

**Drivers of Banks' Debt Financing: The Panel Data Evidence from Large Commercial Banks in Tanzania**

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**Abstract:**

Debt financing is one of the major funding sources of commercial banks. In recent years, analysis of the banks' debt financing has gained considerable interest in the context of the global financial crisis. Despite the importance of debt financing on banks, the determinants of debt financing in the banking sector have remained largely unexplored compared to non-banking firms. This led this paper to investigate the significant drivers of debt financing of commercial banks in Tanzania. To achieve the study objective a balanced panel was formed by extracting the data of Tanzanian all ten large commercial banks over the period of 10 years from 2013 to 2022. The study employed a fixed effect model along with a random effect model and ordinary least squares regression. The findings revealed that banks' debt financing is positively and significantly influenced by bank size, bank liquidity, and economic growth. Profitability, collateral, and the COVID-19 pandemic negatively and significantly affect banks' debt financing. The findings indicate that the drivers of debt financing of banks in Tanzania are similar to those of non-banks institutions however, distinctive in nature. The practical implications of this paper assist bank managers to identify the significant drivers influencing banks' debt financing and opt for the best capital structure strategies. The regulators should ensure that low-cost capitals are accessible to banks during the financial crisis to maintain economic growth.

**Keywords:** Commercial banks; Covid-19 pandemic; Debt financing; Debt financing determinants

**JEL Classification Codes:** C23, G21

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## **1.0 Introduction**

One of the vital management decisions a firm's financial manager must decide is a financial decision. For decades, firm financing decisions have been a dominant area of debate in corporate finance. This decision has received great attention from academicians and corporate researchers because of its significance for the firm's performance and growth (Obadire *et al.*, 2022; Kayo & Kimura, 2011). Determining the proportion of debt in the capital structure is essential for firms, particularly in developing economies. Though debt is a less expensive form of capital that provides tax benefits, it reduces a firm's liquidity, making it difficult to survive during contractions. Since the seminal work of Modigliani & Miller, (1958, 1963) capital structure theories on optimal capital structure have attracted a lot of attention from academics and practitioners. Numerous studies have been conducted to better understand the drivers influencing a firm's capital structure. Debt financing is one of the key funding sources of commercial banks, in addition to equity, customers' deposits, and central bank liquidity. The analysis of the banks' debt financing in recent years has gained considerable interest in the context of the global financial crisis (Rixtel *et al.*, 2015). The global financial crisis has triggered large research on corporate finance to investigate the relationship between debt markets and banks' leverage and the impact of debt financing on banks' performance (Rixtel *et al.*, 2015; Beltratti & Stulz, 2012; Demirguç-Kunt & Huizinga, 2010). The attraction of debt financing to the banking industry is due to the low cost resulting from tax shield on interest payment and its flexibility and predictability (Naik, 2020). Therefore, the targeted financial leverage ratio is set by firms to reduce financial distress and mitigate the risk of bankruptcy (Naik, 2020; Ebrahim *et al.*, 2014). Thus, the issue of firms' capital structure decisions is widely discussed and debated in financial management literature, such as the capital structure irrelevance hypothesis (Modigliani & Miller, 1958) has attracted several controversies, and subsequently, several capital structure theories have emerged to give the solution. Among the most famous theories are the pecking-order theory, the agency cost, and the trade-off theory. (see Myers & Majluf, 1984; Jensen & Meckling, 1976). Some researchers tried to give empirical validation of these theories, however, the issue remained unsolved (Rajan & Zingales, 1995; Titman & Wessels, 1988).

In the banking literature, the study of banks' debt financing drivers largely remained unexplored. At present, it is unclear how banks decide on capital structure mix and what drives their business debt financing. Houston *et al.* (1997) found that large banks' lending is less susceptible to variations in their capital and cash flows. Jayaratne & Morgan (1999) revealed that changes in supply deposits have an impact on small banks' lending that have low access to the major capital market internally. Akhavein *et al.*, (1997) noted that after mergers, large banks frequently see increases in lending and decreases in capital. The size of the bank appears to enable banks to function with less capital while also making more loans. Abor & Biekpe (2005) found that more than half of the capital of firms listed in the Ghana market depends on debt financing and also noted that a relationship between debt financing and asset tangibility, growth, size, corporate tax, and risk. In addition, despite scant studies carried out on the determinants of banks' debt financing, most of these studies employed data from developed markets (Diamond & Rajan, 2000; Gropp & Heider, 2010; Sheikh & Qureshi, 2017; De Jonghe & Oztekin, 2015). Given the unique banks' financial characteristics and the environment in which banks operate and scant studies focusing on the determinants of banks' debt financing within the context of emerging markets. There are strong reasons to conduct a separate study on the factors affecting banks' debt financing in the context of emerging markets. Thus, the void in empirical evidence on banks' debt financing has led this study

to investigate the internal drivers of banks' debt financing of all large banks in Tanzania. The study sample period covers the period from 2013 to 2022, including the period when banks faced a major financial crisis due to the COVID-19 pandemic. Therefore, apart from investigating bank-internal drivers' impact on banks' debt financing, this study will examine the effect of the COVID-19 pandemic on banks' debt financing.

