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Firm-specific and country-level determinants of commercial banks capital structures: evidence from Ethiopia

Tekalign Negash Kebede[1*]

*Correspondence:
tekanega@gmail.com

[1] College of Business and Economics, Department of Accounting and Finance, Hawassa University, Hawassa, Ethiopia

Abstract

Since the seminal work of MM irrelevance theory, there has been a long history of controversy among academicians both in developed and developing nations regarding the determinants of capital structure. To this end, the main aim of this study was to investigate firm-specific and country-level determinants of the capital structure of Ethiopian commercial banks. The study adopted an explanatory research design with a quantitative research approach. A panel dataset was obtained from 14 commercial banks, which range from 2010 to 2022. A random effect panel regression result revealed that tangibility, non-debt tax shields, growth, and interest rate had a positive and significant effect, while the gross domestic product had a negative and significant effect on leverage which is used as a measure of capital structure. Among the independent variables tested, ROA, liquidity, effective tax rate, risk, and inflation have an insignificant effect on the capital structure of the selected commercial banks. The study will have implications for managers of commercial banks, legislators, regulators, and other interested parties that can use the study's conclusions to help them make well-informed capital decisions and implement the necessary measures to enhance the financial performance of Ethiopian banks with an optimal ratio of debt to equity.

Keywords: Commercial banks, Firm-specific variables, Macroeconomic variables, Random effect, Ethiopia

JEL Classifications: C01, C23, G21, M41, F65, E44

Introduction

The firm's financial health depends on the different financing choices made. Since the seminal work of Modigliani and Miller (MM) theory (Modigliani & Miller, 1963), one of the most popular and controversial corporate finance issues among academics, researchers, and financial managers is the capital structure (hereafter called CS). Its significance stems from the simple fact that CS is vehemently associated with businesses' capacity to satisfy the needs of many stakeholders. In the face of intense competition, a robust financial structure will strengthen the company and give it a competitive edge.

Laux (2011) claims CS is the combination of debt and equity used to fund a company's assets. Choosing the CS is one of the most crucial yet daunting tasks since it has a

significant impact on the performance (Owolabi & Inyang, 2013), competitiveness, and survival (Aggarwal, 1990) of the business. Since choosing a company's CS is a very complicated process, existing theories can only explain certain aspects of the diversity and complexity of these decisions. Instead, since there is no one universal theory of capital structure, various theories of CS explain the decisions made regarding a company's CS from various angles.

It is crucial to look at whether the applicability of CS theories can be supported in the setting of developing nations like Ethiopia because most of the previous research was conducted in the most advanced economies with robust capital markets (see, for example, Australia (Li & Stathis, 2017). Sweden (Yazdanfar & Öhman, 2016), Taiwan (Chen, 2011), Malaysia (Saif et al., 2020), Spain (Miguel & Pindado, 2001), Turkey (Cevheroglu-Acar, 2018), Brazil (Matsuo & Eid Jr., 2009). Portugal (Neves et al., 2020), Germany (Jamin & Lenz, 2022), Nepal (Pradhan & Pokharel, 2016), China (Kaakeh & Gokmenoglu, 2022), Hong Kong (Yat Hung et al., 2002), Pakistan (Liaqat et al., 2021), India (Handoo & Sharma, 2014), Jordan (Gharaibeh & AL-Tahat, 2020), Kenya (Gathogo & Ragui, 2014), Ghana (Dabi et al., 2023), South Africa (Ramjee & Gwatidzo, 2012), and Nigeria (Bolarinwa & Adegboye, 2020).

The results that have been derived in the case of developed economies may not be extended in the context of developing countries like Ethiopia, as there are considerable differences across countries related to the corporate and legal environment, taxation system, and corporate governance laws in which firms operate, which impact their corporate decisions, including capital structure choices. Apart from this, interest rate environments, banking systems, sources of funds, etc., all differ from country to country. Consequently, it is imperative to focus on countries individually.

Some of the previous research from Ethiopia has included: Ashenafi (2005) conducted research on small and medium enterprises; Amanuel (2011) conducted research on manufacturing companies; Beshir (2015) conducted research on insurance companies; Assfaw (2020) and Fisseha (2010) on banks. Despite the fact that there has been a clear increase in this type of research in developing countries in recent years, the dearth of research certainly encourages further empirical research, particularly in Ethiopia, which is one of the fastest-growing economies in the region, with an estimated 6.4% growth in FY2021/22 (The World Bank, 2023).

Because conflicting theoretical stances and empirical findings were found in Ethiopia, the current study was required. According to the researcher's understanding of empirical study, not many studies on the factors influencing capital structure in the banking industry have been carried out in Ethiopia. However, earlier research carried out in Ethiopia also did not take macroeconomic (external) influences over a brief time span into account. Thus, over an extended period of time (2010–2022), this study looks at capital structure and its determinant factor on the banking industry in Ethiopia as measured by leverage, taking into account both firm-specific factors (profitability, tangibility, non-debt tax shield, liquidity, effective tax rate, growth, earning volatility) and macroeconomic factors (inflation, saving interest rate, and GDP).

This study makes three contributions to the body of literature already in existence. First, it offers important proof regarding Ethiopia's commercial banks capital structure conundrum. Second, it looks into the factors that influence capital structure decisions

using random effect model analysis. Thirdly, it offers the first data regarding Ethiopia's banks capital structure issues over an extended period of time using a long list of variables.

Accordingly, the remainder of the paper is structured as follows: the "Literature review and hypothesis development" section gives a summary of the theories of CS literature, and this part derives research hypotheses on possible variables that could affect CS based on theoretical and empirical findings. The research methodology is described in the "Methods". The empirical findings of the study are presented in the "Results and discussion". "Conclusion, implications, and ideas for future research" discusses the study's findings. Some closing thoughts are presented in the final section.

Literature review and hypothesis development

The theoretical foundations of CS are briefly discussed in this part in order to guide the selection of determinants to be used when making CS choices. The section also goes through the typical empirical factors that most studies employ to determine CS at the business and country level to come up with formulations of hypotheses.

