Competition and Stability of Sub-Saharan African Commercial Banks; a GMM Analysis

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Abstract: Competition and stability relationship have continued to be debated around the world with mixed results. Our mission is to test how this relationship subsist in SSA region commercial banks in the light of competition-stability and competition-fragility views using the generalised Methods of moment. We studied 440 commercial banks in 37 SSA countries over the periods of 2006-2015. The results provide evidences that support competition-fragility views over the study periods in the SSA region as we found Lerner index, our competition measure and score, the stability measure to be consistently strong and negatively related over the static and dynamic regression analysis that we carried out. While competition may be good as argued, and found in some other quarters, the policy implication of this study is for policy makers, regulators and practitioners alike to tread with caution in dealing with issues of competition given its potential to destabilise the system.

Keywords: Competition; Stability; Generalised Method of Moments; Commercial Banks

JEL Classification: G29

1. Introduction

A lot has been done in literature on the relationship between competition and stability. Yet not much have been done on this in Africa let alone the Sub-Sahara Africa region whether on regional or individual country basis[3]. Theoretical propositions argue competition affects stability of banks both through the charter value and the franchise value, but are far from reaching consensus regarding the direction of relationship. However, the main line of arguments has been across two divides; that competition could be good or bad for the banking system. It is good where competition enhances stability of the system, hence the competition stability view argument. On the other hand, competition is bad if its leads to distress in the

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[3] See (Léon, 2015).

banking sector thereby causing the system to fail, this is in line with competition-fragility views that argued that competition heightens banks incentives to take more risk which in turn threatens the stability of the system. Yet another view which is now gaining momentum in literature is the non-linear relationship between competition and stability theoretically modelled by Boyd and De Nicolo (2005) and have found in empirical literature[1].

The SSA region is underdeveloped and confronted with abject poverty. The financial system that is dominated by the banking system is also being nurtured. Given that competition in the banking system has the potential to drive other sectors of the economy, increase access to finance that could spur economic growth and improve on the lots of the region, there was the debate about increasing competition in this sector. While empirical work has chartered the course of dealing with issue of competition and especially as its borders on systemic stability in most regions of the world, no such work has focused on this region. This is the gap that this study wants to fill.

The study therefore contributes to extant literature in two ways. Firstly, we use large datasets of commercial banks in 37 SSA region countries to test competition and stability relationship. This is the first of its kind. Again, based on the agitation for increasing competition in SSA region, this paper provide evidence to guide policy maker in dealing issues of competition and stability relationship. Our results thus provide evidence that support the competition fragility views over the study period as we found negative and significant relationship between competition, surrogate by Lerner index and stability rep- resent by z-score, consistently over the static and dynamic models. This provides a bit of caution for policy makers in dealing with issues of competition and stability in SSA region. Fu et al 2014 provided evidence to show that the recent financial crisis is a problem of excessive competition in the banking system.

Going forward, the study is structured to capture the review of related literature that include both theoretical and empirical framework in Section 2. In Section 3 are contained the various methods adopted to arrive at the results in Section 4. While Section 5 concludes.

2. Literature Review

There is deluge of theoretical and empirical evidences on the relationship between competition and stability around the world. Yet specific literature telling the SSA region part of the story have been wanting. The perception about the relationship between competition and stability in the banking system align with the industry

[1] See (Tabak, Fazio, and Cajueiro (2012); Berger, Klapper, and Turk-Ariss (2009), among others).

disposition and dated back to the periods of the great depression[1]. These periods up until the 60'5 in the US and 80's in the EU were characterised by the feelings that competition was inimical to the stability of the banking system and the systemic well-being as whole and hence saw a complacent regulators and practitioners preferring collusion and/or a concentrated banking system. The fact that competition might mean allocative efficiency that could help the stability of the system heralded the change in this trend that procreated the waves of liberalisation that took place in the industry to induce competition. This pattern continued until the recent financial crisis of 2007-2009 of which Africa was not left out as since in the 80s structural adjustment programs were implemented across SSA as a hallmark for liberalising the banking system and putting an end to indigenisation policies that characterised the nations after their independence. The financial crisis however brought a mix feelings as per the role of competition in bringing about the crisis and in some quarters the crisis was blamed on liberalisation and excessive competition in the sector (Fu, Lin, & Molyneux, 2014).

