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Economic freedom, competition and bank stability in Sub-Saharan Africa

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Abstract

Purpose – This study aims to analyze the potential implications of economic freedom and competition for bank stability.

Design/methodology/approach – Using system generalized method of moments and data from 139 banks across 11 Sub-Saharan African (SSA) countries during the period 2006–2012, this study considers whether the degree of economic freedom affects the relationship between competition and bank stability.

Findings – The results show evidence of the competition-fragility hypothesis in SSA banking, but suggests that beyond a setting threshold, increases in market power may also be damaging to bank stability. Financial freedom has a negative effect on bank stability, suggesting that banks operating in environments with greater financial freedom generally tend to be less stable or more risky. The authors also find evidence of a conditional effect of economic freedom on the competition–stability relationship, implying that bank failure is more likely to occur in countries with greater economic freedom, but with low competition in the banking sector.

Practical implications – The results suggests to policy makers that a moderate level of competition and economic freedom may be the appropriate policy to ensure the stability of banks.

Originality/value – The study provides insight on the competition–bank stability relationship, by providing new empirical evidence on the effect of economic freedom, which has not been previously considered.

Keywords Competition, Bank stability, Economic freedom, Financial freedom, Market power, Lerner index

Paper type Research paper

1. Introduction

A well-functioning banking system is widely recognized as essential to economic growth and development. A major reason for reforms worldwide in the 1980 and 1990s was to make the banking sector more competitive (Delis, 2012). Yet, the view that competition is unambiguously good may be more naive in banking than in other industries (Claessens and Laeven, 2004). In fact, despite numerous research on the subject, there is no consensus on the effect of competition on bank stability. Two opposing views are theorized in the literature. One view, called the competition–fragility or competition-instability view, and pioneered by Keeley (1990), asserts that competition in banking reduces market power of banks, decreases profit margins and results in reduced franchise value that encourages banks to take on greater risks. By contrast, the competition–stability view came out strongly from the work of Boyd and De Nicoló (2005), who argued that competition leads to greater bank stability. Hence, some suggest the need to consider channels through which competition affects bank stability (Schaeck and Cihak, 2014; Beck *et al.*, 2013). The Global Financial Crisis (2007/2008) and recent banking crisis in Europe have also re-ignited the debate about regulation and freedom in the banking sector. Indeed, there is some concern that excessive freedom may contribute to financial institutions' propensity to take on greater risks, which may have contributed to the

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global and European crises (Chortareas *et al.*, 2013). Yet, the link between economic freedom and bank performance is scarce in the literature. Economic freedom is typically treated as a control or instrumental variable in bank performance literature (Chortareas *et al.*, 2013).

Also, recently, Martinez-Miera and Repullo (2010) questioned the theoretical predictions of Boyd and De Nicoló (2005) by arguing that lower loan rates resulting from greater bank competition also reduce the interest payments from performing loans. They conclude that a U-shaped relationship between competition and the risk of bank failure generally prevails. Even so, only few studies have tested this argument. Moreover, most studies on competition and bank stability have concentrated on the developed economies. Of course, some studies have covered our broad areas of interest in contexts similar to our own. For example, Turk-Ariss (2010) and Amidu and Wolfe (2013) for emerging and developing economies, and Kouki and Al-Nasser (2017) for Africa. Even so, these studies ignored the potential effect of economic freedom on the competition and bank stability relationship. Also, while Mavrakana and Psillaki (2019), Asteriou *et al.* (2016) and Ghosh (2016) considered the effect of economic freedom on bank stability and risk-taking, our focus is on the role of economic freedom on the competition–bank stability relationship.

Given the difficulty in understanding the channels between competition and bank stability, our study seeks to assess the potential effect of economic freedom on the competition–stability relationship. Our study differs from most of the other studies in the literature, particularly in Africa, in the following ways: first, we assess the potential impact of economic freedom on the competition–stability relationship (which is yet to be tested in the literature). Second, we test for a nonlinear relationship between competition and bank stability (a recent development in the literature following the theoretical work of Martinez-Miera and Repullo, 2010). And finally, we add to the scant literature on competition and bank stability in the developing countries context.

