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Capital, Competition and Stability Nexus in the Kenya Banking Sector

Samuel Kiemo*

Abstract

The paper examines the nexus between capital, competition and stability in the Kenya banking sector. This is achieved by applying a panel data analysis model on annual bank level data for the period 2001 to 2022. The paper estimated H-Statistics and Bank Stability Index to measure evolution of banking sector competition and stability respectively. The results revealed four key findings. First, Kenya banking sector competition conditions is monopolistic with few large banks dominating. Secondly, on average the banking sector remains stable, with considerable gain in long-term resilience. Thirdly, increase in capital promotes competition first, however significant increase in capital reduces competition. Fourth, increase in capital promotes banking sector stability. The paper concludes that, capital positively effects both banking sector competition and stability. However, significant increase in bank capital reduce competition. The paper recommends appropriate capital regulation reforms should be implemented taking cognizance of the adverse implication on significant increase in capital on banking sector competition.

Key words: *Capital, Competition, Stability, Panel*

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1.0 Introduction

Globally, the aftermath of 2007-2009 global financial crisis witnessed significant focus on capital enhancement regulations. The revamping of capital aimed at enhancing banking sector competition and stability to mitigate against future financial crisis. The introduction of stringent capital measures such as increased capital buffer and introduction of Basel III recommendations aimed at addressing solvency risks which were identified as major vulnerabilities. Additionally, other reforms aimed at enhancing risk management, supervision and market conduct in the banking sector gained prominence during this period, ultimately focused of preventing future banking crisis (Bank of International Settlements (BIS), 2009, 2012; Gudmundsson, Kisinguh & Odongo, 2013; Shijaku, 2017).

The Central Bank of Kenya (CBK) has over the years revised capital requirements for banks aimed at promoting stability in the banking sector. These capital requirements involves both revision of capitalization level requirement in quantum terms and as ratio of banks proportion to its risk's exposure. In 2012, the CBK required banks to build-up its core capital requirement five folds in quantum terms to KSh. 1 billion from KSh. 250 million which was the requirement prior 2008. Additionally, in January 2015, CBK required banks to maintain 2.5 percent Capital Conservation Buffer (CCB) designed to ensure that banks build up enough capital, which makes the bank more resilient during stress periods. The 2.5 percent CCB is over and above the minimum capital ratios. These measures were aimed at fostering financial sector stability through increasing capital buffer for absorbing losses and utilizing economies of scale to reduce to lower bank lending rates. The opponents of these policy changes argued the revision of capital requirements would reduce competition in the banking sector, as small banks unable to raise the additional capital exit the industry through mergers or acquisition. Additionally, reduction in competition may lead to build-up of financial stability risk due to monopolistic banking practices and creation of 'too big to fail' banks in Kenya. The desire to enhance capital requirement is largely support by arguments that, increase in core capital promotes financial stability. However, some empirical

work on Kenya banking sector such as Gudmundsson, et.al, (2013); Talam & Kiemo (2017); CBK, (2013, 2023) found that increase in capital inversely effect competition, due to increased concentration caused by consolidations.

In 2024, discussion re-emerged on the need to revise the minimum capital requirement for banks in Kenya by tenth fold, from KSh, 1 billion to 10 billion in 3 years. The proponents for enhanced capital regulation arguments are hinged on addressing the following structural banking sector issues. First, is addressing the issue of high lending rates and high interest rate spread between deposit and lending. The Kenya banking sector has been experiencing interbank tightening evidenced by sharp rising in the interbank market rate since 2016. The tightened interbank market elevated the segmentation within the interbank forcing banks perceived to be risky facing liquidity risks, ultimately heightening banking sector stability concerns. Additionally, the continued elevation of domestic lending interest poses financial stability concerns due to increased exposure to credit default. This is evident by continued raising in the ratio of non-performing loan as proportion of gross loan to double digits ratio in the last decade. The decline in profitability over the similar periods also exacerbates the financial stability concerns, considering banks uses retained earnings to enhance its capital buffers. Additionally, the continued high deposit-lending spread rate, occasioned by stickiness on deposit rate amidst rise in the lending rate driven by tightening monetary policy stance to stem out inflationary pressure and FX deprecation, also poses policy concerns. The proponents of raising capital requirements argues, increased capital will lead to banking sector consolidation, creating bigger banks. Through benefits of economies of scale, the bigger banks will provide loans products at competitive rates leading to reduction in the lending rates and thus interest rate spreads. Analysis of the lending rates and spreads across the banks by size categorization also revealed the spread are higher among the small banks in comparison to medium and big banks (CBK, 2022, 2023).

The second structural issue involves addressing the competition issue in the banking sector. Empirical studies have shown that, Kenya banking sector competition conditions has declined in the recent times. The findings show the banking sector still monopolistic, dominated by few big banks (tier 1 banks) despite Kenya having more than thirty licensed banks (Gudmundsson, et.al, 2013; Kiemo & Kamau, 2021; Talam & Kiemo, 2017; Mwega, 2011; Ombongi & long, 2018). The proponents of increased capitalization requirements argue increased capital requirement will lead to more banking sector consolidation, eliminating the small banks and medium banks who are perceived as weak banks and creating large banks who are more competitive in provision of financial services. The big banks are assumed they will have adequate resources to compete among themselves, hence reversing the declining competition levels in the Kenya banking sector.

