Competition and Banking Sector Stability in Kenya.

By

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Abstract

Financial liberalization and globalization has enhanced competition in the banking sector across both developed and developing markets with profound implications for stability. On a brighter note, competition has had obvious benefits including increased efficiencies, continuous financial innovations and accelerated financial inclusion. However, competition may also inform aggressive risk taking by banks especially where charter value is threatened. To this end, the assumption that efficiency and competition consideration may have overshadowed financial stability concerns in the run up to the global financial crisis has raised questions on the exact link between competition and stability, with divergent empirical arguments! Moreover, what level of competition may be optimal for the sector remains an empirical question. This paper analyses the competition-stability nexus within the Kenyan context using quarterly data from 23 banks operating in the country between 2006 and 2018. The empirical estimation follows a three-step model. First, we construct a composite bank stability index, building on the Uniform Financial Rating System Model that looks beyond risk as measured by asset quality to incorporate liquidity, capital and the earnings aspects of banks. Secondly, a proxy for bank competition is estimated using the Panzar-Rosse H-statistic. The final estimation deploys panel regression, with a GLS estimator taking into account presence of heteroscadasticity and random effects while controlling for business cycles and some bank specific features. The empirical results support the "competition stability nexus" i.e. Bank stability is positively linked to competition within the industry. However, the relationship is not as strong as a 1.0 percentage point increase in competition will only enhance bank stability by 2.65%. What level of competition may be healthy for the sector offers room, further studies in future.

1.1   Introduction

The competition landscape in the global financial sector has evolved considerably over the years, with profound implications for efficiency and stability for the banking sector. This has in part been driven by financial liberalization in the pre-financial crisis period as well as globalization (Andries, 2013) which facilitated increased cross border operations by international banks. Even then, as to whether competition enhances stability or exacerbates instability, the debate among both the academia and in policy circles remains inconclusive.

Undoubtedly, competition has had some obvious benefits of increasing efficiencies, motivating innovations and accelerating financial inclusion across the globe. However, the ambiguity in empirical and theoretical finding has necessitated continuous and more nuanced assessment of the competition-stability nexus in the post crisis era. Whereas the connection between bank competition and financial stability has historically been weak (Shijaku, 2016), the assumption that efficiency and competition consideration overshadowed financial stability

concerns in the run up to the crisis (Vives 2016), reinforced the need for a review of the competition stability association. To be sure, the Global Financial Crisis (GFC) raised questions on some key underlying assumptions about financial markets mechanisms and their inferences for stability. The belief that increased competition among banks would lead to a more efficient banking sector, had been the biggest incentive for the unprecedented levels of deregulation in the four decades prior to the crisis (Beck et al 2013). However, following the crisis, this was now up for debate.

In spite of rich literature, consensus on the impact of competition on banking sector stability has remained elusive. Findings on whether competition mitigates or aggravates financial stability are ambiguous and inconclusive, Kasman and Carvallo (2014). While the issue of competition-stability is more nuanced depending on the sample, period and assumptions used, two schools of thoughts have emerged. The charter value also known as competition-fragility supports a negative relationship between competition and stability. Keeley (1990) argues that excessive competition erodes market power and bank profit margins driving them to take on higher risks, which leads to failures and instability. Beck (2008) also posits that very high levels of bank competition can endanger financial stability by increasing their risk taking in order to compensate for the loss of revenue through weaker market share.

The parallel strand – competition stability, propagated by Boyd and Nicolo (2005) argue that excessive competition within the banking sector drives banks to lower their lending rate, which reduces moral hazard and adverse selection and effectively, default risk and stability. Kasman and Carvallo (2014) postulates that more competition is conducive for greater financial stability as banks achieve market power through better efficiency, leverage and earnings ability. However, as size and complexity increases, agency problems and increased risk taking might start gaining momentum, generating inefficiency and fragility (Kunt 2012). This non-linear relationship was propagated by Miera and Repullo (2010) who argued that both the competition-fragility view of Keely (1990) and the competition-stability view of Boyd and Nicolo (2005) could coexist and that the relationship between competition and financial stability is non-linear and U-Shaped.

1.2 Competition in the Banking Sector

Competition in banking has two fundamental connotations; it can drive social welfare by pushing down prices (i.e. interest rates, transactions costs) through efficiency gains and improving services for consumers and enterprises (Cetorelli, 2001). Likewise, competition is pivotal to monetary policy transmission. Literature supports a positive correlation between competition and the pace of policy transmission.

Competition in banking has increased remarkably over the years; arising from both traditional and non-conventional sources including non-bank financial intermediaries, market-based financers and most recently from fin-tech companies. Today, borrowers have direct access to funding from the market, shadow banks are providing alternative credit channels and technology has also reduced switching costs between banks and other credit sources, with the resultant multi-banking relationships significantly altering the competition landscape.

However, the standard competition paradigm in favour of cost minimization and allocative efficiency may not be entirely valid for banking given that its crucial role in the economy makes it prone to tighter regulations, supervision and public intervention (Danisman, 2018). The structure of banks has also considerably evolved. Following the liberalisation and deregulation in the 1970s, bank functions have expanded beyond the traditional intermediation role to include payment services, asset management, equity underwriting and debt issues, securitization and insurance, adding some complexities to bank wide assessment of the competitive landscape (Vives, 2016).

That said the biggest disruption to banking today, with considerable implications for market structure and competition is from the non-traditional 'banks'. Entry of Fintechs in the financial payments systems has seen unprecedented innovations, with immense transformative potential compared to traditional banks. This could worsen within the next digital era where the combination of new telecommunication systems, predictive algorithms, cryptography and machine learning will potentially change the industry in faster and more disruptive ways.

