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Original Article

Determinants of Private Commercial Banks' Lending in Ethiopia

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ABSTRACT: *Choosing seven senior private commercial banks using judgmental sampling, this study used an explanatory research approach to examine the factors affecting private commercial banks' lending in Ethiopia. Using bank-specific and macroeconomic indicators based on audited financial statements; microeconometric analysis & secondary panel data from National Bank of Ethiopia, Ministry of Finance for the period 2008–2022. Statistical methodsIn the current study, data were analyzed by utilizing both descriptive statistics and a fixed-effect panel multiple linear regression model with STATA 16. The results indicate that bank size, deposit volume positively influenced private commercial banks' lending while cash reserve requirement, lending interest rate and management efficiency as well as inflation had negative statistically significant effects. On the other hand, lending had negative and statistically weak association with liquidity ratio and GDP respectively. These findings lead the study to advise Ethiopian private commercial banks to prioritize asset size growth and more effective deposit mobilizing techniques. Moreover, when extending loans, they ought to handle liquidity and lending activities by thoughtfully weighing internal variables, present economic circumstances, the larger macroeconomic environment, legal actions, and their intended clients.*

KEYWORDS: *Determinants, Private, Commercial Banks, Lending, Ethiopia.*

1. INTRODUCTION

Since the evolution of monetary systems in human history, the credit system, which is characterized by deposit aggregation the process whereby financial resources are amassed by commercial banks and subsequently lent to deficit economic agents who require them, has emerged where banking services act as intermediaries between economic actors that possess an excess supply of funds depositors and those facing a shortfall (borrowers; Akpanuko & Acha, 2010). Lending, which is a key role performed by commercial banks (Olokoyo, 2011) involves offering both short- medium and long term loans and advances to individuals, firms and government to stimulate capital formation as well as create economic development.

Generally, loans and advances represent the major asset class and main source of earning for banking institutions (Malede, 2014; McCarthy, 2010). Bank lending behaviour is hugely diversified depending upon the ownership of banks private banks having more inclination towards profit maximization whereas states owned banks very often target other objective harmonious to social welfare (Behr, Norden, & Noth, 2013; La Porta, Lopez-de-Silanes, & Shleifer, 2002). For instance, with respect to Ethiopia, the foundation of modern banking can be dated back to 1905, underwent nationalization for a certain period of time and after deregulation in 1992 paved a way for many private banks (Gedey, 1990; Gezae, 2015).

Currently, there are one state-owned commercial bank, a development bank and seventeen private commercial banks in Ethiopia under the administration of the National Bank of Ethiopia (NBE). The lending activities of such financial institutions are determined by a combination of both bank-level characteristics and macroeconomic indicators. This study aims explicitly at finding and investigating the effect of some influencing factors such as bank size, deposit volume, liquidity ratio, managerial efficiency, gross domestic product, and cash reserve requirement ratio and lending interest rate on the lending of private commercial banks in Ethiopia.

1.1. THE STATEMENT OF THE PROBLEM

Commercial banks have a crucial role to play in economic growth and development, acting as central means end through which savings are directed and resources allocated within economies where banking predominates such as Ethiopia; where the capital market is embryonic the commercial bank provides finance (Olokoyo, 2011 & Kannan & Sudalaimuthu. The process of lending is not only the basis for how commercial banks, and more broadly financial institutions operate, but also serves as the main source of income through interest earned on loans (Malede, 2014; Vong & Chan, 2009); however this process comes at a relatively high risk because tight loan portfolios have always led to forfeited wealth and even institutional failure in history (Vong & Chan, 2009).

Thus, understanding the drivers behind lending activity the supply of loans, which depends on both internal (microeconomic) and external macroeconomic conditions are crucial when assessing bank performance (Gaiotti & Secchi, 2006; Kishan & Opiela, 2000). Even though there is numerous international research on these determinants across many countries as Nigeria (Olokoyo, 2011), Vietnam (Dai Van Pham, 2015), Russia (Chernykh & Theodossiou, 2011), Turkey (Tomak, 2013) and Nepal (Bhattarai, 2016), the empirical evidence in Ethiopian commercial banks remain few and inconsistent (Malede, 2014; Getahun, 2014; Temesgen, 2016; Abebie, 2016; Getachew, 2017; Haile,2020).

Similarly, Malede (2014) highlighted a strong positive relationship between lending and bank size, liquidity, credit risk, and GDP; however, an insignificant relationship with deposits, investments, cash reserves and interest rates contradicts the results of Getahun (2014) and Abebie (2016). The different conclusions of these studies concerning the impact of management efficiency on bank productive efficiency and in view that there is a big research gap regarding the effect of management efficiency on banks' lending behaviour in Ethiopia, as affirmed by Bage et al. Using a panel dataset from 2008-2022, the objective of this study is to identify the bank-specific and macroeconomic determinants of private commercial banks' lending in Ethiopia in order to add up to evidence and contribute to policy formulation.

1.2. OBJECTIVES OF THE STUDY

The main objective of the study is to investigate the determinants of private commercial banks' lending in Ethiopia. To achieve the above broad objective the study has been the following specific objectives.

- To examine the impact of bank specific factors (bank size, volume of deposit, liquidity ratio, lending interest rate and management efficiency) on private commercial banks' lending in Ethiopia.
- To examine the impact of macro-economic factors (GDP, cash reserve requirement and inflation) on private commercial banks' lending in Ethiopia.

1.3. HYPOTHESES OF THE STUDY

In line with objectives, eight **hypotheses** were formulated based on existing theories and this hypothesis is developed based on the theories and empirical review literature write in chapter two, but this shows only directions. All independent variables have a hypothesis can be supported by theories and empirical pieces of evidence.

