The Effect of Inflation on the Performance of Private Commercial Banks in Ethiopia: the Case of 12 Selected Banks

MSc. Thesis Submitted

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STATEMENT OF AUTHOR / DECLARATION

I, the undersigned, declare that this study entitled: **'The Effect of Inflation on the Performance of Private Commercial Banks in Ethiopia: the case of 12 Selected Banks'** is my original work and has not been presented for a degree in any other university, and that all sources of materials used for the study have been duly acknowledged.

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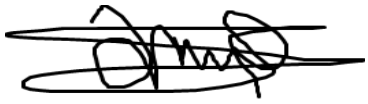
Signature: 

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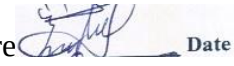
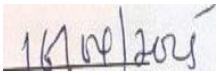
Examiner : **Etsubdink Sileshi** (Ph.D) ; Signature  Date 17/04/2025

Examiner : Habtamu Adane (Ph.D) ; Signature  **Date** 

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DEDICATION

I lovingly dedicated this thesis work to my late beloved mother Medenekiya Melsachew Yeshaneh who suddenly passed away while I was attending this degree. Your love and words of encouragement will never be faded. You will always be in my heart!!!

LIST OF ACRONYMS

AAU: Addis Ababa University

CAR: Capital Adequacy Ratio

CBs: Commercial Banks

CBE: College of Business & Economics

CFI: Corporate Finance Institute

CPI: Consumer Price Index

CSD: Cross Section Dependence

DEA: Data Envelopment Analysis

DVs: Dependent Variables

ER: Efficiency Ratio

ESS: Ethiopian Statistical Service

FEM: Fixed Effect Model

FY: Financial Year

GDP: Gross Domestic Product

GIR: General Inflation Rate

IMF: International Monitory Fund

IV: Independent Variable

LDCS: Least Developed Countries

LDR: Loans to Deposits Ratio

ME: Management Efficiency

NBE: National Bank of Ethiopia

NIM: Net Interest Margin

NPLs: Non-Performing Loans

OMO: Open Market Operation

PCBs: Private Commercial Banks

PPI: Producer Price Index

REM: Random Effect Model

ROA: Return on Assets

ROE: Return on Equity

WB: World Bank

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ABSTRACT

Inflation one of the prevalent issue in Ethiopia, have been growing nearly 25% on average for the last 5 years, a relatively higher rate & affects various sectors of the economy including the banking sector. CB, whose primary product is financial service, is highly affected by this inflation dynamics. A higher inflation rate leads to an economic disruption & this affect both the real & financial sectors. Slowdown in the economy, downsize the amount of money that flow to CBs in the form of deposit & vice versa.

This study examined 'The effect of inflation on the performance of private CBs in Ethiopia: a case of 12 selected banks; particularly highlighting its influence on Return on Equity (ROE) & Efficiency Ratio (ER); using reliable data for the period covering 2009 to 2024; analyzed using a quantitative approach, mainly panel data analysis techniques: the fixed effect model and its respective error correction version i.e. the Driscoll and Kraay fixed effect model with robust standard errors. The results are inflation positively & significantly affects return on equity (ROE) & negatively & significantly affects efficiency ratio (ER) of examined PCBs. The findings of this thesis suggest that inflation affects CBs performance by boosting return on equity (ROE) through higher lending rates while reducing efficiency due to rising operational costs. Ethiopian CBs, like those in other emerging economies, must implement dynamic interest rate strategies, cost-saving measures, digital transformation & revenue diversification to navigate inflationary conditions successfully. NBE should also play crucial role in inflation stabilization & ensuring a sustainable banking environment.

Keyword: *Inflation, Performance of Private Commercial Banks, Return on Equity (ROE), Efficiency Ratio (ER), Fixed Effect Model.*

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Inflation refers to the general increase in the prices of goods and services in an economy over a period of time, resulting in a decrease in the purchasing power of money. It's typically measured as the percentage change in the Consumer Price Index (CPI) that reflects the average change in prices over time. Inflation is a sustained rise in the price over a period of time; sustained period is regarded as at least several months or over a year's time. While rising inflation eats away purchasing power, many economists believe an optimal level inflation is an important component of a healthy economy. (Mankiw, 2017)

Recently inflation rates are rising throughout the world. Many economies are experiencing double or triple digit rises in prices. Inflation is mounting across most of the world's economies. Some of developed and emerging economies such as Germany, Italy, UK; Argentina and Turkey recorded double-digit inflation levels particularly starting from 2020.The war in Ukraine has caused global spikes in food and fuel prices; especially in import reliant countries like Ethiopia.(IMF, April 2024). Out of the 172 countries analyzed by Investment Monitor in October 2022, 74 countries i.e. 40% had inflation rates in excess of 10%. Three of the top ten highest inflation rates are found in Africa, with Zimbabwe having the highest inflation rate in the world at 269%. Countries that are relatively poor, import reliant and politically weak are at more risk of higher inflation levels. (Glenn Barklie, 2022).

Inflation, defined as a sustained increase in the general price level of goods and services, significantly impacts bank performance. The Fisher Effect postulates that nominal interest rates adjust to expected inflation, allowing banks to maintain profitability through higher

loan rates (Fisher, 1930). However, rising inflation can also increase operational costs, such as wages and administrative expenses, thereby reducing profitability unless offset by adjustments in fees or interest rates (Bilalli et al., 2024). Additionally, high inflation often deteriorates loan quality, as it erodes borrowers' purchasing power and increases default risks (Wamucii, 2010). National banks typically adjust monetary policies, like raising interest rates, to curb inflation, directly influencing banks' lending and borrowing activities (Ben Moussa, Boubaker, & Hdidar, 2021). Moreover, inflation uncertainty disrupts planning and risk management, leading to inefficiencies in banks' operations (Bilalli et al., 2024).

Inflation rate in Ethiopia averaged 18.95% from 2006 till 2024, reaching an all-time high rate of 64.2% in July of 2008 and a record low of -4.10% percent in September of 2009. Source: (Ethiopian Statistical Service (ESS), 2024). According to World Bank Data (2023), the inflation rate for consumer prices in Ethiopia moved over the past 56 years between -9.8% and 44.4% at the year ending December 2022 , and an inflation rate of 33.9% was calculated for the year ended December 2023. Though inflation at some degree is not bad for the economy, high inflation can cause deterioration in the population's confidence in their own currency and economy. High inflation therefore often has a harmful effect on overall economic growth. If inflation gets too high, a country's central / national bank will often intervene by raising its interest rates and thus discourage the creation of money.

Ethiopia's banking industry is made up of the National Bank of Ethiopia (NBE), Development Bank of Ethiopia, and Commercial Banks. The two aforementioned banks, as well as one of the largest commercial bank, Commercial Bank of Ethiopia are all state-owned. About 32 local PCBs were in operation nationwide as of November 2024.

Inflation in Ethiopia remains stubbornly high; and this can pose significant challenges for commercial banks, impacting their profitability, asset quality, and ability to support economic growth and development. Addressing inflation requires comprehensive policy measures, including monetary policy reforms, exchange rate flexibility, and improvements

in regulatory frameworks, to ensure macroeconomic stability and fostering a favorable environment for sustainable banking sector growth.

Due to the nation's severe inflationary problems, which have been worsening over the last ten years and are still rising steadily now, the national bank has been implementing a number of short- and long-term policies to control the rate of inflation and preserve a sound macroeconomic environment. When market interest rates rise, banks typically raise loan interest rates as well. By making loans more expensive, higher interest rates reduce demand for loans. In addition to having a direct impact on loan performance, interest revenue, and deposit flows, high inflation also has an indirect impact on the macroeconomic environment as a whole.

1.2. Statement of the Problem

As projected by the World Economic Situation and Prospects 2024 , global inflation will continue to decline, from an estimated 5.7% in 2023 to 3.9% in 2024; but also notes that, since January 2021 consumer prices in developing economies have increased by a cumulative 21.1%, and annual inflation in a quarter of developing countries is projected to exceed 10% in 2024. Such persistent high inflation has further setback the progress in poverty eradication, with especially severe impacts in the least developed countries" (LDCs) like Ethiopia.

Consumer price inflation in Ethiopia averaged 15.3% in the ten years to 2022, above the Sub-Saharan Africa regional average of 9.4%. Ethiopia's inflation rate for the year 2022 was 33.89%, a 7.05% increase from 2021. Ethiopia inflation rate for 2021 was 26.84%, a 6.48% increase from 2020. Ethiopia inflation rate for 2020 was 20.36%, a 4.55% increase from 2019. Ethiopia inflation rate for 2019 was 15.81%, a 1.98% increase from 2018; which shows an increasing trend for a continuous period. According to *World Bank's* open data source the inflation rate in Ethiopia at 2023 is 29.13% and the 2024 forecast is projected to be 20.6% which will still be higher.

Banks function as financial intermediaries connecting lenders and borrowers; collect funds from customers who want to deposit their surplus income and utilize to lend it out to the people who need money for various purposes like implementing business ideas with a return in the form of interest on deposits; and the interest earned on loans serves as an income for the banks. Banks also offer several other services like foreign exchange services, insurance for deposits, credit cards etc. Vaidya, D. (2023).

High Inflation can affect banks in several ways directly through affecting loan performance, interest income and deposit flows and indirectly affecting through broader macro-economic condition. Inflation directly affects the net interest margin, as rising interest rates increase borrowing costs and erode the profitability of fixed-rate loans. To adapt this, banks may offer adjustable-rate mortgages and floating-rate loans. Moreover, in cases of higher inflation, central banks respond with monetary policy tightening and higher interest rate; and the economy generally slows down in response to these changes. Inflation & monetary policy response to inflation can affect banks through several channels; some of which support favorable banking outcome, while others weaken them. Inflation and higher interest rate possibly affect bank's loan demand and profitability. World Bank (2023)**.**

According to a press release issued by the NBE on August 7, 2023, inflation has been one of Ethiopia's most challenging macroeconomic issues for a number of years. As seen by the average annual inflation rate of 16 percent over the last ten years, Ethiopia's economy and people have long had to cope with inflation. Over the last two years, inflation outturns have increased significantly more than this historical average pace and lasted far longer than first anticipated. In order to significantly and sustainably lower inflation, the NBE implemented a variety of policy initiatives after this.

The interest rate at the NBE's Emergency Lending facility, which banks use when they have liquidity issues, raised from 16% to 18%. The use of credit ceilings is a temporary arrangement in place until mid-2024 but not reinstated as planned. As a result, credit growth is limited to 14 percent for the fiscal year ending June 30, 2024, and all commercial

banks instructed to limit the growth of their loan books to be consistent with this aggregate credit ceiling. Because the central bank must make difficult policy trade-offs in order to sustain a fragile economic recovery, maintain financial stability, and control the increase of inflation, this measure looks to have an impact on the nation's enterprises and economic activity as well as the banking industry.

Despite the high rate of inflation and the challenges it poses for the country including the banking sector, little study has been done, and the majority of the results of earlier studies conducted around the globe had inconsistent findings. This led the researcher to investigate the impact of inflation on the performance of Ethiopian commercial banks, with a particular emphasis on twelve private commercial banks.

1.3. Objectives of the Study

1.3.1. General objective

The general objective of this study is to investigate the Effect of Inflation on the Performance of 12 selected Private Commercial Banks in Ethiopia.

1.3.2. Specific objectives

- To investigate the effect of inflation rates on the performance of Private Commercial Banks measured in terms of Return on Equity (ROE).

- To investigate the effect of inflation rates on the performance of Private Commercial Banks measured in terms of Efficiency Ratio (ER).

1.4. Research Questions

- How does inflation affect the performance of PCBs measured in terms of Return on Equity (ROE)?

- How does inflation affect the performance of PCBs measured in terms of Efficiency Ratio (ER)?

- What are the implications of the findings of this research for the CBs as well as the regulatory authorities or national banks?

1.5. Significance of the Study

By identifying the behaviors in which Ethiopia's high rate of inflation impacts CBs performance, the study sought to assist Ethiopian commercial banks generally and the 12 PCBs that were specifically selected. Furthermore, this study fills a knowledge gap on the impact of inflation on the performance of Ethiopian PCBs, which was not extensively discussed until recently. This research is highly relevant because inflation is currently a significant issue in Ethiopia and many other countries across the world. The steps the NBE has made to keep inflation at a desirable level have had an effect on the financial and economic sectors, both directly and indirectly. Therefore, researching the topic is relevant, timely and helpful.

1.6. Scope of the Study

This paper attempted to answer questions focused on how inflation affects the performance of 12 selected PCBs in Ethiopia. Out of the 30 PCBs operating in the country as of November 2024, this study mainly focused on assessing how inflation affect the performance of the 12 PCBs for the period covering 2009 to 2024; which basically focus on return on equity (ROE) and Efficiency Ratio (ER).

1.7. Limitation of the Study

Since every study has its own limitations, acknowledging them is crucial to contextualize its findings. This study has a limited sample size, which affects generalizability, its temporal scope also restrict the ability to capture long-term trends. External variables influencing the results were not fully controlled. These limitations highlight areas for caution and potential improvement in future research.

1.8. Organization of the Paper

The study was divided into five main chapters. The first chapter serves as an introduction, covering the study's background, problem statement, aims, research questions as well as its scope, significance, limitations, ethical considerations, and organizational structure. In the second chapter, relevant literature—both theoretical & empirical; as well as the conceptual framework was reviewed. The study's research methodology and techniques are covered in the third chapter. The study's results are presented, interpreted, & analyzed in the fourth chapter. The fifth chapter includes a summary of the findings, conclusion and implications.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Inflation, as a macroeconomic phenomenon, holds significant implications for various sectors of the economy, including the banking industry. Understanding this relationship is crucial for policymakers, bank management, and stakeholders to make informed decisions in an inflationary environment. This part of the study consist: definition of key terms, how we measure inflation , various theories of inflation that address the contemporary relevance on banks' performance, key performance indicators (KPI) of Commercial Banks and how they are affected by inflation , linkage between financial and real sector , review of empirical literature, research gaps and the conceptual framework.

2.1. Theoretical and Conceptual Review

2.1.1. Definition of key terms and concepts

Inflation: Inflation refers to the sustained increase in the general price level of goods and services in an economy over a period of time. It is typically measured as an annual percentage change in a price index, such as the Consumer Price Index (CPI) or the Producer Price Index (PPI). (Mankiw, N. G. 2014).

Banking Sector: The banking sector encompasses all institutions that provide banking services. These institutions include commercial banks, savings and loan associations, credit unions, and other financial institutions. They play a crucial role in the economy by facilitating financial transactions, lending money, accepting deposits, and providing various financial services and products. (Wiley, 2007.)

Commercial Banks: Commercial banks are financial institutions that provide a wide range of services to individual customers and businesses. These services include accepting

deposits, providing loans, offering checking and savings accounts, and other financial services such as investment products and safe deposit boxes. Commercial banks earn money primarily through the interest on loans and fees for various services. (American Bankers Association, 2012).

Retail Banking: Also known as consumer banking refers to the provision of financial services to individual consumers rather than businesses. These services typically include savings and checking accounts, personal loans, mortgages, credit cards, and certificates of deposit. Retail banking focuses on offering convenient, accessible, and personalized financial solutions to meet the needs of individual customers. Pond, K. (2007).

Corporate Banking: Corporate banking involves providing financial services to large businesses, corporations, and other large institutions. Services offered in corporate banking include business loans, treasury and cash management, trade finance, and corporate investment services. Corporate banking aims to support the financial needs of large organizations and help them manage their financial operations efficiently. (Walmsley, 2000)

Banking Performance: Banking performance is the assessment of a bank's financial health and operational efficiency. Key performance indicators (KPIs) used to measure banking performance include return on assets (ROA), return on equity (ROE), net interest margin (NIM), cost-to-income ratio, and non-performing loan (NPL) ratio etc. These metrics help evaluate a bank's profitability, efficiency, and risk management. (Rose & Hudgins, 2012).

Monetary Policy : Monetary policy is the process by which central banks manages the supply of money and interest rates to achieve specific economic objectives, such as controlling inflation, maintaining employment levels, and achieving economic growth. Tools of monetary policy include open market operations, the discount rate, and reserve requirements. **(**Jordi Galí, 2015)

Interest Rate: An interest rate is the cost of borrowing money or the return earned on savings and investments. It is expressed as a percentage of the principal amount. Interest rates are influenced by central bank policies, economic conditions, and the level of demand and supply for credit. Higher interest rates can reduce borrowing and spending, while lower rates can stimulate economic activity. (N. Gregory Mankiw, 2017)

Open Market Operations: Open market operations involve the buying and selling of government securities by a central bank to regulate the money supply and influence short-term interest rates. When the central bank buys securities, it injects money into the economy, increasing the money supply and lowering interest rates. When it sells securities, it withdraws money from the economy, decreasing the money supply and raising interest rates. (Mishkin, 2018).

Discount Rate: The discount rate is the interest rate charged by a central bank on loans it provides to commercial banks and other financial institutions. By adjusting the discount rate, central banks can influence the cost of borrowing and, consequently, the overall economic activity. A lower discount rate encourages borrowing and spending, while a higher rate can help control inflation and slow down economic growth. (The Federal Reserve Board, 2005)

Reserve Requirement: Reserve requirements are regulations set by central banks that determine the minimum amount of reserves that commercial banks must hold against their deposits. These reserves can be held in the form of cash or deposits with the central bank. Reserve requirements help ensure liquidity and stability in the banking system and can be used as a tool to control the money supply. (Cecchetti & Schoenholtz, 2014).

Interest on Reserve Requirements: Interest on reserve requirements refers to the interest paid by central banks on the reserves that commercial banks hold with them. By paying interest on reserves, central banks can influence the amount of money that banks keep in reserve and their lending activities. This tool is used to manage the money supply and maintain stability in the banking system. (Mishkin, 2007).

2.1.2 Financial sector and real sector linkage

The financial sector encompasses institutions like banks, investment firms, and markets where financial securities are transacted. Its primary function is to channel funds from depositors to investors, facilitating economic activities.