The perception of theories of theories on competition stability views relationship emphasis competition been responsible for excessive risk-taking of banks in the loan market culminating to the probability of individual bank run and eventual failure[2]. The dominance of the assumption in conventional theories that solving banks portfolio problem determined by the allocation of banks assets have in recent literature provide plausible evidences of the likelihood of competition been favourable to their risk portfolio. It follows that in a competitive banking markets, banks face the temptation to offer higher rates in the deposit market while neglecting competition in the loan market thus causes earnings to decline. And so, banks more often than not have no further options than to take on more risky investments to compensate for the lost incomes. Conversely, when faced with competition restrictions, banks arrogate market power with the propensity to charge higher deposit rates with it attendant high profits. The tendency is that markets become uncompetitive with banks overly reluctant to invest in projects that will fetch them as much returns as in the deposit market, hence the probability of banks failure becomes low if not impossible. Other theoretical models; Matutes and Vives (1996) argued bank's fragility is the result of depositors' expectation and not necessarily due to competition in the market, Matutes and Vives (2000) argued more on the effects of regulation and nature of deposit insurance as the main drivers of risk-taking attitude of banks, this is also the position of Allen (2004) even though Niinimäki (2004) believes that the effects of deposit insurance of risk taking depends on the market side competition is taking place. Theory modelling competition on both sides of the statement of financial assumes the main preoccupation of banks is solving the optimal contraction problem. Boyd and De Nicolo (2005) in their work on theory of

[1] See (Vives, 2016).
[2] See (Casu, Girardone, & Molyneux, 2012).

bank risk-taking and competition argue portfolio problem is transformed to contraction problem in the face of moral hazard concluding on competition stability view. A non-linear relationship was concluded by Martinez-Miera and Repullo (2010) between competition and stability in banks. They argued that's Boyd and De Nicolo (2005) competition-stability view may not hold when loan defaults are imperfectly correlated. That intense competition may result in risk- shifting effects, reduce borrowers' default probability but result in margin effects, that is, reduce interest payment from performing loan that should serve as buffer against loan losses. Measuring competition by the number of banks, they found competition to have a U-shaped relationship with bank stability. Their position was that, risk-shifting effects dominates more concentrated markets such that risk is reduced with competition; while margin effects is associated with highly competitive markets that erode banks' franchise values in an increased competitive environment hence increase risk.

Empirical reviews align with the perspectives of theories providing evidences that support mixed results in individual and cross country studies. US banks studies found both stability (Akins, 2014) and fragility (Hussain & Hassan, 2012; Rhoades & Rutz, 1982). Results of studies in European banking markets found evidences that majorly support stability views, see (Schaeck & Cihak, 2012; Uhde & Heimeshoff, 2009) among others except Liu, Molyneux, and Wilson (2013) that found a non-linear relationship. In Asian countries studies; Fu et al. (2014) found fragility while Soedarmono, Machrouh, and Tarazi (2013) support stability. Works in Latin America; Tabak et al. (2012) – non-linear relationship and Yeyati and Micco (2007). Individual countries evidences reviewed include Spanish Korean and Japanese banking sectors for which the authors came to ambiguous conclusions[1]. Studies that were also conducted on cross continental basis had similar conclusions[2]. The only African studies related to competition stability relationship found fragility (Kouki & Al-Nasser, 2014). Most of these studies adopted Z-score, distance-to-failure as stability measure and lerner index, H-statistics and concentration ratios as competition measures. In summary, there is no straight answer for competition and stability relationship as shown by evidences around the world. Apart from pockets of empirical works that incorporated a number of African countries which peradventure will include some SSA region we have found no studies dedicated to study this case in SSA region and on commercial banks in particular as they account for the largest shares of market and assets of the SSA financial sectors that burdened with underdeveloped capital market. It is this gap that this study is out to fill especially at a point when policy makers are out to stimulate competition in the region's banking sectors as a catalyst to drive economic growth.

[1] See (Jeon & Lim, 2013; Jiménez, Lopez, & Saurina, 2013; Liu & Wilson, 2013).

[2] See (Agoraki, Delis, & Pasiouras, 2011; Amidu, 2013; Berger et al., 2009; Boyd, De Nicoló, & Jalal, 2009) among others.

