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The determinant of African banks' capital structure: Basel III Accord or bank-specific factors?

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Orientation: The decision to have an optimum mix of capital structure is an issue of concern for financial service firms as much as other firms.

Research purpose: The study investigated the impact of the Basel III regulatory requirements and other bank-specific factors on African banks' capital structure and ascertained which of these factors ultimately determines the capital structure decision.

Motivation for the study: There is limited evidence of study conducted on banks' capital structure determinants within the Basel III Accord framework in Africa.

Research approach/design and method: This study employed panel data drawn from 45 listed banks from 6 African nations. The panel data regression model was fitted with the system generalised moment methods estimator.

Main findings: The findings revealed that within a similar economic condition in the sampled African nations, the Basel III minimum capital requirements, bank risk and size play the most important role in shaping the observed capital structure decisions of African banks.

Practical/managerial implications: The regulators including central and reserve banks of the sampled African nation, and CEOs should keep their leverage ratio within the Basel III leverage ratio threshold to monitor and curb the build-up of excess leverage and also pay significant attention to the minimum capital requirements, bank risk and size in order to have an optimum capital mix.

Contribution/value add: The Basel III Accord has significant importance in the financing decisions of African banks as much as the bank-specific factors.

Keywords: capital adequacy ratio; capital buffer; leverage ratio; liquidity coverage ratio; panel data; theories of capital structure.

Introduction

The financing decision of firms has been a predominant issue of discourse in corporate finance for decades. This decision has received an enormous amount of research attention in the academic and corporate world because of its significant importance on the firms' profitability and growth (Kayo & Kimura 2011). Banks and other financial services firms are not excluded from the challenges faced with choosing between various financing options such as debt and equity among others. According to Nikoo (2015), making the optimum capital structure choices among alternatives is vital for a bank's financial performance, stability and risk profile.

Banks are financial institutions that provide intermediary functions in an economy through channelling surplus financial resources from depositors to borrowers of funds who are in deficit (BIS 2017). Banks play a pivotal role in the economy, and thus, problems within the banking sector affect the financial services system and the economy more severely than problems in non-banking and non-financial services sectors.

Unlike any other firm, what constitutes the bank capital structure is inherently unstable and vulnerable as their liabilities such as demand deposits are usually short term and can be withdrawn at any time, while their assets such as mortgages and business loans are long term and normally illiquid (King 2013). To reduce the inherent instability and illiquidity in the bank's capital structure and alleviate the likelihood of banking failures and distress, the Basel Committee on Banking Supervision (BCBS) established a series of international standards for bank regulations known as

the Basel I, Basel II and the Basel III Accord. These Basel Accords are globally acceptable standards of bank capital regulations because the BCBS is the primary global standard-setter for banks' prudential regulation and provides a platform for regular cooperation on banking supervisory matters (BIS 2017). According to the Basel III transitional arrangements with coverage from 2017 to 2028, the Accord aims to improve on leverage ratio with specifications on the exposure definition. Also, the Basel III Accord improved on the capital composition requirements of banks by introducing the capital conservation buffer, minimum common equity and removal of capital instruments that no longer qualify as non-core Tier 1 or Tier 2 capital. The Accord improved the banks' risk coverage and liquidity requirements (BIS 2017). The Basel III requirements represent a stricter definition of capital and improve the quality of the capital, which invariably affects the capital structure of the banks. The stringency of the Basel III capital requirements was as a result of the failed Basel II Accord, which was exposed by the global financial crisis; this led to a significant update of the banking regulations.

Despite the numerous studies conducted on the determinants of banks' capital structure, the majority of these studies used data from the developed nations with scant studies focusing on the determinant of bank capital structure within the African context. Moreso, the impact of Basel III in the developed countries may not apply to African countries because of the differences in the unique country fundamentals such as the political influence in the banking regulations and supervision, central bank legislation and independence, country size, Gross Domestic Product and risk rating, economic factors and local institutional factors such as bank size and operational jurisdiction among others in the African countries (Afinindy, Salim & Ratnawati 2021; Beck & Rojas-Suarez 2019; Bilen & Kalash 2020; Bogale 2020; Chiaramonte & Casu 2017; Neves et al. 2020; Yitayaw 2021). These factors determine the adoption of the Basel III Accord within the African jurisdiction. Also, documented studies have not exhaustively considered the impact of the Basel III regulatory requirements as determinants of bank capital structure, rather most studies have focused on the firm-specific determinants. Emphatically, for the measure of bank capital structure, this study uses the Basel III prescribed leverage measure of Tier 1 capital to total exposure, unlike numerous prior studies that have used the traditional leverage measure of total debt to equity (King 2013; Lim 2016). Accordingly, the main purpose of this study is to examine the key determinants of the capital structure of African banks that have adopted the Basel III Accord.

According to the BIS (2017), the banks from the developed nations have adopted the Basel III accord in its entirety while the majority of the African countries are still on the implementation of the Basel II Accord. However, owing to the global financial crisis in 2008, the financial regulation of a few African countries has evolved and taken a different turn. The IMF (2014) asserted that a few African nations such as South Africa have evolved rapidly in these past years from the traditional approach of regulating banking activities to adopting the global macro-prudential guidelines of the Basel III Accord. Also, Nigeria, Uganda, Malawi, Kenya and Tanzania have mirrored largely the global best practices of the Basel III Accord.

The article drew its data specifically from listed banks of six African countries that have adopted the Basel III regulatory requirements. These African countries are South Africa, Nigeria, Kenya, Tanzania, Ugandaand Malawi. The objective is to understand whether the Basel III regulatory requirements indeed form a part of the determinants of bank capital structure or the determinants usually considered by the capital structure theories regarded as firm-specific factors are the predominant factors determining the capital structure of the selected listed African banks.

Following the brief introduction, the rest of the article is organised as follows: literature review of capital structure, methodology, empirical discussion of results and lastly the conclusions. In the section, 'literature review of capital structure', relevant theories underpinning the capital structure were discussed, the determinants of the capital structure were elicited in turns, and the research hypotheses ensued. The section 'methodology' presented the data sources, estimation techniques and empirical tests and models. While the section 'empirical discussion of results' elaborately presented the results and discussed the research findings. The last section 'conclusions' summarised the results in alignment with the research objective and proffer recommendations.

Literature review of capital structure

In this section, the relevant theories underpinning the bank capital structure were discussed alongside the determinants of capital structure, which were elicited in turn. Finally, the research hypotheses were developed.

Capital structure theories

An understanding of the capital structure theories provides useful insight into the financing behaviours and choices made by those charged with the governance of the bank. According to Mota and Moreira (2017), this theory explains how banks use equity and debt capital to finance their assets.

