Research Article

Competition, Survival Issue, and Performance Constraints of Banks: Evidence from Ethiopian Private Commercial Banks

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Banks are financial institutions that are crucial to the accomplishment of development objectives because they transfer money from surplus to deficit parties. This study examines the competition, survival, and performance constraints of commercial banks in Ethiopia using the DEA and CAMEL frameworks from 2015 to 2020. The nonparametric (DEA) approach was applied to approximate the overall technical efficiency score of the banks under consideration. The empirical study used twelve private commercial banks operating in Ethiopia, excluding four banks because of a lack of appropriate and audited financial data and no risk assessment between the study periods. The result of the study reveals that under CRS, except for Abyssinia, Anbesa, and Nib International Banks, the remaining banks are more efficient. Under VRS, while Abyssinia Bank was less efficient, other banks were found to be more efficient. Under scale efficiency, Abyssinia, Anbesa, and Nib International Banks were found to be less efficient, while the remaining banks were more efficient. The composite ranking of the CAMEL framework portrays that Awash International Bank, Zemen, and Wegagen Banks were found in the top three ranks, while Cooperative Bank of Oromia, Dashen, and Abyssinia Banks were found in the bottom position. The regression result demonstrates that the ratios of total capital to total assets, loans to assets, total loans to total deposits, and CAR have a positive effect on bank profitability, whereas the ratio of total loans to the number of branches has a statistically negative and significant influence on the return on assets.

1. Introduction

The growth and development of a given nation are determined by both controllable and noncontrollable factors. One of the factors that can affect the well-functioning of the economy is the availability of sound financial institutions that the government can control. Banks are financial institutions that play an indispensable role in the achievement of development goals through channeling funds from surplus parties to deficit parties. Smooth economic development demands a well-functioning and efficient banking system [1]. This implies banks play a pivotal role by channeling funds from those who have a surplus by mobilizing deposits to those parties that need funds for investments. Since the banking sector is very crucial for the economy, keeping the health of this institution on track leads to a well-functioned and well-organized economy at large

[2]. This is because the sound banking sector contributes to the economy by deposit mobilization from the community and avail them for capital investment of the country.

Numerous factors might have an impact on the banking industry which is categorized as bank-specific variables and macroeconomic variables. The bank-specific variables are an issue within the bank and include assets quality, liquidity, operational cost efficiency, management experience, income diversification, and capital adequacy [3]. Moreover, a bank-specific factor, which is measured by the debt-to-asset ratio, has a positive and significant effect on the financial performance of the bank. Conversely, the deposit-to-asset ratio and loan-to-deposit ratio were found to have a negative and significant impact on the bank's performance [4]. These factors are found within the banks and the manager can control those variables. On the other hand, the sector can be affected by external factors which are countrywide so that

beyond the control of the organization like inflation unemployment, market system, exchange rate, and legal framework [5]. Consequently, checking the financial healthiness of this sector plays a decisive role to save banks from failures so that it supports the economy to function as expected. According to Athanasoglou et al. [6], strong economic growth and a stable financial system can be achieved by a sound and profitable banking system that withstand negative shocks.

Checking the healthiness of banking sector has multiple advantages because it safeguards the concern of lenders, depositors, shareholders, and others stakeholders since it builds the confidence of the users. Baral [7] pointed out that banking industry strength is expressed by various factors which includes asset quality, liquidity position, capital base, management quality, market sensitivity, and earning quality. Bank performance that has been a topic of interest for many years is comprehensive in the banking industry. It may be expressed in phrases of efficiency, concentration, competition, productivity, and profitability [8]. Mohammed et al. [9] pointed out that banks operating in different countries use various methods to assess their financial performance starting from customary ratios to most detailed methods like CAMEL, GIRRAFE, EAGLS, and PEARLS. To check the financial soundness of commercial banks, using financial ratio analysis should be appropriate that measure liquidity, profitability, credit growth, nonperforming loan, and efficiency ratios [10].

The other major issue that could be raised under the banking sector discussion is their efficiency. According to Zenebe [11], to play the aforementioned role, this sector must be efficient in transforming costly inputs into a variety of financial products and services. This implies that to play a decisive in the economy of a given nation, banks should be able to act efficiently and profitably so that they can survive in the stiff competitive environment and can earn a genuine return to their shareholders that save them from the probability of bankruptcy [12]. According to Karimzadeh [13], the investigation of the financial systems efficiency, particularly banks, has gained appropriate focus because of several reasons including the banking sector being directly linked to the productivity of the economy, deliver liquidity, remittance and depositing service, and channel funds from surplus parties to deficit parties [14].

In any economy, whether it is developed or underdeveloped banking sector plays a crucial role in achieving the country's development goals. To achieve the important roles expected from it, the banking sector is required to examine its overall financial performance continuously in a systematic manner. Few studies were conducted to examine the financial performance of the banking sector in Ethiopia after and before the country's second Growth and Transformation Plan (GTP-II). However, the studies conducted during GTP-II are very few which requires deep investigation to improve the overall performance of this sector. In this study, the researcher tried to fill the gap

comprehensively to examine the performance of the Ethiopian banking sector using data envelopment analysis (DEA) which measures the technical efficiency score of each bank under study and the capital adequacy ratio, assets quality, management efficiency, and earning and liquidity management (CAMEL) ratings. Consequently, the study will support managers, stockholders, government, and policymakers in the process of setting organizational strategy that will boost the performance of the banking sector.

Despite efforts to investigate the factors that influence bank efficiency in various parts of the world, research on commercial banks in Ethiopia is limited. The study on the determinants of bank technical efficiency of Ethiopian banks conducted by Tesfay [15] for the period 2003–2012 and Zenebe [11] for the period 2011–2014 attempted to look at factors affecting the efficiency of selected commercial banks. However, the year between 2015 and 2020 in Ethiopia is remembered for the implementation of GTP II, in which banks played a critical role in achieving the plan. The evaluation of technical efficiency determinants and factors affecting commercial bank financial performance provide important inputs for the country's next growth plan. Consequently, because Ethiopia's banking sector is rapidly improving in relation to the number of banks, outreach, capital and resources, branch, productivity, and profitability, investigating financial performance and its determinants is critical.

There are multiple sections to the article. Section 2 discusses the literature and hypothesis development. Section 3 explains the methodologies that the study applied. The detailed results and discussion are discussed in Section 4. Finally, Section 5 contains the conclusion.