3. Methodology

Extant literature has employed various methods to investigate the relationship between competition and stability in the banking system. Notable among these methods are OLS[1]; fixed and random effects regression (Anginer, Demirgüç-Kunt, & Zhu, 2013; Hussain & Hassan, 2012), among others) and tobit model (Ariss, 2010). Others include logit model and duration analysis (Schaeck, Cihak, & Simon, 2009), probit regression (Marques-Ibanez, 2014), 2SLS (Soedarmono et al., 2013), granger causality (Fiordelisi & Mare, 2014) and GMM (Berger et al., 2009; Boyd et al., 2009) among others). Each of this method have their merits and demerits, however we are employing the robust system GMM for this study because of its ability to deal with endogeneity issues that is inherent in the regression of stability on competition. This makes our study different from Kouki and Al-Nasser (2014) who studied the implication of market power on stability in Africa with fixed effects regression that does not account for endogeneity. Based on the literature reviewed and for wants of data in the study area, we are surrogate Lerner index for competition and z-score for stability. Lerner index is best at measuring bank level competition which makes it a better choice for the study and the fact that it has strong theoretical basis. Z-score has wide application in literature and it measures the overall stability of the banking sector incorporating most risks that banks may face.

This studies thus pooled together cross-sectional time series data of the sampled banks in the SSA countries under consideration using GMM. The choice of panel data analysis is informed by the benefits that the technique offers to the study. According to Baltagi (2008), panel analysis accommodates the creation and analysis of more difficult behavioural models. Moreover, the technique provides for additional degree of freedom, efficient when compared to time series and cross-sectional data and offers more explanatory analysis. Panel analysis generally meant more variability, fewer collinearity and controlled heterogeneity within individual data[2].

3.1. Generalised Method of Moments

The implementation of the regression of the relationship between competition and stability in the SSA region commercial banks is done using the Generalized Method of Moments (GMM) regression. The prevalence of individual cross-sectional data over–time have resulted in the development and the increase in the popularity and/or acceptability of panel data techniques. This no double has ignited the application of dynamic panel data (DPD) that allows finance and economics experts alike to accommodate individual dynamics in their studies. At the same time, the inclusion

[1] See (Akins, Li, Ng, & Rusticus, 2016) among others).
[2] See (Baltagi, 2008).

of lagged endogenous variables in a model where individual effects may be present pose a problem of dynamic panel bias (DPB). Regrettably, the conventional DPD estimators like; first difference, pooled OLS, GLS, among others are inefficient in handling DPB, hence the use of instrumental variables was proposed to alleviate the issue of endogeneity in the lagged endogenous variables. In addition, it is a normality free regression technique, having great adaptability and data generating process assumptions with dependent variables been instrumented by their lagged variables.

Modelling the relationship between the competition and stability of the commercial banks in SSA region with the following linear dynamic panel model;

$$\Gamma_{it} = \rho_1 \Gamma_{it-1} + x_{it}\rho + E_{it} \quad (3.1)$$

Where $i = 1, 2, \cdots, N$, $t = 1, 2, \cdots, T$, x' is a $(1 \times \kappa)$ vector of explanatory variables, ρ is a $(\kappa \times 1)$ vector of coefficients to be estimated and $Eit = \gamma_{it} + \psi_{it}$; where, γ_{it} denotes the individual fixed effects capturing individual differences of the cross–sections (banks in the sample), and ψ_{it} is the idiosyncratic term such that $\gamma \sim iidN(0, \delta_\gamma^2)$, $\psi \sim iidN(0, \delta_\psi^2)$, assuming that;

$$E[\gamma_{it}] = [\gamma_{it}\psi_{it}] = 0 \quad (3.2)$$

Since Γ_{it} brings up *DPB* given that γ_{it} is correlated with Γ_{it}, it therefore follows that, if Γ_{it} is a function of γit, then Γ_{it-1} will also be a function of γit making one of the explanatory variables to correlate with one of the composed error terms thus given rise to endogeneity problem.

OLS could not be used to estimate *equation (3.2)*. This is because the correlation between $\Gamma it-1$ and Eit, in other words, $E[\Gamma it-1, Eit] > 0$, leading to overestimation of $\rho 1$ and so the result with be bias upward as well as inconsistent. One way to fix this endogeneity bias is to remove the individual fixed effects through data transformation. Another way is to look for a valid instrument of the lagged endogenous variable. For the purpose of simplicity, let's assume a model of competition and stability relationship with just one regressor;

$$\Gamma_{it} = \rho_1 \Gamma_{it-1} + E_{it} \quad (3.3)$$

Taking one more lag from equation (3.3) will remove individual fixed effects;

$$\Gamma it-1 = \rho 1 \Gamma it-2 + Eit-1 \quad (3.4)$$

This gives;

$$(\Gamma it - \Gamma it-1) = \rho 1(\Gamma it-1 - \Gamma it-2) + (\gamma i - \gamma i) + (\psi it - \psi it-1) \quad (3.5)$$