Kraus and Litzenberger's (1973) trade-off theory proposes that there is an optimal capital structure where the value of the firm is maximised while its weighted average cost of capital (WACC) is minimised. According to them, the optimal capital structure occurs when the target debt benefit of interest tax shields offsets the costs of bankruptcy and financial distress. Barclay and Smith (2020) added that the optimal capital structure is the debt ratio where the firm's value is maximised while its WACC is minimised. According to Shahsavaripour and Heydarbeygi (2022), static trade-off theory assumes that firms set a target debt-to-value ratio and gradually approach the target. Nevertheless, dynamic trade-off theory suggests that firms passively accumulate profits

and losses and let their debt ratios deviate from the target unless the cost of adjusting the debt ratio exceeds the cost of a suboptimal capital structure (Effendi 2017; Susilo, Wahyudi & Demi-Pangestuti 2020).

Evaluation of the trade-off theory by researchers (Barclay & Smith 2020; Lemma & Negash 2014) shows that it is plausible in explaining the financial behaviour of banks. The predictions regarding the relationship between leverage and profitability, leverage and asset tangibility or leverage and size are highly supported by the hypothesis.

Myers and Majluf's (1984) pecking order theory posited that firms minimise their time-varying adverse selection costs by relying more on internal financing. The theory states that the information costs associated with issuing securities are enormous and that they dominate all other considerations of financing choices. According to the pecking order theory, companies maximise value by systematically choosing to finance new investments with the cheapest available source of funds, which are always internally generated funds called retained earnings, before considering any external financing (Barclay & Smith 2020). Leary and Roberts (2010) and Moyo (2015) argue that where firms face a shortage of internal financial resources and external financial resources appear inevitable, firms prefer debt over equity because of lower information costs associated with debt. Firms will issue shares only as a last resort because the issue of an equity instrument is perceived negatively by the market and the information costs associated with shares are high. Pecking order theory is one of the most plausible theories of information asymmetry that have been put forward to explain firms' financial decisions and its strong predictions regarding leverage, profitability, firm growth and size (Ahmad & Abbas 2011; Chipeta & McClelland 2018; Frank and Goyal 2009; Lemma & Negash 2014).

Additionally, Jensen and Meckling's (1976) agency cost theory assumes that firm managers may not always act in the best interests of firm owners. As a result, firms use more debt capital to align managers' actions with shareholders' interests. This is because the debt financing decision has a real first-order effect on managers' incentives and their investment and operating decisions (Barclay & Smith 2020; Ferdous 2019). Agency cost theory predicts the optimal capital structure by comparing the agency costs of debt with the benefits of debt. It also predicts that leverage is positively related to profitability and efficiency, as more profitable and efficient firms tend to use more debt because of the disciplinary role that debt has on managers (De Jonghe & Öztekin 2015; Teixeira et al. 2014). In sum, based on the review and relevancy of the theories, the research is underpinned mainly by the trade-off theory, pecking order theory and agency cost theory to better explain the capital structure of the selected listed African banks. However, none of these three theories dominates the financing behaviour of African banks but were complementary to each other.

The determining factors of capital structure and development of hypotheses

Studies from developed nation and a few from developing nations have considered a number of factors as the determinants of bank capital structure. Ahmad, Ariff and Skully (2008) in their study of the determinants of bank capital in the developing economy identified minimum regulatory capital and bank profitability as the concerning factors of bank capital decision. Similarly, Le, Nasir and Huynh (2020) reported that stricter capital ratio influences the capital structure decision making of the British and Australian banks. Furthermore, Tran et al. (2020) conducted a novel study on the determinants of bank capital structure in the world and affirm that bank capital structure is largely influenced by similar factors affecting the non-financial firms. They concluded that asset tangibility, bank size, risk, profitability and liquidity creation are the main factors that determine banks' capital structure except for growth opportunities. Emphatically, adding the African voice, Sibindi (2016) alluded that bank risk and size are the significant factors that determine the capital structure of financial service firms in South Africa.

The richness of these studies formed the bedrock for the selection of bank capital structure determinants being investigated within the African context of the current study. This study assesses the effect of the minimum capital requirements (MCR), capital adequacy ratio **(**CAR**)**, capital buffer premium (CBP), liquidity requirements, profitability, size, growth rate, risk and asset tangibility as the determining factors of banks' capital structure within the African context.

Minimum capital requirements

The MCR is defined as the level of capital that a bank should mandatorily maintain in any situation (BIS 2017). According to Basel III requirements, the minimum regulatory ratio expected of a bank is 8%, which includes both Tier 1 and Tier 2 minimum requirements. Despite all the funds available to banks, banks largely rely on debt capital to meet their investments and operational funding requirements. This is because as banks tend to be highly profitable, they enjoy the debt interest tax shields from heavy reliance on debt funding (Beltratti & Stulz 2012; Klefvenberg & Mannehed 2017). Gavalas and Syriopoulos (2018) argued that the Basel III minimum capital index has a direct positive impact on the capital structure of Brazilian banks. Also, Lim (2016) and Berger and Bouwman (2013) argue that the tighter MCR positively influences the capital structure of banks. The study used the sum of the minimum ratios of the Tier 1 and Tier 2 capital as the measure of the MCR. Thus, this hypothesis was formulated for the current study:

> H1: There is a significant positive relationship between bank leverage and Basel III MCR.

Capital adequacy ratio

According to BIS (2017), the CAR is a suitable measure of bank capital because it considers the risk factor of a bank

operation, implying that it measures the ability to meet maturing obligations as they come due and indicates the capability of a bank to manage risk. It is predominantly known as the regulatory capital ratio. The CAR ratio measures the ability of banks to meet their funding liabilities and shows the strength of banks against the vagaries of the economic and financial environment. A high CAR ratio indicates that a bank can withstand sudden deposit withdrawals and absorb losses (Aggarwal & Jacques 2001). The results of Gabriel's (2016) study showed that the Basel III capital ratio has a positive effect on the capital structure of European banks. Similarly, the study of Klefvenberg and Mannehed (2017) showed that the Basel III capital ratio has a positive effect on the capital structure of Swedish banks. They argued that banks with a higher CAR have the capacity and strength to withstand changing financial and economic factors and give cushion confidence in taking on more debt capital to fund their operations. On the contrary, studies such as those of Okahara (2018), Chun, Kim and Ko (2012) and Jokipii and Milne (2011) found a negative relationship between the CAR and bank leverage. They argued that a bank with high bargaining power and a strong capital base would choose to use equity financing more as there was no probability that bank lending activities would decrease. The study used the ratio of Tier 1 and Tier 2 capital to total risk-weighted assets as the measure of CAR. Hence, this hypothesis was formulated for the current study:

H2: There is a significant positive relationship between bank leverage and Basel III CAR.

