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FINANCIAL ECONOMICS | RESEARCH ARTICLE

Capital structure and profitability: Panel data evidence of private banks in Ethiopia

Zemenu Amare Ayalew^{1*}

Abstract: The paper primarily studied the empirical relationship between capital structure, as measured by total and short-term debt ratios, and profitability of private banks in Ethiopia, for the period 2013/14 to 2018/19, using panel fixed effects. A survey of 16 private banks are included in the study. Based on the regression analysis results, capital structure variables and some bank-specific characteristics explain a substantial part of the variations in bank profitability. Higher profitability measures of ROA and net interest margin tend to be associated with relatively higher total and short-term debt ratios, loan to deposit ratios, and credit risks. Besides, older banks are in a better position than younger counterparts in terms of profitability. The impact of size is found to be significantly negative, at least for the ROA model, implying that Ethiopian private banks are operating below their optimal capacity. Mixed results were found pertaining the coefficient estimates of cos-income ratio and employee productivity.

Subjects: Economics; Economic Theory & Philosophy; Finance; Business, Management and Accounting

Keywords: Capital Structure; Profitability; Panel Data; Fixed Effects; Private Banks

1. Introduction

Every business firm aims to maximize the wealth of shareholders as measured by the firm's outstanding market price or shareholders' return. To achieve this intended objective, the management of a firm makes various decisions; one is setting an optimal level of capital, which may in turn minimize the cost of financing, thereby maximizes the firms' value and shareholders' wealth (Frank & Goyal, 2009; Le & Phan, 2017). To this end, firm management's ability in addressing the issue of the optimal level of capital structure is imperative.

ABOUT THE AUTHOR

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PUBLIC INTEREST STATEMENT

The main purpose of the study was to identify the empirical relationship between capital structure and performance in the Ethiopian banking industry. This study has a wide range of significance to various parties. First, it proved relevant policy information to the central bank regarding the regulatory interventions in capital requirement. Second, the study will help private commercial banks to highlight the mix of capital and leverage they need to remain profitable in the industry. Thirdly, it can also serve as a base for further research and a reference for those researchers who wanted to conduct scholarly studies in the area.

After the pioneering but “impractical” work (as quoted by most studies) of Modigliani and Miller (1958)—M&M hereafter, abundant literatures were published in the academia and business eco-sphere as to capital structure and firm-level profitability, applied to different sectors and methods. The impracticality of the M&M first proposition is may be due to their unlikely assumptions of perfect capital markets, investors’ homogenous expectations, and tax-free economy (Abdullah & Tursoy, 2019; Yao et al., 2018). M&M later modified their original study by incorporating a tax variable in the model, which provides a new thought in corporate finance theory called “tax shield advantage” of debt financing (Modigliani & Miller, 1963), while their original sentiment remains unchanged in the frictionless capital market. Miller (1977) again questioned the tax shield advantage of debt by considering time serious trend in corporate firm’s debt level against corporate income tax in the USA and introduced the personal income tax rate from capital gains to challenge the tax shield advantage hypothesis of debt financing proposed by Modigliani and Miller (1963). Subsequently, Warner (1977) and Smith and Warner (1979) referring bankruptcy costs related to debt financing; Jensen and Meckling (1976) and Jensen (1986) taking into account agency cost theory of free cash flows; and Myers and Majluf (1984) and Myers (1984) assuming asymmetric information in the capital market, made efforts to justify the impact of capital structure decisions and leverage on the firms’ value. Since then, pieces of literature provide inconclusive results about the impact of leverage on firm profitability. Consequently, ambiguity in research findings resulted in absence of unique methodology to determine the optimal mix of debt and equity (Salim & Yadav, 2012).

To the best of the researcher knowledge upon review, the only studies which directly deal with the impact of capital structure on bank profitability in Ethiopia are Rao and Lakew (2012), Lelissa (2014), and Hailu (2015),¹ and Birru (2016). Lelissa (2014) used panel data set, simply applying OLS estimation without considering the appropriate tests for the most frequently used panel data models, fixed and random effect models. Rao and Lakew (2012), on the other hand, consider the capital adequacy ratio as a proxy of the capital structure of banks. To break down the capital structure components into the short-term and long-term, however, it will be worthwhile to consider debt ratios rather than capital adequacy measures (Sufian, 2011). Besides, all the studies used the traditional measures of profitability: return on asset (ROA) and return on equity (ROE). Amid the fact that commercial banks in Ethiopia garner large proportion earning from interest income. Thus, employing net interest margins (NIM) as an additional measure of profitability will increase the credibility of the study. The study has also used average asset values to calculate ROA, ROE and NIM to make adjustments for the prevailing risk factors. Moreover, almost all studies include the state giant commercial bank, CBE, which would probably create an outlier in the dataset while this study focused on private banks only.

Thus, this study mainly tried to empirically test the relationship between capital structure and bank-level performance as measured by profitability indicators of ROA and net interest margin per asset (NIMA), calculated using average asset, for 16 registered Ethiopian private commercial banks using balanced panel data from the period 2013 to 2019. The study tried to empirically seek answers to the following research questions: (1) how capital structure and profitability of the Ethiopian private banks evolve through time; (2) does the level of financial leverage affects the Ethiopian private banks’ profitability; and (3) are there other factors than leverage which affect the profitability of private banks in Ethiopia. The findings of the study indicated that capital structure variables and some bank-specific characteristics explain a substantial part of the variations in bank profitability. Higher profitability measures of ROA and net interest margin tend to be associated with relatively higher total and short-term debt ratios, loan to deposit ratios, and credit risks. Older banks are found to be more profitable than younger counterparts. The impact of size is found to be significantly negative implying that Ethiopian private banks are operating under their optimal capacity.

The rest of the study is organized as follows: the second section summarizes theoretical and empirical literatures pertaining to the impact of capital structure on firm profitability. The third section deals with data and methodology. Section 4 deals with data analysis and discussions; followed by concluding remarks, some policy recommendations, and suggestions for future research.

2. Literature review

2.1. Theoretical reviews

The theoretical and empirical debate on the role of capital structure on firms' value began after the "irrelevance propositions" of Modigliani and Miller (1958). While studies quoted the M&M model as irrelevant (Eckbo, 1986; Smith & Warner, 1979), probably due to unrealistic assumptions incorporated in their thesis, all argued that the MM's pioneering propositions are novel and the catalyst for subsequent discussion, debates, and researches in corporate finance. This is because the "modern" theory of capital structure and firm performance showed remarkable progress after the works of M&M (Myers, 2001). As Myers (2001) pointed out the M&M propositions often used as benchmarks in the capital structure literature.

Later, M&M issued a correction paper relaxing one of the assumptions of their original work, absence of the corporate tax. Through this, they came up with new thinking in corporate finance theory in which debt has an advantage over equity due to its "tax shield advantage" (Modigliani & Miller, 1963). Their conclusion was, however, similar to Modigliani and Miller (1958) in a frictionless economy. Subsequently, in an independent study, Miller (1977) questioned firm value enhancement impact of debt financing over equity by looking over the trends of firm value and corporate tax rates and incorporating the income tax effect of capital gains along with corporate taxes in the model for the US corporate firms. Subsequently, relaxing some of the assumptions made by the authors, plenty of researches were done in giving support or criticism the original work of M&M.

Following these, different theories of capital structure and its effect on firm performance have been forwarded. According to Harris and Raviv (1991), the bulk of capital structure theories focused on relaxing the assumptions of the M&M original model; corporate and personal taxes, agency costs, asymmetric information, product/input market interaction, and corporate control considerations. Below, the study presents some of the literatures on alternative theories of capital structure.

2.1.1. Tax and capital structure

In the Modigliani and Miller (1958, 1963) propositions, corporate financial decisions are irrelevant in frictionless world. One of the assumptions in the M&M proposition was the absence of the corporate tax. In most economies, however, corporate firms are subject to taxes while interest is a tax-deductible expense and sometimes the interest tax shield due to debt financing could be large (Myers, 2001). The general hypothesis is that firms operate in high tax rate economies peruse financing policies that provide tax benefits to them (Graham, 2006).