The real sector contains the production of goods and services. It comprises industries like manufacturing, agriculture, services, etc.

The financial sector and the real sector are inter-reliant. The real sector requires financing from the financial sector to invest in new ventures, increase operations, or meet working capital needs. On the other hand, the financial sector's performance is influenced by the health of the real sector, as it affects the ability of borrowers to repay loans and the overall demand for financial services.

2.1.2.1 Financial sector & real sector linkage Vis –a-Vis inflation

Expansionary monetary policies, such as lowering interest rates or increasing money supply, can stimulate borrowing and spending in the real sector, leading to higher demand for goods & services. This in turn, led to inflation if production capacity can't grow as well. However, a well-functioning financial sector can help to mitigate the inflationary pressures. For instance, well-organized financial markets expedite the allocation of capital to productive investments, which can enhance productivity and reducing cost-push inflationary burdens. However, if financial sector volatility leads to a credit crux or financial catastrophe, it can have deflationary effects on the economy as lending declines, investment dropdowns, and demand falls. (Mishkin, 2016).

2.1.2.2. Financial sector & real sector linkage Vis –a-Vis economic performance

The performance of both the financial and real sectors is closely linked to overall economic performance: A healthy financial sector with stable organizations, efficient markets, and proper regulation nurtures economic growth by efficiently allocating resources and managing risks. Similarly, a vibrant real sector with healthy production, innovation, and employment generation contributes to economic development. Economic policies, such as monetary and fiscal measures, play a crucial role in influencing the performance of both sectors and, consequently, overall economic performance.

The linkage between the financial and real sectors is intricate and plays a substantial role in determining inflation dynamics and overall economic performance. Effective policy measures are essential for maintaining equilibrium among these sectors to warrant sustainable economic growth and stability. (Mankiw, 2019).

2.1.5 Natures of inflation & their relation with banking sector performance

Inflation can be classified into various types based on its causes and effects. Here are a few common types:

2.1.5.1. Demand-pull inflation

This type of inflation occurs when aggregate demand exceeds aggregate supply. It's often associated with strong economic growth, low unemployment, and increasing consumer spending. Commercial banks might benefit from demand-pull inflation as it usually leads to higher interest rates and increased borrowing by businesses and consumers. (Mishkin & Eakins, 2016).

2.1.5.2. Supply-side or cost-push inflation

Cost-push inflation results from increases in production costs, such as wages or raw materials. This can lead to businesses passing on these increased costs to consumers in the form of higher prices. Commercial banks may face challenges during cost-push inflation as it can squeeze profit margins for businesses, leading to reduced borrowing and investment. (Mankiw, 2014).

2.1.5.3. Built-in inflation

Built-in inflation, also known as wage-price spiral, occurs when workers demand higher wages to keep up with rising prices and businesses subsequently increase prices to cover higher labor costs. This cycle can lead to a persistent upward pressure on prices. Commercial banks may see increased loan demand during this type of inflation as businesses seek financing to cover rising costs. (Blanchard & Johnson, 2013).

2.1.5.4. Hyperinflation

Hyperinflation refers to an extremely rapid and uncontrollable increase in prices, typically defined as monthly inflation rates exceeding 50%. It occurs when a country's currency loses its value dramatically, often due to excessive monetary supply or loss of confidence in the economy. Hyperinflation disrupts economic stability, diminishes purchasing power, and destabilizes both businesses and households. (Mankiw, 2014)

2.1.5.5. Moderate inflation

Moderate inflation refers to a steady and manageable increase in the general price level. This type of inflation is often targeted by central banks, as it can signal a healthy economy. Commercial banks may perform well during moderate inflation, especially if they can adjust interest rates to maintain profitability. (Bernanke & Gertler, 1999).

2.1.6. Causes of inflation in Ethiopia & measures taken

Ethiopia's inflation is driven by several domestic and external factors. Demand-pull inflation, fueled by rapid economic growth and increased government spending, has been a significant contributor (Feyisa, 2024). Supply-side constraints, such as limited agricultural productivity and supply chain disruptions, have driven food price increases, which are key contributors to inflation (Ndikumana et al., 2021). Excessive money supply growth, often resulting from expansionary monetary policies, has also exacerbated inflationary pressures (Altasseb, 2013). Additionally, the ongoing civil conflict in the country has disrupted production and distribution networks, worsening inflation. Lastly, rising global commodity prices, particularly for food and fuel, have further amplified inflationary trends in Ethiopia (World Bank, 2021).

Table 1. Summary of the nature of inflation and their effects on the banking sector

Nature /Causes	**Inflation**	**Resulting Consequences**	**Effects (Favorable / Harmful / Mixed)**	**References**
Demand-pull inflation	Higher demand for goods and services leads to increased prices.	Can boost economic growth but may lead to higher interest rates to control inflation.	Mixed	Remesh, V. P. (2021).
Cost-push inflation	Rising production costs (e.g., wages, raw materials) drive prices up.	Reduces disposable income and affects loan repayments and savings rates.	Harmful	Academia.edu. . . (n.d.). Inflation economics. https://www.academia.edu/Documents/in/Inflation
Structural inflation	Economic inefficiencies and rigidities cause	Challenges for banks in managing interest rates and lending.	Harmful	OECD. (2020). https://www.oecd.org/economic-outlook/

	persistent inflation.			
Built-In inflation	Wage-price spirals create inflation expectations.	Influences interest rates and loan demand, potentially destabilizing the economy.	Mixed	Smith, J., & Taylor, L. (2019). https://papers.ssrn.com
Hyper-inflation	Extremely rapid inflation erodes currency value.	Breaks down the economy; banks struggle as assets and loans lose value.	Harmful	Reinhart, C., & Rogoff, K. (2011). https://www.jstor.org
Moderate inflation	Controlled inflation targeted by central banks.	Signals a healthy economy; banks can adjust interest rates to maintain profitability.	Favorable	International Monetary Fund. (2018). https://www.imf.org/en/Publications

Source: Summarized by own based on the above theories

2.1.7. Measurement of inflation

Precise measurement of inflation is crucial for policymakers, businesses, and consumers to make informed decisions regarding economic policy, investment, and personal finances. Central banks often use inflation measures as a key indicator to set monetary policy, aiming to maintain price stability and support economic growth. The three most common inflation measurement units are:-

2.1.7.1. Consumer price index (CPI)

The CPI measures the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services. It is widely used as an indicator of inflation and as a tool for adjusting wages, salaries, and pensions for changes in the cost of living. (Bureau of Labor Statistics (2020)

2.1.7.2. Producer price index (PPI)

The PPI measures the average change over time in the selling prices received by domestic producers for their output. It provides insight into price changes at the wholesale level, which can eventually be passed on to consumers. Bureau of Labor Statistics. (2020).

2.1.7.3. Gross domestic product (GDP) deflator

The GDP deflator measures the change in prices of all goods and services included in GDP. It captures price changes for the entire economy, including consumption, investment, government spending, and net exports. Bureau of Economic Analysis. (2021).

3.4.2. Inflation measurement in Ethiopia

In Ethiopia, inflation is measured using three main categories: Food Inflation, Non-Food Inflation, and General Inflation. Here's a brief overview of each as stated in the national bank's website:-

Food Inflation: measures the change in prices of food items over time. It is a crucial indicator as food constitutes a significant portion of household expenditure in Ethiopia. It helps policymakers understand the inflationary pressures specifically related to food prices, which can be influenced by factors like weather conditions, agricultural productivity, and global commodity prices.

Non-Food Inflation: measures the change in prices of non-food items, such as clothing, housing, transportation, and medical care. This indicator helps in assessing inflationary trends in sectors other than food, providing a broader view of the overall inflationary environment in the economy.

General Inflation Rate: is a comprehensive measure that includes both food and non-food items. It reflects the overall change in the price level of a basket of goods and services consumed by households. It's the most widely used measure to gauge the overall inflation rate in the economy. It is used by the National Bank of Ethiopia (NBE) to formulate and implement monetary policy. In this study, inflation measured as general inflation rate taken from the National Bank of Ethiopia (NBE) is used.

3.4.3. Other determinants of commercial bank performance

The performance of commercial banks is influenced by various factors, which can be broadly categorized into bank-specific, industry-specific, and macroeconomic determinants. Bank-specific factors include capital adequacy, asset quality, management efficiency, liquidity, earning ability and profitability. Industry-specific determinants involve market concentration, competition, and regulatory environment. Macroeconomic factors such as inflation, interest rates, GDP growth, and exchange rates also play a crucial role in shaping bank performance.

The performance of commercial banks in Ethiopia is influenced by several factors, which can be categorized into internal and external determinants. Based on available research, here are summary of some key determinants, though their significance may vary depending on the study:-

Table 2. Summary of other key determinants of banking performance

Category	Determinant	Impact on Banking Performance	Reference
Macro-economic	Interest Rates	Low rates encourage borrowing but reduce interest income; high rates improve margins but may discourage loans.	Mishkin, F. S. (2021)
	GDP Growth	Economic growth boosts banking activity, deposits, and loan repayments, improving bank performance.	Levine, R. (2019). (Tesfaye, 2019).
	Political Stability Index	Political instability increases financial risks, reduces investor confidence, and negatively impacts bank profitability.	(Ayele, 2018).
	Average Lending Rate	Higher lending rates may reduce loan demand but increase interest income; lower rates encourage borrowing but may lower profitability.	(Tesfaye, 2019).

	Exchange Rates	Currency fluctuations impact foreign transactions, profitability, and exposure to foreign debts.	Krugman, P. R., & Obstfeld, M. (2020).
Bank-Specific	Capital Adequacy	Enhances stability and risk absorption, preventing insolvency during crises.	Berger & Bouwman (2013).
	Asset Quality	High non-performing loans (NPLs) reduce profitability and increase credit risk.	Berger, A. N., & DeYoung, R. (1997).
	Management Efficiency	Poor management increases costs and reduces profitability, while efficiency optimizes operations.	Fama, E. F., & French, K. R. (1992).
	Liquidity Management	Inadequate liquidity leads to financial distress, affecting customer withdrawals and lending.	Diamond, D. W., & Dybvig, P. H. (1983).
	Bank Size	Larger banks benefit from economies of scale, but excessive size may reduce efficiency.	Berger, A. N., & Mester, L. J. (1997).
	Earnings Ability	Profitability metrics (e.g., ROA, ROE) indicate overall performance.	Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008).
Industry -Specific	Market Concentration	High competition improves efficiency but can reduce profit margins.	Claessens, S., & Laeven, L. (2004).
	Regulatory Environment	Strong regulations maintain stability, while weak regulations increase financial risks.	Barth, J. R., Caprio, G., & Levine, R. (2006).
	Technological Advancements	Digital banking and fintech improve efficiency, customer service, and competitiveness.	Gomber, P., Koch, J., & Siering, M. (2017).

2.1.8 Commercial bank's key performance indicators & inflation's impact

The banking industry is structurally different from many other industries since its primary product and service is related to money. As a result, investors and financial analysts must

use specific financial ratios when analyzing the profitability of retail banks. Key Performance Indicators (KPIs) are essential metrics that help commercial banks measure their operational effectiveness and overall performance. Here is the common core KPI metrics mentioned in most literatures that every commercial bank should monitor:

2.1.8.1. Net interest margin (NIM)

NIM measures the difference between the interest income generated by banks and the amount of interest paid out to their lenders, relative to the amount of their interest-earning assets. It indicates the bank's efficiency in managing its interest-earning assets and liabilities. It can be calculated as:

$$\boldsymbol{NIM = \frac{\text{Net Interest Income}}{\text{Average Interest Bearing Assets}} * 100}$$

Inflation can impact NIM by influencing interest rates. When inflation rises, central banks often increase interest rates to control it. Higher interest rates can widen the spread between what banks earn on loans and pay on deposits, potentially increasing NIM. However, if inflation leads to economic instability, it can also increase the risk of loan defaults, which might negatively affect NIM. (Rose & Hudgins, 2012).

2.1.8.2. Return on equity (ROE)

ROE measures the profitability of a bank in relation to its shareholders' equity. It is a measure of how effectively a bank is using its equity to generate profits. The ratio can be calculated:-

$$\boldsymbol{ROE = \frac{\text{Net Income After Tax}}{\text{Share} - \text{Holders' Equity}} * 100}$$

Inflation can impact ROE by affecting both net income and equity. Higher costs can reduce net income, while inflation can also erode the purchasing power of equity, leading to lower ROE. Heffernan (2005)

2.1.8.3. Return on assets (ROA)

ROA indicates how profitable a bank is relative to its total assets. It helps in comparing the profitability of banks of different sizes. The ratio can be calculated as:-

$$\boldsymbol{ROA = \frac{Net\ Income}{Total\ Assets} * 100}$$

Inflation can reduce ROA by increasing the cost of goods and services, which can squeeze profit margins. Higher input costs can lead to lower net income, reducing the efficiency with which a company uses its assets to generate profit. (Koch & MacDonald, 2014).

2.1.8.4. Efficiency ratio(ER)

The efficiency ratio is calculated by dividing a bank's non-interest expenses by its revenue. It helps in assessing the bank's operational efficiency and cost management.

$$\boldsymbol{Efficiency\ Ratio = \frac{Non - Interest\ Expense(Operating\ \ Expense)}{Total\ Revenue} * 100}$$

Inflation can impact this ratio by increasing operating expenses, such as wages and utilities. Higher expenses can reduce a bank's efficiency in generating revenue from its operations. (Rose & Hudgins, 2012).

2.1.8.5. Capital adequacy ratio (CAR)

CAR measures a bank's capital in relation to its risk-weighted assets and current liabilities. It is a critical indicator of a bank's financial strength and stability. The ratio can be calculated:-

$$\boldsymbol{Capital\ Adequecy\ Ratio = \frac{Tier\ 1\ Capital + Tier\ 2\ Capital}{Risk - Weighted\ Assets} * 100}$$

Inflation can erode the value of a bank's capital and increase the risk of loan defaults, which can impact the risk-weighted assets. Higher inflation may also lead to higher interest rates, potentially affecting the bank's profitability and capital adequacy. (Saunders & Cornett, 2014).

2.1.8.6. Liquidity ratio (LR)

Liquidity ratio is a financial metric used to measure a business's ability to pay off their debts when they're due. It measures a bank's ability to meet its short-term obligations without raising additional capital. Common liquidity ratios can be calculated using:-

$$\textbf{Current Ratio} = \frac{\textbf{Current Asset}}{\textbf{Current Liability}} * \textbf{100}$$

$$\textbf{Quick Ratio} = \frac{\textbf{Current Asset} - \textbf{Inventory}}{\textbf{Current Liability}} * 100$$

$$\textbf{Liquidity Ratio} = \frac{\textbf{Liquid Assets}}{\textbf{Deposits}} * \textbf{100}$$

Inflation can increase the cost of short-term obligations, potentially reducing a bank's liquidity. Higher inflation may also lead to increased borrowing costs, affecting the bank's ability to meet its short-term liabilities. **(**Hayes Adam, 2024).

Table 3. Summary the effect of inflation on banks key performance indicators

KPI	Possible effect of inflation on the KPI's (Sign +/-)	Source
Return on Equity	Negative/Positive	Heffernan, S. (2005).
Return on Asset	Negative/Positive	Koch, T. W, & MacDonald, S. S. (2014).
Efficiency Ratio	Negative	Rose, P. S., & Hudgins, S. C. (2012
Net Interest Margin	Positive/Negative	Rose, P. S., & Hudgins, S. C. (2012).
Asset Quality	Negative	Bloomenthal, A. (2021).
Capital Adequacy Ratio	Negative	Saunders, A., & Cornett, M. M. (2014)
Liquidity Ratio	Negative	Hayes, A. (2024).
Deposit Growth Rate	Positive/Negative	Beird, A. (2024).

Source: own summary based on the literatures

2.1.9. Inflation's effects on bank operations, profitability and risk

Inflation can impact banks in multiple ways:

Operations: Rising inflation can lead to increased operational costs, such as wages and technology. Banks may need to invest more in technology to maintain efficiency and customer satisfaction (Nguyen & Nguyen, 2020).

Profitability: Higher inflation can erode profitability due to increased costs and reduced demand for loans as interest rates rise. However, if banks adjust their lending rates effectively, they can maintain profitability (Mishkin, 2015).

Risk Exposure: Inflation can increase risk exposure by impacting credit risk, market risk, and liquidity risk. Rising interest rates may lead to higher default rates among borrowers, while market volatility can affect investment portfolios (Choudhry, 2011).

Based on the above summarized literature, this research considers testing selected KPIs considering their relevance from various theories and CFI's definition of bank specific performance ratios specifically focusing on profitability measured in terms of return on equity & efficiency ratio.

2.2. Review of Empirical Literature

The effect of Inflation on banking sector performance has been extensively been studied worldwide. This review tries to consider studies across the world by focusing on the studies conducted in Asia & African economies, particularly in the African region.

2.2.1. Selected review of studies conducted across the world

The study "Inflation and Bank Profitability: G20 Countries Banks Panel Data Analysis" by Hüseyin Çetin (2019) examines the relationship between inflation and the profitability of banks in G20 countries over the period from 2013 to 2015; using panel data analysis and fixed effects model. The study finds that inflation has a negative impact on bank profitability i.e. inflation has a negative fixed effect on the return on assets of developed countries' banks, while it has a positive fixed effect on the return on assets of developing countries' banks.

2.2.2 Review focusing on Asia & African region

2.2.2.1. Asian cases

The study "Impact of Inflation on Bank's Profitability: A Study on Selected Banks Profitability" by R. Jeevitha, Mathew and Shradha (2019) examines the relationship between inflation & the profitability of select public sector banks in India by analyzing data from five public sector banks over the period 2014 to 2018. The findings indicate a negative correlation between inflation & bank profitability such as Return on Assets (ROA), Return on Equity (ROE), and Net Profit, suggesting that inflation does not significantly affect the profitability of these banks.

