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Bank-Specific Variables and Banks' Financial Soundness: Empirical Evidence from Nigeria

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Abstract: *This study examines the explanatory power of capital adequacy, asset quality, management soundness, earnings quality, liquidity and sensitivity to market risk (CAMELS) framework as well as a number of other variables on the financial soundness (measured by regulatory capital adequacy ratios) of banks in Nigeria. The findings, using ordinary least squared (OLS) regression subsequent to the establishment of no panel effects among the sampled banks, reveal the significant explanatory potentials of these bank-specific variables though some give a reversal of their prior expectations. Apart from reawakening the investors' and depositors' interest, the findings further have policy implications on the regulation and operation of these financial institutions. The study breaks new grounds in the measurement of capital adequacy using gross revenue ratio and leverage ratio, asset quality using income statement impairment charges for loan losses, and in the inclusion of the sensitivity to market risk most especially in the Nigerian context.*

***Keywords*:** CAMELS Framework; Capital Adequacy Ratio; Charter Value Theory; Deposit Money Bank; Nigeria

JEL Classification: M41, M48

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Introduction

Banks are key players in the financial sector which is the backbone of any economy (Chockalingam, Dabadghao, & Soetekouw, 2018; Jha & Hui, 2012). Banks as financial intermediaries transfer financial resources across time and space, that is, they connect, in every financial system, surplus-spending units to deficit-spending units through the creation of financial assets and liabilities (Ariccia & Marquez, 2004; Scannella, 2012). They are keyed to every developmental activity in the developing economies by serving as a major source of finance for the majority of firms and main depository of economic savings (Arun & Turner, 2004).The fact that banks hold large share of economic activities of any country (Jha & Hui, 2012) is a sufficient rationale for making their activities sustainable via ensuring their financial soundness.

The sound banking sector and the monetary mechanism play a significant role in the development of a nation (Misra & Aspa, 2013). This means that sound financial health of banking industry is an assurance not only for the safe custody of depositors' fund but equally significant for all stakeholders alike: shareholders and other investors; employees; and the whole economy. During an adverse economic condition, the threat to the going concern of a sound and profitable bank is insignificant (Athanasoglou, Brissimis & Delis, 2008). As a matter of fact, a healthy banking sector and a robust economy are inseparable. In Nigeria, activities of corporate entities from formation to liquidation are governed by Companies and Allied Matters Act (CAMA) Cap C20 Law of Federation (LFN) 2004 as amended. Banks and other financial institutions, given their importance, are not only required to comply with the provisions of CAMA, but are further mandated to comply with Banks and Other Financial Institutions Act (BOFIA) Cap B2 LFN 2004, prudential guidelines and other directives and circulars as issued by their regulator- Central Bank of Nigeria (CBN).

Banking stands out among the most regulated industries in the world (Santos, 2001). In the regulation of banks, all-encompassing importance is attached to the banks' capital. The strategic importance of capital in the bank management cannot be overemphasised (Scannella, 2012). There is evidence in the literature that capital generally accounts for a small percentage of the financial resources of banking institutions, but it plays a crucial role in their long-term financing and solvency position and therefore in public credibility (Barrios & Blanco, 2000). The golden value assigned to banks' capital makes its regulation have international touch (Scannella, 2012), although compliance is monitored and ensured by central banks of various jurisdictions. Capital plays a dual-role of investment function and insurance function in the banking sector meaning that their long-term investment is covered and stabilising their economic and financial results becomes easier (Scannella, 2012). Capital is not only the first but also a very important component of CAMEL model of banks' supervision and regulation. CAMEL is an acronym for five components of bank safety and soundness: capital adequacy; asset quality; management quality;

earning ability and liquidity (Kumar & Sayani, 2015).CAMEL rating system is not only a modern technique of financial performance analysis; it also helps in evaluating financial soundness and safety of banking institutions (Alani, Yacoob, & Hamdan, 2013; Kumar & Sayani, 2015). CAMEL potential of identifying banks that may need additional capital or alternative arrangements to continue their operations make it a viable tool used by supervisory authorities (central banks in most jurisdictions) around the world to rate financial soundness of banking institutions (Kumar & Sayani, 2015). Capital, as a unique component of CAMEL rating system, is applied in terms of its adequacy or ability to protect the banks in their trying periods.

Since the CAMEL framework remains an important tool used by financial system regulator in establishing financial soundness of banking institutions, this study is set to examine the impact of each of the components on the tendency of a bank being regarded as financially sound in Nigeria. Nigerian banks have passed through series of recapitalisation regimes and turbulent periods (Adegbaju & Olokoyo, 2008; Adeyemi, 2011; Yauri, Musa & Kaoje, 2012). This has resulted in mergers and acquisitions that have produced a number of bigger banks with the sole aim of appearing adequately capitalised (Adeyemi, 2011). It is recently revealed that not less than ₦70 billion of the public fund was trapped in the failed deposit money banks (DMBs) based on the information from Nigerian accountant-general's office ("FG lost ₦70 billion", 2017). Evidence also abound that a number of DMBs are trading below regulatory minimum liquidity ratio ("Four banks trading", 2017; "Four Nigerian Banks", 2017). It is also a fact that CAMEL ratings conducted by the banks' regulators are not available in the public domains indicating that they are held in secrecy (Mayes & Stremmel, 2014). This requires periodic independent examination of various categories of CAMEL variables (Mayes & Stremmel, 2014) in order to reawaken the consciousness of the depositors and investors. Furthermore, by analysing each of the components of CAMEL model's effect on the banks' financial soundness and safety in Nigeria, individual banks will be privileged to have access to empirical findings calling their attention to areas that can jeopardise their chance of appearing a going-concern and by implication set them free from any threat of liquidation.

Review of Related Literature

This section reviews concepts, theories and empirical findings related to the purpose of the study. It also spells out the study's hypotheses and variables that are tested.

Theoretical Underpinning of Bank's Capital Regulation and Financial Soundness

Using Modigliani-Miller theory of perfect capital market and absence of taxes and bankruptcy costs, the capital structure of the firm does not matter in deciding the

value of the firm (Bhatta, 2015). As a matter of fact, information is imperfect and the imperfection poses challenge to perfect financial intermediation between borrowers and lenders and requires the role for specialised financial intermediaries (Bhatta, 2015; Montiel, 2003). An integral part of financial intermediation is the bank capital regulation. Given the nature of business transacted by the banks and their role as intermediaries in the economy, considering banks in the context of capital structure concerns should be a priority (Aktas, Acikalin, Bakin & Celik, 2015).United States of America (U.S) is known for initiating banks' capital requirements and this did not exist until the early 1980s (Chernykh & Cole, 2015). The lax capital regulation pre-1980s in the U.S according to (Chernykh & Cole, 2015, p. 134) "lead to a gradual decline in the capital ratios in the U.S. banking system". Theoretical literature relevant to banks' capital regulation and financial soundness includes but not limited to: regulatory and efficient market-monitoring hypothesis; portfolio regulatory theory; moral hazard hypothesis; charter value theory; capital buffer theory and option-pricing model (see, for example, Hendriks, 2000; Ikpefan, 2013; Odunga, Nyangweso, Carter & Mwarumba, 2013; Rime, 2001; Scannella, 2012) but regulatory and efficient market-monitoring hypothesis, portfolio regulatory theory, and charter value theory are considered in this study.