- H1: Bank size has a positive and significant impact on private commercial banks' lending.
- H2: Volume of deposit has a significant and positive impact on private commercial banks' lending.
- H3: liquidity ratio has a significant and positive impact on private commercial banks' lending.
- H4: lending interest rate has a negative and significant impact on private commercial banks' lending.
- H5: management efficiency has a significant and positive impact on private commercial banks' lending.
- H6: cash reserve requirement has a negative and significant impact on private commercial banks' lending.
- H7: gross domestic product has a significant and positive impact on private commercial banks' lending.
- H8: inflation has a significant and negative impact on private commercial banks' lending.

2. THEORETICAL LITERATURE REVIEW

Numerous theoretical frameworks elucidate the mechanisms by which commercial banks engage in the act of lending. The loan pricing theory posits that banks are not always at liberty to impose elevated interest rates to optimize their profit margins, as such actions may precipitate adverse selection whereby high-risk borrowers are attracted to elevated rates and moral hazard where borrowers undertake risky ventures. Consequently, this indicates that interest rates may not invariably correspond with the risk profile of the borrower (Stiglitz & Weiss, 1981; Chodecal, 2004).

The theory of multiple-lending posits that banks exhibit a diminished propensity to engage in loan syndication when equity markets are robustly developed and following consolidation, as these conditions enhance the lending capacities of banks while concurrently diminishing their necessity for diversification and oversight through collaborative lending practices (Carletti, Cerasi, & Daltung, 2006).

Moral hazard theory elucidates that when two parties enter into a contractual agreement, complications may arise due to hidden information one party failing to disclose all available options and associated risks or hidden actions one party opting for choices that are not aligned with the interests of the counterparty. In the context of lender-borrower relationships, banks may struggle to guarantee that the funds procured through borrowing are allocated towards productive investments, thereby resulting in borrowers engaging in high-risk projects and potentially defaulting as a consequence of information asymmetry (Arrow, 1985; Diamond & Rajan, 2001).

The hold-up and soft-budget-constraint theories critically assess the rationale behind banks' preference for multiple-bank lending. Hold-up theory asserts that collaborative lending mitigates the risk of expropriating informational rents, thereby fostering prudent investment decisions and enhancing bank profitability (Von Thadden, 2004). Conversely, soft-budget-constraint theory maintains that multiple-bank lending serves to restrain banks from providing further inefficient credit, thus

lessening the occurrence of strategic defaults. Both theories posit that multiple-bank lending functions as a mechanism for banks to commit to entrepreneurs while simultaneously improving incentive structures. Nonetheless, they fail to elucidate the impact of multiple-bank lending on the monitoring incentives of banks. Carletti et al. (2006) contend that multiple-bank lending may constitute an optimal strategy for banks with constrained lending capacities to enhance their monitoring efforts, as it permits them to amplify loans and attain superior diversification, thereby alleviating agency dilemmas between banks and depositors.

The credit market theory articulates that, in the presence of collateral and other constraints, the lending rate is the sole determinant of the volume of credit extended by banks. As demand for credit escalates alongside a stable supply, interest rates are compelled to increase. Any supplementary risk associated with a project ought to be encapsulated within a risk premium appended to the lending rate in order to correspond with the heightened default risk. This engenders a positive correlation between borrower default probabilities and the interest rates imposed (Ewert, Schenk, & Szczesny, 2000). Such a theory offers direct support to the loan pricing theory.

The bank lending channel theory postulates that during periods of monetary contraction, banks may curtail loan availability to certain firms, thereby reducing their intended investment levels, irrespective of prevailing interest rates (Clouse, Henderson, Orphanides, Small, & Tinsley, 2003).

Lastly, transactions theory posits that the credit money generated by commercial banks is fundamental and serves as the driving force of the monetary system, as opposed to being derived from central bank money. Monetary transactions are characterized by a tripartite structure (involving a buyer, a seller, and a bank), wherein a debit is applied to the buyer's account and a corresponding credit is allocated to the seller's account, as exemplified in credit or debit card transactions (Alfaro, Franken, García, & Jara, 2003).

2.1. DETERMINANTS OF PRIVATE COMMERCIAL BANK LENDING AND HYPOTHESIS DEVELOPMENT

The lending operations of private commercial banks are affected by two primary categories of determinants: bank-specific (internal) and macroeconomic (external). Bank-specific determinants, which encompass factors such as the size of the bank, the volume of deposits, the liquidity ratio, management efficacy, and the lending interest rate, are predominantly influenced by the internal management decisions and policy objectives of the bank. For example, bank size, typically assessed by total assets, generally exerts a positive influence on lending capabilities, as larger banks usually possess enhanced access to financial resources (Chernykh & Theodossiou, 2011; Constant & Ngomsi, 2012a; Malede, 2014; Amidu, 2014; Rabab'ah, 2015; Tomak, 2013; Chernykh & Theodossiou, 2011), although contrasting studies propose a negative correlation (Pruteanu-Podpiera, 2007). Consequently, this study posits the following hypothesis:

H1*: Bank size exerts a significant and positive influence on the lending activities of private commercial banks*.

The volume of deposits serves as a critical determinant, given that customer deposits represent the primary source of funds for banks to issue loans, with an increase in deposits directly augmenting lending capacity and profitability (McCarthy, 2010; Bologna, 2011; Haron, Azmi, & Shafie, 2006; Obamuyi, 2013; Abebie, 2016). Therefore, this study posits the subsequent hypothesis:

H2*: The volume of deposits exerts a significant and positive influence on the lending activities of private commercial banks.*

The liquidity ratio is also of paramount importance, as banks are required to maintain adequate cash reserves to satisfy customer demands, which directly affects their capacity to extend loans (Kasman, Tunc, Vardar, & Okan, 2010; Ituwe, 1985; Ojo, 1978). Thus, this study posits the following hypothesis:

H3*: Liquidity has a significant and positive influence on the lending activities of private commercial banks in Ethiopia.*