The study "Impacts of Inflationary Trends on Banks' Performance (Large Banks Segment) in Pakistan" by Khan et al., 2014 examines how inflation affects the performance of large banks in Pakistan. The researchers analyzed key performance indicators such as Return on Assets (ROA), Return on Equity (ROE) & Net Interest Margin (NIM) for large banks in the Bahawalpur district & find a strong positive relationship between inflation & bank performance, suggesting that inflation positively impacts the profitability of large banks in Pakistan.

2.2.2.2. African cases, focusing on East Africa and Ethiopia

The study "The Impact of Inflation on Bank Financial Performance: Case of Tunisia" by Mohamed A. B. Moussa, et al (2021) examines the relationship between inflation & the financial performance of banks in Tunisia.; analyzed data from 11 Tunisian banks over the period 2000 to 2018 using panel data techniques. The findings indicate that inflation has a positive impact on Return on Assets (ROA) & a negative impact on Return on Equity (ROE).

The study "The Impact of Inflation on Bank Liquidity: Case of Tunisia" by Moussa & Marzouk, 2023 examines the relationship between inflation & bank liquidity in Tunisia; analyzed data from 11 Tunisian banks over the period 2005 to 2020 using panel static methods. The findings indicate that inflation has a negative and significant impact on bank

liquidity, suggesting that higher inflation rates reduce the ability of banks to meet their financial obligations.

The study "Inflation and Financial Performance of Commercial Banks in Nigeria" by Baba & Ashogbon, 2023 examines the impact of inflation on the financial performance of commercial banks in Nigeria; analyzed data from 2006 to 2015 using ordinary least square regression models to evaluate the effect of inflation on key financial performance indicators such as Return on Equity (ROE) and Return on Assets (ROA) and finds inflation has a significant negative impact on the financial performance of commercial banks in Nigeria,

The study "Inflation Rate & Return on Equity of Commercial Banks in Nigeria" by Sukana, Manga & Abubakar (2020) examines the impact of inflation on the ROE of commercial banks in Nigeria from 1999 to 2018 using ARDL models, the study found that inflation rates have no significant positive effect on ROE.

The study entitled "The Determinants of Ethiopian Commercial Banks Performance" by Tesfaye B, 2014 investigates the factors influencing the performance of Ethiopian commercial banks from 1990 to 2012, the study highlights that inflation is a significant driver of the performance of Ethiopian commercial banks.

The study "Determinants of Commercial Banks' Performance in Ethiopia" by Tesfaye K ,2013; examines the factors influencing the performance of Ethiopian commercial banks from 2003 to 2012 using panel data from 16 banks, and finds in addition to bank-specific factors ; macroeconomic factors, particularly inflation, also play a crucial role.

The study "Determinants of Commercial Banks Performance in Ethiopia: Performance in Terms of Profitability; Prospects, Challenges & Policy Implications" by Tesfaye D , 2014 ; analyzed data from 2005 to 2011 using panel data techniques and concludes that both bank-specific and macroeconomic factors significantly impact the profitability of Ethiopian commercial banks.

The study "The Impact of Inflation on Return on Assets of PCBs: Evidence from Ethiopia" by Taye M, 2021 investigates the relationship between inflation & the return on assets

(ROA) of private banks in Ethiopia; analyzed data from 16 private banks over the period 2016 to 2020 using inferential statistics methods and finds higher inflation rate negatively affect the ROA of private banks in Ethiopia & inflation is a significant factor influencing the profitability of these banks.

2.3. Implications of Empirical Findings

Inflation affects bank performance in multiple ways, with both positive and negative implications. On one hand, it can enhance Return on Equity (ROE) by increasing interest rates, which boosts banks' lending revenues and profitability, particularly for large banks that effectively manage their financial operations. However, inflation also raises operational costs, including wages and administrative expenses, leading to a decline in efficiency as banks struggle to maintain cost-effectiveness. Additionally, the effects of inflation vary across regions, with some studies showing positive impacts on ROE (Pakistan, Ethiopia), while others indicate a negative or insignificant relationship (India, Nigeria, Tunisia). Ultimately, managing inflation-driven challenges is crucial for banks, requiring adaptive strategies to balance profitability and operational efficiency.

In the Ethiopian context, a study by Tesfaye K. (2013) and Tesfaye .B.Lelissa (2013) highlighted key findings that show; along with bank specific factors; inflation significantly impact profitability. Tesfaye D. (2014) also supports these findings, emphasizing the role of inflation in affecting bank performance. This tells us, while specific outcomes vary; inflation is typically a critical factor.

2.4 Research Gaps

The studies conducted in Ethiopia tried to address inflation just as one of the many factors that affect performance of commercial banks; they focused on investigating the determinants of performance of commercial banks. This study addressed this gap by solely investigating the effect of inflation on the performance of private commercial banks in Ethiopia; using various key performance metrics.

A study by Taye Melesse (2021) investigated 'the impact of inflation on return on assets of private banks: evidence from Ethiopia' using panel data covering 2016 to 2020 and finds a

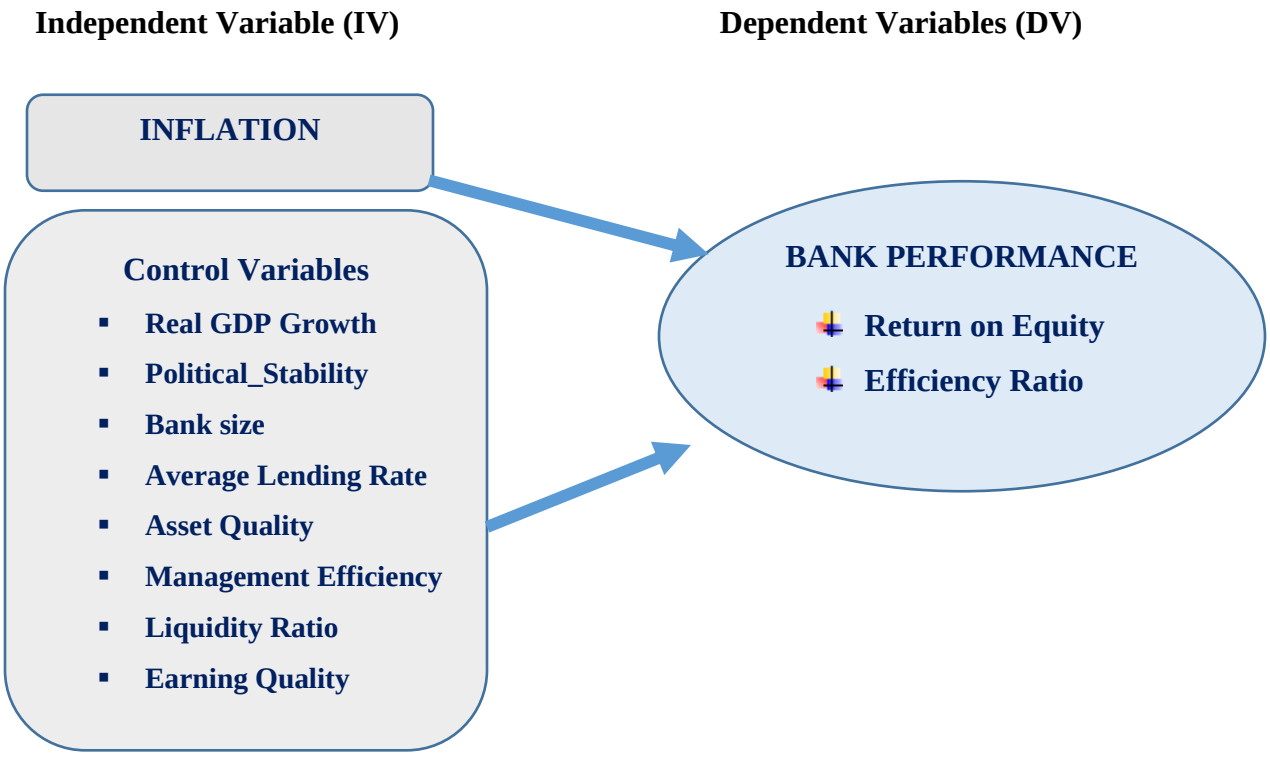
significant negative relation between inflation and return on asset of commercial banks in Ethiopia, but deployed an ordinary regression technique which is problematic since the data is panel. This research addresses this issue by employing the appropriate panel data analysis technique, which is a robust fixed effect model.

2.5. Conceptual Framework

Inflation (Independent Variable): Represented as an overarching factor or external force affecting multiple components within the banking environment.
Key Bank Performance Metrics' (Dependent Variables): Return on Equity (ROE) & Efficiency Ratio (ER)

Control Variables : macroeconomic & bank specific factors that affect performance of commercial banks : Real GDP Growth, Political Stability ,Bank size, Average Lending Rate, Asset Quality , Management Efficiency, Liquidity Ratio & Earning Quality

Figure 1. Conceptual Framework on the Relationship between the DVs & IV



CHAPTER THREE

METHODOLOGY OF THE STUDY

This chapter discusses various methodological considerations on research philosophies, research design, research approaches, as well as sampling technique. It aims to make explicit, the assumptions of the researcher‘s philosophical stance and provide assurance that appropriate procedures will be followed.

3.1 Research Design

The selection of research design depends on availability of resources, research philosophy, research questions and objectives (Sounders et al. 2009). This research has a combination of exploratory and explanatory research design. Exploratory research design is selected because limited research was conducted on the effect of inflation on the performance of commercial banks i.e. the effect is not clearly defined especially in Ethiopian context. Explanatory research design is required as it needs to explain the established relationship between inflation and banking sector performance.

3.2 Research Approach

The study basically used a quantitative research approach; as it uses quantitative data collection technique or data analysis procedure that generates or uses numerical data. (Saunders et al. 2009). It focused on collecting and analyzing numerical data to understand patterns, relationships, and effects. For studying the effect of inflation on CBs, this approach would involve quantitative approach, to obtain objective, measurable, and generalizable findings that provide a clear picture of the effects of inflation on the selected private commercial banks.

3.2.2. Target population of the study

Target population includes the people or entity the researcher is interested in conducting the research and generalizing the findings on. In this case the target population of the study is 12 private commercial banks that are operating in Ethiopia starting from on or before 2009. These banks were targeted using their year of establishment i.e. those that have been active starting from on or before 2009 because this enables to capture the required data on the variables especially to captures varying inflation trends, by taking longer periods of 10 to 15 years as most of the banks are homogenous in their product and services except their size. Hence, the targeted 12 banks were considered based on their order of establishment as shown below.

Table 4. List of selected sample banks with their year of establishment

No.	Bank Name	Year Est.	Web Site
1	Awash International Bank S.C	1994	https://awashbank.com/
2	Bank of Abyssinia S.C	1995	http://www.bankofabyssinia.com/
3	Dashen Bank S.C	1996	http://www.dashenbanksc.com/
4	Cooperative Bank of Oromia	1997	http://www.coopbankoromia.com.et/
5	Nib International Bank S.C	1998	https://www.nibbanksc.com/
6	Hibret Bank S.C	1999	http://www.unitedbank.com.et/
7	Lion International Bank S.C	2006	http://www.anbesabank.com/
8	Wegagen Bank S.C	2006	http:/ /www.wegagenbanksc.com/
9	Oromia Bank S.C	2008	https://oromiabank.com
10	Zemen Bank S.C	2008	www.zemenbank.com
11	Bunna Bank S.C	2009	https://bunnabanksc.com
12	Berhan Bank S.C	2009	https://berhanbanksc.com

Source: National bank of Ethiopia website Nov. 2024 (full source on the appendices part)

3.4. Methods of Data Collection

The study mainly used secondary data sources and these data's' both on the dependent (bank specific data) and independent variable (macro-economic data – inflation) were collected mainly from the National Bank of Ethiopia (NBE) data center of macro-economic information's and bank supervision officials. Only the remaining some data ice the Financial Year 2024 is collected from individual bank annual reports since their audited report is not yet submitted to NBE. In addition, various relevant sources including NBE's website & published reports, financial statements & published annual reports of the selected sample private commercial banks, Ethiopian Statistical Service (ESS) website, WB and IMF published periodic reports and journals and other economic databases from reliable internet source were assessed / referred to ensure quality data.

3.4.1. Variables

This relationship between dependent and independent variables is crucial in economic modeling and analysis, as it helps economists understand causation and predict outcomes. Boyce, P. (2023)

Dependent Variables: are the outcomes or effects that are measured in response to changes in the independent variable. In this study, commercial bank performance measured in terms of major KPIs i.e. Return on Equity (ROE) & Efficiency Ratio (ER) would be the dependent variable, as they depend on the changes in inflation rates.

Independent Variables: are factors that are manipulated or changed to observe their impact on other variables. This study analyze how changes in inflation rates ; measured as General Inflation Rate measured in annual basis (independent variable) affect commercial banks performance.

Control Variables: In panel data models control variables will be introduced, to isolate the effect of key independent variable of interest by accounting for other factors that could potentially influence the dependent variable thereby improving the accuracy and reliability of the analysis by mitigating omitted variable bias, especially when dealing with the

inherent heterogeneity across individuals or firms in a panel dataset. Including the relevant control variables in panel data may help to:-

Control variables enhance the internal validity of a study by limiting the influence of confounding and other extraneous variables. This helps you establish a correlational or causal relationship between the variables of interest and helps to avoid research bias. Aside from the independent and dependent variables, all variables that can impact the results should be controlled. Uncontrolled variables are alternative explanations for your results and affect the reliability of your arguments. Bhandari, P. (2021).

To select control variables for this study, the following important points were taken into considerations:-

Theoretical & Empirical Relevance: variables that are theoretically expected to influence the dependent variable based on the research question are included

Data Availability: only variables that have a reliable data are included.

Collinearity Concerns: caution taken for not to include variables that are highly correlated with each other, as this can lead to multicollinearity, where independent variables are highly correlated with each other, potentially distorting the results.

Accordingly, here are the selected key determinants that have the most significant impact on banking performance across macroeconomic & bank-specific factors:

Macroeconomic Key Determinants:-

1. **Real GDP Growth Rate (GDPG)**: Reflects overall economic conditions that affect bank performance. Drives overall economic activity, impacting deposits, loans, and financial stability.
2. **Average Lending Rate (AVLR):** Influences the cost of borrowing and lending, affecting bank margins. Affect borrowing, lending, and bank profitability.
3. **Political Stability:** A stable political environment fosters better banking operations.

Bank-Specific Key Determinants:-

4. **Bank Size (SIZE)**: taken as logarithm of total asset of the bank: larger banks might have different risk profiles and efficiencies compared to smaller banks i.e. larger banks tend to have more resources and economies of scale.

5. **Asset Quality**: Directly affects profitability and credit risk, measured as the ratio of fixed asset to total asset

6. **Liquidity Management**: Determines a bank's ability to handle withdrawals & lending. For this research liquidity ratio of sampled banks is taken from NBE which is calculated as data which is calculated as:- ratio of liquid asset to deposit

7. **Management Efficiency:** The effectiveness of bank management in controlling costs, optimizing resources, & making strategic decisions. This is often measured using the Cost-to-Income Ratio (CIR); effective management improves profitability.
8. **Earnings Ability:** Banks with low operational costs and efficient management can maximize profits i.e. measured as the ratio of operating income to gross revenue

By including these control variables, a comprehensive model that accurately captures the impact of inflation on banks' Return on Equity (ROE) & Efficiency Ratio (ER) providing more robust and insightful results can be build.

3.5. Data Analysis Techniques

The study used an inferential statistical analysis tools and methodologies to analyze various aspects of bank performance in the context of changing inflationary environments. In this study the following analysis methods were applied: -

3.5.1. Panel data analysis

Since the data set consist multiple banks data over time, panel data analysis techniques were employed. Panel data allows controlling for both time-series and cross-sectional variation in the data i.e. they helped to control for unobserved heterogeneity, providing

more robust estimates of the relationship between inflation and bank performance indicators. These models are useful as the research data are across multiple banks over several time periods.

Fixed Effects Model (FEM): Controls for time-invariant characteristics within banks (e.g., management practices, organizational structure). It assumes that each bank has its unique characteristics that may influence the dependent variables, and these characteristics are constant over time. It also refers to a statistical model that assumes each unit has its own fixed intercept, rather than stochastic conditions. By conducting **Hausman Test**, we can determine whether to use a fixed effects model or a random effects model. If the test suggests that fixed effects are more appropriate, it means that unobserved bank-specific factors are correlated with the independent variables.

Random Effects Model (REM): Assumes that bank-specific effects are uncorrelated with the independent variables. It allows for generalization beyond the sample.

- **Breusch-Pagan Lagrange Multiplier Test**: This test helps decide whether a random effect model is suitable compared to a simple OLS regression.

3.5.2. Pre-estimation diagnostic test: test for multicollinearity

Multicollinearity in panel data can distort regression estimates, making it difficult to determine the individual effect of independent variables. Researchers often use the Variance Inflation Factor (VIF) to detect multicollinearity, through its direct application in panel data models can be challenging. An alternative approach is to examine the correlation matrix of independent variables at the same time point (Gujarati & Porter, 2009). Additionally, in Stata, the command estat vce, corr can provide insights into multicollinearity when estat vif is not available for panel data. Proper identification and mitigation of multicollinearity to ensure that panel regression models yield reliable and interpretable results were conducted.

3.5.3. Model specification

To study the impact of inflation on the performance of commercial banks focusing on the key performance metrics of banks': Return on Equity (ROE) & Efficiency Ratio (ER) measured in annual basis at end of financial years.