2. Review of Literature and Hypothesis Development

The banking sector is considered the most important institution and plays a vital role in the nation's growth and development. It accepts savings from customers and is involved in various investments that alleviate poverty and boost economic growth and development [16, 17]. Deregulation of monetary institutions like what happened during the financial crisis of 2008 makes banks vulnerable so that their failures would endanger the global economic system. As a result, the financial healthiness of the banks and other financial institutions should be managed depend upon risk-based performance [18]. The performance of the banks is demonstrated by their competition, concentration, efficiency, productivity, and profitability [8]. Nowadays, the performance of the bank gets serious attention because of its importance in the economy.

2.1. Determinants of Bank Profitability. Traditionally, the scholars use financial ratio analysis such as liquidity, assets management ratio, debt ratio, and profitability ratio to

measure the overall performance of banks. CAMELS form as a device could be very effective, appropriate, and correct for use as an overall performance evaluator in banking industries and to expect the destiny and relative risk [20]. This implies that the overall performance of the banking industry can be evaluated by using CAMELS ratings in addition to financial ratios. Das and Nayak [21] pointed out that CAMELS evaluation assures a bank's sound position by observing different features of a corporation's financial statements, source of financing, macroeconomic results, expenditure, and cash flow based on several information sources. Therefore, the CAMELS model helps to guarantee a healthy, concrete, and sound banking sector so that the sector is required to be evaluated and analyzed that will allow the immediate remedial action and elimination of potential exposures that may have a possible impact on their performance [22, 23].

2.1.1. Capital Adequacy.

As a part of the CAMELS model, capital adequacy measures the financial well-being of the bank by indicating the level of capital that the bank held to safeguard the shareholders' interest and to enrich the stability and efficiency of the bank [24]. Tamimi and Obeidat [25] pointed out that to avoid unanticipated financial forfeiture that banks might face and to maintain the security and safety of banking sector, the role that capital plays is eminent. Furthermore, capital adequacy depicts the safety of financial institutions so that they can withstand shocks in their financial position by having sufficient capital equal to their assets, which helps to reduce financial, credit, foreign exchange, and interest rate risk by assigning risk weighting to the bank's assets [7, 9]. The healthiness of capital adequacy may improve the income of banks; consequently, enormous capital supports operations to be more flexible in dealing with various investment prospects [26]. Alalaya and Ahmad [27] found that capital adequacy positively and significantly related to the financial performance of commercial banks measured by ROA at a 5% level of significance [28, 29]. Moreover, the study conducted by Eric et al. [30] reveals that the relationship between capital adequacy and bank profitability was positive [31, 32]. All of the abovementioned studies' results show that capital adequacy is positively and significantly related to bank profitability (Kryeziu et al. [33–35]).

Hypothesis 1. Capital adequacy has a statistically significant positive effect on the bank profitability.

2.1.2. Assets Quality.

The other very important member of the CAMELS model is asset quality which is one of the vital factors that is used to comprehend the risk on the exposure of the borrowers. As a result, the soundness and the healthiness of the banks are affected by the quality of their assets [36, 37]. This implies the main aim of evaluating the financial performance of banks using asset quality is to analyze the extent to which these financial institutions are sound and to determine the composition of nonperforming assets as a percentage of total assets [38]. As a result, asset

quality evaluation is regarded as a fundamental condition of the bank, as an increase in nonperforming loans increases the risk of loan loss [39]. Durguti [40] found that assets quality which is measured by the ratio of loan loss provision to total loans and total loans to total assets has negative and statistically significant effect on the banks' profitability [29–31, 33, 41].

Hypothesis 2. Asset quality has a significant positive effect on the bank profitability.

2.1.3. Management Efficiency.

Management personnel quality plays a significant role in improving the banks' performance by planning, organizing, staffing, evaluating, and controlling. As cited, Masood et al. [42, 43] pointed out that since the contribution of management to the performance of a bank is not quantitative, it is cumbersome to illustrate the efficient performance of management. It is prominent that the efficiency of management fundamentally depends on the influencing ability of boards of directors and management, which plays a pivotal role in identifying, measuring, and controlling risks that safeguard and lead to efficient operation and compliance with applicable laws and regulations [44]. Even though it is difficult to measure the quality of management, ratios such as profit per employee, cost to income, and total loan to total deposit were used to indicate the management efficiency of the banks. Assfaw [45], Eric et al. [30], and Gautam [31] in their studies found positive and significant relationship between management efficiency and banks' profitability. However, the results of Shamim et al. [46], Mahmud et al. [34], and Petria et al. [35] were not complemented with the abovementioned findings; in contrast, they concluded that the relationship between management capability and bank performance is negative.

Hypothesis 3. Management efficiency has a significant positive effect on the bank profitability

2.1.4. Earning Quality.

The major objective of any privately-owned company is maximizing the profit and wealth of its shareholders. To achieve profit and wealth maximization aims, the companies earning quality need to be feasible. According to Ahsan [37], the growth and justifiable future earning quality of banks is measured by earning quality that is explained by the profitability and productivity of the banks. This implies that the current and future earning capacity of the banks are determined by their earning ability that is measured by the profitability and productivity of the banks. Different studies applied different ratios to measure earning ability which indicates the profitability of the banks. Ghazai and Bayraktar [47] applied ratios such as net income/ total assets, net income/equity, net interest margin, non-interest expense/net interest income + noninterest income, and noninterest income/net-interest income + noninterest income. Alemu and Aweke [36] tried to use the ratio of net interest income to total assets and net interest income to total income as a proxy to measure the earning quality of banks. Aspal and Dhawan [24] identified and used the ratio

of operating profit to total assets, net interest margin to total assets, and noninterest income to total income. According to Eric et al. [30], earning quality has a positive effect on the bank performance [37, 41, 48, 49].

Hypothesis 4. Earning quality has a significant positive effect on the bank profitability

2.1.5. Liquidity Position.

Liquidity refers to the banks' ability to pay their short-term obligations as they mature. To what extent that banks are capable of paying their current obligation is depicted by liquidity ratios. Accordingly, the banks are expected to have a higher liquidity ratio since the higher the value of the ratio, the larger the margin of safety that a bank possesses to cover short-term obligations [50]. Banks can keep a sufficient liquidity position by increasing short-term liabilities and by converging currents and other assets into cash promptly so that the availability of funds to meet their credit demand and cash flow requirements can be achieved [51]. According to Mekonnen et al. [9], liquidity is described as the firm's capability to finance their assets and pay their liabilities as they mature. For this study, liquidity was measured by the ratio of total liquid assets to total deposits and cash to total deposits. According to Alalaya and Ahmad [27], Eric et al. [30], Jaouad and Lahse [52], Kryeziu and Hoxha [33], and Mahmud et al. [34], the liquidity level influences the bank profitability positively.