Therefore;

$$\Delta\Gamma it = \rho 1 \Delta\Gamma it-1 + \Delta\psi it \quad (3.6)$$

Where Δ = (1 − L) represents the first difference operator. The problem with the transformation is the loss of degree of freedom as T first–period observations is dropped which could pose a serious challenge for unbalanced panel data. Notwithstanding, in the views of Griliches (1998) the first differencing transformation is able to get rid of the individual effects. The transformation has also MA(1) for Δψit given the assumption of ψ ~ iidN (0, δ2). This hence requires the application of GLS that is anle to transform data by means of subtracting the time averaged model from equation (3.1);

$$\bar{\Gamma}_i = \rho_1 \bar{\Gamma}_{t-1} + \bar{\gamma}_i + \bar{\psi}_i \qquad (3.7)$$

So that the transformed model becomes;

$$(\Gamma_{it} - \bar{\Gamma}_i) = \rho_1(\bar{\Gamma}_{t-1} - \bar{\Gamma}_{i,-1}) + (\gamma_i - \gamma_i) + (\psi_{it} - \bar{\psi}_i) \qquad (3.8)$$

In equation (3.8), $(\Gamma_{it} - \bar{\Gamma}_i)$ is regressed on $(\bar{\Gamma}_{t-1} - \bar{\Gamma}_{i,-1})$ using OLS within group estimator. Although within group estimator manages to eliminate individual effects, per Nickell (1981), it is inconsistent due to its inability to deal with dynamic panel bias. Thus, makes first difference conversion a better approach than the within group conversion in resolving endogeneity issues. For instance, in the first difference transformation, on previous error term realised is included in the model, meanwhile, in within group conversion, all preceding realisations are incorporated into the model. For this reason, all OLS estimators are unable to resolve dynamic panel bias and therefore require an alternative approach.

The works of Anderson and Cheng (1982) among others, argued that the failure of the OLS estimator in dealing with the issues arising from the dynamic panel bias orchestrated the popularity that instrumental variable estimator gained in literature. Equation (3.6) requires instrumental variable estimator for implementation since the first difference conversion is unable to recover consistency with the application of OLS estimator. To deal with this, Anderson and Cheng (1982) proposed a two stage least square (2SLS) approach that is able to utilise the first difference transformation to eliminate the fixed effects, as well as employ the lags of the explained variable to instrument the transformed lag endogenous variable. The essence is that, since Γit, a component of ΔΓit−1 is correlated with Eit−1 which is also contained in ΔEit, then the deeper lags of the explanatory variables are not correlated with the error term, as such could be used as instrument. Anderson and Hsiao (1981) proposed Γit−2 to be used as instrument for ΔΓit−1 because it is correlated with Γit−1 − Γit − 2 but orthogonal to ΔEit if error terms are assumed not to be serially correlated. Be that as it may, 2SLS does not utilise all the valid instruments available, thus suffers similar setback as the OLS - not efficient.

Consequently, the generalised method of moments GMM proposed by Arellano and Bond (1991) is applied to efficiently and consistently estimate the relationship between competition and stability of SSA region commercial banks in equation (3.1).

GMM can take equations both in first difference and in levels with its specific sets of instrumental variables. To deal with banks specific effects, first difference is taken as in equation (3.5) and the utilisation of the appropriate lag instruments needed resolves the issues of the correlation between Γit − Γit−1 and ψit − ψit−1. The same approach is deployed to generate instruments for other regressors that are permitted to be dependent on the past and the current realisation of the explained variable. Given the assumptions that regressors are weakly exogenous and that the error term is devoid of serial correlation, dynamic GMM employs the following moments conditions;

$$E[\Gamma_{i,jt-s} \cdot (\mathbb{E}_{i,jt} - \mathbb{E}_{i,jt-1})] = 0 \quad for\ s \geq 2,\ t = 2, \cdots T \qquad (3.9)$$

$$E[\chi_{i,jt-s} \cdot (\mathbb{E}_{i,jt} - \mathbb{E}_{i,jt-1})] = 0 \quad for\ s \geq 2,\ t = 2, \cdots T \qquad (3.10)$$

The outcomes of the above moments of condition produces the first difference GMM. One major drawback associated with this is that, where the lagged endogenous variables and the regressors are persistent overtime, there is every likelihood that the lagged levels may be weak instrument for the first differenced variables. Hence, amount to finite bias with reduced accuracy culminating to the need to regress at levels as well to complement the regression at the first differences. The lagged first differences instrument the regression in levels of the same variables. So that additional moments of condition for the regression in levels are as stated below.

