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Article

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

Firm-specific, industry-specific and macroeconomic determinants of commercial banks' lending in Ethiopia: Panel data approach

Mekonnen Yitayaw^{1*}

Abstract: Lending is the primary role in commercial banks' daily banking activities and is described as the heart of a commercial banks' banking business. On the other hand, it is also one of the greatest sources of risk to the safety and soundness of financial institutions. There is little empirical evidence on bank lending behavior in emerging markets like Ethiopia. However, the existing studies have a difference in the identification of which factors have a strong impact and on the direction of those impacts if any on Ethiopian commercial banks' lending. Thus, this study investigated the bank-specific, industry-specific and macroeconomic determinants of commercial banks' lending in Ethiopia using balanced panel data of 15 commercial banks from 2011 to 2019. To realize the stated objective quantitative approach and explanatory design were employed using secondary data sources from the audited financial statement of sampled commercial banks. The model result of the study indicated that bank-specific factors such as; volumes of deposit, capital adequacy, and bank size have a positive and statistically significant effect on bank lending. Industry-specific factors such as; cash reserve requirement, bank concentration, and average lending rate have a negative and statistically significant effect on bank lending. Likewise, one of the macro-economic variables gross domestic products has a negative and statistically significant effect on bank lending. The study suggested that commercial banks



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PUBLIC INTEREST STATEMENT

Banks play an important intermediary role to drive economic growth in every economy, and financial system through offering a mechanism for payments, matching the supply and demand of financial markets, conducting risk transfer, discovering and funding productive investments, and handling the risk management roles. Thus, this study investigated the bank-specific, industry-specific and macroeconomic determinants of commercial bank lending in Ethiopia and documented that volumes of deposit, capital adequacy, and bank size will increase bank lending. However, cash reserve requirement, bank concentration, average lending rate, and gross domestic products will decrease bank lending. My study is of interest to managers, regulators, and policymakers since it provides an understanding of how bank intermediation roles may respond to an introduction of internal as well as external rules, regulations, and general economic dynamics.

in Ethiopia have to manage their lending by giving more attention to the internal factors, which the management has control over in line with the banking industry rules and regulations recalling the influence of the general economic dynamic.

I believe that this study is of interest to bankers, analysts, regulators, policymakers, and investors since it provides useful insight on the determinants of commercial banks' lending and an understanding of how bank intermediation roles may respond to internal as well as external rules, regulations, and general economic dynamics, and it will contribute to the scarce empirical evidence.

Subjects: Finance; Business, Management and Accounting; Industry & Industrial Studies

Keywords: Bank lending; bank-specific; commercial bank; determinants; Ethiopia; industry-specific; macroeconomic; panel data approach

1. Introduction

In every economy, the existence of the financial sector is designed to drive economic growth (Oyebowale, 2019). Financial intermediaries play important financial roles in the economic and financial systems through offering a mechanism for payments (Allen & Gale, 2004), matching the supply and demand of financial markets (Adrian & Shin, 2008), conducting risk transfer (Scholtens & Van Wensveen, 2000), and handling the risk management roles (Allen & Santomero, 2001). In most economies, banks are the most important financial intermediaries which provide a range of services (Allen & Santomero, 2001). The essential role of the banking system in stimulating economic growth is through their special function of discovering and funding productive investments (Oyebowale, 2019) since they are one of the critical components of the financial system (Ladime et al., 2013;; Kassie, 2014).

Oyebowale (2019) stated that the influence of the banking system in an economy focuses on two main channels: credit allocation (Croitoru, 2012) and capital accumulation (Hicks, 1969). On the credit allocation role of commercial banks, improved financial intermediation and innovation in an economy drive economic growth, which helps to boost investment and productivity through the supply of bank loans from savings surplus units to savings deficit units. Lending is the primary role in commercial banks daily banking activities and described as the heart of a commercial bank's banking business where loan and advances comprise the largest component of the bank's asset portfolio and the predominant sources of revenue for the bank (Abdul Adzis et al., 2018; Malede, 2014). Commercial banks accept deposit from customers who have a surplus of the fund and use that fund to grant loans to the deficit unit in the financial market to enable them to embark on investment and development activities for their growth and contributing towards the economic development of a country (Abdul Adzis et al., 2018; Amano, 2014).

Commercial banks play an immense role in the growth of the economy by maintaining three main operating guiding principles, which are profitability, liquidity, and solvency (Ladime et al., 2013). However, bank loans involve a high degree of risk and have a profound impact on the bank's profitability, liquidity, and solvency (Malede, 2014). Poor management of loan portfolios is the major cause of liquidity crises and bank failures around the world. Although credit growth can spur investment and economic activity, excessive credit growth can impact the stability of the financial system by increasing prudential risks at the micro and macro levels (Timsina, 2016;; Igan & Pinheiro, 2011). Furthermore, Ezirim (2005) stated that bank lending decisions are fraught with a lot of risks, which need a great deal of caution and tact since the major risk of the banking business lies in the credit function, as there is a high possibility of default.