To this end, Fintech credit has grown rapidly around the world although with varying volumes and transactions, across countries, depending on the degree of economic development and the structure of the financial market (Stijn et., al, 2018). According to a report by the Bank of International Settlement (BIS), Fintech credit market in an economy is positively correlated to its income level and negatively related linked to the competitiveness of its banking system and the stringency of its banking sector.

As technology promise better and cheaper ways to compete for core banking business, banks' dominant positions will therefore continue to be challenged (Yves Mersch ECB, 2019). In the first half of 2018, global investment in Fintechs reached $ 57.9Bn compared to $38.1Bn for the whole of 2017. The life span of adopting new banking innovation such as online and mobile banking is getting shorter and shorter.

1.2.1   The case of Kenya

The banking sector in Kenya is composed of 42 commercial banks, 1 mortgage finance company, 9 representative offices of foreign banks, 13 licenced microfinance banks, 3 credit reference bureaus, 19 money remittance providers, 8 non-operating bank holding companies and 73 foreign exchange bureaus. Of the 43 banking institutions, 40 are privately owned, 25 of which have a local majority holding and domiciled in Kenya while 15 are foreign owned. The sector is regulated by the Central Bank of Kenya.

Whereas the composition of the sector has changed considerably over the last 30 years, the last 10 have seen minimum alterations to the structure. Following a wave of bank failures in the 90s, the sector has witnessed a series of mergers and acquisitions motivated by the need to build scale in the fast-changing operating and regulatory environment. To be sure, in the last three decades, 33 mergers and 9 acquisitions have taken place. Of this, however, only 3 mergers (Savings and Loans (K) Limited Vs. Kenya Commercial Bank, City Finance Bank Vs. Jamii Bora Kenya Limited and Equatorial Commercial Bank Vs. Southern Credit Banking Corporation Ltd) and 5 acquisitions have happened in the last decade **(See Table1)**

Even then, the collapse of three banks; Dubai, Equatorial and Chase bank within a span of 9-months between 2015-2016 has altered the structure somewhat and may trigger more Merger & Acquisition (M&A) activities in coming years. The failures led to considerable fragmentation of the interbank markets as depositors and investors' perception of the smaller

players were altered. This compounded fragilities that were already evident in the local interbank market. Sichei et. al (2012) at al posits that, the Kenya interbank market is incomplete and fragmented by size; small Vs. big and that large banks tend to discriminate against small banks in extending credit with potential for liquidity strains in the small banks.

This may be aggravated by the existence of interest rate controls, characterised by CBR+4% lending rate cap that has restricted risk pricing at a time when funding costs for smaller banks are on the rise due to the said discrimination by depositors. Already, strains are evident as bank's profitability has slowed partly reflecting changes in the balance sheet structures with a bias towards lower-yielding, risk free government securities than actual lending. In fact, credit growth has slowed and stagnated within the single digits over the last three years. The central bank of Kenya partially attributed the 9.0% decline in 2017 pre-tax profit for the banking industry and the 5.0% decline in lending to the impact of the interest rate caps enacted by the Banking (Amendment) Act 2016 (Bank Supervision Annual Report, 2017). The pace of M&A activities in the sector may therefore depend on the durability of this environment as banks seek to enhance their competitive edge through scale.

1.2.2 Regulation

Regulations have the potential to influence both stability and competition within the banking sector depending on their magnitude and the cost of compliance. The regulatory landscape in the Kenyan banking sector has been rather stable in the last decade. In response to lagged effects of the financial crisis of 2008/09 and to create a structural buffer for the sector, the Central Bank of Kenya increased the core capital requirements for banks to KES 1.00 Billion from KES 250 Million. The capital adequacy ratio was increased to a minimum of 12.5% from 10.5%. This has been retained at these levels since.

However, critics have argued that raising capital requirements increases concentration in banking reducing competition, with no guarantee for stability. J. Oduor et al, (2017) concluded that higher capital did not make African banks safer due to the use of varied international models that allow banks to understate their risks in order to maintain the regulatory capital which exposes the entire sector. To remedy this, the Central Bank of Kenya accompanied the capital increase with strict supervision on compliance to minimize banks' ability to hide risky assets. The study also concludes that, increase in capital has no impact on

competition at industry level but increases the competitive advantage of foreign banks who has access to cheaper capital compared to their peers.

The most definitive yet controversial piece of legislation in the sector was the introduction of interest rate controls through the Banking (Amendment) Act 2016. This introduced a ceiling on lending rates at 4.0 percentage points above the CBR and a floor on deposit rates at 70% of the Central Bank Rate. The objective of this legislation was noble; to increase affordability of credit, which is fundamental for stronger and sustained economic growth. However, the effects have been adverse. Credit rationing for individual borrowers and small and medium enterprises has increased, and according to the central bank, the conduct of monetary policy has also been impaired.

Relatedly, surveillance for banks has tightened following the collapse of Dubai Bank and Imperial Bank in 2015 and Chase Bank in 2016. These failures significantly impacted confidence in the sector and their reverberations remains clear even in 2019. Markets have remained somewhat segmented as investor take flight to quality. This has enhanced commercial banks' and even investors' preference for sovereign over corporate and individual risk.

The regulatory landscape is expected to tighten further with the adoption of the IFRS 9 reporting standards in 2021. The environment may be even more stringent in the event of another global recession as regulators tighten macro-prudential guidelines to avert another shock to the financial system.

Just like the global debate, the local view on the competition-stability nexus within the Kenyan banking industry is equally ambiguous. Available literature suggests that competition has remained fairly low in the sector. Ogola 2016, concluded that the level of competition among commercial banks in Kenya is low, characterized by 96.1 per cent persistence in profitability, which increases with adoption of technology and consolidation but slows with increase in the capital requirements. Mdoe, Omolo, and Wawire (2018) in their study of competition dynamics in the Kenyan banking sector, found that the level of competition is low, characterized by a 96.10 per cent persistence in profitability which increases with the level of technology and consolidation but slows with capital requirements. That said, a look at the central bank's statistics reveal that activity remains concentrated among few banks. The top eight banks accounts for 70% of the sectors net assets and 67% of customer deposits. In a

sector with 44 banks, this distribution could add some fuel to the argument that the sector in indeed overbanked.