2.1.2. Bankruptcy cost approach

If the tax benefit of debt financing is real, it signals that firms could increase their value by using more debt in their capital mix. But, this line of argument doesn't tell us the extent to which that firms are going to employ debt over equity in their financing strategy. This leads to the emergence of another theory in the capital structure literature; the static trade-off or bankruptcy cost theory. The trade-off theory favors moderate debt ratios. This theory emphasized on the need to limit firms' borrowing to the point where the marginal value of tax shields on additional debt is just offset by the increase in the present value of possible costs of financial distress (Myers, 2001). Miller (1977) also tried to show the tradeoff theory including personal tax on capital gains which offsets the tax benefit of debt. Thus, bankruptcy cost or financial distress is one factor which prevents firms from using excessive debt which probably results a trade-off between the tax benefit and the possibility of bankruptcy due to debt financing (Barclay et al., 1995).

2.1.3. The agency cost theory

Due to separations of ownership and control for the corporate type of firms, agency problem arises between the managers and shareholders and sometimes between shareholders and creditors (Jensen & Meckling, 1976). The conflict between shareholders and managers arises since managers are entitled to the fraction of the marginal gains in firm value out of their investment

decision. Thus, managers may spend shareholders' money to their ends. On the other hand, since debt financing committed the firm to make out regular cash payments to the debtors, it decreases the "free cash" available to managers (Harris & Raviv, 1991). This is one of the benefits of debt financing which resolves the conflict of interest between managers and shareholders. Barclay et al. (1995) have also argued paying dividends and using debt rather than equity reduces the agency cost of equity. Besides, the conflict of interest between shareholders and creditors arises because debt gives equity holders an incentive to invest the debt holder's money sub-optimally in high-risk projects (Harris & Raviv, 1991). Thus, an optimal capital structure can be obtained by trading off the agency cost of debt against its tax benefit (Jensen & Meckling, 1976).

2.1.4. *The pecking order theory*

In viewing information asymmetry between investors and firm managers, Myers and Majluf (1984) and Myers (1984) came up with a new theory of capital structure, the pecking order theory. The pecking order theory insists firms first to use their internal sources (retained earnings) and then debt. According to this theory, issuing equity is the last resort. Myers and Majluf (1984) expressed the logic behind the pecking order theory as "a firm with ample financial slacks (retained earnings) or the ability to issue default-risk free debt securities would take all NPV investment projects and it will prefer debt over equity if external finance is needed". The theory maintains that when firms become more profitable, the amount of financing from debt decreases as retained earnings from the higher profit takes precedence over debt for maximizing the firm's value. It is only upon the event of insufficient retained earnings that firms decide to finance their investment through debt and if further financing is needed, they would sell new shares. The theory, as the name indicates, asserts that firms order their financing options, from the less risky low-cost retained earnings to the riskier and moderately costly debt, and finally to the riskiest and highly costly new equity issue (Uremadu, 2012). The pecking order theory is empirically justified by Shyam-Sunder and Myers (2001), Atiyet (2012) while Frank and Goyal (2003) are unable to find any empirical explanation for the theory.

2.1.5. *The information signaling theory*

Obviously, it is logical to assume in such a way that managers have better information about the value of the firm than either shareholders or creditors. As Barclay et al. (1995) and Dierkens (1991) indicated managers spend much of their time in analyzing the firms' product, marketing, strategies, and investment opportunities, which leads to the rise to information asymmetry between the investors and managers. The information asymmetry theory of capital structure acquaints that firm's capital structure signals information of insiders (managers) to the outside investors (Brealey et al., 1977; Harris & Raviv, 1991; Miller & Rock, 1985; Ross, 1977). Besides its information signaling effect, capital structure mitigates unseemly investment decisions of firm managers in the presence of information asymmetry (Myers & Majluf, 1984).

2.2. *Capital structure and bank performance: empirical evidences*

Abundant literatures were found which revealed the possible relationship between capital structure and firm performance in different sectors of the economy or business organization; manufacturing (Long & Malitz, 1985; Titman & Wessels, 1988); utility companies (Modigliani & Miller, 1963); pharmaceutical companies (Mohammadzadeh et al., 2013); and general business firms (mostly cited as listed companies) (Abor, 2005; Agrawal & Knoeber, 1996; Alonso et al., 2005; Olokoyo, 2013; Salim & Yadav, 2012).

Following the empirical works of Short (1979), Molyneux and Thornton (1992), Angbazo (1997), and Neely and Wheelock (1997), extensive bodies of studies examined the factors that affect bank profitability, for many individual economies and a group of countries all over the world. These factors are often categorized as bank-specific, industry-specific, and macroeconomic variables. Some studies are focused on specific country (Ameur & Mhiri, 2013; Amidu, 2007; Anafo et al., 2015; Athanasoglou et al., 2008; Bandt et al., 2014), while others studied a group of countries, regions, and territories (Athanasoglou et al., 2008; Berger & Di Patti, 2006; Demirgüç-Kunt & Huizinga, 1999; Dumičić & Rizdak, 2013; Saona, 2016).

Other class of studies also intended to relate capital structure variables to bank-level profitability indexes though profitability is affected by bank-specific, industry-specific, and macroeconomic factors (Dumičić & Rizdak, 2013). Berger and Di Patti (2006), Berger and Bouwman (2013), Demirgüç-Kunt and Huizinga (1999), Musah (2017), Siddik et al. (2017), Awunyo-Vitor and Badu (2012), Amidu (2007), Anafo et al. (2015), Niresh (2012), and Zafar et al. (2016) tried to assess the direct effect of capital structure on performance in the banking industry. These literatures, however, resulted in inconclusive results regarding the impact (in terms of the sign, magnitude, and significance) of capital structure on bank profitability, which eventually resulted in the absence of a clear and common understanding of the optimal capital choice for banks.

Using the panel data of 22 banks for the period of 2005–2014, Siddik et al. (2017) empirically examined the impacts of capital structure on the performance of Bangladeshi banks assessed by ROE, ROAs and earnings per share. The results of the pooled ordinary least square analysis showed that capital structure inversely affects bank performance. Likewise, another study by Amidu (2007) investigated the dynamics involved in the determination of the capital structure of Ghanaian banks via a panel data regression model. The study considers 19 banks that were licensed and supervised by the country's central bank, Bank of Ghana, for the periods 1998–2003. The regression result revealed that short-term debt of Ghanaian banks found to negatively determine profitability; implying profitable banks were more likely to have less short-term debt in their balance sheets.

Demirgüç-Kunt and Huizinga (1999), for instance, using bank-level, industry-specific, and country-specific macroeconomic variables for OECD and developing countries over 1990–1997, tried to identify the relationship between capitalizations, measured by equity to total asset ratio, and bank profitability and found a positive and significant relationship in which well-capitalized banks faced with lower bankruptcy cost, thereby reducing the cost of capital and increase profitability. Similar results were also found by Adesina et al. (2015), Anafo et al. (2015), Idode et al. (2014), Sufian and Habibullah (2009), and Anarfo and Appiahene (2017), employing a Price Water House Coopers Annual Banking long panel survey data of banks from 37 countries in the Sub-Saharan region for the period 2000–2006 and Granger casualty test, has found an insignificant impact of capital structure in bank performance while the effect of profitability on the capital structure is negative and statistically significant.

Capital structure as a determinant of bank profitability in general and a determinate of bank performance, in particular, is under-researched topic in the Ethiopian banking industry. As per the researcher's best knowledge, Birru (2016) and Hailu (2015) are the pioneering works that tried to assess the empirical relationship between capital structure and bank profitability for Ethiopian commercial banks. Birru (2016) tried to investigate the impact of capital structure variables on the financial performance of commercial banks using multiple regression model for the period 2011 to 2015 and found a significantly negative relationship between debt to equity as a measure of capital structure and bank profitability (ROA), whereas the coefficient estimate for debt ratio was found to be statistically insignificant. In a masters' thesis, Hailu (2015) has also attempted to figure out the empirical ties that exist between capital structure and profitability in the Ethiopian banking industry using 12 years of data for eight commercial banks and employed panel fixed-effect models. The findings revealed that capital structure as measured by total debt to total asset had a statistically significant negative impact, but deposit to total asset ratio had a significant positive impact on the profitability of core business operations of commercial banks as measured by ROA and NIM.