The following are estimates of panel fixed effects regression using Driscoll-Kraay robust standard errors:

$$ROE_{it} = \beta_0 + \beta_1 GIR_t + \beta_2 AVLR_t + \beta_3 RGDPGR_t + \beta_4 PSI_t + \beta_5 BSz_{it} + \beta_6 LM_{it} + \beta_7 EQ_{it} + \beta_8 AQ_{it} + \beta_9 ME_{it} + \mu_i + \varepsilon_{it}$$

$$ER_{it} = \beta_0 + \beta_1 GIR_t + \beta_2 AVLR_t + \beta_3 RGDPGR_t + \beta_4 PSI_t + \beta_5 BSz_{it} + \beta_6 LM_{it} + \beta_7 EQ_{it} + \beta_8 AQ_{it} + \beta_9 ME_{it} + \mu_i + \varepsilon_{it}$$

Where:

- ROE i,t & ER i,t are the dependent variables representing return on equity and efficiency ratio respectively
- β1GIRi, t; is the main independent variable (General Inflation Rate).
- RGDPGR i,t (Real GDP Growth Rate), AVLRi,t (Average Lending Rate) , PSI i,t (Political Stability Index) are external control variables , while BSz i,t (Bank Size), LMi,t (Liquidity Management), EQi,t (Earning Quality), AQi,t (Asset Quality) & MEi,t (Management Efficiency) are bank specific control variables.
- μi\mu_i captures fixed effects for each entity/bank.
- ϵi, t\epsilon_ {i, t} is the error term, which is adjusted using Driscoll-Kraay standard errors.

3.5.4. Post estimation diagnostic and robustness tests

When conducting panel data analysis, several diagnostic tests are essential. Here are some of the key ones:-

Pooling vs. Panel Data (i.e. declare panel data set): Determine whether the data set is pooling data or panel data.

Endogeneity tests / Hausaman test: to decide between fixed or random effects models i.e. whether the explanatory variables are correlated with the error terms or not. Endogeneity refers to where the effect of an independent variable on a dependent variable cannot be casually interpreted because it includes omitted causes leading to biased (i.e., inconsistent) estimates (Antonakis et al., 2010).

Heteroscedasticity Tests: whether the error terms have different variances across units or time periods. The Breusch-Pagan test to check for heteroscedasticity, if present it violates OLS assumptions and requires to consider using robust standard.

Autocorrelation: the Durbin-Watson test to check for autocorrelation in the residuals; autocorrelation can indicate that the model's errors are correlated over time, violating OLS assumptions.

Cross section dependence: Testing for cross-section dependence in panel data models is crucial to ensure the reliability of statistical analysis. The cross section dependence is tested using test tools Pesaran's CD & Breusch-Pagan LM Test. This test checks for cross-sectional independence by examining the residuals of the panel data model.

Based on post estimation test results, when there is a presence of heteroscedasticity, autocorrelation and cross section dependence, the models will no more be taken as the final results. Thus, alternative error correction techniques for both fixed and random effect models were applied to both the fixed and random effect results i.e. the Driscool Kraay for the fixed effect models and robust standard error techniques for random effects model.

CHAPTER FOUR

RESULTS PRESENTATION AND ANALYSIS

This chapter discussed the panel data analysis conducted to investigate 'The Effect of Inflation on the Performance of Private Commercial Banks in Ethiopia: the Case of 12 Selected Banks'measured in terms of Return on Equity (ROE) & Efficiency Ratio (ER).

4.1. Data Description

The dataset utilized in this study comprises 192 observations from 12 entities i.e. 12 selected private commercial banks covering the period 2009 to 2024.

4.2. Pre-estimation Diagnosis Test : *Test for multicollinearity*

Before conducting the main estimation a check or test for multicollinearity is conducted using an appropriate test tool for panel data. Multicollinearity in panel regression models can be evaluated using the correlation matrix of estimated coefficients, obtained in **Stata** through the command estat vce, corr as below.

Regression results: OLS regression result

Return_on_Equity	Coef.	St. Err.	t-value	p-value	[95% Conf. Interval]		Sig
General_Inflation_~e	.122	.046	2.64	.008	.031	.213	***
Bank_Size	6.379	.739	8.63	0	4.931	7.828	***
Average_Lending_Rate	-4.276	1.176	-3.64	0	-6.581	-1.971	***
Real_GDP_Growth_Rate	-1.017	.542	-1.88	.061	-2.08	.046	*
Political_Stabilit~x	5.886	2.206	2.67	.008	1.563	10.21	***
Liquidity Management	.097	.045	2.14	.033	.008	.185	**
Earning Quality	-.894	.655	-1.36	.172	-2.178	.39	
Asset Quality	-1.906	.326	-5.84	0	-2.546	-1.266	***
Management_Efficie~y	-.852	.191	-4.46	0	-1.226	-.478	***
Constant	17.975	17.769	1.01	.312	-16.851	52.802	
Mean dependent var		20.289	SD dependent var			8.102	
Overall r-squared		0.551	Number of obs			178	
Chi-square		198.651	Prob > chi2			0.000	
R-squared within		0.526	R-squared between			0.657	

*** p<.01, ** p<.05, * p<.1

Correlation matrix of coefficients of xtreg model: multicollinearity test result

Genera~e	Bank_S~e	Averag~e	Real_G~e	Politi~x	Liquid~o	Earnin~y	Asset_~y	Manage~y	_cons
1.000									
-0.128	1.000								
-0.121	-0.338	1.000							
-0.039	-0.136	0.603	1.000						
0.217	0.100	0.128	-0.236	1.000					
-0.142	0.529	-0.243	-0.217	0.277	1.000				
-0.069	-0.164	-0.299	0.032	0.073	0.470	1.000			
0.043	0.035	-0.331	-0.006	-	0.221	0.228	1.000		
				0.022					
0.079	0.232	-0.032	-0.021	0.178	0.128	-	-0.010	1.000	
						0.173			
0.089	-0.116	-0.822	-0.658	-	-	0.097	0.166	-0.106	1.000
				0.365	0.173				

A high correlation values (above 0.8 or -0.8) between independent variables indicate potential multicollinearity, which can inflate standard errors and affect coefficient reliability (Gujarati & Porter, 2009). Based on the above test results, there is no noticeable multicollinearity between the independent variables.

4.3. Return on Equity and General Inflation Rate

4.3.1. Exploratory data analysis

To gain initial insights to the analysis, data exploration or an exploratory data analysis is performed; a time-series plot and fitted model of Return on Equity and General Inflation Rate that show the relationship between these variables are presented.

Figure 2. Time-series plot of return on equity & general inflation rate

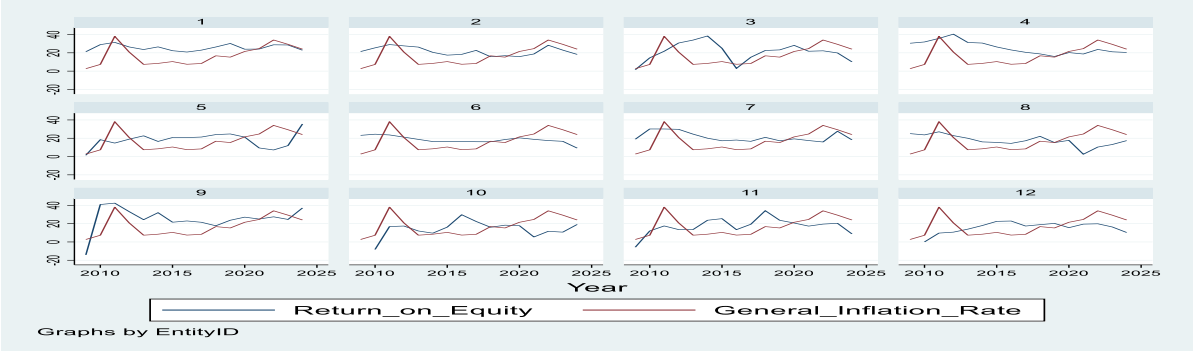
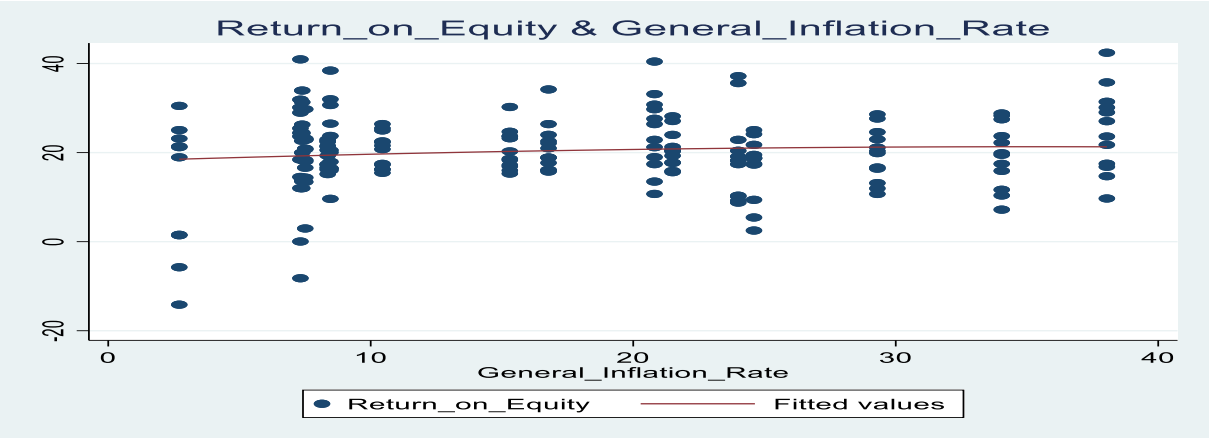


Figure 3. Fitted model of return on equity & general inflation rate



As shown above, the model's predictions closely follow the actual data i.e. the fitted model capture the main trends and patterns of the actual data. Residuals are randomly distributed around zero, which indicates that the model doesn't systematically over or under-predict. This is further improved with the application of Robust Standard Errors techniques.

4.3.2. Model estimation

The models are estimated using fixed and random effects models; to decide which model is appropriate Hausman test is conducted.

1. *Fixed effect model: regression results*

Return_on_Equity	Coef.	St.Err.	t-value	p-value	[95% Conf.	Interval]	Sig
General_Inflation_~e	.115	.045	2.53	.012	.025	.204	**
Bank_Size	6.434	1.24	5.19	0	3.986	8.883	***
Average_Lending_Rate	-5.422	1.33	-4.08	0	-8.048	-2.796	***
Real_GDP_Growth_Rate	-.934	.528	-1.77	.079	-1.977	.109	*
Political_Stabilit~x	6.301	2.136	2.95	.004	2.083	10.519	***
Liquidity_Managemen	.146	.05	2.89	.004	.046	.246	***
Earning Quality	.697	.798	0.87	.384	-.879	2.274	
Asset Quality	-1.824	.362	-5.04	0	-2.539	-1.109	***
Management_Efficie~y	-.836	.196	-4.26	0	-1.225	-.448	***
Constant	22.445	17.229	1.30	.195	-11.587	56.476	

Mean dependent var	20.289	SD dependent var	8.102
R-squared	0.540	Number of obs	178
F-test	20.510	Prob > F	0.000
Akaike crit. (AIC)	1087.512	Bayesian crit. (BIC)	1119.330

**** p<.01, ** p<.05, * p<.1*

Heteroscedasticity test for FEM: Test for heteroscedasticity using Modified Wald test for group-wise heteroscedasticity in fixed effect regression model (xttest3) is conducted.
Result**:** H0: sigma (i) ^2 = sigma^2 for all i

chi2 (12) =101.75: Prob > chi2 =0.0000; a lower Prob > chi2 value (.000) which is less than the standard significance level, indicates the presence of heteroskedasticity

Autocorrelation test for FEM: Wooldridge test for autocorrelation in panel data is conducted

H0: no first order autocorrelation

F (1, 11) = 81.081: Prob > F = 0.0000, the result shows the presence of Auto-correlation.

2. *Random coefficient model: regression results*

Return_on_Equity	Coef.	St.Err.	t-value	p-value	[95% Con.	Interval]	Sig
General_Inflation_~e	.122	.046	2.64	.008	.031	.213	***
Bank_Size	6.379	.739	8.63	0	4.931	7.828	***
Average_Lending_Rate	-4.276	1.176	-3.64	0	-6.581	-1.971	***
Real_GDP_Growth_Rate	-1.017	.542	-1.88	.061	-2.08	.046	*
Political_Stabilit~x	5.886	2.206	2.67	.008	1.563	10.21	***
Liquidity_Managemen	.097	.045	2.14	.033	.008	.185	**
Earning_Quality	-.894	.655	-1.36	.172	-2.178	.39	
Asset_Quality	-1.906	.326	-5.84	0	-2.546	-1.266	***
Management_Efficie~y	-.852	.191	-4.46	0	-1.226	-.478	***
Constant	17.975	17.769	1.01	.312	-16.851	52.802	
Mean dependent var		20.289	SD dependent var			8.102	
Overall r-squared		0.551	Number of obs			178	
Chi-square		198.651	Prob > chi2			0.000	
R-squared within		0.526	R-squared between			0.657	

**** p<.01, ** p<.05, * p<.1*

Hetroskedasticity test for REM: *** Panel Data Heteroscedasticity Wald Test
Ho: Panel Homoscedasticity –
Ha: Panel Heteroscedasticity
- Wald Test: LogE2 = X = 29.5332; P-Value > Chi2 (1) = 0.0000; the; the result is a relatively lower P-Value i.e. below the standard 5% significance; implies to reject Ho & presence of heteroscedasticity

Cross section dependence test for REM: Breusch-Pagan LM test of independence: chi2 (66) = 101.090, Pr = 0.0035. Based on 14 complete observations over panel units, lower Probe > chi2 value (.0035) which is less than the standard significance level, indicates the presence of cross section dependence.

Hausman Test: To choose between fixed and random effect Hausman test is conducted.

Hausman (1978) specification test

	Coef.
Chi-square test value	20.99
P-value	.013

As the p-value is smaller than the standards significance level of .05; the Hausman null hypothesis is rejected, indicating that the fixed effects model is more appropriate than REM. However, there is presence of heteroscedasticity & autocorrelation in the above conducted and diagnosed FEM; which results in the need for application of appropriate error correction robust model. In this case the suitable error correction model is the Driscoll-Kraay standard errors technique for fixed effects for the following reasons:

- **Panel data with time dependence**: If observations over time are correlated, Driscoll-Kraay corrects for serial correlation in the errors.
- **Panels with cross-sectional dependence**: If errors across different entities (e.g., countries, firms) are correlated, standard errors may be biased. Driscoll-Kraay adjustments remain consistent even when the number of panels grows large.
- **Presence of heteroscedasticity**: If residuals exhibit heteroscedasticity, meaning they have non-constant variance, Driscoll-Kraay standard errors help provides more reliable inference.
- **Small number of time periods**: Unlike some traditional estimators, Driscoll-Kraay is suitable for panels with a small time dimension.

Regression with Driscoll-Kraay standard errors — Number of obs = 178

Method: Fixed-effects regression — Number of groups = 12
Group variable (i): Entity ID — F (9, 14) = 114.38
Maximum lag: 2 — Prob > F = 0.0000
Within R-squared = 0.5404

Regression with driscoll-kraay standard errors

Return_on_Equity	Coefficient	Std. err.	t	P>t	[95% Conf.	Interval]
General_Inflation_Rate	0.115	0.031	3.680	0.002	0.048	0.181
Bank Size	6.434	1.564	4.110	0.001	3.080	9.789
Average_Lending_Rate	-5.422	0.736	-7.370	0.000	-6.999	-3.844
Real_GDP_Growth_Rate	-0.934	0.385	-2.420	0.029	-1.761	-0.108
Political_Stability_Index	6.301	1.091	5.770	0.000	3.960	8.642
Liquidity_Managemen	0.146	0.043	3.410	0.004	0.054	0.238
Earning Quality	0.697	0.510	1.370	0.193	-0.396	1.791
Asset Quality	-1.824	0.555	-3.290	0.005	-3.015	-0.634
Management Efficiency	-0.836	0.303	-2.760	0.015	-1.486	-0.187
_cons	22.445	14.215	1.580	0.137	-8.043	52.933

*NB. Management Efficiency measured as **cost to income ratio** implies lower ratios reflects higher efficiency & it is considered in interpreting the results*

4.3.4. Result interpretations & analysis

Coefficients: The coefficients value of General Inflation Rate 0.115 implies that the expected change in Return on Equity (ROE) for a one-unit change in general inflation rate holding other factors constant i.e. the Return on Equity (ROE) increased by .115.

Statistical significance: Since the p-value is 0.002 (<0.05), the effect of General Inflation Rate is statistically significant i.e. General Inflation Rate has a meaningful impact on banking performance measured in terms of Return on Equity (ROE).

Control variables: Average Lending Rate (-5.422, p=0.000), Real GDP Growth Rate (-0.934p=0.029), Asset Quality (-1.824, p=0.005) negatively & significantly affects commercial bank performance measured interms of Return on Equity (ROE). Bank Size (6.434, p=0.001), Political Stability Index (6.301, p=0.000), Liquidity Management (0.146, p=0.004) & Management Efficiency (-0.836, p=0.015) positively & significantly affects commercial bank performance measured in terms of Return on Equity(ROE); while Earning Quality (0.697, p=0.193) is not statistically significant, i.e. its effect is weak.

Driscoll-Kraay robust standard errors: The Driscoll-Kraay standard errors account for heteroscedasticity, autocorrelation, and cross-sectional dependence, they may be larger than conventional standard errors. The P-values remain low despite larger errors; it suggests the estimates are robust and reliable.

Confidence intervals (95% confidence interval): the interval excludes zero implies the variable inflation is statistically significant.

Fixed effects consideration: The model controls for entity-specific characteristics, ensuring that the results reflect within-entity variation rather than across-entity differences.

The R-squared values 0.5404 tell us, as the model explains 54.04 % the variation in the return on equity (ROE).

Contextually, several studies including *Khan et al. (2014)* on Pakistani banks, suggest that inflation can positively impact ROE for large banks. This effect arises because inflation often leads to higher interest rates, which in turn increase banks' revenues from lending activities. When interest income grows faster than costs, profitability rises, boosting ROE. Additionally, the study by Tesfaye B. (2014) suggests that inflation significantly drives commercial bank performance in Ethiopia. If inflation enhances revenue streams while allowing banks to maintain profitability, shareholders benefit through improved ROE.

However, not all studies confirm this. Jeevitha, Mathew, and Shradha (2019) found no significant effect of inflation on ROE for Indian banks, highlighting how different banking structures, regulatory environments, and inflationary trends shape outcomes.