$$E[(\Gamma_{i,jt-s} - \Gamma_{i,jt-s-1}) \cdot (\gamma_i + \mathbb{E}_{i,jt-1})] = 0 \quad for\ s = 1 \qquad (3.11)$$

$$E[(x_{i,jt-s} - x_{i,jt-s-1}) \cdot (\gamma_i + \mathbb{E}_{i,jt-1})] = 0 \quad for\ s = 1 \qquad (3.12)$$

We however applied the orthogonal deviation of Arellano and Bover (1995) which Roodman (2006) argues to be more applicable in the case of an unbalanced panels with pockets of missing data. To be consistent, the instrument of the GMM regressors must be valid. This is verified through the Hansen J statistics in a robust estimation[1]. Also, test of serial correlation among the error terms is required for a valid GMM results. Arellano-Bond test for serial correlation assumes no serial correlation and its applied to the differenced residuals. Once the null hypothesis is acceptable order two, inferring the absence of serial correlation, the study will then employ corresponding moment of conditions.

To estimate the relationship between competition and stability of SSA region commercial banks therefore we employ the following estimation equation;

$$Z_{kit} = \beta_{kit} + Z_{kit-1} + \pi_{kit} LI_{kit} + \zeta_{kit} \Sigma X_{kit} + \xi_{kit} \qquad (3.13)$$

Where Y_{kit} measures the stability for bank i in country *k* at year *t*. β_{kit} is a constant;

[1] See (Mileva, 2007).

π_{kit} is the coefficient of competition measure, *LI*, for *k*s regression in year *t*; ζ_{kit} is the coefficient of the vector of bank specific variables and other macroeconomics/non-financial variables; ξ_{kit} is the error term.

3.2. Data and Variable Description

Data for this study were mainly sourced from BankScope that is considered to house the most comprehensive database on banks. We employed an unbalanced panel of 440 commercial banks from 2006 to 2015 to account for entry and exit and also cater for periods of data unavailability. The focus on commercial banks ensure uniformity in our choice of banks as quite a good number of other deposit money banks still enjoy government support at one time or the other. Data requirement for the estimation of lerner index, competition variable that were collected include personnel expenses, total assets, total revenue, interest and non-interest expense, fixed assets and total deposits. For stability measure, Zscore, we collected equity capital ratio (ECR) and return of assets (ROA). Other data collected include Return on equity (ROE), pre-tax income, GDP annual growth rate and corruption perception. The GDP annual growth rate is available from WDI of World Bank while corruption perception is from Transparency International. We followed literature in carefully selecting the combination of variables that are used in this study. We limit our measure of stability to Zscore[1] in this study for want of comprehensive data of non-performing loans on commercial banks. This study follow the procedure for computation of lerner index as contained in (Kouki & Al-Nasser, 2014).

4. Empirical Results

We present the results of the relationship between competition and stability of SSA countries commercial banks in this section. Competition is measured using Lerner index that has the ability to capture bank level market power. We surrogate stability with Zscore. Zscore has been used in literature as a stability test for banks and banking sector stability, measured based on banks performance in terms of employed in ration to their capital. Ongoing results in literature provide evidences that competition may be good or bad for the banking sectors. Specifically, empirical works have supported stability and fragility of banking sector due to competition. Most of this debates have largely been domiciled in the advanced world of US and Europe with pockets of literature in emerging markets like China. We do not expect the SSA commercial banking markets to behave differently, more so with the level of development in the region, and the recent crisis5 that have been partly blamed on excessive competition. To this end, we hypothesis that competition may have contributed significantly to such instability in this part of the world6. In the next

[1] See (Agoraki et al., 2011; Amidu, 2013), among others.

three subsections are the summary statistics providing insight to the data used in this study, the correlation results which though not an econometrics analysis, gives a precursor to what the econometrics analysis might be, and finally the regression analysis results.