Moreover, Lelissa (2014) and Rao and Lakew (2012) studied the determinants of bank profitability. For instance, Lelissa (2014) in his study on the determinants of Ethiopian commercial banks performance, found that capital adequacy ratio and liquidity to have statistically insignificant effect on the profitability of banks while some bank-specific factors (credit risk, income diversification, overhead cost management, and size), as well as inflation, had a statistically significant impact on profitability variable (ROA). Similarly, Rao and Lakew (2012) found statistically significant coefficient estimates for bank-specific variables on average return on asset (ROAA).

3. Methodology

3.1. Data and their description

The study mainly depends on secondary panel data (data which have spatial and temporal elements), accessed from listed private commercial banks operated in the country. As Baltagi (2005) pointed out, the panel data specification of an empirical model has multiple benefits; overcome the impact of unobserved and heterogeneous characteristics of cross-sections and time, increase the degree of freedom and efficiency, and increase sample elements (observations).

The study is based on survey of all private banks in the country. Thus, data were collected from 16 private commercial banks registered and licensed by NBE, the financial sector regulatory body of the country. The names of the banks included in the survey listed in alphabetical order are: Abay Bank, Abyssinia Bank, Addis International Bank, Awash Bank, Birhan Bank, Bunna International Bank, Cooperative Bank of Oromia, Dashen Bank, Debu Global Bank, Enat Bank, Lion International Bank, Nib International Bank, Oromia International Bank, United Bank, Wegagen Bank, and Zemen Bank.

Book values, rather than market values, of the financial variables were compiled from audited financial statements published in the annual reports of respective private commercial banks. Some relevant data for the study were also accessed from NBE. In this regard, the study has to depend on the availability of annualized figures in selecting the number of banks and also the period to be included in the study. Therefore, the study included 6 years' data ranging from 2013/14 to 2018/19 for each private bank whose data is available in the specified periods.

The collected data were analyzed both descriptively and using inferential statistics. Simple descriptive statistics on mean, standard deviation, minimum, maximum values, and correlation coefficients of the variables of interest were given in the form of tables. Besides, a panel econometric approach to data analysis was conducted to identify the effect of capital structure (financial leverage) and other control variables on the profitability of Ethiopian private commercial banks.

3.2. Variables and hypothesis

3.2.1. Dependent (profitability) variables

Existing literatures used various measures of profitability; financial ratios from the balance sheet and income statements, firm values based on information from stock markets, and Tobin's q which mixes market and accounting values (Berger & Di Patti, 2006). Since market values are difficult to obtain, plenty of researches used book value financial ratios as measures of profitability such as ROA, ROE, earning per share (EPS), and net interest margin (NIM). Among others, Ercegovac et al. (2020), Obamuyi (2013), and Flamini et al. (2009) used ROA to measure bank profitability, and ROE employed by Abor (2005), Soana (2011), Yao et al. (2018), Rachdi (2013), Zeitun (2012), and Sufian (2011) applied both ROA and ROE. Some studies have also used interest margin ratios as profit proxies along with other indicators (Niresh, 2012). Saona (2016) and Owoputi et al. (2014) has employed net interest and profit margins together with ROA, ROE, return on deposit (ROD), and return on average equity (ROEA) to measure bank profitability while a study by Adesina and associates employed Before Tax Profit (BTP) as dependent variable for their OLS model (Adesina et al., 2015).

ROA is the best and widely used measure of bank profitability given the relatively low equity of banks in developing countries (Flamini et al., 2009; Saona, 2016). It is used to measure the earning obtained from total assets or the ability of the management to earn profits from the banks' financial and real assets (Obamuyi, 2013). In most studies, ROA is complemented by ROE (see Saona, 2016; Zeitun, 2012; Sufian, 2011). ROE is a financial ratio which measures the earning derived from equity if a bank. This ratio shows how the management of the bank is efficiently using the shareholders' fund. This study used ROA as main measures of bank profitability provided that the limited off-balance sheet activities of commercial banks in Ethiopia which directly contributes to banks' profitability evidenced by the low proportion of investment in the total asset (Trujillo-Ponce, 2012) and as ROE

disregard the risk of financial leverage (Athanasoglou et al., 2008). Moreover, if the tax rates differ across banks, it is advisable to use profit before tax rather than net profit (Siddik et al., 2017) as numerators of the ROA ratio. However, since the tax rates applied to Ethiopian commercial banks are the same, there is no problem in using net profit figures. Thus, ROA is the ratio of net profit to the total asset for this study. For robustness checks, however, ROE is used as a profitability variable. More importantly, the study used net interest margin,² net interest margin to total asset, as the measure of bank performance (profitability) following Demirgüç-Kunt and Huizinga (1999). All profitability measures were calculated using average total assets as a denominator.

3.2.2. Explanatory variables

The main independent variables used as capital structure measure for the study are total debt ratio (TDR)—the ratio of total debt to total asset and short-term debt ratio (STDR)—the ratio of short-term debt to total asset.³ Previous studies have used these ratios as explanatory determinants of firm profitability (Anafo et al., 2015; Gadzo & Asiamah, 2018; Musah, 2017; Salim & Yadav, 2012; Siddik et al., 2017; Zafar et al., 2016). Contradictory empirical results and theoretical explanations were found on the expected sign of the three measures of leverage on the profitability of banks. For instance, Siddik et al. (2017) found statistically significant negative impact of LRD and STD ratios on EPS of 22 banks in Bangladesh while Zafar et al. (2016) indicated a significant positive impact of STD and LTD and on ROA. A study by Marandu and Sibindi (2016), on the other hand, revealed insignificant impact of saving deposits among South African commercial banks.

In the Ethiopian banking industry, amid large proportion of the banks' earnings is from interest income on loans and advances which directly linked with their level of deposit and less vulnerability to liquidity problems, we expect positive and significant impact for both debt measures and bank profitability. Thus, the following hypotheses have been formulated: (1) Ho—1a: there is a statistically significant positive relationship between total debt and bank profitability, and (2) Ho—1b: there is a statistically significant positive relationship between short-term debt and bank profitability against the alternative hypothesis that all forms of leverage have no statistically significant effect on bank-level profitability. This hypothesis is in line with the agency cost theory while against the distress cost and picking order theories of capital structure.

3.2.3. Control variables

Studies identified some important variables which influence the profitability of commercial banks besides the capital structure variables described above. These variables are included in this study as control variables to help the achievement of objectives and increase the precision of the estimated models. The variables are bank size, bank age, loan to deposit ratio, cost to income ratio, credit risk, and employee productivity. The properties and directions of impact for each control variable on profitability are explained below.

3.3. Bank size (SIZE)

Size is an important determinant of firm profitability though the direction of its effect is ambiguous. According to the modern economic theory, efficiency is highly related to scale economics which might implies that large firms experiences high efficiency and profitability (Al-Harbi, 2019; Regehr & Sengupta, 2016; Siddik et al., 2017; Sufian & Habibullah, 2009). Thus, large banks are expected to generate relatively higher profit than small banks. This is partly due to portfolio diversification in earning sources and the economic advantage of scale (Yao et al., 2018). Moreover, larger banks tend to get abnormal profits in a monopolistic type of market (Flamini et al., 2009). Amid bureaucratic and other reasons, on the other hand, the effect of size could be negative for extremely large banks (Athanasoglou et al., 2008) while Marandu and Sibindi (2016), based on the trade-off theory, argued that large banks are more diversified and less exposed to the risk of bankruptcy costs. Yao et al. (2018) and Regehr and Sengupta (2016) also found a positive but non-linear (decreasing) relationship between bank size and profitability. In due recognition of its scale and efficiency effects, a positive and significant effect of bank size on

profitability is expected in this study. Moreover, natural logarithm of total asset is used as a proxy for bank size as indicated in Siddik et al. (2017) and Abor (2005).

Ho—2: Bank size has statistically significant positive impact on bank profitability.

3.4. Bank age (AGE)

Empirical evidence shows that the age of a firm has a mixed effect on profitability; positively, negatively, no effect affects profitability. While Anafo et al. (2015) and Regehr and Sengupta (2016) found negative relationships, Musah (2017) indicated a positive and significant impact of bank age on profitability. In due recognition of the learning by doing principle of classical economics, however, the study hypothesized that age to have a positive and statistically significant effect on bank profitability. Bank age has measured by operational years of service of the respective banks since incorporation.

Ho—3: Bank age has positive and significantly affect bank profitability in Ethiopian private banking industry.

