflation deteriorates banks' credit risk profiles, thereby impairing overall financial stability.

However, other research suggests that inflation may enhance bank performance. Banks often adjust their lending rates to offset inflationary pressures, leading to increased nominal revenues. Thus, moderate inflation may support profitability, particularly in markets with flexible interest rate environments. For instance, a study by Maria and Hussain (2023) found that inflation expectations have a significant and positive impact on accounting-based measures of banking performance in the Indian banking sector.

Given the present state of the economy, it is critical to understand how inflation impacts Ethiopia's banking industry's performance. First off, internal issues including supply chain interruptions, currency devaluation, and fluctuations in food prices, as well as more general global economic situations, have caused Ethiopia to experience erratic and frequently high

inflation rates in recent years (Nuru, 2022). Understanding how these inflationary pressures impact commercial banks' stability and capacity to provide long-term profitability is crucial.

Second, Ethiopia's economic growth depends heavily on the banking sector. Extremely high inflation rates can hinder attempts to promote financial inclusion, limit investment in vital industries like manufacturing and agriculture, and make it harder to obtain affordable loans.

Moreover, the banking industry in Ethiopia functions within a distinct institutional and regulatory structure. There is a strong regulatory oversight by the National Bank of Ethiopia (NBE), including stringent interest rate and currency controls. Government-owned dominated banks and little outside competition is also its defining characteristics. These characteristics influence how inflationary pressures affect bank performance and call for country specific examination of how inflation affects profitability.

The results of the study are anticipated to be useful to commercial banks and policymakers. Furthermore, by offering current empirical data to back up the discussion of how inflation impacts the profitability of Ethiopia's banking sector, this study fills a gap in the existing literature.

1.2 Statement of the Problem

Both internal and external causes have contributed to the Ethiopian economy's recent years of persistent double-digit inflation (EEA, 2024; Nuru, 2022). Yet only a few researchers have examined the scope and effect of inflation on bank profitability in Ethiopia. Besides, many of these studies leave out crucial control variables which are acknowledged in literatures as important factors influencing profitability of commercial banks. Furthermore,

previous researches frequently rely on data from a small number of institutions or a period of only a few years, which limits the robustness and generalizability of the conclusions.

On top of this, research on how inflation affects Ethiopian banks' profitability has produced conflicting and even inconsistent findings. While Kidane (2020) observed a favorable significant effect on bank profitability, Worku (2019) and Mamo (2020) found inflation to be statistically negligible. This disparity highlights the need for further study on this subject in Ethiopian context.

Discrepancies in previous research emanates from Methodological variations Kidane (2020) employed dynamic panel models, whereas Worku (2019) relied on cross-sectional data. Omission of factors such as non-interest income is also the main causes of discrepancies in previous research. These inconsistencies would limit the generalizability and practical value of their conclusions and hinder policy makers' ability to set resilient policies.

Therefore, to fill the above-observed gaps, this study examines the effects of inflation on profitability of commercial banks in Ethiopian utilizing data of a sample of ten commercial banks covering thirteen years (2010–2022) to offer a more thorough understanding of the connection between profitability of banks and inflation in the Ethiopian context.

Furthermore, a panel data regression is used to give a robust framework for comprehending the pressure of inflation on bank profitability. The study has also incorporated a wider range of factors such as Capital Adequacy, Deposit Ratio, Bank Size, Non-Interest Income Ratio, Loan-to-Assets Ratio, lending interest rate, and real GDP growth.

1.3 Objectives of the Study

The main objective of this study is to examine how Ethiopian commercial banks' profitability is impacted by inflation. The specific goals of the study are as follows:

i. Evaluate the effect of inflation on commercial banks profitability in Ethiopia, using specifically one key financial performance metric: return on assets (ROA).
ii. Estimate the effect of lending interest rates on commercial banks' profitability
iii. Estimate the effect of the Real GDP growth rate on Commercial banks' profitability
iv. Analyze the relationship between bank size (log of assets) and profitability
v. Evaluate the effect of the non-interest income ratio on commercial banks' profitability
vi. Evaluate the effect of capital adequacy on the commercial banks' profitability

1.4 Significance of the Study

Many stakeholders, including the National Bank of Ethiopia, policymakers, and commercial banks that are currently doing business in Ethiopia, will find the study helpful.

Decision-making procedures will be enhanced if the approximate relationship between inflation and bank profitability is fully understood. The overall results of the research will provide stakeholders with the guidance they need to take advantage of the possibilities and challenges of inflation and to better calibrate their policies to promote economic growth and financial stability in Ethiopia. Moreover, this study will also add to the literature concerning bank profitability and inflation.

1.5 Scope of the Study

The aim of this paper is to examine how Ethiopian commercial banks' profitability was impacted by inflation between 2010 and 2022. The investigation focuses on ten commercial banks that are active in the nation. The primary measure of profitability was return on assets.

Return on Assets was chosen as the key metric of profitability because it accurately depicts how successfully a bank uses its total assets to create profits. This aligns with the study's objective of examining how inflation affects bank profitability generally. Inflation affects the whole economy, including banking operations, and ROA establishes a clear relationship between profitability and asset efficiency. This makes it a comprehensive statistic for assessing how inflation affects bank performance overall.

In contrast, measurements such as Return on Equity (ROE) are more sensitive to changes in a bank's capital structure, such as changes in equity levels or leverage. Moreover, ROA is preferred over ROE as Ethiopia’s banks face leverage restrictions, making ROA a more stable metric for asset efficiency under inflation. These changes can hide the real impact of external forces, such as inflation, on profit. The study's focus on ROA provides a more clear and precise measurement of the impact of inflation.

The research also includes the following independent variables along the main independent variable of interest, i.e. inflation: capital adequacy, deposits to total assets ratio, loans to total assets ratio, real GDP growth, lending interest rates, and noninterest income.

1.6 Organization of the Study

There are five chapters in this research paper. The introduction is the first chapter of the study and includes the study's background, problem statement, research questions, objectives, significance, and scope. The literature and empirical research that are relevant to it are covered in Chapter 2. The study's methodology is explained in Chapter 3. Chapter 4 contains the linear regression analysis and discussion, along with a thorough examination of how inflation affects Ethiopian commercial banks' profitability. The study's conclusion and potential recommendations are presented in the last chapter.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Review of the Theoretical Literature

The connection between inflation rates and the profitability of commercial banks has been the subject of numerous studies, especially in developing countries like Ethiopia. An effective way to learn about the economy's stability and how banks function is to understand what happens to financial institutions during periods of inflation. To model the possible effects of inflation on profitability commercial banks, this study of the literature has synthesized research data from a variety of situations.

2.2 Overview of Inflation and Its General Economic Implications

According to Cogoljević et al. (2018), inflation is the rate at which prices for goods and services generally increase, which reduces a currency's buying power. It is a crucial economic metric that influences markets and the economy as a whole. Several pricing indices, including the Consumer pricing Index (CPI), are commonly used to calculate the inflation rate.

Monetary aggregates, discount rate, and exchange rate are only a few of the numerous variables that affect inflation (Cogoljević et al., 2018). Inflation rates can also be greatly impacted by external variables such as oil prices, fiscal deficits, money supply, and economic development (Ding et al., 2023).

Recent empirical studies indicate that high inflation rates can adversely affect investment and economic growth. For instance, Maiga (2024) found a significant negative correlation between inflation and GDP growth in Tanzania, suggesting that higher inflation rates are

associated with lower economic growth. Keeping inflation under control is essential to preserving economic stability. Because of this inflation targeting is a monetary strategy used by the majority of nations to stabilize prices and anchor inflation expectations (Nasir et al, 2019).

2.3 Theories on Inflation

Important economic theories of inflation that are particularly pertinent to commercial banks' operations are listed in this section. A solid understanding of inflation dynamics, particularly the demand-pull and cost-push theories, is crucial for banking institutions, which must navigate the complex market environment. This part of review of the literature highlights research on the connection between inflation and commercial banking profitability, specifically focusing on the impact of cost-push and demand-pull factors.