4.4. Efficiency Ratio and General Inflation Rate

4.4.1. Exploratory data analysis

To gain initial insights to the analysis, data exploration or an exploratory data analysis is performed; a time-series plot and fitter model of Efficiency Ratio and General Inflation Rate that show the relationship between these variables are presented.

Figure 4. Time-series plot of efficiency ratio & general inflation rate

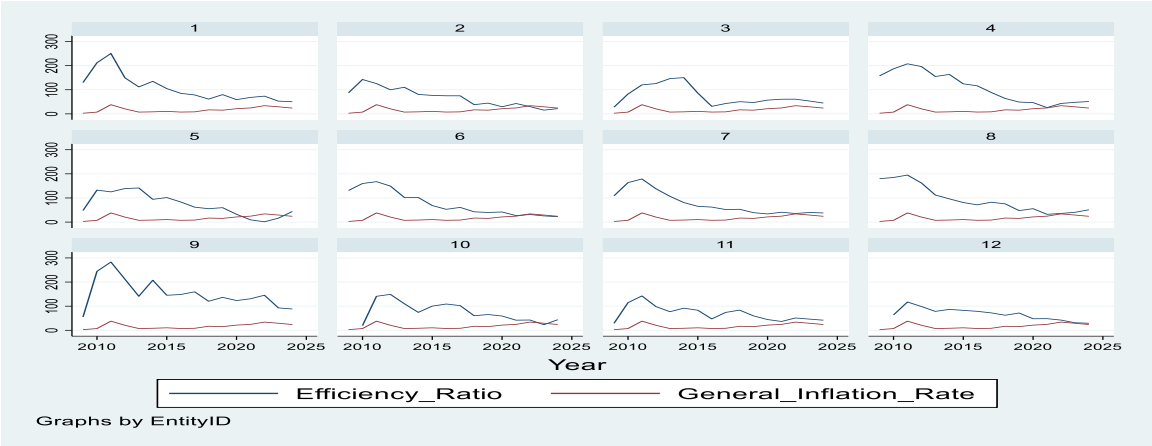
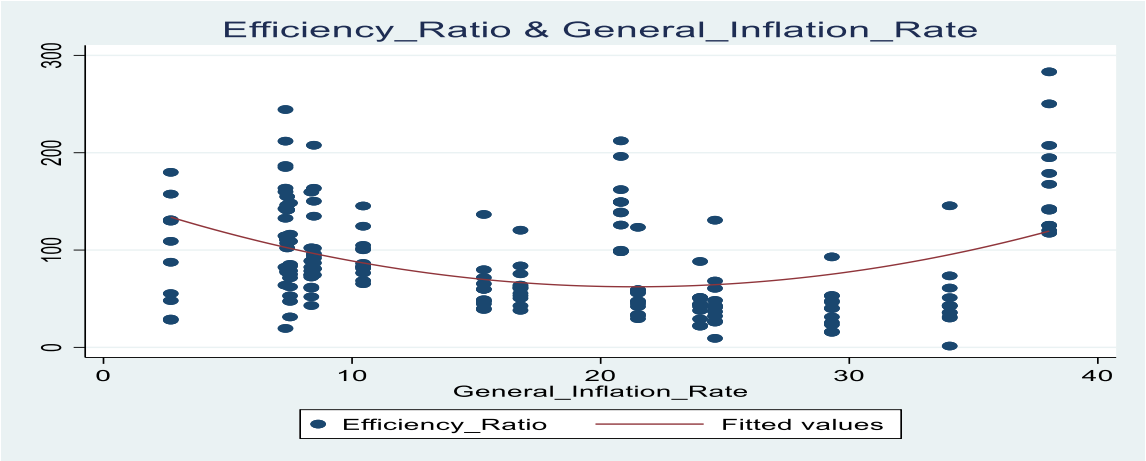


Figure 5. Fitted model of efficiency ratio & general inflation rate



As shown above, the model's predictions closely follow the actual data i.e. the fitted model capture the main trends and patterns of the actual data. Residuals are randomly distributed around zero, which indicates that the model doesn't systematically over or under-predict. This is further improved with the application of Robust Standard Errors techniques.

4.4.2. Model estimation

The models are estimated using fixed and random effects models; to decide which model is appropriate Hausman test is conducted.

1. Fixed effect model: regression results

Efficiency Ratio	Coef.	St. Err.	t-value	P_value	[95% Conf. Interval]		Sig
General_Inflation_~e	1.092	.23	4.74	0	.641	1.543	***
Bank Size	23.268	4.224	5.51	0	14.989	31.548	***
Average_Lending_Rate	-32.183	6.042	-5.33	0	-44.025	-20.342	***
Real_GDP_Growth_Rate	-3.72	2.694	-1.38	.167	-9	1.56	
Political_Stabilit~x	8.381	10.953	0.77	.444	-13.086	29.849	
Liquidity Management	.86	.232	3.70	0	.404	1.316	***
Earning Quality	-14.958	3.479	-4.30	0	-21.777	-8.139	***
Asset Quality	-6.963	1.676	-4.15	0	-10.248	-3.677	***
Management_Efficie~y	-1.166	.966	-1.21	.227	-3.059	.727	
Constant	335.672	88.293	3.80	0	162.621	508.724	***
Mean dependent var		89.931	SD dependent var			52.585	
Overall r-squared		0.673	Number of obs			178	
Chi-square		424.603	Prob > chi2			0.000	
R-squared within		0.745	R-squared between			0.433	

*** p<.01, ** p<.05, * p<.1

Heteroscedasticity test for FEM: Test for heteroscedasticity using Modified Wald test for group-wise heteroscedasticity in fixed effect regression model (xttest3) is conducted.

H0: sigma (i) ^2 = sigma^2 for all I: chi2 (12) = 50.06; Prob > chi2 = 0.0000; a lower Prob > chi2 value (.000) less than the standard significance level indicates the presence of heteroscedasticity

Autocorrelation test for FEM: Wooldridge test for autocorrelation in panel data is conducted.

H0: no first order autocorrelation: F (1, 11) =37.415; Prob > F = 0.0001; the result shows the presence of Auto-correlation.

2. Random coefficient model: regression results

Efficiency Ratio	Coef.	St. Err.	t-value	p-value	[95% Conf. Interval]		Sig
General_Inflation_~e	1.092	.23	4.74	0	.641	1.543	***
Bank_Size	23.268	4.224	5.51	0	14.989	31.548	***
Average_Lending_Rate	-32.183	6.042	-5.33	0	-44.025	-20.342	***
Real_GDP_Growth_Rate	-3.72	2.694	-1.38	.167	-9	1.56	
Political_Stabilit~x	8.381	10.953	0.77	.444	-13.086	29.849	
Liquidity Management	.86	.232	3.70	0	.404	1.316	***
Earning Quality	-14.958	3.479	-4.30	0	-21.777	-8.139	***
Asset Quality	-6.963	1.676	-4.15	0	-10.248	-3.677	***
Management_Efficie~y	-1.166	.966	-1.21	.227	-3.059	.727	
Constant	335.672	88.293	3.80	0	162.621	508.724	***
Mean dependent var		89.931	SD dependent var			52.585	

Overall r-squared	0.673	Number of obs	178
Chi-square	424.603	Prob > chi2	0.000
R-squared within	0.745	R-squared between	0.433

**** p<.01, ** p<.05, * p<.1*

Heteroscedasticity Test for REM: *** Panel Data Heteroscedasticity Wald Test Ho: Panel Homoscedasticity Ha: Panel Heteroscedasticity Wald Test: LogE2 = X = 101.3794 P-Value > Chi2 (1) 0.0000; a relatively lower P-Value i.e. below the standard 5% significance implies to reject Ho & presence of heteroscedasticity

Cross section dependence test for REM: Breusch-Pagan LM test of independence: chi2 (66) = 142.197, Pr = 0.0000. Based on 14 complete observations over panel units, lower Prob > chi2 value (.0000) which is less than the standard significance level, indicates the presence of cross section dependence.

Hausman Test: To choose between fixed and random effect Hausman test is conducted.

Hausman (1978) specification test

	Coef.
Chi-square test value	62.89
P-value	.0000

As the p-value is smaller than the standards significance level of .05; the Hausman null hypothesis is rejected, indicating that the FEM is more appropriate than REM. However, there is presence of heteroscedasticity & autocorrelation in the above conducted & diagnosed FEM; which results in the need for application of appropriate error correction robust model. In this case the best or appropriate error correction model is the Driscoll-Kraay standard errors technique for fixed effects model as it's justified in the previous part.

Regression with Driscoll-Kraay standard errors — Number of obs = 178
Method: Fixed-effects regression — Number of groups = 12
Group variable (i): Entity ID — F (9, 14) = 225.50
Maximum lag: 2 — Prob > F = 0.0000
Within R-squared = 0.7517

Regression with driscoll-kraay standard errors

Efficiency_Ratio	oefficient	**Std. err.**	**t**	**P>t**	**[95% Conf. Interval]**	
General_Inflation_Rate	1.032	0.181	5.710	0.000	0.644	1.420
Bank_Size	28.250	9.263	3.050	0.009	8.383	48.116
Average_Lending_Rate	-39.148	5.683	-6.890	0.000	-51.337	-26.959
Real_GDP_Growth_Rate	-3.559	1.813	-1.960	0.070	-7.448	0.331
Political_Stability_Index	9.941	5.753	1.730	0.106	-2.399	22.281
Liquidity_Ratio	1.110	0.230	4.820	0.000	0.616	1.604
Earning_Quality	-10.525	3.143	-3.350	0.005	-17.266	-3.784
Asset_Quality	-6.638	2.542	-2.610	0.020	-12.090	-1.187
Management_Efficiency	-0.596	1.005	-0.590	0.562	-2.751	1.559
_cons	346.292	77.225	4.480	0.001	180.660	511.924

NB. Efficiency Ratio measured as a ratio of operating expense to operating revenue & Management efficiency measured as cost to income ratio implies lower ratios reflects higher efficiency & it's considered in interpreting the results

4.4.3. Result interpretations & analysis/ discussion

Coefficients: The coefficients value of General Inflation Rate 1.032 implies that the expected change in Efficiency Ratio (ER); for a one-unit change in general inflation rate holding other factors constant i.e. the Efficiency Ratio (ER) decreased by 1.032

Statistical Significance: Since the p-value is 0.000 (<0.05), the effect of inflation is statistically significant. This means general inflation rate has a meaningful impact on banking performance measured in terms of efficiency ratio (ER)

Control variables: Average Lending Rate (-39.148, p=0.000), Real GDP Growth Rate (-3.559, p=0.070) & Asset Quality (-6.638, p=0.020) negatively & significantly affects CBs performance measured in terms of Efficiency Ratio (ER). Bank Size (28.250, p=0.009) & Liquidity Management (1.110, p=0.000) positively & significantly affects CBs performance measured in terms of Efficiency Ratio (ER). Real GDP Growth Rate (-3.559,

p= 0.070), Political Stability Index (9.941, p=0.106) & Management Efficiency (-0.596, p= 0.562) do not have statistically significant, i.e. its effect is weak.

Driscoll-Kraay robust standard errors: Driscoll-Kraay standard errors account for heteroscedasticity, autocorrelation & cross-sectional dependence, they may be larger than conventional standard errors. The P-values remain low despite larger errors, it suggests the estimates are robust and reliable.

Contextually, the study by Moussa & Marzouk (2023) on Tunisian banks shows that inflation reduces bank liquidity, making it harder for banks to manage costs effectively. Similarly, the findings by Baba & Ashogbon (2023) on Nigerian banks suggest inflation significantly deteriorates overall financial performance. As inflation increases, banks may struggle to offset rising costs through revenue growth, leading to lower operational efficiency. This explains the negative significant effect of inflation on efficiency ratios across various banking sectors.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This study aimed to investigate the effect of inflation on the performance of private commercial banks in Ethiopia: a case of 12 selected private commercial banks: using a panel data from 2009 to 2024. The fixed effects models were used to investigate the cause. In the previous chapter detail estimation results of econometric models, interpretations and analysis were presented. This chapter comprises summaries of major findings, conclusions and recommendations.

5.1. Summary of Findings

Inflation has significant positive effect on commercial banks performance measured in terms of Return on Equity (ROE) i.e. for each additional increment in inflation, the return on equity (ROE) increases by 0.115 on average. The effect is statistically significant with p-value of 0.002. Inflation has significant negative effect on commercial banks performance measured in terms of Efficiency Ratio (ER) i.e. for each additional increment in inflation, the Efficiency Ratio (ER) decreases by 1.032 on average. The effect is statistically significant with p-value of 0.002.

Average Lending Rate, Real GDP Growth Rate & Asset Quality negatively & significantly affects CB performance measured in terms of Return on Equity (ROE). Bank Size, Political Stability Index, Liquidity Management & Management Efficiency positively & significantly affects commercial bank performance measured in terms of Return on Equity (ROE); while Earning Quality is not statistically significant, i.e. its effect is weak. Average Lending Rate, Real GDP Growth Rate & Asset Quality negatively & significantly affects commercial bank performance measured in terms of Efficiency Ratio (ER). Bank Size & Liquidity Management positively & significantly affects CB performance measured in

terms of Efficiency Ratio (ER); while Real GDP Growth Rate, Political Stability Index & Management Efficiency weren't statistically significant, i.e. their effect is weak.

5.2. Conclusion

The primary objective of this thesis is to investigate the effect of inflation on the performance of 12 selected PCBs measured in terms of Return on Equity & Efficiency Ratio. In order to meet the intended objectives, the study used a quantitative approaches & secondary data. Almost all the data required for this study were obtained from the NBE, except the 2023/24 FY data obtained from individual banks audited annual reports for the period covered 2009 to 2024. The data is analyzed using panel data fixed effects model and their respective error correction tool using Stata_17 software package. The study concludes:-

General inflation rate has a significant positive effect on the performance of selected commercial banks measured in terms of Return on Equity (ROE) while it has a significant negative effect on the performance of selected commercial banks measured in terms of Efficiency Ratio (ER).

Inflation has a complex impact on CBs performance, influencing both return on equity (ROE) and the efficiency ratio in different ways. Empirical evidence suggests that inflation has a dual effect on commercial bank performance. On the positive side, inflation can enhance ROE by increasing nominal revenues, particularly from interest income on loans, as banks adjust lending rates to compensate for rising prices. This allows banks to maintain profitability, ensuring that their equity holders receive higher returns. However, inflation negatively affects the efficiency ratio, which measures the proportion of operating expenses relative to revenue. As inflation drives up costs, such as employee wages, rent, and administrative expenses, banks struggle to maintain operational efficiency, leading to a higher efficiency ratio and reduced cost-effectiveness. As evidences further suggest, banks operating in economies with persistently high inflation must adopt strategic measures to mitigate efficiency losses.

The result proved that the impact of inflation on banking performance is context-dependent. While inflation can enhance ROE by increasing nominal revenues, it also raises operational costs, negatively affecting efficiency ratios. Banks that effectively manage interest rates and cost structures can mitigate these effects, ensuring sustainable profitability.

Generally , studies from Ethiopia, Nigeria, Tunisia, Pakistan, and India show a mixed impact of inflation on CBs performance. The effect on ROE may vary depending on factors such as inflation management policies, bank size, and economic structure. Likewise, the negative influence of inflation on efficiency ratios underscores the need for cost control mechanisms to maintain financial stability.

Thus, while inflation can positively impact ROE, enabling banks to generate higher nominal profits, it simultaneously raises operational inefficiencies, increasing the efficiency ratio and reducing overall banking performance; which calls for implementing various dynamic mechanisms to manage the consequences.

5.3. Recommendations

As the findings of this research showed inflation has a positive effect on commercial banks performance measured interms of return on equity (ROE) & a strong negative effect on efficiency ratio, Ethiopian commercial banks face these problems in recent years. To maximize the benefits and mitigate the challenges posed by inflation, banks and policymakers should consider the following strategies:

Adjust interest rate strategies: Banks should dynamically manage their interest rates to optimize the positive effect of inflation on ROE, ensuring profitability while avoiding excessive lending costs that may discourage borrowing.

Improve cost control mechanisms: To counteract the negative impact of inflation on the efficiency ratio, banks should implement cost-saving measures such as automation, digital banking, and operational streamlining to maintain efficiency amidst rising expenses.

Diversify revenue streams: Banks can explore alternative revenue sources beyond interest income, such as advisory services, investment banking, and transaction fees, to offset inflation-induced cost increases.

Policy interventions: Governments and regulatory bodies should implement inflation-targeting policies to stabilize inflation rates, ensuring that banking performance remains predictable and sustainable. The NBE should also improve inflation forecasting models, incorporating real-time economic data to proactively adjust policies rather than reacting to inflation spikes. Maintaining effective communication and transparency with commercial banks and the public will also enhance confidence in the inflation control measures.

Enhance risk management practices: Banks should continuously monitor inflation trends and adjust their financial models to optimize equity returns while minimizing efficiency losses.

By integrating these recommendations, banks can leverage the positive effect of inflation on ROE while counteracting its negative impact on efficiency ratios, ensuring sustainable profitability and operational effectiveness.

REFERENCES

Academia.edu. (n.d.). Inflation economics. Retrieved from https://www.academia.edu/Documents/in/Inflation

Abduh, M., & Omar, M. A. (2012). Islamic banking and economic growth: The Indonesian experience. International Journal of Islamic and Middle Eastern Finance and Management.

Acemoglu, D., & Robinson, J. A. (2012). Why nations fail: The origins of power, prosperity, and poverty. Crown Business.

Almansour, A. Y., Alzoubi, H. M., & Almansour, B. Y. (2021). The Effect of Inflation on Performance: An Empirical Investigation on the Banking Sector in Jordan. Journal of Accounting, Finance and Economics, 8(6), 97-107. doi: 10.13106/jafeb.2021.vol8.no6.0097.

Altasseb, H. G. (2013). An investigation into the causes and dynamics of price inflation in Ethiopia: A macro-econometric approach. Institute of Social Studies. Retrieved from Erasmus University Repository.