Moreover, whether due to lax credit standards, poor portfolio risk management, or weakness in the economy, historically loan portfolio problems have been the major cause of losses and failures for commercial banks (Vong et al., 2009). Since commercial banks are dominant in the Ethiopian financial system and perform several banking businesses like attracting all types of deposit and granting loan and advance which constitutes 95% share of assets, 97% of deposits, 94% loans and advances, and 77% equity of the financial sector on average (Kassie, 2014 and Mitku, 2014), lending decisions by banks cannot be overlooked as they are the principal providers of funds to governments, corporate bodies and individuals as a whole (stock markets are not just introduced in the financial system). Consequently, it is crucial for bank management and regulators to know the drivers of the bank lending activities and develop strategies to enhance their lending as well as improve their interest income with appropriate portfolio risk management activities and to formulate effective policies to ensure that the bank lending can continuously support the growth of the country economy. Therefore, the study of the determinants of banks lending behavior is very crucial for banks to make a more sustainable profit from the credit portfolio.

However, existing literature provides a paucity of empirical evidence on bank lending behavior in emerging markets like Ethiopia. Given this, Akinlo and Oni (2015) stated that the issue of determining factors, which may affect the level of lending, is still a subject of research and is not resolved greatly, where there are still differences between many studies in the identification of which factors have a strong impact and on the direction of those impacts if any. Thus, this work tries to fill this gap and find evidence on the determinants of bank lending behavior in Ethiopia by investigating the effect of bank-specific, industry-specific, and macroeconomic factors on Ethiopian commercial bank lending.

1.1. Limitation of the study

Even if there are 18 functional commercial banks in Ethiopia, this study considered only 15 commercial banks to investigate determinants of banks' lending based on the availability of data. This study considered only 10 variables as the determinants of commercial banks' lending whereas there could be other factors. Lack of previous research studies and accessibility of sufficient current literature on the area in the Ethiopian context was also one of the off-putting factors.

The rest of this paper is organized as follows: section two discussed the existing relevant literature. Section three indicated the data and methodology of the study. Section four presented the results and discussions, and Section five provides conclusions and recommendations, and directions for future studies.

2. Literatures review

Lending is the core function of commercial banks which is evidenced by the volume of loans that constitute banks' assets portfolio and the annual considerable raise of loan which is granted to borrowers in both private and public sectors of the economy (Abdul Adzis et al., 2018). Thus, the major portion of the gross profit of the banking industry is earned from loans in the form of interest income and contributes to the lion's share of commercial bank earnings (Abdul Adzis et al., 2018 and Vong et al., 2009). In the view of Nwankwo (2000), "credit constitutes the largest single income-earning asset in the portfolio of most banks which explains why banks spend enormous resources to estimate, monitor and manage credit quality".

Commercial banking especially lending by its nature is highly prone to unpredictability, arising from different bank-specific, regulator, and macroeconomic factors. Furthermore, Ezirim (2005) stated that bank lending decisions are fraught with a lot of risks, which need a great deal of caution and tact in this aspect of banking operations, since the major risk of the banking business lies in the credit

function, as there is a high possibility of default. Therefore, the study of the determinants of banks lending behavior is very crucial for banks to make a more sustainable profit from the credit portfolio.

Several studies have been carried out globally on the bank lending determinants, such as Olokoyo (2011) who identified the volume of deposits, investment portfolio, lending rate, cash reserve requirement ratio, and liquidity ratio as the determinants of lending behavior, Bhattarai (2016) found that bank lending is determined by investment portfolio, bank size, liquidity, and cash reserve ratio, and Timsina (2016) also found that the gross domestic product and liquidity ratio of banks have an impact on bank lending behavior in Nepal but all of them didn't show the direction of impact on banks' lending behavior. Abdul Adzis et al. (2018) investigated the determinants of commercial banks' lending and demonstrated that bank size and volume of deposit positively influence commercial bank lending, while liquidity negatively influences bank lending activities. Olaoluwa and Shomade (2017) investigated the impact of monetary policies on bank lending behavior and they revealed that exchange rate, interest rate, the volume of deposits, and reserve requirements have a significant impact on bank lending behavior.

Alkhazaleh (2017) examined factors that may drive the Jordan commercial banks lending and he found a negative effect of credit risk and liquidity on bank lending and a positive effect of the return on assets, bank size, inflation, money supply, and growth in the gross domestic product on bank lending. A study by Olusanya et al. (2012) identified foreign exchange, cash reserve ratio, GDP at market price, liquidity ratio, and volume of deposits as bank lending determinant factors, and Ajayi and Atanda (2012) also found an exchange rate and cash reserve ratio as significant variables influenced bank lending in Nigeria. Furthermore, Uyagu and Osuagwu (2015) established a negative relationship between liquidity ratios, inflation, cash reserve ratio, loan-to-deposit ratio, and commercial bank lending in Nigeria.

A study by Pham (2015) investigated determinants of bank credit and found that bank credit is enhanced by domestic liquidity and high level of interest rate while credit supply is negatively influenced by exchange rate, capital requirements ratio, nonperforming loans, and bank concentration. Thi (2015) also found that bank concentration has a negative effect on bank credit. However, Laidroo (2012) revealed that banking sector concentration positively associated with lending growth, which is contrary to his expectation but in line with the finding of Aisen and Franken (2010). Olivero et al. (2011) also investigated the impact of the level of competition in the banking sector on the lending channel of monetary policy and found that the lending channel of monetary policy is weakened as the level of competition increases. Ciro and Hincapia (2018) also examined the effect of banking concentration on the lending channel and their finding denoted that the monetary policy can affect the growth rate of loans.