The present study attempts to answer these two questions: First, whether the bank-specific factors have a significant impact on the debt financing of Tanzanian banks, and second whether the COVID-19 pandemic has a significant impact on the debt financing of Tanzanian banks. This study enhances the literature by developing an understanding of how bank-specific drivers and financial crisis due global pandemic impacted the debt financing of Tanzanian commercial banks and attempts to identify changes in leverage ratio during the period of study by applying statistical techniques known as the fixed effect model (FEM) along with the random effect model (REM) and pooled ordinary least squares (OLS) regression.

The important motivation for this study is that banks are generally excluded from empirical investigation of capital structure compared to non-banking firms. The paper will contribute to the relevant debt financing literature in several ways. First, according to my knowledge, the paper will be a rectification for the lack of debt financing of banks related research in Tanzania. Second, the paper identifies the significant drivers of debt financing. Third, the paper will provide important evidence regarding the debt financing of banks in Tanzania. It is believed that by investigating the debt financing decision of commercial banks in Tanzania this paper will help bankers and regulators on potential factors influencing banks' debt financing during the financial crisis.

The Tanzanian banking sector constitutes of 48 operating banks, 35 commercial banks, 5 village community banks (VICOBAs), 4 microfinance banks, 2 mortgage banks, and 2 development banks (BoT, 2021). Commercial banks in Tanzania are classified into three main peer groups, large banks, medium banks, and regional & small banks. Ten large commercial banks in the country dominate the banking industry with 76% of total assets, 69% of the market share of total customers' deposits, and more than 75% of total loans and advances (BoT, 2021). large commercial banks include NMB, CRDB, NBC, Standard Chartered, Diamond Trust Banks (DTB), Exim Bank, Stanbic Bank, Citi Bank, Tanzania Commercial Bank (TCB), and Azania Bank.

The rest of the study is organized as follows. Section 2 presents the theoretical literature review of firms' capital structure with the extension of previous empirical studies on banks' debt financing. Section 3 discusses the research methodology by presenting the sample, the data sources, and the model specifications employed for the analysis. Section 4 discusses the empirical finding. Section 5 presents conclusions and policy implications.

## **2. Literature review**

### **2.1 Theoretical literature review**

The study of financial decisions is an important issue in the field of financial management. Capital structure decision is considered one of the most crucial decisions for a firm because it affects the financial performance of the firm and the value of the shareholders. The most famous and influential capital structure decision was the work of Modigliani & Miller (1963: 1958) which provides the foundation of the capital structure decision debate and became the milestone of the

theoretical literature on the financial management field. Subsequently, several previous theories have been developed by various researchers, such as signalling theory, trade-off theory, pecking-order theory, and agency theory. The agency theory i.e. agency costs argue that an increase in the cost of equity reduces the value of the firm. It is suggested that debt financing can be used to solve the problem by monitoring an increase in debt relative to equity (Jensen & Meckling, 1976). Myers (1977) argued that an underinvestment problem occurs when the firm increases its debt level, this argument implies that there is an inverse relationship between financial leverage and the firm's growth opportunities. The trade-off theory, argues the firm's optimal capital structure is attained when the benefit of its leverage is equal to its marginal costs. According to the trade-off theory, a firm prefers to employ debt financing to benefit from the advantage of tax shields on interest payments. The information asymmetry also may influence the capital structure of a firm between outsiders and insiders (Ross,1977). Myers (1984) developed the pecking-order theory which suggested the existence of a financial hierarchy. In this theory, the process of selecting various sources of funds follows a pecking order. First firms prefer internal financing (i.e. retained earnings) over external financing (i.e. debt and equity) and if they need external financing then debt financing is preferred to equity financing. In addition, physical asset availability in the firm predicts whether a firm can have access to more debt financing. The pecking order and trade-off theories supported this argument. Trade-off theory argues that firms that maintain more tangible assets are in a position to borrow more than those which maintain fewer tangible assets. The Pecking order theory argues that when the tangible assets of a firm are used as collateral then there will be low information asymmetry (Khan et al., 2020)