Theories of capital structures

Modigliani and Miller (MM) theory

The so-called irrelevance theory, established by Modigliani and Miller, is one of the most noteworthy theories of CS (Modigliani & Miller, 1958). Despite the fact that the theory has been challenged by a myriad of research scholars, its significance is particularly evident in the fact that a number of modern CS theories have been built upon the Modigliani–Miller (MM) hypothesis. Several scholars (like Alipour et al. (2015), Amraoui and Jianmu, (2018), Balios et al. (2016), Bukair, (2019), Chipeta and Deressa (2016), Kahya et al. (2020), Nawi (2017), Rodrigues et al. (2017), and Ukaegbu and Oino (2014)) applied this theory as the foundation for determining firms' capital structure.

Agency cost theory

The theory accounts for the impact of agency costs, or expenses brought on by agent conflicts of interest. Numerous studies have been done on the models where agency costs determine capital structure. The groundbreaking study on this subject by Jensen and Meckling (1976) was based on the prior work of Fama and Miller (1972). They suggested that these expenses result from a conflict of interest between managers and stockholders, who both want to maximize their own interests. Additional costs are incurred by shareholders and debt holders, and these are technically termed agency costs of debt. According to Myers (1977), if a corporation has outstanding default-risky debt and a good investment opportunity that must be financed by stock, it may incur deadweight costs. Managers will not take on the project in this scenario, even if it is profitable, if the residual benefits to shareholders are less than the project's costs after being distributed to debt holders. The underinvestment problem occurs when managers make decisions that transfer wealth from debt holders to shareholders while operating in the best interests of shareholders. Scholars (e.g., Amraoui & Jianmu, 2018; Bilgin & Dinc, 2019; Burgstaller & Wagner, 2015; Handoo & Sharma, 2014; Jędrzejczak-Gas, 2018; Moradi & Paulet, 2019; Rashid et al., 2020; Sakr & Bedeir, 2018; Shahzad et al., 2020; Vo, 2017; Yazdanfar et al.,

2019), when researching factors influencing capital structure, this notion was validated. Therefore, the optimum CS is obtained when there is less animosity between owners and managers, enabling managers to choose wisely how to finance their companies.

Trade-off theory

The Miller and Modigliani theory, which promoted the advantages of debt financing through debt-related tax shields, sparked the development of the trade-off theory (hereafter called TOT). There were concerns raised about the lack of an offset cost for debt. As a result, a discussion ensued, with participants agreeing that the best leverage should be chosen where there is a trade-off between the advantages of debt as a tax shield and the costs of financial distress (Shyam & Myers, 1999). Debt makes it possible to deduct interest payments, which increases the incentive to use more leverage to optimize the tax break. By doing this, the value of the tax shield and the firm value rise together (Graham, 2000). According to Damodaran (2001), higher debt levels force managers to exercise greater financial restraint. Concerns have been voiced, meanwhile, regarding the potential for higher agency fees between owners and managers as well as the rising risks of bankruptcy brought on by rising debt levels. A conflict of interests brought on by debt is one of the fundamental causes of this Myers (1984). As a result, when achieving a trade-off by weighing the advantages of debt against the costs of financial distress, the ideal debt level that maximizes the value of the enterprise does exist, according to the trade-off theory.

Pecking order theory

The pecking order theory (hereafter called POT) does not presuppose an ideal amount of capital structure, in contrast to the trade-off theory. The pecking order hypothesis, which integrates the assumptions of information asymmetries and transaction costs, is preferred by Myers and Majluf (1984). The POT asserts that businesses strongly favor internal financing because it is thought to be more affordable than new debt and equity (Myers, 1984). When companies need external financing, they first issue debt and then, after exhausting all other "safe" choices, equity. Since Myers (1984) and Myers and Majluf (1984) initially suggested the pecking order idea, the literature on it has been dormant since the early 1980s. In order to reduce knowledge asymmetry between the parties, this pecking order hypothesis advises that enterprises should adhere to a funding hierarchy. The article claims that businesses prioritize their sources of funding, from internal finance to stock financing, in accordance with the principle of least resistance, with equity raising being the last choice for financing. The POT contends that internal resources are used first and that enterprises will only optimally employ debt once all internal resources have been exhausted. They will finally turn to equity as a last resort when it becomes unwise to issue any more debt (Henrik & Sandra, 2004). Former research scholars like Alnori and Alqahtani (2019), Daskalakis et al. (2017), Gottardo and Maria Moisello (2014), Güner (2016), Hang et al. (2018), Kaur et al. (2020), Kedzior et al. (2020), Leary and Roberts (2014), Matias and Serrasqueiro (2017), Moradi and Paulet (2019), Proença et al. (2014), Ramli et al. (2019), Rashid et al. (2020), Sikveland and Zhang (2020), Soykan and Ulucak, (2016), Yazdanfar et al. (2019) and Yildirim et al. (2018) used the pecking order to derive the determinants of capital structure.

Market timing theory

Considering an external finance average weighted by the market-to-book ratio, Baker and Wurgler (2002) hypothesis takes stock market timing into consideration. According to the market timing hypothesis, organizations in business make steady adjustments to achieve a targeted debt ratio, but equity financing is only selected when it seems to be more valuable to financial markets. Additionally, Welch (2004) makes reference to the fact that firms observe share price variations prior to making an equity financing decision. As a result, previous research scholars like Brown et al. (2019), Louziri (2018), Shahzad et al. (2020) and Tin and Diaz (2017) among others, used the market timing theory to examine the factors that affect CS in corporate organizations.

Empirical evidence and hypotheses formulations

Many authors attempted to explain the factors that determine capital structure, but their efforts yielded conflicting findings. Nonetheless, empirical evidence from some previous studies seems to be consistent with the POT and TOT. Here is a long list of studies that were previously conducted in different economic periods and across mixed economic setups.

Profitability (ROA)

Profitability has been viewed as an instrument for the survival of business organizations. The majority of empirical research does not consistently show how profit affects leverage as a proxy for capital structure. The majority of empirical research shows an inverse link between profitability and leverage. For example, Demirgüç-Kunt and Maksimovic (1999), Gebreyes Begna (2018), Huang and Song (2002), Myers and Majluf (1984), Miguel and Pindado (2001), Rajan and Zingales, (1995), Sheikh and Wang (2011), Titman and Wessels (1988), Tomak (2013), Wahab et al. (2012), Wahab and Ramli (2014), Yolanda & Soekarno (2012), and on the contrary, a few researchers like Dasilas and Papasyriopoulos (2015), Qiu and La (2010) and Rani et al. (2019) have found positive correlations between profitability and capital structure.