The study of Matousek and Solomon (2018) revealed that bank size, liquidity, and capitalization are significant determinants of loan supply in Nigeria, and a study by Ebire and Ogunyinka (2018) also showed that real GDP and lending rate have a negative relationship with bank loans while inflation has a positive relationship with bank loans in Nigeria. On the other hand, Moussa and Chedia (2016) studied the impact of internal and external factors on Tunisian banks credit and concluded that among external factors, only inflation has a significant impact on loans, while return on assets, net interest margin, and liquidity as internal factors have a significant impact on the volume of bank loans.

Even though the empirical evidence is limited in Ethiopia, there are few studies conducted such as; Malede (2014) who found bank size, credit risk, liquidity ratio, and GDP as significant factors that determine commercial bank lending while deposit, investment, interest rate, and cash reserve ratio are insignificant factors. Temesgen (2016) revealed that liquidity ratio, the volume of deposit,

credit risk, bank capital, lending rate, and annual foreign exchange rate influenced the banks' lending behavior. Additionally, Getachew (2017) also found that Ethiopian commercial banks' lending was positively influenced by bank size, the volume of deposit, and GDP growth, and negatively influenced by cash reserves requirement and liquidity ratio. However, authors in their study failed to include the impacts of profitability, inflation, and bank concentration on Ethiopian commercial banks' lending and there are still differences between studies in the identification of which factors have a strong impact and on the direction of impacts, which initiated the researcher for further study and detailed investigation in the area.

Even though the existing literature provides a paucity of empirical evidence on commercial bank lending in Ethiopia, empirical evidence around the globe suggested that commercial bank lending is affected by internal and external factors. Thus, this study is conducted to fill this gap and find evidence on the determinants of bank lending in Ethiopia by considering bank-specific, industry-specific and macroeconomic variables such as; volumes of deposit, capital adequacy, profitability, bank size, cash required to reserve, liquidity, bank concentration, average bank lending rate, inflation, and real gross domestic product growth rate.

2.1. Determinants of bank lending and the hypothesis

Theoretically, factors affecting commercial bank lending are divided into three broad categories such as; bank-specific, industry-specific, and macroeconomic factors.

2.1.1. Bank-Specific determinants

2.1.1.1. Volume of deposit. All Banks thrive on their ability to generate income through their lending activities. The lending activity is possible only if the banks can mobilize enough funds from their customers. Since commercial banks depend on depositor's money as a source of funds, it means that there are some relationships between the ability of the banks to mobilize deposits and the amount of credit granted to the customers (Obamuyi, 2013). Thus, one of the intermediation functions of banks is the mobilization of funds from the surplus economic agents to the deficit economic agents to generate economic growth. Akinyomi and Enahoro (2014) documented that the volume of deposit has a significant and positive relationship with the bank loan and advances. Abdul Adzis et al. (2018), Getachew (2017), and Olokoyo (2011) also found that volumes of deposits have a significant positive relationship with bank lending and they suggested that commercial banks should focus on mobilizing more deposits, as it will enhance their lending performance. In other words, the higher the deposit volume, the greater the probability of granting loans and advances to prospective borrowers.

H1: The volume of deposits has a significant positive effect on bank lending

2.1.1.2. Capital adequacy. The banks' capital serves as a custom for the protection of depositors' funds. The size of capital and deposit influenced the amount of risk that a bank can afford. Thus, capital adequacy ensures the availability of funds and strength to lend hence the ability to give more loans at a competitive interest rate, and thus the regulators should ensure banks have adequate capital (Itimu & Abdul, 2018). Many empirical studies have examined the effect of bank capital on lending, with most indicating a positive effect such as Ebire and Ogunyinka (2018) and Karmakar and Mok (2013) found a positive relationship between bank capital and bank lending behavior. Berrospide and Edge (2010) and Carlson et al. (2013) also documented a positive effect of bank capital on bank lending. Thus, can be concluded that there is a positive relationship between bank capital and lending. On the other side, a relatively large capital structure can make loans of longer maturities and greater credit risk and Temesgen (2016) found a negative effect of bank capital on loans and advances.

H2: Capital adequacy has a significant positive effect on bank lending

2.1.1.3. Profitability. Profitability is the capacity of a firm to make a profit, and profit is what is left over from income earned after all costs and expenses related to earning the income deducted. Thus, the profitability ratio is considered a good indicator to evaluate the profitability of a bank. Theoretically, profitable banks can provide more loans to the customer and generate income in return. Alkhazaleh (2017) and Moussa and Chedia (2016) found the return on assets has a positive impact on the volume of bank lending. Rossi et al. (2019), Dang (2019), and Antoni and Nasri (2015) provide empirical evidence that there is a positive relationship between loan growth and profitability.

H3: Profitability has a significant positive effect on bank lending

2.1.1.4. Bank size. The bank size is used to measure the bank lending as it shows the economics of scale enjoyed by the bank (Chernykh & Theodossiou, 2011). According to Bashir (2003) large-sized banks have the advantage of providing a larger menu of financial services to their customers and thereby mobilize more funds. Salas and Saurina (2002) asserted that a big balance sheet allows managers to invest in different geographical or business segments to deal with asymmetric shocks. On the other side, Berger and Udell (2006) provide that large and complex banks tend to lend few loans to small-scale firms. Stein (2000) explains that small banks have comparative advantages in producing soft information whereas large banks also have comparative advantages in lending based on hard information. Rabab'ah (2015) who investigated commercial bank lending concluded that bigger banks tend to provide higher credit facilities to the public. Malede (2014) and Amidu (2014) also claim that bank size positively influences bank lending.