The regulatory and efficient market-monitoring hypothesis states that regulators encourage banks to increase their capital to be commensurate with the amount of risk taken by banks (Odunga et al., 2013). Regulators and supervisors are encouraged by the conviction that a sound regulatory system brings about compliance with laid down rules and corporate governance codes as well as requisite management routines (Ezeoha, 2011). To institutionalise a sound capital regulation regime therefore, efficient market monitoring parameters that will bring about increase in capital when banks' capital positions seem insufficient are indispensable (Calomiris & Kahn, 1991; Berger, 1995).It is evident that regulatory and efficient market-monitoring hypothesis focuses on the capital adequacy. Against this bad drop, Scannella (2012) summarises the consequences of capital adequacy and inadequacy as:

> *The bank capital inadequacy may force banks to reduce the amount of assets or their riskiness. The adequate amount of bank capital represents a prerequisite for a sound and prudent bank management. It impacts on many aspects of banking activities, such as bank growth and competitive dynamics of banking industry, strategic decision processes, market positioning, risk profiles of investments, assets and liabilities structure, expected profitability, etc (p. 32).*

Theory of portfolio regulation is an integral part of banking regulation as a whole. Regulation is the rational response of the government to the market failures (Freixas & Santomero, 2002). The justification for the regulation of banks is the existence of market failures which if not properly attended to would result in either financial

institution's excessive risk taking or in the growth and development of monopoly power (Freixas & Santomero, 2002). The theory of portfolio regulation proposes that the regulation of banks is necessary to maintain safety and soundness of the banking system to an extent that financial institutions will be in a position to meet their financial obligations without difficulty (Ikpefan, 2013). Summarily, the theory allows the regulators to command greater solvency, liquidity and soundness of individual banks (Ikpefan, 2013).

Another theory that provides a nexus of banks' capital requirements with their safety and soundness is charter value theory. Charter value, also known as "franchise value", is the value that would be forgone if an organization closes (Demsetz, Saidenberg, & Strahan, 1996; Keeley, 1990). Charter value is the bank's future profit-generating potential arising from things such as efficiency, market power and customer relationships (Palia & Porter 2004). Being an important intrinsic value of a bank, charter value represents an important indication for governments and investors to see how stable and profitable the bank is (Hendriks, 2000). Since the overall value of a firm incorporates both tangible and intangible assets, franchise value is described as the firm's intangible assets, that is, the value of the firm above and beyond the value of its tangible assets (Ren & Schmit, 2006). The central argument of this theory is that banks have something to lose since bankruptcy leads to a loss of future profits (Jokipii & Milne, 2011). The only condition for reaping the charter value by a bank is if it survives (Fisher, Gueyie & Ortiz, 2001). Thus, franchise value provides risk-constraining incentives to firms that seek to remain a going-concern (Ren & Schmit, 2006). There is evidence of decreasing bank franchise value during the 1950s, 1960s, and 1970s when the banking industry was experiencing the deregulation (Keeley, 1990).Previous studies have documented positive relationships between charter value and capital requirements (Allen & Rai, 1996; Hellman, Murdoch & Stiglitz, 2000). Hellmann et al. (2000) empirically showed that once banks have enough of their own capital invested, equity holders internalise the adverse consequences of taking risk and thus will choose to make more prudent investments. Hendriks (2000) concludes that capital levels are a significant positive factor for determining bank charter value after establishing that when there are higher capital requirements, the shareholders want to invest in more safe assets which will result in a higher charter value. While establishing the fact that the cessation from appearing as a going concern by a bank has significant relationship with the loss of charter value, Estrella, Park and Peristiani (2000) provide the following:

> *This potential loss in the value of the firm in liquidation also helps explain why capital levels in general should be significantly related to bank failure. The charter value of the bank produces a strong incentive to the owners of the bank to manage it as a going concern. If the bank fails, one consequence is the dissipation of charter value—value that the owners could capture by selling their stakes if the institution were*

> *viable. Thus, owners have an interest in maintaining a level of capital that is consistent with a low probability of failure. Needless to say, regulators and supervisors also tend to favour low probabilities of failure (p. 35).*

According to Rime (2001, p. 791) "capital regulation is motivated principally by the concern that a bank may hold less capital than is socially optimal relative to its riskiness as negative externalities resulting from bank default are not reflected in market capital requirements". Further evidence provides that unregulated banking system is characterised with excessive portfolio and leverage risks taking in the name of maximising shareholders' value at the expense of deposit insurance (Furlong & Keeley, 1989). Given the linkage of bank capital requirements with financial safety and soundness, this study adopts all the three theories because of their emphasis on the significance of capital regulation in reducing banks' probability of default and strengthening the stability of the banking system.

An Overview of CAMEL Framework

CAMEL model is the mechanism used for the critical analysis of the financial position of banks and the presentation of such analysis to provide for the assessment of the health of the banks (Khatik & Nag, 2014). It can also be described as a ratio-based model used specifically for evaluating the performance and/or rating or ranking of banks (Khatik & Nag, 2014; Misra & Aspa, 2013). "The CAMEL ratings system examines capital adequacy, asset quality, management, earnings, and liquidity and is widely used by supervisory bodies around the world to rate financial soundness of banking institutions" (Kumar & Sayani, 2015, p. 2). In fact CAMEL remains the most popular approach of bank ratings system (Baral, 2005; Doumpos & Zopounidis, 2010).The need to justify the intertwining of the safety and soundness of the banking system with the stability of the economy calls for the use of CAMEL model as it incorporates bank specific factors/variables of true profitability and soundness as well as five risk categories rated by the supervisory authorities (Whalen & Thomson, 1988).In on-site examinations to determine the financial condition of a bank, supervisory agency (CBN in Nigeria) rates the bank on a scale from one to five (one being the highest) in five basic areas (Gilbert, Meyer & Vaughan, 2002; Mayes & Stremmel, 2014; Whalen & Thomson, 1988). In Nigeria, ratings A-E are used in place of ratings 1-5 (Njoku, 2011). The banks rated class '**A'** are the very strong ones. Sound banks are rated Class **'B'**. Fundamentally sound and stable banks with limited supervisory concerns are in Class **'C'**. Marginal banks with serious financial weaknesses requiring close supervisory attention are put in Class '**D'**. Class '**E'** represents the critically ill banks that have immediate failure possibilities. Based on CAMEL model as at end-March, 2004, the CBN's ratings of all the banks, classified 62 as sound/satisfactory,

14 as marginal and 11 as unsound, while 2 of the banks did not render any returns during the period (Soludo, 2004). CAMEL model focuses on accounting and financial data for individual banks (Mayes & Stremmel, 2014).The inclusion of "sensitivity to market risk" in the CAMEL framework expands the components of the model and renames it CAMELS. This component was not added to the model until 1997 by the bank examiners (Gilbert et al., 2002), although it is seldom applied in most developing countries (Baral, 2005).To corroborate the efficacy of CAMEL model as adopted by supervisory authorities, a number of studies have also used CAMEL rating model to evaluate the performance and financial condition of banks (see, for example, Abdelrahim, 2013; Baral, 2005; Doumpos & Zopounidis, 2010; Khatik & Nag, 2014; Khouaja & Boumediene, 2014; Kouser, Aamir, Mehvish & Azeem, 2011; Kumar & Sayani, 2015; Misra & Aspal, 2013; Prasad & Ravinder, 2012; Roman & Şargu, 2013; Sangmi & Nazir, 2010; Whalen & Thomson, 1988; Zagherd & Barghi, 2017). Majority of these studies adopted supervisor's approach of rating or ranking banks by means of individual CAMEL parameters and composite CAMEL ratings. In the alternative, this study examines the impact of these bank-specific factors on the ability of the banking industry to appear financially safe and sound as represented by the ability of DMBs to meet the Basel capital adequacy ratio (CAR) adopted by the banks' regulators the world over including Nigeria.