H_1 Profitability has a statistically positive effect on a bank's CS decision.

Asset tangibility

The majority of CS theories contend that a company's choice of CS is one way or another influenced by the kind of assets it owns. As established through countless previous investigations, asset tangibility as a variable is observed to have a relationship with leverage. Just to mention a few, Alves et al., (2015, Faccio and Xu (2015), Morri and Parri (2017), Rashid et al., (2020), Rovolis and Feidakis, (2014), and Sarlija and Harc (2016) found asset tangibility affects leverage positively. Researchers have also shown a negative correlation between asset tangibleness and leverage (see Hang et al., 2018; Moradi & Paulet, 2019; Pacheco & Tavares, 2017); ; .

H_2 Asset tangibility has a statistically positive effect on a bank's CS decision.

Growth

A number of research scholars have found a strong correlation between growth and leverage, as demonstrated by Ramli et al. (2019), Rashid et al. (2020), and Vo (2017). Other researchers, such as Dasilas and Papasyriopoulos (2015), Milos (2015), Neves et al. (2020), Sánchez-Vidal (2014), Sikveland and Zhang (2020), and Zhang and Liu (2017), have discovered a negative connection.

H_3 Growth has a statistically negative effect on a bank's CS decision.

Non-debt tax shield

Another deterministic variable that has frequently been looked into in studies on capital structures is the non-debt tax shield. While Mackie-Mason (1990) and Sánchez-Vidal (2014) found a positive relationship between non-debt tax shield and capital structure, on the contrary, other scholars like Daskalakis et al. (2017), Matemilola et al. (2018), Ramli et al. (2019), Soykan and Ulucak (2016), and Zhang and Liu (2017) have discovered a negative correlation, as shown by:

H4 The non-debt tax shield has a statistically positive effect on a bank's CS decision.

Liquidity

Most of the time, liquidity can be defined as the ratio of current assets to current liabilities (Bilgin & Dinc, 2019; Soykan & Ulucak, 2016; Vo, 2017). Research scholars at different times and places have attempted to look into the link between CS and liquidity, with varying degrees of success. For instance, some authors, such as Güner (2016), Guner (2016), Kahya et al. (2020), Kahya et al. (2020), and Milos (2015), indicate an inverse relationship between liquidity and firm CS measured by the ratio of debt to total assets, while others, like Kaur et al. (2020), Rani et al. (2019), and Sharma and Paul (2015), found a direct relationship between liquidity and leverage.

H_5 Liquidity has a statistically negative effect on a bank's CS decision.

Earning volatility (risk)

Numerous researchers have found a correlation between earnings instability and CS in the scientific literature. Scholars like Neves et al. (2020) propose a negative link between earnings volatility and leverage; however, authors like Mohd (2015), Hang et al. (2018), Sofat and Singh (2017), Soykan and Ulucak (2016), and Zhang and Liu (2017) corroborate a positive relationship.

H_6 Earning volatility (risk) has a statistically negative effect on a bank's CS decision.

Effective tax rate

DeAngelo and Masulis (1980) and Zimmerman (1983) come up with a substantial positive association between a firm's effective tax rate and its leverage ratio, suggesting that tax influences the selection of CS decisions. However, Antoniou et al. (2008) determined

that there is an indirect association between the effective tax rate and debt ratios, stating that the influence of this rate on CS is dependent on each country's tax policies. Furthermore, Karadeniz et al. (2009) and Sogorb-Mira (2005) confirmed the negative association between the effective tax rate and debt ratios. The improvements from borrowing grows with the effective tax rate (Antoniou et al., 2008).

H_7 Effective tax rate has a statistically positive effect on a bank's CS decision.

GDP

With regard to its impact on the firm's financing decisions, the GDP growth rate is among the most frequently used variables in empirical studies. Bastos et al. (2009), Alufar Bokpin (2009), Dincergok and Yalciner (2011), and Camara (2012) through previous research have come with some conflicting results. Accordingly, studies by Daskalakis and Psillaki (2008), Baltaci and Ayaydin (2014), and others have confirmed the positive correlation between GDP growth rate and leverage. The rate of GDP growth and leverage were found to be inversely related in research by Alufar Bokpin (2009), Camara (2012), Dincergok and Yalciner (2011), Gajurel (2006) and Köksal and Orman (2015).

H_8 GDP has a statistically positive effect on a bank's CS decision.

Inflation

Another extensively studied macroeconomic factor in the earlier research was the inflation rate, although the outcomes of these investigations have been mixed. Inflation has no influence on the capital structure, according to Bastos et al. (2009). Gajurel (2006) demonstrates that, based on debt structure, inflation has a negative relationship with overall leverage and the short-term debt ratio but a positive relationship with the long-term debt ratio.

H_9 Inflation has a statistically negative effect on a bank's CS decision.

Interest rate

It is still mysterious how the company's appropriate mix of debt and equity selection connects to its CS conceptually. Studies by Bancel and Mittoo (2004), Bartholdy and Mateus (2008), Graham (2000) and Henderson et al. (2004) revealed that interest rates and leverage are negatively related. On the contrary, scholars like Bopkin (2009) found a direct correlation between interest rates and CS.

H_{10} Interest rate has a statistically negative effect on a bank's CS decision.

Conceptual framework

A conceptual framework has been developed based on the latest literature and the above formulated hypotheses that diagrammatically portray the relationships between key variables affecting capital structure decisions. In this framework, variables such as risk, growth, profitability, non-tax debt shield, inflation, GDP, asset tangibility, liquidity, tax rates, and

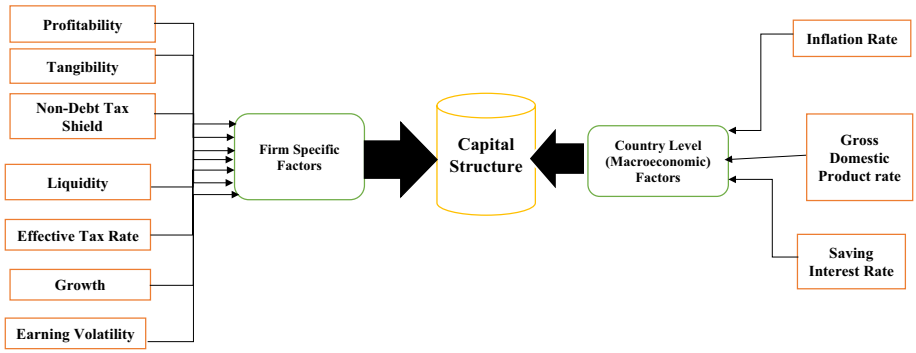

Fig. 1 Conceptual framework (2023) Source: Researcher's own constructions

interest rates are mapped in a systematic way and their hypothesized interactions indicated. This provides a canvas of how all these factors integrate to determine capital structure. Underpinned by relevant theories, this framework acts as a very strong analytical tool that will give insight into the dynamic interplay of these variables in their influence on capital structure decisions (Fig. 1).