The third structural issue is to ultimately promote financial sector stability. Data shows, Kenya banking sector remains resilient amidst pockets of instability experienced over the last two decade. This is evidenced by strong capital buffers and adequate bank liquidity conditions. However, elements of instability remain

persistent. This is evidenced elevated credit risks with ratio of non-performing loans to total loan remaining double digits since 2017. The elevated credits is also amidst stagnation of profitability measured by return of asset (ROA) at 3 percent since 2014. This raises long-term viability of the banking sector. Analysis across the banking sector segmentation by size, reveals the banks in small categories are hardest hit by declining profitability and raising non-performing loan. These banking stability concerns are aimed to be addressed through enhanced capital requirements (CBK, 2022, 2023).

Policy blind spot still exist on the role of capital in promoting banking sector competition and stability. Empirical findings are still inconclusive on whether increase in capital promote banking sector competition and stability. This indicate there is no guarantee increase that, increase in capital requirement will yield the desired results in Kenya. Opponents of enhanced capital requirement argues, increased capital regulations increase the cost for doing business for banks. Increased cost of doing business, is largely driven by constrained lending due to limits on lending capped as ratio of capital, intensive equity raising activities, aggressive funding through deposits or debts. For this, the constrained lending leads to high pricing of loans aimed at generating enough returns, coupled with reduction deposit rate paid to customers to minimize financing costs (Beck, et.al, 2006a, 2006b). On competition, increase in capital requirement may lead to rise in market entry barriers, exits and consolidation. This increases market power through concentration ultimately stifling competition. Stringent entry barriers for new banks coupled by policy driven consolidation may exacerbate financial stability risks through creating systemic banking distress amidst 'too big to fail' concerns (Berger, 2009).

Against this policy objectives, this paper attempts to provide empirical evidence to solve policy blind spots that still exist on appropriate capital requirements for promoting banking sector competition and stability in Kenya.

1.1 Research Objectives

The general objective of this study is to examine the effect of capital on banking sector competition and stability in Kenya. To achieve this objective, the paper investigated the following specific objectives.

- First, examine the evolution of banking sector competition and stability conditions in Kenya.
- Secondly, examine the impact of capital on banking sector competition and stability in Kenya.

1.2 Significance of the Study

The paper contributes to empirical literature by adding to the scarce body of knowledge on the linkages between banking sector capital, competition and stability. This paper also contributes to empirical literature alternative measures of banking sector competition and stability risks. The paper also generates empirical evidence using new data points covering recent study period. The paper also provides evidenced based policy recommendations on capital requirements for banks aimed at promoting competition and financial stability.

The reminder of the paper is organized as follows;

section 2 present stylized facts on competition and stability conditions in Kenya. Section 3 present literature review relating to the effect of capital on competition and stability. Section 4 discuss data and research methodology adopted by this paper. Section 5 present empirical findings and, section 6 provides conclusion and policy recommendation.

2.0 Stylized Facts

2.1 Bank Stability and Capitalization Requirement in Kenya

Over the years, CBK has revised capitalization requirements for each individual banks aimed at coping with dynamism in the financial sector. CBK has prescribed capital requirement in both quantum form and as ratio to specific bank indicators. For example, CBK requires each institution to maintain a minimum, core capital (Tier 1) of KSh, 1, 000 million (CBK, 2013). In respect to specific bank appetite to risks, each individual bank is expected to maintain at a minimum; first, core capital (Tier 1) not less than eight (8) percent of its total Risks Weighted Assets (RWA); Secondly, total capital (Tier 2) of not less than twelve (12) percent of its RWA. The RWA should include off-balance sheet items and thirdly, a capital conservation buffer of 2.5 percent above the minimum capital ratios for Tier 1 and Tier 2 requirement; fourth, a core capital of not less than eight (8) percent of its deposit's liabilities

Table 1 shows as at 2023, the banking industry on average maintained higher capital requirements above the CBK requirement across all the five (5) categories. The total industry core capital was about KSh. 874.9 million, indicating majority of banks were meeting this requirement. Additionally, on average banks Tier 1 ratio was at 15.1 percent, Tier 2 ratio was at 18.3 percent way above 10.5 percent and 14.5 percent respectively including the 2.5 percent buffer. This indicates, on overall banks holds adequate capital buffers for absorbing financial shocks. However, despite industry averages being above the requirements, this may not conceal pockets of vulnerabilities across select individual banks in the sector.

Comparative analysis between CBK requirements and international best standards prescribed by the Basel III framework, reveals Kenya has a more stringent capital regulation. CBK minimum requirement for both Tier 1 and Tier 2 is higher than Basel III requirements (CBK, 2023). Individual banks, if any, failure to meet CBK capital requirement risks supervisory actions.

Table 1: Banks Capitalization Requirements

Description	CBK Requirement	Basel III Requirement	Industry Average- 2023
Minimum Core Capital (Tier1) to RWA (%)	8.0	6.0	15.1
Minimum Total Capital (Tier 2) to RWA (%)	12.0	8.0	18.3
Minimum Core Capital (Tier 1) to total deposit liabilities (%)	8.0	-	15.1
Capital Conservation buffer above minimum (%)	2.5	2.5	-
Minimum core capital (KSh. Million)	1,000	-	874.9 (Total)

Source: Central Bank of Kenya and Basel Committee on Banking Supervision

Data on banking sector core capital for the period 2006-2021, indicates banking sector has maintained capitalization level on average above the minimum CBK requirement across the three banking peer groups **(Table 2**). Tier 3 (Small peer) group maintained the highest capitalization level across the period, while Tier 2 (medium peer) group maintained the least capitalization level across the period. Tier 1 (large peer) group banks-maintained capitalization levels within the industry average (**Figure 1a**). Holding high capital above minimum requirement indicates both risks and benefits. First, the excess capital acts as buffer to accommodate any potential financial shock, hence promoting stability within the financial sector. However, the banks incur opportunity occasioned by revenue lost through holding excess idle capital (CBK, 2022).