However, competition may be more nuanced than the traditional look at market power. Perhaps a more product centric look may provide more insights on competition in the sector. To be sure, as customers become more informed and the competition landscape more stringent, competition on products has been evident as margins thin across both funded and non-funded product lines. Moreover, spreads on foreign exchange have thinned as customers become more savvy and multi-banked, driving banks to capitalise on volumes rather than spreads.

The declining spread in part reflects rising influence of non-traditional 'banking' channels on the market power of banks. M-Pesa has been revolutionary in driving innovations within the Kenyan banking sector with considerable gains for financial inclusion. Mobile money has been a major driver of formal inclusion and has created the rails for further innovation, inspiring a plethora of digital borrowing and savings solutions now emerging on the market (FSD 2019).
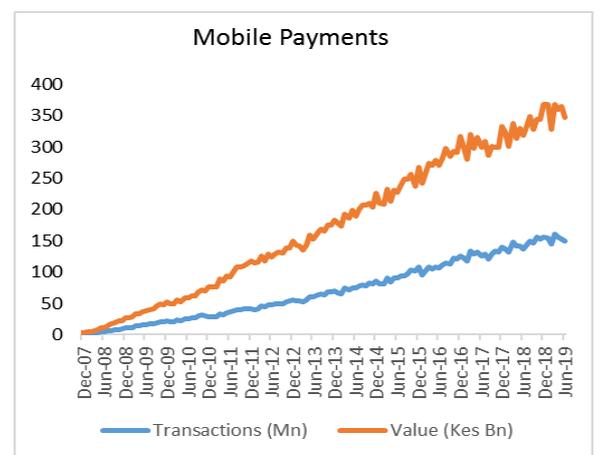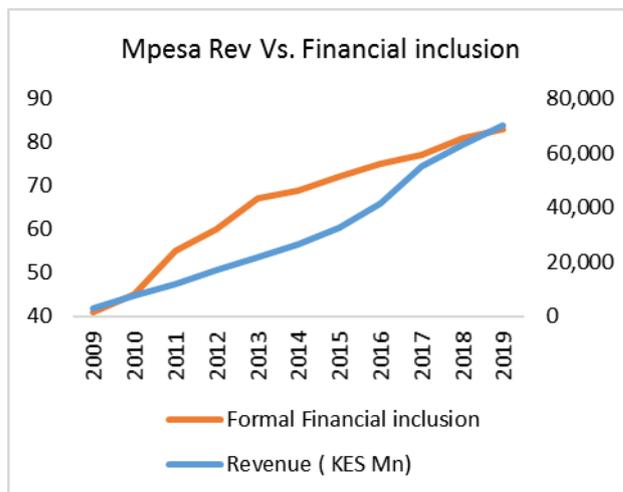
Although the overall lending by Fintechs as a percentage of total credit remains somewhat small, their influence has increased exponentially in the consumer segments, particularly in facilitating payments. In line with global evolution, many consumers in Kenya are switching to e-commerce, and more e-retail payments are made from mobile phones. The ability of Fintechs to offer better targeted, faster and cheaper financial services should sustain their edge over banks on this front. For banks, this may mean considerable reduction in fees and

commission income. Their entry into to the credit business may further weaken interest income growth for banks. Whereas banks will continue to leverage partnerships with Fintechs to enhance their product offering, emergence of bigger, faster and dominant non-traditional players remains an existential risk to the traditional bank.

Certainly, the banking sector in Kenya remains core to facilitating growth through its intermediation role. According to the Central Bank of Kenya data, the sector has KES 4,420 Billion in assets, an equivalent of 49.6% the country's GDP. The sector has been on a stable footing with solid returns on earnings and solid capitalisation. Over the last 10 years, the sector's ROE has declined from 29.0% in 2015 to still a decent 21.0% in 2018 as the sector matures.

While the banking sector in Kenya has remained resilience even in the phase of global and domestic vulnerabilities, there have been pockets of systemic threats. While in some cases, this has been attributed to governance issues, the role of competition in driving risk taking behaviour of some backs remains unclear. In the years 2016-2018, sectors NPL's have remained stubbornly in the double digits averaging 12.50%. While the implication for capital is evidently dire, the greater question is whether competition had any influence in driving some banks to take more risks and did macroeconomic conditions play any role?

The empirical study uses quarterly data from 23 banks operating in Kenya between the periods of 2010-2018 to determine the level of competition among banks and whether it affects stability or increases fragility.

1.3   Motivation of the Study

While we believe that increased competition in the banking sector has led to more innovative products and increased access to financial services due to lower prices and increased convenience, there very little literature on its role in the stability or fragility of the Kenyan banking sector. Available research has focused mainly on bank size, overlooking the impact of competition. We go beyond the bank size to include other measures of competition to provide an enhanced diagnosis of the role of competition in banking sector's stability or fragility. Like Odundo (2018), we control for the country's business cycle on the sectors stability. This comes against a backdrop of heavy and persistent non-performing loans within the industry. Nyanchama (2018) recommends continuous research on banking competition

due to the ever-changing techniques and strategies employed by banks towards improved banking performance and continued existence.

1.4. Research Questions

1.4.1 General Question

What is the impact of competition on the stability of banks in Kenya?

1.4.2 Specific Questions

1. What are the determinants of stability in the Kenya banking sector?

2. What is the nature of competition within the banking sector?

1.5. Research Objectives

1.5.1 General Objective

The main research objective of this study is to investigate the impact of competition on the stability of banks in Kenya.