The Sub-Saharan African (SSA) banking markets serve as a fertile ground for a study of the potential effect of economic freedom on the competition–bank stability relationship. Generally, banking markets in this region are less competitive compared to other regions of the world. African banks are also well-capitalized, quite liquid, more profitable and fairly stable (Beck and Cull, 2013; Honohan and Beck, 2007; Moyo *et al.*, 2014; Beck *et al.*, 2011). Competitive conditions continue to improve with the gradual relaxation of remaining restrictions on banking activities as pertains in the developed markets in the western world. For instance, the index of financial freedom developed by the Heritage Foundation (2017), which gives an indication of the freedom with which banks conduct their activities clear of government intervention and control, has increased in many of these countries over the past decade. But, as competition gets more intense in SSA banking markets along with greater freedom, how will bank stability be affected? This study sought to address this and related issues.

Our results show evidence of the competition-fragility hypothesis in SSA banking. Higher market power (or less competition) may generally result in enhanced bank stability. But, the relationship between competition and bank stability in Sub-Saharan Africa is found to be quadratic, implying that beyond a setting threshold, increases in market power may also be damaging to bank stability. This suggests to policy makers that a moderate level of competition in banking may be the appropriate policy to ensure the stability of banks.

The direct effect of financial freedom on bank stability is negative, suggesting that banks operating in environments with greater financial freedom generally tend to be less stable or more risky. Economic freedom does not appear to have a direct effect on bank stability, but there is evidence of a conditional effect of economic freedom on the competition–stability relationship. The results indicate that banks with higher market power in countries with greater economic freedom are more unstable. In other words, bank failure is more likely to occur in countries with low competition in the banking sector, but with greater economic freedom.

The rest of the paper is as follows: Section 2 reviews the existing literature. In Section 3, the measurement of the variables is outlined together with the estimation methodologies. Section 4 presents the empirical results and discussion, while Section 5 concludes and offers policy recommendations.

2. Literature review

2.1 African banking systems and performance

Banks are the most important institutions of the financial system in Sub-Saharan Africa. In many countries, other financial structures (such as bond and stock markets) are either underdeveloped or almost nonexistent (Kablan, 2010). Many African countries suffered banking crises in the 1980 and 1990s. Indeed, at the peak of regional financial distress (about 1995), as many as 27 African countries suffered from banking crises, with 20 of them being systemic (Laeven and Valencia, 2008). While the usual ingredients of banking crises – macroeconomic boom and bust cycles and bad private banking – were also present in banking crises in Sub-Saharan Africa, it appears that government failures were the leading cause. For example, in many countries, such as Mozambique, Tanzania, Uganda and Zambia, large government-owned banks had to be rescued and sold (Beck *et al.*, 2009).

However, banking in Africa has undergone dramatic changes over the past 20 years. While dominated by government-owned banks in the 1980s and subject to restrictive regulation – including interest rate ceilings and credit quotas – financial liberalization, institutional and regulatory upgrades and globalization have changed the face of financial systems across the region. Today, most countries have deeper and more stable financial systems, though challenges of concentration and limited competition, high costs, short maturities and limited inclusion persist (Beck and Cull, 2013). Recent reforms in the banking sector have led to the liberalization of interest rates and credit markets. For instance, interest rate controls, particularly in Kenya, Ghana and Tanzania, and directed credit in Uganda, have been replaced with open market operations.

Although there is still strong government presence in African banking sectors (e.g. Algeria and Tunisia), a significant degree of success has been achieved in privatizing banks in a number of countries, including Morocco, Kenya, Tanzania, Uganda, Rwanda and Zambia (Allen *et al.*, 2011). These reforms have led to significant growth in the number of banks in many African countries, with a significant increase in the degree of cross-border banking as well. But, with domestic credit to the private sector averaging about 32% of the gross domestic product (GDP), financial intermediation remains relatively low in a number of African countries. This feature of the banking sector is coupled with strong government ownership and traditional banking activities. The poor performance of the banking sector, especially record high levels of problem loans in the 1980s, led to significant financial sector reforms in many countries (Fosu, 2013).

In terms of stability, African financial systems have made some progress. Beck *et al.* (2011) indicate that while in 1995, a third of all countries on the continent were suffering from a systemic banking crisis, fragility has subsided across the continent. Today, most African banking systems are stable and well capitalized and have a good level of liquidity. Nevertheless, there is still hidden or silent fragility in several Central and West African countries. Systemic distress is concentrated in state-owned banks, and a number of small locally owned banks face liquidity problems because of their dependence on the public sector and wholesale funding (Beck *et al.*, 2011).