The lending interest rate constitutes a substantial source of income for banks (Moussa & Chedia, 2016); theoretically, elevated rates diminish the demand for credit due to the increased financial burden imposed on borrowers (Ngugi, 2001; Bernanke & Blinder, 1988), although empirical findings present a mixed picture (Richard & Okoye, 2014; Swamy, 2012; Abdul Karim, Azman-Saini, & Abdul Karim, 2011). Therefore, this study posits the following hypothesis:

H4*: The lending interest rate has a negative impact on the lending activities of private commercial banks in Ethiopia.*

Management efficiency, which pertains to a bank's profitability and cost management practices, exhibits a variable impact, with certain studies indicating a positive association (Qudah, 2017) while others suggest a negative correlation whereby increased costs deter lending willingness (Tabila, 2016; Alhassan, Brobbey, & Asamoah, 2013). Thus, this study posits the following hypothesis:

H5*: Management efficiency exerts a significant and positive influence on the lending activities of private commercial banks in Ethiopia.*

Macroeconomic determinants, which lie beyond the immediate control of bank management, include cash reserve requirements, gross domestic product (GDP), and inflation rates. The cash reserve requirement, a tool of monetary policy employed by central banks, generally constrains the credit creation capabilities of commercial banks, thereby exerting a negative influence on lending (Abebie, 2016; Haile, 2020), notwithstanding some studies proposing a positive influence (Getahun, 2014) or no discernible effect (Malede, 2014; Getachew, 2017). Consequently, the sixth hypothesis is articulated as follows:

H6*: The cash reserve requirement has a negative and significant impact on the lending activities of private commercial banks.*

Gross Domestic Product (GDP), serving as a pivotal indicator of economic performance, consistently demonstrates a positive correlation with bank lending, as robust economic conditions stimulate heightened demand for credit, investment, and savings (Imran & Nishat, 2013; Stepanyan & Guo, 2011; Constant & Ngomsi, 2012b; Amidu, 2014; Olokoyo, 2011).

H7*: The gross domestic product exerts a substantial and affirmative influence on the lending practices of private commercial banks in Ethiopia.*

Finally, inflation, characterized as a sustained escalation in prices, generally exerts a detrimental effect on commercial bank lending by eroding the value of currency and potentially escalating interest rates while concurrently diminishing the supply of loans (Boyd, De Nicolo, & Smith, 2004; Santoni, 1986; Taner, 2000).

H8*: Inflation manifests a significant negative influence on the lending activities of private commercial banks in Ethiopia.*

2.2. EMPIRICAL LITERATURE REVIEW

Numerous empirical investigations conducted globally have explored the determinants of private commercial bank lending, broadly classifying these determinants into bank-specific (internal) and macroeconomic (external) factors. Internationally, research presents a spectrum of findings concerning these determinants. The size of the bank typically exerts a favorable influence on lending, as evidenced by studies conducted in Nigeria (Olokoyo, 2011), Central Africa (Fouopi Djiogap & Ngomsi, 2012), Ghana (Ladime, Sarpong-Kumankoma, & Osei, 2013), and Nepal (Bhattarai, 2016).

The volume of deposits consistently emerges as a pivotal positive determinant, as it constitutes the primary funding source for loans provided by banks (Olokoyo, 2011; Olusanya et al., 2012; Imran & Nishat, 2013; Timsina & Pradhan, 2016; Qudah, 2017). The lending interest rate exhibits varied effects, with certain studies suggesting a negative correlation attributable to diminished demand at elevated costs (Olusanya et al., 2012; Khangalah, 2016), while others indicate a positive or mixed relationship (Moussa & Chedia, 2016).

The liquidity ratio also yields inconsistent outcomes, demonstrating negative significance in some contexts (Bhattarai, 2016; Khangalah, 2016) while revealing positive significance in alternative scenarios (Qudah, 2017; Timsina & Pradhan, 2016).

Management efficiency (Qudah, 2017) and capitalization (Fouopi Djiogap & Ngomsi, 2012; Ladime, Sarpong-Kumankoma, & Osei, 2013; Khangalah, 2016) are likewise identified as critical internal determinants.

From a macroeconomic standpoint, growth in Gross Domestic Product (GDP) consistently reveals a positive association with bank lending across diverse studies, signifying that favorable economic conditions promote increased credit issuance (Olusanya et al., 2012; Fouopi Djiogap & Ngomsi, 2012; Imran & Nishat, 2013; Timsina & Pradhan, 2016). Cash reserve requirements, utilized as a monetary policy instrument, generally manifest a negative or negligible impact on lending (Olusanya et al., 2012; Bhattarai, 2016; Timsina & Pradhan, 2016), as heightened requirements constrain the funds accessible for loan disbursement.

Inflation similarly yields mixed findings, being positively significant in particular instances (Moussa & Chedia, 2016; Qudah, 2017) while remaining insignificant in others (Imran & Nishat, 2013). Additional macroeconomic variables such as exchange rates (Olusanya et al., 2012; Ladime, Sarpong-Kumankoma, & Osei, 2013; Imran & Nishat, 2013; Timsina & Pradhan, 2016) and monetary conditions (Imran & Nishat, 2013) also contribute to the landscape, with their effects varying according to the specific national and contextual frameworks, underscoring that bank lending behavior adapts to the unique dynamics and institutional contexts of each country.

In Ethiopia, empirical investigations concerning the factors influencing commercial bank lending are somewhat sparse; however, they generally correspond with global patterns, albeit exhibiting certain discrepancies. Malede (2014) identified positive and statistically significant correlations between lending and variables such as bank size, liquidity ratio, credit risk, and GDP, while noting insignificant correlations with deposits, investments, cash reserves, and interest rates. Getahun (2014) documented positive and significant effects from the volume of deposits and bank size, negative influences from liquidity ratios and interest rates, and unexpectedly positive impacts from cash reserve requirements and inflation, alongside insignificant GDP growth.