## **2.2 Empirical literature review**

Financing decisions often appear as more complex decisions for financial managers because a high level of debt to the firm can cause high-interest expenses; however, a low level of debt increases corporate tax payments. Therefore, the optimal level of equity and debt must be maintained and managed. Hence, the optimum amount of capital structure of the firm mainly depends upon the factors influencing it. The previous empirical research on capital structure tried to verify the validation of the discussed theories above and identified the specific drivers influencing the debt financing of the firms. However, most of these studies focused on non-banks firms and a few of them focused on banks' debt financing. Such as Gropp & Heider (2010) using the data of the European and the US banks examined the drivers of debt financing by using bank size, profitability, and collateral as explanatory variables, and confirmed that the standard drivers of debt financing in non-banking institutions also hold for banking institutions. Similar results were found by Octavia & Brown (2010) for banks in developing counties. Caglayan & Sak (2010) examined the determinants of banks' capital structure in Turkey by using bank size, profitability, market-to-book value, and tangibility and found a positive relationship between market-to-book value, bank size, and leverage while tangibility and profitability were found negatively related to leverage. Sheikh & Qureshi (2017) used the data from Pakistan's conventional commercial and Islamic banks to examine the drivers of capital structure. The findings indicated that tangibility and profitability were negatively related to the capital structure; however, there was a positive relationship between capital structure and bank size for both conventional commercial and Islamic banks. Laux & Rauter (2017) examined the drivers of leverage of commercial and saving banks in the US and found that capital structure was positively related to GDP growth and asset growth. Naik (2020) using the data from 26 public sector banks in India examined the major drivers of debt financing by employing the pooled OLS regression. The findings indicated that bank size,

tangibility, and liquidity were positively and significantly related to the debt of the banks while GDP and financial strength were found negatively related to the level of debt of the banks. Khan et al (2020) examined the determinants of capital structure of 11 commercial banks in Saudi Arabia from 2010-2017 by employing pooled OLS regression and found that growth, bank size, and earnings volatility had positive and significant effects on banks' leverage while tangibility and profitability had a negative effect on banks' leverage. Oliveira & Raposo (2021) examined the determinants of capital structure of 21 European countries' banks from the period 2000 to 2016 and confirmed that the drivers of banks' leverage are more closely related to those that affect non-banks firms.

The benefits, as well as the drawbacks of debt financing, are considered into account by theoretical models to recommend an ideal capital structure. According to this theory, the maximum capital structure might shift from debt to equity when bankruptcy risk and costs rise (Kraus & Litzenberger, 1973). According to studies, firms routinely reduced their leverage throughout previous crises to deal with the higher costs of bankruptcy. For instance, during the 2018 financial crisis, Portugal's debt ratios exhibited a declining trend (Proença *et al.*, 2014). During the period of pandemic literature has been focused on the obstacles that firms face in maintaining the target debt-to-equity ratio (Vo *et al.*, 2022). Maheshwari & Hawaldar (2022) examined the effect of the COVID-19 pandemic on the leverage of Indian firms and revealed that the Covid-19 pandemic has a negative and significant effect on debt financing. Given the previous financial crisis triggered by the COVID-19 pandemic across the countries, this study examines whether the COVID-19 pandemic had an effect on banks' debt financing in Tanzania.

### **3.0 Methodology of the Study**

#### **3.1 Sample and Data,**

This paper investigates the drivers of banks' debt financing in Tanzania. A total of 10 large commercial banks are operating in the banking sector in Tanzania. The sample size of this study included the population of 10 large commercial banks which consisted of NMB, CRDB, NBC, Standard Chartered Bank, DTB, Exim Bank, Stanbic Bank, Citi Bank, TCB, and Azania Bank in which these banks dominate the banking sector in the country and account for more than 75% of the total assets of the whole banking sector. This paper used the standardized audited financial statement data for 10 large commercial banks which were obtained from banks' websites and the Bank of Tanzania reports. The data covered the period 2013–2022. The summarized definitions of study variables are shown in Table 3.2. Accordingly, the study formed a balanced panel with 10 cross-sectional banks over 10 years comprising 100 observations for the analysis.

#### **3.2 Study variables definitions**

This paper employed the variables from well-known existing literature for comparison purposes with previous studies such as Sheikh & Qureshi (2017) and Gropp & Heider (2010).