Capital buffer premium

According to the Basel III requirements, banks are required to hold a certain minimum level of capital to safeguard them against financial distress and failure; however, banks often hold capital above the required regulatory minimum to protect them against unexpected shocks, which may result in a bank failure. This excess capital is referred to as the CBP. Chortareas, Girardone and Ventouri (2012) and Gabriel (2016) posit that the CBP causes a reduction in the debt capital of banks, which implies a negative relationship between the bank leverage and the CBP. This is, however, contrary to the findings of Berger and Bouwman (2013) and Lim (2016) who posited that having a capital base well above the required minimums provides cushion confidence for banks and enables them to finance the majority of their operations through debt. The study used the difference of the actual capital held by the bank and the minimum capital prescribed by the regulator as the measure of CBP. Despite the contradicting findings from prior authors, the following hypothesis was formulated for this study:

H3: There is a significant positive relationship between bank leverage and Basel III CBP.

Liquidity requirements

One of the most important improvements made by the Basel III Accord to the previous Accords is that it introduced liquidity measures that require banks to maintain liquidity buffers. The liquidity requirement is aimed at reducing the chances of future banking crises and associated losses of economic output. According to the global liquidity standards and supervisory monitoring of the new Basel III requirements (BCBS 2013), there are two quantitative measures developed to measure liquidity, and these are the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). The study adopted the LCR as the measure of liquidity requirements. The LCR aims to ensure that banks have enough liquid assets to withstand liquidity stress in the short term (30-days stressed funding) while the NSFR aims to encourage the banks to hold more stable and longer-term funding sources against their liquid assets to maintain operational efficiency (Jul-Larsen 2014). In line with the BIS (2017) and the BCBS (2013) report, a negative relationship is expected between the LCR and the bank leverage. This is because the liquidity standards state that the banks should have enough liquid assets to withstand liquidity stress in the short term. As a result of this, the capital structure of banks must have less debt capital and more equity capital to maintain the liquidity ratio. This is similar to the findings of Sadien (2017) and contrary to the findings of Chadha and Sharma (2015). Therefore, the following hypothesis was formulated for this study:

H4: There is a significant negative relationship between bank leverage and Basel III liquidity requirements.

Profitability

Baker and Wurgler (2002) linked the availability of internal funds to profitability. They predict that there should be a negative relationship between firm profitability and leverage. They argue that more profitable firms will prefer to use retained earnings and therefore have lower debt. This is linked to pecking order theory, which postulated that firms minimise their time-varying adverse selection costs by relying more on internal financing such as retained earnings, and if firms are still financially constrained after using their retained earnings, the priority order is assigned to equity over debt (Moyo 2015). Empirical evidence to support the inverse relationship between profitability and leverage can be found in the study of Frank and Goyal (2009), Ahmad and Abbas (2011), Bartoloni (2013) and Lemma and Negash (2014). The trade-off theory, on the other hand, assumes that the benefit of interest tax shields is associated with higher leverage; more profitable firms have higher levels of indebtedness. The study used return on equity (ROE) as a measure of profitability and the following hypothesis was formulated for this study:

H5: There is a significant positive relationship between bank leverage and profitability.

Bank size

According to Lemma and Negash (2014), as the size of the firm increases, its financing behaviour tends to change towards debt financing. Afinindy et al. (2021) hypothesise that larger firms can negotiate debt financing on more favorable terms compared with smaller firms and enjoy a

lower interest rate on a high debt obligation. On the contrary, Sibindi (2016) argues that as the size increases, firms proportionally become more profitable and as a result of high profit, the firm will have enormous retained earnings and give the firm access to internal financing over external financing that reduces the internal financing gap. This means that such large firms will have a significant amount of free cash flow. The a priori expectation from the perspective of pecking order theory is that as firms grow, they generate more profits and can use internally generated finance that provides protection against debt financing and high leverage (Frank & Goyal 2009). For the purpose of the current study, bank size was measured by the natural logarithm of total assets as adopted by previous researchers, which consist of cash, government securities, as well as interest-earning loans such as mortgages, letters of credit and inter-bank loans (Afinindy et al. 2021; Frank & Goyal 2009). Therefore, the following hypothesis was formulated for this study:

H6: There is a significant positive relationship between bank leverage and size.

Growth rate

Capital structure theories such as trade-off theory predict that growth reduces leverage because growth increases the cost of financial distress and reduces the agency cost of free cash flow in firms that generate excess free cash flow, exacerbating the agency cost of underinvestment in financially constrained companies (Frank & Goyal 2009). Eriotis, Vasiliou and Ventoura- Neokosmidi (2007) further observed that a negative relationship between growth opportunity and leverage is expected based on the trade-off theory prediction. According to trade-off theory, the costs of financial distress increase with expected growth, forcing managers to reduce debt in their capital structure. In the case of information asymmetry, firms also issue equity instead of debt when overvaluation leads to higher expected growth (Bartoloni 2013). In contrast, pecking order theory implies that firms with greater investment holdings and higher profitability should accumulate more debt over time. This is based on the consideration that a higher growth rate implies a higher demand for funds and, all things being equal, a greater dependence on external financing through the preferred source of debt has been expected (Lemma & Negash 2014). The study used the ratio of the market value of equity to book value of equity as a measure of growth rate and the following hypothesis was formulated for this study:

H7: There is a significant positive relationship between bank leverage and firm growth rate.

Risk

Because of the natural nature of banks' business, one of the important determinants of their capital structure is their risk behaviour. Al-Najjar and Hussainey (2011) hypothesise that a financial services firm is a high-risk firm with fluctuating profits because of the nature of its operations, so risk plays a significant role in determining its financial behaviour. In corporate finance, the risk is the probability that a loss will occur that will negatively affect earnings and profitability (Frank & Goyal 2009). Risk measures the volatility of a firm's cash flows or profit prospects. According to the trade-off theory, a firm with highly volatile cash flows should avoid debt financing and have low debt capital (Bilen & Kalash 2020). Yitayaw (2021) argues that firms with more volatile cash flows face higher expected costs of financial distress and should use less debt. More volatile cash flows make it less likely that tax shields will be fully utilised. However, pecking order theory predicts a direct relationship between a firm's leverage and risk, assuming that cash flow volatility is directly related to earnings volatility. This means that firms are forced to finance from their retained earnings and therefore have to seek financing from external sources. Pecking order theory therefore predicts that riskier firms have higher leverage (Al-Najjar & Hussainey 2011). The findings of Lemma and Negash (2014) and Aremu et al. (2013) confirm this prediction by showing that the too-big-to-fail concept was disproved by the global financial crisis, as internationally deep-rooted banks failed during the Global Financial Crisis because they were overly leveraged. Thus, the Basel III framework guides banks in their risk behaviour through strict risk hedging procedures that include, among others, a standardised approach to counterparty credit risk, a revised securitisation framework, a revised operational, market and risk framework (BIS 2017). The study used the ratio of risk-weighted assets to total assets as the measure of risk and the following hypothesis was formulated for this study:

H8: There is a significant positive relationship between bank leverage and firm risk.