Temesgen (2016) emphasized the importance of several bank-specific factors, particularly liquidity ratios and lending rates, while deeming macroeconomic variables, such as GDP and cash reserve requirements, as insignificant. Abebie (2016) observed positive and significant influences from liquidity ratios, capital adequacy, inflation, and GDP, contrasted with negative impacts from nonperforming loans, cash reserve requirements, and lending interest rates, in addition to an insignificant positive effect from deposits. Getachew (2017) demonstrated that bank size, deposits, and GDP had a positive influence on lending, while cash reserve requirements and liquidity ratios exerted negative effects, and credit risk, lending interest rates, and inflation were deemed insignificant. More recently, Haile (2020) identified capital adequacy, volume of deposits, and return on assets as positively significant, while lending interest rates were positively insignificant, and credit risk, cash reserve requirements, and liquidity ratios exhibited negative significance.

In summary, a robust banking system is essential for achieving financial stability, with lending serving as the principal activity and major revenue generator for commercial banks, despite its inherent risks. The provision of loans is consistently perceived as a function of both internal (bank-specific) and external (macroeconomic) determinants. Although extensive research has been conducted in developed economies, a distinct knowledge gap remains in developing nations such as Ethiopia. The limited studies conducted within Ethiopia (Malede, 2014; Getahun, 2014; Temesgen, 2016; Abebie, 2016; Getachew, 2017; Haile, 2020) yield inconsistent findings and frequently overlook pertinent variables, such as management efficiency. Moreover, these investigations often amalgamate public and private banks, which may encounter varying determinants due to the comparative advantages held by state-owned banks in terms of governmental support, asset accumulation, and experiential knowledge. Thus, the current study aspires to rectify these inconsistencies and knowledge deficiencies by concentrating specifically on private commercial banks in Ethiopia and integrating additional significant variables, including management efficiency.

2.3. CONCEPTUAL FRAMEWORK

The primary aim of this research is to explore the determinants influencing lending practices of private commercial banks in Ethiopia. The bank-specific factors encompass bank size, lending interest rates, volume of deposits, management efficiency, and liquidity ratios. The macroeconomic factors comprise cash reserve requirements, gross domestic product, and inflation. Consequently, the figure below, which illustrates the conceptual framework, encapsulates the principal focus and scope of this study in relation to the variables and their interconnections.

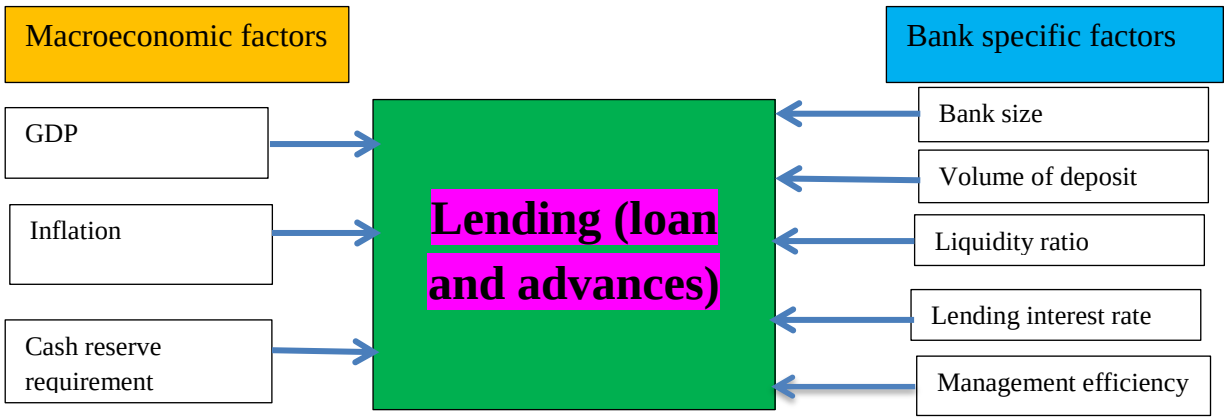

FIGURE 1 Conceptual Framework of Lending or Loan and Advances Model

***Source**: Extracted By the Researcher (2023)*

3. RESEARCH METHODOLOGY

This research adopts an explanatory research design to elucidate the causal relationships between the lending activities of private commercial banks loans and advances and their various determinants (Kothari, 2004). A quantitative research methodology is employed, as it is optimally aligned with the testing of objective theories, the specification of narrow hypotheses, and the collection of data to either substantiate or contest these hypotheses, thereby conforming to the deductive nature of this investigation (Creswell, 2009; Morse, 1991).

The population of interest for this study encompasses all seventeen private commercial banks that are presently operational in Ethiopia, as delineated by the National Bank of Ethiopia (NBE, 2022), including institutions such as Abay Bank S.C., Awash International Bank S.C. and Zemen Bank S.C. In terms of the sampling design, a non-probabilistic or purposive sampling method was implemented to select seven private commercial banks that initiated operations prior to 2006, thereby facilitating the availability of fifteen consecutive years of data spanning from 2008 to 2022. The banks selected for this study are Awash International Bank S.C., Dashen Bank S.C., Bank of Abyssinia S.C., Wegagen Bank S.C., United Bank S.C., Nib International

Bank S.C., and Cooperative Bank of Oromia S.C., resulting in a balanced panel data set comprising 105 observations (15 years * 7 banks).

Panel data is employed owing to its capacity to control for individual heterogeneity, mitigate collinearity, and effectively track trends in comparison to straightforward time-series or cross-sectional data (Arellano & Bover, 1995; Gujarati, 2004). The methodology for data collection is exclusively reliant on secondary data, which is considered the most suitable for the objectives of this study. This data was obtained from the audited annual financial statements of the selected private commercial banks for bank-specific factors, and from publications issued by the National Bank of Ethiopia (NBE) and the Ministry of Finance and Economic Cooperation (MoFEC) for macroeconomic factors.