3.5. Loan to deposit ratio (LDR)

Liquidity has been mentioned as an important determinant of bank profitability in many empirical studies (Adelopo et al., 2018; Trujillo-Ponce, 2012; Sufian & Habibullah, 2009;; Athanasoglou et al., 2008) so does in this study. Loan to deposit ration, as measured by total outstanding loans divided by total deposit is used to proxy liquidity in the regression models.⁴ The effect of loan to deposit ratio on profitability is expected to be positive, as higher ratio implies higher interest and total income. On the other hand, excessively higher loan to deposit ratio could have an adverse effect on profitability by increasing the distress cost. Bourke (1989) and Ozili (2017) hypothesized that banks with higher and diversified loan portfolio tends to earn higher profits. In line with these, the loan to deposit ratio variable is hypothesized to have a positive impact on bank profitability following Al-Harbi (2019), Ozili (2017), and Dietrich and Wanzenried (2014); and Ćurak et al. (2012).

Ho—3: Loan deposit ratio (the reciprocal of liquidity) has a positive and significant impact on bank profitability.

3.6. Cost to income ratio (CIR)

The advancement in information, communication and financial technologies are helped banks to be operationally efficient implying that banks are incurring low expenses relative to income receipts (Trujillo-Ponce, 2012). Operation efficiency shows the ability of the management to managing costs. Under normal circumstances, the ratio of cost to income is expected to negatively relate with profit as high ratios imply lower efficiency. Previous studies found a negative and significant relationship between cost to income ratio and profitability (Zafar et al., 2016; Trujillo-Ponce, 2012; Alexiou & Sofoklis, 2009;; Athanasoglou et al., 2008). Thus, we expect a significant negative impact of CIR on profitability in our model too. This variable is measured as the ratio of the total cost to total income.

Ho—4: Cost income ratio has a significant negative effect on profitability.

3.7. Credit Risk (CR)

Theory and empirical findings suggest that credit risk is an important determinant of bank profitability with inverse relationships. Among others, Adelopo et al. (2018), Owoputi et al. (2014), and Athanasoglou et al. (2008) supported the inverse relationship argument. In this case, banks could improve their profitability by improving their screening and monitoring of credit risk (Athanasoglou et al., 2008). Conversely, a study on determinants of bank profitability in sub Saharan Africa by Flamini et al. (2009) found no significant impact. The ratio of loan loss provision to total outstanding loans is used to proxy credit risk and the coefficient of the credit risk variable is expected to be negative, as higher risks associated with loans reduce the quality of the loan and performance at the bottom-line.

Ho—5: Credit risk has negative and significant impact on bank profitability.

3.8. Employee Productivity (EP)

Recently, market dynamism and high level of completion in the industry forced Ethiopian commercial banks to re-assess their doing of business. Among others, banks are striving to increase productivity to secure sustainability and profitability. In this regard, employee productivity can be seen as an important driver of bank performance. For this study, employee productivity is measured by the ratio of after-tax income to salary and benefits paid to employees since the number of employees (specifically temporary and outsourced employees) is unavailable for most banks.

Ho—6: The relationship between employee productivity and profitability is positive and statistically significant.

3.9. Empirical model specification

Data were analyzed using multiple panel data regression models. Multiple panel data regressions extend the concept of simple pane linear regression to cases where a researcher wishes to apply several explanatory variables measured across firms and time in predicting the value of the dependent variables. Below are the estimated regression models. The general econometric model for this study can be specified as;

$$Y_{it} = \beta_0 + \beta \sum X_{it} + \delta \sum Z_{it} + \varepsilon_{it}$$

Where $\varepsilon_{it} = \mu_i + \gamma_t + v_{it}$, if we assume a two-way error component model; (1) for special heterogeneity, and (2) for time heterogeneity; Y_{it} = Dependent variables measured across individual bank, i and time periods, t ; X_{it} and Z_{it} = Vector of explanatory variables (leverage and controlled variables, respectively) over bank, i and time, t ; β and δ = Vectors of parameter estimates of independent variables included in the model; β_0 = The constant term; ε_{it} = The composite error term consists of the cross-section and time heterogeneities as well as the random stochastic element of the model; μ_i = unobserved individual (cross-sectional) heterogeneity; γ_t = unobserved temporal heterogeneity; and v_{it} = the usual random stochastic term.

Depending on the assumptions that the unobserved error components follow, there are two basic models in panel data analysis; fixed effect and random effect models. If μ_i and γ_t are assumed to be fixed parameters to be estimated and the while noise term, v_{it} , is identically and independently distributed with mean zero and constant variance σ_v^2 (meet the Gaussian standard homoscedasticity assumption), implies $v_{it} \sim \text{IID}(0, \sigma_v^2)$, then equation gives a two-way⁵ fixed effect error component or with simple term fixed effect model. Conversely, if the cross sectional and time heterogeneity terms, μ_i and γ_t respectively, are assumed to be random similar to the usual white noise term of the model, μ_{it} , i.e. $v_{it} \sim \text{IID}(0, \mu_\mu^2)$, $\gamma_{it} \sim \text{IID}(0, \gamma_\gamma^2)$, and $v_{it} \sim \text{IID}(0, \sigma_v^2)$, and with additional assumption of all error components are independent of each other and with explanatory variables, it is possible to estimate the random effect two-way error component model, simply the random effect model.

Generally, the models to be estimated can be specified using four econometric equations grouped in to two cases based on the dependent variables of econometric models⁶; NIMA and NIME ratios as measures of bank level profitability. Thus, four independent regressions were conducted and summarized tables for presentation convenience and simplicity.

3.9.1. Case I: ROA as dependent variable

$$ROA_{it} = \beta_0 + \beta_1 TDR_{it} + \beta_2 SIZE_{it} + \beta_3 AGE_{it} + \beta_2 LDR_{it} + \beta_2 CIR_{it} + \beta_2 CR_{it} + \beta_2 EP_{it} + \varepsilon_{it} \quad (1)$$

$$ROA_{it} = \beta_0 + \beta_1 STDR_{it} + \beta_2 SIZE_{it} + \beta_3 AGE_{it} + \beta_2 LDR_{it} + \beta_2 CIR_{it} + \beta_2 CR_{it} + \beta_2 EP_{it} + \varepsilon_{it} \quad (2)$$

3.9.2. Case III: NIMA as dependent variable

$$NIMA_{it} = \beta_0 + \beta_1 STDR_{it} + \beta_2 SIZE_{it} + \beta_3 AGE_{it} + \beta_2 LDR_{it} + \beta_2 CIR_{it} + \beta_2 CR_{it} + \beta_2 EP_{it} + \varepsilon_{it} \quad (3)$$

$$NIMA_{it} = \beta_0 + \beta_1 STDR_{it} + \beta_2 SIZE_{it} + \beta_3 AGE_{it} + \beta_2 LDR_{it} + \beta_2 CIR_{it} + \beta_2 CR_{it} + \beta_2 EP_{it} + \varepsilon_{it} \quad (4)$$

Where: ROA is Return on Asset; NIMA, Net Interest Margin to Total Asset Ratio; STDA, Short-term Debt to Total Asset Ratio; LTDA, Long-Term Debt Total Asset Ratio; TDA, Total Debt Total Asset Ratio; SIZE, Bank Size; AGE, Bank Age; LDR, Loan to Deposit Ratio; CIR, Cost to Income Ratio; CR, Credit Risk; and EP, Employee Productivity. All the parameter estimates and the error term are defined as before.

4. Empirical findings

4.1. Descriptive results

Table 1 shows the descriptive results of the variables used in the regression analysis. Commercial banks in Ethiopia mainly engaged in the retail banking business; they collect deposit from savers and disburse the sum to productive economic sectors for potential and prominent borrowers. Thus, private banks in the country primarily perform the intermediary role in the financial system. Based on the description presented in Table 2, the private banking industry showed remarkable growth in assets, deposits and loan disbursement over the years considered in the study, all variables jumped on average by more than three-fold within 6 years. Unlike banks in developed countries and some developing economies where banks have the option to borrow and lend in the financial market, credit made by banks in Ethiopian is mainly from deposits collected from customers. Thus, an increase in deposits shall smoothly translate to higher loan disbursements and assets.⁷ Consequently, short-term (saving and demand deposits) and long-term debt (time deposit) followed the same pattern as total debt (total deposit). Recently, however, most private banks have been cutting their level of long-term debt because time deposits are costly.