Methods

Data and sample size

The research approach employed in the current study was a quantitative research approach with an explanatory research design because the objective of this study is to identify firm-specific and macroeconomic determinants of capital structure for commercial banks of Ethiopia. The target population of this study is all commercial banks in Ethiopia. Currently, there are 30 commercial banks operating in Ethiopia (NBE, 2022/23). The study applied the judgmental sampling technique. From the total of 30 commercial banks, only 14 that have a 13 year (2010–2022) annual report were selected. The study obtained financial data of the sampled commercial banks and macroeconomics data from National Bank of Ethiopia.

Model specifications

According to Brooks (2014), regression differs from correlation in that if X has a significant impact on Y, then X's change will also affect Y's change. This suggests that the relationship between dependent and explanatory factors is shown by regression. Thus, a multiple linear regression model was employed to examine the impact of firm-specific and macroeconomic factors on the capital structure of commercial banks. In order to accomplish the stated goal of this study, a multiple linear regression model was used. The important variables that have a substantial impact on a company's capital structure served as the representatives for the variances. The following linear format is used to estimate and report the regression model:

$$\begin{aligned} \mathrm{LEV_{it}} =& \beta_0 + \beta_1 \mathrm{ROA_{it}} + \beta_2 \mathrm{TANG_{it}} + \beta_3 \mathrm{NDTS_{it}} + \beta_4 \mathrm{LIQ_{it}} \\ &+ \beta_5 \mathrm{TAX_{it}} + \beta_6 \mathrm{GROW_{it}} + \beta_7 \mathrm{RISK_{it}} + \beta_8 \mathrm{GDP_{it}} \\ &+ \beta_9 \mathrm{INF_{it}} + \beta_{10} \mathrm{INT_{it}} + \varepsilon_{it} + \mu_{it}, \end{aligned}$$

where i, denote individual commercial banks; t, epitomize time; β_0, represent constant term; β1–β10 symbolizes coefficient for the respective of independent variables; Lev,

Table 1 Variable definitions and measurements

Variable		Formula	Empirical evidences which corroborate the variables to be included in this research	Exp. sign
DV	Leverage	$\frac{\text{Total debt}}{\text{Total assets}}$		
IV	ROA (profitability)	$\frac{\text{Operating income}}{\text{Total assets}}$	Sheikh and Wang (2011), Wahab et al., (2012), Yolanda and Soekarno (2012), Tomak (2013), Wahab and Ramli (2014), Gebreyes Begna (2018), Qiu and La (2010), Dasilas and Papasyriopoulos (2015) and Rani et al., (2019), Gilani et al. (2023)	–
	Tangibility	$\frac{\text{Total fixed assets}}{\text{Total assets}}$	Alves et al., (2015), Faccio and Xu (2015), Morri and Parri (2017), Rashid et al. (2020), Rovolis and Feidakis (2014), and Sarlija and Harc (2016) Hang et al., (2018), Moradi and Paulet (2019), Pacheco and Tavares (2017), and Yasin et al., (2023)	+
	Growth	*A*nnual change in total assets	Ramli et al. (2019b), Rashid et al., (2020) and Vo (2017). Other researchers such as Dasilas and Papasyriopoulos (2015), Milos (2015), Neves et al., (2020), Sánchez-Vidal (2014), Sikveland and Zhang (2020), and Zhang and Liu (2017)	–
	Non-debt tax shield	$\frac{\text{Depreciation}}{\text{Total assets}}$	Sánchez-Vidal (2014), Daskalakis et al. (2017), Matemilola et al., (2018), Ramli et al. (2019), Soykan and Ulucak (2016), and Zhang and Liu (2017), Yasin and Gilani (2022)	+
	Liquidity	$\frac{\text{Current asset}}{\text{Current liabilities}}$	Bilgin and Dinc (2019), Soykan and Ulucak (2016), Vo (2017), Güner (2016), Milos (2015), Kaur et al., (2020), Rani et al., (2019), and Sharma and Paul (2015)	–
	Effective tax rate (tax)	$\frac{\text{Business taxes}}{\text{Earning before taxes}}$	Bui Thanh Khoa and Duy Tung Thai (2021), Karadeniz et al., (2009) Sogorb-Mira (2005), and Antoniou et al., (2008)	+
	Risk	Standard deviation of operating income	Neves et al., (2020, Mohd (2015), Hang et al., (2018), Sofat and Singh (2017), Soykan and Ulucak (2016) and Zhang and Liu (2017)	–
	GDP	Real gross domestic product	Bastos et al., (2009), Alufar Bokpin (2009), Dincergok and Yalciner (2011), Camara (2012), Daskalakis and Psillaki (2008), Baltaci and Ayaydin (2014), Gajurel (2006), Alufar Bokpin (2009) Dincergok and Yalciner (2011) Camara (2012) and Köksal and Orman (2015), Gilani et al., (2023)	–
	Inflation	Annual inflation rate	Bastos et al., (2009), and Gajurel (2006)	–
	Interest rate	Annual interest rate	Graham (2000), Bancel and Mittoo (2004), Henderson et al., (2004) Bartholdy and Mateus (2008), and Bokpin (2009)	+