2.3.1 Demand-Pull Inflation Theory

When demand for goods and services increases more quickly than supply, demand-pull inflation occurs, which inevitably leads to increased prices (Ghoshal, 2022). When the economy is expanding and people are feeling more confident and spending more, it is particularly crucial for the banking industry since this increases demand for loans (Ghoshal, 2022).

More recent analysis by Palley (2022) demonstrates how fiscal stimulus programs in developing economies can trigger demand-pull inflation through credit channel effects, with banks experiencing a 15-20% surge in loan demand during expansionary periods.

Contemporary research by Nguyen et al. (2023) confirms the inflation-profitability nexus, finding African banks maintain positive correlations between inflation and ROA when operating in regulated interest rate environments.

New evidence from the African Development Bank (2023) shows demand-pull inflation initially increases bank lending volumes by 12-18% in Sub-Saharan Africa, but sustained inflation beyond 18 months leads to deteriorating loan quality (NPL ratios increasing by 4.2 percentage points).

2.3.2 Cost-Push Inflation Theory

On the other side, cost push inflation happens when manufacturing costs increase and consumers pay more. Increased operational expenses brought on by outside shocks can affect commercial banks' lending policies and profit margins while also complicating operational strategy (Ghoshal, 2022).

Studies by Giovanni et al. (2022) and Alhassan et al. (2023) suggest that while inflation may lead to nominal increases in revenue; it may also result in higher costs and lower actual profitability. This duality highlights the difficulties banks encounter when they have to weigh the advantages of more income against growing operating expenses in an inflationary climate.

Empirical work by Mugume (2022) confirms that cost-push inflation reduces bank efficiency ratios by 0.8 percentage points for every 5% inflation increase in East African economies, with particularly severe impacts on SME lending portfolios. Commercial banks are particularly concerned about the risk of cost-push inflation, because businesses will be

less inclined to borrow as operating expenses rise, but banks will also have to pay more, which will reduce their profit margins and perhaps raise the percentage of loan default.

A 2023 World Bank study of South Asian banks reveals operating expenses increase by 1.8% for every 10% inflation rise, reducing return on assets by 0.6 percentage points and increasing loan rejection rates by 9%. This result supports the idea that borrowing becomes more expensive as inflation increases, which may discourage companies from applying for loans. As a result of less lending activity, banks may see a decline in revenue. This opinion is further supported by Yao et al. (2018), who demonstrate that inflation harms Pakistani banks' profitability and emphasizes how cost-push inflation lowers bank profits and increases default rates.

2.4 Bank Profitability and Metrics to Measure Profitability

Profitability is a key factor in a bank's growth and financial system stability. It explains how successfully a bank can generate revenue and returns from its operations, making it a critical concern for bank management and a central issue for the financial system as a whole (Ristanovic, 2023). Because banking is such a specialized industry with such a vast range of goods, measuring bank profitability is a challenging task. Return on Equity (ROE), Return on Assets (ROA), and Net Interest Margin (NIM) are common indicators of bank performance.

- Return on Assets (ROA): This ratio is an indication of how well a bank is utilizing its resources to make profits (Al-Homaidi et al., 2018).
- Return on Equity (ROE): This is an indicator of the return produced on owners' equity (Al-Homaidi et al., 2018).

- Net Interest Margin (NIM): This is an indication of the spread between interest income and interest expenses expressed as a percentage of the bank's assets (Paukmongkol, 2023).

These profitability ratios are often used to evaluate bank performance both in practice and research (Borroni & Rossi, 2019). But it's crucial to remember that risk-adjusted return measurements are also available and can offer a more thorough understanding of bank profitability (Borroni & Rossi, 2019).

2.5 Determinants of Profitability of Commercial Banks

Technological, regulatory, macroeconomic, and internal factors collectively determine bank profitability. Recent research by Dietrich and Wanzenried (2023), bank-specific factors, such asset and loan management, are crucial to profitability. While poor management, especially when it comes to credit risk, has negative consequences, effective management of these internal components has a favorable correlation with profitability metrics like ROA and ROE.

Borroni & Rossi (2019) found that greater capital ratios typically result in improved profitability, demonstrating the major influence of capitalization on profitability. Even while larger banks may see operational benefits, efficient asset management is still necessary to prevent declining returns since excessive asset growth can lead to diseconomies of scale.

Macroeconomic variables like inflation and economic growth have a big influence on bank profitability. Research on Indian and Pakistani banks shows that while inflation tends to raise expenses and hurt profitability, economic development has a beneficial effect on performance (Borroni & Rossi 2019).

Bank performance is also influenced by the competitive and regulatory environment. Strong regulatory frameworks increase capitalization and risk management, which boosts profitability, as shown by Borroni & Rossi (2019). Profitability is also impacted by competition in the banking industry. While less competitive markets may result in better profitability, more rivalry may spur efficiency and innovation, which might eventually boost profitability.

2.6 Empirical Studies

2.6.1 Review of global studies on the impact of inflation on commercial banks

The performances of commercial banks and inflation have a complicated and nuanced relationship. The literature is also inconclusive regarding the effects of inflation on profitability of banks; with findings seem to depend on context and the state of the economy.

Recent studies continue to find that inflation negatively impacts bank performance. For example, Awdeh et al. (2024) examined banks in the MENA region and found that higher inflation rates undermine bank stability and profitability by eroding the real value of returns and increasing operational costs.

Other research has shown contradictory or situation-specific results. For example, Poudel (2018) found that inflation had a very small negative impact on Nepal's commercial banks' profitability, indicating that inflationary pressures might not substantially influence bank profitability there. Similarly, Kobia (2018) found that bank profitability and inflation were negatively correlated in their study of the Kenyan banking sector, indicating that as inflation decreased, bank profits increased.

Overall, it appears that the effect of inflation on the profitability of commercial banks varies by country and economic situation. There is a positive association, a negative correlation, or no link at all.

2.6.2 Specific Studies Related to Ethiopia

Numerous studies have analyzed the effect of inflation on profitability of commercial banks' in Ethiopia's, with varying and often ambiguous findings. According to several studies, inflation has very little impact on bank profitability. For instance, Worku (2019) found that inflation was not statistically significant on the profitability of Ethiopian private commercial banks.

Similarly, Mamo (2020) discovered that profitability metrics like Return on Equity, Return on Assets, and Net Interest Margin were not significantly impacted by macroeconomic factors like inflation.

Other research, however, suggests that inflation and bank profitability might be linked. Inflation was a statistically significant explanatory variable of ROA, as Kidane (2020) observed a favorable significant effect on bank profitability. Also, Tura (2022) found that inflation significantly affected the commercial banks' financial performance, with both Return on Assets and Return on Equity negatively affected by inflation. This indicates that inflationary pressures could have a damaging effect on performance and profitability of banking business in Ethiopian.

To sum up, the local studies examining the connection between inflation and bank profitability in Ethiopia present mixed results. Some studies report no relationship at all, others a possible or even detrimental one. This inconsistency highlights the importance of

more research to fully comprehend the dynamics of Ethiopia's inflation and bank profitability.

2.7 Knowledge Gaps and Future Research Directions

Despite the growing body of research on how inflation affects bank profitability, most of the research on Ethiopian commercial banks has focused on a small number of variables, typically leaving out crucial macroeconomic indicators like foreign exchange rates, real GDP growth, lending interest rates, and bank-specific factors like non-interest income. These gaps suggest that to fully represent the diverse range of factors influencing bank profitability in Ethiopia, a larger, more comprehensive collection of variables should be employed in future studies. Moreover, Prior research has typically been based on limited data, sampling just a small number of institutions or a short period.

2.8 Conceptual Framework

The conceptual framework is a diagram that depicts the interrelatedness of the variables in this research.