Determining Choice of Accounting Measures of Bank-Specific Variables

This sub-section provides evidence of indicators of each component of CAMELS framework adopted for the study.

Capital Adequacy

Capital requirements have a long tradition in the banking regulation (Detzer, 2015)."Insufficient equity capital has been partly blamed for the Global Financial Crisis" (Abdulkarim, Hassan, Hassan & Mohamad, 2014, p. 58). A bank in a comfortable capital position is on a sound footing to pursue business opportunities more effectively and has more time and flexibility to deal with problems arising from unexpected losses, thus achieving increased profitability (Athanasoglou et al., 2008). Bank capital acts as a buffer against liquidity shocks and portfolio losses (Cordell & King, 1995; Diamond & Rajan, 2000) and also serves as the last line of defense against losses to uninsured depositors, general creditors and the deposit insurance corporation (Whalen & Thomson, 1988). The minimum capital requirements initiative as introduced by Banks for International Settlement (BIS) in 1996 was geared towards enabling that banks are prudent in maintaining adequate reserves as a shield to protect themselves and their depositors (Abdulkarim et al., 2014). Capital adequacy is borne out of the necessity to rearrange the existing capital structure of banks

with a view to repositioning the existing capital structure to guard against the losses that accrue as their operating activities widen (Ezike & Oke, 2013). It is all-inclusive and as well reflects the inner strength of a bank (Sangmi & Nazir, 2010). The need for capital adequacy can also be inferred from the need to avoid the consequences of financial distress as succinctly stated by Berger, Herring and Szegö (1995):

> *Financial distress occurs when the bank is expected to have difficulty honoring its commitments. Costs of financial distress include the costs of bankruptcy -- i.e., the costs of transferring ownership of the firm from shareholders to creditors. Financial distress costs also include the loss in value that may occur as a result of the perception that bankruptcy may be imminent -- even if bankruptcy may ultimately be avoided (p. 5).*

Bank capital requirements are products of Basel Accords. Basel Accords, which are international agreements among central banks members of the Bank of International Settlement (BIS), are aimed at promoting safety and soundness of the financial system; ensuring adequate level of capital to safeguard the bank's deposits and enhancing competitive equality (Coyle, 2000; Abdelrahim, 2013). The accords operate in form of the Basel Committee on Banking Supervision (BCBS) as established by the central bank governors of a group of ten countries in 1975 (Suarez, Dhaene, Henrard, & Vanduffel, 2006). BCBS has produced three international guidelines known as Basel I, Basel II and Basel III produced in 1988, 2004 and 2010 respectively (Abdelrahim, 2013; Hogan, 2015).

All components of CAMELS framework including capital adequacy comprise a number accounting measures or ratios. Capital adequacy, for instance, is represented by a number of accounting measures- capital adequacy ratio (CAR) which is the product of BCBS guidelines and purely risk-based, capital to asset ratio, advances to asset ratio, leverage ratio (LVR), government securities to total investments ratio and gross revenue ratio (GRR), but most prominent of them is CAR (see Abdelrahim, 2013; Bourkhis & Nabi, 2013; Chernykh & Cole, 2015; Doumpos & Zopounidis, 2010; Khatik & Nag, 2014; Misra & Aspal, 2013; Sangmi & Nazir, 2010; Şargu, 2013;). CAR as recommended by Basel accords is risk-based and is defined as the ratio of addition of Tier 1 and Tier 2 capitals to risk-weighted assets (TCAR) for total capital ratio (see Abdulkarim et al., 2014; Aspal & Nazneen, 2014; Chernykh & Cole, 2015; Hogan, 2015; Mayes & Stremmel, 2014) and the ratio of Tier 1 capital to risk-weighted assets- T1CR (Banerjee & Majumdar, 2014; Chernykh & Cole, 2015; Mathuva, 2009; Schütz, 2014; Smith, Grill & Lang, 2017) considered as core capital ratio (Mathuva, 2009; Odunga et al., 2013). The sum of Tier 1 and Tier 2 capital is the risk-based capital (RBC) adjusted for items such as intangible assets and unrealised gains or losses while risk-weighted assets (RWA) is the sum of all bank asset categories multiplied by their designated risk weightings (Hogan, 2015). RWA represents an aggregate of credit RWA, market RWA and operational RWA (CBN). Based on

Basel's standard, Tier 1 capital is an aggregate of shareholder funds, retained earnings, and perpetual non-cumulative preference shares scaled by risk-weighted assets and off-balance sheet exposures (Schütz, 2014). Although TCAR benchmark recommended by BCBS is 8%, CBN fixes 10% and 15% as minimum TCAR for deposit money banks with regional/national and international operating licences respectively in Nigeria (see CBN, 2015). For the domestic systematically important banks (SIBs) in Nigeria, the required minimum regulatory CAR is 15% in addition to setting aside 1% higher loss absorbency or what is referred to as additional capital surcharge (CBN, 2014).

Both the GRR and LVR are considered good measures of capital adequacy (Bank for International Settlement-BIS, 2010; Estrella et al., 2000) despite being risk-independent. Indeed, there are both potent explanatory variables used in the prediction of bank's financial condition in previous studies (see Estrella et al., 2000; Mayes & Stremmel, 2014; Schütz, 2014). While GRR is described as the ratio of Tier 1 capital to gross earnings, that is, the sum of total interest and non-interest income (Mayes & Stremmel, 2014), LVR is often measured as the ratio of Tier 1 capital to total adjusted assets (TAAT) where TAAT is described as total assets less intangible assets comprising goodwill, software expenses and deferred tax assets (D'Hulster, 2009).

For the purpose of this study, therefore, TCAR and T1CR are adopted as the measures of bank financial soundness. Although, there are a number of indicators for bank financial soundness (Kutum & Al-Jaberi, 2015), risk-based capital ratios remain unique among them and are consistently used in the literature (Nikhat, 2014; Salgotra & Wadhwa, 2015). The risk-based capitals are incontrovertibly prerequisite for sound and prudent bank management (Scannella, 2012). The leverage ratio (LVR) and gross revenue ratio (GRR) are adopted as measures of capital adequacy in consonance with the previous studies on bank financial condition (Estrella et al., 2000; Mayes & Stremmel, 2014; Schütz, 2014).

Asset Quality

According to Chisti (2012, p. 127), "bank asset quality does not only affect the financial and operating performance of the bank itself, it also impinges on the soundness of the national financial system". The condition and quality of individual asset categories can trigger financial problems and can as well accelerate the bank fragility (Mayes & Stremmel, 2014). Banks that hold qualitatively inferior assets are more vulnerable to losses and consequence of the capital loss is the increase in the risk of failure (Mayes & Stremmel, 2014). What the bank examiners do to verify the quality of banks asset is to"wade through loan documentation and check the quality of collateral (if any) backing each loan" (Whalen & Thomson, 1988). Chisti (2012) empirically found that when a bank's asset quality becomes worse, it takes more resources for the bank to conduct non- value-added credit receiving activities, which

leads to poor performance. In other words, the better the asset quality of a bank, the better its operating performance and the worse the asset quality of a bank the poorer its operating performance. By virtue of spread of bank activities and range of asset figures disclosed, there exists a wide variety of potential indicators of asset quality (Mayes & Stremmel, 2014). Accounting measures of asset quality include ratios of: net performing assets to total assets; net performing assets to net advances; total investments to total assets; net loan to total asset, net loan to deposit, non-performing loans to gross loans (NPL/GL) and loan loss provision to net interest revenue (LLP/NIR) but LLP/NIR and NPL/GL are more helpful and often used (Bourkhis & Nabi, 2013; Mayes & Stremmel, 2014; Misra & Aspal, 2013). In compliance with literature on bank asset quality LLP/NIR and NPL/GL are adopted as a proxy of asset quality for the study.