H4: Bank size has a significant positive effect on bank lending

2.1.1.5. Liquidity. Liquidity describes the ability of a bank to convert its assets into cash with minimum losses (Mac Donald & Koch, 2006) and used to determine the effect of the portion of liquid assets held by the bank against the commercial bank lending (Rabab'ah, 2015). Theoretically, the high proportion of liquid assets held by the bank will directly reduce the funds available for loans. Since loans are illiquid assets, an increase in the volume of loans and advances means an increase in illiquid assets in the asset portfolio of a bank. Rabab'ah (2015) found that the high liquidity maintained by the bank will reduce the ability of the bank to grant a loan to the public. Sarath and Pham (2015) concluded that higher liquidity held by the bank negatively affects bank lending. Furthermore, studies by (Moussa & Chedia, 2016; Amidu, 2014) also provide substantial evidence that liquidity influenced bank lending negatively.

H5: Liquidity has a significant negative effect on bank lending

2.1.2. Industry-Specific Determinants

2.1.2.1. Cash Reserve Requirement. The cash reserve requirement is one of the monetary policy instruments used by the Central Bank to manage the liquidity and credit creation in the banking system (Medina Guzman & Roldos, 2014). Theoretically, central banks raise reserve requirements to contain credit growth in the boom part of the business cycle to counteract financial imbalances in the economy or an economic downturn, they can lower reserve requirements to enable banks to utilize reserve to extend more credit to nonfinancial businesses. Cargill and Mayer (2006) investigated the effect of reserve requirement on bank lending and found that cash reserve requirement tends to negatively influence bank lending. Koray et al., (2016), Glocker & Towbin, (2012) and

Montoro and Moreno (2011) indicated that an increase in reserve requirement leads to a decreased bank credit. However, Richard and Okoye (2014), Olumuyiwa et al. (2012), and Olusanya et al. (2012) found that cash reserve requirement has a positive impact on the volume of bank loans and advances.

H6: Cash reserve required has a significant negative effect on bank lending

2.1.2.2. Bank concentration. Concentration is a measure of subject participation in cumulative sales, assets, or market share and it is usually determined by the number of companies in an industry and by their relative size (Zingales & Rajan, 2003). The market share of each bank is measured by the ratio of the bank's total assets to the total assets of all banks (Gajurel & Pradhan, 2012). The importance of concentration in the banking sector is reflected in its impact on competition, efficiency, and profitability. Theoretically, an increased level of concentration in the banking sector will increase competition and lower profitability that reduced the lending channel of monetary policy as well as associated with reductions in the flow of bank capital to construction and land development loans, the highest-risk category of commercial bank loans which in turn it can affect the growth rate of loans. Furthermore, the central bank loses degrees of freedom to affect the growth rate of bank loans in a greater concentration scenario and banks size mitigates the monetary policy shock. Thi (2015) identified the determinants of bank lending and found that bank concentration has a negative effect on bank credit. Ciro and Hincapia (2018) and Olivero et al. (2011) also showed that the lending channel of monetary policy is weakened as the level of competition increased. However, Laidroo (2012) and Aisen and Franken (2010) revealed that the banking sector concentration is positively associated with lending growth.

H7: Bank concentration has a significant negative effect on bank lending

2.1.2.3. Average lending rate. The lending rate refers to the interest rate charged by the banks to its customers and it provides the most significant sources of income for the banks (Moussa & Chedia, 2016). Moreover, it is one of the monetary policy instruments used by the Central Bank to control the liquidity in the financial market. Theoretically, a high-interest rate negatively affects the demand for a loan because only limited borrowers with high-risk projects may have their demand satisfied. Amano (2014) concluded that the lending rate tends to negatively affect bank lending. Thus, a high interest rate negatively affects the demand of the public to borrow money from banks because it increases the financial cost of the borrowers. If the central bank reduces the rate, banks become reluctant to provide loans to firms and vice versa (McKinnon, 2009). On the other hand, Richard and Okoye (2014) and Swamy (2012) found that the higher interest rate tends to increase the volume of loans and advances granted by banks.

H8: Average lending rate has a significant negative effect on bank lending

2.1.3. Macroeconomic determinants

2.1.3.1. Gross domestic product. The real gross domestic product is the measure of total economic activity within the economy and commonly used economic indicator. Logically, a strong economic condition creates more demand for goods and services, which leads to more investment in different sectors, hence increase the per capita income as well as the savings, collectively these factors convince banks to issue more credit private. Amidu (2014) also documented that when the gross domestic product increases, it will lead to the increment of bank lending. Rabab'ah (2015) pointed out that the higher rate of economic growth leads to an increased proportion of credit facilities. Similarly, Al-Kilani and Kaddumi (2015) found that gross domestic product has a positive significant effect on bank lending. On the other hand, Moussa and Chedia (2016) investigated the

determinants of bank lending in Tunisia and contend that the gross domestic product has a negative relationship with bank lending.