1.5.2 Specific Objectives

The specific objectives are:

1. To investigate the determinants of stability in the Kenya banking sector

2. To examine the impact of competition on bank stability

2.0. Literature Review

The importance of banking system stability is widely recognised given its fundamental role in driving a country's economic agenda as the intermediation agent of the monetary authority. Following the financial crisis of 2009, regulators and policy makers have placed greater emphasis on banking stability, culminating in stricter enforcement of regulations both prudential and conduct. While these adjustments were meant to preserve financial sector stability, protect consumers and encourage responsible innovations, some legislatures believe that the laws may be burdensome and that the need for 'rightsizing' regulatory requirement,

targeted amendments and refining communication of expectations by regulators cannot therefore be gainsaid (Deloitte 2018).

On one hand, deregulation may have intensified competition among banks, with positive repercussions for financial depth (Dick and Lenhert, 2001), growth (Cetorelli and Gambera, 2001) and efficiency (Bertrand et al., 2007). On the other, Keely (2009), argued that deregulation may have been self-defeating as it eroded margins, increasing incentives for banks to take risks. Vives 2016, also added that during the deregulation period, efficiency and competition consideration overshadowed financial stability concerns. (Vives, 2001) underscored that contagion effects of bank failures produce strong negative externality both for the financial sector and for the real sector with a large social cost. Given the said ramifications of banking sector imbalances mostly through weaker credit extension and distortions to the interbank market and payment systems (Noman, Isaa 2017), the need to understand the role of competition, against a backdrop of fast evolving economic and regulatory backdrops remain fundamental in effective policy formulation. Thus far, theoretical forecasts and empirical outcomes remain inconclusive despite a deluge of studies to this effect.

The traditional view of competition–fragility also known as the franchise value hypothesis as propagated by Keely (2009) argues that, competition dilutes market power, reduces profit margins and capital buffers for banks, weakening their franchise value. This motivates aggressive risk taking by banks to compensate for the loss in value, with the risk of contagion spelling vulnerability to the entire sector. Proponents of the franchise view argue that large banks dominate less competitive markets by benefiting from scale and scope and more diversified portfolios. This provides banks less incentive to monitor borrowers prudently which may increase moral hazards and adverse selection (Gale 2004). Saez L, Shi X (2004) argue that contagion effect is more prominent in competitive markets as all banks are price takers and a solvent bank may have little incentive to provide liquidity to troubled banks in periods of uncertain.

The parallel view of the competition stability as proposed by Boyd and Nicolo (2005) hypothesizes that high competition promotes stability by lowering interest rates on loans and therefore reducing the moral hazard problem that may result in high non-performing loan ratio. Banks with stronger market power enjoy lower competition in the loans market which encourages them to set high interest rates for borrowers, increasing their risk-taking

tendencies and potentially increasing moral hazard and adverse selection and therefore the risk of default. Furthermore, large banks in a concentrated market influence other through the contagion effect. Therefore, failure of large banks in a concentrated market renders the whole system fragile (Abu et all 2005).

However, Martinex-Miera and Repullo (2010) have argued that the two: the fragility and stability can coexist. The relationship between competition and stability is non-linear and U-shaped (inverted). While high market power in less competitive market induces banks to charge high rates on loans increasing the probability of default, this also results to higher profitability through increased interest income. Berger, Klapper (2009) argue that the competition stability and fragility views are not opposite perditions, rather both may be concurrently applicable if high risk-taking can be hedged with a high capital buffer.

That said, economic cycles are said to influence banking stability. Naturally, banks will flourish in an economically sound environment as both the demand for credit tends to be high and the credit environment sound. Generally, banks do adopt aggressive risk policy in stable to bullish economic landscape but will be more prudent and risk averse during periods of economic uncertainty to minimize moral hazards. However, Cook (2008) posits that few banks suffered moral Hazard problem during the 1997-98 Asia Financial Crisis, as crisis changes the risk taking behaviour of banks with a natural bias to conservative lending to reduce risks associated with moral hazards. Business cycle theory suggests that during recession, banks adopt conservative approaches to credit management, shrink loan extension and focus on building capital buffers (Jokipii and Miline 2008). This helps minimize banks' exposure to risk and moral hazard bolstering stability.

2.1. Empirical Literature Review

Many studies have sought to explore the connection between competition and banking sector stability with mixed outcomes. This divergence has been partly credited to the different variables or methods deployed by researchers in interrogating the relationships. In measuring competition, several measures may be deployed, reflecting market concentration, market power, bank efficiencies and the quality of assets. Biiker, et al (2007), argue that competition is determined by various factors including market structure, contestability, inter-industry, institutional and macroeconomic variables. Some studies utilize the average size of banks, number of banks and bank concentration as proxies for competition (Abedifar, et al 1999; Weill, 2013). Allen, et al 2004, Laeven, et al, 2013 underscores the threat of new entrants as

a determinant of competition. That said, the most deployed measures include (Bekmurodava, 2016).

Measure of bank competition	Description
Herfindahl-Hirschman Index (HHI)	The HHI Index measures market concentration. In monopoly markets, concentration is high competition low. HHI will be high. In perfect competition, HHI index will be low indicating high levels of competition.
Lerner Index	The index is used to measure market power. Shows the difference between output pricing and mark up costs. High index reveals low competition in the market
Boone Indicator	Determines competition based on the profit efficiency of banks. Calculated by taking the profit elasticity in relation to mark-up cost. High bone indicator implies lower competitive power in the market.
Z-Score	Used to manage financial health and stability of banks
H-statistics	Similar to ANOVA test which shows whether there is a statistically significant difference in the group means of more than two groups.