Asset tangibility

Frank and Goyal (2009) argue that as firms grow, a large proportion of tangible assets accumulate. Tangible assets are easier for outsiders, such as creditors or investors, to value than intangible assets, such as the value of goodwill from an acquisition. Thus, the ease of valuing tangible assets reduces the expected cost of distress (Frank & Goyal 2009). With trade-off theory, there is a positive relationship between a firm's financial leverage and tangible assets (Aviral & Raveesh 2015). This opinion is supported by Aviral and Raveesh (2015), who claim that increased collateral reduces the borrowing costs of firms and at the same time increases their debt capacity, making borrowing more attractive for firms and thus a higher leverage effect. In contrast, pecking order theory makes an inverse prediction between firm leverage and asset tangibility. Relatedly, Yapa Abeywardhana (2019) argued that firms with higher tangible assets have a lower leverage ratio. This is because managers have access to insider information and future earnings of firms and tend to minimise information asymmetry costs and maximise firm value by issuing more equity instruments with lower issuance costs compared with debt. The study used the ratio of fixed assets to total assets as a measure of asset tangibility. The following hypothesis was formulated for this study:

H9: There is a significant positive relationship between bank leverage and asset tangibility.

Methodology

Data and variables description

The study used the standardised audited financial statement data for 45 listed banks from six African countries, which were obtained from the IRESS database. The study only used data from African countries that have adopted the Basel III Accord, namely, South Africa, Nigeria, Kenya, Tanzania, Uganda and Malawi. The data covered the period 2010–2019. The summarised definitions of variables are shown in Table 1. Leverage is largely measured by the ratio of debt to equity (Bartoloni 2013; Mateev, Poutziouris & Ivanov 2013; Zhang & Liu 2017). However, this study adopted the new measure prescribed by the Basel III Accord, which is the ratio of Tier I capital to total exposure (BCBS 2013). This leverage measure is a non-risk-based leverage ratio aimed to supplement the capital minimum requirements.

The study used the mostly adopted measures of the Basel III regulatory requirement. The measures are indicated in the published BIS (2013) guidelines. The study used MCR, CAR, CBP and liquidity requirements (LCR) as test variables for the determinant of African bank leverage. According to Zheng et al. (2017), Anarfo (2015), Zhang and Liu (2012), Kayo and Kimura (2011) and Frank and Goyal (2009), there are several measures for size, profitability, growth rate, asset tangibility and risk, which are regarded as the firm-specific determinant of capital structure.

This study used the ROE as a measure of profitability. This is because the ROE is an indication of the profit generated by the bank with the money invested by the shareholders (Kayo & Kimura 2011; Taskinsoy 2013). According to Zheng et al. (2017), size is a significant determining factor of bank capital structure. The proposition 'too big to fail' is accrued to the large banks as they are well diversified, highly leveraged, securitised and more volatile in return (Zheng et al. 2017). This study used the natural logarithm of total assets as a measure of bank size as adopted by previous researchers.

A reliable proxy for a firm's growth is the ratio of the market value of equity to the book value of equity (Anarfo 2015). It follows that the higher the market value relative to the book value of equity, the higher the growth prospects for the firm. The study used the ratio of the market value of equity to the book value of equity as adopted by previous researchers (Anarfo 2015; Zhang & Liu 2012). This study used the ratio of fixed assets to total assets as the measure for asset tangibility. This measure was largely adopted by authors such as Frank and Goyal (2009), Öztekin and Flannery (2012) and De Jonghe and Öztekin (2015). Following the study of Jokipii and Milne (2011) and Zhang and Liu (2012), this study adopted the ratio of risk-weighted assets to total assets as a measure of risk.

TABLE 1: Definition of the dependent and independent variables.

S/N	Variables	Acronym	Variable measurement
Dependent variables			
1	Capital structure	C/S	Tier 1 capital/total exposure
Basel III regulatory requirements: Independent variables			
2	Minimum capital requirement	MCR	Minimum ratio of Tier 1+ Tier 2
3	Capital adequacy ratio	CAR	Tier 1 + Tier 2/risk-weighted asset
4	Capital buffer premium	CBP	Actual capital (core capital plus supplementary capital) less minimum regulatory capital.
5	Liquidity requirements	LCR	HQLA, high-quality liquid assets/ ENCO, expected net cash outflows
Bank-specific determinants of capital structure			
6	Profitability	P	ROE = ratio profit after taxes to total equity.
7	Bank size	BS	Natural log of total asset
8	Growth rate	GR	Market value of equity/book value of equity
9	Risk	R	Ratio of risk-weighted assets to total assets
10	Asset tangibility	AT	Fixed asset/total asset

ROE, return on equity.

Estimation methods and model

This research adopted the panel data method. According to Malik and Rafique (2013), Nigist (2015) and Shumet (2016), panel data methodology collects observations of a cross-section of subjects over a period, whereby each variable is studied repeatedly over a period. This methodology allows for an increase in the amount of data, as it combines cross-sectional and time-series data. This increases the degrees of freedom and reduces the collinearity between the explanatory variables, leading to more efficient econometric estimation. This methodology also allows the researcher to analyse various econometric problems that cannot be accurately studied using only longitudinal or time series methods.

The main advantage of this methodology is that it improves the efficiency of the dataset estimation and expands the scope of drawing conclusions; it is more informative than pure time series or cross-sectional data analysis, so it is suitable for detecting the dynamics of changes, and it also allows the use of various suitable estimators that can be categorised into static and dynamic data estimates.

The study applied a dynamic panel data model for a balanced panel because it allows checking for model endogeneity issues. The reason for choosing between static and dynamic panel data estimators is: the static panel data estimator assumes static leverage for the bank, while the current value of leverage is affected by the value of previous years, so leverage is a dynamic variable (Vollmer & Wiese 2013). Therefore, a dynamic panel data model is more appropriate to explain bank leverage, and a lagged dependent variable will be included on the right-hand side of the regression equation to account for the dynamic nature of bank leverage.

Although the model is not without limitations, the main disadvantages of the panel data model are heterogeneity, sample selectivity bias and problems with the dimensions of short time series (Malik & Rafique 2013). These limitations, if not taken into account, can lead to higher standard errors for individual estimators in panel data, which can also lead to misinterpretation of the statistical significance of the coefficient (Munthali 2018).

Therefore, the researcher conducted various tests to verify the presence or absence of multicollinearity, heteroskedasticity and cross-sectional independence. Variance inflation factor (VIF) test, Sargan test and first- and second-order autocorrelation (AR) tests were performed to address multicollinearity, heteroskedasticity and cross-sectional independence bias in panel data. The study used system generalised moment methods (sys-GMM) to fit the panel data model. The system-GMM is from Blundell and Bond (1998). Arellano and Bover (1995) and Blundell and Bond (1998) demonstrate that the correlation between the lagged dependent variable and the error term makes the generalised least squares (GLS) and ordinary least squares (OLS) estimates biased and inconsistent, even when the error terms are not serially correlated. Elsas and Florysiak (2013) and Qian et al. (2009) argue that the system-GMM is the most efficient estimator among other estimators mainly because it provides fixed effects and OLS estimators that provide more accurate results and account for heteroskedasticity and AR errors.