Keeping a close look over other variables, the average loan to deposit ratio reaches the historical maximum of 75.6% as of 2019 and the 6-year average stood at 65.1%. The recently observed liquidity problem that the industry encounters might be due to this observed excessive risk-taking behavior of banks. Cost to income ratio has exhibited erratic trend; continuously surge until 2018 to reach 70.2%. On average, private banks incurred 66.6 cents as costs for every Birr earned as income. More importantly, the credit risk of the private banks found to be 1.1% implies that the possibility of loan impairment in the industry is relatively low compared to domestic regulatory requirements and international standards. Despite the surge in loan disbursement, credit risk as measured by positional loan loss provision to total loan outstanding loan ratio, has declined for the last 2 years indicating the banks' capability to properly manage credit risk. Bank efficiency as measured by employee productivity (net income per salary and benefits) has declined while some improvements were observed for the last 2 years. On average, every employee in the industry contributes about Birr 1.2 million to the after-tax profit of banks. All these explain the high profitability of the Ethiopian private banks over the periods considered in this study. On average, ROA and NIMA remain at 2.8% and 4.3%, respectively. These profitability values are higher compared to some developed and developing countries. For instance, Trujillo-Ponce (2012) found ROA of 1% for Spanish banks, Alexiou and Sofoklis (2009) indicated ROA of 1.2% for Greek banks and Anbar and Alper (2011) found ROA of 1.91% in Turkey, which are below the average profitability indexes of the Ethiopian private banks. Amid this one can say that banks in Ethiopia are not considered as alternative investment portfolio, while a lucrative business for investors.

4.2. Model diagnosis

4.2.1. Multicollinearity

A correlation coefficient shows the linear interdependence between two variables. Thus, it can be seen as a measure of multicollinearity between explanatory variables in the econometric models. Significantly high correlation coefficients represent strong linear relationships between variables

Table 1. Summary of VARIABLES

Variables		Notation	Description	Measurement	Expected Sign	Source	
Dependent variable	Bank Profitability	ROA	Return on Asset	Net Income/ Average Total Asset		Computed from Annual Reports of Banks	
		NIMA	Net Interest Margin per Asset	(Interest Income— Interest Expense)/ Average Total Asset			
Independent variables	Capital Structure Variables	TDR	Total Term Debt Ratio	Total Debt/ Total Asset	+	Computed from Annual Reports of Banks	
		STDR	Short-Term Debt Ratio	Sort-Term Debt/ Total Asset	+		
	Control Variables	SIZE	Bank Size	Logarithm of Total Asset	+		
		AGE	Bank Age	Years of service since incorporation	+		NBE
		LDR	Loan to Deposit Ratio	Total Outstanding Loan/ Total Deposit	+		
		CIR	Cost to Income Ratio/ Operational Efficiency	Total Cost/Total Income	-		
		CR	Credit Risk		-		
	EP	Employee Productivity	Profit Before Tax/ Salary and Benefits	+			

and high multicollinearity. As shown in Table 3, the Spearman’s correlations between leverage variables are high (all more than 0.8 in absolute value terms). This is expected given short-term debt is part of the total debt variable and it might not be a problem in the regression analysis as the variables of leverage are independently estimated in separate models. The correlation coefficient of all other control variables is, however, less than 0.8 implies that multicollinearity will not be a problem in subsequent econometric estimations.

Moreover, after OLS regression dependent and independent variables, we obtain the variance inflation factor result to highlight the extent to which repressors are interrelated. As indicated in the table below, multicollinearity is not a problem in the regression models as the VIF for all explanatory variables is less than the conventional value of ten.

4.2.2. Panel unit root

In panel data analysis, variables are expected to be stationary to avoid spurious regression and interpretation of coefficient estimates. Therefore, before conducting the regression analysis, the study has performed a unit root test of the variables. Table 4 and 5 presents the panel unit root test result. To increase the robustness of the results, the study performed three independent panel units root tests; Levin-Lin-Chu unit-root test (LLC), Fisher augmented Dickey-Fuller unit-root test (F-ADF) and Harris-Tzavalis unit-root test (HT). Based on the test results from the three methods described below, all the variables are found to be stationary at level, though some inconsistencies are observed for some variables such as STDR and CR. Thus, conducting a regression analysis could be possible with the given dataset.

4.3. Results and discussions

Regression analysis is used to investigate the empirical relationship between capital structure and profitability on Ethiopian private banks as measured by ROA and NIMA. To deal with individual and time-specific heterogeneity, panel fixed regression models are employed. The fixed effect regression results which regress bank profitability variables against leverage and supplementary control

Table 2. Descriptive statistics (mean values)

Variables	Year						All years
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	
ROA (%)	0.0295 (0.0078)	0.0280 (0.0075)	0.0270 (0.0091)	0.0234 (0.0056)	0.0264 (0.0095)	0.0346 (0.0318)	0.0281 (0.0149)
NIMA (%)	0.036 (0.0088)	0.039 (0.0115)	0.043 (0.0105)	0.040 (0.0096)	0.045 (0.0114)	0.055 (0.029)	0.043 (0.0159)
TA (in Million Birr)	7,513.24 (6,875.44)	9,338.293 (7,672.36)	11,599.13 (8,972.06)	15,702.3 (11,249.96)	20,907.89 (14,905.49)	26,154.32 (19,950.1)	15,202.53 (13,821.61)
TD (in Million Birr)	5,756.92 (5,109.90)	7,371.65 (5,809.93)	9,277.52 (6,686.67)	12,720.11 (8,604.85)	17,407.91 (11,748.81)	22,368.91 (15,559.81)	12,483.83 (11,069.34)
STD (in Million Birr)	5,271.94 (4,788.77)	6,650.81 (5,366.16)	8,172.69 (6,235.57)	11,027.94 (8,008.11)	15,034.00 (10,881.07)	20,097.13 (14,861.84)	11,042.42 (10,234.12)
LTD (in Million Birr)	485.00 (352.43)	720.81 (518.86)	1,104.88 (687.61)	1,652.38 (925.62)	2,121.75 (1,589.00)	2,530.56 (1,916.70)	1,435.9 (1,340.37)
TOL (in Million Birr)	3,357.63 (2,954.79)	4,727.78 (3,649.93)	5,868.25 (4,120.97)	8,493.84 (6,097.70)	11,179.27 (8,155.05)	16,296.31 (11,479.22)	8,320.51 (7,922.85)
LDR (%)	0.583 (0.0597)	0.643 (0.1059)	0.646 (0.0481)	0.653 (0.0555)	0.623 (0.0916)	0.756 (0.2647)	0.651 (0.1354)
CIR (%)	0.623 (0.0697)	0.651 (0.0539)	0.683 (0.0934)	0.702 (0.0592)	0.658 (0.0521)	0.678 (0.1075)	0.666 (0.0779)
CR (%)	0.011 (0.0085)	0.011 (0.0071)	0.014 (0.0154)	0.011 (0.007)	0.006 (0.0065)	0.009 (0.0083)	0.011 (0.0094)
EP (in Million Birr)	1.645 (0.712)	1.341 (0.5334)	1.176 (0.5345)	0.948 (0.4210)	1.006 (0.3308)	1.076 (0.4849)	1.199 (0.5558)

Note: TA, TD, STD, LTD and TOL are total asset, total debt, short-term debt, long-term debt and total outstanding loan, respectively, and see Table 1 for description the rest of the variables. The table also show mean standard deviations (in parenthesis) over the study periods.

variables are presented in Table 6. The study has also performed regressions taking in to account both bank and time-specific fixed effects.⁸ The panel fixed effect models represent the data very well and most variables remaining stable across the various regressions. The explanatory power of the models is also reasonably high as the *F*-statistics in all models is significant at the 1% level (p -value = 0.0000 < 1%) which conveys that the models are a good fit of the data and all explanatory variables are jointly significant. Besides, the relatively high R^2 and Adjusted- R^2 statistics suggest that variations in the dependent profitability variables, as measured by ROA and NIMA, are explained satisfactorily by variations in the selected independent variables.⁹

Spinning to our main analysis, the regression outputs indicate that all the capital structure variables (TDR and STDR) have the expected signs, in favor of our hypothesis (1a) and (1b). The results in regression models (1) and (3) disclose a significantly positive relationship between TDR and bank profitability at 1% level of significance. The significantly positive regression coefficient for total debt ratio implies that an increase in the debt position is associated with an increase in profitability; the higher the total debt, the higher the profitability. Moreover, the results from regression (2) and (4) have indicated a significantly positive association between STDR and profitability as measured by ROA and NIMA. This is because short-term debt relatively tends to be less expensive, and therefore increasing short-term debt with a relatively low interest expense will lead to an increase in profit levels. Among others, the findings are in line with Abdullah and Tursoy (2019), Zafar et al. (2016), and Anafo et al. (2015), but not consistent with the insignificant relationship finding of Anarfo and Appiahene (2017).