For the purpose of data analysis, both descriptive and econometric analyses (specifically panel data analysis) were executed using STATA version 16 software (Kothari, 2004). Descriptive statistics, encompassing mean, standard deviation, and minimum/maximum values, were utilized to characterize the variables. Diagnostic tests including assessments of normality, heteroscedasticity, autocorrelation, and multicollinearity were conducted to ascertain the appropriateness of the model, with correlation of variables and variance inflation factor employed to evaluate multicollinearity. A fixed effect regression model was subsequently utilized to investigate the influence of each explanatory variable on the lending behaviors of private commercial banks in Ethiopia.

3.1. VARIABLES AND MEASUREMENTS

The dependent variable is defined as lending loans and advances, which is characterized by the National Bank of Ethiopia as any financial asset arising from a direct or indirect advance by a commercial bank to an individual, contingent upon repayment, and includes a variety of credit facilities. It is proxied by the natural logarithm of loans and advances.

TABLE 1 Description of Variables and Measurements

	Variables	**Notations**	**Measurements**	**Expected sign**
Dependent variable	Lending(loans and advances)	TLA	The natural logarithm of loan and advance	
Independent variable	Volume of deposit	VoD	$= \frac{total\ deposit}{total\ asset}$	Positive
	Bank size	BS	The natural logarithm of total assets of the bank	Positive
	Liquidity ratio	LR	$\frac{\text{Liquid asset}}{\text{total asset}}$	Positive
	Lending interest rate	LIR	The annual average lending interest rate	Negative
	Management efficiency	ME	$\frac{operating\ expense}{operating\ income}$	Positive
	Cash reserve requirement	CRR	annual cash reserve requirement rate	Negative
	Gross domestic product	GDP	annual real GDP growth rate	Positive
	Inflation	INFL	The annual gross inflation rate	Negative

The independent variables encompass:

- Bank size: This is quantified by the natural logarithm of the bank's total assets, reflecting the institution's capacity for intermediation (Berger & Udell, 2006; Stein, Tabatabai, & Ambrose, 2000).
- Volume of deposit: This is measured as the ratio of customer deposits to total assets, representing the primary source of loanable funds for banks, with a positive relationship anticipated with lending activities (Olokoyo, 2011).
- Liquidity ratio: Proxied by the total liquid assets to total assets ratio, it signifies a bank's ability to meet financial obligations. Its impact on lending has shown mixed results in previous studies (Getahun, 2014; Malede, 2014; Haile, 2020; Timsina, 2014; Khangalah, 2016; Qudah, 2017).
- Management efficiency: Measured as the ratio of total operating expenses to total operating income, it reflects the quality of management policies affecting bank performance and lending. Its expected impact is mixed, with some suggesting a positive relation where banks lend more to cover expenses (Qudah, 2017), while others suggest a negative one where increased costs reduce profitability and willingness to lend (Tabila, 2016).
- Lending interest rate: Proxy by the annual average lending interest rate, it represents the cost of borrowing for customers and a key revenue source for banks.
- Cash reserve requirement: Measured by the annual cash reserve requirement rate, it is a monetary policy tool used by the central bank to control liquidity and credit creation.

- Gross domestic product (GDP): proxy by the annual real GDP growth rate, it controls for cyclical output effects, with a strong economy generally stimulating bank lending (Imran & Nishat, 2013; Stepanyan & Guo, 2011; Flamini, McDonald, & Schumacher, 2009). Its impact has shown positive and significant effects in several studies (Getachew, 2017; Timsina & Pradhan, 2016; Malede, 2014; Haile, 2020).
- Inflation: proxy by the annual gross inflation rate, it represents the persistent increase in price levels, which can depreciate money value and influence lending rates (Boyd et al., 2004; Santoni, 1986).

3.2. MODEL SPECIFICATION

This study utilizes a panel/longitudinal data model**,** which offers significant advantages over traditional cross-sectional or time-series methodologies by combining observations across multiple entities over several time periods (Brooks, 2008). The general panel regression model is represented as

$$Y_{it=}\ \alpha + \beta_i X_{it} + U_{it} \ldots\ldots\ldots\ldots 1$$

$$TLA_{it}=\alpha+\beta_1 BS_{it} + \beta_2 VoD_{it} + \beta_3 LR_{it} + \beta_4 ME_{it} + \beta_5 CRR_{it} + \beta_6 GDP_{it} + \beta_7 INFL_{it} + \beta_8 LIR_{it} + +\varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots 2$$

Whereas Yit is the dependent variable (Total Loan and Advances of private commercial banks in Ethiopia), α is the intercept, β is a vector of coefficients for the explanatory variables, Xit is a vector of independent variables, and ϵit is the error term.

The independent variables included in the model are Bank Size (BS), Volume of Deposit (VOD), Liquidity Ratio (LR), Management Efficiency (ME), Gross Domestic Product (GDP), Cash Reserve Requirement (CRR), Inflation (INFL), and Lending Interest Rate (LIR), with 'i' representing the bank and 't' representing the time period.

4. RESULTS AND DISCUSSIONS

4.1. DESCRIPTIVE STATISTICS

This study analyzes the descriptive statistics of private commercial banks' lending (measured by the natural logarithm of total loans and advances) and its determinants: bank size, volume of deposits, liquidity ratio, management efficiency, GDP, cash reserve requirement, inflation, and lending interest rate, using Stata 16 software for 105 observations from seven sampled Ethiopian private commercial banks between 2008 and 2022.

The average total loans and advances stood at 22.40391 (log-transformed), exhibiting low dispersion (standard deviation of 1.14%), indicating relative stability across banks, with Awash International Bank (AIB) showing the maximum and Cooperative Bank of Oromia (CBO) the minimum. For bank size, the average was 18.67 with a standard deviation of 3.518, again with AIB at the maximum and CBO at the minimum. The volume of deposit averaged 77.14%, signifying that a substantial portion of private commercial banks' assets are deposit-financed, though it showed higher variation (standard deviation of 5.81%).