Table 2 Correlation matrix

Variables	LEV	ROA	TANG	NDTS	LIQ	TAX	GRO	RISK	GDP	INF	INT_RATE
LEV	1.000										
ROA	0.118	1.000									
	0.127										
TANG	0.447	0.021	1.000								
	0.000*	0.784									
NDTS	0.466	0.058	0.414	1.000							
	0.000*	0.454	0.000*								
LIQ	− 0.059	− 0.048	− 0.033	0.142	1.000						
	0.445	0.536	0.668	0.066***							
TAX	0.184	− 0.045	0.245	0.458	0.100	1.000					
	0.017	0.565	0.001*	0.000*	0.197						
GRO	0.351	0.041	0.160	0.215	0.017	0.003	1.000				
	0.000*	0.594	0.038**	0.005*	0.828	0.964					
RISK	− 0.155	0.117	− 0.091	0.010	0.093	− 0.087	− 0.041	1.000			
	0.045**	0.132	0.241	0.901	0.229	0.262	0.599				
GDP	− 0.308	− 0.044	− 0.051	− 0.061	0.285	− 0.029	0.019	0.136	1.000		
	0.000*	0.573	0.508	0.433	0.000*	0.705	0.804	0.079***			
INF	0.073	− 0.050	0.104	0.098	− 0.088	0.252	0.050	− 0.177	− 0.473	1.000	
	0.344	0.516	0.180	0.207	0.258	0.001*	0.524	0.022**	0.000*		
INT_RATE	0.244	0.136	− 0.008	− 0.018	− 0.165	− 0.132	− 0.066	0.073	− 0.308	− 0.513	1.000
	0.001*	0.079***	0.923	0.815	0.033**	0.088***	0.398	0.350	0.000*	0.000*	

LEV leverage, *ROA* return on asset, *TANG* tangibility, *NDTS* non-debt tax shield, *LIQ* liquidity, *TAX* effective tax rate, *GROW* growth, *RISK* earning volatility, *GDP* gross domestic product growth rate, *INF* inflation, *INT_RATE* saving interest rate

*Correlation is significant at the 0.01 level (2-tailed); **correlation is significant at the 0.05 level (2-tailed) and ***correlation is significant at the 0.10 level (2-tailed)

is proxy of CS of banks; Profitability (ROA), tangibility (TANG), non-debt tax shield (NDTS), liquidity (LIQ), effective tax rate (TAX), growth (GROW), earning volatility (RISK), gross domestic product growth rate (GDP), inflation (INF), and saving interest rate (INT) (Table 1).

Results and discussion

Correlation analysis

The primary objective of correlation analysis, according to Gujarati (2004), is to determine the degree of linear relationship between two variables. Pearson correlation analysis was used in this research to figure out the degree of correlation between dependent variables and explanatory factors as well as the degree of correlation between independent variables. The table below depicts the relationship between independent and dependent variables.

As seen in Table 2, Pearson's correlation coefficients among the variables that explain this have been examined to validate the lack of multicollinearity issues. According to Kennedy (1985) and Tabachnick and Fidell (1996), multicollinearity should be regarded as a major concern only if the coefficient of correlation across variables that explain something exceeds 0.8. The Pearson correlation coefficients between explanatory variables are not strong (the maximum scored result is 0.524, which is in between inflation and growth), as seen in Table 2 above. As a consequence, there are no multicollinearity issues that must be addressed.

Moreover, coming to the correlation between variables, as shown in Table 2, liquidity (LIQ), earning volatility (RISK), and GDP had a negative correlation with leverage (LEV). It suggests an increase in these variables may result in a decline in LEV, which in turn decreases indebtedness. While profitability (ROA), tangibility (TANG), non-debt tax shield (NDTS), effective tax rate (TAX), growth (GRO), inflation (INF), and interest rate (INT_RATE) had a positive correlation with leverage used as a proxy for CS decisions, it indicates that an increase in these variables leads to an increase in the amount of debt in their capital structure, which may increase their obligations and, in the worst-case scenario, may harm the commercial banks financial stability, leading to distress.

Model specification test

The likelihood ratio was utilized in this research to determine whether fixed-effect regression or POLS regression was appropriate for this data set. The test findings indicated that both cross-section F and cross-section Chi-square had significant *p*-values of 0.000, as shown in Table 3. Consequently, the null hypothesis that stated POLS is the best model is rejected, and the researcher concludes that fixed-effect regression is the best fit for this data set.

Above all, the Hausman specification test is employed in the present study when deciding between fixed and random effect models for parameter estimation. To start with, the fixed-effect regression was conducted and saved. The random effect regression was then conducted and saved. Finally, the Hausman test was carried out, and the *p*-values obtained were 0.700. Considering the p-values are relatively insignificant (>0.05),

Table 3 Model specification test

	Statistic	*df*	Prob
Redundant fixed effects tests-likelihood ratio (POLS or fixed effect)			
Cross-section F	7.975982	− 13,144	0.0000
Cross-section Chi-square	91.115752	13	0.0000

Test summary	Chi-Sq. statistic	Chi-Sq. d.f	Prob
Correlated random effects—Hausman test (fixed effect or random effect)			
Cross-section random	9.685312	4	0.0700

Source: Researcher's own computation and EViews Output (2023)

this study concludes that the random effect model would be the most appropriate and suitable for this data set.

Regression output

The outcome demonstrates that the general model goodness, as indicated by the F-statistic, is met. The model accounts for about 37.33% of the variance in the dependent variable (leverage) as described by the independent variables profitability, tangibility, non-debt tax shield, liquidity, earnings volatility, effective tax rates, GDP, inflation, and saving interest rate. An *R*-squared between 0.10 and 0.50 (or 10% and 50% when reported in percentage) is acceptable in social science research only when some or all of the explanatory variables are statistically significant (Ozili, 2023). The adjusted *R*-square on the above regression result is also 33.45%, which is very close to the *R*-square, indicating that the sample size used in this study is representative of the population, and it can also show that the explanatory variables and the explained variable have a very honest statistical association. The beta coefficient in the preceding regression model reflects the degree to which each independent variable's coefficient affects the dependent variable in both directions. The p-value of each independent variable, on the other hand, shows that the percentage level of each explanatory variable is significant.

As demonstrated in Table 4 which is the regression table, ROA, TANG, NDTS, LIQ, TAX, GRO, INF, and INT_RATE have positive coefficients, indicating that a rise in these variables would result in an increase in commercial banks' total debt to total asset ratio (leverage). Whereas RISK and GDP have a negative coefficient, indicating an inverse link with commercial bank leverage, a rise in these factors will reduce the utilization of external debt.