Table 3. Correlation matrix

	ROA	NIMA	TDR	STDR	SIZE	AGE	LDR	CIR	CR	EP
ROA	1									
NIMA	0.701***	1								
TDR	0.845***	0.829***	1							
STDR	0.833***	0.878***	0.975***	1						
SIZE	-0.240**	0.185*	-0.044	0.029	1					
AGE	0.127	0.164	0.170*	0.1295	-0.0137	1				
LDR	-0.079	0.038	-0.104	-0.135	0.205**	-0.193*	1			
CIR	-0.390***	0.059	0.002	-0.022	0.091	0.030	0.056	1		
CR	0.051	0.051	0.084	0.110	-0.121	-0.321***	-0.163	0.190*	1	
EP	0.552***	0.080	0.431***	0.304***	-0.159	0.046	0.155	-0.295***	0.077	1

Note: the table shows the pear-wise Spearman's correction coefficients. "***" and "**" represent significant at 95% and 99% confidence levels, respectively.

Table 4. Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
EP	2.03	0.492652
SIZE	1.55	0.644841
CIR	1.52	0.656826
CR	1.14	0.877363
LDR	1.11	0.903465
STDR	1.05	0.956125
Mean VIF	1.4	

Note: The VIF results were obtained after running an OLS model.

In a net shell, the results suggest that profitable banks depend more on debt (deposits) as their main financing option and achievement of financial performance objectives. Similar to Trujillo-Ponce (2012) argument for Spanish banks, the liability side of the Ethiopian bank's balance sheet is portrayed by a high proportion of customer deposits, which appears to have a positive effect on their profitability as measured both by ROA and NIMA. Recently, private banks have been aggressively expanding into wide geographical areas of the country and able to mobilize more deposit, which could further strengthen our argument. Thus, the result could be logical given the large proportion of the Ethiopian private banks' asset is balanced by deposits, particularly short-term debt (saving and demand deposits) which constitute more than 85% of their total debt. Abdullah and Tursoy (2019) has explained positive associations as the result of lower cost of issuing debt than equity and higher pressures of leveraged firm managers to concentrate on profitable investments.

Mixed results are obtained regarding the impact of bank size on profitability. As in regression (1) and (2), bank size, measured by log of total asset, has a statistically significant negative effect on the banks' ROA, while its impact is significantly positive if NIMA is used as a measure of profitability. The negative relationship implies that at relatively low asset size, banks can enjoy the economics of scale advantage, but the advantage becomes diminished at the bank's size increases. The negative relationship between bank size and profitability (ROA) is supported by Ameur and Mhiri (2013); Soana (2011); Sufian and Habibullah (2009); and Demirgüç-Kunt and Huizinga (1999). Căpraru and Ihnatov (2014) also found a significant negative effect of bank size on ROA and NIM for banks in Central and Eastern European countries.

Table 5. Unit root test results

	ROA	ROE	NIMA	TDR	STDR	SIZE	AGE	LDR	CIR	CR	EP
LLC	4.91*	-5.21*	-9.59*	-18.69*	0.838	-11.45*	-7.99*	-18.42*	-22.42*	-85.13*	-7.46*
F-ADF	62.69*	71.81*	47.32**	63.90*	47.20**	18.90	176.5**	76.39*	110.2*	25.64	43.61***
HT	-0.33*	0.06*	0.29*	0.04*	-1.33*	0.91	0.42***	0.20*	0.16*	0.33*	0.41**

Note: LLC is the Levin et al. (2002) panel unit root test. F-ADF is the Maddala and Wu (1999) Fisher-ADF panel unit root test. HT is Harris-Tzavalis panel unit-root test. *, **, and *** are significance levels at 1%, 5% and 10%, respectively.

Table 6. Panel fixed effect estimation results (dependent variables ROA and NIMA)

	ROA		NIMA	
	(1)	(2)	(3)	(4)
TDR	0.0382*** (0.0022)	/ /	0.0474*** (0.0018)	/ /
STDR	/ /	0.0362*** (0.0020)	/ /	0.0449*** (0.0016)
SIZE	-0.0041*** (0.0010)	-0.0036*** (0.0010)	0.0034** (0.0014)	0.0040*** (0.0014)
AGE	0.0001* (0.0001)	0.0002*** (0.0001)	0.0002 (0.0002)	0.0003* (0.0002)
LDR	0.0082** (0.0040)	0.0081** (0.0035)	0.0160* (0.0094)	0.0159* (0.0089)
CIR	-0.0609*** (0.0152)	-0.0532*** (0.0146)	-0.0096 (0.0092)	-0.0003 (0.0090)
CR	0.1486** (0.0748)	0.1298** (0.0583)	0.2736*** (0.0612)	0.2506*** (0.0818)
EP	0.0522** (0.0259)	0.0542** (0.0269)	-0.0020 (0.0164)	0.0002 (0.0163)
Cons	0.0575*** (0.0096)	0.0524*** (0.0094)	-0.0383*** (0.0115)	-0.0447*** (0.0103)
sigma_u	0.0063	0.0045	0.0080	0.0067
sigma_e	0.0034	0.0033	0.0045	0.0044
rho	0.7733	0.6567	0.7571	0.7042
Log-Likelihood	421.97	425.87	394.74	398.89
F-test	11,609.41 ($p < 0.000$)	2,146.96 ($p < 0.000$)	1,078.58 ($p < 0.000$)	1,032.26 ($p < 0.000$)
R ²	0.938	0.943	0.900	0.908
Adjusted R ²	0.933	0.938	0.892	0.901
Hausman-test for FE	110.58 ($p = 0.000$)	38.38 ($p = 0.000$)	45.26 ($p = 0.000$)	24.52 ($p = 0.000$)
N	96	96	96	96

Note: The table reports panel fixed effect regression estimates of capital structure and other bank specific (control variables) determinants of bank profitability. Model (1) and (3) uses total debt ratio (TDR) whereas model (2) and (4) uses short-term debt ratio (STDR) as measures of capital structure, respectively. Values in parenthesis are heteroscedasticity corrected standard errors of coefficient estimates. ***, **, and * represent significance at 1%, 5% and 10% levels, respectively.

Unlike the finding of Zeitun (2012) on Islamic and conventional banks in Gulf Cooperation Council (GCC) countries, during the period 2002–2009, this study revealed a significant positive effect of age on profitability in the three models, except for model (3) in which its impact is not statistically significant. This might be because older firms are in a better position than young banks in most bank performance measurement KPIs, such as customer base, deposit, and loans and advances, which will boost their profitability. More importantly, financial intermediation skills and the resulting efficiency gains can be acquired through learning by doing.

Liquidity, measured by the ratio of total loans and advance to total deposits, is one of the most influential variables of bank performance. Concerning this variable, a positive and significant relationship with profitability is confirmed by this study for all regression models. The estimated coefficient for the loan to deposit ratio indicates that an increase in the ratio is significantly associated with higher level of bank profitability. The finding gives elaboration on the presence of trade-off between liquidity and profitability amongst Ethiopian private banks; more resources kept aside to meet future withdrawal demands greatly hampered the profitability position of banks. Thus, banks need

managerial skills in balancing the two, ensuring adequate liquidity without affecting the banks' performance. The result corroborated with the findings of (Le & Phan, 2017), Molyneux and Thornton (1992), and Alexiou & Sofoklis, 2009) while in contrast with Liu and Wilson (2010) which find a negative correlation between loan to asset ratio and ROA and ROE.