Hypothesis 5. Liquidity position has a significant negative effect on the bank profitability

2.1.6. Sensitivity to Market Risk.

The last elements of the CAMELS model are sensitivity to market risk that measures the impact of change in the exchange rate, interest rate, equity price, or commodity price on the financial performance of banks. According to Ghazai and Bayraktar [47], changes in variables such as the exchange rate, interest rate, equity price, or commodity price can exert a negative effect on the income and capital of the financial institutions. Since there is no active capital market, it is difficult to measure the sensitivity to the capital market in Ethiopia. Therefore, in this study, the study did not apply sensitivity to market risk as a measurement of the financial performance of banks.

2.2. Conceptual Framework.

The relationship between the study's dependent and independent variables is depicted using Figure 1. Return on assets (ROA) and net interest margin (NIM) are taken as dependent variables while the CAMEL approach together with their proxy variables is used as independent variables. Figure 2 shows input and output variables used to examine the technical efficiency of commercial banks under study.

3. Methodology

3.1. Source of Data and Sample.

The main source of data for this study was the secondary sources obtained from the audited financial statements of the banks starting from 2015 to 2020. In Ethiopia, this period is known as the implementation of Growth and Transformation Plan II (GTP II). The data were collected from the annual financial reports of private commercial banks included in the study. Out of sixteen commercial banks operating in Ethiopia during the study period, twelve private commercial banks were selected for the investigation. The study excluded four private commercial banks (i.e., Enat Bank, Abay Bank, Buna International Bank, and Berhan International Bank) because of a lack of appropriate and audited financial data and a lack of risk assessment between the study periods.

3.2. Data Analysis.

The data from secondary sources were analyzed using the following three data analysis techniques: descriptive, multiple panel data regression analysis, and the DEA approach. While descriptive analysis was used for CAMEL ratings and DEA approaches, the impact of bank-specific variables on the financial performance of private commercial banks was analyzed using multiple linear panel regression.

3.3. Brief Description of Data Envelopment Analysis.

Data envelopment analysis (DEA) is an analysis method particularly used to measure the efficiency level of companies. According to Zenebe [11], the efficiency of DMUs can be measured using DEA, which uses two major approaches, i.e., parametric and nonparametric techniques. The usage of data envelopment analysis (DEA), a linear programming-based technique for evaluating the performance of homogeneous organizational units, is growing in the banking industry [53]. The method, known as nonparametric analysis, enables comparison of the relative efficiency of units as the benchmark and determining the inefficiencies in input combinations in other units relative to the benchmark [13]. Because the method has gained acceptance in the examination of the technical efficiency of DMUs, the DEA approach, particularly nonparametric, was utilized to determine the relative technical efficiency of private commercial banks. The main aim of using DEA is to identify the best bank among DMUs in terms of technical efficiency.

Zenebe [11] asserts that banks have greater control over input than output; hence, for this study, an input-oriented DEA was used. Input variables used in this study were operating expenses, interest expenses, capital, labor, and deposits, while output variables were interest income, noninterest income, loans, and investment. Farrel created the original version of DEA in 1957, which Charnes, Cooper, and Rhodes (CCR) later refined in 1978 [54]. Later on, in 1984, Banker, Charnes, and Cooper widened
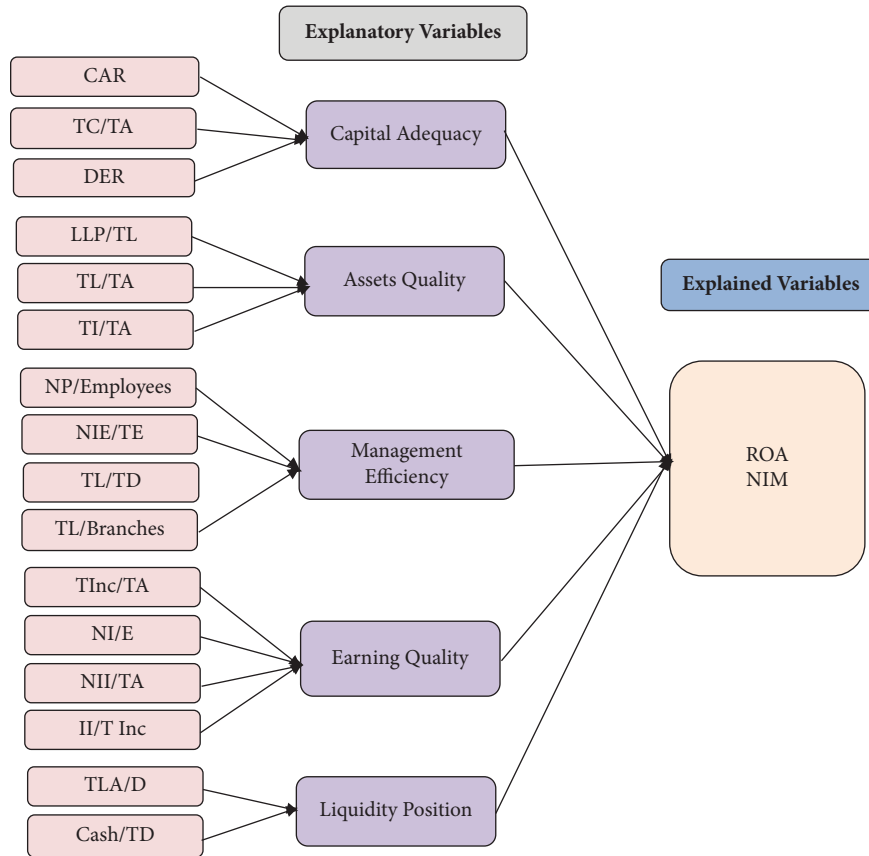
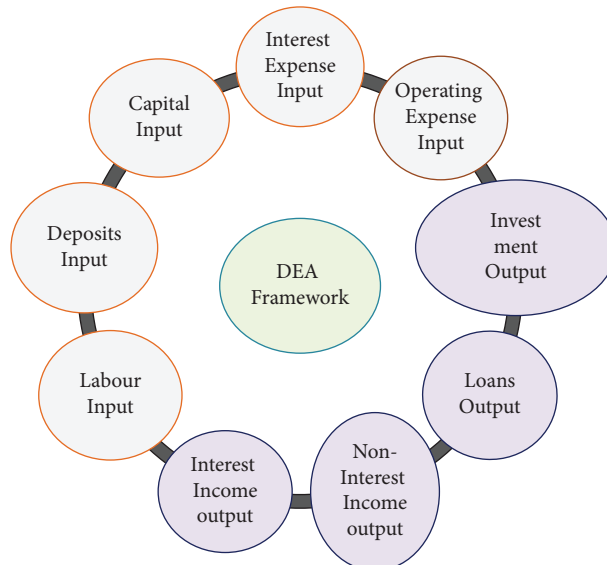FIGURE 1: Conceptual framework.