##### **3.2.1 The dependent variable**

The book leverage value is employed as a dependent variable as a proxy for the banks' debt financing. The reason for using book leverage value is that most of the regulations of the banks are based on book values (Khan *et al.*, 2020). This paper used the book value of total debt (both long-term and short-term debt) to the total assets. This variable is widely used to measure the

financial leverage of a firm since it is simple to compute and reflect the features of indebtedness of a firm (Naik, 2020: Khan *et al.*, 2020)

### **3.2.2 Explanatory variables**

The previous research on debt financing argued that the drivers of the capital structure of banking institutions might differ from non-banking institutions as the purpose of leverage and assets portfolio are different from each other (Diamond & Rajan 2000: Rajan & Zingales, 1995: Flannery, 1994). Based on the previously discussed literature on the characteristics and behaviour of banking firms in Tanzania, the following bank-specific drivers were considered as the potential drivers of banks' debt financing for this paper.

**Bank size:** this study used the natural logarithm of banks' total assets to measure the bank size (Khan *et al.*, 2020: Naik, 2020: Sheikh & Qureshi, 2017: Gropp & Heider, 2010). The trade-off theory argues that large firms usually have a high level of leverage ratios due to having more borrowing power. Thus, this theory implies that there is a positive relationship between debt financing and the size of the firm. Contrary, to the pecking-order theory which argues for a negative relationship between debt financing and a firm's size. This is due to reasons that the theory assumes large firms have sufficient internal funds therefore they rely on this fund for financing their investments.

**Profitability:** the paper used a ratio of profit after tax to total assets to measure profitability (Khan *et al.*, 2020: Caglayan & Sak, 2010: Sheikh & Qureshi (2017)). The trade-off theory assumes a positive relationship between a firm's profitability and debt financing while the pecking-order theory assumes a negative relationship. The trade-off theory argues that debt financing is preferred by more profitable firms to benefit from tax advantages (Gonzalez & Gonzalez, 2012). On the other side, the pecking order theory argues that the accumulated retained earnings from large profits generated are employed to finance the firm rather than external financing, thus less debt financing.

**Collateral:** the study used the availability of physical assets of a bank as a proxy of collateral and is measured by total fixed assets to total assets (Khan *et al.*, 2020: Naik, 2020: Caglayan & Sak, 2010: Sheikh & Qureshi, 2017). The availability of physical assets predicts a particular bank to access more debt financing. The proposed statement is supported by the trade-off theory and postulates a positive relationship between debt financing and collateral.

**Liquidity:** the total loans and advances to total assets ratio was used to measure a bank's liquidity (Lipson & Mortal, 2009: Naik, 2020). Contrary to the pecking-order theory, the trade-off theory postulates a positive relationship between debt financing and a firm's liquidity.

**Capital adequacy:** this study used capital adequacy as a proxy of a bank's financial strength and it is measured by the capital-to-asset ratio (Naik, 2020). The capital ratio of the bank can be increased by issuing more equity shares. A higher capital ratio implies more equity financing than debt financing. Therefore, there is an inverse relationship between debt financing and financial strength (Naik, 2020). Apart from the above-discussed bank-specific drivers, the study employed the dummy variable of the COVID-19 pandemic to examine its impact on banks' debt financing during the period of the global financial crisis as the result of the COVID-19 pandemic. Also,

several previous studies have employed macroeconomic factors as external determinants of debt financing (Bashir *et al.* 2020: Bashir *et al.*, 2017). The most employed external determinants in debt financing studies are the rate of inflation and GDP growth (Mokhova & Zinecker 2014). Hence, to control the effect of macroeconomic factors on leverage decisions, this paper used inflation rate and GDP growth as control variables.

### **3.3 Description of variables**

Table 3.1 presents the descriptions of the variables and the expected signs between the drivers and debt financing based on the assumptions of capital structure theories.

**Table 3.1. Descriptions of variables and expected sign**

		Name of variable	Acronym	Measurement	Sign
Dependent variable	Debt financing	Book leverage	BLV	Total debt/ total assets	N/A
Explanatory variable	Bank-specific drivers	Bank size	SIZE	Natural log of total assets	+
		Profitability	PROF	Net profit/Total assets	-
		Collateral	COLL	Total fixed assets/total assets	+
		Liquidity	LQ	Total loans and advances /total assets	+
		Financial strength	CAR	Total capital/total assets	-
	Dummy Variable	COVID-19 Pandemic	COV19	1 for the years during the COVID-19 and 0 for the years before the COVID-19	-
	Control Variables	GDP growth	GDP	Real GDP growth rate	
Inflation		IR	Annual inflation rate		