American Bankers Association (2012).Principles of Banking. American Bankers Ass Antonakis et al., 2010. On making causal claims: A review and recommendations: Journal of Vocational Behavior, 2020. https://doi.org/10.1016/j.leaqua.2010.10.010

Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. International Financial Markets, Institutions & Money, 18(2), 121-136.

Audo, P. N. (2014). The Relationship between Inflation Rates and Liquidity of Commercial Banks in Kenya. University of Nairobi.

Baba, S., & Ashogbon, S. O. (2023). Inflation and Financial Performance of Commercial Banks in Nigeria. Global Scientific Journal, 11(3), 45-58. doi: 10.5281/zenodo.7654321.

Barth, J. R., Caprio, G., & Levine, R. (2006). Rethinking bank regulation: Till angels govern. Cambridge University Press.

Basel Committee on Banking Supervision. (2019). Basel III: International regulatory framework for banks. Bank for International Settlements.

Batsinda, G., & Shukla, J. (2019). Inflation and Profitability of Commercial Banks in Rwanda: A Case Study of Bank of Kigali. International Journal of Scientific & Research Publications, 9(5), 170-181.

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2006). Bank concentration and crises. Journal of Banking & Finance.

Beird, Amanda. (2024). "14 Effective Strategies to Boost Bank Deposits." Bankers Hub. https://vuir.vu.edu.au/view/type/thesis.html

Ben Moussa, M. A., Boubaker, A., & Hdidar, Z. (2021). The impact of inflation on bank financial performance: Case of Tunisia. European Journal of Business and Management. Retrieved from IISTE.

Berger, A. N., & Bouwman, C. H. (2013). How does capital affect bank performance during financial crises? Journal of Financial Economics.

Berger, A. N., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. Journal of Banking & Finance, 21(6), 849-870.

Bhandari, P. (2021, July 7). An Introduction to Correlational Research. Scribbr.

Bikker, J. A., & Bos, J. W. B. (2008). Bank Performance: A Theoretical and Empirical Framework for the Analysis of Profitability, Competition, and Efficiency.

Bilalli, A., Sadiku, M., & Sadiku, L. (2024). The impact of inflation on financial sector performance: Evidence from OECD countries. Economics Innovative and Research Journal. Retrieved from Sciendo

Blanchard, O., & Johnson, D. R. (2013). Macroeconomics. Pearson Education.

Bloomenthal, A. (2021). "Asset Specificity: Meaning and Varieties." Investopedia.

Board of Governors of the Federal Reserve System. (2023). Monetary Policy.

Boyce, P. (n.d.). Dependent and independent variables. BoyceWire. Retrieved from https://boycewire.com/dependent-and-independent-variables/

Brooks, C. (2008) introductory econometrics for finance. Cambridge University Press, UK.

Bureau of Economic Analysis. (2021). "National Income and Product Accounts." U.S. Department of Commerce. Available at: https://www.bea.gov/data/gdp/gdp-price-index

Bureau of Labor Statistics. (2020). "Consumer Price Index." U.S. Department of Labor. Available at: https://www.bls.gov/cpi/

Business Insider Africa. (2021). Ethiopia's inflation rate surges to 35.1% in December 2021. Retrieved from Business Insider Africa.

Cecchetti, S. G., & Schoenholtz, K. L. (2014). Money, banking, and financial markets (4th Ed.). McGraw-Hill Education.

Çetin, H. (2019). Inflation and Bank Profitability: G20 Countries Banks Panel Data Analysis. Proceedings of the 2019 International Conference on Management Science and Industrial Engineering, 168-172.

Claessens, S., & Laeven, L. (2004). Competition in the financial sector: Overview of competition policies. World Bank Research Observer, 19(1), 59-81.

Claessens, S., & Laeven, L. (2004). Financial dependence, banking sector competition, and economic growth. Journal of Finance.

Demirgüç-Kunt, A., & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability. World Bank Economic Review, 13(2), 379-408.

Demirgüç-Kunt, A., & Levine, R. (2009). Finance and inequality: Theory and evidence. Annual Review of Financial Economics.

Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. Journal of Political Economy, 91(3), 401-419.

Ethiopian Statistical Service (ESS), April, 2024.

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. Journal of Finance, 47(2), 427-465.

Federal Reserve Board, 2005. The Federal Reserve System: Purposes and Functions.

Feyisa, B. (2024). Sources of inflation in Ethiopia: A dynamic ARDL model. Cogent Economics & Finance, 12(1), 2421702. Retrieved from Tandfonline.

Financial Institutions Management: A Risk Management Approach (8th Ed.). McGraw-Hill Education.

Fisher, I. (1930). The Theory of Interest. Macmillan.

Focuseconomics:https://www.imf.org/en/Publications/WEO/Issues/2023/10/10/world-economic-outlook-october-2023

Friedman, M. (1968). "The Role of Monetary Policy. “American Economic Review.

Friedman, M., & Schwartz, A. J. (1991). A Monetary History of the United States, 1867–1960. Princeton University Press.

Galí, Jordi, 2015. Monetary Policy, Inflation, and the Business Cycle: An Introduction to the New Keynesian Framework. Princeton University Press.

Glenn Barklie, October, 2022. Which countries have the highest level of inflation? www.investmentmonitor.ai

Global Matrices: Ethiopia Inflation Rate 1960-2024:

Gomber, P., Koch, J., & Siering, M. (2017). Digital finance and fintech: Current research and future research directions. Journal of Business Economics, 87(5), 537-580.

Gup, B. E. (2007). Banking and Financial Institutions: A Guide for Directors, Investors, and Borrowers. Wiley. |

Hayes Adam. (2024). "Understanding Liquidity Ratios: Types & Their Importance." Investopedia.

Heffernan, S. (2005). Modern Banking.
Wiley.https://www.scribbr.com/methodology/correlational-research/

IMF, April 2024. Global finance magazine May 8, 2024.
https://www.imf.org/en/Publications/WEO/weo-database/2024/October

International Monetary Fund, World Economic Outlook Database, April 2024: Luca Ventura. (https://gfmag.com/data/economic-data/worlds-highest-lowest-inflation-rates/

International Monetary Fund. (2018). Central bank policy and moderate inflation. IMF. Retrieved from https://www.imf.org/en/Publications

Jeevitha, R., Mathew, B., & Shradha, K. (2019). Impact of Inflation on Bank's Profitability: A Study on Select Banks Profitability. Journal of Emerging Technologies and Innovative Research, 6(5), 170-181.

John Maynard Keynes, detail of a watercolour by Gwen Raverat, c. 1908; In the National Portrait Gallery, London. Courtesy of the National Portrait Gallery, London

Kaldor, N. (1975). "Inflation and Recession in the World Economy." Economic Journal, 85(338), 749-768.

Kashyap, A. K., & Stein, J. C. (2000). What do a million observations on banks say about the transmission of monetary policy? American Economic Review, 90(3), 407-428.

Khan, W. A., Shahid, M., Bari, R., Anam, W., Shehzad, N., & Siddique, S. (2014). Impacts of Inflationary Trends on Banks' Performance (Large Banks Segment) in Pakistan. International Journal of Accounting and Financial Reporting, 4(1), 1-10. doi: 10.5296/ijafr.v4i1.6083.

Koch, T. W., & MacDonald, S. S. (2014). Bank Management. Cengage Learning.

Koelewijn, Jaap. Retail Banking, 2008. Business Transformation and Competitive Strategies for the Future. Palgrave Macmillan.

Kosmidou, K. (2008). The determinants of banks' profits in Greece during the period of EU financial integration. Managerial Finance.

Krugman, P. R., & Obstfeld, M. (2020). International economics: Theory and policy (11th Ed.). Pearson.

Mankiw, N. G. (2014). Principles of Economics (7th Ed.). Cengage Learning.

Mankiw, N. G. (2018). Principles of Economics (8th Ed.). Cengage Learning.

Mankiw, N. G. (2021). Principles of Economics. Cengage Learning.

Mankiw, N. Gregory (2017). Principles of Economics. Cengage Learning.

Marta Campillo and Jeffrey A. Miron; January 1997. Why Does Inflation Differ across Countries?

Messele, T. (2021). The Impact of Inflation on Return on Assets of Private Banks: Evidence from Ethiopia. Addis Ababa University.

Miller, S. R., & Parkhe, A. (2002). Patterns in international banking. Journal of International Business Studies.

Mishkin, F. S. (1996). The channels of monetary transmission: Lessons for monetary policy. NBER Working Paper No. 5464

Mishkin, F. S. (2019). The Economics of Money, Banking, & Financial Markets (12th Ed.). Pearson.

Mishkin, F. S. (2021). The economics of money, banking, & financial markets (12th Ed.). Pearson.

Mishkin, F. S., & Eakins, S. G. (2012). Financial Markets & Institutions (8th Ed.) Pearson.

Mishkin, F. S., & Eakins, S. G. (2015). Financial Markets and Institutions. Pearson Education.

Mishkin, Frederic S (2007). Monetary Policy Strategy. MIT Press

Mishkin, Frederic S (2018). The Economics of Money, Banking and Financial Markets. Pearson,

Moussa, M. A. B., & Marzouk, H. (2023). The Impact of Inflation on Bank Liquidity: Case of Tunisia. International Journal of Business and Finance Research, 9(1), 38-49. doi: 10.56201/ijbfr.v9.no1.2023.pg38.49.

Moussa, M. A. B., Boubaker, A., & Hdidar, Z. (2021). The Impact of Inflation on Bank Financial Performance: Case of Tunisia. European Journal of Business and Management, 13(18), 170-181. doi: 10.7176/EJBM/13-18-11.

NBES WEBSITE: https://nbe.gov.et/

Ndikumana, L., Nkurunziza, J. D., Sanchez Martin, M. E., Mulugeta, S., & Getachew Kelbore, Z. (2021). Monetary, fiscal, and structural drivers of inflation in Ethiopia: New empirical evidence from time series analysis. World Bank Policy Research Working Paper. Retrieved from World Bank.

Nguyen, H., & Nguyen, M. (2020). The impact of inflation on bank performance in emerging markets. Journal of Emerging Markets, 12(3), 245-255.

OECD. (2020). the causes of persistent inflation. Retrieved from https://www.oecd.org/economic-outlook/

Pasiouras, F., & Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union. Research in International Business and Finance.

Phelps, E. S. (1967). "Phillips Curves, Expectations of Inflation, and Optimal Unemployment over Time." Economica, 34(135), 254-281.

Phillips, A. W. (1958). "The Relationship between Unemployment & the Rate of Change of Money Wages in the United Kingdom, 1861-1957." Economica, 25(100), 283-299.

Pond, K. (2007). Retail Banking. Global Professional Publishing.

Reinhart, C., & Rogoff, K. (2011). Hyperinflation and currency collapse. JSTOR. Retrieved from https://www.jstor.org

Remesh, V. P. (2021). A study on inflation. SSRN. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3816410

Rose, P. S., & Hudgins, S. C. (2012). Bank Management and Financial Services. McGraw-Hill Education.

Rose, P. S., & Hudgins, S. C. (2014). Bank Management & Financial Services (9th Ed.). McGraw-Hill Education.

Routledge. Choudhry, M. (2011). An Introduction to Banking: Liquidity Risk and Asset-Liability Management. John Wiley & Sons.

Saunders, A., & Cornett, M. M. (2014). Financial Institutions Management: A Risk Management Approach (8th Ed.). McGraw-Hill Education.

Saunders, M., Lewis, P. & Thornhill, A. (2009). Research Methods for Business Students. Pearson, New York.

Smith, J., & Taylor, L. (2019). Built-in inflation dynamics. SSRN. Retrieved from https://papers.ssrn.com

Sukana, D. T., Manga, I. U., & Abubakar, A. (2020). Inflation Rate and Return on Equity of Commercial Banks in Nigeria. Journal of Financial Management and Analysis, 34(2), 123-135.

Taylor, J. B. (1993). Discretion versus Policy Rules in Practice. Carnegie-Rochester Conference Series on Public Policy.

Tesfaye Boru Lelissa (2013). The Determinants of Ethiopian Commercial Banks Performance.

Levine, R. (2019). Finance & growth: Theory & evidence. Journal of Economic Literature, 35(2), 688-726.

Tesfaye Diriba (2014). Determinants of Commercial Banks Performance in Ethiopia: Performance in Terms of Profitability; Prospects, Challenges and Policy Implications. KDI School of Public Policy and Management.

Tesfaye Kassa (2013). Determinants of Commercial Banks' Performance in Ethiopia. Unpublished Master's Thesis, Addis Ababa University.

The National Bank of Ethiopia (2023) : Board of Directors Regular Meeting Press Release August 7, 2023

U.S. Bureau of Economic Analysis. (n.d.). Gross Domestic Product (GDP) Deflator. Retrieved from https://www.bea.gov/data/gdp/gdp-price-deflator

U.S. Bureau of Labor Statistics. (n.d.). Consumer Price Index (CPI). Retrieved from https://www.bls.gov/cpi/

U.S. Bureau of Labor Statistics. (n.d.). Producer Price Index (PPI). Retrieved from https://www.bls.gov/ppi/

Umar, M., Maijama'a, D., & Adamu, M. (2014). Conceptual Exposition of the Effect of Inflation on Bank Performance. Journal of World Economic Research, 3(5), 55-59. doi: 10.11648/j.jwer.20140305.11

Vaidya, D. (2023). How banks operate and generate income. WallStreetMojo. https://www.wallstreetmojo.com/how-do-banks-make-money/

Walmsley, Julian. (2000).Corporate Banking & Financial Markets. Butterworth-Heinemann,

Wamucii, J. C. (2010). The relationship between inflation and financial performance of commercial banks in Kenya. University of Nairobi Research Project. Retrieved from University of Nairobi Repository.

World Bank's open data source (Focus Economics Online Source). (https://www.wallstreetmojo.com/financial-intermediary/

World Economic Situation and Prospects 2024.
https://www.bing.com/search?q=worlddata.info%3Attps%3A%2F%2Fwww.worlddata.info%2Fafrica%2Fethiopia%2Finflation-

World Economic Situation and Prospects: May 2022 Briefing, No. 160
https://www.un.org/development/desa/dpad/publication/world-economic-situation-and-prospects-may-2022-briefing-no-160/

https://www.macrotrends.net/global-metrics/countries/ETH/ethiopia/inflation-rate%20cpi#:~:text=Ethiopia%20inflation%20rate%20for%202022,a%201.98%25%20increase%20from%202018

rates.php%23%3A~%3Atext%3DDuring%2520the%2520observation%2520period%2520from%2Cat%2520the%2520beginning%2520of%25202023&PC=U316&FORM=CHROMN