Independent Variable:

Inflation Rate: In this study, the inflation rate refers to the general inflation in the economy, reflecting the general increment in prices of goods and services

Dependent Variable:

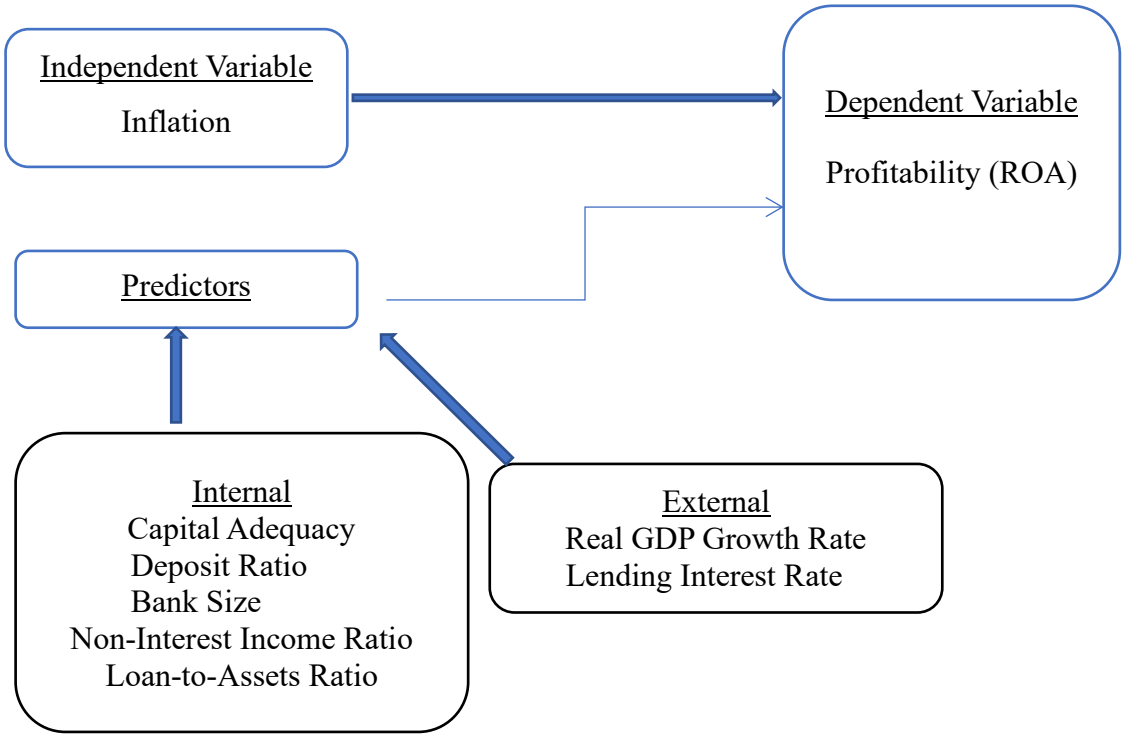
Profitability: Profitability is the explanatory variable, the measure of how well banks turn their assets into profits, which is a measure of operational efficiency. Return on Assets (ROA), a metric of financial performance frequently used to evaluate the performance of commercial banks in Ethiopian, is utilized in this study to quantify profitability.

Control Variables:

Bank-Specific Factors: Among these are factors that might affect profitability regardless of inflation. The factors are capital adequacy, bank size, loan-to-deposit, non-interest income and loan-to-assets ratios.

Macroeconomic Variables: As a means of capturing the broader economic factors affecting profitability, other macroeconomic indicators such as real GDP growth rate, and the lending interest rate are included. These factors can either reinforce or mitigate the effects of inflation on bank profitability.

Figure 2.1: Conceptual Framework



Source: Developed based on pieces of literature

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter summarizes an overview of the methodology utilized to undertake out the study. It contains sections on research design, target population, sampling methods and procedures, data collection techniques and tools, data analysis instruments, and a description of the model applied in the study.

3.1 Research Design

This study looked at the effect of inflation on profitability of commercial banks in Ethiopia by using a quantitative research design and econometric method (i.e., panel data regression analysis) to analyze balanced panel data from ten commercial banks operating in Ethiopian.

The study examined the effects of independent variables like bank size, non-interest income ratio, GDP growth rate, lending interest rate, inflation rate, deposit-to-total asset, capital adequacy, and loan-to-total asset. On the dependent variable side return on assets (ROA) is as a measure the profitability of commercial banks.

3.2 Population

All commercial banks that are registered with and conducting business in Ethiopia under the supervision of the National Bank of Ethiopia (NBE) make up the study's target population. As of now, there are 31 licensed commercial banks in Ethiopia, with 30 being privately owned and 1 state-owned.

3.3 Sample Size and Sampling Technique

Out of the 31 commercial banks operating in Ethiopia, ten (Awash International Bank, Bank of Abyssinia, Cooperative Bank of Oromia, Dashen Bank, Hibret Bank, Lion International Bank, Nib International Bank, Oromia International Bank, Wegagen Bank, and Zemen Bank) were chosen.

The sample banks for this study were chosen via purposive sampling, with an emphasis on commercial banks that had comprehensive financial accounts for the thirteen years 2010–2022 and that functioned consistently during that time.

Purposive sampling was purposefully chosen to guarantee data consistency and dependability during the 13-year study period (2010–2022), even though it may add selection bias by rejecting smaller or younger banks. The ten commercial banks that were chosen were ones that ran consistently during the time frame and kept comprehensive audited financial records, which is an essential prerequisite for reliable panel data regression.

The sample comprises major and mid-sized banks with a range of ownership structures, product offerings, and customers, even if this method restricts the findings' applicability to all Ethiopian banks. As such, it provides a fairly accurate representation of the formal commercial banking industry. However, this constraint is recognized, and when more information about newer banks becomes accessible, future research may take into account wider sampling techniques.

3.4 Data Source and Collection Methods & Instruments

In order to fulfill the objectives of the study and reduce the likelihood of data distortion, the researcher ran the econometric model using only secondary data, specifically from the audited annual financial statements of the selected private commercial banks and inflation rate reports from the National Bank of Ethiopia (NBE).

The kind of secondary data used in this study is panel data, which comprises both cross-sectional and time-series dimensions. Panel data is used because it improves the effectiveness of econometric estimations by increasing the number of data points and degrees of freedom while decreasing multi-collinearity among the explanatory factors.

Additionally, individual heterogeneity resulting from unobserved variables may be taken into account by panel data, which could provide biased findings if ignored in time series or cross-sectional analysis. This rationale led the researcher to use panel data.

Thus, thirteen years of audited financial statements i.e. balance sheets and profit and loss statements spanning the years 2010–2022 are used in the study. This yields 130 observations with 10 chosen commercial banks, which is enough to do panel data estimation for fixed-effect or random-effect models.

3.5 Methods of Data Analysis

A panel regression model—which includes pooled OLS, fixed effects and random effects models and descriptive statistics was used to examine the gathered panel data. The Stata software program, version 17, was used to do the analysis. The data's mean, standard deviation, minimum and maximum values were analyzed using descriptive statistical

techniques. Additionally, diagnostic tests were performed before proceeding to panel data regression in order to guarantee the accuracy of the estimation findings and conclusions.

3.6 Econometric Model Specification

Panel data refers to a type of data that consists of observations of multiple phenomena collected over various time periods for the same group of individuals, units, or entities. In econometrics, panel data encompasses multidimensional data collected over time. In this study, the model uses Return on Assets (ROA) as the dependent variable to measure the profitability of commercial banks. The explanatory variables include; Deposit to total asset ratio, capital adequacy ratio, loan-to-total asset ratio, bank size, non-interest income ratio, lending interest rate, GDP growth rate, and inflation rate.

The omission of certain macroeconomic variables such as political instability, foreign exchange rates, and regulatory policy changes, which may also influence bank profitability, is acknowledged in this study. Exchange rate was not included in the regression model because Ethiopia has fixed exchange rate policy.