4.1. Summary Statistics

Table 1. Summary Statistics

		Lerner Index											
year	N	mean	SD	min	max	zscore	size	eqcapratio	roa	roe	pbtaratio	GDPG	cop
2006	190	0.2556606	0.165618	0.0006262	0.8370308	3.54343	11.96434	0.1611557	0.0204855	0.1913219	0.0270156	0.0693923	28.78161
2007	215	0.2693673	0.155672	0.0128989	0.7842373	3.204579	12.19327	0.1441192	0.0181973	0.1962862	0.0236399	0.0704374	29.44335
2008	250	0.2884124	0.1773142	0.0109381	9.67E-01	3.380152	12.2133	0.1568832	0.0203531	0.1795552	0.0254339	0.0546536	30.75527
2009	275	0.293903	0.1883627	0.010171	9.21E-01	3.29502	12.33728	0.150284	0.0140424	0.1480773	0.0193112	0.0389074	30.37308
2010	296	0.2959335	0.182933	0.0003647	9.79E-01	3.273991	12.3817	0.1563837	0.009863	0.1317374	0.0142714	0.0631269	29.61176
2011	320	0.2821636	0.1727603	0.0029686	9.77E-01	2.988873	12.57774	0.139725	0.0116465	0.1232481	0.0151931	0.0585695	30.81787
2012	357	0.3237032	0.1944634	0.00499	9.98E-01	3.235099	12.59943	0.1542496	0.0133897	0.1158373	0.0171139	0.0583529	34.54573
2013	392	0.3520863	0.314314	0.0000355	9.26E-01	3.403835	12.6364	0.170136	0.0116615	0.08695642	0.01574	0.0580944	34.6199
2014	430	0.3318136	0.1854892	0.0003017	9.96E-01	3.624344	12.58567	0.1810446	0.0106149	0.07606974	0.0136577	0.0521768	34.92326
2015	440	0.3243521	0.1964074	0.0005727	9.96E-01	3.484	12.61072	0.1704147	0.0110423	0.06922351	0.0152894	0.0399826	34.42263

Authors' computation, 2017

In Table 1 is the summary statistics. This is to provide an insight into the nature of data used in the study. The four columns immediately to the right of the first two columns in the table relates exclusively to the competition measure. Lerner index is a measure of market power that range from 0 to 1, with indices close to 1 signifying high market power and/or low degree of competition/concentration in the banking sector. Banks at this end of the markets are said to be oligopolistic or at the extreme, monopoly. Whereas, indices close to zero denotes low market and/or high competition, with banks either competing in monopolistic banking market or faced with perfect competition7. We found market power to range almost between 0.355E-04 in 2013 and 0.998E-01 in 2012 giving the minimum and the maximum indices across the 440 banks considered over the study period of 2006 - 20015. This momentarily suggest a mixture of high and low market power. However, further analysis by the mean and the standard deviation suggest a highly competitive commercial banking sector having mean of market power that are below 0.50. The means are closer to the minimum than the maximum in all the years considered and the standard deviation substantiated our claim by not been fundamental far from the mean. The other parts of the Table are the mean of Zscore suggesting a rather stable sector; size, representing the log of total assets used as a control variable; equity capital ratio, which is the ratio of capital to total assets and most times used to denote regulatory capital; return on assets, return on equity and pre–tax income to total

assets ratio, as performance measures. Others include the means of GDP annual growth and corruption perception.

4.3. Econometrics Analysis

We regressed stability on competition and provided other variables as contained in literature to explain the stability of the commercial banking sector in the SSA region. We also provide the correlation results among variables in Table 2. Our main objective is to measure the impact of competition on stability in SSA Commercial banks. The essence of the other variables is to also look at other factors that may also impact on stability and so the emphasis will be on competition and stability relationship.

Table 2. Correlation Result

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
zscore & lerner index	-0.1346	-0.2072	-0.0259	-0.0098	-0.3066	-0.3131	-0.2533	0.0038	-0.0681	-0.0174
p-value	0.0640	0.0023	0.6834	0.8715	0.0000	0.0000	0.0000	0.9409	0.1586	0.7166
zscore & size	-0.4253	-0.2936	-0.3279	-0.2966	-0.1474	-0.0913	-0.1588	-0.2291	-0.3007	-0.2238
p-value	0.0000	0.0000	0.0000	0.0000	0.0111	0.1031	0.0026	0.0000	0.0000	0.0000
zscore & eqcapratio	0.9478	0.9480	0.7938	0.8324	0.8105	0.8167	0.6661	0.5692	0.6157	0.6990
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
zscore & roa	0.1778	0.2587	0.3241	0.1765	0.3096	0.5014	0.3173	0.2496	0.3083	0.5687
p-value	0.0141	0.0001	0.0000	0.0033	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
zscore & roe	0.0650	-0.0466	0.0490	0.0224	0.1126	0.0175	0.0990	0.0958	0.0883	0.0895
p-value	0.3751	0.4991	0.4443	0.7131	0.0546	0.7564	0.0621	0.0585	0.0683	0.0608
zscore & pbtaratio	0.0860	0.1767	0.2094	0.0805	0.1910	0.3483	0.0821	0.1303	0.0589	0.4823
p-value	0.2383	0.0094	0.0009	0.1831	0.0010	0.0000	0.1215	0.0098	0.2229	0.0000
zscore & cop	0.1158	-0.0587	0.0541	-0.0115	0.0865	0.0918	0.0448	0.0889	0.1023	0.1291
p-value	0.128	0.4057	0.4073	0.8541	0.1685	0.1183	0.4186	0.0789	0.0339	0.0071
zscore & GDPG	-0.0215	-0.0165	-0.0713	0.0853	0.0069	0.0532	-0.0787	-0.0177	-0.1646	-0.0532
p-value	0.7701	0.8102	0.2613	0.1582	0.9065	0.3427	0.1379	0.7262	0.0006	0.2772