FIGURE 2: Inputs and outputs of the DEA framework.

the Charnes, Cooper, and Rhodes model to include variable returns to scale [55]. Based on the BCC model, Karimzadeh [13] developed the following mathematical model to define the relative efficiency of DMUs using the ratio of the weighted sum of outputs to the weighted sum of inputs:

$$ho = \left(\frac{\int_{r=1}^{s} U_r Y_{ro}}{\int_{i=1}^{m} V_i X_{io}} \right), \tag{1}$$

where s = number of outputs, U_r = weight of output r, Y_{ro} = amount of r produced, M = number of inputs, V_i = weight of input i, X_{io} = amount of input I used by DMUs.

The main assumption of equation (1) is CRS and controllable inputs. However, DMUs might assess their outputs and inputs differently. The CCR model, which was created by Charnes, Cooper, and Rhodes and had an input orientation and assumed inefficiency, provides an answer to this question CRS [13].

$$\max ho = \frac{\int_{r=1}^{s} U_r Y_{ro}}{\int_{i=1}^{m} V_i X_{io}}. \tag{2}$$

Which is subject to

$$\frac{\int_{r=1}^{s} U_r Y_{ro}}{\int_{i=1}^{m} V_i X_{io}} \le 1; \quad j = 1, 2, \ldots . n, \tag{3}$$

where $j = 1, \ldots, n$ (no. of DMUs)

The next step is converting equation (2) into linear programming to measure efficiency. (See Table 1).

$$\max ho = \int_{r=1}^{s} u_r y_{ro},$$

$$\int_{i=1}^{m} V_i X_{io} = 1,$$

$$\int_{r=1}^{s} u_r y_{rj} - \int_{i=1}^{m} V_i X_{ij} \le = 0, \tag{4}$$

$$u_r, \quad Vi \ge \varepsilon.$$

Zenebe [11] pointed out that in the Charnes, Cooper, and Rhodes (1978) (CCR) model, above constant returns to scale (CRS) is assumed whereby the scale of operation and efficiency of DMUs are unrelated. It is a linear programming issue where input minimization is modeled [13]. CRS assumption is applicable when all DMUs are operating at full capacity, which is not real because DMUs might experience either economy of scale or diseconomies of scale. According to Řepková [56], the technical efficiency score calculated by the CCR model will be tainted by scale efficiencies when some DMUs are not running at an ideal scale. Equation (4) that is developed by Banker, Charnes, Cooper (1984) answered this by assuming a VRS as follows:

$$\max ho = \int_{r=1}^{s} u_r Y_{ro} + Co,$$

$$\int_{i=1}^{m} V_i X_{io} = 1,$$

$$\int_{r=1}^{s} U_r Y_{rj} - \int_{i=1}^{m} V_i X_{rj} - Co < 0, \tag{5}$$

$$u_r, \quad Vi \ge \varepsilon.$$

3.4. Model Specification.
The main objective of this study is to examine the overall performance of private commercial banks in Ethiopia. Multiple linear regressions were used taking ROA and NIM as explained variables and capital adequacy (CA), assets quality (AQ), management efficiency (ME), earning quality (EQ), and liquidity position (LP) as explanatory variables.

$$ROA = \beta 0 + \beta 1 (CAit) + \beta 1 (AQit) + \beta 1 (MEit) + \beta 1 (EQit) + \beta 1 (LPit) + \alpha it, \ldots, Model1,$$

$$NIM = \beta 0 + \beta 1 (CAit) + \beta 1 (AQit) + \beta 1 (MEit) + \beta 1 (EQit) + \beta 1 (LPit) + \alpha it, \ldots, Model2. \tag{6}$$

3.5. Variables Definition.
Table 1 depicts the variables used for this study. Return on assets (ROA) and net interest margin (NIM) are dependent variables, while capital adequacy (CA), assets quality (AQ), management efficiency (ME), earning quality (EQ), and liquidity position (LP) are independent variables that are expected to affect the financial performance of banks. The assumption of no perfect multicollinearity states that there are no perfect linear relationships among the explanatory variables. In Tables 2 and 3, the VIF results for both models are less than 10 and 1/VIF is greater than 0.1, which indicates no perfect linear relationship among explanatory variables. In other words, the problem of multicollinearity is not a serious problem in both models. In addition, Table 4 indicates that the panel data does not have a unit root, meaning it is stationary, which means it does not have time-dependent structure.

Assumption about error term (u)

Zero mean value of disturbance ($E(u_t) = 0$) $\tag{7}$

According to Brooks [57]; if a constant term is included in the regression equation, this assumption will never be violated. However, if the regression model did not include an intercept and the average value is different from zero so that severe bias in the slope coefficient estimates. In this study, since the regression model included constant term, there is no doubt regarding this assumption.

4. Results and Discussion

4.1. Descriptive Analysis: CAMEL Approach.
The first section of result and discussion deals with the indication of the performance of the banks using the CAMEL approach. The rating system depicts and ranks the partial performance among institutions. For this study, capital adequacy, assets quality, management efficiency, earning quality, and liquidity position of the banks under study periods were applied. In the following section, the discussion for the CAMEL framework is going to be discussed.

TABLE 1: List of variables and their measurement.

	Description	Proxy tools	Description of ratio
Camel approach	Capital adequacy	CAR	Capital adequacy ratio = (tier1capital + tier2capital)/(risk weighted assets)
		TCTA	Total capital/total assets
		DER	Debt/equity ratio
		LLP/TL	LLP/total loan
	Assets quality	TL/TA	Total loan/total assets
		TI/TA	Total investment/total assets
		NP/Em	Net profit/no. of employees
	Management efficiency	NIETE	Noninterest expense/total expense
		TL/TD	Total loan/total deposits
		TL/Bra	Total loan/no. branches
		TInc/TA	Total income/total assets
	Earning quality	NI/E	Net income/equity
		NII/TA	Net-interest income/total assets
		II/Tinc	Interest income/total income
	Liquidity position	TLA/TD	Total liquid assets/total deposits
		Cash/TD	Cash/total deposits
Financial performance	Profitability	ROA	Net income/total assets
		NIM	Interest income-interest expense total assets
DEA variables		Input variables	Output variables
		Interest expense	Interest income
		Operating expense	Noninterest income
		Deposits	Loans
		Capital	Investment
		Labor	

TABLE 2: Multicollinearity test (model 1).