H9: Real gross domestic product has a significant positive effect on bank lending

2.1.3.2. Inflation rate. The inflation rate is a reduction in the purchasing power of a currency resulted from a general and sustained increase in the general price level of all goods and services in an economy usually expressed as an annual percentage change of consumer price index. When inflation increases, banks also increase their cost of credit to keep the space with inflation, which will result in an increased lending rate in the country (Banda, 2010). Thus, as inflation increases beyond some point, it results in a decrease in bank lending. Uyagu and Osuagwu (2015) found a negative relationship between inflation and bank lending. Taner (2000) study on the effects of inflation uncertainty on credit markets reveals that unpredictable inflation raises interest rates, decreases loan supply, and affects loan demand. This, therefore, suggested that an increase in inflation may raise the bank lending rates and reduce customer's demand for credit. On the other side, Alkhazaleh (2017) found that inflation has a positive relationship with bank lending.

H10: Inflation rate has a significant negative effect on bank lending

3. Data and methodology

This study attempted to investigate the determinants that affect commercial bank lending in Ethiopia. In light of the research objective, the hypotheses developed and the quantitative nature of the data, this study employed a quantitative approach to identify the determinants that affect commercial bank lending. Accordingly, this study adopted an explanatory research design to examine the cause and effect relationships between bank lending and their determinant variables.

From the total population of 18 commercial banks in Ethiopia, 15 commercial banks that have 9 years of audited financial data from 2011 to 2019 are considered as a sample purposively. The study used secondary data which includes the annual financial reports, mainly balance sheets and income statements of commercial banks under study. The data were balanced panel data, which captured both cross-sectional and time-series behaviors simultaneously.

3.1. Methods of data analysis

The study used both descriptive statistics and econometric tools to analyze the data. The former one includes simple descriptive methods such as, mean, maximum, minimum, standard deviations, and others that enable to better understand the existing situation and analyze the general trends of the data. The study substantiated the descriptive analysis by manipulating econometric models to examine causation between the explanatory and dependent variables. In this regard, the study employed the Random Effect Model to identify determinants that significantly affect commercial bank lending.

3.2. Definition and measurements of variables

3.2.1. Dependent variable

In this study bank lending (loans and advances) has been used as a dependent variable. Lending which may be on a short term, medium, or long-term basis is one of the services that commercial banks usually render to their customers (individuals, business organizations as well as government) to enable them to embark on developmental activities as a means of aiding their growth and contributing towards the economic development of a country in general (Iwedi & Onuegbu, 2014). In this study, bank lending is measured using the logarithm of total loan and advance as

a proxy of lending or loan and advance and used by (Getachew, 2017) and (Amano, 2014). It demonstrates the size of loans and advances granted by the banks to the public.

3.2.2. Independent variables

Depending on the research hypothesis and literature reviewed, the explanatory variables used in this study to determine the commercial banks lending in Ethiopia are bank-specific factors (such as deposit, capital adequacy, profitability, bank size, and liquidity), industry-specific factors (such as average lending rate, cash reserve requirement, and bank concentration) and macroeconomic factors (such as real GDP growth rate and inflation rate). Those variables are used with different combinations and reported as significant factors that determine bank lending by various studies (Ebire & Ogunyinka, 2018; Olaoluwa and Shomade, 2017; Bhattarai, 2016; Temesgen, 2016; Malede, 2014). Table 1 presents the summary of variables and their expected effect on commercial bank lending.

Table 1. Summary of variables and their expected relationship			
Variables	Measurement/proxies	Notation	Expected Effect
Bank Lending	Natural Logarithm of Loans and Advances	LEN	NA
Independent Variables (bank-specific Factors)			
Volumes of Deposit	Deposit/Total Asset	DEPO	+
Capital Adequacy	Total Equity/Total Asset	CA	+
Profitability	Net Income/Total Asset	ROA	+
Bank Size	Natural Logarithm of Total Asset	Size	+
Liquidity	Liquid Asset/Total Asset	LIQ	-
Independent Variable (Industry-specific Factor)			
Cash Reserve Required	Cash Required Reserve/Total Asset	CRR	-
Bank Concentration	Total Asset of ⁱ th Bank/ Total Asset of Banking Industry	BC	+
Average Lending Rate	National Bank Reference Average Lending Rate	ALR	-
Independent Variables (Macroeconomic Factors)			
The real GDP growth rate	The annual real Growth rate of gross domestic product	GDP	+
Inflation Rate	The annual general consumer price index	INF	-

Source: Developed based on the literature

To identify the effect of determinant variables on Commercial Banks lending this study formulated the following econometric model:

$$LEN_{it} = \alpha + \beta_1(PO)_{it} + \beta_2(CA)_{it} + \beta_3(ROA)_{it} + \beta_4(Size)_{it} + \beta_6(LIQ)_{it} + \beta_5(CRR)_{it} + \beta_7(BC)_{it} + \beta_8(ALR)_{it} + \beta_{10}(GDP)_{it} + \beta_9(INF)_{it} + \varepsilon_{it} \dots \quad (1)$$

Where, LEN is the Lending, DEPO is the Deposit, CA is the Capital Adequacy, ROA is the Return on Asset, Size is the Bank Size, LIQ is the Liquidity, CRR is the Cash Reserve Required, BC is the Bank Concentration, ALR is the Average Lending Rate, GDP is the Real Gross Domestic Product and INF is the Inflation and i is the ⁱth Banks, t is the time, $\theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_6, \theta_7, \theta_8, \theta_9$ and θ_{10} are the coefficients for each explanatory variables in the model, ε_{it} is the error term.