Moreover, for other omitted variables reliable and sector-wide or bank-level time-series data for the full study period (2010–2022) was not available. Other important macroeconomic factors, such inflation, GDP growth, and lending interest rates, which are strongly connected with more general economic policy dynamics, are included in the study to make up for their removal and increase the model's explanatory ability. With improvements in data access and quality, future studies should try to incorporate these missing characteristics.

Therefore, based on the relationships among these bank profitability indicators and specific bank determinants, the following equation represents the general model of the study, employing panel regression:

$$ROA_{it} = \boldsymbol{\beta_0} + \sum_{m=1}^{n} \beta_m X_{it}^{m} + \sum_{k=1}^{n} \beta_k X_{it}^{k} + \boldsymbol{\varepsilon_{it}}$$

Where ROA_{it} is the explanatory variable and is an observation on profitability measures of Return on Asset, for the bank i at time t, and $\boldsymbol{\beta_0}$ is the constant term. $\sum_{m=1}^{n} \beta_m X_{it}^{m}$ is vector of m^{th}bank-specific variables. While the second set of independent variables $\sum_{k=1}^{n} \beta_k X_{it}^{k}$ is vector of k^{th} external variables, ε_{it} is the error term.

Therefore, the general model which incorporates all the variables to test the hypotheses of the study is:

$$\boldsymbol{LROA_{it} = \beta_0 + \beta_1 LDR_{it} + \beta_2 LCA_{it} + \beta_3 LLTAR_{it} + \beta_4 LBS_{it} + \beta_5 LNIR_{it} + \beta_6 RLIR_{it} + \beta_7 GDPG_{it} + \beta_8 INF_{it} + \varepsilon_{it}}$$

Where:

β_0 ……Constant

β_1…….β_8 ……..……Coefficient of independent variable

ROA_{it}…….……Return on asset of ith bank on the year t

DR_{it}…… Deposit ratio of ith bank on the year t

CA_{it}……... Capital adequacy of ith bank on the year t

$LTAR_{it}$……..… Loan to Total Asset Ratio of ith bank on the year t

BS_{it}……Size of ith bank on the year t

NIR_{it}……. Noninterest Income Ratio of ith bank on the year t

$RLIR_t$……..…Lending Interest Rate of ith bank on the year t

$GDPG_t$……...……GDP growth rate of ith bank on the year t

INF_t……...……Inflation Rate of ith bank on the year t

ε_{it} …….…..…... Error term

L ……. natural logarithm

This study employed a panel model to analyze the collected data because it accounts for:

i. Variations over time and individual differences in observable behavior across the aggregated time series, and

ii. Both observed and unobserved individual heterogeneity. Panel data regression analysis can be conducted primarily in three ways: To estimate the predictors influence on ROA, the following panel regression models were used:

   a. The ***Pooled OLS estimate***, Pooled OLS is a method of panel data analysis which assumes that all units are homogenous and that there are no unique effects for each unit or period.

   b. The ***Fixed Effects model***, which accommodates heterogeneity among different cross-sections by allowing each cross-section to have its own intercept; and

   c. The ***Random Effects model***, which also accounts for heterogeneity and is time-invariant, but assumes that the individual-specific effects are uncorrelated with the independent variables.

3.7 Definition and Measurement of Variables

- **Dependent Variable:**

Return on asset (ROA): Return on Assets (ROA) is a key financial metric that measures a bank's profitability relative to its total assets. It is calculated by dividing the bank's net income by its average total assets. ROA indicates how efficiently management is using the bank's assets to generate earnings—a higher ROA reflects more effective performance (Harvard Business School Online, 2023).

- **Independent Variables**

- **Bank Specific Variables (Internal Factors)**

Deposit Ratio (DR): calculated by dividing a bank's total deposits by its total assets, measures the extent to which a bank's assets are funded by customer deposits. A higher DR indicates that a larger portion of the bank's assets is financed through deposits, which are generally considered a stable and low-cost source of funding. This can enhance the bank's ability to generate loans and, consequently, increase profitability (Al-Homaidi et al., 2018).

LDR (Loan-to-Deposit Ratio): This is a ratio to compare a bank's total loans to its total deposits in order to determine how liquid it is. It shows how much a bank is lending out on its deposits, which is a crucial component of bank risk and profitability. A more aggressive lending strategy is indicated by higher values, whilst a more cautious strategy with a greater liquidity position is indicated by lower values (Mehzabin et al., 2018).

Capital adequacy (CA): It is calculated by taking the total amount of deposits held by a bank and dividing it by its total assets. This measure indicates how much the deposits gathered by the bank help finance its assets. A higher collection of deposits enables the bank

to create more loan opportunities, which in turn can lead to increased profits (Al-Homaidi et al., 2018).

Loan to Total Asset Ratio (LTAR): Loans and advances are intended to be the main source of income and expected to positively influence a bank's profitability (Al-Homaidi et al., 2018). It is calculated by dividing total loans by total assets. Represents the proportion of assets allocated to loans, which could impact profitability based on the performance of the loan portfolio.

Bank's Size (BS): Bank size is indicated by the logarithm of total assets. Research has shown that an increase in size has a positive effect on profitability up to a certain point. While profitability tends to rise as banks grow larger, there comes a threshold beyond which the impact becomes negative (Mehzabin et al., 2018).

Noninterest Income Ratio (NIR): It is calculated by dividing incomes outside interest income by total income, measuring the proportion of non-interest income that banks earn relative to their overall income. The profitability of the bank is expected to improve with an increase in non-interest income (Alhassan et al., 2023).

- **Macroeconomic Variables (External Factors)**

Real Lending Interest Rate (RLIR): The true cost of borrowing and its effect on bank lending profitability are reflected in the real lending interest rate, or RLIR. This suggests that banks could boost lending rates by a higher proportion than they do for deposits. On the other hand, rising real interest rates may raise borrowers' actual debt loads, which could lower asset quality and negatively affect profitability (Dietrich et al., 2023).

GDP growth rate (GDPG): Recent studies, such as those by Rahman et al. (2020), highlight that GDP growth positively influences bank profitability by expanding credit opportunities and improving asset quality. However, Neupane (2020) notes that the relationship can be nuanced, as rapid growth may also intensify competition or regulatory pressures, potentially offsetting some benefits. These findings underscore the importance of contextual factors in determining how GDP growth impacts bank performance.

Inflation Rate (INF): While some studies like Bolt et al. (2019) found that high inflation erodes bank profitability by increasing operational costs and credit risks in developing economies, others such as Tan and Anchor (2017) demonstrated that banks in ASEAN countries could maintain profitability during inflationary periods through effective interest rate adjustments.

Table 3.1: Summary of variables used for analysis

Variables	Notation	Variable Measurements	Expected Sign
Financial performance (Return on Asset)	**ROA**	$\frac{Net\ income\ (after\ tax)}{Total\ asset}$	**Dependent Variable**
Deposit Ratio	**DR**	$\frac{Total\ Deposit}{Total\ asset}$	**+ve**
Capital adequacy ratio	**CA**	$\frac{Total\ Equity}{Total\ asset}$	**+ve**
Loan to Total Asset Ratio	**LTAR**	$\frac{Total\ Loans}{Total\ Assets}$	**+ve**
Bank's Size (Asse size)	**BS**	Natural logarithm of total assets	**+ve**
Noninterest Income Ratio	**NIR**	$\frac{Non-Interest\ Income}{Total\ Income}$	**+ve**
Lending Interest Rate (Real)	**RSIR**	-	**-ve**
GDP growth rate (Economic growth rate)	**GDPG**	-	**+ve**
Inflation Rate	**INF**	Growth rate of CPI	**-ve**

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis and discussion of findings on the impact of inflation on the profitability of selected Ethiopian commercial banks using panel data from 2010 to 2022. Descriptive Statistics is where the analysis starts, giving an idea of the data and stating summary statistics for the study variables.