ANNEX

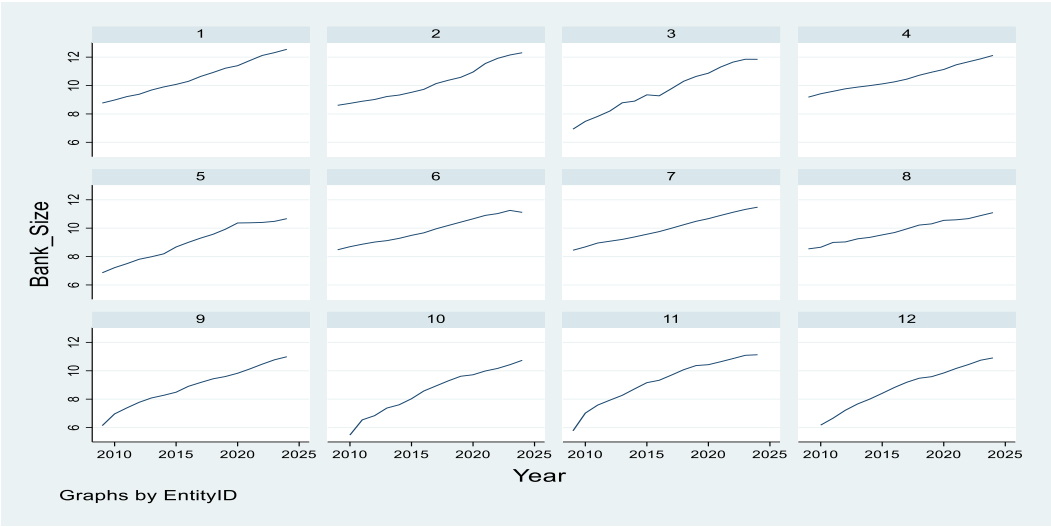
Table 5. Raw Data

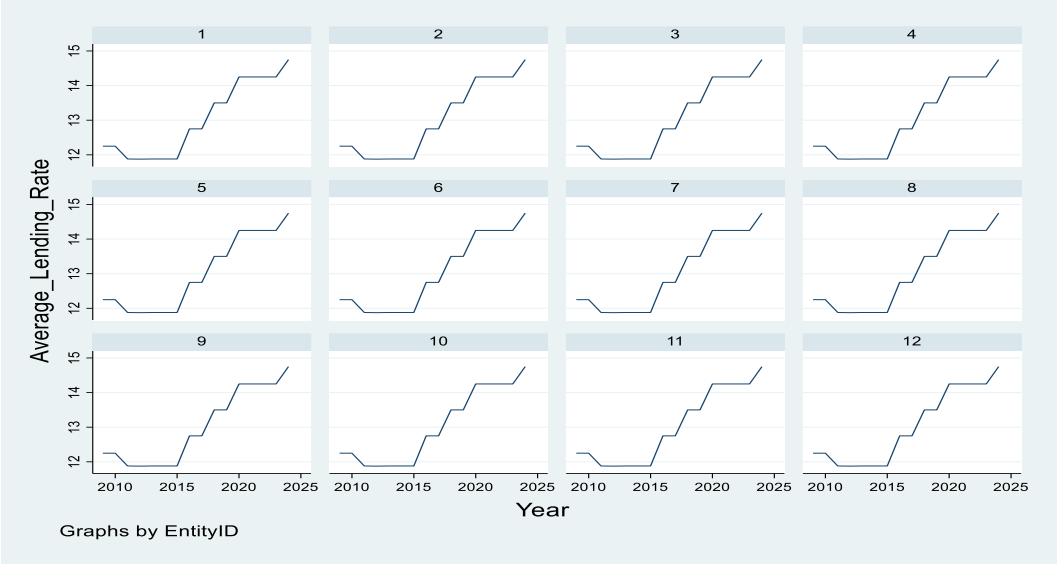
Entity	ID	Year	ROE	ER	GIR	SIZE	AVLR	RGDPGR	PIS	LM	EQ	AQ	ME
AWASH	1	2009	21.2	129.7	2.7	8.8	12.3	10	1.9	64.2	2.4	2.3	0.8
AWASH	1	2010	29	211.9	7.3	9	12.3	10.6	1.9	66.2	1.9	2.9	0.5
AWASH	1	2011	31.4	250.2	38	9.2	11.9	11.4	2	52.3	1.8	2.5	0.4
AWASH	1	2012	26.4	149.7	20.8	9.4	11.9	8.7	1.9	34.3	3.2	2.7	0.6
AWASH	1	2013	23.6	111.7	7.4	9.7	11.9	9.9	2.1	28.5	3.3	3	0.8
AWASH	1	2014	26.5	134.8	8.5	9.9	11.9	10.3	2.2	33.6	3.1	3.2	0.7
AWASH	1	2015	22.3	104.8	10.4	10.1	11.9	10.4	2	21	3.4	3.8	0.9
AWASH	1	2016	20.9	85.3	7.5	10.3	12.8	8	1.9	25.4	3.9	3.9	1.1
AWASH	1	2017	23	78.5	8.4	10.6	12.8	10.1	1.8	22.9	4	2.8	1.1
AWASH	1	2018	26.4	61.2	16.8	10.9	13.5	7.7	2.2	26.8	4.9	4.4	1
AWASH	1	2019	30.2	79.8	15.3	11.2	13.5	9	2.2	19.1	5.2	3.4	0.8
AWASH	1	2020	24	59.1	21.5	11.4	14.3	6.1	1.7	20.5	5.8	3.3	1.1
AWASH	1	2021	24.1	68.2	24.6	11.8	14.3	6.3	1.3	17.1	5.1	2.7	1.2
AWASH	1	2022	28.8	73.5	34	12.1	14.3	6.4	1.4	21.7	5.3	2.6	1.2
AWASH	1	2023	28.6	52.8	29.3	12.3	14.3	7.2	1.5	19.1	7.1	3.5	1.3
AWASH	1	2024	22.9	50.3	24	12.6	14.8	6.5	1.5	0	0	0	0.3
BOA	2	2009	21.4	87.5	2.7	8.6	12.3	10	1.9	60	3	1.4	1
BOA	2	2010	25.5	142.5	7.3	8.7	12.3	10.6	1.9	57.6	2.1	1.2	0.7
BOA	2	2011	29	125.5	38	8.9	11.9	11.4	2	47.7	2.9	1.2	0.8
BOA	2	2012	27.6	99.8	20.8	9	11.9	8.7	1.9	37.3	3.5	1.2	0.8
BOA	2	2013	26.3	110.3	7.4	9.2	11.9	9.9	2.1	28.5	3.2	2.6	0.7
BOA	2	2014	20.5	80.7	8.5	9.3	11.9	10.3	2.2	30.2	3.7	2.6	1
BOA	2	2015	17.5	76.5	10.4	9.5	11.9	10.4	2	56.4	3.5	6.4	1.2
BOA	2	2016	18.3	75.1	7.5	9.7	12.8	8	1.9	22.8	3.8	6.4	1.5
BOA	2	2017	22.7	74.9	8.4	10.1	12.8	10.1	1.8	16.6	4	4.9	1.4
BOA	2	2018	15.7	38.1	16.8	10.4	13.5	7.7	2.2	17.4	5.2	5.6	1.9
BOA	2	2019	16.9	44.6	15.3	10.6	13.5	9	2.2	13.9	5.1	5	1.7
BOA	2	2020	15.9	29.5	21.5	10.9	14.3	6.1	1.7	13.3	5.3	7.1	2.6
BOA	2	2021	18.7	43	24.6	11.6	14.3	6.3	1.3	13.6	5	5.9	2.7
BOA	2	2022	28.3	30.2	34	11.9	14.3	6.4	1.4	15.1	6.8	3.3	1.7
BOA	2	2023	23	15.5	29.3	12.2	14.3	7.2	1.5	13.3	7.8	3.2	2.2
BOA	2	2024	18.3	21.8	24	12.3	14.8	6.5	1.5	0	0	0	2.1
CoBO	3	2009	1.5	28	2.7	6.9	12.3	10	1.9	45.9	3.2	2.9	11.2
CoBO	3	2010	14.5	82.4	7.3	7.5	12.3	10.6	1.9	62.1	2.7	2	1.8
CoBO	3	2011	21.7	120.2	38	7.8	11.9	11.4	2	61.5	2.1	2.5	1.2
CoBO	3	2012	30.8	125.7	20.8	8.2	11.9	8.7	1.9	44.2	3.1	2.4	0.8
CoBO	3	2013	33.9	146.3	7.4	8.8	11.9	9.9	2.1	76.7	2.6	1.4	0.8
CoBO	3	2014	38.4	150.2	8.5	8.9	11.9	10.3	2.2	32.2	4.4	1.8	0.6
CoBO	3	2015	25	86.3	10.4	9.3	11.9	10.4	2	33.1	4.9	1.7	1.3
CoBO	3	2016	3	31.3	7.5	9.3	12.8	8	1.9	25.1	5.6	2.3	22
CoBO	3	2017	15.2	43	8.4	9.8	12.8	10.1	1.8	24.4	4.4	2.2	4
CoBO	3	2018	22.6	50.5	16.8	10.3	13.5	7.7	2.2	31.4	4.1	1.9	2.2
CoBO	3	2019	23.2	47.1	15.3	10.6	13.5	9	2.2	25.9	4.3	1.8	2.5
CoBO	3	2020	28.2	57	21.5	10.9	14.3	6.1	1.7	15	5	1.9	2
CoBO	3	2021	21.7	60.7	24.6	11.3	14.3	6.3	1.3	19.8	4.2	2	2.5
CoBO	3	2022	22.2	61	34	11.6	14.3	6.4	1.4	17	4.7	2.4	2.3
CoBO	3	2023	19.9	53.3	29.3	11.9	14.3	7.2	1.5	13.5	5.8	3.2	3
CoBO	3	2024	10.1	44.8	24	11.8	14.8	6.5	1.5	0	0	0	2.2
DASHEN	4	2009	30.5	157.5	2.7	9.2	12.3	10	1.9	59.3	2.4	1.1	0.6
DASHEN	4	2010	31.9	186.8	7.3	9.4	12.3	10.6	1.9	51.8	1.9	1.3	0.6
DASHEN	4	2011	35.8	207.5	38	9.6	11.9	11.4	2	52.6	1.9	1.3	0.5
DASHEN	4	2012	40.4	196.2	20.8	9.8	11.9	8.7	1.9	41.1	2.8	1.5	0.5
DASHEN	4	2013	31.3	154.9	7.4	9.9	11.9	9.9	2.1	38.2	2.7	1.6	0.6
DASHEN	4	2014	30.7	163.5	8.5	10	11.9	10.3	2.2	37	2.6	2.7	0.6
DASHEN	4	2015	26.4	124.5	10.4	10.1	11.9	10.4	2	27.9	3	2.8	0.9
DASHEN	4	2016	23.1	116.3	7.5	10.3	12.8	8	1.9	30.2	2.7	2.8	1.1
DASHEN	4	2017	20.6	88.8	8.4	10.5	12.8	10.1	1.8	18.9	3.3	2.4	1.5
DASHEN	4	2018	18.8	64	16.8	10.7	13.5	7.7	2.2	19.6	4	6.2	1.6
DASHEN	4	2019	16	49	15.3	10.9	13.5	9	2.2	13.6	4.2	5.4	1.7
DASHEN	4	2020	20.3	46.7	21.5	11.1	14.3	6.1	1.7	16.3	4.9	5.9	1.7
DASHEN	4	2021	18.7	26	24.6	11.5	14.3	6.3	1.3	15.7	5.3	4.5	1.4

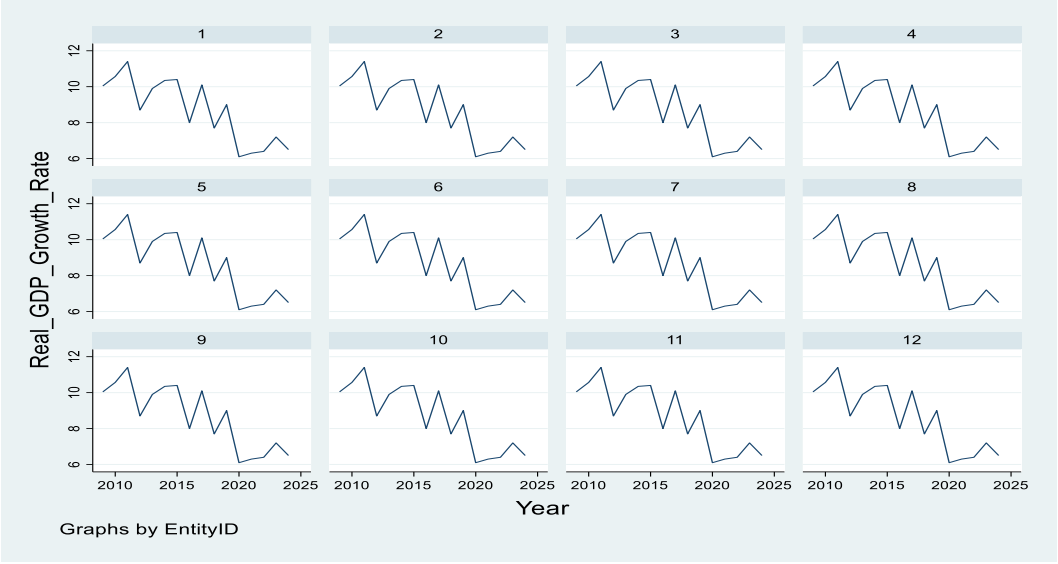
Entity	ID	Year	ROE	ER	GIR	SIZE	AVLR	RGDPGR	PIS	LM	EQ	AQ	ME
DASHEN	4	2022	23.7	43.2	34	11.7	14.3	6.4	1.4	18.5	5.5	4.2	1.2
DASHEN	4	2023	21.1	47.8	29.3	11.9	14.3	7.2	1.5	17.6	6.5	4.8	1.7
DASHEN	4	2024	20.4	51.2	24	12.1	14.8	6.5	1.5	0	0	0	0.9
LION	5	2009	1.4	48.1	2.7	6.9	12.3	10	1.9	62.9	2.2	1.8	9.1
LION	5	2010	18.4	132.7	7.3	7.2	12.3	10.6	1.9	72.8	2.7	1.4	0.8
LION	5	2011	14.7	125.3	38	7.5	11.9	11.4	2	70.3	2.7	1.1	0.8
LION	5	2012	19	139	20.8	7.8	11.9	8.7	1.9	59.8	3.1	0.9	0.7
LION	5	2013	22.7	141.5	7.4	8	11.9	9.9	2.1	46.7	3.8	1	0.6
LION	5	2014	16.5	94.3	8.5	8.2	11.9	10.3	2.2	42.1	3.7	1.3	1.1
LION	5	2015	20.8	101.7	10.4	8.7	11.9	10.4	2	34.4	3.8	1.1	1.4
LION	5	2016	20.7	83.4	7.5	9	12.8	8	1.9	29	4.4	1.1	1.6
LION	5	2017	21.3	61.9	8.4	9.3	12.8	10.1	1.8	30.4	4.8	1	1.3
LION	5	2018	24	55.5	16.8	9.6	13.5	7.7	2.2	25.9	5.2	1	1.3
LION	5	2019	24.7	59.8	15.3	9.9	13.5	9	2.2	22	5.2	1	1.3
LION	5	2020	21.3	32.4	21.5	10.4	14.3	6.1	1.7	26.4	5.3	2.8	1.7
LION	5	2021	9.4	9.3	24.6	10.4	14.3	6.3	1.3	15	6.6	3.1	4.6
LION	5	2022	7.2	1.4	34	10.4	14.3	6.4	1.4	14.7	6.1	3.1	5.6
LION	5	2023	12	16.2	29.3	10.5	14.3	7.2	1.5	14.4	6.2	3.1	2.3
LION	5	2024	35.6	43.9	24	10.7	14.8	6.5	1.5	0	0	0	0.2
NIB	6	2009	23.2	131.1	2.7	8.5	12.3	10	1.9	70.8	3.7	1.2	0.6
NIB	6	2010	24.4	159.9	7.3	8.7	12.3	10.6	1.9	74.3	3	1.2	0.6
NIB	6	2011	23.6	167.6	38	8.9	11.9	11.4	2	70.7	3	1.1	0.6
NIB	6	2012	21.2	149.4	20.8	9	11.9	8.7	1.9	51.1	3.4	1.2	0.6
NIB	6	2013	18.7	102.2	7.4	9.1	11.9	9.9	2.1	33.9	4.2	1.4	0.7
NIB	6	2014	16.4	101.9	8.5	9.3	11.9	10.3	2.2	24.2	3.6	2	0.7
NIB	6	2015	16.3	68.6	10.4	9.5	11.9	10.4	2	18.4	4.4	2.3	1.1
NIB	6	2016	16.6	53	7.5	9.7	12.8	8	1.9	24	4.7	2.5	1.1
NIB	6	2017	16.2	60.9	8.4	10	12.8	10.1	1.8	20	4.6	2.5	1.1
NIB	6	2018	16.1	42.7	16.8	10.2	13.5	7.7	2.2	18	4.5	7.2	1.4
NIB	6	2019	18.6	40	15.3	10.4	13.5	9	2.2	14.2	4.9	6.9	1.3
NIB	6	2020	20.4	42	21.5	10.7	14.3	6.1	1.7	15.9	5.1	6.5	1.2
NIB	6	2021	18.8	27	24.6	10.9	14.3	6.3	1.3	17.1	5.9	6.8	1.3
NIB	6	2022	17.5	31.4	34	11	14.3	6.4	1.4	30.1	5.9	6.6	1.5
NIB	6	2023	16.7	25.6	29.3	11.3	14.3	7.2	1.5	20.3	6.1	5.4	1.9
NIB	6	2024	9.2	22.4	24	11.1	14.8	6.5	1.5	0	0	0	4.5
UNITED	7	2009	18.9	109	2.7	8.4	12.3	10	1.9	68.7	2.6	0.9	0.9
UNITED	7	2010	30.1	163.6	7.3	8.7	12.3	10.6	1.9	69.3	2.5	0.7	0.6
UNITED	7	2011	30.1	178.8	38	9	11.9	11.4	2	58.7	2.5	0.8	0.5
UNITED	7	2012	29.7	138.2	20.8	9.1	11.9	8.7	1.9	42.4	3.6	1.1	0.6
UNITED	7	2013	24.5	107	7.4	9.2	11.9	9.9	2.1	25.6	3.5	1.1	0.8
UNITED	7	2014	20	80.9	8.5	9.4	11.9	10.3	2.2	36	3.7	1.5	1.1
UNITED	7	2015	17.3	65.4	10.4	9.6	11.9	10.4	2	23.1	3.9	2.5	1.6
UNITED	7	2016	18	62.2	7.5	9.8	12.8	8	1.9	22.4	4.1	2.8	1.7
UNITED	7	2017	16.6	52	8.4	10	12.8	10.1	1.8	19.3	4.2	3.3	1.8
UNITED	7	2018	21	53.1	16.8	10.2	13.5	7.7	2.2	19.6	4.4	4.4	1.6
UNITED	7	2019	17.2	39	15.3	10.5	13.5	9	2.2	13.2	4.7	4.4	1.7
UNITED	7	2020	19.3	33.9	21.5	10.7	14.3	6.1	1.7	15.3	5.6	5.3	1.7
UNITED	7	2021	17.5	40.9	24.6	10.9	14.3	6.3	1.3	10.6	5.4	6.3	1.7
UNITED	7	2022	15.9	35.6	34	11.1	14.3	6.4	1.4	11.3	6.5	5.5	2.1
UNITED	7	2023	27.7	39.9	29.3	11.3	14.3	7.2	1.5	7.3	6.7	5.1	1.3
UNITED	7	2024	18.2	37.9	24	11.5	14.8	6.5	1.5	0	0	0	0.8
WEGAGEN	8	2009	25.1	179.9	2.7	8.5	12.3	10	1.9	78.2	2.9	1.1	0.5
WEGAGEN	8	2010	23.7	184.9	7.3	8.7	12.3	10.6	1.9	77.4	3	1.4	0.5
WEGAGEN	8	2011	27.1	194.9	38	9	11.9	11.4	2	69.5	2.7	1.4	0.6
WEGAGEN	8	2012	22.9	162.1	20.8	9	11.9	8.7	1.9	48.5	3.6	3.7	0.5
WEGAGEN	8	2013	20	112.2	7.4	9.2	11.9	9.9	2.1	36.8	4	3.5	0.7
WEGAGEN	8	2014	16	96.3	8.5	9.4	11.9	10.3	2.2	35.9	3.7	4.7	1
WEGAGEN	8	2015	15.5	81.1	10.4	9.5	11.9	10.4	2	24.8	4.1	4.7	1.3
WEGAGEN	8	2016	14.4	71.5	7.5	9.7	12.8	8	1.9	28	4.2	4.6	1.5
WEGAGEN	8	2017	17.3	82.4	8.4	9.9	12.8	10.1	1.8	27.9	4.2	4.5	1.4
WEGAGEN	8	2018	22.1	75.6	16.8	10.2	13.5	7.7	2.2	19.7	5	4.9	1.2
WEGAGEN	8	2019	15.3	47.7	15.3	10.3	13.5	9	2.2	18.2	5	4.8	2
WEGAGEN	8	2020	17.7	55.7	21.5	10.5	14.3	6.1	1.7	21.1	5.3	4.3	2
WEGAGEN	8	2021	2.5	32.2	24.6	10.6	14.3	6.3	1.3	15.4	6.2	4	17.3
WEGAGEN	8	2022	10.4	35.9	34	10.7	14.3	6.4	1.4	30.4	5.2	3.5	4.6
WEGAGEN	8	2023	13.2	40.5	29.3	10.9	14.3	7.2	1.5	21.2	6.5	3	3.2
WEGAGEN	8	2024	17.4	51.2	24	11.1	14.8	6.5	1.5	0	0	0	0
ZEMEN	9	2009	-14.1	55.3	2.7	6.1	12.3	10	1.9	79.7	0.4	6.6	-2.7
ZEMEN	9	2010	40.9	244.4	7.3	7	12.3	10.6	1.9	88.8	0.8	3.2	0.6