Management Quality

The significance of the ability and skill of the bank management in the performance and success of the entity cannot be overemphasised (Mayes & Stremmel, 2014). Management quality or efficiency focuses on the "adherence with set norms, ability to plan and respond to changing environment, leadership and administrative capability of the bank" (Misra & Aspal, 2013, p. 44). It is difficult to divorce the higher the management competence with the lower vulnerability of the bank to and its likelihood of making wrong decisions (Mayes & Stremmel, 2014). Although it is difficult to find an independent indicator of management quality or expertise (Mayes & Stremmel, 2014), common ratio researchers have been used is cost to income ratio (CIR) otherwise known as ratio of expenses to revenue (Bourkhis & Nabi, 2013; Klomp & Haan, 2012; Mayes & Stremmel, 2014; Schütz, 2014). This CAMELS's component can also be measured by the asset turnover ratio, ratio of revenue to total asset- RTA (Abdelrahim, 2013). Thus, CIR and RTA are adopted as proxies of management quality.

Earning Capacity

Bank examiners regard earnings as the "first line of defense against loan defaults and other unforeseen events" (Whalen & Thomson, 1988, p. 18). It is highly probable that higher levels of profitability allow banks to improve their capital and economic performance and by implication achieve a negative relationship between profitability and the likelihood of distress (Mayes & Stremmel, 2014). A bank that cannot sufficiently maintain its earnings is liable to make losses and suffer considerably from sustainable growth (Mayes & Stremmel, 2014; Misra & Aspal, 2013). The profitability indicators as obtained from the literature include: net income to total asset (ROA); net income to Shareholders' equity (ROE); net interest income to earning asset; and interest income to total income (Misra & Aspal, 2013; Tan, 2016). However, this

study examines the impact of ROA and ROE on the banking soundness because they appear most prominent (Olson & Zoubi, 2011) and have sufficient empirical evidence even in the recent time (Odunga, 2016; Tan, 2016; Zagherd & Barghi, 2017).

Liquidity

Liquidity crisis has a negative impact on the image of a financial institution (Misra & Aspal, 2013). A bank's ability to meet and repay its short-term obligations and unexpected withdrawals of depositors and creditors is a function of how liquid it is (Mayes & Stremmel, 2014). "Liquid assets refer to cash and its equivalent that are easily convertible to cash at any time without significant losses" (Bourkhis & Nabi, 2013, p. 71).When financial assets cease to be available to the owners on short notice liquidity problem ensues in the bank (Sangmi & Nazir, 2010). The indicators of liquidity in the banking industry used in the literature include the following: liquid assets to total assets (LTA), investment (government securities) to total assets, liquid asset to deposit (LTD) and investment to deposit (Bourkhis & Nabi, 2013; Mayes & Stremmel, 2014; Sangmi & Nazir, 2010). Basel III emphasises on "net stable funding ratio", an equivalent of LTD which indicates the percentage of loans funded through deposits and the stability of funding (Mayes & Stremmel, 2014). Based on this rationale, LTA and LTD are considered most appropriate as the proxies of the liquidity. This complies with the approach of Bourkhis and Nabi (2013) on banking soundness.

Sensitivity to Market Risks

The inclusion of sensitivity to market risk in the CAMEL framework expands the component of the model and renames it CAMELS. The shifts and fluctuations in the financial market have significant impact on the activities of banks (Mayes & Stremmel, 2014). The assessment of the sensitivity to market risk can only be done through fluctuations in interest rate, foreign exchange rates and equity prices (Aspal & Nazneen, 2014). "Banks are vulnerable to market distortions if they rely heavily on market refinancing or are holding highly volatile assets" (Mayes & Stremmel, 2014, p. 13-14).The assessment of the impact of market risk is very important to Nigerian banks. Apart from the fact that Nigerian banks are part of major stakeholders in the financial market, their stocks often appear most traded in the stocks exchange. The omission of this component in the determination of banks' financial condition is not unconnected with difficulties in capturing its relationship with accounting and financial data (Mayes & Stremmel, 2014). In spite of this challenge, researchers have attempted to represent this component with a number of measures including size and deposit ratios (Baral, 2005; Mayes & Stremmel, 2014) but using bank's holding with volatile liabilities is considered more appropriate (Mayes & Stremmel, 2014). Based on the empirical works of Klomp and Haan (2012) and Schütz (2014), the market risk

can be measured by the ratio of total interest expenses to total deposit. In order to identify maturity and repricing mismatches between assets, liabilities, and off-balance sheet items (Federal Deposit Insurance Corporation- FDIC, 2015), interest rate risk can also be measured using gap analysis (Aspal & Nazneen, 2014; FDIC, 2015). Empirically, the influence of this interest rate risk measurement on bank's financial condition has been established (Aspal & Nazneen, 2014). Hence, the total interest expenses to total deposit (MKR1) and interest gap ratio (MKR2) are adopted as the measures of sensitivity to market risk for this study. Since the market risk sensitivity has positive influence on bank financial distress (Schütz, 2014), its impact on bank financial soundness should be negative.

Control Variables

This study adopts four (4) additional explanatory variables: bank size (SIZE); age since the commencement of operation (AGE); systematically important status (SIM); and the penalties for contravening related banks' legal and institutional frameworks (PEN), considered relevant to bank's financial condition. In the related accounting literature, firm size is often represented by natural logarithm of any of the total assets, net sales or firm's market capitalization (Wallace & Naser, 1995). Previous research on CAMEL and banking soundness measured bank size with natural logarithm of banks' total assets (Athanasoglou et al., 2008; Bahadori, Talebnia, & Imani, 2015; Mayes & Stremmel, 2014; Tan, 2016) and that of age (Bahadori et al., 2015). Thus, as adopted by Gilbert, Meyer and Vaughan (2000) and Bahadori et al. (2015), natural logarithm of total assets and the age of individual banks are used as the measures of the two variables respectively. The Basel III requirement of additional capital surcharge and its creation of two liquidity standards, the liquidity coverage ratio and the net stable funding ratio, for SIBs (BIS, 2010; Labonte, 2017) are suggestive of positive relationship between SIM and bank's financial soundness. Using regulatory and efficient market hypothesis, a sound regulatory system is expected to bring about compliance with laid down rules and corporate governance codes as well as requisite management routines (Ezeoha, 2011). This presupposes that the imposition of fines and the publication of such for contravening bank's statutes and other frameworks have inverse relationship with bank's financial soundness. Hence it is expected that the penalty for the contravention (PEN) of banking regulation in Nigeria has a negative influence on the financial soundness of DMBs.

Research Hypotheses

Having regard to the requirements of the statute and the need to cater for the financial soundness of Nigerian DMBs as well as findings of previous related studies (Abdel-

rahim, 2013; Bahadori et al., 2015; Mayes & Stremmel, 2014; Muhmad & Hashim, 2015; Schütz, 2014; Zagherd & Barghi, 2017), the following hypotheses are formulated to examine the impact of these bank-specific factors.

Hypothesis I

Capital adequacy, measured by leverage ratio and gross revenue ratio, has significant positive impact on the bank's financial soundness in Nigeria.