The following model was defined for empirical testing of the formulated hypotheses and taking into account the defined methodology:

$$TCTEi,t = \beta_0 TCTE_{i,t-1} + \beta_1 MCR\ i,t + \beta_2 CAR\ i,t + \beta_3 CBP\ i,t + \beta_4 LCR\ i,t + \beta_5 P\ i,t + \beta_6 BS\ i,t + \beta_7 GR\ i,t + \beta_8 R\ i,t + \beta_9 AT\ \mathrm{i,t} + \varepsilon\ \mathrm{i,t}$$

[Eqn 1]

In the above model regression equation, the i,t-$_1$ represents the lagged dependent variable, while β_1 - β_9 represents the coefficients of the variables and ε_t represents the error term. The model equation is aimed at testing whether the capital structure (TCTE) of banks is largely determined by Basel III regulatory requirements and bank-specific factors.

Discussion of empirical results

Dynamic panel data and econometric methodology using STATA 15 were used to perform the data analysis in this study. This study used a balanced panel across all variables across the years of observation. Descriptive statistics and the normality test of the data used are shown in Table 2, while Table 3 summarises the observations by year.

Table 2 presents the summary statistics for the dependent and independent panel data variables. The panel data variables were created from the data extracted from the yearly financial reports that were gotten from the IRESS database. All the variables are well defined in Table 1.

Table 3 presents the summarised aggregate result for the dependent and independent panel data variables on a yearly basis. The variable definition follows the same as presented in Tables 1 and 2.

The results from Table 2 and Table 3 show the descriptive statistics, normality test results and yearly aggregate results. The descriptive statistics results are represented by the mean, standard deviation, minimum and maximum values. Furthermore, the normality tests were represented by the skewness-kurtosis tests. The normal distribution is expected to have a skewness of zero and kurtosis of three (Obadire, Moyo & Munzhelele 2022).

With the test results from Table 2, it is possible to conclude that the African banks' MCR, CAR, CBP and LCR on average are 13.59%, 29.37%, 15.78% and 181.72%, respectively. Firstly, a higher MCR implies that on average, African banks keep a minimum of Tier 1 and Tier 2 capital of 13.59%, which is higher than the MCRs indicated in the improved capital regulatory framework of Basel III (BIS 2017). Secondly, having a higher CAR indicates that African

TABLE 2: Summary statistics and normality test results of the variables.

Variables	Mean	Standard deviation	Minimum	Maximum	Skewness	Kurtosis
TCTE	0.0894	0.0429	0.0440	0.2070	0.0107	0.0320
MCR	0.1359	0.0620	0.0628	0.2090	0.0054	0.0204
CAR	0.2937	0.1851	0.1056	0.4818	0.0156	0.0518
CBP	0.1578	0.1231	0.0428	0.2728	0.0950	6.0737
LCR	1.8172	1.1984	0.7053	2.6991	0.0251	0.1170
P	0.0279	0.0185	0.0004	0.1793	0.0284	0.2153
BS	0.0861	0.0066	0.0655	0.0985	-0.0040	0.0294
GR	0.4361	1.6136	-0.1167	13.9493	0.0631	3.0031
R	0.0420	0.0147	0.0016	0.0971	0.0049	0.0432
AT	0.0360	0.0316	0.0051	0.1493	0.0215	0.0742

TCTE, Tier 1 capital to total exposure; MCR, minimum capital requirement; CAR, capital adequacy ratio; CBP, capital buffer premium; LCR, Liquidity Coverage Ratio; BS, Bank size; GR, Growth rate; R, Risk; AT, Asset tangibility; P, Profitability.

TABLE 3: Summary results based on yearly observation.

Years	Dependent variable	Independent Basel III variables				Independent bank specific determinants				
	TCTE	MCR	CAR	CBP	LCR	P	BS	GR	R	AT
2010	8.13	6.01	15.52	9.51	88.81	8.78	5.99	70.11	22.58	1.09
2011	10.21	6.17	16.58	10.41	98.88	10.77	6.61	72.43	48.77	1.20
2012	11.49	6.39	17.24	10.85	99.51	11.85	6.97	77.14	52.15	1.29
2013	12.58	6.91	20.91	14.00	133.92	14.64	7.58	78.15	58.82	1.39
2014	13.32	7.12	22.10	14.98	158.13	18.08	7.99	81.33	56.28	1.57
2015	14.24	9.05	33.41	24.36	166.71	18.88	8.93	82.28	54.69	1.81
2016	15.69	9.92	35.36	25.44	184.79	20.25	9.03	85.08	51.92	1.85
2017	16.28	10.60	36.47	25.87	187.11	24.82	9.16	87.30	48.46	2.16
2018	19.51	10.76	39.21	28.45	189.25	26.82	9.98	89.31	44.23	2.96
2019	20.07	10.89	41.03	30.14	198.04	28.05	10.91	90.40	41.38	3.29

TCTE, Tier 1 capital to total exposure; MCR, minimum capital requirement; CAR, capital adequacy ratio; CBP, capital buffer premium; LCR, Liquidity Coverage Ratio; BS, Bank size; GR, Growth rate; R, Risk; AT, Asset tangibility; P, Profitability.

banks keep their CAR far above the 8% of the CET, common equity tier 1 ratio and Tier 1 capital ratio prescribed by the Basel III Accord. More so, the comparison of the CAR and MCR indicates that African banks held a higher buffer premium capital.

It is clear from Table 3 that the annual aggregated observations show that CAR and MCR increase slowly from 2010 and increase rapidly from 2014 to 2019. It follows that selected banks from African countries have been slow to adopt the Basel III Accord and have been slow to recover from the 2008 GFC. Finally, a high LCR means that in the period under review, African banks held liquid assets above the LCR threshold to withstand liquidity pressures. This reduces the chances of a future banking crisis and the associated losses in economic performance in the short term.

In addition, the MCR, capital adequacy, CBP and LCR are variables that have little impact on volatility as their standard deviations are smaller than their mean values, indicating some level of stability. The specific determinant of the capital structure of African banks also appears to be less volatile, except for bank growth rates with a higher standard deviation above the mean.

In addition, the skewness normality test shows that all variables are uniformly distributed with skewness coefficients close to zero. All variables are right skewed for exception bank size, which is left skewed. This means that the variables are asymmetrically distributed, where the mean, median and mode do not occur at a regular frequency or at the same point (Joanes & Gill 1998).

The kurtosis coefficients for most variables also have values less than 3, indicating that there is no positive excess kurtosis following a light distribution known as the platykurtic distribution. Except for this general light-tailed distribution, the growth rate with a kurtosis coefficient of 3.0031 follows a mesokurtic distribution, that is normally distributed, while the CBP with a kurtosis coefficient of 6.0737 follows a heavy distribution, thus exhibiting one of the important characteristics of financial and economic panel data, namely leptokurtosis (Munthali 2018; Sigauke 2014).