Variable	Centered VIF	1/VIF
DER	2.1989	0.4547
CAR	1.8261	0.5476
Total loan/total assets (TL/TA)	3.6714	0.2723
Total-investment/total asset (TI/TA)	1.2240	0.8169
Net profit per employees (NP/Em)	1.5198	0.6579
Total loans per branches (TL/Br)	1.2638	0.7912
Total income/total assets (Tinc/TA)	5.8391	0.1712
Interest income/total income (II/Tinc)	5.0275	0.1989
Noninterest expense/total expense (NIE/TE)	1.3555	0.7377
Total liquid assets/total deposit (TLA/TD)	1.2162	0.8222
Cash/total deposits (cash/TD)	2.9236	0.3420

TABLE 3: Multicollinearity test (model 2).

Variable	VIF	1/VIF
Total capital/total assets (TC/TA)	2.1109	0.4737
CAR	1.4853	0.6732
Net profit per employees (NP/Em)	1.3169	0.7593
Total loan/total assets (TL/TA)	2.6560	0.3765
Loan loss provision/total loans (LLP/TL)	1.1351	0.8809
Total investment/total assets (TI/TA)	1.2408	0.8059
Total loans/total deposit (TL/TD)	1.1456	0.8729
Total loans per branches (TL/Br)	1.4256	0.7014
Total income/total assets (Tinc/TA)	1.5274	0.6547
Cash/total deposits (cash/TD)	2.8013	0.3569

TABLE 4: Stationary test (unit-root test using Levin–Lin–Chu).

Variable	Statistic	P
DER	Unadjusted t: −19.2265 Adjusted t: −5.8091	0.0021
CAR	Unadjusted t: −20.5214 Adjusted t: −8.7825	0.0000
Total loan/total assets (TL/TA)	Unadjusted t: −26.0265 Adjusted t: −9.9124	0.0024
Total investment/total asset (TI/TA)	Unadjusted t: −22.4484 Adjusted t: −10.1287	0.0004
Net profit per employees (NP/Em)	Unadjusted t: −26.0028 Adjusted t: −7.1602	0.0000
Total loans per branches (TL/Br)	Unadjusted t: −25.8747 Adjusted t: −5.7825	0.0019
Total income/total assets (Tinc/TA)	Unadjusted t: −18.1589 Adjusted t: −6.1825	0.0041
Interest income/total income (II/Tinc)	Unadjusted t: −16.5214 Adjusted t: −8. 3214	0.0032
Noninterest expense/total expense (NIE/TE)	Unadjusted t: −23.8973 Adjusted t: −8. 6895	0.0000
Total liquid assets/total deposit (TLA/TD)	Unadjusted t: −25.3794 Adjusted t: −6.0749	0.0061
Cash/total deposits (cash/TD)	Unadjusted t: −24.0994 Adjusted t: −7. 2465	0.0009

Table 5 displays capital adequacy which measures the degree to which banks are strong to ensure they have enough capital that confirms that their businesses remain stable. One of the elements of capital adequacy is the capital adequacy ratio that indicates the capital balance as a percentage of a bank's risk-weighted credit exposures so are used to protect depositors and promote the stability and efficiency of banks. This implies that the ratio measures the ability of

Table 5: Capital adequacy ratios.

Bank	Capital adequacy							
	CAR		TC/TA		DER		Group ranking	
	Average (%)	Rank	Average (%)	Rank	Average	Rank	Average	Rank
AIB	19.17	4	12.81	6	6.92	6	5.33	6
OIB	14.26	11	11.41	11	7.84	11	11	11
DB	15.83	7	12.06	9	7.30	9	8.33	8
CBO	10.94	12	9.25	12	9.68	12	12	12
ZB	35.00	1	14.97	4	5.72	4	3	3.5
ABYB	14.46	10	12.43	8	7.11	8	8.67	9
AnB	0.1527	8	12.66	7	6.93	7	7.33	7
ADDB	16.83	6	22.61	1	3.46	1	2.67	2
NIB	17.40	5	14.29	5	6.06	5	5	5
HB	15.22	9	11.47	10	7.74	10	9.67	10
DGB	30.55	2	19.78	2	4.10	2	2	1
WB	21.75	3	15.22	3	5.63	3	3	3.5

a bank to meet the time liabilities and other risks such as credit risk or operational risk [22]. The highest ratio indicates that the bank is found to be sound in using its available resources to reduce various risks. While the ratio of total capital to total assets portrays the percentage of the total assets that are financed by the equity, the debt-to-equity ratio measures the degree that the bank uses debt in financing its assets about using equity. Consequently, the banks are required to achieve higher total capital to assets and lower debt to equity.

Pertinent to capital adequacy ratio, Zemen Bank (35%) scored the highest rank followed by Debub Global (30.55%), Wegagen, Awash International Bank (21.75%), and NIB Bank (17.40%). Cooperative Bank of Oromia scored the lowest rank in this regard. Above all, all commercial banks included in the study achieved above the minimum rate fixed by NBE, that is, 8%. Regarding total capital to total assets, while Addis International Bank (22.66%), Debub Global Bank (19.78%), Wegagan Bank (15.22%), Zemen Bank (14.97%), and NIB Bank (14.29%) are found to be in the top five achievements, Oromia International Bank (11.41%) and Cooperative Bank of Oromia (9.25%) are found in a lower position. The third element of the capital adequacy framework is the debt-to-equity ratio. In this case, Addis International Bank, Debub Global Bank, Wegagen Bank, Zemen Bank, and NIB Bank are found in the top five ranks. However, Cooperative Bank of Oromia and Oromia International Bank were found in the least position.