Authors' estimation, 2017

Although we had provided some motivation for using dynamic panel data analysis in this study via GMM, we still however, begin this analysis from the standpoint of static to dynamic analysis, hence the presentation of OLS, fixed effects (FE) and random effects (RE) model results as contained in Table 4 and the outcome produced

a rather interesting result. The dynamic panel model employs the robust two-step system GMM with orthogonal deviation, the results displayed in column 4 of Table 3. This has been proven to resolve panel data bias with the ability to handle unbalanced panel data analysis. we found the lagged value of ZSCORE to be positive

Table 3. Regression Results

	OLS Model zscore	FE Model zscore	RE Model zscore	GMM Model zscore
VARIABLES				
L.zscore				0.394***
				-0.117
li	-0.0322***	-0.00904***	-0.0105***	-0.0260***
	(0.00562)	(0.00303)	(0.00305)	(0.00887)
lnabv	-0.209***	-0.350***	-0.322***	-0.0971
	(0.024)	(0.0404)	(0.0339)	(0.106)
eqcapratio	10.34***	12.58***	12.08***	7.950**
	(0.199)	(0.201)	(0.189)	(3.701)
roa	26.93***	15.28***	16.42***	30.02***
	(1.37)	(1.084)	(1.043)	(8.931)
roe	-0.00263***	0.000187	0.000108	-0.00252
	-0.000995	-0.000571	-0.000566	-0.00197
pbtaratio	-5.531***	6.163***	4.945***	-18.21***
	(1.335)	(1.045)	(1.008)	(6.635)
cop	0.0141***	0.0171***	0.0163***	0.00870*
	(0.00344)	(0.00539)	(0.00468)	(0.00487)
gdpg	-0.462	-0.514	-0.476	-0.112
	(0.932)	(0.51)	(0.509)	(0.519)
Constant	3.626***	4.845***	4.650***	1.589
	(0.329)	(0.471)	(0.42)	(1.376)
Observations	2,955	2,955	2,955	2,552
R-squared	0.612	0.727		
Number of id		438	438	425
Wald (chi2)				1030.31
*Prob > chi*2				0.000
AR2				0.136
Hansen J Stat.				0.522

Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

and significant signifying that stability in the past periods has a considerable effect in ensuring current period stability. In fact, it has an impact of up to 0.3% on the current banking stability. Similar to the two previous models, competition as measured by Lerner index is has inverse but significant relationship with stability. In other words, if competition increases, stability goes down. EQCAPRATIO, ROA and COP are also consistent with previous models as the coefficients that are significant and positive with stability reiterating the fact that banks capital base, return on assets and corruption signalling effects are important determinant of bank stability. Our results in terms of stability and capitalisation relationship therefore does not support Kouki and Al-Nasser (2014) that found capitalisation as not only insignificant with ZSCORE but also negative. Unlike the fixed effect model, ROE is negative but not significant, PBTARATIO is significantly negative showing consistency with the OLS result. Again, GDP annual growth shows no significant and negative relationship with stability, this is consistent across the three models.