Diagnostic tests including the Hausman test, Heteroskedasticity in fixed effect regression model, and autocorrelation were conducted to validate the model assumptions. To strengthen the robustness of the inflation estimates Pooled Ordinary Least Squares (OLS), Fixed Effects (FE), and Random Effects (RE) regression models were employed and the inflation estimates are significant across the three models ensuring consistency and reliability

The regression analysis provides a detailed examination of the relationships between profitability (ROA) and inflation, and other predictors. A commentary that applies financial or economic theory to the findings and connects the empirical data to previous studies follows.

4.2 Descriptive Statistics

This part provides preliminary overview for the variables used in the study offering an initial overview of profitability, inflation, and other key predictors of Ethiopian commercial bank's performance.

Table 4.1: Summary statistics for the variables used in the model

Variable	Obs	Mean	Std. dev.	Min	Max
ROA	130	.0273077	.0115998	0	.08
CA	130	.1333077	.0294494	.08	.21
DR	130	.7762308	.0466101	.64	.87
LTAR	130	.4986154	.1015443	.31	.75
NIR	130	.4591538	.1749686	.01	.92
BS	130	10.20644	.4789135	9.023507	11.26338
RLIR	130	.1283808	.0095712	.11875	.1425
RGDPG	130	.0256095	.0165671	-.0215682	.054859
INF	130	.1557692	.0931092	.028	.341

Source: Author's calculation, 2024

The average inflation rate of 15.6 percent with a standard deviation of 9.3 percent indicates high variance. Inflation ranged from 2.8% to 34.1%, indicating fluctuations that could impact bank profitability and financial stability over time.

The average real GDP growth rate of 2.6 percent (with a range from -2.16 percent to 5.49 percent) indicates sluggish growth with some contractions, which could influence demand for banking services and loan performance. Moreover, the relatively consistent real nominal interest rate of 12.8 percent (mean of 12.8 percent) acts as a reflection of a tightly regulated lending environment with relatively little variation (i.e., standard deviation of 0.96 percent).

Narrow variation is observed in the size of banks, which is captured by the natural logarithm of total assets, suggesting that the banks in the sample are of comparable size, which ranges from 9.02 to 11.26, which ensures comparability in the sampled banks. Regarding the loan-

to-asset ratio, about 50 percent of the assets of each bank are devoted to lending, with some variation across the sample from 31 percent to 75 percent.

A very high mean deposit ratio, which is 77.6%, suggests a heavy reliance on deposits as a source of funding, a common feature of commercial banks. However, the spread suggests that some banks have more diversified funding sources. The average capital adequacy ratio of 13.3 percent indicates a healthy capital position for most banks, with enough buffers to absorb possible losses. Finally, an average ROA of 2.7 percent represents low profitability, with some banks achieving 8 percent. The standard deviation indicates the existence of variation in the performance banks.

4.3 Panel Regression Results and Discussion

All required regression tests were carried out prior to accepting and analyzing the regression results (refer Appendix 1). The Hausman test was conducted to see which model, Fixed Effects (FE) or Random Effects (RE), is more appropriate for our analysis. The Hausman test checks whether the unique errors (unobserved effects) in the model are correlated with the explanatory variables.

The p-value is 0.0000, so the test is highly significant, implying there is indeed some association between the unobserved effects and the explanatory variables, meaning that the Fixed Effects (FE) model is the best model to use for our analysis because it controls for the correlation between the unobserved effects and the explanatory variables, thus providing more accurate and reliable estimates for our analysis. Consequently, the FE model results are used for final interpretation.

Results from the Wooldridge test for autocorrelation in panel data show that there is first-order autocorrelation in our panel. With a p-value of 0.0155 (smaller than 0.05), we can say that there is a first-order autocorrelation. This implies that error terms are correlated for entities, and that this can be problematic for the accurate estimation of parameters unless it is properly accounted for. Therefore, I clustered the standard errors in the model to correct for autocorrelation. This correction returns standard errors that are robust to autocorrelation and heteroskedasticity.

The Modified Wald test for group-wise heteroskedasticity with a p-value of 0.0000, in the fixed effects model indicates that there is heteroskedasticity in the model. This implies that residual variance exists between banks and so might the efficiency of coefficient estimates and the validity of inference. The researcher estimated a robust fixed effect model that computes a robust variance estimator based on a variable list of the equation to address the heteroskedasticity issue. This adjustment will help to maintain the un-biasedness and validity of the standard errors in the face of heteroskedasticity and lead to more trustworthy p-values for inference.

Multicollinearity was assessed using the Variance Inflation Factor (VIF). All variables had VIF values well below the commonly accepted threshold of 10, indicating no serious multicollinearity issues. Therefore, the explanatory variables are not highly correlated with each other, and the model coefficients remain interpretable.

OLS, Fixed Effects (FE), and Random Effects (RE) models were utilized in the study to investigate how inflation affected Ethiopian commercial banks' profitability. To handle heteroscedasticity and autocorrelation, robustness tests were performed on all of these models, guaranteeing accurate and consistent parameter estimations.

A thorough investigation of the connections between inflation, profitability (ROA), and other factors is provided by the regression analysis. It is then followed by a commentary that evaluates the results in light of current literature and financial or economic ideas and tries to link empirical results to earlier research. The results demonstrate that while high lending interest rates and demands attributed to GDP growth impose pressure on Ethiopian banks, inflation and revenue diversification (via noninterest income) have a favorable impact on the profitability of the banks.

As shown in Table 4.2 below column three, Inflation is Significant across all models. This shows the robustness and the strength of inflation effect on commercial banks profitability in Ethiopia. The Fixed Effects (FE) estimates reveal that inflation has a positive and statistically significant effect on bank profitability (LROA). A 1-unit increase in inflation is associated with an approximate 86.3 percent increase in profitability, holding other variables constant. It may seem counterintuitive that a 1% increase in inflation is linked to around a 0.86% increase in ROA. The price flexibility of banks and the composition of their revenue streams, however, provide an explanation for this in the Ethiopian banking sector. Banks frequently raise lending rates more quickly than deposit rates during inflationary time, which widens the interest rate spread and raises net interest margins.

This result aligns with contemporary studies such as Talavera et al. (2018), who demonstrate that in moderate inflationary environments, banks can preserve profitability through dynamic loan pricing strategies. Similarly, Elnahass et al. (2021) found that banks in emerging markets actively adjust interest margins to offset inflationary pressures, thereby stabilizing returns.

Both Kidane (2020) and Tura (2022) highlight Ethiopian banks' capacity to maintain margins through proactive rate changes, implying that, with proper management, inflationary pressures might boost profitability. Interest revenue can be increased by higher rates, particularly if banks raise lending rates to reflect inflation more quickly than their expenses do.

However, the FE result shows that the Real GDP growth rate significantly lowers profitability, indicating that economic expansion may bring about market circumstances or competition that lower bank profitability in the short-term. All other factors held constant, LROA decreases by 3.24 percent for every unit rise in GDP growth.

Despite the fact that GDP development is typically linked to higher bank profitability, in Ethiopia context however, increased competition may result in narrower interest margins and greater operating expenses as banks compete for market share. This paradoxical negative relationship aligns with the Structure-Conduct-Performance paradigm and the Competition- Profitability hypothesis, which suggest that increased competition in a growing economy may erode margins and increase cost pressures, ultimately reducing profitability despite greater economic activity. Recent empirical studies (e.g., Barua et al., 2016; Lelissa et al., 2018) support the Structure-Conduct-Performance (SCP) paradigm and the competition–profitability hypothesis, suggesting that higher competition in financial markets despite economic expansion can lead to reduced margins and lower profitability.

The findings of Yao et al. (2018), who discovered that expansion in quickly emerging countries might occasionally put burden on banks via escalating competitiveness and regulatory demands, are consistent with this negative link. Economically speaking,

expansion can raise operating costs, therefore Ethiopian banks might profit by streamlining processes to be profitable in a market that is expanding.