The liquidity ratio averaged 30.83%, surpassing the 15% statutory requirement, but displayed the highest deviation (13.65%) among all variables, suggesting significant differences in liquidity positions among the sampled banks. Management efficiency averaged 101.66% with the largest standard deviation of 49.8%, indicating unstable non-interest operating income to non-interest expense ratios over the period. The cash reserve requirement averaged 8% with a 4% standard deviation, reflecting regulatory adjustments by the NBE.

Gross Domestic Product (GDP) averaged 9.31% (standard deviation 2.84%), showing stable economic growth, peaking in 2010 (12.551%) and lowest in 2020 (6.1%). Inflation averaged 15.77% but was highly unstable (standard deviation 9.416%), ranging from 2.8% (2010) to 36.4% (2009). Finally, the lending interest rate averaged 11.94% with a relatively low standard deviation of 12.9%, implying limited variation across private banks in the country.

TABLE 2 Descriptive statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
TLA	105	22.04391	1.140021	18.6597	24.77112
BS	105	18.1308	3.51826	11.22716	25.48443
VOD	105	0.7714267	0.0581788	0.4375	0.8689912
LR	105	0.3083413	0.1365807	0.0056743	0.613819
ME	105	1.016688	0.4983634	0.023333	2.502
CRR	105	0.08	0.401918	0.05	0.15
GDP	105	0.0937278	0.0271386	0.061	0.12551
INFL	105	.1577333	0.0941607	0.028	0.364
LIR	105	.11943	.0129321	0.085	.1425

***Source**: Audited Financial statements of banks, NBE, and own computation through STATA 16.*

4.2. COLLINEARITY OF EXPLANATORY VARIABLES

This study employs a panel/longitudinal data model to analyze the relationship between private commercial banks' lending and various determinants, leveraging its advantages over cross-sectional and time-series data for more complex problem-solving (Brooks, 2008).

TABLE 3 Correlation Analysis

	TLA	VOD	BS	LR	ME	CRR	GDP	INFL	LIR
TLA	1.000								
BS	0.9882	1.000							
LR	0.4848	0.4750	1.000						
LR	-0.6147	-0.5538	-0.2434	1.000					
ME	-0.3053	-0.2316	-0.0473	0.5944	1.000				
CRR	-0.6084	-0.5732	-0.2563	0.5986	0.4795	1.000			
GDP	-0.5258	-0.4694	-0.0751	0.6867	0.5929	0.3580	1.000		
INFL	-0.1974	-0.1914	0.002	0.1597	0.1438	-0.2752	0.4254	1.000	
LIR	0.631	0.6790	0.2056	-0.3193	-0.2305	-0.5895	-0.3142	-0.1416	1.000

***Source**: Audited Financial statements of banks, NBE, and own computation through STATA 16.*

Correlation analysis: Pearson product-moment coefficient was conducted to assess the association between variables. With 105 observations, a correlation coefficient of 0.20 or above is statistically significant at the 5% level (Yu & Meyer, 2006). Results indicate a statistically significant positive correlation between loans and advances with bank size (0.9882) and lending interest rate (0.631), and a positive correlation with volume of deposit (0.4848). Conversely, loans and advances had negative correlations with cash reserve requirement (-0.6084), management efficiency (-0.3053), liquidity ratio (-0.6147), inflation (-0.1974), and GDP (-0.5258), with liquidity ratio, GDP, and cash reserve requirement being statistically insignificant despite their negative correlation. It's important to note that correlation only indicates association, not causation (Brooks, 2008); thus, econometric regression analysis is used to establish cause-and-effect relationships.

4.3. CLASSICAL LINEAR REGRESSION MODEL (CLRM) ASSUMPTIONS TESTS

To ensure the validity and robustness of regression results, **Classical Linear Regression Model (CLRM) assumptions** were tested (Brooks, 2008).

According to (Brooks, 2008), if a constant term is included in the regression equation, this assumption will never be violated. Thus, in this study since the regression model included a constant term, the average value of the error term is expected to be zero. Therefore this assumption was not violated.

TABLE 4 Normality Test for Residuals: Bera-Jarque

Variable	Obs	Pr(skeweness)	Pr(kurtosis)	Adj chi2(2)	Prob>chi2
Residual	105	0.0947	0.3643	3.71	0.1564

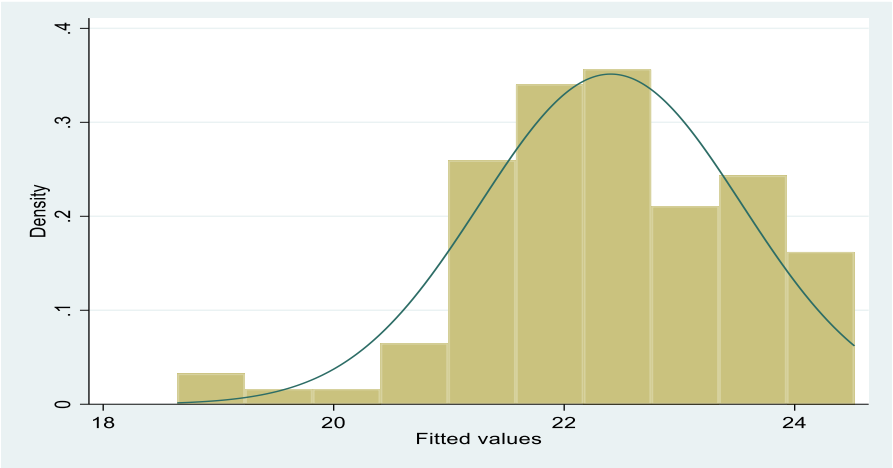

FIGURE 2 Histogram of Fitted Values with Kernel Density Estimation (KDE) Curve

***Source**: own computation by STATA 16*

The normality assumption for residuals was confirmed by the Jarque-Bera test (p-value = 0.1564 > 0.05), indicating a normal distribution of data.