Additionally, banks are expected to hold at minimum 20 percent of all its deposit liabilities, matured and short-term liabilities in liquid assets. This is aimed at ensuring banks meet maturing deposit obligations as and when they are demand. **Figure 1b** shows the liquidity buffers across all the three banks peer group has consistently remained above the CBK requirement. However, the industry average may conceal elements of liquidity risks across individual banks.

Holding high excess capital and liquidity indicates elements of intermediation inefficiency, where the banks are not putting the excess funds into a more productive use to generate returns for long-term productivity. This is evidenced by the declining profitability as shown by Return on Assets (ROA) and Return on Equity (ROE) during the period 2006 – 2021. The significant decline in profitability, lead to the banks reduction in ability to build up reserve to support long-term bank growth.

Table 2: Selected Banking Stability Indicators

	2006	2008	2010	2012	2013	2014	2016	2017	2018	2019	2020	2021
CAR (Total Capital)	17	18	21	22	23	19	19	18	19	19	19	20
CAR (Tier 1)	16	16	19	19	19	16	16	16	17	17	17	17
Gross NPLs to Gross Loans	21	8	6	5	5	5	9	11	12	12	15	14
Return on Assets (ROA)	3	3	4	4	4	3	3	3	3	3	2	3
Return on Equity (ROE)	29	29	31	34	29	27	25	21	23	21	14	22
Liquidity Ratio	45	37	45	42	39	38	41	44	49	50	55	56
Private Sector Credit Crowth	12	29	20	11	20	22	5	3	2	7	8	9
Credit to Government Growth	53	3	13	64	(21)	15	30	8	(2)	9.7	43	28
Total Bank Credit as a Percentage to GDP	N/A	N/A	29	32	34	36	36	32	30	31	28	30

Source: Central Bank of Kenya

Figure 1a: Bank Core Capital Trend

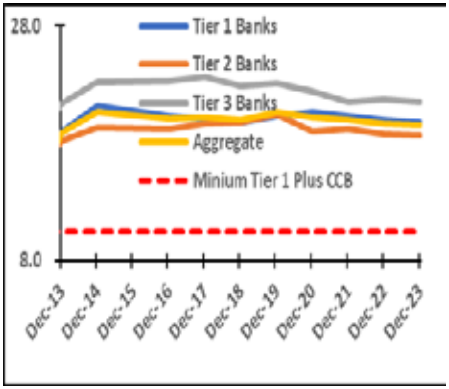
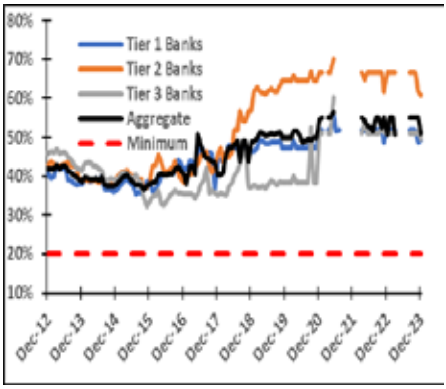


Figure 1b: Bank Liquidity Ratio Trend



2.2 Competition in the Banking Sector

The banking sector competition conditions in Kenya has remained monopolistic in nature for the last three decades. This is despite the numbers of licensed banks averaging about 40 banks during the period. This is evidenced by data revealing 76.6 percent market share is controlled by only nine (9) banks categorized as large peer group (Tier 1) in 2023. The remaining market share is shared among the rest thirty (30) banks in medium (Tier II) and small (Tier III) peer group category. However, the competition situation has just slightly improved from competition condition experienced in 2003, where 80.8 percent market share was only controlled by thirteen (13) large peer group banks. The remaining thirty (30) banks controlled paltry 20 percent market share (CBK, 2003, 2013, 2023). Despite slight decline in market share for large peer banks, competition condition hasn't greatly improved (**Table 3**).

Table 3: Trend of Banking Sector Market Share in Kenya

Peer Group	Combined Weighted Market Share (%)	Number of Institutions	Combined Weighted Market Share (%)	Number of Institutions	Combined Weighted Market Share (%)	Number of Institutions
	2023		2013		2003	
Large (Tier 1)	76.6	9	52.4	6	80.8	13
Medium (Tier 2)	15.0	8	39.1	16	12.4	13
Small (Tear 3)	8.4	22	8.5	21	6.6	17
Total	**100**	**39**	**100**	**43**	**100.0**	**43**

Source: Central Bank of Kenya

Estimation of market competition conditions using measures such as Concentration Ratio (CR) shows, the sector has shifted from oligopolistic competition to monopolistic competition. This is evidenced by CR shifting from above 60 percent in 2001 to 47 percent in 2017. The shift from high concentration to low concentration, shows competition in the banking sector had increased forcing the banks to be more competitive through improved efficiency to remain profitable. In addition, the Herfindahl-Hirschman Index (HHI) also shows the banking sector has gained competitiveness, evidenced by moving from an HHI of 1024 in 2002 to 675 in 2017 (Kiemo & Kamau, 2021; Talam & Kiemo, 2017).