Profitability and leverage

As one can see from Table 4, profitability (ROA) has a positive but statistically insignificant ($\beta = 0.0797$, $t = 1.5264$, $p > 0.10$) impact on leverage, which is used as a proxy for the CS decisions of commercial banks. This result is consistent with the TOT, which posits that profitability and debt ratios have a positive connection. On the one hand, a prosperous company may choose debt since it maximizes its worth due to tax benefits. Profitability, on the contrary, demonstrates a signal to the lender about the business's financial condition and eliminates information asymmetries, which are a key barrier to funding

Table 4 Regression result

Method: panel EGLS (cross-section random effects)				
Variable	**Coefficient**	**Std. error**	***t*-Statistic**	**Prob.**
C	0.3096	0.0928	3.3352	0.0011
ROA	0.0797	0.0522	1.5264	0.1289
TANG	0.1631	0.0425	3.8342	0.0002*
NDTS	0.3502	0.0944	3.7091	0.0003*
LIQ	0.0021	0.0298	0.0711	0.9434
TAX	0.0180	0.0460	0.3905	0.6967
GRO	0.0344	0.0106	3.2572	0.0014*
RISK	− 0.0077	0.0053	− 1.4643	0.1451
GDP	− 0.0042	0.0016	− 2.5911	0.01**
INF	0.0063	0.0376	0.1683	0.8665
INT_RATE	0.7559	0.2916	2.5920	0.01**
R-squared	0.374359			
Adjusted R-squared	0.334509			
F-statistic	9.394271			
Prob(F-statistic)	0.000000			
Durbin–Watson stat	1.741949			

Source: Researcher's own computations and EViews Output (2023)

LEV leverage, *ROA* return on asset, *TANG* tangibility, *NDTS* non-debt tax shield, *LIQ* liquidity, *TAX* effective tax rate, *GROW* growth, *RISK* earning volatility, *GDP* gross domestic product growth rate, *INF* inflation, *INT_RATE* saving interest rate

*Correlation is significant at the 0.01 level (2-tailed)

commercial banks. Moreover, previous research also corroborates this finding (Chiang et al., 2010; Daskalakis et al., 2017; Margaritis & Psillaki, 2007; Rani et al., 2019).

Tangibility and leverage

The random effect model findings in Table 4 revealed that the correlation among tangibility and leverage was positive and statistically significant (p-value = 0.0002) at the 1% level. As a consequence, the final result aligned with the already-formulated hypothesis. This finding additionally indicates that every 1% point shift (increase or decrease) in the bank's tangibility, while holding everything else equal, resulted in a 16.31% change in leverage in the same direction. This study outcome concurs with TOT and agency cost, which predict that the tangibility of an asset has a beneficial effect on the organization's debt level. As a result, a firm with more physical assets has more collateral to cover debt in the case of bankruptcy and so has a larger potential to obtain further debt. Comparable past research has also been discovered, which complements the present study's findings (Alves et al., 2015; Faccio & Xu, 2015; Rashid et al., 2020; Rovolis & Feidakis, 2014).

NDTS and leverage

Based on the parameter estimates, the current study finds a significant and positive relationship between non-tax debt shields (NDTS) and leverage. This finding is consistent with TOT and previous research (Mallikarjunappa & Goveas, 2007; Sánchez-Vidal, 2014). However, the results of random effect analysis contradict the empirical studies,

which alluded to a negative relationship (Daskalakis et al., 2017; Qian et al., 2008; Ramli et al., 2019; Soykan & Ulucak, 2016; Zhang & Liu, 2017).

Growth and leverage

Growth and leverage have a positive and significant relationship, according to the random effect regression analysis (p-values 0.001). The finding of a positive association might be due to the fact that rising commercial banks depend increasingly on external borrowings to capitalize on market possibilities. This argument is backed by the POT and the preceding studies (Ramli et al., 2019; Rashid et al., 2020; Vo, 2017). The most likely explanation is that expanding banks need to expand their branches to serve more consumers, which requires them to take on more debt.

Liquidity and leverage

As illustrated in Table 4, liquidity had a positive relationship with leverage and was insignificant (p-value > 0.1000). This positive, insignificant relationship implies that banks with liquid assets such as cash and marketable securities prefer external sources to finance future investments after weighting the possible cost of interest on debts and related tax deductibility benefits derived from debt. Ultimately, the findings of this research are consistent with the TOT. Previous research scholars (Bukair, 2019; Faris Nasif Al-Shubiri, 2011; Teixeira et al., 2014; Ukaegbu & Oino, 2014) also validate the positive association between liquidity and leverage.

Earning volatility and leverage

The risk utilized in this research model to depict earning volatility is negligible ($\beta = -0.0077$, $t = -1.4643$, p-value = 0.1451) in explaining Ethiopian commercial banks' CS choices. The outcome of this research is consistent with TOT's theory, which states that greater earnings volatility or business risk for an enterprise boosts the possibility of problems with finances. In addition, the results also line up with the POT, which predicts a negative link between leverage and a firm's earning volatility (Neves et al., 2020; Weldemikael Shibru, 2012). Nonetheless, this finding contradicts the following research (Hang et al., 2018; Mohd, 2015; Sofat & Singh, 2017; Soykan & Ulucak, 2016; Zhang & Liu, 2017).

Effective tax rate and leverage

The TOT contends that there is a positive correlation between the effective tax rate and leverage; however, the POT fails to establish one. The findings of this study indicate a positive association (= 0.0180, $t = 0.3905$, and p-value = 0.696) between the two variables in question for Ethiopian commercial banks. This result confirms TOT projections, and the scientific explanation for this is that firms would prefer debt to other financing resources like equity and others due to the tax deductibility and merit of interest. Additionally, past empirical investigations (DeAngelo & Masulis, 1980; Eugene Brigham & Joel Houston, 2004; Graham, 2000; Qian, et al., 2008; Zimmerman, 1983), to mention a few, have found a strong link among these two variables: effective tax rate and leverage.