4. Result and discussion

4.1. Descriptive analysis

The dependent variable is loan and advance measured by Log of loan and advance. According to Table 2, the average value of bank lending is 9.725 equal to 5.3 Billion Ethiopian Birr, which is the average loans and advances given by sampled commercial banks to their borrowers during the study period. The maximum and minimum loans and advance have given during the study period were 11.42 (266 Billion Ethiopian Birr) and 8.18 (152 Ethiopian Million Birr), respectively with the standard deviation value of 0.66 in its natural logarithm implying that Commercial Banks in the sample varying in loans and advance size during the study period.

Table 2. Descriptive statistics for the variables

Variable	Obs = 135	Mean	Std. Dev.	Min	Max
LEN		9.725	0.6653	8.1845	11.4252
DEPO		0.7127	0.1565	0.0984	0.9276
CA		0.1621	0.1034	0.0755	0.9945
ROA		0.2417	0.0878	-0.0826	0.5754
Size		10.0555	0.6261	8.0721	11.7453
CRR		0.0223	0.0105	0.0019	0.0458
LIQ		0.2537	0.1562	0.0583	0.8760
BC		0.0072	0.0176	0.00002	0.1104
ALR		0.1243	0.0067	0.1188	0.135
INF		0.1398	0.0792	0.074	0.341
GDP		0.095	0.0116	0.077	0.114

Source: Own computation, 2020

Regarding explanatory variables, the average value of volumes of deposit (DEPO) is 0.71, which revealed that on average 70% of the total bank asset was financed by customers deposit which ranges from a minimum of 0.09 (9%) to a maximum of 0.92 (92%) with a standard deviation of 0.15. The average value of capital adequacy (CA) is 0.16, which showed that 0.16 cents of one birr asset were financed by shareholders equity with a minimum value of 0.03 (0.3 cents) to a maximum value of 0.99 (0.99 cents) and a standard deviation of 0.08. The average value of profitability (ROA) is 0.24, which indicated that 0.24 cents after tax was generated from one birr investment on bank assets. The profitability of banks ranges from -0.08 (-8 cents) of minimum value to 0.57(57 cents) of maximum values with a standard deviation of 0.08. The sizes of sampled commercial banks, measured by the natural logarithm of total asset, ranges from a minimum value of 8.07 (118 Million Ethiopian Birr) to a maximum value of 11.74 (549 Billion Ethiopian Birr) with an average value of 10.05 (11 Billion Ethiopian Birr). The average value of cash reserve requirement is 0.02, which shows that the average amount of legal reserve required by the National Bank of Ethiopia was 2% of the bank's total asset which ranges from 0.0019 (0.19%) to 0.04 (4%). The average value of liquidity is 0.25 (25%), which portrayed that on average the sampled Ethiopian Commercial Banks have a higher liquidity position which was above the statutory requirement of 15% NBE Directive N° SBB/57/2014 which range from 5% to 87% with 15% deviation from the mean value. The average value of bank concentration is 0.007, which showed the existence of a lower (0.7%) concentration of the banking industry in Ethiopia. The average lending interest rate is 0.12 (12%) and the minimum and maximum lending rate ranged from 0.11 (11%) to 0.13 (13%). Currently, the lending rate is fully

liberalized, thus banks determine the lending rates by considering the loan type and their target customer. Likewise, the average value of the real gross domestic product (GDP) is 0.09, which confirmed that on average the real gross domestic product growth rate was 9% with a minimum value of 0.07 (7%) and a maximum value of 0.11 (11%). Likewise, the average value of the inflation rate was 0.13, which indicated that the general inflation rate of the country was 13% with a minimum value of 0.07 (7%) and a maximum value of 0.34 (34%) during the study period.

4.2. Regression results and discussions

Table 3 presents the model results to identify the determinants of commercial bank lending in Ethiopia. The variables included in the model explained about 98% of the total variation of bank lending scores which is reasonably a good fit. This implied that the bank-specific, industry-specific and macroeconomic variables (such as deposit, capital adequacy, bank size, cash reserve requirements, bank concentration, average lending rate, and real gross domestic product) jointly explained about 98% of the total variation in the bank lending.

Table 3. Random effect model for identifying determinants of LEN

Explanatory Variables	Coefficient	Std. Err.	Z-value
DEPO	0.1569***	0.0701	2.24
CA	0.6917***	0.1211	5.71
ROA	-0.1489	0.1155	-1.29
Size	1.1872***	0.0359	33.06
CRR	-3.7230***	1.2093	-3.08
LIQ	-0.0685	0.0765	-0.89
BC	-5.7149***	1.1003	-5.19
ALR	-4.6694***	2.0718	-2.25
INF	-0.1833	0.1303	-1.41
GDP	-2.4634***	1.0988	-2.24
_cons	-1.4191	0.4278	-3.32
R2 Within	0.9753	sigma_u	0.0000
R2 Between	0.9952	sigma_e	.09368
R2 Overall	0.9808	Prob > chi2	0.0000

***and ** implies significance at a 1 and 5% level of significance, respectively.

Source: Own computation, 2020

The model result of the study indicated that bank-specific factors such as; volumes of deposit, capital adequacy, and bank size have a positive and statistically significant effect on commercial bank lending. On the other hand, industry-specific factors such as; cash reserve requirement, bank concentration, average lending rate have a negative and statistically significant effect on commercial bank lending. Moreover, one of the macroeconomic variables gross domestic products has a negative and statistically significant effect on the commercial banks lending as to the model result in Table 3.