To promote competition, Kenya has undertaken various financial sector policy reforms. These reforms aim at reducing information asymmetry, reducing entry barriers, increase supervision and monitoring efficiency and addressing the high cost of funding. Additionally, other reforms have been undertaken to increase to the number of financial sector players and variety of financial products. This includes policies such as introduction of mobile money services, enactment of National Payment Act, microfinance bank legislation, deposit insurance system, agency banking regulation and leveraging on technological advancement. These reforms may be attributed to the slight shift from oligopolistic competition to monopolistic competitions. However, gaps remain for banking sector in Kenya to be more competitive (Mwega, 2011; Talam & Kiemo, 2017).

3.0 Literature Review

Review of empirical literature reveals conflicting results on the impact of capital on banking sector competition and stability in both pre and after 2007-2009 global financial crisis (GFC). Some empirical studies have found bank capital has positive linkages with stability, where increase in capital promotes both competition and banking sector stability. This is achieved through increased capital buffer for lending and absorbing loses (Gudmundsson, et.al, 2013; Mwega, 2011; Kiemo & Kamau, 2021; Kiemo, et.al, 2021; Berger, 2009). This strand of literature argues that competition promotes firm stability against both internal and external financial shocks. This is achieved by competitive firms providing products at competitive prices through focusing on efficiency through optimization and utilizing economies of scale. The proponents of of this strand of literature, argues increased competition foster stability through creating competitive firms focusing on utilization of technology. Therefore, as firms aim at maximizing profitability, they minimize risks, hence safeguarding their stability.

Another strand of literature has emerged asserting that increased concentration due to market consolidation creates to few large institutions raising 'too big to fail' stability problem. These studies argue that there is not guaranteed that few big financial institutions reduce financial stability risks (Mlambo & Ncube 2011, Kamau, 2011). This argument is supported by evidence prior to 2007-2009 global financial crisis, where banks through market competition encourages risk-taking behavior which led to build-up of risks and vulnerability. Financial institutions with increased market power, due to increased competition may lead moral hazard and adverse selection problems increasing the risky banks portfolios (Allen & Gale, 2004; Boyd & Nicolo, 2005). The competitive banking sector provides vital financing to financially dependent industries enabling them to seize growth opportunities. Schaeck & Cihak (2014) study on the European Banking sector support this argument that competition improved bank stability.

Other studies have found negative linkages between competition and stability, where increase in capital lowers competition condition through market exits,

exacerbating financial stability concerns through risking lending practices and uncompetitive market conduct issues (Shijaku, 2017; Demirguc-Kunt, et.al., 2010). The proponents of this strand of literature argues competition promotes efficiency leading to re-allocation of resources from in-efficient firms to more efficient firms. The re-allocation occurs in form of exits of inefficient firms through either merger or acquisition. The market consolidation through re-allocation of resources to most efficient firms lead to increased concentration. Highly concentrated banking sector with few banks is more susceptible to banking crises. Highly concentrated banking sector also stifles economic growth through credit rationing by dominant's banks, this is not the case for competitive banking sector where credit rationing are limited (Moyo, 2018; Schaeck & Cihak, 2014). Banks with excess market power influences both lending rate and deposit rate. This is evidenced by their ability to charge higher lending rates while offering deposit providers a lower deposit rate. This hinders credit flows to productive sectors of the economy which ultimately hampers economic growth which elevates financial instability.

Other studies have also emerged with arguments that there is no empirical evidence linking financial stability and capital (Agung, et al., 2019; Mlambo & Ncube, 2011). Data shows despite authorities adopting stringent regulatory measures in the post GFC period, elements of instability persist. The failure of Credit Suisse in Switzerland, Silicon Valley Bank and other several regional banks in the USA in 2023 reinforces this argument. Higher capital requirements as a move towards having stable and more competitive banking sector, financial sector instability remain pertinent as evidenced, Additionally, with complexity of the financial sector due to various interconnectedness and technological advancement, it difficult to unmask the positive effects of competition driven by capital changes (Van, & Le., 2023; Nguyen, 2024).

Therefore, review of existing literature raises various empirical questions on linkages between capital, competition and stability that requires further examination. First, there is no guarantee linkage that increased competition leads to financial development through emergence of competitive and efficient firms. In retrospection, policy makers should be keen on the negative consequences of increased competition such as excess risk-taking and moral hazard. Secondly, firms should aim at finding the optimal level of competition that guarantee market development, technological innovation and long-term sector stability. This optimal level of competition is expected to produce desirable effect on financial development. That optimal level of competition is still ongoing empirical research. Third, is the role of technological advancement which is altering business models re-shaping traditional role of capital in influencing competition dynamics. Consideration of technological risks should be prevalent in the financial sector. This calls for more recent studies re-examining capital, competition and stability nexus in this era of advanced distribution network channels, exposure to counter-party and cross border risks. Fourth, majority of available empirical literature have focused on developed economies where the structure of the banking sector is different from developing countries like Kenya, and there is little available empirical literature examining linkage between capital, competition and banking sector stability in Kenya.

4.0 Data and Research Methodology

4.1 Data

The study used both annual bank-level and group-level data for 37 banks covering the period 2001 to 2022. The choice of study period is largely based on availability of bank level data sets. In addition, the period adequately captures different policy regime changes. Secondary data was extracted from the published financial statements of banks.