Hypothesis II

Loan loss provision to net interest revenue and non-performing loans to gross loans, representing asset quality, negatively and significantly influence Nigerian DMBs' financial soundness.

Hypothesis III

Management soundness has significant impact on the ability of Nigeria DMBs to appear financially sound.

This hypothesis can be further broken into two (2) based on the variables of the study:

$H_{3:1}$ Bank's financial soundness is negatively and significantly influenced by the cost-to-income ratio.

$H_{3:2}$ Gross earnings to total assets have significant positive influence on the DMBs' financial soundness in Nigeria.

Hypothesis IV

Profitability, measured by return on assets and return on equity, has significant positive influence on bank's financial soundness in Nigeria.

Hypothesis V

Liquidity, measured by liquid assets to total assets and liquid assets to deposit, has significant positive influence on bank's financial soundness in Nigeria

Hypothesis VI

Sensitivity to market risk influences negatively and significantly the ability of Nigerian DMBs being financially sound.

Empirical Evidence

In accounting and finance literature CAMELS-related studies are conducted to determine and analyze banking soundness and/or predict banking failure or financial distress. The findings of these studies are diverse. Whalen and Thomson (1988), using financial data to identify changes in financial condition of banks in the Cleveland, were able to establish the predictive power of CAMEL rating model. In particular, the results of logistic regression confirmed the critical predictive role of asset quality and earning measures most especially the ratio of non-performing loans to primary capital. In a study conducted to investigate the early signals of banking sector vulnerabilities in central and eastern European emerging markets, Männasoo and Mayes (2005) showed, by the use of fixed effects panel logit model that, macroeconomic variables tend to give a signal earlier than most of financial variables but with a clause that Wald test strongly rejects the hypothesis that either the bank-specific variables or macroeconomic variables are irrelevant for explaining the crisis probability. The study found the bank-specific factors to be more important in the later stages and gain more weight as the banking sector develops and the institutional framework becomes mature. Specifically, they found non-performing loans, cost-income ratio, solvency, liquidity, and profitability measures as good determinants of banks' soundness. The potential of CAMELS model in analysing banking soundness and financial condition is also reinforced by Mayes and Stremmel (2014) who examined the effectiveness of capital adequacy measures in predicting bank distress. A contrast of logit model and time survival analysis showed that the influence of the bank-specific characteristics in the determination of banks' financial condition in both approaches is slightly different. Summarily, capital adequacy, asset quality and earning ability measures have higher explanatory power. The study found, in all, 80% and 98% predictive accuracy for CAMELS model using logit and time survival analysis respectively. In an Indian study of an empirical analysis of capital adequacy in the context of bank-specific performance factors, Aspal and Nazneen (2014), using ordinary least square (OLS) regression analysis, revealed that Loans, Management Efficiency, Liquidity and Sensitivity have statistically significant influence on the capital adequacy of private sector banks but the influence of asset quality is negligible.

For Abdelrahim (2013) only accounting measure of liquidity is found to have significant positive impact on the bank's financial condition/soundness indicated by capital adequacy ratio in the Saudi's context. The study further found a significant influence of SIZE but negatively against the expectation. Iranian empirical evidence provided by Bateni, Vakilifard and Asghari (2014) from a dataset of 6 privately-owned Iranian banks for the period 2006-2012 using panel regression showed that two components of CAMELS framework, capital adequacy and earnings quality, explain banks' financial soundness as measured by total risk-weighted capital (TCAR). The bank-specific variables making up these two components are equity-to-assets ratio, ROA and ROE which are all significantly positive. A South Eastern European

(SEE) countries study of the impact of bank-dimensional and environmental factors on CAR by Aktas et al. (2015) found aside environmental factors the positive impact of a number of accounting measures of CAMELS on CAR. Using the Feasible Generalised Least Square (FGLS) regression, it was found that the bank dimensional explanatory variables: size; ROA; leverage; liquidity; net interest margin and risk show statistically significant effects on CAR for the banks in the region.

A logistic regression (Probit) analysis of the relationship between financial soundness (indexed by CAR) and measures of components of CAMELS framework in an Iranian study could not but find positive impacts of bank-specific determinants on financial soundness of commercial and non-commercial banks in Iran. As found by Bahadori et al. (2015), there is no sufficient evidence to show that measures of CAMELS framework have no significant impact on financial stability index or CAR of Iranian banks except the liquidity and profitability variables on commercial banks and liquidity measure on non-commercial banks. Although not all indicators of CAMEL framework were adopted, Riaz's (2016) findings for Pakistani banks based on bank-level and macroeconomic data between 2009 and 2013 revealed the significant influence of accounting measures of bank liquidity, operating efficiency (CIR) and profitability (ROA) on bank's financial soundness measured by total regulatory capital ratio (TCAR).

Although Duqi and Al-Tamimi (2017) sought to examine the impacts of owner's identity on banks' capital adequacy and liquidity risk, incidental to their findings is that some bank-specific variables statistically explain total regulatory capital (TCAR) and Tier 1 capital adequacy ratio (T1CR). These bank-specific variables as established by Duqi and Al-Tamimi (2017) using a sample of 188 banks- both listed and unlisted, from 13 countries in the Middle East and North Africa for the period 2000-2011, are loan loss ratio (measuring asset quality) which has significantly negative impact on Tier 1 capital but indifference to TCAR and cost-to-income ratio (measuring management quality) which has negative influence on both measures of CAR but significant on T1CR based on the results of system Generalised Methods of Moment (system-GMM). Other significant variables but not parts of CAMELS indicators are operating leverage (fixed assets-to-total assets) with negative influence on T1CR and SIZE with negative influence on both measures of CAR. For Kalifa & Bektaş (2018) who examined how bank-specific and macroeconomic variables affect capital adequacy ratio of Islamic banks of Saudi Arabia, Malaysia, Qatar, Indonesia, Turkey, Kuwait, United Arab Emirate and Bahrain for the period 2005-2014, a number of bank-specific variables are found to be good predictors of Islamic banks' financial soundness. Specifically, the results of Arellano-Bond Generalised Methods of Moment (GMM) showed that ROA, ROE, credit risk and leverage aside the lag of the capital adequacy ratio affect the Basel II capital adequacy ratio. While ROA, leverage and credit risk positively and significantly influence Islamic banks' CAR, ROE has significantly negative impact. Also found to explain significantly Basel II CAR of Islamic banks by Kalifa & Bektaş (2018) is the size of these banks but negatively.

Methodology

Studies on bank failure and soundness incorporate substantially elements of prediction (Bahadori et al., 2015; Männasoo & Mayes, 2005). In these studies, the use of logistic regression and/or linear regression has been found very useful (Aktas et al., 2015; Männasoo & Mayes, 2005; Mayes & Stremmel, 2014; Schütz, 2014; Zagherd & Barghi, 2017). Since the information about the measures of bank financial soundness (TCAR and T1CR) are readily available, the choice of linear regression is considered appropriate. Though there are several indicators for each of the components of CAMELS framework (Klomp & Haan, 2012), the impact of a number of them on bank's financial condition have been empirically established in previous related studies (see Aspal & Nazneen, 2014; Bahadori et al., 2015; Bourkhis & Nabi, 2013; Mayes & Stremmel, 2014; Schütz, 2014; Zagherd & Barghi, 2017). Based on the deductions from previous studies, banks' financial soundness is made a function of the indicators of CAMELs framework and a number of other variables. This is as presented in the models below:

Model I

$$BFS_{it} = \propto + \beta_1 GRR_{it} + \beta_2 NPL/GL_{it} + \beta_3 CIR_{it} + \beta_4 ROA_{it} + \beta_5 LTA_{it} + \beta_6 MKR1_{it} + \beta_7 SIZE_{it} + \beta_8 AGE_{it} + \beta_9 SIM_{it} + \beta_{10} PEN_{it} + \varepsilon_{it} \quad (1)$$

Model II

$$BFS_{it} = \propto + \beta_1 LVR_{it} + \beta_2 LLP/NIR_{it} + \beta_3 RTA_{it} + \beta_4 ROE_{it} + \beta_5 LTD_{it} + \beta_6 MKR2_{it} + \beta_7 SIZE_{it} + \beta_8 AGE_{it} + \beta_9 SIM_{it} + \beta_{10} PEN_{it} + \varepsilon_{it} \quad (2)$$

In the two models, BFS stands for bank financial soundness which is either TCAR or T1CR. The variables of coefficients $\beta_1 - \beta_6$ represent the accounting measures of each of the components of CAMELS framework respectively while those of coefficients $\beta_7 - \beta_{10}$ are measures of control variables in both models. Although this study has two models, using two measures of the dependent variable shows that there are four (4) equations in all. All the variables of the study are described in Table 1.

Data related to the variables of this paper are obtained from published annual reports and accounts of individual banks. Although there are more than 20 DMBs in Nigeria, only 15 are listed on the Nigerian Stock Exchange (NSE). Therefore, only DMBs whose accounting information is publicly available are included in this study. The bank-dimensional data obtained fall within 2012-2016, a purely International Financial Reporting Standards' (IFRS's) era of Nigerian banking sector. With 15 DMBs listed on NSE, 75 bank-year observations are probable but an unbalanced panel data of 72 bank-year observation is settled for due to unavailability of a number of annual reports.

In a panel data regression as used in this study, a choice has to be made between its random-effects (RE) model and fixed-effects (FE) model based on the results of Hausman test (Baltagi, 2005; Gujarati & Porter, 2009; Torres-Reyna, 2007a). Upon the choice of RE model, a further test is carried out, Breusch-Pagan Lagrange Multiplier (BPLM), to decide whether to use random-effects regression and a simple ordinary least squared (OLS) regression (Torres-Reyna, 2007a). Having followed this procedure, a simple OLS is adopted given the results of Hausman tests (HausM) which show that the residuals are not correlated with the regressors (that is, $p>0.05$) and BPLM which show no panel effects across sampled banks (that is $p>0.05$). Other tests carried out include: Breusch-Pagan Cook-Weisberg (BP-CW1) with fitted values of dependent variable and BP-CW2 with independent variables (Baum, 2006) for heteroscedasticity; and the pair-wise correlations and variance inflation factor (VIF) for discovering the level multi-collinearity among the explanatory variables. The data are not only analysed inferentially, descriptive statistics like mean, standard deviation, minimum and maximum values are also performed.

Table 1: Variables' Definitions

S/N	Variable	Variable Type	Measurement	Expected Sign of Explanatory variables
1	Total Regulatory Capital Ratio (TCAR)	Dependent	Sum of Tier 1 and Tier 2 capitals scaled by risk-weighted assets	
2	Core Capital Ratio (T1CR)	Dependent	Tier 1 capital scaled by risk-weighted assets	
3	Gross Revenue Ratio (GRR)	Independent	Tier 1 capital scaled by the sum of interest and non-interest income	+
4	Leverage Ratio (LVR)	Independent	The ratio of Tier 1 capital to total adjusted assets	+
5	Non-Performing Loan Ratio (NPL/GL)	Independent	Non-performing Loans to Gross Loans	-
6	Impairment for Loan Losses in Profit or Loss account (LLP/NIR)	Independent	The ratio of impairment for loan losses in income statement to Net Interest Income	-
7	Cost to Income Ratio (CIR)	Independent	Ratio of operating expenses to operating income	-
8	Asset Turnover (RTA)	Independent	Ratio of Gross revenue to total asset	+
9	Return on Asset (ROA)	Independent	Net income scaled by total assets	+
10	Return on Equity (ROE)	Independent	Ratio of Net income to shareholders' fund	+
11	Liquidity (LTA)	Independent	Total Liquid Assets scaled by Total Assets	+
12	Liquidity (LTD)	Independent	Liquid Assets to Total Deposits	+
13	Market Risk (MKR1)	Independent	total interest expenses to total deposit	
14	Interest Gap Ratio (MKR2)	Independent	Difference between Rate-Sensitive Assets and Rate-Sensitive Liabilities scaled by earning assets	

S/N	Variable	Variable Type	Measurement	Expected Sign of Explanatory variables
15	Banks' Size (SIZE)	Control	Natural Logarithm of Bank's Total Assets	+
16	Bank's Age (AGE)	Control	Natural Logarithm of Bank's Age since Commencement of Operation	+
17	DMB's Systemic Status (SIM)	Control	'1' is assigned if a DMB is classified as Systematically Important Bank (SIB), otherwise '0'	+
18	Contravention of Banking Regulation (PEN)	Control	Natural Logarithm of penalties paid for contravening banking regulation yearly by each bank	-

Source: Authors' compilation, 2017 based on deduction from related literature

Data Analysis and Results

This section presents the results of various statistical analyses carried out to achieve the purpose of this study. While descriptive statistics reveal mean, standard deviation, minimum and maximum values of all variables of the study, the correlation analysis and VIF seek to find the extent of multi-collinearity. The regression analyses depict the impact of each of the explanatory variables on DMBs' financial soundness in Nigeria.

Descriptive Statistics

As obtainable in Table 2, the mean values of TCAR and T1CR which measure bank's financial soundness are 16.2% and 13.7% respectively. These values fall within the benchmark for all DMBs whether SIB, international, national or regional. Conversely, the minimum value of -47% for both measures, are indeed not a good omen for DMBs in Nigeria. Similar scenario applies to GRR and LVR which are measures of capital adequacy. Although the average values, 74% and 9%, for both measures respectively are satisfactory, the minimum values of -259% and -48% are substantial indicators of capital inadequacy of a number of DMBs in Nigeria due to negative core capital (Tier 1 Capital). A non-performing loan ratio that is as low as 2% and that is averaged 8% is good but a maximum value of 96.5% is source of concern. For impairment for loan losses charged in the income statement, its ratio to net interest revenue of 19.2% is reported within the sampled period while it is as high as 73%. Regarding CIR, a measure of management soundness, an average value of 77% accounts for why ROA and ROE are at low ebb averaged 1.6% and 5% respectively. The liquidity measures, LTA and LTD, are averaged 38% and 56% respectively. Conversely, their minimum values of 2.6% for LTA and in particular 22% for LTD

which is below benchmark of 30% is another source of concern. For interest rate risk, MKR1 and MKR2 are averaged 5.3% and 10.4% respectively. Apart from NPL/GL, ROE and a couple of others, there is no much variability in the values of each variable with standard deviation being less than mean values.