Entity	ID	Year	ROE	ER	GIR	SIZE	AVLR	RGDPGR	PIS	LM	EQ	AQ	ME
ZEMEN	9	2011	42.4	283.1	38	7.4	11.9	11.4	2	60.8	1.2	1.4	0.5
ZEMEN	9	2012	33.1	212.2	20.8	7.8	11.9	8.7	1.9	50.2	1.5	2	0.6
ZEMEN	9	2013	24.3	141.1	7.4	8.1	11.9	9.9	2.1	44.8	1.5	1.8	1.5
ZEMEN	9	2014	32	207.7	8.5	8.3	11.9	10.3	2.2	49.3	2.3	1.9	0.5
ZEMEN	9	2015	21.6	145.3	10.4	8.5	11.9	10.4	2	30.2	2.6	1.4	0.8
ZEMEN	9	2016	23	148.4	7.5	8.9	12.8	8	1.9	40.2	2.2	1	0.8
ZEMEN	9	2017	21.5	159.6	8.4	9.2	12.8	10.1	1.8	42	1.7	5.2	0.9
ZEMEN	9	2018	17.7	120.4	16.8	9.4	13.5	7.7	2.2	39.6	2.2	4.2	1
ZEMEN	9	2019	23.7	136.6	15.3	9.6	13.5	9	2.2	21.7	3.3	4.9	0.7
ZEMEN	9	2020	27.1	123.4	21.5	9.8	14.3	6.1	1.7	30.3	4.7	4.6	0.6
ZEMEN	9	2021	25.1	130.7	24.6	10.1	14.3	6.3	1.3	31.7	4.1	4	0.6
ZEMEN	9	2022	27.5	145.5	34	10.5	14.3	6.4	1.4	29.9	4.3	4.1	0.6
ZEMEN	9	2023	24.6	93	29.3	10.8	14.3	7.2	1.5	24.2	5.5	4	0.7
ZEMEN	9	2024	37.2	88.3	24	11	14.8	6.5	1.5	0	0	0	0.6
BIRHAN	10	2010	-8.2	19.5	7.3	5.5	12.3	10.6	1.9	82.7	1.1	2.2	-2.1
BIRHAN	10	2011	16.8	141	38	6.5	11.9	11.4	2	76.2	1.8	1.5	0.9
BIRHAN	10	2012	17.4	149	20.8	6.8	11.9	8.7	1.9	61	2.3	1.2	0.7
BIRHAN	10	2013	12	110.2	7.4	7.4	11.9	9.9	2.1	46.4	2.2	0.9	0.9
BIRHAN	10	2014	9.6	74.4	8.5	7.6	11.9	10.3	2.2	48.8	3.8	1	1.5
BIRHAN	10	2015	16.2	100.3	10.4	8	11.9	10.4	2	40.5	3.3	1.3	1.2
BIRHAN	10	2016	29.7	109	7.5	8.6	12.8	8	1.9	29.4	4.5	0.9	0.8
BIRHAN	10	2017	22.4	102.3	8.4	8.9	12.8	10.1	1.8	31.6	4.4	1.5	1
BIRHAN	10	2018	16	60.5	16.8	9.3	13.5	7.7	2.2	24.6	4.9	1.5	1.8
BIRHAN	10	2019	18.3	65.4	15.3	9.6	13.5	9	2.2	20.4	4.9	1.9	1.7
BIRHAN	10	2020	17.8	59.3	21.5	9.7	14.3	6.1	1.7	16.8	5.8	4.3	1.9
BIRHAN	10	2021	5.4	42	24.6	10	14.3	6.3	1.3	13.9	5.8	4.7	6.2
BIRHAN	10	2022	11.7	42.7	34	10.2	14.3	6.4	1.4	12.1	5.9	5.5	4
BIRHAN	10	2023	10.7	23.3	29.3	10.4	14.3	7.2	1.5	11	6.2	5.1	4.7
BIRHAN	10	2024	19.1	44	24	10.7	14.8	6.5	1.5	0	0	0	0.7
OROMIA	11	2009	-5.7	29.1	2.7	5.8	12.3	10	1.9	94	0.2	4	-1.8
OROMIA	11	2010	12	114.6	7.3	7	12.3	10.6	1.9	76.6	1.4	3.3	2
OROMIA	11	2011	17.5	142.5	38	7.6	11.9	11.4	2	55.7	1.5	2.5	1.1
OROMIA	11	2012	13.5	98.3	20.8	7.9	11.9	8.7	1.9	52.3	2.4	2.9	1.7
OROMIA	11	2013	13.6	77.2	7.4	8.3	11.9	9.9	2.1	39.4	3.4	2.7	1.9
OROMIA	11	2014	23.7	91.7	8.5	8.7	11.9	10.3	2.2	37.3	3.7	1.8	1.2
OROMIA	11	2015	25.5	83.2	10.4	9.2	11.9	10.4	2	20.9	3.8	1.9	1.3
OROMIA	11	2016	13.4	47.3	7.5	9.3	12.8	8	1.9	23	4.7	4.5	2.6
OROMIA	11	2017	19.3	74.2	8.4	9.7	12.8	10.1	1.8	24.7	3.6	3.2	2.1
OROMIA	11	2018	34.2	83.7	16.8	10.1	13.5	7.7	2.2	29.2	4.6	2.7	1.1
OROMIA	11	2019	23.7	59.7	15.3	10.4	13.5	9	2.2	19.3	4.9	2.4	1.4
OROMIA	11	2020	20.7	44.7	21.5	10.4	14.3	6.1	1.7	19.2	5.6	2.4	1.4
OROMIA	11	2021	17.3	36.7	24.6	10.6	14.3	6.3	1.3	20.6	5.7	2.4	1.8
OROMIA	11	2022	19.5	51.1	34	10.9	14.3	6.4	1.4	22.5	5.3	3	1.7
OROMIA	11	2023	20.4	46.5	29.3	11.1	14.3	7.2	1.5	20.2	6.2	4.1	2
OROMIA	11	2024	8.8	41.9	24	11.1	14.8	6.5	1.5	0	0	0	0.2
BUNNA	12	2010	0	63.9	7.3	6.2	12.3	10.6	1.9	104.3	1.4	2.2	3.6
BUNNA	12	2011	9.7	117.3	38	6.7	11.9	11.4	2	77	2.7	2	1.3
BUNNA	12	2012	10.7	98.6	20.8	7.2	11.9	8.7	1.9	44.7	2.9	1.3	1.2
BUNNA	12	2013	14	78.5	7.4	7.7	11.9	9.9	2.1	37.5	3.8	1	1
BUNNA	12	2014	17.9	86.8	8.5	8	11.9	10.3	2.2	41.5	4.2	2.1	1.2
BUNNA	12	2015	22.5	82.7	10.4	8.4	11.9	10.4	2	23.4	4.9	2	1.2
BUNNA	12	2016	22.9	78.7	7.5	8.8	12.8	8	1.9	23.3	4.6	1.7	1.2
BUNNA	12	2017	17.4	72.3	8.4	9.2	12.8	10.1	1.8	27.6	3.8	1.9	1.5
BUNNA	12	2018	18.9	62.5	16.8	9.5	13.5	7.7	2.2	26.8	4.9	1.3	1.3
BUNNA	12	2019	20.3	71.7	15.3	9.6	13.5	9	2.2	21.6	5.8	2.1	1.2
BUNNA	12	2020	15.6	47.9	21.5	9.8	14.3	6.1	1.7	21.9	6	3.3	1.8
BUNNA	12	2021	19.5	48.3	24.6	10.2	14.3	6.3	1.3	16	6.5	2.9	1.6
BUNNA	12	2022	19.9	42.4	34	10.4	14.3	6.4	1.4	5.5	6.9	2.8	1.7
BUNNA	12	2023	16.4	31.3	29.3	10.7	14.3	7.2	1.5	12.2	8	2.9	2.5
BUNNA	12	2024	10.3	29.2	24	10.9	14.8	6.5	1.5	0	0	0	0.7

Figure 6. Line Graphs of Control Variables



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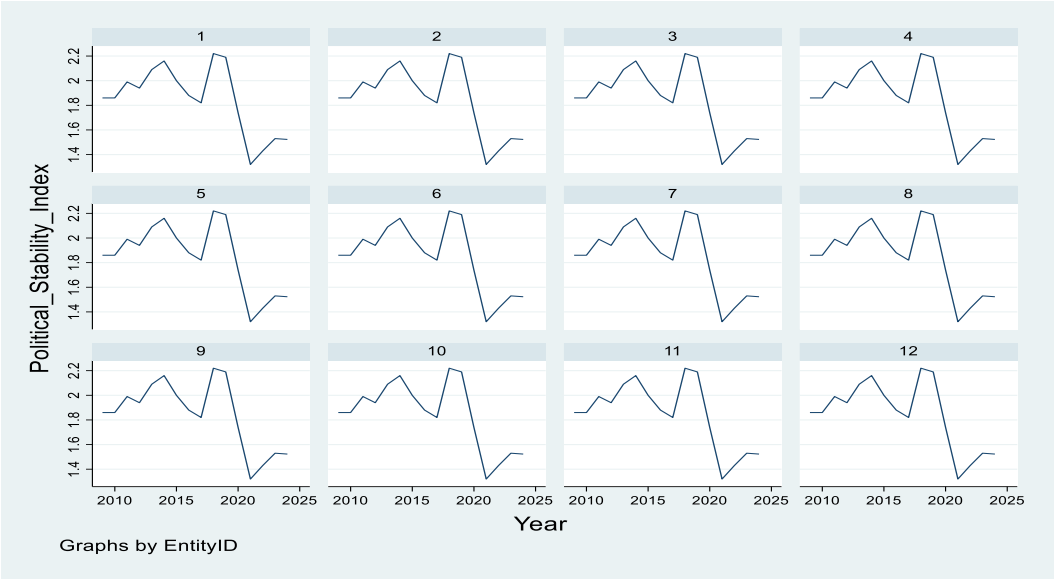
12
2010
2015
2020
2025
Year
Graphs by EntityID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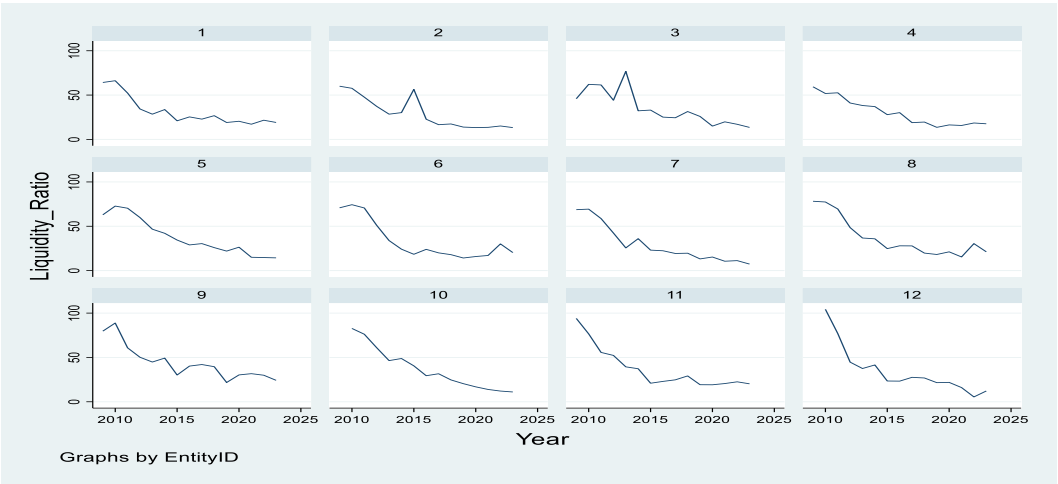
2010
2015
2020
2025
Year
Graphs by EntityID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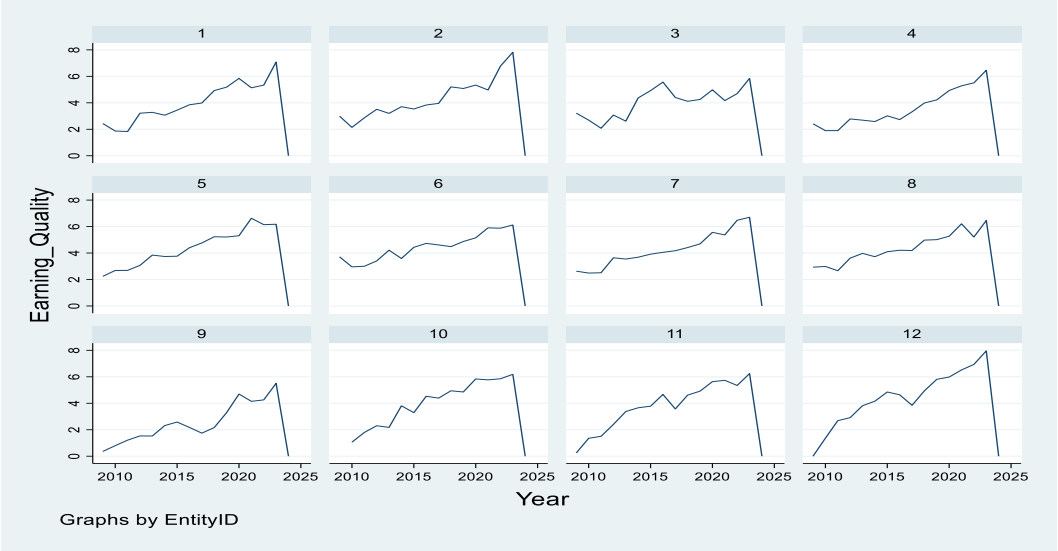
100
2010
2015
2020
2025
Year
Graphs by EntityID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Earning_Quality
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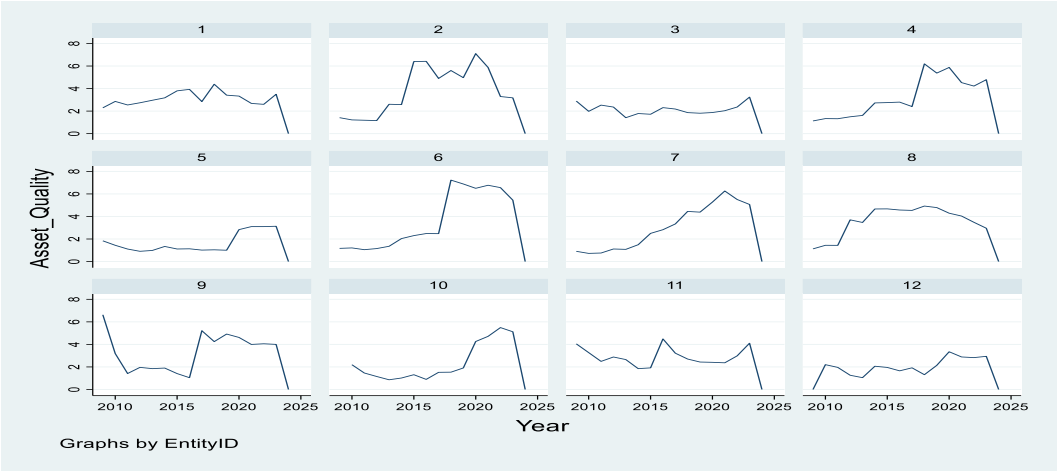
2010
2015
2020
2025
Year
Graphs by EntityID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12
Asset_Quality
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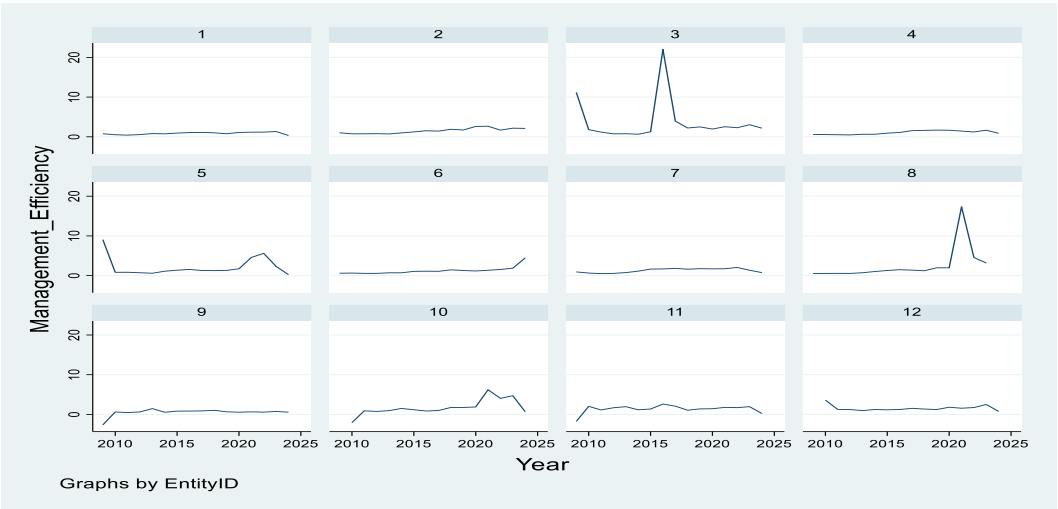
2010
2015
2020
2025
Year
Graphs by EntityID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7
8
9
10
11
12
Management_Efficiency
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10
20
2010
2015
2020
2025
Year
Graphs by EntityID