The model result revealed that the volume of deposits has a positive and statistically significant effect on bank lending. The result indicated that holding all the other variables constant, an increase in volumes of deposits by one unit causes increased bank loans and advances by 0.15 cents. The result confirms the prior expectation that the higher the volume of deposit the higher the bank loans and advances. Based on the findings, the study failed to reject hypothesis number one namely volumes of

deposit has a positive effect on bank lending. The result is consistent with the findings of Abdul Adzis et al. (2018), Getachew (2017), Al-Kilani and Kaddumi (2015), Malede (2014), and Akinyomi and Enahoro (2014) who found that volumes of deposit have a positive effect on bank lending. However, Alkhazaleh (2017) found that the deposit has a negative effect on the level of bank lending. Generally, it can be concluded that the higher the capabilities of commercial banks to attract more deposits from their customers leads to the higher the ability of commercial banks to grant loans and advances to the public.

The study result showed that capital adequacy has a positive and statistically significant effect on bank lending, which depicted that holding all the other variables constant, an increase in capital adequacy by one unit leads to increased bank lending by 0.69 cents. The result is in line with the prior expectation that, the higher the banks capital the higher the bank loans and advances. Based on the findings, the study failed to reject hypothesis number two namely capital adequacy has a positive effect on bank lending. The result is consistent with the findings of Ebire and Ogunyinka (2018), Karmakar and Mok (2013), Carlson et al. (2013), Chernykh and Theodossiou (2011), and Berrospide and Edge (2010) who found a positive impact of bank capital on bank lending behavior but against the finding of Temesgen (2016) found a negative impact of bank capital on bank lending. Thus, it can be concluded that the size of bank capital improved the volumes of bank loans and advances.

Bank size has a positive and statistically significant effect on bank lending. The beta coefficient of bank size (1.1872) depicted that, holding all the other variables constant, an increase in size by one unit cause an increase in bank lending by 0.18 cents. The result is in line with the prior expectation and the hypothesis developed by the researcher, as a result, the study failed to reject hypothesis number four namely bank size has a positive effect on bank lending. The study result is inconsistent with the findings of Abdul Adzis et al. (2018), Alkhazaleh (2017), and Malede (2014) who established a positive relationship between bank size and bank lending. Based on the result, it can be concluded that the larger the bank size, the more commercial banks' ability to hold loanable funds to lend to their customers.

The model result indicated that cash reserve requirement has a negative and statistically significant effect on bank lending. This demonstrated that the higher the reserve requirements from the central bank, the lower the volumes of loans and advances a bank is willing to give to the public. The result indicated that holding all the other variables constant, an increase in cash reserve requirement by one unit causes decreased bank lending by 3 birr and 72 cents. Based on the findings, the study failed to reject hypothesis number five namely cash reserve requirement has a negative effect on bank lending. The result is similar to the findings of Koray et al. (2016), Amano (2014), Glocker & Towbin, (2012), and Montoro and Moreno (2011) who concluded that an increase in cash reserve requirement decreased bank credit. However, Richard and Okoye (2014), Olumuyiwa et al. (2012), and Olusanya et al. (2012) established a positive relationship between cash reserve requirement and bank lending. The regression output implied that the cash reserve requirement set by the regulatory body, NBE affects commercial bank's loans and advances negatively.

Bank concentration has a negative and statistically significant effect on bank lending. This result proved that an increase in bank concentration leads to decreased bank lending implied that countries with a more concentrated banking industry displayed smaller growth rates of bank credit (Beck et al., 2000). The result is in line with the prior expectation and the hypothesis developed by the researcher, as a result, the study failed to reject hypothesis number seven namely bank concentration has a negative effect on bank lending. The result is consistent with the findings of Ciro and Hincapia (2018), Thi (2015), Pham (2015), Olivero et al. (2011), and Bergstresser (2008) who found that bank concentration has a negative effect on bank lending. However, the result is against the finding of Laidroo (2012) and Aisen and Franken (2010) who established a positive relationship between bank concentration and bank lending.

The model result revealed that the average lending rate has a negative and statistically significant effect on commercial banks' lending. The result indicated that holding all the other variables constant, an increase in lending rate by one unit causes decreased bank lending by 4 Birr and 66 cents. Based on the findings, it is in line with prior expectation and the study failed to reject hypothesis number eight namely lending rate has a negative effect on bank lending. The result is consistent with the findings of Berhanu (2016) and Amano (2014) who established a negative relationship between the lending rate and bank lending. However, the result is against the findings of Assefa (2014) and Richard and Okoye (2014) who established a positive relationship between the lending rate and bank lending. Hence, it can be concluded that a high interest rate negatively affects the demand of the public to borrow as it reduced bank lending because it increases the financial cost of the borrowers.