Lerner Index, HHI and H-statistic are perhaps the most deployed measures of competition. While researchers pick the measure of competition depending on the specific characteristic of the market, more often, the other indicators are equally deployed to check robustness of the findings. Bolt and Humphrey (2015) used all the three measures on a sample of 2655 banks and reported weak correlation among the three measures in so far as measuring competition, understandably because the three measures competition differently.

A 2015 study of the influence of competition on Turkish banks between the years of 2002-2012 utilised the Boone Indicator and Lerner Index as measures of competition and used non-performing loans and S-score as measures of stability. The result revealed a negative

correlation between bank competition and nonperforming loans but a positive link with the Z-score, offering some backing to the competition fragility narrative. The study added that banks risk appetite is largely influenced by competition.

Schaeck and Cihak (2008) in establishing how competition affect efficiency and soundness in 3500 banks in ten European banks and 9000 banks from the US between 1995 and 2005 found that Boone Indicator as a measure of competition causes bank stability to increase by promoting bank efficiency and that financial stability benefits the more concentrated markets. Fu, Lin (2014) in explored bank competition and financial stability in Asia Pacific using bank level data between the years of 2003-2010 from 14 countries. The study uses the Lerner Index and the large three bank's concentration ration as a measure of competition and Merton's contingent claim pricing model along with Z score as a measure of banks risk taking. The study concludes that the Lerner Index is negatively correlated to risk taking while concentration positively relate to banking sector fragility. Generally, the studies provide mixed outcomes on the competition stability nexus.

3.0   Research Methodology

As elaborated in the literature, numerous studies have sought to establish the relationship between competition and banking sector stability with varied outcomes. However, literature on this interplay in the context of Kenya remains thin. This study seeks to adds to the literature by using bank level data for a sample of banks operating in Kenya to determine the nature of the relationship between competition and the stability of banks in the country.

3.1   Data description and sources

The study deploys quarterly data from 23 commercial banks operating in Kenya between 2006 and 2018. The country's quarterly GDP is used to proxy for business cycle. The sample data is compiled from various data sources, specifically bank-specific financial statements, the Central Bank of Kenya (CBK) and the Kenya National Bureau of Statistics (KNBS). The data consists of 1195 observations for the 23 banks operating in Kenya. For the analysis, the paper adopts a panel regression using Generalised Least square method with random errors. The model is specified as follows;

$$\text{Ln (BSI)}_{it} = \alpha + \beta \ln(H)_{it} + \beta_1 \ln(GDP)_{it} + \beta_2 \ln(\omega\lambda_{K,it}) + e_{it}$$

Where BSI is the Banks Stability Index, H is a measure of competition proxied by Panzar Rossee H-Statistic, GDP is Gross Domestic Product used to proxy for business cycle, $\omega\lambda$ is a vector of bank specific control variables (efficiency and leverage (Shijaku 2017)), $\boldsymbol{\beta,\beta_1,\beta_2}$ are regression coefficients for the different variables.

3.2   Measurement of Bank Stability

We estimate a proxy for bank stability using the methodology adopted by Shijaku (2017) which builds on the Uniform Financial Rating System adopted by the Federal Financial Institutions Examination Council in the US in 1979. This method is endorsed by the IMF and also literature which supports it as a tool that could help monitor bank stability on a real time basis Bets et al. (2014). The rating system takes into consideration measures of **CAELS** rating (**C**apital adequacy, **A**sset quality, **E**arnings, **L**iquidity and **S**ensitivity to market risk) to infer stability of a bank. However, our model excludes sensitivity to market risk due to data limitations.

Model specification;

$$BSI_{t,w} = \omega_1 \sum_{i=1}^{n} Z_{t,C}^* + \omega_2 \sum_{i=1}^{n} Z_{t,A}^* + \omega_3 \sum_{i=1}^{n} Z_{t,E}^* + \omega_4 \sum_{i=1}^{n} Z_{t,L}^*$$

$$\sum_{* = a,b,c,d,e} \omega^* = 1$$

Where, n is the number of indicators in each sub index; C relates to the capital adequacy; A represents a proxy for asset quality; E is a proxy for bank earnings; and L is a proxy for liquidity risk. Z^* is the exponentially transformed simple average of the normalized values of each indicators included in the sub index of the individual bank stability index. The derived bank stability index is expected to indicate that an increase in the value of the index corresponds to a lower risk in that period compared to other periods.

To estimate the Bank Stability Index (BSI), we compute the sub-indices for capital adequacy, asset quality, earnings and liquidity using the variables in the table below. The sub-indices are then aggregated, at equal weights to determine the bank's stability index.

Table 2: Indicators used to estimate Bank Stability Index

Category	Indicator	Sub-Index
Capital	Capital Adequacy ratio Core Capita/Total Asset Equity/Total Asset Asset growth Equity growth ROE NPL/Regulatory capital	$Z_{capital\ adequacy}$
Asset quality	NPL/Total Loans Total loan/Assets Growth of loan portfolio	$Z_{Asset\ quality}$
Earnings	ROA Interest revenue growth Net interest margin Efficiency ratio Net interest/operating revenues	$Z_{Eearnings}$
Liquidity	Net loan/average deposits Active liquidity/Total asset	$Z_{Liquidity}$

The data was tested for unit root using Fisher-type F-fuller for unbalanced panel, the absence of which allowed us to use the variables at level. The indicators within each sub index were first normalised into a common scale with a mean of zero and standard deviation of one using the formula below;

$$zt = \left(\frac{xt - \mu}{\sigma}\right)$$

Where Zt – Z score (normalised value), Xt is the value of indicator X at time t; μ is the mean and σ is the standard deviation for individual banks. This minimizes potential distortions that could arise from differences in the mean of the indicators.