One of the major achievements of the banks could be measured by the quality of the assets that the company maintained. According to Rahman and Islam [39], asset quality guarantees the major risks faced by commercial banks, particularly the risk of loan losses that may occur due to an increase in nonperforming loans so that credit risk increases. Since assets quality is one of the fundamental parameters to examine the degree of financial strength, the major aim to measure the quality of the assets is to ascertain the composition of nonperforming assets as a percentage of the total assets [38]. As depicted in Table 6, for loan loss provision to total loans, Awash International Bank was found in the best position followed by cooperative Bank of Oromia, Zemen Bank, Anbessa Bank, and Oromia International Bank. NIB Bank and Hibret relatively ranked the least. Based on the table, Awash international Bank was found in the first position under total loans total assets but Debub global Bank achieved the least rank compared to other banks. While Wegagen Bank and Nib Bank were found in the better position under total investment to total assets, the achievement of Dashen and Anbesa International Bank was poor.

The contribution of managing bodies for the performance of the bank is more qualitative. It is another vital measurement of the bank performance under the CAMEL approach that indicates how the managers are efficient and effective in managing the bank. Under management efficiency, the ratio of net profit after tax to the number of employees, noninterest expenses to total expenses, total loans to total deposits, and total loans to the number of branches was used to measure the quality of management. Table 7 depicts that under management quality, the overall performance (group average: 3.25) indicates that Awash international Bank achieved outstanding performance and secured the first position. While Zemen and Hibret Bank followed Awash International Bank by scoring group average of 4.00 and 4.50, respectively, Oromia International Bank and Debub Global Bank were the least performer and scored group average of 9.25 and 10.75.

Any business seeks to maximize its shareholders' profit and wealth. To achieve this objective, sufficient and stable earning needs to be generated by the company. Rahman and Islam [39] pointed out that good earnings support the banks in sustaining the present and future operations, increasing the capital base, paying dividends to the shareholders, increasing the capacity to absorb losses, and also ensuring the expansion of the business which enables them to withstand unwanted shocks arising from the risks that the bank may face in its operations. Table 8 shows the group average, which indicates that Anbesa International Bank secured the first position followed by Awash International Bank by scoring 3.00 and 4.80, respectively. Debub Global bank, Hibret Bank, Dashen Bank, and Abyssinia Bank are found in the lower position.

TABLE 6: Assets quality ratios.

Bank	Assets quality							
	LLP/TL		TL/TA		TI/TA		Group ranking	
	Average (%)	Rank	Average (%)	Rank	Average (%)	Rank	Average	Rank
AIB	2.77	1	56.03	1	19.80	7	3.00	1
OIB	0.59	5	46.52	10	20.80	5	6.67	7.5
DB	0.36	9	51.76	7	14.98	11	9.00	12
CBO	1.38	2	53.83	4	17.41	10	5.33	3
ZB	0.94	3	45.62	11	21.37	4	6.00	5
ABYB	0.35	10	54.09	3	20.09	6	6.33	6
AnB	0.94	4	53.23	5	13.32	12	7.00	9
ADDB	0.47	8	46.92	9	18.64	9	8.67	10.5
NIB	0.21	12	52.98	6	23.60	2	6.67	7.5
HB	0.33	11	54.57	2	22.69	3	5.33	3
DGB	0.55	6	43.42	12	19.36	8	8.67	10.5
WB	0.53	7	51.23	8	24.10	1	5.33	3

TABLE 7: Management efficiency ratios.

Bank	Management efficiency									
	NP/Emp		NIE/TE		TL/TD		TL/Bra		Group ranking	
	Average	Rank	Average (%)	Rank	Average (%)	Rank	Average	Rank	Average	Rank
AIB	182781.18	3	53.88	1	71.75	4	60144011.91	5	3.25	1
OIB	152382.90	5	67.86	9	58.51	11	31099543.73	12	9.25	11
DB	125566.37	11	61.11	6	95.28	2	70870321.23	2	5.25	4
CBO	140472.01	8	73.98	11	68.10	6	48707058.53	8	8.25	10
ZB	456031.42	1	55.14	2	56.91	12	169691650.81	1	4	2
ABYB	103819.73	12	60.89	5	125.01	1	58780546.68	6	6	6.5
AnB	167914.65	4	71.09	10	66.73	9	44381500.20	9	8	9
ADDB	247805.49	2	63.41	7	68.84	5	33392000.43	10	6	6.5
NIB	140135.80	9	57.14	3	67.24	8	67324664.13	3	5.75	5
HB	142613.64	7	57.74	4	74.16	3	63860018.46	4	4.5	3
DGB	138677.88	10	75.53	12	64.47	10	33303147.86	11	10.75	12
WB	143578.59	6	67.66	8	67.90	7	51193116.19	7	7	8

TABLE 8: Earning quality ratios.

Bank	Earning quality											
	TInc/TA		NI/E		NII/TA		II/Tinc		NI/TA		Group ranking	
	Average (%)	Rank	Average (%)	Rank	Average (%)	Rank	Average (%)	Rank	Average (%)	Rank	Average	Rank
AIB	6.01	10	21.04	2	4.66	4	151.06	2	2.76	6	4.8	2.5
OIB	5.46	11	19.87	4	4.51	6	164.54	1	3.10	2	4.8	2.5
DB	4.82	12	19.11	6	3.70	9	147.87	3	2.29	9	7.8	10
CBO	8.34	3	20.67	3	4.70	2	83.82	10	1.85	12	6	4
ZB	7.07	4	19.18	5	2.79	12	84.69	9	3.01	3	6.6	6
ABYB	6.79	5	15.47	10	3.95	8	109.77	7	1.92	11	8.2	12
AnB	6.54	6	25.24	1	4.79	1	113.74	6	2.90	5	3.8	1
ADDB	9.55	2	13.83	12	3.53	10	72.45	11	3.14	1	7.2	8
NIB	6.47	8	15.98	8	4.67	3	119.10	5	2.62	7	6.2	5
HB	6.52	7	17.38	7	4.46	7	105.83	8	1.98	10	7.8	10
DGB	10.07	1	14.88	11	3.49	11	57.77	12	2.97	4	7.8	10
WB	6.46	9	15.93	9	4.63	5	128.02	4	2.42	8	7	7

Table 9 displays the last element of the CAMEL framework which is liquidity management that measures the ability of the banks to meet their short-term obligation. Addis International Bank has performed outstanding and secured first position in all individual parameters followed by Debub Global Bank and Oromia International Bank. Moreover, Awash International Bank, Cooperative Bank of Oromia, and Nib Bank were found in the last position.