GDP and leverage

The result of the study shows that the GDP has a significant negative effect on the leverage level of banks at a 1% level of significance, but surprisingly, its coefficient is nominal. The estimation result of the model shows a 1% change in the GDP growth rate of banks; other factors remain constant, resulting in a -0.4% decrease in the leverage of commercial banks. The result of the findings is in line with previous research findings (Kayo & Kimura, 2011). Further this denotes that higher economic growth tends to cause firms to use less amounts of debt as compared to other means of finances. Further, the results of this finding contradicts majority of the previous research findings, which get a positive autocorrelation between GDP and leverage (Beck, et al., 2008; Chipeta & Mbululu, 2013; de Jong et al., 2008; Muthama & Mbaluka, 2013).

Inflation and leverage

As seen in Table 4, inflation had a positive association with leverage but was statistically insignificant owing to the country's monetary policies. As a consequence, the outcome did not match the predicted sign. The data also indicated that inflation is not a determining element of bank leverage in Ethiopia since the parameter for this variable is inconsequential, as shown by a *p*-value greater than 0.1000. This conclusion supports earlier research by Farah et al. (2014) and Saddam (2014). The findings of the current study contradict the following research (Booth et al., 2001; Gajurel, 2006; Rajan & Zingales, 1995).

Interest rate and leverage

Interest rates are major determinants of a company's capital structure. The study's findings indicate that, at a 1% level of significance, interest rates have a considerable direct influence on bank leverage. Accordingly, during a period of rising interest rates, the emphasis on seeking debt as a source of funding will rise. This conclusion is consistent with previous studies (Jan & Rafiq, 2011) which discovered a positive association between the two factors. Some research, however, finds no significant relationship between interest rates and capital structure (Tai, 2017).

Conclusion, implications, and ideas for future research

Conclusions

The current research examines the factors that influence the corporate capital structure, focusing on commercial banks in Ethiopia, a subject that has received little attention. To investigate factors affecting capital structure decisions, random effect panel data analysis was adopted by utilizing leverage as a proxy for the capital structure.

The random effect regression results demonstrate that tangibility has a positive impact on commercial banks' leverage. This finding is consistent with the TOT, which implies that companies with a higher percentage of physical assets than total assets tend to rely more heavily on debt than those without such a percentage. GDP has a negative and significant effect on a firm's leverage. According to this study, the negative association between GDP and leverage further indicates that higher economic growth tends to cause firms to use fewer amounts of debt as compared to other means of finance. As may be predicted, leverage and risk are inversely correlated, meaning that the riskier a company

is, the less debt it should be carrying to reduce the chance that it will not be able to pay its debts.

Profitability has a positive impact on banks' capital structure decisions, which is consistent with TOT's argument that firms prefer debt over equity. Inflation has a positive influence on the capital structure of sampled commercial banks. When the purchasing power of money is reduced, it creates uncertainty in the business sector, which makes it less competitive in the global market; consequently, firms engaged in either issuing debt instruments like bonds or borrowing more funds from external sources to tackle their liquidity problems. Furthermore, as the size of commercial banks increases, the demand for more money through various means will also rise.

The results of this research also clearly support that firms that have more growth tend to demand more equity than debt, which is consistent with POT, which states businesses have a preferred funding hierarchy where internal funds are prioritized, then debt, and equity is the last option. This research also reveals that interest rate and leverage are positively related. Since interest rate and leverage dynamics impact market valuations, investment choices, and business stability, companies must monitor leverage and interest levels and adjust financial plans to minimize risks and maximize shareholder value. Liquidity and capital structure are crucial aspects of corporate finance, influencing risk management, growth, and financial stability, and businesses must manage them effectively. Finally, companies can optimize shareholder value and improve their financial performance by employing tax-efficient techniques and managing their capital structure with caution. NDTS can be effectively utilized by businesses to enhance their capital structure, manage financial risk, and boost shareholder value.

It is indicated that some independent variables such as risk, profitability, liquidity, tax rate, and inflation are found with insignificant coefficients. The possible reasons would be the size difference among the sample banks, which could cause outliers and most likely reduce the explanatory power of these variables. Important economic events, like COVID-19 or financial crises, might overshadow the independent variables, hence causing obscurity of their distinct effects. The issue of measurement errors and inconsistencies in the data collection methods at different points in time could decrease the accuracy of the results obtained. Given these drawbacks, a call is placed for future studies that would use diversified model specifications like GMM, which can accommodate complex interactions that affect capital structure.

Theoretical and managerial implications

The research contributes significantly to the current literature by better understanding how company-level and country-level factors influence the CS choice of Ethiopian commercial banks. Accordingly, the study forwards the following recommendations since its findings have a number of important research and policy implications:

- Based on the evidence presented in this research article, managers should take into account the negative relationship between capital structure and earnings volatility when financing. Additionally, firms with higher earnings volatility should choose a conservative capital structure policy and prefer internal financing in order to avoid bankruptcy and high volatility adjustment costs.

- To enhance their operations and lower their cost of capital, Ethiopian commercial banks should create capital structure policies based on the appropriate mix of critic elements.
- Given that the government's macroeconomic policies have a direct impact on businesses' capital structure decisions, the board of directors and chief financial officers must give careful consideration to both external and firm-specific issues.
- To accelerate growth and sustainability, the government should create and issue financial policies and directives that are advantageous to businesses.
- Both profitability and capital structure are critical aspects of financial management, and their interplay influences a company's overall financial performance and sustainability. Striking the right balance between profitability and a sound capital structure is essential for long-term success. Organizations with low profitability led to low levels of liquidity, which may affect firms in meeting obligations and, finally, firms exposed to e more levered

Ideas for future research

The current study looks at the macroeconomic and firm-specific factors that affect Ethiopian commercial banks' capital structures. Nonetheless, a number of recommendations for additional study could expand on this discovery. Among them are:

- Future researchers would be better qualified to conduct research between countries (comparative studies), as this one only addresses one country's context.
- Since this study only considers commercial banks, additional research will be conducted to examine the determinants of CS in other financial institutions, like insurance companies, microfinance institutions, and other non-financial intuitions.
- While the majority of the data used in this study were quantitative, qualitative data, such as interviews with important banking sector stakeholders, may be used in further studies. This would provide additional information about the elements that go into choosing the best possible mix of capital structure.
- Interestingly, this area is fertile ground for researchers. As a result, more studies on the exact same issue should be carried out employing more variables not included in this studies, like business uniqueness (Titman & Wessels, 1988) financial flexibility (Eldomiaty, 2008), share price performance (Luigi & Sorin, 2009), asset utilization ratios (Jermias, 2008) and other market-related factors. Inclusion of such factors may rouse future studies to arrive at a more general conclusion.