Secondly, the normalised data is converted to a single uncorrelated index using the Principal component analysis approach. To predict the indices, we follow the rule of thumb and restrict

our final components to the ones with eigen value of above one except in the liquidity index computation where neither component had an eigen value of more than one. The results were again normalised to a mean of zero standard deviation of one and transformed to a common scale of 0-1 using exponential transformation;

$(1/ (1+\exp (-Z^*))$.

The indices were then aggregated, (at equal weighting) to get the aggregate bank stability index.

Alternate Measure of Bank stability: Z – score

As a comparable measure, the study computes the Z-score which is included among the indicators of The Global Financial Development Database (World Bank), to check for the BSI's robustness. The study uses the Z-score as captured by Lepetit and Strobel (2014) which uses the alternative time-varying Z-score measure which uses the mean and standard deviation estimates of the return on assets that are calculated over the full sample and combines these with current values of the equity-asset ratio. This provides a straightforward approach to implement in the assessment of individual bank insolvency risk and financial stability. The Z-score is therefore as follows:

$$Z = \frac{(\mu(ROA)_t + EA_t)}{\sigma(ROA)_t}$$

Where μ denotes the expected value and σ denotes the standard deviation of the ROA. The Z-score indicates with how many standard deviations profits can fall before capital is depleted and is therefore the inverse of insolvency (Lepetit and Strobel, 2014). Thus, a higher Z-score indicates that the bank is more stable.

The basic principle of the Z-score is to relate bank capital to variability of its return that is to say, how much variability in returns can be absorbed by capital without making the bank insolvent. What the study seeks to infer from this indicator is that the lower the capital base the higher the likelihood of bankruptcy and that higher variability in returns also increases the probability of bankruptcy.

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Independent Variables - Competition

According to literature, there are two categories of competition measures; Structural measures and Non-structural. Structural measures follow the Structural-Conduct-Performance (SCP) approach that links the market share with performance. This measure uses a variety of indicators such as concentration ratios, the count of banks and the Herfindhal-Hirschmann Index (HHI). Most studies in literature use the HHP approach.

Non-structural measures of competition are however the most popular in literature given that they are influenced by the New Empirical Industrial Organization. According to the IMF (Working Paper 2018), the competition indicators broadly used in banking literature are the C5 indicator (the higher the indicator, the less the competition), the H-statistic (the higher the indicator, the more the competition), the Lerner index (the higher the indicator, the less the competition and the Boone indicator (the higher the indicator, the more the competition).

Main measure of competition – The H-Statistic

The study uses the Panzar-Rosse approach by Rosse and Panzar (1987) to estimate the H-statistic, a proxy of competition. This is a non-structural approach to competition that derives a profit maximizing equilibrium conditions i.e assesses variations in a firm's revenue relative to input prices. Its use of bank-level data makes it robust to the geographic extent of the market. The model estimates a reduced form equation relating total revenues to a vector of input prices using the equation below;

$$log(TR/TA) = \alpha + \sum_{i=1}^{n} \beta_i \, log\omega i + \sum_{i=1}^{n} \lambda \, logCF + log(TA) + error$$

Where TR denotes total revenues, TA is total assets, ω_i ith input factor and CF entails other firm specific control factors. Where interest income/total assets is used as a proxy for price

Input cost variables include;

W1 = interest expense /customer deposit

W2 = capital/total assets

W3 = total other operating expense/total assets

Log(TA) = controls for firm size

Where H=1, shows a market in equilibrium/ perfect competition, 0=1 in a monopolistic market, H<1 reflects monopolistic competition.

4.0 Results

This section reports the main results of our empirical analysis. The estimation of the sub-indices within the bank stability using bank level data using the principal component analysis is showed below.

Bank stability Index

Index	Principal component	PCR (Eigen value)	Proportion	Size of ref population/ observations	Rho
Capital Adequacy	Comp1	2.4894	0.3556	1167	0.7217
	Comp2	1.4882	0.2126		
	Comp3	1.0745	0.1535		
	Comp4	0.8499	0.1214		
	Comp5	0.5844	0.0835		
	Comp6	0.4497	0.0642		
	Comp7	0.6378	0.0091		
Asset quality	Comp1	1.2218	0.4073	1167	0.4073
	Comp2	0.9200	0.3067		
	Comp3	0.8581	0.2860		
Earnings	Comp1	1.3384	0.2677	1167	0.4689
	Comp2	1.0063	0.2013		
	Comp3	0.9888	0.1978		
	Comp4	0.9741	0.1948		
	Comp5	0.6925	0.1385		
Liquidity	Comp1	1.0388	0.5194	1167	0.5194
	Comp2	0.9611	0.4806		

Source: Authors' calculations

bankstability_index- Bank level

Industry level – BSI using CAELS
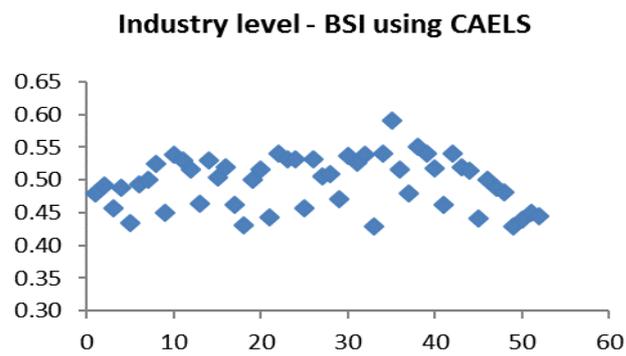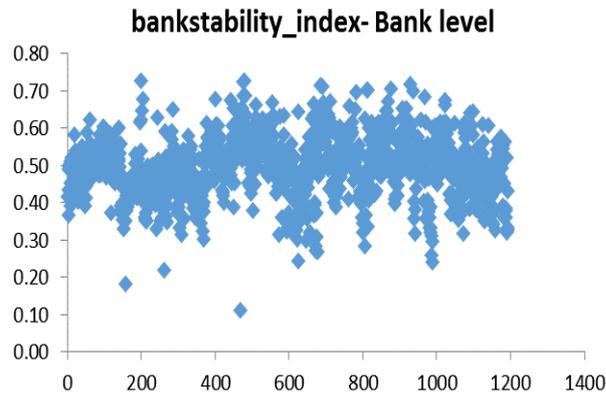
Source: Authors'