Profitability has also been adversely and considerably impacted by the real lending interest rate. With all other factors held constant, the FE model shows that a 1-unit rise in RLIR is linked to a 19.50-percent drop in LROA, suggesting a serious negative impact on bank profitability. Real lending interest rates have a significant detrimental impact on ROA, which is indicative of how higher borrowing costs lower credit demand and erode banks' primary revenue stream. Elevated real rates in Ethiopia also raise the chance of default risk, particularly for retail and small business borrowers, which raises loan loss provisions.

This finding is consistent with that of Bogale (2019), who discovered comparable difficulties in the Ethiopian banking industry, where high interest rates may restrict loan demand or increase the likelihood of default. This finding aligns with the results of Kohlscheen et al. (2018), who found that higher short-term interest rates tend to reduce bank profitability in emerging markets by increasing funding costs, whereas higher long-term rates can enhance profitability through improved interest margins.

Borroni and Rossi (2019) emphasize further that, particularly in emerging economies, prudent interest rate management is essential to striking a balance between risk and profitability.

Table 4.2: Effect of Inflation on Profitability of Commercial Banks

	(1)	(2)	(3)
	OLS	Fixed Effect	Random Effect
Log of Capital Adequacy	0.320*	0.144	0.320*
	(2.28)	(1.79)	(2.28)
Log of Deposit Ratio	-0.0403	-0.513	-0.0403
	(-0.08)	(-0.57)	(-0.08)
Log of Loan to Asset Ratio	0.607	0.410	0.607*
	(1.98)	(1.43)	(1.98)
Log of Noninterest Income Ratio	0.351***	0.327***	0.351***
	(5.84)	(9.40)	(5.84)
Log of Bank Size	0.0181	1.309	0.0181
	(0.02)	(0.45)	(0.02)
Lending Interest Rate	-16.94**	-19.50*	-16.94**
	(-3.10)	(-2.59)	(-3.10)
RGDP Growth Rate	-2.897	-3.245*	-2.897
	(-1.71)	(-3.17)	(-1.71)
Inflation	0.885**	0.863*	0.885**
	(2.78)	(3.00)	(2.78)
Constant	-0.202	-3.501	-0.202
	(-0.08)	(-0.52)	(-0.08)
Observations	128	128	128

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: the standard error of the fixed effect model is robust since heteroskedasticity is found as a problem.

Source: Author's estimation, 2024

The result pertaining to bank size, however, shows no statistically significant effect on profitability, indicating that asset expansion by itself does not always result in higher profits. The advantages of economies of scale may be outweighed by possible operational inefficiencies or market saturation that larger banks deal with.

On the other hand, non-interest income significantly and favorably affects profitability. When all other factors are held constant, a one percent rise in LNIR is linked to a 0.33 percent increase in LROA, indicating that revenue diversification significantly boosts bank profitability. According to the findings, banks with greater non-interest revenue which comes from fees, commissions, and other non-loan activities tend to be more profitable.

Non-interest income's ability to increase profits underscores the critical importance of income diversification for banks. This finding aligns with recent research by Köhler (2015) and Nguyen et al. (2020), who demonstrate that revenue diversification through non-interest activities enhances profitability while reducing banks' exposure to interest rate volatility.

Yao et al. (2018) also note that non-interest income can be a dependable source of income, particularly in markets with fluctuating interest rates. Ethiopian banks can increase their capacity to withstand interest rate swings and sustain long-term profitability by establishing non-interest revenue streams.

Despite having a positive coefficient, the loan-to-asset ratio is not statistically significant; suggesting that the percentage of assets devoted to loans has no apparent effect on profitability in this model. Though, in theory, allocating a larger share of assets to loans could result in profit improvement through accrual of interest income, the effect on the profit improvement may be inconsistent for several reasons such as: Credit risk and loan quality, asset diversification and income stability. In line with the study's findings, Mamo (2020) calculated that the loan-to-asset ratio had a little impact on Ethiopian banks' profitability.

Increased reliance on deposits relative to assets may marginally lower profitability, as evidenced by the Deposit-to-Total Asset Ratio's negative (though statistically insignificant) impact on ROA. However, this relationship may vary based on factors including deposit

maintenance costs and operational structures. These results are consistent with recent research by Dietrich et al. (2014) and Tran et al. (2020), which discovered that although deposit funding offers stability, the influence it has on profitability is heavily dependent on banks' capacity to control related expenses. High deposit ratios only increase profitability when combined with effective liability management techniques, according to their studies in emerging countries.

Lastly, capital adequacy has a favorable but not statistically significant effect on profitability, suggesting that while a strong capital base may support profitability, its effect is not definitive. This conclusion is in line with Ristanović and Mirković (2023) findings in Serbian banks that while capital adequacy enhanced stability, it did not have a significant effect on profitability.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter is a brief overview of the key findings derived from the study of the effects of inflation on commercial banks profitability. It doesn't just conclude the analysis but also makes recommendations for stakeholders. It also outlines the constraints study ran across and makes recommendations that can further illuminate the topic.

5.1 Conclusion and Summary of Key Findings

This study investigated the effects of inflation and many macroeconomic and bank-specific variables on the profitability of commercial banks in Ethiopian using Return on Assets (ROA) as the main profitability gauge. This study yielded some important clues about how these factors affect bank performance.

Inflation has a favorable effect on profitability banks. Additionally, non-interest income was found to be a highly significant positive predictor of profitability, underscoring the significance of having several sources of income. Banks have shown to be stable and profitable by generating income from sources other than interest fees.

However, profitability was negatively impacted by real GDP growth and the real lending interest rate. High lending interest rate shrinks profitability since they tend to deter borrowing and increase loan defaults. Similarly, the negative correlation with real GDP growth may indicate that banks' profit margins may be under pressure from competition or changes in the banking sector brought on by economic expansion. The positive but less noticeable effect that other traits, such capital adequacy, had on profitability served to emphasize the need to have a strong capital basis.

The study concludes by showing that profitability of commercial banks in Ethiopian is influenced by both macroeconomic and bank-specific factors, with inflation and income diversification acting as the main determinants.

Although this study provides valuable insights on the connection between Ethiopian commercial banks' profitability and inflation, it should be noted that it has a number of limitations.

First, the study has excluded potentially influential variables such as political instability, foreign exchange rates, and regulatory policy changes, which may also influence bank profitability.

Second, even though purposive sampling is justified by the availability of data; it may add selection bias, which would limit the results' applicability to smaller or more recent banks. Furthermore, the study used Return on Assets (ROA) as the only indicator of profitability, which may not fully capture the range of financial performance even if it is a suitable metric for assessing asset efficiency.

5.2 Recommendations

From the results and interpretation of the regression analysis of the effect of inflation and other variables on the profitability of commercial banks in Ethiopia, the following suggestions are made:

Diversify Income Sources: since our panel data regression shows that non-interest income is such a positive factor in bank profitability, banks should not be reliant on interest income. Expanding fee-based services, wealth management, and other non-interest-driven incomes

can provide stability against fluctuations in interest rate income, especially during high inflation periods.

- Expanding fee-based services (e.g., mobile transactions, card services, ATM usage).
- Offering business advisory and SME support services,
- Scaling digital payment solutions like wallets and QR code payments,
- Providing foreign exchange and trade finance products for exporters/importers.

Focus Lending on Inflation-Resilient and Growth-Driven Sectors: To take advantage of inflation-linked profitability:

- Prioritize sectors with pricing power (e.g., agro-processing, wholesale).
- Support exporters and FX earners.
- Avoid excessive lending to high-risk, low-margin segments.

Monitor Real Interest Rates and the policy: Since inflation and profitability are positively correlated in our fixed effect estimate, banks must be wise to pay close attention to loan pricing policies to get profit during inflationary periods. To reduce any potential effects on loan demand and borrowers' ability to repay, they must, nevertheless, continue doing comprehensive risk assessments. Furthermore, regulators may want to look at interest rate rules to see if they are inadvertently hurting bank lending and economic activity, considering the detrimental impact the real interest rate has on bank profits. Policies that provide stable real interest rates may lead to a more robust banking industry.