Given that the robustness of the panel data estimation, our discussions on economic implication will be based on the GMM results. To begin with, the persistent, positive and significant relationship of stability in the immediate past period with the present reflects the fact that stability in the past is fundamental for the current and future periods stability. This is a wakeup call for an unrelenting effort in ensuring a stable banking environment at all time for the smooth running of the monetary economic system as in the words of Vives (2016), the banking system is so pivotal to an economy to the extent that the modern monetary economy stops functioning with bank failure. That been said, this study found a negative and significant relationship between ZSCORE and LERNERI. In other words, stability is negatively related to competition as measure by the Lerner index in the SSA region commercial banks. We had reported a monopolistic competitive banking market given the outcome of the commercial banks' market power computation in the SSA region. This result suggests that competition is associated with instability and consistent with the competition fragility view of Yeyati and Micco (2007) in a study of 8 Latin American countries between 1993–2002; Beck, De Jonghe, and Schepens (2013) in 79 countries between 1994–2009; Fu et al. (2014) in a study of 14 Asian countries from 2003–2010; Agoraki et al. (2011) who studied 13 CCE countries between 1998–2005 and Ariss (2010) who studied 60 developing countries that included 14 African countries. Most of this studies had employed both Lerner index as Zscore to measure competition and stability respective making our study directly comparable to theirs.

Although, at the moment, our data; bank capital base, bank performance and the stability measure estimated, the ZSCORE, do not suggest any form of instability in the commercial banking sectors of the SSA region, however, banks in this region continues to face the risk of high non-performing loans NPLs among others in their asset portfolios. These are likely to arise from undue competition that makes banks

to either wave or not to pay proper attention to processes of KYC and other corporate governance issues that arises during selection of loan assets portfolio. Knowing that potential instability is associated with competition in this region is a call for caution among players, regulators and practitioners alike, so that their priorities should be aligned to avoid such eventualities. A point to note is that the proponents of competition stability view emphasis the role of efficiency in the relationship between competition and stability. this we have not taken account of in this study and might require further investigation in the case of the SSA region.

The emphasis on banks' capital base and why it is made as the cardinal point of regulation is justified by the direct influence it has on the stability of the banking system as found in this study. As such banks, must at all time maintain an adequate and sound capital base to withstand stress and provide cushion for it survival. We noted from the results that only the return on assets among the performance measures employed is significant and has direct relationship to explaining stability in the SSA region commercial banks. It is not clear at this point why return on equity is negative but not significant to explain stability and also why pre–tax income is significantly negative in explaining stability of banks in the region. Hence, we briefly like to draw the attention of stakeholders in this region this and a need for further studies as well. GDP annual growth proxying economic growth is al seen to be insignificant to explain the stability of the commercial banking sector of the SSA region. The expectation is that growth in an economic should impact positively to improve the well-being of the people in terms of per capital income. Likewise, industry should grow which ultimately should reduce the cost of banking as well as loan default rates hence stability. However, the case of SSA region suggests otherwise. More often than not most SSA countries statistically report growth in their economy annually but what is seen has been as the growth increase so does the level of poverty and underdevelopment. Providing evidences that economic growth might not explain stability in the region since it could not support the necessary parameters that should culminate in the stability of the banking system. The correlation results above support this view as both variables are weakly negatively correlated. Government have works to do in this area ensuring economic growth statistical parameters reflect the status quo and work assiduously to improve it. Finally, it will make sense to increase anti-corruption crusades in the region given that our result suggest that corruption perception plays a significant role in the stability of banks.

Overall, our result meet the various requirements of the regression models as shown in Table 3. In particular, for the GMM, the overall fitness of the result is good indicated by the Wald test probability, AR2 confirms the absence of serial correlation and the result of the Hansen J statistics gives us the confidence that the instruments are not overidentified.

5. Summary and Conclusion

This study looked at competition and stability relationship in the SSA region commercial banks in the light of the call to increase competition of the banking system in the region to fight poverty through stimulating economic growth. Models that we reviewed argue for and against competition and stability, expressing that competition may be good and bad for the banking system. The study employed the robust orthogonalized version of the Generalised method of Moments to analyse this relationship. The choice of methods is to avoid the shortfalls of OLS while accounting for possible endogeneity issues between competition and stability. We proxy competition with the Lerner index and stability with the Zscore. Both measures have been used prominently in this kind of literature and has continued to gain relevance. The study concludes based on the findings that competition is detrimental to the commercial banking sector of the SSA region. This is a departure from Moyo, Nandwa, Council, Oduor, and Simpasa (2014)'s results that found otherwise in the SSA region among other studies done elsewhere around the world. However, their study differs from ours in the sense that they looked at competition and stability vis-a-vis efficiency and we suggest further investigations in these areas. Based on the conclusion we might one to recommend caution in the way policies are directed towards increasing competition further in the region pending further studies factoring efficiency into competition stability relationship in the region is carried out. This Study contribute to the literature of competition and stability in Africa as this as far as we know is the second empirical works focusing on this region.

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