Therefore, the study conducted various tests to verify the presence or absence of non-stationary / unit root, multicollinearity and AR. The nature of the data used in this study warrants checking for the existence of non-stationarity in the data series. Non-stationary data generate the problem of spurious regression between unrelated variables; therefore, both variables on the left and right sides of the regression model must be stationary to avoid the spurious regression problem (Obadire 2018). To solve the problem of non-stationarity, a unit root test was performed. There are many unit-root tests, and one of the most popular of them is the augmented Dickey-Fuller (ADF) test, which was used for this study. Decision criteria include comparing the calculated ADF test statistics with a critical value for unit root identification. In general, if the ADF test statistic is greater than the tested critical value at the 1%, 5% and 10% significant levels, it indicates that the time series data is non-stationary and must be differenced until it becomes stationary (Obadire et al. 2022; Sigauke 2014).

Table 4 presents the results of the stationarity test for the dependent and independent variables. The stationarity in the variables was ascertained by conducting the ADF test. The variable definition follows the same as presented in Table 1 and Table 2. The marking *** indicates significance levels at 1%.

TABLE 4: Stationarity test results showing augmented Dickey-Fuller test results.

Variables	ADF test results			
TCTE	ADF test statistic	1% critical value	5% critical value	10% critical value
	-9.596***	-3.480	-2.884	-2.574
p-value inference no of obs.	(0.000) stationary 450			
MCR	ADF test statistic	1% critical value	5% critical value	10% critical value
	-10.467***	-4.450	-3.664	-2.917
p-value inference no of obs.	(0.000) stationary 450			
CAR	ADF test statistic	1% critical value	5% critical value	10% critical value
	-11.109***	-4.450	-3.664	-2.917
p-value inference no of obs.	(0.000) stationary 450			
LCR	ADF test statistic	1% critical value	5% critical value	10% critical value
	-16.112***	-4.450	-3.664	-2.917
p-value inference no of obs.	(0.000) stationary 450			
CBP	ADF test statistic	1% critical value	5% critical value	10% critical value
	-1.025	-4.450	-3.664	-2.917
p-value inference no of obs.	(0.881) non-stationary 450			
P	ADF test statistic	1% critical value	5% critical value	10% critical value
	-8.109***	-4.450	-3.664	-2.917
p-value inference no of obs.	(0.000) Stationary 450			
BS	ADF test statistic	1% critical value	5% critical value	10% critical value
	-10.761***	-4.450	-3.664	-2.917
p-value inference no of obs.	(0.000) stationary 450			
GR	ADF test statistic	1% critical value	5% critical value	10% critical value
	-9.827***	-4.450	-3.664	-2.917
p-value inference no of obs.	(0.000) stationary 450			
R	ADF test statistic	1% critical value	5% critical value	10% critical value
	-6.652***	-4.450	-3.664	-2.917
p-value inference no of obs.	(0.000) stationary 450			
AT	ADF test statistic	1% critical value	5% critical value	10% critical value
	-12.928***	-4.450	-3.664	-2.917
p-value inference no of obs.	(0.000) stationary 450			

TCTE, Tier 1 capital to total exposure, MCR, minimum capital requirement; CAR, capital adequacy ratio; CBP, capital buffer premium; LCR, Liquidity Coverage Ratio; BS, Bank size; GR, Growth rate; R, Risk; AT, Asset tangibility; P, Profitability; ADF, augmented Dickey-Fuller.

***, indicates significance levels at 1%.

The results of the ADF test in Table 4 show that all variables were stationary, that is, without unit roots with the exception of the CBP. The CBP variable was, therefore, differenced to its first order level to remove all presence of unit root from the variables and ensure stationarity.

Table 5 presents the result of the correlation matrix of the main variables used for the capital structure specification model. The variable definition follows the same as presented in Table 1 and Table 2 for the exception of the ***DCBP,*** which denotes CBP differenced on the first-order level. The marking *** and ** indicates significance levels at 1% and 5%, respectively.

The results from the correlation matrix table show that the MCR, CAR, DCBP and LCR are significantly correlated with the TCTE. The LCR has the highest correlation coefficient of 49.44%. This implies that the capital structure decision of a bank is largely influenced by the level of the LCR. As such, this section does not delve much into the discussion of these correlations. The results are elaborately discussed in Table 7.

In addition to the non-stationarity test, the study conducted a multicollinearity test on the adjusted stationary variables and found no multicollinearity in the predictor variables, which could lead to a wrong understanding of the coefficient's statistical significance. The test was done by calculating the VIF for the variables in the model equation. The VIF test result is reported in Table 6.

Table 6 presents the results of the multicollinearity test for the *TCTE* dynamic model. The test was done by calculating the VIF for the variables in the capital structure model equation. The variable definition follows the same as presented in Table 5.

The VIFs for the relationship between the independent and dependent variables as shown in Table 6 are less than 10 with an average VIF value of 1.59. It is clear that there is no multicollinearity in the independent variables associated with the regression models.

Some specification tests such as the Wald test, the AR test and the Sargan test were performed when performing the dynamic panel data regression of the Blundell and Bond system. The results of these tests were presented together with the output of the regression result. The results in Table 7 show the result of the BB sys-GMM estimations for the capital structure regression model. It also shows the results of the Wald Chi^2, Prob>Chi^2, AR (1), AR (2) and Sargan test statistics, which confirm that the model was well fitted.

The Wald test for joint significance of time effects for the regression model is met at the 1% significance level. The AR results also revealed that the estimates are consistent as there is no AR of the second-order residuals, indicating that

TABLE 5: Correlation matrix of the main variable.

Variables	TCTE	MCR	CAR	DCBP	LCR	P	BS	GR	R	AT
TCTE	1.0000	-	-	-	-	-	-	-	-	-
MCR	0.4156*** (0.0000)	1.0000	-	-	-	-	-	-	-	-
CAR	0.4738*** (0.0000)	0.6967*** (0.0000)	1.0000	-	-	-	-	-	-	-
DCBP	0.0416** (0.0040)	-0.1148** (0.0208)	0.0253 (0.6116)	1.0000	-	-	-	-	-	-
LCR	-0.4944** (0.0081)	0.8215** (0.0000)	0.7132*** (0.0000)	0.0065 (0.8969)	1.0000	-	-	-	-	-
P	-0.0229 (0.6461)	0.0781 (0.1164)	0.1032*** (0.0000)	0.0258 (0.6045)	0.0977** (0.0494)	1.0000	-	-	-	-
BS	-0.0259 (0.6026)	0.0835* (0.0932)	-0.0807 (0.1047)	-0.0382 (0.4437)	0.0382 (0.4439)	-0.1459** (0.0033)	1.0000	-	-	-
GR	-0.0653 (0.1899)	-0.1517** (0.0022)	0.0258 (0.6053)	-0.0321 (0.5189)	-0.1638** (0.0009)	-0.2529** (0.0022)	0.1076** (0.0304)	1.0000	-	-
R	-0.0205 (0.6804)	-0.0331 (0.5069)	-0.1190** (0.0166)	-0.0353 (0.4788)	-0.0787 (0.1138)	0.0283 (0.5705)	0.1611** (0.0011)	0.0737 (0.1389)	1.0000	-
AT	-0.0425 (0.3934)	0.1932*** (0.0001)	0.2562*** (0.0000)	0.0726 (0.1446)	0.2239** (0.0060)	0.1521** (0.0021)	-0.1483** (0.0028)	-0.1313** (0.0081)	-0.2989** (0.0710)	1.0000

TCTE, Tier 1 capital to total exposure; MCR, minimum capital requirement; CAR, capital adequacy ratio; CBP, capital buffer premium; LCR, Liquidity Coverage Ratio; BS, Bank size; GR, Growth rate; R, Risk; AT, Asset tangibility; P, Profitability.
***, ** and * indicates significance levels at 1%, 5% and 10% respectively.