Table 2: Descriptive Statistics of all Variables of the Study

Variable	Observation	Mean	Std. Dev.	Min	Max
TCAR	72	0.1616	0.1142	-0.4698	0.305
T1CR	72	0.1366	0.1090	-0.4698	0.303
GRR	72	0.7392	0.5805	-2.5896	1.56
LVR	72	0.0865	0.0877	-0.4779	0.18
NPL/GL	72	0.0761	0.1277	0.0171	0.9646
LLP/NIR	72	0.1917	0.1785	0	0.7266
CIR	72	0.7734	0.3057	0.3685	2.84
RTA	72	0.1234	0.0175	0.0918	0.1865
ROA	72	0.0162	0.0150	-0.056	0.053
ROE	72	0.0543	0.4948	-3.94	0.296
LTA	72	0.3799	0.1243	0.0260	0.6134
LTD	72	0.5560	0.1661	0.2211	0.9984
MKR1	72	0.0526	0.0153	0.0236	0.0845
MKR2	72	0.1040	0.1438	-0.2411	0.4939
SIZE	72	20.9503	0.6707	19.3196	22.1781
AGE	72	3.4795	0.6885	1.7918	4.8040
SIM	72	0.4028	0.4939	0	1
PEN	72	10.0838	2.3290	0	14.9037

Source: Authors' computation, 2017, based on Stata version 14 outputs

Correlation Analysis

High correlation is noticeable between some variables which is suggestive of multi-collinearity based on the information in Table 3. These variables include; LVR and GRR; NPL/GL and GRR; NPL/GL and LVR; and SIM and SIZE. Since all the variables are not used together in a model, for instance, GRR and LVR and the NPL/GL and LVR, the issue of multi-collinearity is mitigated. To confirm the reality of the multi-collinearity of those that are used together in a model, a further test of multi-collinearity, VIF, is conducted. The results of which are included in the Table 4 and Table 5 of regression estimates. Based on the results of VIF in the Tables 4 and 5, the highest VIF for the first model is 9.57 and 4.59 for the second model (mean VIF: 4.72 and 2.11 respectively). The lowest tolerance values (VIF reciprocal or 1/VIF) are 0.105 and 0.218 for Model I and Model II respectively. Where VIF does not exceed 10

and 1/VIF is higher than 0.1, as palpable in this study, multi-collinearity is not present among the explanatory variables (Gujarati & Porter, 2009; Torres-Reyna, 2007b).

Table 3: Correlation Matrix

Variable	GRR	LVR	NPL/ GL	LLP/ NIR	CIR	RTA	ROA	ROE	LTA	LTD	MKR1	MKR2	SIZE	AGE	SIM	PEN
GRR	1.00															
LVR	0.97	1.00														
NPL/GL	-0.84	-0.90	1.00													
LLP/NIR	-0.52	-0.51	0.58	1.00												
CIR	-0.51	-0.48	0.30	0.50	1.00											
RTA	-0.55	-0.48	0.57	0.59	0.29	1.00										
ROA	0.52	0.49	-0.27	-0.49	-0.91	-0.16	1.00									
ROE	0.40	0.35	-0.12	-0.27	-0.49	-0.07	0.52	1.00								
LTA	0.50	0.45	-0.37	-0.22	-0.41	-0.28	0.34	0.31	1.00							
LTD	0.43	0.39	-0.29	-0.12	-0.30	-0.09	0.30	0.30	0.91	1.00						
MKR1	-0.36	-0.30	0.17	0.11	0.40	0.37	-0.48	-0.28	-0.28	-0.15	1.00					
MKR2	0.32	0.28	-0.05	-0.01	-0.25	0.03	0.34	0.32	0.18	0.18	-0.22	1.00				
SIZE	0.61	0.51	-0.31	-0.12	-0.51	-0.48	0.49	0.38	0.51	0.44	-0.65	0.34	1.00			
AGE	-0.11	-0.08	0.03	-0.01	0.05	-0.27	-0.09	-0.14	-0.11	-0.10	-0.17	-0.24	0.14	1.00		
SIM	0.32	0.23	-0.17	0.05	-0.30	-0.37	0.23	0.14	0.22	0.13	-0.58	0.17	0.72	0.08	1.00	
PEN	-0.01	-0.01	-0.02	0.16	0.05	-0.09	-0.16	0.00	0.08	0.02	-0.01	0.03	0.24	0.19	0.18	1.00

Source: Authors' computation, 2017, based on Stata version 14 outputs

Regression Results

The regression results are presented in the Table 4 and Table 5 accompanied by other relevant tests. From Table 4, it is evident that majority of the CAMELS indicators and other variables influence significantly bank's financial soundness measured by TCAR and T1CR. While GRR, NPL/GL, LTA, MKR1 and AGE influence significantly as hypothesised, the results of SIZE and SIM are against the expectation. Basically, capital adequacy, asset quality, liquidity, sensitivity to market risk, bank's size and systematically important status predict bank's financial soundness equally regardless of its measure. Although CIR and ROA produce the expected sign, their insignificance is an indication of no empirical evidence for their relevance within the sampled period. These findings are consistent with the findings of Männasoo and Mayes (2005), Aktas et al. (2015), Duqi and Al-Tamimi (2017) and Kalifa and Bektaş (2018) except for CIR and ROA. There is also an agreement between the findings of this study and that of Bahadori et al. (2015) except for measures of liquidity whose influence was insignificant as found by Bahadori et al. (2015). Some level of agreement is also observable between the findings of this study and those of Aspal and Nazneen (2014) except for the influence of measure of management soundness on banks' finan-

cial soundness proxied by TCAR. However, this study disagrees with the findings of Whalen and Thomson (1988) except for non-performing loan ratio and Abdelrahim (2013) except for measures of liquidity and size.

With adjusted R^2 >0.9 for both models, Table 4 further reveals that substantial changes in banks' financial soundness as measured by TCAR and T1CR are better explained by CAMELS indicators and other variables. This is espoused by the results of root mean squared error (RMSE), the standard deviation of the regression whose closeness to zero suggests a better fit of the model (Torres-Reyna, 2007b). The RMSE for both regression models with the first set of independent variables using TCAR and T1CR are 0.04 and 0.03 respectively. With F-stat having $p<0.05$, there is enough evidence of statistically significant relationship between bank's financial soundness and all the explanatory variables. There is some degree of heteroscedasticity in the model with TCAR as a measure of financial soundness based on the results of Breusch-Pagan Cook-Weisberg (BP-CW1 & BP-CW2) which are significant at $p<0.05$. Thus robust standard errors are added to the model.

Table 4: Regression Estimates with First Set of Independent Variables

	Dependent Variable =TCAR (OLS)			**Dependent Variable = T1CR (OLS)**			**VIF Analysis**	
Variable	**Coefficient**	**t**	**P value**	**Coefficient**	**t**	**P value**	**VIF**	**1/VIF**
GRR	0.1561*	4.72	0.000	0.1571*	9.20	0.000	9.57	0.1045
NPL/GL	-0.1761**	-2.22	0.030	-0.1303**	-2.18	0.033	5.67	0.1762
CIR	-0.0296	-1.00	0.323	0.0049	0.17	0.863	7.21	0.1388
ROA	0.1111	0.15	0.878	0.7167	1.15	0.257	8.54	0.1171
LTA	0.0952**	2.15	0.035	0.0746**	2.20	0.032	1.73	0.5794
MKR1	-0.7263**	-2.19	0.033	-0.6155***	-1.92	0.059	2.34	0.4271
SIZE	-0.0355**	-2.04	0.045	-0.0253**	-2.06	0.043	6.59	0.1518
AGE	0.0261*	3.72	0.000	0.0112**	2.08	0.042	1.33	0.7522
SIM	-0.0258***	-1.77	0.081	-0.0199***	-1.81	0.075	2.89	0.3466
PEN	0.0017	0.78	0.438	0.0004	0.23	0.821	1.33	0.7534
_cons	0.7297**	2.3	0.025	0.5154**	2.18	0.033	**Mean VIF = 4.72**	
R^2	0.9151			0.9472				
Adj.R^2	0.9011			0.9386				
HausM	12.96(0.1646)			8.74(0.5572)				
BPLM	0.00(1.000)			1.45(0.1145)				
F-stat	46.52(0.0000)*			109.46(0.0000)*				
BP-CW1	5.03(0.0249)**			3.46(0.0630)				
BP-CW2	23(0.0108)**			17.34(0.0672)				
RMSE	0.0359			0.02702				

Source: Authors' computation, 2017, based on Stata version 14 outputs, where *, ** and *** stand for significance at 1%, 5% and 10% respectively. Hausman tests (HausM) and tests of heteroscedasticity (BP-CW1 & BP-CW2) report chi-square values while F-stat report F-values with p-values in parentheses.