Appendix

Choosing between PLS and fixed effect

Redundant fixed effects tests
Equation: untitled

Redundant fixed effects tests			
Test cross-section fixed effects			
Effects test	**Statistic**	***df***	**Prob**
Cross-section F	7.975982	13,144	0.0000
Cross-section Chi-square	91.115752	13	0.0000

The above result strongly suggest a fixed-effect model is more appropriates.

Choosing between fixed and random effect

Correlated random effects—Hausman test			
Equation: untitled			
Test cross-section random effects			
Test summary	**Chi-Sq. statistic**	**Chi-Sq. *df***	**Prob**
Cross-section random	9.685312	4	0.0700
*Cross-section test variance is invalid. Hausman statistic set to zero			

POLS output

Dependent variable: LEV				
Method: panel least squares				
Date: 09/27/23 Time: 09:20				
Sample: 2010 2022				
Periods included: 13				
Cross-sections included: 14				
Total panel (balanced) observations: 182				
Variable	**Coefficient**	**Std. error**	**t-Statistic**	**Prob**
C	0.232561	0.100251	2.319779	0.0216
ROA	0.066672	0.062623	1.064660	0.2887
TANG	0.211211	0.050961	4.144518	0.0001
NDTS	0.416578	0.104284	3.994639	0.0001
LIQ	0.005708	0.034785	0.164106	0.8699
TAX	− 0.000425	0.057210	− 0.007427	0.9941
GRO	0.049254	0.011484	4.288771	0.0000
RISK	− 0.012449	0.006226	− 1.999572	0.0473
GDP	− 0.004191	0.002023	− 2.071116	0.0400
INF	− 0.000847	0.047056	− 0.017991	0.9857
INT_RATE	0.758823	0.365596	2.075577	0.0396
R-squared	0.481126	Mean dependent var		0.869136
Adjusted R-squared	0.448077	S.D. dependent var		0.041210
S.E. of regression	0.030615	Akaike info criterion		− 4.071401
Sum squared resid	0.147155	Schwarz criterion		− 3.866855
Log likelihood	352.9977	Hannan−Quinn criter		− 3.988386
F-statistic	14.55783	Durbin−Watson stat		1.855739
Prob(F-statistic)	0.000000			

Fixed effect

Dependent variable: LEV

Method: panel least squares
Date: 09/27/23 Time: 09:20
Sample: 2010 2022
Periods included: 13
Cross-sections included: 14
Total panel (balanced) observations: 182

Variable	Coefficient	Std. error	*t*-Statistic	Prob
C	0.232561	0.100251	2.319779	0.0216
ROA	0.066672	0.062623	1.064660	0.2887
TANG	0.211211	0.050961	4.144518	0.0001
NDTS	0.416578	0.104284	3.994639	0.0001
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TAX	− 0.000425	0.057210	− 0.007427	0.9941
GRO	0.049254	0.011484	4.288771	0.0000
RISK	− 0.012449	0.006226	− 1.999572	0.0473
GDP	− 0.004191	0.002023	− 2.071116	0.0400
INF	− 0.000847	0.047056	− 0.017991	0.9857
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R-squared	0.481126	Mean dependent var	0.869136
Adjusted R-squared	0.448077	S.D. dependent var	0.041210
S.E. of regression	0.030615	Akaike info criterion	− 4.071401
Sum squared resid	0.147155	Schwarz criterion	− 3.866855
Log likelihood	352.9977	Hannan−Quinn criter	− 3.988386
F-statistic	14.55783	Durbin−Watson stat	1.755739
Prob(F-statistic)	0.000000		

Dependent variable: LEV

Method: panel EGLS (cross-section random effects)
Sample: 2010 2022
Periods included: 13
Cross-sections included: 14
Total panel (balanced) observations: 182
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. error	*t*-Statistic	Prob
C	0.3096	0.0928	3.3352	0.0011
ROA	0.0797	0.0522	1.5264	0.1289
TANG	0.1631	0.0425	3.8342	0.0002*
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LIQ	0.0021	0.0298	0.0711	0.9434
TAX	0.0180	0.0460	0.3905	0.6967
GRO	0.0344	0.0106	3.2572	0.0014*
RISK	− 0.0077	0.0053	− 1.4643	0.1451
GDP	− 0.0042	0.0016	− 2.5911	0.0100**
INF	0.0063	0.0376	0.1683	0.8665
INT_RATE	0.7559	0.2916	2.5920	0.0100**

Effects specification				
			S.D	Rho
Cross-section random			0.007412	0.0847
Idiosyncratic random			0.024375	0.9153
Weighted Statistics				
R-squared	0.374359	Mean dependent var		0.598369
Adjusted R-squared	0.334509	S.D. dependent var		0.034551
S.E. of regression	0.028186	Sum squared resid		0.124727
F-statistic	9.394271	Durbin—Watson stat		1.741949
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.462701	Mean dependent var		0.869136
Sum squared resid	0.152381	Durbin—Watson stat		1.6607302

Normality test

	Jarque–Bera
LEV	180.8470
ROA	1138.372
TANG	12.73485
NDTS	374.3602
LIQ	7.964999
TAX	166.2413
GRO	354.2946
RISK	6389.813
GDP	16.32914
INF	16.37539
INT_RATE	99.68000

Abbreviations

MM	Modigliani and Miller
CS	Capital structure
FY	Financial year
GDP	Gross domestic product
TOT	Trade-off theory
POT	Pecking order theory
ROA	Return on assets
NDTS	Non-debt tax shield
PPE	Property, plant, and equipment
NBE	National Banks of Ethiopia
CSA	Central Statistics Agency
LIQ	Liquidity
LEV	Leverage
TANG	Tangibility

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The author bears exclusive responsibility for the idea, planning, analysis, and interpretation of the data; writing the paper and carefully reviewing it for intellectual substance; and approving the final version that will be published.

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Data availability
The datasets generated and/or analyzed during the current study are obtained from each commercial bank and on the other hand, data on macroeconomic factors, such as inflation, GDP, and interest rate, were collected from the central bank. The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request. All data generated or analyzed during this study are included in this published article.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable in this section.

Competing interests
The author declares that there is no competing interest.

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