4.2 Econometric Model

To achieve the first objective, the paper estimate competition and stability measures as follows.

4.2.1 Bank Competition Measures

Two strands of measuring competition have gained prominence in literature namely, structure-conduct-performance and non-structure-conduct-performance models (Mwega, 2011; Talam & Kiemo, 2017; Lerner, 1934; Boone, 2008; Tusha & Hashorva, 2015). The structure-conduct-performance model argues that the conduct and performance of firms is driven largely by the market structure. Herfindahl-Hirschman Index (HHI) and the Concentration Ratios (CR) are the most commonly structure conduct measures of competition. CRm indicates the market structure of 'M' firm in the economy, where "M" is the number of largest firms indicating the degree of oligopolistic competition in an economy. CR has been criticized for not considering all firms, heavily relying on a few large firms, ignoring other firm characteristics such as bank size and business model. To overcome CR weakness, HHI was developed. HHI, which measures a firm's size in relation to the industry, as the sum of the squares of the market share of each participant in the market. The HHI give more weight to larger firms, hence considered as a standard measure of concentration. Generally, the major weakness of structure-conduct-performance models' is the assumption that higher market power indicated by high ratios, result in super-normal profits due to monopolistic tendencies, while ignoring many other factors that impact competition.

Non-structure-conduct-performance models were developed to address limitations of structural measures through incorporating other firm-level characteristics firm's competitive conditions. The most common non-structure-conduct-performance models used include the Lerner Index, the Boone Indicator and Panzar-Rosse H-statistics. Lerner Index measures competition through establishing the prices and costs relationship for profit maximizing firms. Gathering prices and cost information is a tedious process hence, forming the main weakness for Lerner Index. On other hand, Boone Indicator as a measure of competition assesses how firms utilize its inputs for profit maximizations. The Boone Indicator shows how competition improves the performance of efficient firms and in comparison, with inefficient firms. Panzar-Rosse (P-R) H-statistics uses marginal behavior/conduct to assess degree of competition amongst firms. If there is perfect competition in the market, any increase in the prices of input leads to proportionate raise in both marginal costs and total revenues (Panzar, & Rosse, 1987). On the other hand, in monopolistic competition increasing prices of input increases the marginal costs consequently reducing the total revenues. H-statistics therefore measure the firm's degree of competitiveness in the industry, making it the most popular measure of competitiveness. The H-Statistics falls between 0 and 1, where closer to 0 is collusive (joint monopoly) competition, closer to 1 indicates monopolistic competition and 1 is perfect competition.

This paper adopts H-statistics competition measure using the two-stage model estimation approach. The first stage involves testing equilibrium positions in the data following similar approach by Kiemo & Kamau (2021); Mwega (2011); Mlambo & Ncube (2011); Ombongi & Long (2018). This is achieved by estimating the reduced form equation for Kenya to test long-run equilibrium conditions in the data, as indicated in equation (1).

$$ln\,(ROA_{i,t}) = \alpha + \beta_1\, ln(w1_{i,t}) + \beta_2\, ln(w2_{i,t}) + \beta_3\, ln(w3_{i,t}) + \gamma_1\, ln(npl_{i,t}) + \gamma_2\, ln(bsize_{i,t}) + \gamma_3\, ln(inf_t) + \gamma_4 ln(tbill_t) + \varepsilon_{i,t} \quad [1]$$

The second stage involves estimating H-Statistics following Panzar-Rosse (1987) methodology as shown in equation (2).

$$ln(P_{i,t}) = \alpha + \beta_1\, ln(w1_{i,t}) + \beta_2\, ln(w2_{i,t}) + \beta_3\, ln(w3_{i,t}) + \gamma_1\, ln(npl_{i,t}) + \gamma_2\, ln(bsize_{i,t}) + \gamma_3\, ln(inf_t) + \varepsilon_{i,t} \quad [2]$$

Where $ROA_{i,t}$ is the rate of return measured as the ratio of net income to total asset, p is the output price of loans, measured by the ratio of gross interest revenue over total assets, $w1$ is the input price of funds measured by gross interest expense over total deposits, $w2$ is the input price of labour measured by ratio of salaries and wages to total assets, $w3$ is the input price of capital/equipment measured by ratio of non-interest operating

income to total assets. The control variables, npl computed as ratio of non-performing loans over total loans to measure banks credit risk, bsize, which is total assets to measure for bank size. Inflation rate (inf) measure as percentage change in general prices was used to measure the macroeconomic environment. i and t represent cross-sectional and time dimensions. H-Statistic was computed by summation of $\beta1+\beta2+\beta3$, the coefficients of input elasticity's prices from equation [2]. The λ, β and γ represented coefficients of regressors. The interpretation of H-Statistics is prescribed as follow, if $H<0$, shows the competitive conditions is oligopolistic, collusive or short run competition exist among the firms. If $H=1$, shows perfect competitive conditions exist. If $0<H<1$, monopolistic competition exists.