Using the second set of independent variables (Table 5), CAMELS' indicators also show significant effect on the bank's financial soundness to a larger extent. While LVR, ROE and LTD predict bank's financial soundness measured by TCAR as hypothesised, the significant impact of RTA is contrary to expectation. Two of the control variables, SIZE and AGE, significantly explain changes in bank's financial condition except that the influence of SIZE is a reversal of prior expectation. The first five of the components of CAMELS have significant impact on the bank's financial soundness when it is measured by T1CR except that the impact of RTA (a measure of management quality) is against the prior expectation. The results of diagnostic tests are in tandem with similar scenario applicable to the models with the first set of independent variables regarding adjusted R^2 (adj.R^2>0.9), F-stat ($p<0.05$) and RMSE (being closer to zero) as evident in the models in Table 5. Also, there is no any evidence of the presence of heteroscedasticity based on the results of BP-CW1 and BP-CW2 for both models.

The empirical results depicted in Table 5 substantially agree with the findings of Bahadori et al. (2015) with the exception of indicators of liquidity and profitability. With capital adequacy, asset quality, and earnings ability having substantial explanatory power, there is also an agreement between the findings of this study and those of Bateni et al. (2014), Mayes and Stremmel (2014) and Duqi and Al-Tamimi (2017). The significant explanatory power of ROE on TCAR and T1CR as found in this study agrees with empirical evidence provided by Kalifa and Bektaş (2018). The previous studies of Duqi and Al-Tamimi (2017) and Kalifa and Bektaş (2018) align with the inverse relationship between size and banks' financial soundness as found in this study. On the other hand, this study disagrees with the findings of Abdelrahim (2013) but agrees on the impact of measures of liquidity and size.

Table 5: Regression Estimates with Second Set of Independent Variables

	Dependent Variable =TCAR (OLS)			Dependent Variable = T1CR (OLS)			VIF Analysis	
Variable	**Coefficient**	**t**	**p value**	**Coefficient**	**t**	**p value**	**VIF**	**1/VIF**
LVR	1.0764*	17.8	0.000	1.0294*	21.82	0.000	2.09	0.4775
LLP/NIR	-0.0132	-0.42	0.678	-0.0417***	-1.69	0.095	2.36	0.4232
RTA	-1.1852*	-3.42	0.001	-0.6472**	-2.39	0.020	2.74	0.3644
ROE	0.0400*	4.44	0.000	0.0225*	3.20	0.002	1.48	0.6742
LTD	0.0951*	3.50	0.001	0.0735*	3.46	0.001	1.52	0.6571
MKR2	0.0044	0.15	0.882	0.0275	1.18	0.241	1.36	0.7330
SIZE	-0.0303**	-2.59	0.012	-0.0099	-1.09	0.282	4.59	0.2180
AGE	0.0188*	3.09	0.003	0.0047	1.00	0.321	1.3	0.7676
SIM	-0.0093	-0.79	0.431	-0.0082	-0.89	0.377	2.51	0.3989
PEN	0.0008	0.46	0.646	-0.0010	-0.80	0.424	1.15	0.8682
_cons	0.7269*	2.99	0.004	0.2958	1.56	0.124	**Mean VIF = 2.11**	
R^2	0.9372			0.9580				
Adj.R^2	0.9269			0.9512				
HausM	17.90(0.0567)			10.11(0.4305)				
BPLM	1.54(0.1073)			0.70(0.2011)				
Fstat	90.99(0.0000)*			139.28(0.0000)*				
BP-CW1	1.10(0.2973)			0.88(0.3472)				
BP-CW2	13.73(0.1855)			13.25(0.2098)				
RMSE	0.03087			0.02409				

Source: Authors' computation, 2017, based on Stata version 14 outputs, where *, ** and *** stand for significance at 1%, 5% and 10% respectively. Hausman tests (HausM) and tests of heteroscedasticity (BP-CW1 & BP-CW2) report chi-square values while F-stat report F-values with p-values in parentheses.

Conclusions

This study, which seeks to examine the extent of the influence of CAMELS framework on the financial soundness of DMBs in Nigeria, is borne out of the need to alert the investing public and depositors as well as influencing some regulatory overhauls. The financial soundness is measured by two variables: total regulatory capital (TCAR) and core capital (T1CR) ratios; while each of the CAMELS' components is also represented by two variables. The empirical findings of this study, using pooled OLS, establish the explanatory powers of the CAMELS framework most especially in the prediction of Nigerian DMBs' financial soundness according to Basel's standards. Specifically, using the first set of the measures of CAMELS adopted regardless of whether total regulatory capital (TCAR) or Tier 1 capital (T1CR) is adopted as a measure of financial soundness, gross revenue ratio (capital adequacy), non-per-

forming loans ratio (asset quality), liquid asset to total asset (liquidity), and interest expenses to total deposit (sensitivity to market risk) are effective in the determination of DMBs' financial soundness within the sampled period. For the second set of the measures of CAMELS framework, all the components, except the sensitivity to market risk, exhibit the significant predictive potential of banks' financial soundness. Also, bank's size and age are better predictors but with the influence of size being significantly negative. It is equally evident that systematically important status has inverse relationship with Nigerian DMBs' soundness measured by total risk-weighted and Tier 1 capital as obtained from the first model.

Based on these findings, it is evident that both gross revenue ratio and leverage ratio are good predictors of DMBs' CAR. This lends credence to the introduction of leverage ratio by Basel III. It is also concluded that as the non-performing loans/loan loss provisions build up, banks appear to be unsound given the reduction in the total regulatory capital and Tier 1 or core capital. It can also be inferred that ROE is a better predictor of banks' financial soundness than ROA given its significant explanatory potential of CAR as hypothesised. There is also empirical support for the non-workability of the systematically important status of DMBs which is based substantially on the size of these banks.

These findings are pointers to the need for an overhauling of the bank regulatory system through a review of the systematically important status in such a way that it becomes a dependable predictor of Nigerian DMBs' financial soundness as indicated by regulatory capital adequacy ratio. Alternatively, the approach may be suspended if it continues to fail to accomplish its set objectives. It is imperative for DMBs to reduce the build-up of their non-performing loans in order to improve their financial health. The reversal of the prior expectations of the asset turnover- a measure of management soundness requires further investigation by CBN. The investors and depositors alike require an in-depth understanding of the workings of all the indicators of CAMELS framework to make better informed decisions. Nevertheless, since there are several accounting measures of each of the components of CAMELS framework (Klomp & Haan, 2012), future studies particularly in the Nigerian context require a factor analysis of these indicators before a choice of those with higher factor loadings is made and their impact established. This study stands out among other related studies (see, for example, Echekoba, Egbunike & Ezu, 2014; Iheanyi & Sotonye, 2017; Owoputi, Kayode & Adeyefa, 2014) for measuring capital adequacy using leverage and gross revenue ratios and for including sensitivity to market risk in the study's model particularly in the Nigerian context.

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