Source: Author



### 3.4 Estimation Methods and Models' Specification

This paper used the panel data approach. The panel data approach collects observations of a cross-section of subjects over time, with each variable studied repeatedly. Because it combines cross-sectional and time-series data, this approach allows for more data (Malik & Rafique, 2013; Nigist, 2015; Shumet, 2016). This increases the degree of freedom and decreases collinearity between explanatory variables, resulting in more efficient econometric estimation. This approach also enables the researcher to analyze a wide range of econometric problems that cannot be studied accurately using only longitudinal or time series methods (Ayodeji *et al.*, 2022). This paper used a dynamic panel data model for a balanced panel to check for model endogeneity issues. The difference between static and dynamic panel data estimators is that the static panel data estimator assumes static leverage for the bank, whereas the current value of leverage is affected by the value of previous years, implying that leverage is a dynamic variable (Vollmer & Wiese 2013; Ayodeji *et al.*, 2022). To account for the limitations of the model various tests were conducted by the study to identify whether multicollinearity, heteroskedasticity, and cross-sectional independence exist. To address multicollinearity, heteroskedasticity, and cross-sectional independence bias in panel data, the VIF test, Sargan test, and first- and second-order autocorrelation (AR) tests were used. The paper used a fixed effect model (FEM) along with a random effect model (REM) and pooled ordinary least squares (OLS) regression to examine the effect of explanatory variables on debt financing. For simple cases where there are no bank and time effects then pooled OLS is relevant. The REM assumes that the dependent variables are uncorrelated and the variation across banks is random while the FEM assumes that the intercept for each firm differs however, limits the parameters of slope to be constant for all firms and periods. The paper used panel unit root to test the data stationarity and Hausman's (1978) testing for REM and FEM selection for a better explanation of the model.

For empirical testing of the formulated hypotheses and considering the defined methodology, the following model was defined:

$$.Y_{it} = \beta_0 + \beta_1 X_{1,it} + \dots + \beta_k X_{k,it} + \gamma_2 E_2 + \dots + \gamma_n E_n + \mu_{it} \quad (3.1)$$

Where:  $Y_{it}$  is the dependent variable,  $i$  is a bank, and  $t$  is time:  $X_{k,it}$  is the independent variable:  $\beta_k$  is the coefficient for the independent variable:  $u_{it}$  is the error term:  $E_n$  is the bank  $n$ . Since they are binary (dummies) it has  $n-1$  banks included in the model:  $\gamma_2$  is the coefficient for the binary regressors. The panel data estimations applied in this paper are given as follows pooled OLS (equation (3.2), FEM (equation 3.3) and REM (equation 3.4)

$$BLV_{it} = \beta_0 + \beta_1 \ln(SIZE)_{it} + \beta_2 PROF_{it} + \beta_3 COLL_{it} + \beta_4 LQ_{it} + \beta_5 CAR_{it} + COV19_t + \beta_6 GDP_t + \beta_7 IR_t + \mu_{it} \quad (3.2)$$

$$BLV_{it} = \beta_0 + \beta_1 \ln(SIZE)_{it} + \beta_2 PROF_{it} + \beta_3 COLL_{it} + \beta_4 LQ_{it} + \beta_5 CAR_{it} + COV19_t + \beta_6 GDP_t + \beta_7 IR_t + \mu_{it} \quad (3.3)$$

$$BLV_{it} = \beta_0 + \beta_1 \ln(SIZE)_{it} + \beta_2 PROF_{it} + \beta_3 COLL_{it} + \beta_4 LQ_{it} + \beta_5 CAR_{it} + COV19_t + \beta_6 GDP_t + \beta_7 IR_t + \mu_{it} \quad (3.4)$$

The explanatory variables are the natural logarithm of the bank size (SIZE), profitability (PROF), collateral (COLL), liquidity (LQ), financial strength (CAR), economic growth (GDP), and inflation (IR) for bank *i* in time *t*. This paper employed a dummy variable with 1 for the years during the COVID-19 pandemic and 0 for the years before the COVID-19 pandemic. The dependent variable is book leverage value (BLV). (see Table 3.1 for variables definitions).

### 3.5 Teste statistics and choice of the model

The FE model, RE model, and OLS can all be used to do statistical analysis. Assuming that the constant component of the FE model captures the heterogeneity in individuals while keeping the homogeneity of observations assumption. According to Couto & Ferreira (2010), the RE model views a constant term as an unobservable random parameter rather than a fixed parameter. The Hausman statistics and F-Statistic were used to select the appropriate model. The reliability of the model utilized is evaluated using the F-statistic. The Hausman test enables the study to select the most suitable model. The summary results are shown in Table 3.2 and indicate that the fixed effects model is the most suitable for this study.