The Bank Stability Index is consistent with the outcome of the Z-score which underscores general bank stability as illustrated below;
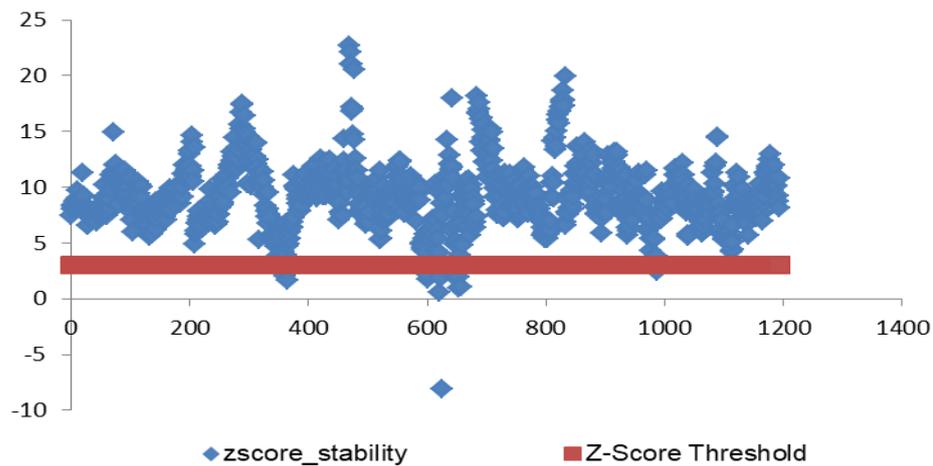
Bank level data may reveal some pockets of fragility but generally, the industry reflects a stable state. The sector remains profitable, well capitalised and liquidity. However, the asset

quality has deteriorated in the last two years weighing on overall stability. However, capital buffers are sufficient to shield the industry from asset quality related shocks.
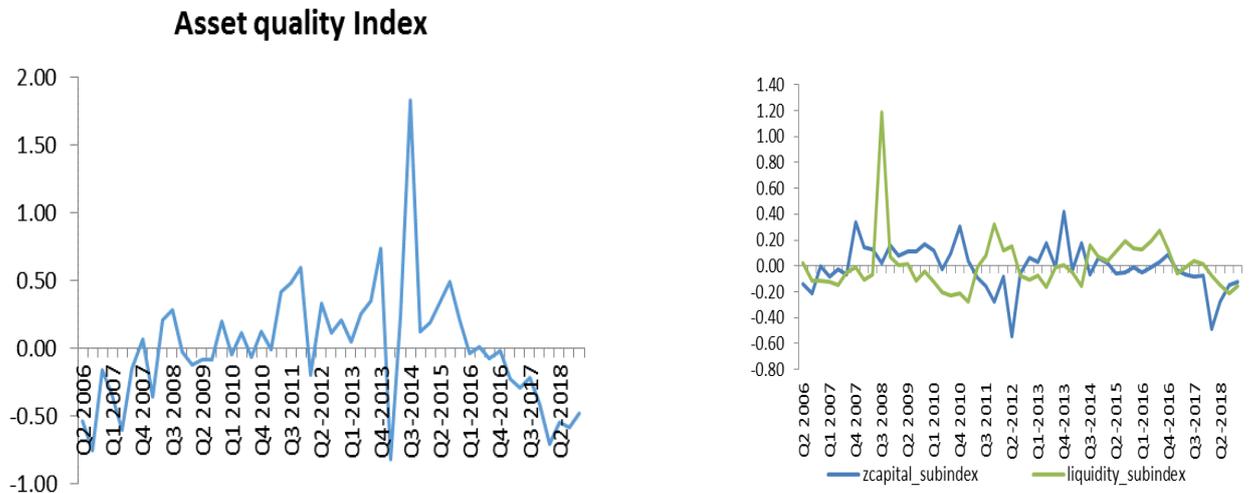
Source: Authors'

4.1 Competition

The estimated Panza-Rosse H-statistic Panzar Rosse ranged between 0-1 throughout the review period. This is consistent with monopolistic competition market tendencies.
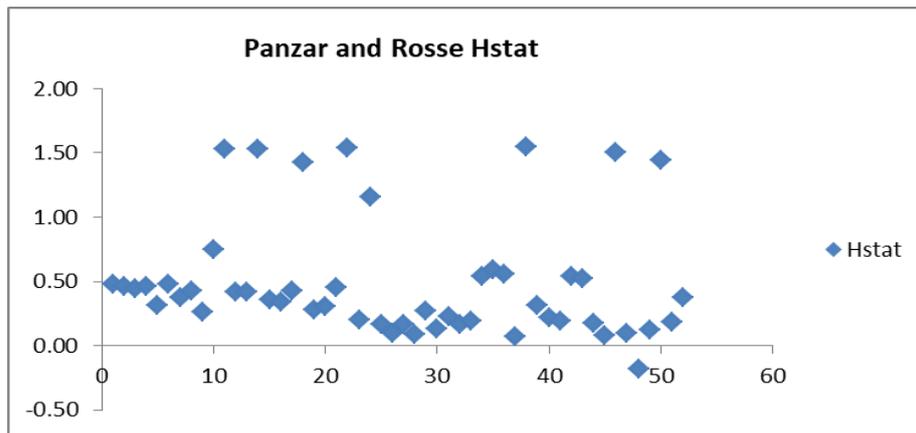
4.3 Main Empirical results

Results of the unit roots tests suggest that all the variables are integrated of order zero and therefore enter the model specification at level.