Operational efficiency has also found to be an important determinant of bank-level performance. Thus, this study used the cost to income ratio as a proxy for bank operational efficiency. In this study, results are mixed regarding the impact of cost to income ratio and profitability; positive and highly significant relationship with ROA and statistically insignificant linear bond with NIMA. This implies that management efficiency in managing costs adequately is necessary to advance the profitability for Ethiopian private banks (at least in the ROA model) and the more operationally efficient the banks are the higher will be their profitability. Our finding is in line with many bank performance studies (Al-Harbi, 2019; Trujillo-Ponce, 2012; Alexiou & Sofoklis, 2009), but against the finding of Demirgüç-Kunt and Huizinga (1999).

Against our prior expectations, the credit risk (CR) has a positive relationship with bank profitability and is statistically significant at least at 5% level in all regression models, suggesting that banks with higher credit risk exhibit higher profitability. The positive impact of credit risk on bank profitability could be explained by the fact that higher credit risk should improve bank incomes since loans are risky and, hence, the highest-yielding type of assets. Thus, Ethiopian private banks implement risk-taking strategies in their attempt to maximize profits. On the other hand, since the Ethiopian banking industry in general and private banks, in particular, have relatively less non-performing loans compared to SSA countries or other developed countries, the management's risk appetite might be increasing from time to time. For the Ethiopian commercial banks, Rao and Lakew (2012) found an insignificant effect for credit risk which may confirm a negative sign for separate consideration private banks that have lower level of loan loss provisions than state-owned banks.

Aligned to Athanasoglou et al. (2008), employees' productivity meets our expectations at least with ROA. The regression results which used ROA as a measure of bank profitability confirm that higher employees' productivity is positively and significantly associated with high profitability. This result indicates that as higher employee productivity generates more income, part of this income might be translated to higher profits. The coefficient estimates of models (3) and (4), which employed NIMA as a dependent variable, however, does not confirm a significant relationship between staff productivity and bank profitability.

4.4. Robustness check

The study has performed different sensitivity analysis to check the robustness of the regression outputs presented above. To this end, OLS and random effect (RE) models are estimated and presented in columns 2, 4, 5 and 7 of Tables A1 and A2 in the appendix part. With the exception of bank age and credit risk, the regression models revealed almost similar results, confirming the robustness of regression outputs. Particularly, the RE model closely follows the fixed effect (FE) model which strongly indicates panel specific variations. The study has also performed regressions using ROE as a proxy measure of profitability in the model and the findings continued to remain robust, but do not pass all model specification tests, implying ROE is not an important measure of bank profitability, at least for our case and dataset.

5. Conclusion

The study empirically tests capital structure as determinant of performance among the Ethiopian private commercial banks using most recent available data covering 2013/14 to 2018/19 and employing robust regression estimations; panel fixed effect regression analysis. This study contributes by studying profitability and its determinants in a more comprehensive way. First, unlike most studies which use the capital adequacy ratio as a proxy for capital structure, this study used debt to total asset ratio as capital structure variable and further cascade the variable to total debt (total deposit) ratio and short-term debt ratio (saving and demand deposits) to have a clear

understanding on the topic. This approach is quiet appropriate in bank performance study and used by many empirical studies in Africa (see Abor, 2005; Musah, 2017 among others). Second, besides the traditional measures of bank profitability, ROA and ROE, the study includes NIMA ratio (NIM divided by total asset) as an additional profitability measure.

The findings of the econometric model estimations revealed that capital structure as measured by total debt ratio and short-term debt ratio has a significant positive impact on bank profitability. Size, however, has a negative and significant impact on the private bank's profitability while the impact of bank age is significantly positive for most model estimates. Moreover, banks with relatively high loan to deposit ratios have higher profit than those with a lower proportion of loans relative to their deposits. Cost income ratio, the inverse of operational efficiency, affects profitability in a negative and significant way for the ROA models while the estimates of credit risk implying that Ethiopian private commercial banks are boosting their profits by taking risks. This might be due to the growing trend of the loan to deposit ratio of most commercial banks in the industry. The study has also found mixed results regarding the impact of employees' productivity; a positive and significant impact for ROA models and statistically insignificant coefficient estimates for NIM models.

The findings present implications for the long-lasting debate on capital structure and bank performance using the Ethiopian private banking industry as the case study. The study enables policy makers, bank practitioners and the executive managements' to critically scrutinize significant determinants of profitability and take corrective actions accordingly. While STD, TD, loan to deposit ratios and credit risk variables revealed significantly positive impact on private banks' profitability, prudent regulatory requirements on liquidity and credit risk management shall be formulated by the governing body to maintain the stability the financial system in general and the banking industry in particular.

Beyond its far-reaching implication for the banking industry in general and private banks in particular, the study has three major limitations that need to be considered in future research endeavors. First, amid the primary objective of the study is to identify the empirical relationship between capital structure and profitability, industry and macroeconomic variables such as competition, economic growth, inflation were not included. Secondly, as many studies on bank profitability, this study has depended on measurable variables while non-measurable variables (bank governance, the regulatory environment, social-political conditions) are excluded from the analysis. Last but not least, the study depends on the book values of variables included in the model though market values might provide a different estimation results and policy recommendations. Thus, addressing the above mentioned limitation in future research undertakings could improve our understanding of the issue.

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Notes

1. Hailu's study is master's thesis that is not yet published in any journal.
2. Net interest margin = (Interest income—Interest expense)/Average Total Asset
3. Total debt ratio (time deposit) is not included in the model since its insignificant share from the total deposit and most private banks' appetite to demand

deposits have been declining in recent periods provided that time deposit is an expensive type of deposit.

4. According to Bourke (1989) liquidity is the ratio of liquid assets to total assets while loan to deposit ration can be used as a reciprocal of liquidity.
5. It is also possible to consider one-way error component models that follow the same procedure as the two-ways error components models describe above. Most studies and this study depend on the one-way error component models.
6. For robustness check three cases were also estimated using ROE as a dependent variable and presented in the appendix section of the paper.
7. Similarly, the balance sheet of Ethiopian private banks evidenced that the loans and deposits constitute large proportion of the assets and liabilities, respectively.
8. The result confirmed significant bank-specific effects based on the (F-test statistic = 76.1 and *Prob. (F) = 0.000*) while time-specific effects are insignificant.
9. Estimation based on ROA as profitability indicator has also performed, but the results are found to be inferior as the coefficient estimates are inconsistent to ROA and NIMA regression results and relatively poor specification test results.

Disclosure statement

The author declares absence of competing interest related to this research paper.

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Appendix

Table A1. Multilevel regression results using ROA as a dependent variable						
Variables	Case-I			Case-II		
	OLS	FE	RE	OLS	FE	RE
TDR	0.0351*** (0.0036)	0.0382*** (0.0022)	0.0377*** (0.0035)	/ /	/ /	/ /
STDR	/ /	/ /	/ /	0.0330*** (0.0026)	0.0362*** (0.0020)	0.0352*** (0.0024)
SIZE	-0.0026*** (0.0006)	-0.0041*** (0.0010)	-0.0025*** (0.0008)	-0.0033*** (0.0006)	-0.0036*** (0.0010)	-0.0031*** (0.0008)
AGE	0.0001 (0.0001)	0.0001* (0.0001)	0.0001** (0.0000)	0.0001 (0.0001)	0.0002*** (0.0001)	0.0002*** (0.0001)
LDR	0.0075 (0.0053)	0.0082** (0.0040)	0.0094** (0.0045)	0.0079 (0.0051)	0.0081** (0.0035)	0.0093** (0.0043)
CIR	-0.0721*** (0.0092)	-0.0609*** (0.0152)	-0.0726*** (0.0128)	-0.0590*** (0.0086)	-0.0532*** (0.0146)	-0.0588*** (0.0118)
CR	0.0774 (0.0599)	0.1486** (0.0748)	0.1043** (0.0526)	0.0137 (0.0519)	0.1298** (0.0583)	0.0677 (0.0533)
EP	0.0076 (0.0094)	0.0522** (0.0259)	0.0123 (0.0171)	0.0291*** (0.0072)	0.0542** (0.0269)	0.0334** (0.0130)
Cons	0.0622*** (0.0091)	0.0575*** (0.0096)	0.0572*** (0.0119)	0.0626*** (0.0089)	0.0524*** (0.0094)	0.0561*** (0.0119)
sigma_u		0.0063	0.0019		0.0045	0.0020
sigma_e		0.0034	0.0034		0.0033	0.0033
rho		0.7733	0.2430		0.6567	0.2743
Log-Likelihood	380.53	421.97		381.93	425.87	
F-test/Wald-test	27.3694 (p < 0.000)	11,609.41 (p < 0.000)	7297.61 (p < 0.000)	45.47 (p < 0.000)	2,146.96 (p < 0.000)	6662.30 (p < 0.000)
R ²	0.904	0.938	0.918	0.907	0.943	0.922
Adjusted R ²	0.896	0.933		0.898	0.938	
N	96	96		96	96	96