**Table 3.2: Summary results of the Hausman test and F-test**

Regression	Test F - P> F		Hausman Prob > $\chi^2$	Explanatory variables		R <sup>2</sup>	
	RE	FE		RE	FE	RE	FE
M1	0.000	0.000	0.000	8	8	0.486	0.528
M2	0.000	0.000	0.000	8	8	0.583	0.622
M3	0.000	0.000	0.000	8	8	0.528	0.562

Source: Author’s computations

## 4 Empirical Results and Discussions

The data in this study were analyzed using dynamic panel data and econometric methodology in STATA 15. This study employed a balanced panel across all variables and observational years.

### 4.1 Descriptive statistics

Table 4.1 presents the summary of descriptive statistics for the independent and dependent panel data variables. It can be seen from the results the borrowing value is 84.6% during the sample period. This motivates this paper to investigate the drivers of banks’ debt financing. The results indicate that the book leverage value ratio in Tanzanian banks is very high compared to the leverage ratio of previous studies in other countries such as (Naik, 2020). The higher ratio value of the book debt is highly contributed by customers’ deposits taking the nature of the business of commercial banks. The results are within the corporate finance standard theories which argue that banks maintain high leverage due to tax benefits for banking firms being larger than for non-banking firms and banking firms being pushed more to leverage due the agency problems (Gropp & Heider (2010). The mean value of bank size is around 17.4% during the sample period with a standard deviation of 0.08%. The mean value of the profitability ratio is around 1.1%, and the average profitability ratios of banks in Tanzania showed an increasing trend during the study period. This overall increase in profitability ratios was driven by a decrease in non-performing loans (NPL) ratios, an increase in net income, and non-interest income, and an improvement in operational efficiency and growth in loan portfolios. It is observed that from the results the mean ratio of fixed assets to total assets which measures the banks’ collateral is 1.2%. This indicated

that banks in Tanzania maintained lower fixed assets in terms of tangible (physical) assets during the study period. The mean of banks' liquidity is 39.2%. The ratio is high indicating that, banks during the study period maintained adequate liquidity sufficient to meet their maturing obligations. The mean value of financial strength is 19.7%. The ratio indicates that banks in Tanzania maintained an adequate ratio which was explained by retained profits made by the banks and additional capital from shareholders during the period of study. The mean values of GDP and IR are 5.5% and 6.0% respectively. The GDP growth in the Tanzanian economy grew by an average value of 4.9% during the period of study while the average inflation rates remained low and stable.

**Table 4.1: Descriptive statistics of variables**

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
BLV <sub>it</sub>	100	0.846	0.004	0.842	0.851
SIZE <sub>it</sub>	100	0.174	0.008	0.123	0.184
PROF <sub>it</sub>	100	0.011	0.045	0.007	0.018
COLL <sub>it</sub>	100	0.012	0.023	0.001	0.004
LQ <sub>it</sub>	100	0.392	0.021	0.372	0.424
CAR <sub>it</sub>	100	0.197	0.009	0.187	0.212
COV19	10				
GDP <sub>t</sub>	10	0.055	0.016	0.020	0.068
IR <sub>t</sub>	10	0.060	0.038	0.034	0.160

Source: Author's calculations

#### 4.2 Results of panel unit test

The study conducted a test to identify the presence or absence of non-stationary/unit roots. The nature of the data used in this paper necessitates a check for non-stationarity in the data series. Non-stationary data create the problem of spurious regression between unrelated variables; thus, to avoid the spurious regression problem, both variables on the left and right sides of the regression model must be stationary (Obadiri, 2018). A unit root test was conducted to solve the problem of non-stationarity. The paper used by Levin et al., (2002) to test whether the data series are stationary and the results are shown in Table 4.2. The results indicate that all the independent variables used in this study are stationary at 5% level of significance. The variables have no unit root. Therefore, the dependent variable and all explanatory variables are stationary.

**Table 4.2: The summary of the Panel unit root test**

Variables	Null hypothesis	Probability
BLV <sub>it</sub>	Common unit root	0.000**
SIZE <sub>it</sub>	Common unit root	0.002**
PROF <sub>it</sub>	Common unit root	0.000**
COLL <sub>it</sub>	Common unit root	0.001**
LQ <sub>it</sub>	Common unit root	0.000**
CAR <sub>it</sub>	Common unit root	0.003**
COV19	Common unit root	0.000**
GDP <sub>t</sub>	Common unit root	0.001**
IR <sub>t</sub>	Common unit root	0.004**

Source: Author's calculations: \*\* presents a 5% level of significance

### 4.3 Correlation Analysis of the Variables

Table 4.3 presents the summary results of the correlation matrix of the variables used in this paper. The results indicate that the multicollinearity is non-existent and less severe among the variables. It can be observed from the results the book value leverage is negatively related to profitability, collateral, financial strength, and inflation, and positively related to size, liquidity, and economic growth.