4.2.3 Banking Sector Stability Index

Banking sector stability prominence emerged in the aftermath of the 2007-2008 global financial crisis with policy makers adopting different methodologies to track its evolution. Broadly, two methodological measures have emerged based on the nature of data used. This methodology approaches includes market-based models and accounting-based models (Ohlson, 1980; Platt & Platt, 2002). The market-based models rely on trading data from secondary market transactions. Since the trading data contains both current information, the market-based models are highly preferred as good measure of stability. However, the inability to observe market data leads to information distortion and estimation errors for market-based models. Accounting-based models rely on historical financial performance indicators. Due to their simplicity, observable nature of the data and availability of the data makes accounting-based models more commonly used. However, since historical data are prone to manipulation through understatement or overstatement, this makes accounting-based models heavily criticized (Athanasoglou, et.al, 2006; Kiemo, et.al, 2019; Agung, et.al, 2019; Lepetit & Strobel, 2014; Shijaku, 2017; BIS, 2015).

The paper adopted accounting-based models to measure banking stability through constructing a Bank Stability Index (BSI). The paper followed previous empirical works of Onyema, et.al, (2018); Kattel, (2015); IMF (2000); Kiemo, et.al, (2021) methodology to construct the BSI. BSI aimed at measuring evolution of bank stability conditions using bank-specific indicators and select macroeconomic indicators as control variables. This was achieved using two steps estimation approach.

First step involved normalization of the multi-attribute variables used in the index, by transforming all data variables needed to the same scale. The paper used the mean of zero and standard deviation of one, implying that standard deviation is a scaling factor as shown equation 3:

$$Z\_it = ((X\_it - \mu))/\sigma \quad \text{..... [3]}$$

Secondly, using equal-weighted approach, the paper applied the normalized variables to compute the BSI as follows in equation 4;

$$BSI_{it} = \alpha_t + l_{it-1} + \sum_{i=1}^{n} \beta_i x_{it} + \gamma_i \, control\ variables_{it} + \epsilon_{it} \quad \text{..... [4]}$$

Where, μ= Mean Value; σ - Standard Deviation; Z -Normalized Value for indicator X of indicator, BSI – is the measure of banking sector stability, l is the coefficient of the lagged dependent variable, β – is the coefficient matrix of explanatory variables, X – vector of firm specific explanatory variables including; asset quality indicated by NPL - non-performing loan ratio to indicate bank exposures to credit risks; profitability indicated by ROA- return on Asset ratio; capitalization indicated by CAR measuring ability of the bank to mitigate against risky assets; liquidity indicated by LA loan to asset ratio measuring liquidity conditions; interest rate risk indicated by $Intrisk$, measured by the ratio of interest expenses to interest income; operating efficiency indicated by CI-ratio of bank's overhead costs to income, ε- error term, Subscript i - denote the cross-sections and, Subscript t -denote the time-series dimension.

In interpreting the BSI, zero is the threshold. Any BSI level above zero shows that the stability. Similarly, any level below zero reflects instability.

4.2.4 Role of Capital on Competition and Stability

To achieve the second objective, the paper undertook two step estimation. First step involved, applying capital measures as an explanatory variable in the equation [3] to capture the role of capital in promoting competition and re-estimated the equation as illustrate in equation [5].

$$H_{it} = \alpha_t + l_{it-1} + \sum_{i=1}^{n} \beta_i M_{it} + \sum_{i=1}^{n} [\![\gamma_i \, control\ variables_{it} + \lambda(logcapital_{i,t}) + \epsilon_{it} \quad \text{..... [5]}$$

The second step involves analyzing the effect of capital and competition on financial stability using equation [6] as follows.

$$BSI_{it} = \alpha_t + li_{t-1} + \sum_{i=1}^{n} \beta_i \, M_{it} + \gamma_i \, control\ variables_{it} + \sum_{i=1}^{n} W_i \, H_{it} + \lambda(logcapital_{i,t}) + \epsilon_{it} \quad \text{..... [6]}$$

Where, p -price of bank loans BSI – is the measure of banking sector stability, H is measure of competition; l is the coefficient of the respective lagged dependent variable, β – is the coefficient matrix of explanatory variable, controlvariables – vector of other explanatory variables that influence stability and log$capital$ - is the natural log of absolute level of core capital. The input factors $lnw1$, $lnw2$ and $lnw3$ represented the input price of funds ($w1$), input price of labour ($w2$), and the input price of capital($w3$).

5.0 Empirical Findings

5.1 Evolution of Banking Sector Competition

5.1.1 Diagnostic Tests

Prior to estimating the measures competition, the paper undertook data specification diagnostic tests to determine the suitability of the data in reference to ordinary linear squares (OLS) classical assumption. The paper used panel unit root test as prescribed by Levin, Lin & Chu (LLC) (2002) to determine the stationarity of the panel data. All the study variables were found to be stationary on first difference.

The paper applied dynamic panel data estimators to track both individual banks characteristics and time period dynmics. To eliminate measurement errors, endogeneity problems and omitted variables, the Generalized Method of Moments (GMM) estimator was applied as prescribed by Arellano & Bond (1991); Newey & West (1987). Hausman test was estimated to evaluate the suitability of fixed effect model (FEM) and random effect model (REM) according to Hausman (1978). The Hausman test results showed the Chi-Square test statistics of 12.71 with 8 degrees of freedom and corresponding P-value of 0.187 percent. These results indicate the paper fail to reject the null hypothesis that REM is most appropriate model at 5 percent significance level.