TABLE 9: Liquidity position ratios.

| Bank | Liquidity position | | | | | |
| | TLA/TD | | Cash/TD | | Group ranking | |
	Average (%)	Rank	Average (%)	Rank	Average	Rank
AIB	112.70	9	22.34	7	8	9
OIB	113.23	7	24.68	4	5.5	3
DB	119.10	5	20.25	9	7	7
CBO	95.70	12	24.57	5	8.5	10.5
ZB	108.46	11	32.16	3	7	7
ABYB	110.41	10	18.32	12	11	12
AnB	112.82	8	23.38	6	7	7
ADDB	131.00	1	38.94	1	1	1
NIB	114.83	6	18.37	11	8.5	10.5
HB	124.17	3	20.16	10	6.5	5
DGB	129.49	2	37.33	2	2	2
WB	120.83	4	22.31	8	6	4

TABLE 10: Composite ranking.

Bank	C	A	M	E	L	Average	Composite ranking
AIB	6	1	1	2.5	9	3.9	1
OIB	11	7.5	11	2.5	3	7	8
DB	8	12	4	10	7	8.2	11
CBO	12	3	10	4	10.5	7.9	10
ZB	3.5	5	2	6	7	4.7	2
ABYB	9	6	6.5	12	12	9.1	12
AnB	7	9	9	1	7	6.6	6.5
ADDB	2	10.5	6.5	8	1	5.6	4
NIB	5	7.5	5	5	10.5	6.6	6.5
HB	10	3	3	10	5	6.2	5
DGB	1	10.5	12	10	2	7.1	9
WB	3.5	3	8	7	4	5.1	3

TABLE 11: Regression result of model one.

NIM	Coef.	Robust Std. Err.	Z	P	(95% conf. interval)
DER	−0.0000167	0.0003885	−0.04	0.966	−0.0007782 0.0007449
CAR	−0.0100268	0.0113748	−0.88	0.378	−0.0323209 0.0122673
TL/TA	0.0917884	0.0345893	2.65	0.008	0.0239947 0.1595822
TI/TA	0.0155844	0.0083861	1.86	0.063	−0.000852 0.0320208
Log_NPEm	−0.000497	0.0021739	−0.23	0.819	−0.0047578 0.0037637
LogTL/Br	−0.001066	0.0008352	−1.28	0.202	−0.0027029 0.000571
TInc./TA	0.1902707	0.0630717	3.02	0.003	0.0666525 0.3138889
II/TInc.	0.0092343	0.003916	2.36	0.018	0.001559 0.0169095
NIE/TE	0.0231829	0.0066162	3.50	0.000	0.0102154 0.0361504
TLA/TD	0.0011277	0.0041713	0.27	0.787	−0.0070479 0.0093034
Cash/TD	−0.0205792	0.0076806	−2.68	0.007	−0.0356329 −0.0055256
_Cons	−0.0159833	0.0313678	−0.51	0.610	−0.0774631 0.0454966

R-square:
Within = 0.5774
Between = 0.8643   Wald Chi^2 (11) = 1860.16 corr (u_i, X) = 0 (assumed) Prob > chi^2 = 0.0000
Overall = 0.6733   (Std. Err. adjusted for 12 clusters in bank)

TABLE 12: Summary of hypothesis testing result of model 1.

Hypothesis	Expectation	Testing results	Decision
1	Positive	No effect	Reject
2	Positive	Positive	Accepted
3	Positive	Positive	Accepted
4	Positive	Positive	Accepted
5	Negative	Negative	Accepted

TABLE 13: Regression result of model two.

ROA	Coefficient	Robust Std. Err.	Z	P	(95% conf. interval)
TC/TA	0.1438822	0.0158838	9.06	0.000	0.1127505 0.175014
CAR	0.0204796	0.0043216	4.74	0.000	0.0120094 0.0289498
NP/E	0.0864299	0.0184505	4.68	0.000	0.0502676 0.1225922
TL/TA	0.0355105	0.0154832	2.29	0.022	0.005164 0.065857
LLP/TL	−0.0014804	0.0221682	−0.07	0.947	−0.0449293 0.0419686
TI/TA	0.0083068	0.0096592	0.86	0.390	−0.0106249 0.0272386
TL/TD	0.0023691	0.000989	2.40	0.017	0.0004306 0.0043075
LogTL/Br	−0.0032212	0.0003297	−9.77	0.000	−0.0038673 −0.0025751
Cash/TD	0.0091384	0.0170142	0.54	0.591	−0.0242087 0.0424856
Tinc/TA	−0.0769146	0.0660739	−1.16	0.244	−0.2064171 0.0525878
Cons	0.0244196	0.0078749	3.10	0.002	0.008985 0.0398542
R-square:					
Within = 0.6036		Wald Chi^2 (10) = 1508.21 corr $(u\_i, X) = 0$ (assumed) Prob > chi^2 = 0.0000			
Between = 0.8867		(Std. Err. adjusted for 12 clusters in bank)			
Overall = 0.6940					

TABLE 14: Summary of hypothesis testing results of model 2.

Hypothesis	Expectation	Testing results	Decision
1	Positive	Positive	Accepted
2	Positive	Positive	Accepted
3	Positive	Positive	Accepted
4	Positive	Positive	Accepted
5	Negative	No effect	Rejected

TABLE 15: Overall technical efficiency (CRS, VRS, and scale efficiency).

Nos.	Bank	CRS_TE	Rank	VRS_TE	Rank	Scale efficiency
1	AIB	1.0000	1	1.0000	1	1.0000
2	OIB	1.0000	1	1.0000	1	1.0000
3	DB	1.0000	1	1.0000	1	1.0000
4	CBO	1.0000	1	1.0000	1	1.0000
5	ZB	1.0000	1	1.0000	1	1.0000
6	ABYB	0.9984	11	0.9985	12	0.9999
7	AnB	0.9978	12	1.0000	10	0.9978
8	ADDB	1.0000	1	1.0000	1	1.0000
9	NIB	0.9998	10	1.0000	11	0.9998
10	HB	1.0000	1	1.0000	1	1.0000
11	DGB	1.0000	1	1.0000	1	1.0000
12	WB	1.0000	1	1.0000	1	1.0000

The CAMEL framework is used to evaluate the performance of commercial banks. Table 10 portrays the composite performance of private commercial banks under study. Accordingly, Awash International Bank outperforms by securing the first rank followed by Zemen Bank, WegagenBank, Addis International Bank, and Hibret Bank. Dashen, Abyssinia, and Debub Global Banks were less performed.