**Table 4.3: Correlation Matrix Figures**

Variable	BLV	SIZE	PROF	COLL	LQ	CAR	COV19	GDP <sub>t</sub>	IR <sub>t</sub>
BLV	1.000								
SIZE	0.326**	1.000							
PROF	-0,284*	0.386*	1.000						
COLL	-0.148**	-0.382*	0.238**	1.000					
LQ	0.238**	0.328*	-0.28**	0.184**	1.000				
CAR	--0.284**	-0.242*	0.146**	0.168**	-0.124**	1.000			
COV19	-0.226*	-0.322*	-0.388*	-0.326*	-0.368*	-0.322*	1.000*		
GDP	0.268**	-0.384*	.0.128**	0.242**	0.186**	0.168*	-0.332	1.000	
IR	-0.263**	-0.254*	-0.226*	-0.132*	-0.122*	-0.136*	-0.328	0.268*	1.000

Notes: \*\* represents statistically significant at the 5% level\* represents significance at the 1% level

In addition to the non-stationarity test, the researchers performed a multicollinearity test on the adjusted stationary variables and discovered no multicollinearity in the predictor variables, which could lead to an incorrect understanding of the coefficient's statistical significance. The VIF for the variables in the model equation was calculated for the test. Table 4.4 shows the results of the VIF test. Table 4.4 indicates that the VIFs for the relationship between the independent and dependent variables are less than 10, with an average VIF value of 1.75. There is no evidence of multicollinearity in the independent variables associated with the regression models.

**Table 4.4: Summary Results of VIF Test.**

Variables	BVL	
	VIF	1/VIF
SIZE	2.31	0.4329
PROF	2.12	0.4717
COLL	1.56	0.6411
LQ	1.48	0.6757
CAR	1.68	0.5952
COV19	2.32	0.4310
GDP	1.12	0.8929
IR	1.41	0.7092
Mean VIF	1.75	

Source: Author's calculations

### 4.4 Regression Results and Discussions

The study used FEM along with pooled OLS regression and REM to examine the effect of bank-specific drivers and external control variables on banks' debt financing. The summary of empirical

regression results of all regression models is presented in Table 4.5. It is observed from the results that the relationship between banks' debt financing and all the determinants in all three models is consistent. The results from the Hausman (1978) test indicated that FEM is an appropriate model for this paper (i.e. Chi  $\chi^2 = 16.88$  and  $p\text{-value} = 0.0238$ ). The findings show that bank size has a positive and significant effect on debt financing in FEM, however insignificant with both pooled OLS model and REM. The positive relationship between banks' debt financing and bank size implies that large banks prefer debt financing, the findings support the trade-off theory. The findings of the study are similar to those observed by Naik, 2020 and Khan et al., 2020 that found a positive relationship between bank size and debt financing. Profitability has a negative and significant relationship with banks' debt financing. The findings of the study failed to support the pecking order theory or trade-off theory. The reason for this is that the level of the profitability of banks in Tanzania is very low, the average value of profit level is around 1.1%, therefore their retained profits might not explain decisions on capital structure. As internal funds are insufficient as a result of the banks' poor level of profitability, they must look to external sources of capital for their investment needs.

The findings are consistent with Khan et al., 2020; Sheikh & Qureshi, 2017; and Gropp & Heider, 2010. The collateral which is measured by the ratio of total fixed assets to total assets has a negative and significant relationship with banks' debt financing in FEM but is insignificant using REM and pooled OLS model which is contrary to the trade-off theory which argues that firms can use the physical assets as collateral to increase borrowing. However, this argument does not apply to financial institutions especially banks due to the reasons that the banks in Tanzania maintain fewer physical assets. Under section 44(1) of the Bank of Tanzania Act, 2006, commercial banks in Tanzania are required to maintain the minimum cash balances with the Bank of Tanzania as reserves against the deposit and other liabilities of banks. In addition, one of the roles of the Bank of Tanzania as a lender of last resort could be the reason for minimizing the requirement of physical assets collaterals. The findings are consistent with the studies of Khan et al (2020) and Sheikh & Qureshi (2017). In all three models, banks' liquidity results were found to have a positive and significant relationship with the banks' debt financing, the findings strongly support the trade-off theory. The findings are in line with that obtained by Naik (2020) which implies that debt financing is opted to provide a high level of short-term loan facilities to other sectors. The banks' financial strength which is measured by capital adequacy found to have a negative and insignificant relationship with banks' debt financing as was expected in this study. The findings in all three models indicate that COVID-19 has a negative effect on banks' debt financing, however, it is significant to model 2 and model 3. The findings are consistent with Maheshwari & Hawaldar (2022) that found a negative and significant relationship between the COVID-19 pandemic and debt financing. The results on control variables, GDP growth found to have a positive and significant relationship with banks' debt financing in all three models while inflation has a negative effect on banks' debt financing.