TABLE 6: Multicollinearity test results for the testing whether the capital structure model.

Variables	TCTE	
	VIF	1/VIF
MCR	3.30	0.3031
LCR	2.02	0.4959
CAR	1.66	0.6026
AT	1.43	0.7014
BS	1.31	0.7644
GR	1.24	0.8072
P	1.21	0.8249
R	1.13	0.8841
DCBP	1.04	0.9628
Mean VIF	**1.59**	-

TCTE, Tier 1 capital to total exposure; MCR, minimum capital requirement; CAR, capital adequacy ratio; CBP, capital buffer premium; LCR, Liquidity Coverage Ratio; BS, Bank size; GR, Growth rate; R, Risk; AT, Asset tangibility; VIF, variance inflation factors; P, Profitability.

the models used were correctly specified (Munthali 2018). The Sargan test confirms the validity of the over-identification restriction, which means that all instrumental variables are valid for estimating the BB sys-GMM. Overall, this shows that the results are robust to panel-specific heteroskedasticity and AR.

Table 7 shows the regression results of the capital structure regression model. The Blundell and Bond (1998) sys-GMM estimator was used to fit the dynamic panel model. The variable definition follows the same as presented in Table 5 for the exception of the $TCTE_{t-1}$, which denotes the lagged ratio of Tier1 capital to total exposure. The T-statistics are presented in parentheses. At the end of the table, the Wald, AR (1), AR (2) and the Sargan test statistics were captured.

Firstly, the results in Table 7 show that for sampled African banks, MCR, CAR, and capital buffer premium (DCBP) have a significant positive relationship with TCTE. However, the LCR has a negative relationship with TCTE.

The analysis results shown in Table 7 confirm that variables such as MCR, CAR, DCBP and LCR have a p-value below 5%. This leads to the rejection of the null hypothesis that the above variables are not statistically significant.

As can be observed, MCR (i.e. Hypothesis 1), CAR (i.e. Hypothesis 2) and CBP (i.e. Hypothesis 3) have a positive effect on the leverage ratio. This result is consistent with the general argument of studies such as Gavalas and Syriopoulos (2018), Klefvenberg and Mannehed (2017), Beltratti and Stulz (2012), Berger and Bouwman (2013) and Lim (2016) who argue that despite all the sources of funding available to banks, they rely heavily on debt capital to meet their investment and operational funding requirements. The argument is based on the assumption that banks tend to be highly profitable and therefore enjoy tax shields on debt interest over heavy reliance on debt financing. However, these results contradict the findings of Chun et al. (2012) and Admati et al. (2013) who argue that the increase in Basel III regulatory requirements has led to a proportional increase in equity financing compared with debt financing, which limits a bank's ability to lend and thus affects its core

TABLE 7: Dynamic panel regression results for the capital structure regression model.

Variables	TCTE	TCTE
	Coefficients	Weight contribution (%)
$TCTE_{t-1}$	0.9819*** (323.47)	Lagged variable
MCR	0.0205*** (11.31)	2.05
CAR	0.0162*** (6.25)	1.62
DCBP	0.0052*** (2.82)	0.52
LCR	-0.0015*** (-27.00)	0.15
P	-0.0339*** (-3.92)	3.39
BS	-0.8182*** (-11.63)	81.82
GR	-0.0009** (-2.23)	0.09
R	-0.1151*** (-2.99)	11.51
AT	-0.0257*** (-5.74)	2.57
Obs.	450	-
Wald Chi^2	574.06	-
Prob > Chi^2	0.0000	-
AR (1)	-5.245***	-
AR (2)	2.108	-
Sargan test	44.7481**	-

TCTE, Tier 1 capital to total exposure; MCR, minimum capital requirement; CAR, capital adequacy ratio; CBP, capital buffer premium; LCR, Liquidity Coverage Ratio; BS, Bank size; GR, Growth rate; R, Risk; AT, Asset tangibility; P, Profitability.

*** and ** indicates significance levels at 1% and 5% respectively.

operating activities. In an effort to alleviate the constraints on core operating activities caused by the surge in equity capital, banks tend to increase their debt capital to remain operationally and financially stable. Ultimately, the results from Table 7 show that the MCR is the most important Basel III determinant of capital structure on the sampled banks. Owing to the premise that it carries the highest weight of 2.05% among other Basel III determining factors considered in the study. This result is corroborated by the findings of Le et al. (2020) and Ahmad et al. (2008), who alluded in their studies that the minimum regulatory capital is the determining factor of bank capital structure decision. The LCR (i.e. hypothesis 4) has a negative impact on the leverage ratio. This is in line with the expectation of the new global liquidity standard as introduced by BCBS (2013). The liquidity standards state that the LCR must ensure that banks have sufficient liquid assets to withstand liquidity stress in the short term (30-day stress funding). Consequently, banks' capital structure must have less debt capital and more equity capital to maintain the LCR threshold. This is equally similar to the findings of Sadien (2017) and Chadha and Sharma (2015) who argue that firms with higher levels of liquidity tend to avoid using excess debt capital.

Profitability (i.e. Hypothesis 5) has a negative relationship with leverage. This result is consistent with the findings of Al-Najjar and Hussainey (2011), Bartoloni (2013) and Lemma and Negash (2014) who argue that profitable banks have sufficient retained earnings to support their operating activities and would prefer to use less debt financing. This result is consistent with the pecking order hypothesis.

Bank size (i.e. Hypothesis 6) maintains a negative relationship with the leverage ratio. The result contradicts the findings of Eriotis et al. (2007) and Lemma and Negash (2014), who argue that as the size of a firm increases, its financial behaviour tends to change towards debt financing. This also

contradicts the prediction of agency cost theory and the expectation of trade-off theory, which predicts that larger firms should be highly leveraged. However, the result of the study is consistent with the proposition of the pecking order hypothesis, which suggests a negative relationship between bank size and leverage because of low information asymmetries associated with larger firms. The a priori expectation from a pecking theory perspective is that as firms grow in size; they generate more profits and therefore can use internally generated financing that provides them protection from debt financing and high leverage (Frank & Goyal 2009).