TABLE 5 Breusch-Pagan/ Cook-Weisberg Heteroscedasticity Test

Chi2(1)	8.32
Prob>chi2	**0.0039**

***Source**: own computation by STATA 16*

However, the Heteroscedasticity test (Breusch-Pagan/Cook-Weisberg) showed its presence (p-value = 0.0039 < 0.05), which was addressed by using robust fixed regression model results.

4.3.1. MODEL SPECIFICATION TEST

TABLE 6 Model Specification Test: Ramsey-RESET Test

F(3,93)	2.51
Prob>F	**0.0636**

***Source**: own computation by STATA 16*

The model specification test (Ramsey-RESET) indicated that the model is correctly specified (p-value = 0.0636 > 0.05), ensuring the overall reliability and validity of the model.

TABLE 7 The Variance Of The Inflation Factor

Variable	Vif	1/vif
CRR	3.93	0.254678
BS	3.40	0.293700
LR	3.09	0.32354
GDP	2.79	0.358718
LIR	2.59	0.385531
ME	2.08	0.481245
INFL	2.05	0.488030
VOD	1.40	0.713724
Mean vif	2.67	

***Source**: own computation by STATA 16*

Finally, the multicollinearity test (Variance Inflation Factor - VIF) revealed no significant multicollinearity, as all VIF values were well below the threshold of 10 (mean VIF = 2.67), meaning explanatory variables are not highly correlated with each other (Gujarati, 2004).

4.3.2. MODEL SELECTION (RANDOM EFFECT VERSUS FIXED EFFECT MODELS

TABLE 8 Hausman Test

Chi2(8)	=16.05
Prob>chi2	**=0.0417**

***Source**: own computation by STATA 16*

For model selection between fixed-effects and random-effects models, the Hausman Specification Test was performed. The test's p-value was 0.0417, which is less than the 5% significance level, leading to the rejection of the null hypothesis that unobservable individual effects are uncorrelated with explanatory variables (Gujarati, 2004). Therefore, the fixed effect model was deemed the most appropriate for analyzing the given dataset in this study.

4.4. REGRESSION RESULTS AND DISCUSSIONS

TABLE 9 Results Of Robust Fixed Effect Regression Model

TLA	Coefficients	Robust Std. err.	Z	p>|z|
BS	.9408193	.0307606	30.59	0.000*
VOD	0.3364895	.1824816	1.84	0.115***
LR	-.1900223	.141448	-1.34	0.228***
ME	-.1239178	.0261139	-4.75	0.003*
CRR	-3.604948	.3544166	-10.17	0.000*
GDP	-.6440426	.4692535	-1.37	0.219***
INFL	-.4185552	.0707441	-5.92	0.001*
LIR	-7.33545	.7874017	-9.32	0.000*
Constant	1.952277	.7375374	2.65	0.038**

No. of observations = 105 R2 = 0.9901 and Adj. R2 = 0.9811 Rho = 0.26901772 Prob > F = 0.0000

***Source**: Audited Financial statements of banks, NBE, and own computation through STATA 16.*
***Note**: *significant at 1%, **significant at 5%, and ***insignificant*

Based on above table the following model was developed to investigate the determinants of loans and advances in this study.
TLA_{it}=1.952+ $0.941BS + 0.336VoD - .19LR - 0.123ME - 3.60CRR - .644GDP - .418INFL - 7.33LIR + \varepsilon$

The robust fixed-effect regression model results (Table 4.8) indicate that bank-specific and macroeconomic factors significantly influence private commercial bank lending in Ethiopia. The model, with an R-squared of 0.9901 and an adjusted R-squared of 0.9811, demonstrates that 98% of the changes in total loans and advances (TLA) are explained by the selected independent variables, and the overall model is statistically significant (Prob > F = 0.0000).

Specifically, bank size has a statistically significant and positive impact on TLA (coefficient 0.9408, p-value 0.000), meaning a 1% increase in bank size leads to a 0.94% increase in lending. This aligns with the hypothesis and previous studies (Chernykh & Theodossiou, 2011; Tomak, 2013; Malede, 2014; Amidu, 2014; Getahun, 2014; Moussa & Chedia, 2016; Bhattarai, 2016), as larger banks benefit from economies of scale and diversified funding pools.

The volume of deposit shows a positive but statistically insignificant relationship with TLA (coefficient 0.3365, p-value 0.115). While consistent with the hypothesis of a positive impact, the insignificance might be due to credit ceilings, fluctuating liquidity, and high demand deposits requiring larger reserves, which is largely consistent with prior research (Ojo, 1978; Ituwe, 1985; Olokoyo, 2011; Olusanya et al., 2012; Malede, 2014; Imran & Nishat, 2013; Swamy, 2012; Dai Van Pham, 2015; Abebie, 2016).

The liquidity ratio has an unexpected statistically insignificant negative impact on TLA (coefficient -0.1900, p-value 0.228), contrary to the hypothesized positive association. This suggests that increased liquidity might lead to decreased lending as loans are illiquid assets, or banks hold more liquid assets when loan demand is weak. This finding aligns with some studies (Amano, 2014; Rabab'ah, 2015; Dai Van Pham, 2015; Moussa & Chedia, 2016; Haile, 2020) but contradicts others (Ojo, 1978; Ituwe, 1985; Ajayi, 2007; Malede, 2014).

Management efficiency unexpectedly shows a statistically significant negative impact on TLA (coefficient -0.1239, p-value 0.003), contrary to the positive hypothesis. This implies that as operating income increases, management may become less reliant on lending to cover expenses, a finding supported by Al-Kilani and Kaddumi (2015) and Alhassan et al. (2013), but not by Gaiotti and Secchi (2006) and Pham (2015).