Furthermore, real gross domestic product as a measure of total economic activity within the economy has a negative and statistically significant effect on bank lending. The result portrayed that an increase in GDP leads to decreased bank lending, which is against the prior expectation. Based on the findings, the study rejects hypothesis number nine namely real gross domestic product has a positive effect on bank lending, which means that data did not support the hypothesis. The result is consistent with the finding of Moussa and Chedia (2016) who found that gross domestic product has a negative effect on bank lending. However, the result is against the finding of Al-Kilani and Kaddumi (2015) and Rabab'ah (2015) who claimed that when the gross domestic product increases, it will lead to the increment of bank lending.

However, the model result of the study indicated that profitability, liquidity, and inflation rate have a negative and statistically insignificant effect on commercial bank lending as of Table 3. This result suggested that there is no evidence to support the influence of profitability, liquidity, and inflation rate on commercial bank lending in Ethiopia. Theoretically, it is expected that profitable banks can provide more loans to the customer. One of the plausible explanations regarding the negative and insignificant effect of profitability on banks lending could be the commercial banks in Ethiopia might not rely too much on their profitability as a criterion to evaluate their loan application from the public rather mostly depend on the repayment capacity of the borrowers and the volume of deposit available for loan. This result is against the findings of Rossi et al. (2019), Dang (2019), and Alkhazaleh (2017) established a positive relationship between loan growth and profitability. Theoretically, the high proportion of liquid assets held by the bank will directly reduce the funds available for loans. Even though liquidity is statistically insignificant it has a negative relationship with bank lending which is in line with the prior expectation and the findings of Moussa and Chedia (2016), Rabab'ah (2015), and Sarath and Pham (2015) found that the high liquidity maintained by the bank will reduce the ability of the bank to grant a loan to the public. Finally, the study result suggested that an increase in inflation reduces customer's demand for credit which is in line with the prior expectation and findings of Uyagu and Osuagwu (2015) found a negative relationship between inflation and bank lending. One of the plausible explanations regarding the insignificant effect of inflation on banks lending could be the different regulatory measures taken by the National Bank of Ethiopia that help to control the impact of inflation on Ethiopian commercial Banks lending activity.

5. Conclusions and recommendations

The main objective of the study was to identify the bank-specific, industry-specific and macro-economic factors that affect Ethiopian commercial bank lending during the period from 2011 to 2019. Based on the findings from the descriptive analysis, the average value of banks lending is 9.725 on its log value which is equal to 5.3 Billion Ethiopian Birr, which indicated that the sampled commercial banks on average given 5.3 Billion Ethiopian Birr loans and advances to their borrowers during the study period.

The model result of the study indicated that bank-specific factors such as; volumes of deposit, capital adequacy, and bank size have a positive and statistically significant impact on commercial bank lending. On the other hand, industry-specific factors such as; cash reserve requirement, bank concentration, average lending rate have a negative and statistically significant impact on commercial bank lending. Likewise, one of the macroeconomic variables gross domestic products has a negative and statistically significant impact on commercial bank lending.

Based on the findings, the study forwarded the following operational and policy recommendations to improve commercial bank lending.

Ethiopian commercial banks' should enhance their strategies to attract and retain more deposits from the public to obtain more funds to facilitate their lending activities through creating awareness, improving their service excellences, branch expansion, and using new banking technology. Since the higher the capabilities of banks to attract more deposits, the higher will be the ability for the banks to grant loans and advances to the public.

Commercial banks have to strengthen their capital to improve the volumes of loans and advances available by selling the additional share to existing shareholders and new entrants into the banking industry investment and improving their fee-based income by introducing innovative products and services for example, mobile banking.

Even if regulatory measures are taken by the central bank (NBE) to control the economy as a whole and to maintain the soundness and stability of the financial sector, there should be closer consultation and cooperation between banks and the regulatory authorities at the stage of policy formulation to take into account the effect of the regulatory measure on banks' lending, as the industry-specific variables included in the study has an adverse impact on commercial banks lending ability.

The study is also recommended for further study: there have to be further researches including more bank-specific, industry-specific, and macroeconomic variables that affect Ethiopian commercial bank lending.

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Appendix1 Multi-collinearity test for LEN

Variable	VIF	1/VIF
Size	7.37	0.135646
BC	5.48	0.182390
ALR	2.81	0.356122
CRR	2.37	0.422592
GDP	2.36	0.424129
CA	2.29	0.437512
LIQ	2.09	0.479512
DEPO	1.76	0.569357
INF	1.55	0.643862
ROA	1.50	0.666227
Mean VIF	2.96	

Appendix2 Heteroskedasticity test

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of LEN2
chi2(1) = 0.00
Prob > chi2 = 0.9560

Appendix3 Model specification test for LEN

Breusch and Pagan Lagrangian multiplier test for random effects	
	$LEN2[YEAR,t] = Xb + u[YEAR] + e[YEAR,t]$
	Estimated results:
	Var sd = sqrt(Var)
	LEN 0.4425857 0.6652711
	e 0.0087768 0.0936844
	u 0 0
	Test: Var(u) = 0
	chibar2(01) = 0.00
	Prob > chibar2 = 1.0000



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