The paper also estimated equation [1] with ROA, as the dependent variable to test the long-run equilibrium of the H-Statistics. The equilibrium statistics E-Statistics was computed by summation of coefficients of input elasticities $\beta 1+\beta 2+\beta 3$. The equilibrium test interpretations are prescribed, if $E=0$, indicate the existence of long-run equilibrium and if $E<0$, indicate existence of disequilibrium or non-existence of equilibrium. The estimation results show the E-statistics value of -0.359, indicating inexistence of equilibrium in the banking sector competition condition for Kenya. The paper further estimated Wald-Statistic (F-Test) to confirm the state of equilibrium. Considering the F-Test null hypothesis is $E=0$. Following the results, the paper failed to reject the null hypothesis at 5 percent significance level, meaning equilibrium existed during the study period (**Table 5**).

Once the long-run equilibrium condition was satisfied, the paper estimated equation [2] to compute the H-Statistics. The results indicate H-Statistics was 0.594. These results indicated Kenya banking sector is still monopolistic. The study results collaborated previous studies who found H-Statistics as follows; Mwega (2011) at 0.58; Ombongi & Long (2018) at 0.72; Talam & Kiemo (2017) at 0.63; and Kiemo & Kamau (2021) at 0.59.

Table 5: Panel Regression Results on Evolution Competition Conditions

	Dependent Variable	
	Equation [1] lnROA	Equation [2] lnP
Intercept	-3.6833*** (-9.36)	-0.412** (-1.88)
Lnw1	-0.140** (-2.22)	0.345*** (13.71)
Lnw2	-0.413*** (-5.23)	0.372*** (8.41)
Lnw3	0.194*** (3.23)	-0.123 (-0.813)
lnnpl	-0.098 (-1.20)	0.013 (0.210)
lnbsize	0.209*** (3.85)	0.126* (1.82)
lntbll	-0.031 (-0.69)	0.015 (0.83)
lninf	0.083* (1.71)	-0.008 (-0.40)
Adjusted R-squared	0.204	0.677
Durbin-Watson stat	2.281	0.892
S.E. of regression	0.586	0.221
Prob(J-statistic)	0.000	
Equilibrium Test		
E-Statistic	-0.359	
Wald Test (F-stat) for E=0	7.417	
Probability Value	0.077	
H- Statistics		0.594
Wald Test (F-stat) for H=1		21.793
Probability Value		0.000
Wald Test (F-stat) for H=0		3.890
Probability Value		0.073

NB: *t-values in parentheses; *** 1% level of significance; ** 5% level of significance; * 10% level of significance.*

5.2 Evolution of Banking Sector Stability

The paper constructed BSI through estimating equation [4] to evaluated stability conditions in Kenya banking sector. The BSI shows the banking sector experienced periods of stability and instability during the study period. The results indicated BSI long-term trend was upward sloping showing on average the sector is moving toward long-term stability region (**Figure 2**).

The results also indicated, during the period 2001-2010, the BSI shows the sector experienced stability conditions moving in upward trajectory from instability regions crossing to stability regions in 2006 to reach the peak in 2010. This period of relatively stability may be attributed to financial sectors reforms implemented in the aftermath of 1990's and 1980's bank failures experienced in Kenya. Results also indicate in the 2007-2009 global financial crisis period, the banking sector experienced instability during the period 2011-2017, as evidenced by BSI crossing from stability region instability region in 2015. This down trend may be attributed to pockets of instability experienced such as instability in foreign exchange market experienced in 2012, failure of three banks in 2015-2016. During this period capital related policy reforms were implemented to reverse the downward trend among them introduction of the 2.5 percent capital conservation buffer in 2013, revision of the foreign exchange limit in 2013 limiting holding of net foreign assets at a maximum 10 percent of core capital, encouragement for banks to adopt liquidity coverage ratio and net stable funding ratio as the liquidity-based tools. These capital reforms may be attributed to the reverse of downward BSI trend during the period 2020 to 2023, with BSI crossing back to stability region in 2022.

Figure 2: Evolution of Banking Sector stability Condition

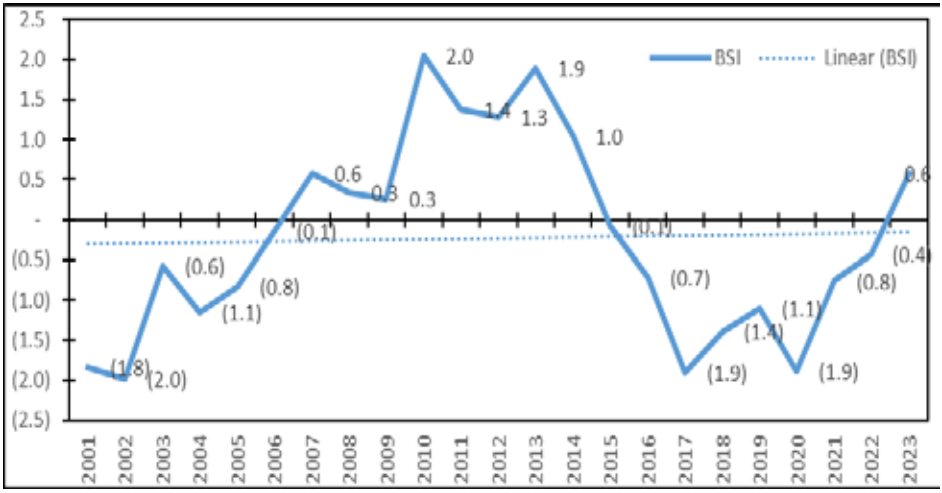
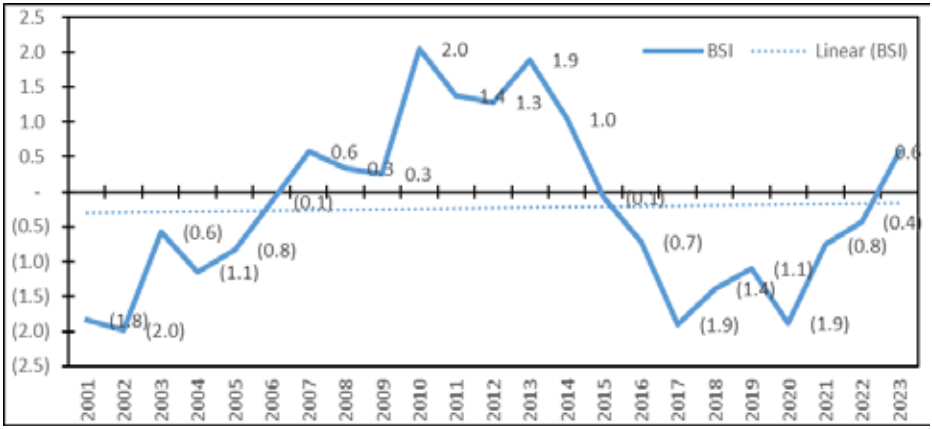