Prioritize efficiency and competitive differentiation: Banks should prioritize efficiency and competitive differentiation as real GDP growth had a detrimental effect on bank profitability,

most likely as a result of heightened competition or changes to regulations in an expanding economy.

- Automate loan approvals, customer service, and compliance.
- Digitize account opening and loan origination processes.
- Consolidate or upgrade low-performing branches

Foster a Stable Inflationary Environment: even if our regression result shows a favorable impact of inflation on a bank's profitability, too much inflation is disruptive. Moderate and stable prices, which are conducive to bank profitability and economic growth, are what policymakers should strive for.

5.3 Suggestions for Future Research

Given the constraints this study found, the following issues are suggested for consideration in future research:

Examine Additional Variables: Scholars should investigate how additional macroeconomic and bank-specific elements, such changes in regulations, political instability, technological adoption, and exchange rate dynamics, affect bank profitability. This might improve knowledge of the various aspects affecting ROA.

Broader Measures of Financial Performance: This study primarily focused on ROA as the measure of profitability. Other financial performance metrics, such as return on equity (ROE), return on investment (ROI), and return on capital employed (ROCE), and return on deposits (ROD), should be investigated in future. Examining these indicators will enable comparisons across other performance parameters and provide insights into how inflation impacts various sides of financial performance.

Qualitative Research Methods: This study only focuses on the quantitative research approach because of time and financial constraints. Nonetheless, using qualitative research techniques, such focus groups or interviews with bank executives, financial analysts, and economists, can offer important insights into the causes of the patterns in profitability that have been noticed. This could have offered a more thorough comprehension of the variables affecting profitability.

References

African Development Bank. (2023). *Inflation dynamics and banking sector performance in Africa: 2023 annual report*. https://www.afdb.org/en/documents/inflation-dynamics-and-banking-sector-performance-africa-2023-annual-report

Alhassan, A. L., & Biekpe, N. (2023). Inflation and bank profitability in Africa: The cost-revenue paradox. *Journal of Financial Stability, 64*, 101112. https://doi.org/10.1016/j.jfs.2023.101112

Alhassan, A. L., & Tetteh, M. L. (2023). The impact of non-interest income on commercial bank profitability in the Middle East and North Africa (MENA) region. *Journal of Risk and Financial Management, 17*(3), 103. https://www.mdpi.com/1911-8074/17/3/103

Al-Homaidi, E. A., Tabash, M. I., Farhan, N. H., & Almaqtari, F. A. (2018). Bank-specific and macro-economic determinants of profitability of Indian commercial banks: A panel data approach. *Cogent Economics & Finance, 6*(1), 1548072. https://doi.org/10.1080/23322039.2018.1548072

Awdeh, A., El Moussawi, C., & Hamadi, H. (2024). The impact of inflation on bank stability: Evidence from the MENA banks. *International Journal of Islamic and Middle Eastern Finance and Management, 17*(2), 379-399. https://doi.org/10.1108/IMEFM-03-2023-0098

Barua, R., Roy, M., & Raychaudhuri, A. (2016). Structure, conduct and performance analysis of Indian commercial banks. *Journal of Emerging Market Finance, 15*(3), 245–275.

Bogale, Y. W. (2019). Factors affecting profitability of banks: Empirical evidence from Ethiopian private commercial banks. *Journal of Investment and Management, 8*(1), 8–15.

Bolt, W., de Haan, L., Hoeberichts, M., van Oordt, M. R., & Swank, J. (2019). Bank profitability during recessions. *Journal of Banking & Finance, 106*, 445-458. https://doi.org/10.1016/j.jbankfin.2019.07.011

Borroni, M., & Rossi, S. (2019). *Bank profitability: Measures and determinants* (pp. 23-53). Springer. https://doi.org/10.1007/978-3-030-25860-6_2

Cogoljević, D., Gavrilović, M., Roganović, M., Matić, I., & Piljan, I. (2018). Analyzing of consumer price index influence on inflation by multiple linear regression. *Physica A: Statistical Mechanics and Its Applications, 505*, 941-944. https://doi.org/10.1016/j.physa.2018.04.026

Dietrich, A., Hess, K., & Wanzenried, G. (2014). The profitability of European banks: A cross-sectional and dynamic panel analysis. *The Manchester School, 82*(6), 123-150. https://doi.org/10.1111/manc.12037

EEA. (2024). Quarterly Macroeconomic Updates on the Ethiopian Economy. *In Ethiopian Economics Association (Vol. 9, Issue 1)*. Ethiopian Economics Association.

Elnahass, M., Trinh, V. Q., & Li, T. (2021). Banking sector performance during the COVID-19 crisis: Does efficiency explain resilience? *Journal of International Financial Markets, Institutions and Money, 74*, 101320. https://doi.org/10.1016/j.intfin.2021.101320

Giovanni, J., Kalemli-Özcan, S., Silva, Á., & Yıldırım, M. A. (2022). Global supply chain pressures, international trade, and inflation. *NBER Working Paper Series*, No. 30240. https://doi.org/10.3386/w30240

Ghoshal, I. (2022). Cost-push and Demand-pull inflation in India – a Frequency domain analysis. *In proceedings of the 16th economics & finance conference,* prague.

Harvard Business School Online. (2023). *The return on assets (ROA) formula explained.* https://online.hbs.edu/blog/post/return-on-assets

Kidane, S. T. (2020). Credit risk management and profitability: Empirical evidence on Ethiopian commercial banks. *Jurnal Perspektif Pembiayaan Dan Pembangunan Daerah, 8*(4), 377-386. https://doi.org/10.22437/ppd.v8i4.10794

Kobia, J. (2018). Moderating Effect of Financial Innovations on Inflation and Financial Performance of Commercial Banks in Kenya. *International Journal of Academics & Research, IJARKE Journals*.

Kohlscheen, E., Murcia Pabón, A., & Contreras, J. (2018). Determinants of bank profitability in emerging markets. *BIS Working Papers, No. 686*. https://www.bis.org/publ/work686.htm

Köhler, M. (2015). Which banks are more risky? The impact of business models on bank stability. *Journal of Financial Stability, 16*, 195-212. https://doi.org/10.1016/j.jfs.2014.07.002

Lelissa, T. B., & Kuhil, A. M. (2018). Empirical evidences on structure-conduct-performance relationship in the banking sector: A systematic review of literature. *Global Journal of Management and Business Research: C Finance, 18*(3), 1–12. https://www.globaljournals.org/

Maiga, Y. (2024). Impact of Inflation on Economic Growth: Evidence from Tanzania. *Journal of Agricultural Studies, 12*(2), 1–15.

Mamo, A. (2020). Determinants of commercial banks profitability: Empirical evidence from Ethiopian commercial banks. *Research Journal of Finance and Accounting, 11*(15), 21-32.

Maria, M. B., & Hussain, F. (2023). Does inflation expectation affect banks' performances? Evidence from Indian banking sector. *Journal of Economic and Administrative Sciences*. Advance online publication. https://doi.org/10.1108/JEAS-03-2023-0065

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. https://doi.org/10.1108/AJEB-03-2022-0036

Mugume, A. (2022). Inflation shocks and banking sector efficiency in the East African Community. *African Development Review, 34*(2), 156-170.

Nasir, M. A., Vo, X. V., & Huynh, T. L. D. (2019). Exchange rate pass-through and management of inflation expectation in a small open inflation-targeting economy. *Journal of International Financial Markets, Institutions and Money, 62*, 145–164. https://doi.org/10.1016/j.intfin.2019.07.003

Neupane, B. P. (2020). Profitability determinants of Nepalese commercial banks. *Pressacademia, 12(1), 40–45.*

Nguyen, T. L. A., Nghiem, S. H., Roca, E., & Sharma, P. (2020). Diversification, efficiency and risk of banks: Evidence from emerging economies. *Emerging Markets Review, 45*, 100719. https://doi.org/10.1016/j.ememar.2020.100719

Nuru, S. (2022). The Distributional Impact of Inflation in Ethiopia. *IGC Policy Brief, ETH* 21179.