Variable	ADF- Fisher Chi-square		PP Fisher Chi-Square	
	Intercept & Trend	P-Value	Intercept & Trend	P-Value
BSI	0.0000	0.0000	0.0000	0.0000
H-Stat	0.0000	0.0000	0.0000	0.0000
GDP	0.0000	0.0000	0.0000	0.0000
Efficiency	0.0000	0.0000	0.0000	0.0000
Leverage	0.0000	0.0000	0.0000	0.0000

4.3.1 Correlation tests show no strong association between variables in the main model.

```
            | lncael   lngdp  lnH_stat   lner  lntsf_ta    lnta
 _____|_____
            |
     lncael |  1.0000
      lngdp | -0.0761   1.0000
   lnH_stat |  0.0693  -0.1024   1.0000
       lner | -0.1869  -0.0068  -0.0705   1.0000
   lntsf_ta |  0.3248  -0.0135  -0.0706  -0.1769   1.0000
       lnta |  0.1083   0.1017  -0.2389  -0.2399   0.0298   1.0000
```

4.3.2 Breusch-Pagan test for Heteroscadasticity

```
      Source |       SS           df       MS      Number of obs   =     1,143
 _____|_____      F(4, 1138)      =      3.60
       Model |  .122918575         4  .030729644   Prob > F        =    0.0063
    Residual |   9.7168957     1,138  .008538573   R-squared       =    0.0125
 _____|_____      Adj R-squared   =    0.0090
       Total |  9.83981427     1,142   .0086163    Root MSE        =     .0924


          e2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
 _____|_____
        lner |   .0054081    .004507    1.20   0.230    -.0034348     .014251
       lngdp |    .007862   .0043757    1.80   0.073    -.0007233    .0164472
    lntsf_ta |   .0316273   .0099383    3.18   0.002     .0121278    .0511268
    lnH_stat |   .0060744   .0041781    1.45   0.146    -.0021233    .0142722
       _cons |   .1249585   .0260457    4.80   0.000     .0738556    .1760615
```

Prob F <0.05 - Confirms presence of heteroscadasticity – the independent variables explain some variations in the error term.

4.3.3 Hausman Test for fixed and random effects - model specification

```
              ── Coefficients ──
               (b)         (B)         (b-B)     sqrt(diag(V_b-V_B))
               fe          re        Difference        S.E.
  ─────────────────────────────────────────────────────────────────
    lnH_stat      .0251     .0252207   -.0001207       .0014589
      lngdp    -.0209049   -.0208561   -.0000487       .0006302
       lner    -.0488958   -.0471937   -.0017021        .001416
       lnta     .0134054    .0133012    .0001043       .0033826
    lntsf_ta     .1724607    .1746754   -.0022147       .0033394
  ─────────────────────────────────────────────────────────────────
```

```
                b = consistent under Ho and Ha; obtained from xtreg
        B = inconsistent under Ha, efficient under Ho; obtained from xtreg

   Test:  Ho:  difference in coefficients not systematic

              chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =        2.06
              Prob>chi2 =      0.8414
```

H_0 - Hypothesis Random effect model is appropriate

H_1 - Alternate Hypothesis Fixed effect model is appropriate

. ****P>0.05, reject the Null. ****fixed model appropriate

Our final random effect GLS panel regression reveals a positive correlation between Bank stability (CAEL) and competition (H_Stat), Bank size (TA) and bank capital (tsf - total shareholders' funds) but has an inverse relationship with efficiency levels proxied by (cost/income ratio) and the business cycle as estimated by GDP growth.

```
Random-effects GLS regression              Number of obs    =       1,143
Group variable: Bank                       Number of groups =          23

R-sq:                                      Obs per group:
    within  = 0.1201                                    min =          47
    between = 0.2068                                    avg =        49.7
    overall = 0.1394                                    max =          51

                                           Wald chi2(5)     =      157.72
corr(u_i, X)   = 0 (assumed)               Prob > chi2      =      0.0000

─────────────────────────────────────────────────────────────────────────
      lncael │     Coef.   Std. Err.      z    P>|z|    [95% Conf. Interval]
─────────────┼───────────────────────────────────────────────────────────
    lnH_stat │  .0252207   .0074255     3.40   0.001     .010667    .0397745
       lngdp │ -.0208561   .0071476    -2.92   0.004   -.0348652   -.0068471
        lner │ -.0471937   .0086557    -5.45   0.000   -.0641587   -.0302288
        lnta │  .0133012   .0069381     1.92   0.055   -.0002974    .0268997
     lntsf_ta │  .1746754    .018884     9.25   0.000    .1376634    .2116874
       _cons │ -.5631876   .0894244    -6.30   0.000   -.7384562   -.3879191
─────────────┼───────────────────────────────────────────────────────────
     sigma_u │ .07974235
     sigma_e │ .14924757
         rho │ .22207562   (fraction of variance due to u_i)
─────────────────────────────────────────────────────────────────────────
```

5.0 Conclusion and areas of further study

The results of our analysis are consistent with the competition stability view of Boyd and Nicolo (2005), Berger & Bouwman (2013) and Schaeck & Cihak (2014) i.e greater competition within the banking sector or among banks is associated with higher bank stability. This is indicated by the positive coefficient of the H_Statistic. Higher competition in the banking sector is likely to encourage banks to lower their cost of lending reducing the risk of default. However, as in the literature, excessive competition can be unhealthy as it reduces the franchise value, pushing banks to increase their risk taking in search for higher earnings. This analysis does not establish the optimal level of completion that enhances stability without making any facet of the financial system and potentially the whole economy vulnerable. Therefore, while competition should be encouraged, further analysis needs to be done to establish a potential tipping point, where competition becomes unhealthy for the banking industry.

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