Note: The table reports panel fixed effect regression estimates of capital structure and other bank specific (control variables) as determinants for bank profitability. In Case-I we use total debt ratio (TDR) whereas in Case-II the study uses short-term debt ratio (STDR) as measures of capital structure, respectively. For the first case, the test statistics for the Breusch and Pagan Lagrangian multiplier Chi² test for random effects is 15.33 with Pro-Chi² (p = 0.0000 < 1%) and the Hausman specification test statistics is 110.58 with Pro-Chi² (p = 0.0000 < 1%)(Ho: The random effective model is efficient). For the second case, the test statistics for the Breusch and Pagan Lagrangian multiplier Chi² test for random effects is 15.78 with Pro-Chi² (p = 0.0000 < 1%) and the Hausman specification test statistics is 38.38 with Pro-Chi² (p = 0.000 < 1%)(Ho: The random effective model is efficient). Values in parenthesis are heteroscedasticity corrected standard errors of coefficient estimates. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

Table A2. Multilevel regression results using NIMA as a dependent variable

Variables	Case 1			Case 2		
	OLS	FE	RE	OLS	FE	RE
TDR	0.0465*** (0.0026)	0.0474*** (0.0018)	0.0478*** (0.0029)	/ /	/ /	/ /
STDR	/ /	/ /	/ /	0.0434*** (0.0017)	0.0449*** (0.0016)	0.0442*** (0.0021)
SIZE	0.0023*** (0.0007)	0.0034** (0.0014)	0.0036*** (0.0007)	0.0013* (0.0007)	0.0040*** (0.0014)	0.0031*** (0.0007)
AGE	0.0002** (0.0001)	0.0002 (0.0002)	0.0002** (0.0001)	0.0003*** (0.0001)	0.0003* (0.0002)	0.0003** (0.0001)
LDR	0.0257** (0.0104)	0.0160* (0.0094)	0.0214** (0.0097)	0.0260** (0.0103)	0.0159* (0.0089)	0.0207** (0.0094)
CIR	-0.0229** (0.0093)	-0.0096 (0.0092)	-0.0216* (0.0124)	-0.0055 (0.0094)	-0.0003 (0.0090)	-0.0042 (0.0115)
CR	0.1718** (0.0712)	0.2736*** (0.0612)	0.2108** (0.0912)	0.0887 (0.0771)	0.2506*** (0.0818)	0.1720 (0.1116)
EP	-0.0737*** (0.0106)	-0.0020 (0.0164)	-0.0525** (0.0225)	-0.0448*** (0.0083)	0.0002 (0.0163)	-0.0251 (0.0180)
Cons	-0.0128 (0.0096)	-0.0383*** (0.0115)	-0.0285*** (0.0103)	-0.0123 (0.0096)	-0.0447*** (0.0103)	-0.0314*** (0.0097)
sigma_u		0.0080	0.0031		0.0067	0.0033
sigma_e		0.0045	0.0045		0.0044	0.0044
rho		0.7571	0.3128		0.7042	0.3626
Log-Likelihood	354.04	394.74		358.16	398.89	
F-test/Wald test	56.415 (<i>p</i> <0.000)	1,078.58 (<i>p</i> <0.000)	6974.04 (<i>p</i> <0.000)	106.54 (<i>p</i> <0.000)	1,032.26 (<i>p</i> <0.000)	7105.97 (<i>p</i> <0.000)
R ²	0.854	0.900	0.805	0.866	0.908	0.804
Adjusted R ²	0.843	0.892		0.856	0.901	
N	96	96	96	96	96	96

Note: The table reports panel fixed effect regression estimates of capital structure and other bank specific (control variables) as determinants for bank profitability. In Case -I we use total debt ratio (TDR) whereas in Case -II the study uses short-term debt ratio (STDR) as measures of capital structure, respectively. For the first case, the test statistics for the Breusch and Pagan Lagrangian multiplier Chi² test for random effects is 10.05 with Pro-Chi² (*p*=0.0008 <1%) and the Hausman specification test statistics is 45.26 with Pro-Chi² (*p*=0.0000 < 1%)(H₀: The random effective model is efficient). For the second case, the test statistics for the Breusch and Pagan Lagrangian multiplier Chi² test for random effects is 12.24 with Pro-Chi² (*p*=0.0002 < 1%) and the Hausman specification test statistics is 24.52 with Pro-Chi² (*p*=0.0009 < 1%) (H₀: The random effective model is efficient). Values in parenthesis are heteroscedasticity corrected standard errors of coefficient estimates. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

Table A3. Multilevel regression results using ROE as a dependent variable

Variables	Case 1			Case 2		
	OLS	FE	RE	OLS	FE	RE
TDR	0.0581*** (0.0199)	-0.0642** (0.0278)	0.0073 (0.0262)	/ /	/ /	/ /
STDR	/ /	/ /	/ /	0.0618*** (0.0221)	-0.0550** (0.0250)	0.0173 (0.0240)
SIZE	0.0746*** (0.0070)	-0.0104 (0.0131)	0.0417*** (0.0097)	0.0731*** (0.0070)	-0.0099 (0.0134)	0.0426*** (0.0093)
AGE	0.0023* (0.0013)	0.0026** (0.0011)	0.0027* (0.0015)	0.0023* (0.0013)	0.0025** (0.0012)	0.0027* (0.0015)
LDR	-0.0308 (0.0521)	0.0343 (0.0339)	0.0211 (0.0307)	-0.0267 (0.0512)	0.0343 (0.0340)	0.0213 (0.0308)
CIR	-0.7932*** (0.1251)	-0.3314** (0.1528)	-0.6406*** (0.1356)	-0.7737*** (0.1241)	-0.3542** (0.1483)	-0.6481*** (0.1339)
CR	2.2058* (1.1350)	-0.0801 (1.0833)	0.7432 (1.1857)	2.0762* (1.1162)	-0.0161 (1.1335)	0.7818 (1.1899)
EP	-0.0778 (0.0742)	0.9540*** (0.3293)	0.2000 (0.1915)	-0.0527 (0.0695)	0.9226*** (0.3219)	0.1735 (0.1748)
Cons	0.0419 (0.0922)	0.4390*** (0.0937)	0.2183** (0.0957)	0.0418 (0.0904)	0.4416*** (0.0941)	0.2123** (0.0970)
sigma_u		0.1362	0.0469		0.1372	0.0470
sigma_e		0.0439	0.0439		0.0443	0.0443
rho		0.9058	0.5333		0.9058	0.5296
Log-Likelihood	126.12	177.01		127.24	176.21	
F-test/Wald test	24.75 (p<0.000)	33.8210 (p<0.000)	99.35 (p<0.000)	25.496 (p<0.000)	30.2870 (p<0.000)	91.59 (p<0.000)
R ²	0.659	0.659	0.559	0.667	0.654	0.612
Adjusted R ²	0.632	0.632		0.640	0.626	
N	96	96	96	96	96	96

Note: The table reports panel fixed effect regression estimates of capital structure and other bank specific (control variables) as determinants for bank profitability. In Case -I we use total debt ratio (TDR) whereas in Case-II the study uses short-term debt ratio (STDR) as measures of capital structure, respectively. For the first case, the test statistics for the Breusch and Pagan Lagrangian multiplier Chi² test for random effects is 13.21 with Pro-Chi² (p=0.0001 <1%) and the Hausman specification test statistics is 17.41 with Pro-Chi² (p=0.0150 < 5%)(Ho: The random effective model is efficient). For the second case, the test statistics for the Breusch and Pagan Lagrangian multiplier Chi² test for random effects is 13,14 with Pro-Chi² (p=0.0001 < 1%) and the Hausman specification test statistics is 6.54 with Pro-Chi² (p=0.4779 < 5%)(Ho: The random effective model is efficient). Values in parenthesis are heteroscedasticity corrected standard errors of coefficient estimates. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.



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