**Table: 4.5. Regression analysis results (panel data models)**

Variable	OLS (M 1)	FEM (M 2)	REM (M 3)
SIZE	0.7548 (0.5882) **	1.2442 (0.0002) **	1.3222 (0.6732) **
PROF	-0.6872 (0.0042) **	-0.8654 (0.0032) **	-0.8567 (0.0042) **
COLL	-0.8864 (0.7682) **	-0.8846 (0.0021) **	-0.8786 (0.4642) **
LQ	0.8752 (0.0022) **	1.3422 (0.0001) **	1.2642 (0.0003) **
CAR	-0.6854 (0.4563) **	-0.7682 (0.3462) **	-0.6453 (0.6482) **
COV19	-0.8832 (0.4882) *	-0.6782 (0.0006) *	-0.7882 (0.0004) *
GDP	-0.7642 (0.0042) *	0.8754 (0.0012) *	0.6754 (0.0032) *
IR	-0.7682 (0.4362) *	-0.8754 (0.2832) *	-0.6874 (0.2342) *
Cons	-1.2842 (0.0031) **	-1.3424 (0,0004) **	-0.8674 (0.0052) **
Adjusted R <sup>2</sup>	0.724	0.684	0.698
Prob. (F-stat)	0.000	0.000	0.000
Hausman test probability		0.0238	
Hausman test Chi $\chi^2$		16.88	
Obs.	100	100	100
No. of groups		11	11

**Notes:** The table reports regression coefficients and t-statistics for all three models. The discussed results in the study's empirical findings are FEM substantiated by the Hausman test. Thus, the reported robust standard errors for FEM and the regression coefficients and p-values are corrected for heteroscedasticity and reported in bracket: \* represents statistically significant at 1% level and \*\* represents significance at 5% level respectively

## 5.0 Conclusions and Policy Implications

There has been a considerable increase in the number of empirical studies in the corporate finance field over the last decade focusing on the drivers of debt financing in non-banking firms however these studies can be applied to banking firms too. The importance of optimal capital structure in recent years has been extended to the banking industry due to the persistent existence of financial crisis facing financial institutions including banks and the implementation of Basel III guidelines. This motivates researchers both professional and academic to investigate the determinants influencing capital structure decisions in the banking industry. This paper examines the most significant drivers that influence the debt financing of commercial banks in Tanzania by using the data of 10 large commercial banks for the period from 2013 to 2022. The balance data of 10 large commercial banks over 10 years was formed and a fixed effect model (FEM) along random effect model (REM) and the pooled OLS regression were employed for analysis. The main findings of this paper are summarized as bank size and bank liquidity found to have a positive and significant relationship with banks' debt financing. The Profitability and collateral were found to have a

negative and significant relationship with banks' debt financing. However financial strength was found to have a negative but insignificant relationship with banks' debt financing while the dummy variable COVID-19 was found to have a negative and significant effect on banks' debt financing. The results on control variables; GDP growth were found to have a positive and significant relationship with banks' debt financing while inflation has a negative effect on banks' debt financing. The findings of this paper mainly support the trade-off theory of corporate finance literature. Therefore, the conclusion which is made by this paper is that the standard drivers of debt financing discussed in non-banking firms in the previous studies of capital structure literature also hold in commercial banks in Tanzania. The most important is that the debt financing of commercial banks in Tanzania is influenced by similar drivers that have been identified and applied by non-banking firms although the choice of capital structure mix will be different according to the nature of the banking industry. Hence, the findings have not only filled the knowledge gap in the literature by providing empirical study evidence for the Tanzania context but also assist regulators and bank management to understand banks' debt financing and its influencing factor. Also, the regulators should ensure that low-cost capitals are accessible to banks during the financial crisis to maintain economic growth.

The findings presented in this paper represent important implications from a policy perspective as follows; The practical implication of this paper assists bank managers to identify the significant drivers influencing banks' debt financing and opt for the best capital structure strategies. The findings also help banks' regulators to formulate and implement an effective and efficient regulatory framework regarding banks' debt financing for banking firms.

While the findings of this paper have an important practical implication from academic and policy points of view in banking institutions. However, it is limited only to large commercial banks in Tanzania. Therefore, future research may be extended to include another group of banks such as medium banks and small banks, and also may include other drivers of debt financing such as growth potential, Earnings volatility, tax paid, etc.

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