Figure 2: Evolution of Banking Sector stability Condition



5.3 Effect of Capital on Competition and Stability

The paper estimated equation 5 and 6 to evaluate impact of capital on competition and stability respectively. The results presented in **Table 6, A** shows the *logcapital,* measuring the natural log of core capital has a positive and significant effect on H-Statistics measuring competition. This indicates, increase in capital promotes competition in the banking sector. This may be attributed to the fact, as banks core capital increases, banks gains buffers to support provision of products, reducing the concentration. Following Gudmundsson, et.al, (2013), the paper also included *logcapital_squared* to estimate the effect significant increase in core capital has on competition. The results indicate, *logcapital_squared* is negative and statistically significant, indicating increase in core capital promotes competition first, however significant increase in capital reduces competition. This implies that significant increase in core capital ultimately leads to consolidations through either merger or acquisition thereby reducing competition. The results also show BSI is positive and significant, indicating increase in banking sector stability contribute to reduction in concentration as stable banks becomes more competitive.

Table 6, B shows *logcapital* is positive and significant, indicating increase in capital promotes banking sector stability, this may be attributed to fact increase in core capital creates capital buffers to absorb financial shocks. These results support previous studies such as Athanasoglou, et.al, (2006); Kiemo, et.al, (2019); Agung, et.al, (2019), which showed increase in capital promotes stability of the banks. H-Statistics was found to have negative and significant, revealing increase in competition reduces stability.

This may be attributed to the fact, as competition

increases, banks profitability margin declines, therefore limiting buildup of capital buffers from excess profits.

Bank size, measured by *lnbsize* was found to be positive and significant for both competition and stability. This indicates increase in bank size, positively influences the competition and stability conditions for that bank. Macroeconomic factors such inflation was found to be negative and significant in influencing both stability and competition. This inverse relationship means, increase in inflation rate, reduces banking sector competition and stability.

Table 6: Effect of Capital on Competition and Stability

Equations	A	B
Dependent Variable	H-Statistics	BSI
Intercept	6.3164*** (40.1747)	14.3214 (40.1747)
logcapital	0.3169*** (7.5008)	0.2659** (6.5632)
Logcapital_squared	-0.1761** (1.5494)	
lnbsize	7.8732*** (7.8471)	5.5432*** (7.9621)
lnnpl	2.2319*** (1.5494)	
Inflation Rate	-0.4877*** (2.8131)	-0.5231*** (2.3167)
BSI	0.0549*** (6.5015)	
H-Statistics		-0.5461 (0.9141)*

*t-values in parentheses; *** 1% level of significance; ** 5% level of significance; * 10% level of significance.*

6.0 Conclusion and Policy Recommendation

This paper evaluated the impact of capital on competition and banking sector stability for the period 2001-2023. Banking sector stability was measured by constructing a BSI and competition was measured by constructing H-Statistics. The paper adopted panel estimators to evaluate impact of capital on competition and stability. The papers results revealed three key findings. First, results from the stability measure, BSI indicates, on average the banking sector remains stable, with considerable gain in long-term- resilience as evidenced by upward slope of BSI trend. During the study period, the sector also experienced periods of both instability and stability as evidenced by BSI oscillations between stability and instability region. Secondly, the findings indicate, Kenya banking sector competition conditions as indicated by H-Statistics of 0.6, remains monopolistic in nature as indicated by previous studies. This shows the few large banks still dominate the Kenya banking sector which account for almost 70 percent of the market shares. The remaining about 30 percent is shared by rest of the banks in medium and small categories.

Thirdly, the results also revealed that, increase in capital measured by absolute core capital promotes competition first, however significant increase in capital reduces competition. Additionally, core capital promotes banking sector stability, as banks increased core capital, create capital buffers to absorb financial shocks. The paper concludes that, capital positively effects both banking sector competition and stability. However, significant increase in bank capital inversely reduce competition. Therefore, the paper recommends appropriate capital regulation reforms should be implemented taking cognizance on its adverse implication on banking sector competition. Additionally, policy makers should take appropriate reforms that manages adverse macro-economic factors like inflation while promoting the growth of the banking sector in terms of size.

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