Cash reserve requirement (CRR) has a highly statistically significant negative impact on TLA (coefficient -3.6049, p-value 0.000), confirming the hypothesis. A 1% increase in CRR decreases lending by 3.6%. This is consistent with central bank policies using CRR to control credit growth (Montoro & Moreno, 2011; Bhattarai, 2016; Abebie, 2016; Haile, 2020), although some studies have found a positive impact (Olokoyo, 2011; Olusanya et al., 2012; Malede, 2014; Amano, 2014).

Gross Domestic Product (GDP) unexpectedly shows a statistically insignificant negative impact on TLA (coefficient -0.6440, p-value 0.219), rejecting the hypothesized positive association. This suggests that private commercial bank lending in Ethiopia might be less dependent on the business cycle, consistent with Tomak (2013), Ladime et al. (2013), and Temesgen (2016), but contrary to Olokoyo (2011), Malede (2014), Abebie (2016), and Haile (2020).

Inflation has a statistically significant negative impact on TLA (coefficient -0.4186, p-value 0.001), consistent with the hypothesis. A 1% increase in inflation leads to a 0.418% decrease in lending, likely due to increased market uncertainty and reduced real interest income (Naceur & Kandil, 2009; Haile, 2020). This contradicts findings by Amano (2014) and Nkusu (2011) who suggest inflation could improve borrowers' repayment capacity.

Finally, the lending interest rate has a highly statistically significant negative impact on TLA (coefficient -7.3355, p-value 0.000), confirming the hypothesis. A 1% increase in the lending interest rate leads to a 7% decrease in lending, aligning with loan pricing theory, where higher rates can increase default risk (Bernanke & Blinder, 1988; Amano, 2014; Getachew, 2017; Temesgen, 2016). However, this contradicts Malede (2014) and Haile (2020).

TABLE 10 Summary and Comparison of Test Result With Expectation

Independent variables	Expected relationship with TLA	Actual result	Statistical significance test	Hypothesis status
Bank size	Positive	Positive	Significant	Accepted
Volume of deposit	Positive	Positive	Insignificant	Accepted
Liquidity ratio	Positive	Negative	Significant	Not accepted
Lending interest rate	Negative	Negative	Significant	Accepted
Management efficiency	Positive	Negative	Significant	Not accepted
Cash reserve requirement	Negative	Negative	Significant	Accepted
Gross domestic product	Positive	Negative	Insignificant	Not accepted
Inflation	Negative	Negative	Significant	Accepted

5. CONCLUSION

This study investigated the determinants of private commercial banks' lending in Ethiopia from 2008 to 2022 using panel data. It specifically analyzed the influence of bank-specific variables (bank size, volume of deposit, liquidity ratio, management efficiency, and lending interest rate) and macroeconomic variables (cash reserve requirement, gross domestic product, and inflation), sourcing data from bank financial reports, the National Bank of Ethiopia, and the Ministry of Finance. The research employed descriptive statistics**,** correlation analysis**,** and a fixed-effect regression model (chosen via the Hausman test) to examine these relationships, with total loans and advances as the dependent variable. Prior to regression, crucial CLRM assumptions, including zero mean error term, homoscedasticity, correct model specification, absence of autocorrelation and multicollinearity, and normality, were all successfully tested.

The regression results indicated that bank size and volume of deposit had a positive and significant impact on lending. Conversely, cash reserve requirement**,** management efficiency**,** lending interest rate**,** and inflation showed a negative and statistically significant impact**.** Although liquidity ratio and Gross Domestic Product (GDP) had a negative correlation, their impact on lending was statistically insignificant. Overall, the model explained 98.1% of the variation in total loans and advances, leading to the acceptance of five hypotheses (bank size, volume of deposit, cash reserve requirement, inflation, and lending interest rate) and the rejection of three (liquidity ratio, GDP, and management efficiency).

6. RECOMMENDATIONS

To ensure optimal performance and effective lending, private commercial banks in Ethiopia must acknowledge that their operating environment significantly impacts their activities. Despite governmental and macroeconomic constraints, these banks, which hold substantial shares of total assets and deposit liabilities, should proactively implement robust credit management policies and enhance their operational efficiency.

Based on this study's findings, it is recommended that private commercial banks prioritize strengthening their asset size to leverage economies of scale in lending, particularly to larger customers. They should also develop strategic approaches to attract and retain more deposits, as this directly improves their lending capacity. Furthermore, banks need to build strong systems and skills in liquidity management, alongside comprehensive asset and liability management. Given the significant impact of the lending interest rate, private commercial banks must meticulously price their loans and advances. The study also suggests that the government consider strategies to reduce the burden of cash reserve requirements, as their adverse effect on lending can hinder both bank profitability and overall economic growth. Maintaining a fast-growing economy and controlling inflation are also crucial for a conducive lending environment. Additionally, commercial banks should develop and consistently enforce sound credit procedures, policies, and analytical capabilities encompassing loan origination, approval, monitoring, and problem management. This comprehensive approach, combined with a careful consideration of macroeconomic factors like cash reserve ratios and inflation, will enable banks to better utilize opportunities, mitigate threats, and align their lending activities with internal capacities, the current economic situation, the competitive landscape, regulatory measures, and customer needs.

7. FUTURE RESEARCH DIRECTIONS

This study examined selected bank-specific and macroeconomic determinants of private commercial banks' lending in Ethiopia; however, it recognizes that its scope is not exhaustive. Therefore, it is recommended that future research expand upon these findings by incorporating additional bank-specific, industry-specific, and macroeconomic variables to provide a more comprehensive understanding. Furthermore, as this study focused solely on the supply-side determinants of lending, future researchers should also investigate the demand-side variables influencing commercial bank lending. Finally, given that

this study exclusively utilized secondary data, subsequent research could benefit from adopting a mixed-methods approach, combining both qualitative and quantitative analyses through the inclusion of primary data collection.

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