4.2. Regression Analysis. Model 1: test of Endogeneity

H_0: variables are exogenous

Durbin (Score) Chi^2 (1) = 1.53320 (P = 0.0954)

Wu-Hausman F (1.119) = 1.41291 (P = 0.1563)

Decision: accept null hypothesis

According to Table 11, asset quality, as measured by total loans to total assets and total investment to total assets, (see Table 1) has a statistically significant and positive effect on the profitability of the banks under study at 5% level of significant (Z = 2.65, $P \leq 0.008$ and Z = 1.86, and $P \leq 0.0063$, respectively). The result is in line with the finding of Gicharu et al. [58], who concluded that asset quality has a positive and significant impact on the profitability of banks. Besides, the earning quality of the banks, which is measured by the ratio of total income to total assets and interest income to total assets, has a positive and significant effect on the financial performance of the banks under study, as measured by NIM (Z = 3.02, $P \leq 0.003$ and Z = 2.36, and $P \leq 0.018$, respectively). Moreover, the liquidity position which is measured by the ratio of cash to total deposit has a negative and significant impact on the bank's profitability measured by NIM at 5% level of significance (Z = −2.68, $P \leq 0.007$). The result obtained by Mohanty [2] supports the study's finding that the liquidity position has a significant and negative effect on the banks' profitability. The findings of the study are not in line with the findings of Abate and Mesfin [59] and Gicharu et al. [58], who found that the liquidity position of the bank has a positive and significant impact onprofitability (see Table 12).

Dependent variable = NIM, @ 0.05 level of significant

Model 2: test of endogeneity

H_o: variables are exogenous

Durbin (Score) Chi^2 (1) = 1.94523 (P = 0.0731)

Wu-Hausman F (1.119) = 1.41291 (P = 0.19765)

Decision: accept null hypothesis

The second profitability measurement tool that the study used was ROA. Table 13 enumerates factors that affect the financial performance of banks under study as measured by ROA. Accordingly, capital adequacy, which is measured by the ratio of total capital to total assets, and CAR have a significant and positive effect on the banks' profitability during study periods at 5% level of significance (Z = 9.06, $P \leq 0.000$ and Z = 4.74, and $P \leq 0.000$, respectively). The result of [58–61] confirms the findings. Besides, the ratio of total loans to total assets positively and significantly affects ROA (Z = 2.29, $P \leq 0.022$) [58]. The study found that the ratio of total loans (TLs) to total deposits (TDs) that

measures management efficiency has a positive and significant effect on ROA (Z = 2.40, $P \leq 0.017$). Concerning total loans to the number of branches, the ratio significantly and negatively affects ROA. Moreover, the earning quality of the banks, which is measured by the ratio of total income net profit to total equity, has a positive and significant effect on the financial performance of their understudies during study periods [58] (see Table 14).

4.3. Technical Efficiency of Private Commercial Banks for the Years between 2015 and 2020.

The major objective of the study is to examine the performance of private commercial banks in Ethiopia between the years 2015 and2020. To achieve the stated aim, the technical efficiency score was applied to measure the efficiency of DMUs. As indicated in Table 15, input-oriented constant returns to (CRS), variable returns to scale (VRS), and scale efficiency were used to measure the efficiency status of the banks under study. Moreover, for this study, the nonparametric (DEA) technique together with intermediation and production approaches was used.

Table 15 shows the overall technical efficiency of banks using CRS, VRS, and scale efficiency. Under CRS, almost all of the commercial banks under study were found in the better position by scoring 100%. Nonetheless, Nib, Abyssinia, and Anbesa Banks were found least efficient with an average technical efficiency of 99.98%, 99.84%, and 99.78%, respectively. Under VRS, except Abyssinia Bank (with a score of 99.85%), the remaining banks were found in the first rank by scoring 100%. Concerning scale efficiency, compared to other banks under study, Abyssinia, Nib, and Anbesa Banks were found to be the least efficient scoring 99.99%, 99.98%, and 99.78%, respectively.

5. Conclusion

The main objective of the study was to examine the performance of private commercial banks in Ethiopia between the years 2015 and 2010. Two methods were used to scrutinize the performance of banks. These are the CAMEL framework to rank financial performance and DEA (CRS, VRS, and scale efficiency) to study the technical efficiency of the banks under study. The results of the study under the CAMEL approach indicate that while Debub Global, Addis International, and Zemen Banks were found in the higher achievement under capital adequacy, Hibret, Oromia International, and Cooperative Bank Oromia were found in the lower position. It is also confirmed that under assets quality, Awash International, Cooperative Bank of Oromia, and Wegagen Banks relatively achieved more while Debub Global, Addis International, and Dashen Banks were found in the lower rank. Moreover, concerning management efficiency, the best achievers were Awash International, Zemen, and Hibret Banks. However, Cooperative Bank of Oromia, Oromia International, and Debub Global Bank achieved less when we compared with other banks under study.

Under earning quality, compared to others, Anbesa International, Awash International, and Oromia International Banks are in a better position while Dashen, Hibret, and Abyssinia Banks were found in less performance. Addis International Bank, Debub Global Bank, and Oromia International Banks were more liquid but Cooperative Bank Oromia, Nib International Bank, and Abyssinia Banks were less liquid compared to others. Generally, the composite ranking depicts that Awash International Bank and Zemen Bank were found in the better status in elements of CAMEL, but the achievement of Dashen and Cooperative Bank of Oromia was less.

Concerning technical efficiency, most of the banks were found under the same position regarding CRS, VRS, and scale efficiency. Except for Abyssinia, Anbesa, and Nib International Banks, relatively, the remaining banks were found in the better performance under CRS. Regarding VRS technical efficiency, except Abyssinia Bank, the remaining banks performed well. Scale efficiency reveals that except Abyssinia, Anbesa, and Nib International banks, the remaining banks were found in the better performance.

5.1. Research Limitations. The main objective of the study is to examine competition, survival, and financial performance of private commercial banks in Ethiopia during Growth and Transformation Plan II. The financial performance indicators selected for the study were limited to net interest margin (NIM) and ROA. However, financial performance of banking sector is not only measured by NIM and ROA. Factors affecting the financial performance of the banks selected for this study were bank specific. Nevertheless, there are various determinants of banking sectors that can be categorized as macroeconomic variables and external factors. In addition, the study was focused on the banking sector in Ethiopia, so the generalizability of the result for the global banking sector may be limited. Therefore, I want to invite scholars to study more deeply, including both macroeconomic and external factors, to examine the financial performance of the banking sector, adding more study periods.

Data Availability

The data used to support the findings of this study are available on reasonable request from the corresponding author.

Conflicts of Interest

The author declares that there are no conflicts of interest.

Acknowledgments

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