Palley, T. I. (2022). Fiscal policy and inflationary bank lending in developing economies. *Journal of Post Keynesian Economics, 45*(3), 421-439.

Paukmongkol, W. (2023). Determinants of bank profitability in Thailand by generalized method of moments estimation. *Asia Social Issues*, e260597.

Poudel, S. R. (2018). Impact of credit risk on profitability of commercial banks in Nepal. *Journal of Applied and Advanced Research,* 3(6), 161–170.

Rahman, H., 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.*

Ristanović, V., & Mirković, S. (2023). Profitability assessment of the banking sector in Serbia. *Revizor, 26(102–103), 71–81*.

Talavera, O., Tsapin, A., & Zholud, O. (2018). Macroeconomic uncertainty and bank profitability: Evidence from Ukraine. *Emerging Markets Review, 35*, 169-183. https://doi.org/10.1016/j.ememar.2018.03.003

Tan, Y., & Anchor, J. (2017). The impacts of risk-taking behaviour and competition on technical efficiency: Evidence from the Chinese banking industry. *Research in International Business and Finance, 41*, 90-104. https://doi.org/10.1016/j.ribaf.2017.04.028

Tran, D. V., Hassan, M. K., & Houston, R. (2020). How does bank funding affect profitability? A comparative analysis of US and emerging Asian economies. *International Review of Financial Analysis, 72*, 101588. https://doi.org/10.1016/j.irfa.2020.101588

Tura, B. D. (2022). Banking sector performance evaluation in Ethiopia for the period of growth and transformation plan (GTP-II): Private vs public commercial banks. *Journal of Banking Regulation, 24(4), 484–494.*

World Bank. (2023). *Inflation and bank performance in South Asia: Policy trade-offs* (Report No. 136741-SA).

Yao, H., Haris, M., & Tariq, G. (2018). Profitability determinants of financial institutions: Evidence from banks in Pakistan. *International Journal of Financial Studies, 6, 1–28.*

Appendixes

Appendices 1: Result of Regression Tests

Hausman Test

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. ***Hausman test: Fixed Effects or Random Effects
. hausman FE RE

                 ---- Coefficients ----
                |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                |       FE           RE         Difference       Std. err.
----------------+----------------------------------------------------------------
         LCA    |    .1437849     .3197905       -.1760056        .1072197
         LDR    |   -.5130762    -.0402948       -.4727814        .3884086
       LLTAR    |    .4102642     .6071531       -.1968889        .1230662
        LNIR    |    .3272412     .3508537       -.0236125        .0222243
         LBS    |    1.309273     .0181019        1.291171        1.301205
        RLIR    |   -19.49522    -16.93611       -2.559118        3.293789
       RGDPG    |   -3.244713    -2.897085       -.3476278               .
         INF    |    .8625703     .8845362       -.0219659               .
----------------------------------------------------------------------------

                          b = Consistent under H0 and Ha; obtained from xtreg.
           B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

    chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =  41.62
Prob > chi2 = 0.0000
(V_b-V_B is not positive definite)

.   /*shows that the unoserved effect is correlated with each explanatory variables -
>      so, the fixed effects model is consistent and efficient*/
```

Heteroskedasticity Test

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (10)  =     109.19
Prob>chi2 =      0.0000
```

Autocorrelation Test

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,       9) =      8.877
           Prob > F =      0.0155
```

Appendices 2: panel regression results

```
. ***Pooled OLS
. reg LROA LCA LDR LLTAR LNIR LBS RLIR RGDPG INF

      Source |       SS           df       MS      Number of obs   =       128
-------------+----------------------------------   F(8, 119)       =     12.07
       Model |  8.45742688         8  1.05717836   Prob > F        =    0.0000
    Residual |  10.4245609       119  .087601353   R-squared       =    0.4479
-------------+----------------------------------   Adj R-squared   =    0.4108
       Total |  18.8819878       127  .148677069   Root MSE        =    .29598

------------------------------------------------------------------------------
        LROA | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
         LCA |   .3197905   .1400888     2.28   0.024     .0424007    .5971803
         LDR |  -.0402948   .4996286    -0.08   0.936    -1.029609    .9490198
       LLTAR |   .6071531   .3071062     1.98   0.050    -.0009477    1.215254
        LNIR |   .3508537   .0600554     5.84   0.000     .2319379    .4697695
         LBS |   .0181019   1.055118     0.02   0.986    -2.071137    2.107341
        RLIR |  -16.93611   5.457656    -3.10   0.002    -27.74281   -6.129404
       RGDPG |  -2.897085   1.691601    -1.71   0.089    -6.246625    .4524541
         INF |   .8845362   .3182596     2.78   0.006     .2543504    1.514722
       _cons |  -.2016711   2.514821    -0.08   0.936    -5.181268    4.777926
------------------------------------------------------------------------------
```

```
Fixed-effects (within) regression               Number of obs      =       128
Group variable: Bank_ID                         Number of groups   =        10

R-squared:                                      Obs per group:
     Within  = 0.4449                                         min =        12
     Between = 0.3164                                         avg =      12.8
     Overall = 0.4285                                         max =        13

                                                F(8,9)             =    362.38
corr(u_i, Xb) = 0.0070                          Prob > F           =    0.0000

                              (Std. err. adjusted for 10 clusters in Bank_ID)
------------------------------------------------------------------------------
             |               Robust
        LROA | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
         LCA |   .1437849   .0803517     1.79   0.107    -.0379833     .325553
         LDR |  -.5130762    .894936    -0.57   0.580    -2.537562     1.51141
       LLTAR |   .4102642   .2876309     1.43   0.188     -.240402     1.06093
        LNIR |   .3272412   .0348134     9.40   0.000     .2484877    .4059947
         LBS |   1.309273   2.917729     0.45   0.664    -5.291088    7.909634
        RLIR |  -19.49522   7.526694    -2.59   0.029    -36.52179   -2.468659
       RGDPG |  -3.244713   1.022059    -3.17   0.011    -5.556771   -.9326553
         INF |   .8625703   .2873961     3.00   0.015     .2124351    1.512705
       _cons |    -3.5009   6.764396    -0.52   0.617    -18.80303    11.80123
-------------+----------------------------------------------------------------
     sigma_u |  .12082103
     sigma_e |  .28769037
         rho |  .14993017   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
. ***Random effects model
. xtreg LROA LCA LDR LLTAR LNIR LBS RLIR RGDPG INF, re

Random-effects GLS regression                   Number of obs      =       128
Group variable: Bank_ID                         Number of groups   =        10

R-squared:                                      Obs per group:
     Within  = 0.4369                                         min =        12
     Between = 0.5658                                         avg =      12.8
     Overall = 0.4479                                         max =        13

                                                Wald chi2(8)       =     96.54
corr(u_i, X) = 0 (assumed)                      Prob > chi2        =    0.0000

------------------------------------------------------------------------------
        LROA | Coefficient  Std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
         LCA |   .3197905   .1400888     2.28   0.022     .0452215    .5943595
         LDR |  -.0402948   .4996286    -0.08   0.936    -1.019549    .9389594
       LLTAR |   .6071531   .3071062     1.98   0.048     .0052361     1.20907
        LNIR |   .3508537   .0600554     5.84   0.000     .2331472    .4685602
         LBS |   .0181019   1.055118     0.02   0.986    -2.049891    2.086095
        RLIR |  -16.93611   5.457656    -3.10   0.002    -27.63292   -6.239299
       RGDPG |  -2.897085   1.691601    -1.71   0.087    -6.212563    .4183922
         INF |   .8845362   .3182596     2.78   0.005     .2607589    1.508314
       _cons |  -.2016711   2.514821    -0.08   0.936     -5.13063    4.727288
-------------+----------------------------------------------------------------
     sigma_u |           0
     sigma_e |  .28769037
         rho |           0   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```