The firm's growth rate (i.e. Hypothesis 7) has a negative relationship with the leverage ratio. This result is consistent with the findings of Bartoloni (2013) and Aremu et al. (2013) who argued that bank growth rates have a negative relationship with leverage because banks with higher growth rates are more equity-controlled companies with a tendency to invest sub-optimally in expropriating wealth from bank bondholders. This result is consistent with the predictions of the trade-off theory. However, this result contradicts the findings of De Jonghe and Oztekin (2015) and Rasiah and Kim (2011) and the proposal of agency cost theory, which predicts that replacing debt with equity is an effective solution to limit the natural inclination of corporate managers to use excess cash to maintain growth rates at the expense of profitability (Barclay & Smith 2020).

Firm risk (i.e. Hypothesis 8) has a negative relationship with leverage. This result is consistent with the findings of Aremu et al. (2013) and Al-Najjar and Hussainey (2011). They argued that firms with highly volatile cash flows, that is riskier firms avoid debt financing and have low debt capital because more volatile cash flows reduce the probability provided by tax shields. This result is consistent with the capital structure trade-off theory. Peking order theory, on the other hand, predicts a positive connection between financial leverage and risk. This is assumed on the basis that cash flow volatility is directly related to earnings volatility. Firms are thus constrained to finance from their retained earnings and therefore have to look for financing from external sources.

The tangibility of assets (i.e. hypothesis 9) has a negative effect on bank leverage because of the low information asymmetry associated with tangible assets; in this case, share issues become less expensive, that is the leverage ratio decreases for firms with higher asset weight. This is consistent with the findings of Lim (2016), Lemma and Negash (2014) and Moyo (2016). This result is equally consistent with the pecking order theory.

Ultimately, the results from Table 7 shows that bank size and risk are the most important bank-specific determinant of the capital structure of the sampled banks. Owing to the premise that bank size has the highest weight contribution of 81.82% while risk has the second largest contribution of 11.51% among other bank-specific determining factors considered in the study. This result is similar to the findings of Tran et al. (2020) and Sibindi (2016) who alluded in their studies that bank size and risk are the significant factors determining bank capital structure decisions.

Conclusion

This study employed the BB sys-GMM dynamic panel-based estimator to explore the determinants of banks' capital structure within the African context. The study selected listed banks from six African countries that have adopted the Basel III Accord. The panel data regression model results showed that Basel III MCR, CAR and CBP are significant positive determinants of the capital structure of African banks.

Regarding the results, as expected, the LCR has a negative effect on the leverage ratio. This is in line with the aim of the liquidity standards, ensuring banks have enough liquid assets to withstand liquidity stress in the short term, hence, must be lowly geared to achieve this. The bank profitability, size, growth rate, risk and asset tangibility, which are the bank-specific determinant of capital structure all reported a significant negative relationship with African banks observed leverage ratio, satisfying the prominent theories of capital structure such as the trade-off theory, pecking order theory and the agency cost theory structure (Bilen & Kalash 2020; Bogale 2020; Gavalas & Syriopoulos 2018; Lemma & Negash 2014; Moyo 2016; Neves et al. 2020).

By implication, this means that as the selected African banks grow in size and are more profitable with an increased tangible asset, they tilt towards more equity funding with less interest in debt capital. This is because highly performing banks have sufficient retained earnings to promote operational activities needing no reliance on external debt funding.

Also, bearing in mind, the main aim of the study that is to understand whether the Basel III regulatory requirements indeed form a part of the determinants of bank capital structure or the determinants usually considered by the capital structure theories regarded as firm-specific factors are the predominant factors determining the capital structure of the selected listed African banks. The study concludes that ultimately, the MCR of the Basel III Accord is the most significant determinant of the sampled banks' capital structure and indeed forms a part of the determinants of bank capital structure. Furthermore, the firm-specific determinants of capital structure argued in several capital structure theories were shown to form a predominant part of the capital structure determinants of African banks. The ultimate bank-specific factors determining African bank capital structure are the bank size and risk that has the higher contributing weights explaining the capital structure variable. Hence, the finding signals a conclusion that, in addition to the Basel III regulatory requirements, bank-specific determinants play important role in shaping the observed capital structure decisions of African banks. This study, thus, provides relevant information and a guide for the African bank regulators and CEOs in making informed

decisions regarding their capital structure, as the findings depict which factor to significantly consider when making the capital structure decision.

The study recommends that the sampled African banks should continually keep a reasonable level of gearing within the Basel III leverage threshold. Emphatically, they should maintain a reasonable level above the prescribed buffer premiums and LCR to have an optimum mix of capital structure. Also, government, central banks and banks from other African nations who are considering the implementation of the Basel III framework can rely on this study's findings and methodology and test using their local bank-level data to ensure the suitability of the new Accord in their jurisdiction, as the study elicits relevant and recent evidences within the African context. This research has important implications as it provides the most recent comprehensive analysis of the intervening impact of the Basel III regulatory requirements regarding the capital structure decision of selected African banks since the GFC. Furthermore, the study addressed the scarcity of literature in capital structure determinants most importantly relative to the Basel III Accord within the African context. This not only adds to the literature on the capital structure of financial services firms, an area that has not been extensively and conclusively researched, but also confirms one of the objectives of Basel III, which is to reduce bank failures caused by excessive leverage.

Also, the study used the most recent measure of leverage proposed by the Basel Committee, which is the ratio of the Tier 1 capital to total exposure. This provides new insight regarding the effectiveness of the non-risk-based leverage ratio proposed by the Basel III Accord on the selected African bank. The non-risk-based leverage ratio increases the confidence of bank management in curbing excessive build-up of leverage that could lead to bank failure.

However, the study has certain limitations that conditioned the research. The first limitation is the small size of the sample, which consisted of only 45 listed banks. This is because the study focused only on the African countries that have adopted the Basel III regulatory framework. Future studies can use a larger sample size with the expectation that other African countries would have adopted the Basel III regulatory requirements by then. Finally, the study is limited to some Basel III regulatory requirements such as the MCRs, CAR, CBP and the LCR. These requirements have been largely adopted within the context of African banks. It is recommended that future studies should test the significance of other revised sections of the Basel III regulatory requirements such as the minimum haircut floors for security financing transactions, standardised credit risk mitigation approach, credit valuation adjustment framework, securitisation of non-performing loans and models to counterparty credit risk among many others, provided they are adopted within the African context, as they might prove yet important. The current study could not consider these revised sections because they are recent amendments mostly made to take effect from the year 2023.

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Competing interests

The authors have declared that no competing interests exist.

Authors' contributions

The article is a comprehensive and original work of A.M.O. under the full guidance, data validation, editing, review and supervision of V.M. and F.M.

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of Venda Research Ethics Social Sciences Committee (RESSC) (No. SMS/21/ACC&AUD/02/2308).

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Data availability

The data that support the findings of this study are publicly available on the IRESS database. Log On Via (iress.co.za).

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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