Further, Beck and Cull (2013) opine that while shallow, Africa's banking systems have also proven stable and resilient over the past years. The shallowness of Africa's banking systems appears to have helped them weather the Global Financial Crisis of 2008 better than some other regions of the world, with the impact of the crisis on Africa mostly working

through real sector channels, such as lower demand for export goods, or through lower foreign direct investment. According to Beck and Cull (2013), the limited integration with global financial markets and exposure to "toxic" assets explains why financial institutions across the Africa region largely evaded the direct impact of the Global Financial Crisis. Greater stability is also illustrated in the aggregate balance sheet indicators of African banks. In 2011, the capital to risk-weighted asset ratio was 19% in the median African country, compared to 17% outside Africa. On the systemic level, Africa has suffered few banking crises since the bout of systemic fragility in the 1980 and 1990s (Laeven and Valencia, 2012). However, as highlighted by Moyo *et al.* (2014), recent global evidence has shown that deregulation of the banking industry can sometimes have the unintended effect of destabilizing the financial system, contributing to macroeconomic instability and, in some cases, leading to a reversal of economic growth. A conspicuous feature of structural financial sector reforms is enhanced competition in the banking industry, with the attendant stability–fragility tradeoff. According to Moyo *et al.* (2014), compared to other economies, the SSA financial system is broadly bank-based and weakly contestable; therefore, any systemic bank failures would have serious contagious ramifications in these economies. They argue that bank-specific, macroeconomic and institutional factors are important in predicting episodes of bank distress in Sub-Saharan Africa.

2.2 Competition and bank stability

Two opposing views are theorized in the literature regarding the relationship between competition and bank stability. The competition–fragility or competition-instability view (Keeley, 1990) asserts that competition in banking reduces market power of banks, decreases profit margins and results in reduced franchise value that encourages banks to take on greater risks. Keeley (1990) finds that the increased competition and deregulation that followed the relaxation of state branching restrictions in the USA in the 1980s eroded monopoly rents and resulted in an increase of bank failures. On the other hand, higher market (or monopoly) power in the banking market leads to greater stability because the greater lending opportunities, higher profits, higher capital ratios and charter values of incumbent banks, put them in a better position to survive demand- and supply-side shocks, which in turn provides a dis-incentive for excessive risk-taking. Recent studies that provide empirical evidence for this hypothesis include Diallo (2015), Fungacova and Weill (2013) and Berger *et al.* (2009). Turk-Ariss (2010) obtains similar findings, suggesting that increased competition may undermine bank stability. For Africa, Kouki and Al-Nasser (2017) report that gains in market power will increase the stability and reduce the risk for the banking system.

By contrast, the competition–stability view came out strongly from the work of Boyd and De Nicoló (2005), who argued that competition leads to greater bank stability. They assert that as banking markets become more concentrated (and less competitive), banks tend to show market power by charging higher interest rates to borrowers. This worsens moral hazard incentives and makes it more difficult for borrowers to repay, as they also take on greater risks in search of more profits, and the result is an increase in the possibility of loan default and therefore the risk of bank portfolios. A number of studies have found support for the hypothesis that competition enhances bank stability. For example, Uhde and Heimeshoff (2009) find that Eastern European banking markets, which exhibit a lower level of competitive pressure, are more prone to financial fragility. Similarly, Schaeck and Cihak (2014) report that competition is stability-enhancing, and that the stability-enhancing effect of competition is greater for healthy banks than for fragile ones.

However, recently, Martinez-Miera and Repullo (2010) questioned the theoretical predictions of Boyd and De Nicoló (2005) by arguing that lower loan rates resulting from greater bank competition also reduce the interest payments from performing loans (which

provide a buffer against loan losses) because of imperfect correlation of loan defaults. They conclude that a *U*-shaped relationship between competition and the risk of bank failure generally prevails. Liu *et al.* (2013) find evidence of this in ten European countries. Similarly, Jimenez *et al.* (2013) obtain results from the Spanish banking system, which highlight the empirical relevance of the Martinez-Miera and Repullo (2010) model. Furthermore, the results of some other recent studies suggest that the relationship between competition and bank stability is not straightforward and may actually depend on other factors previously ignored in the literature. For instance, Amidu and Wolfe (2013) identify revenue diversification as a channel through which competition affects bank insolvency risk in emerging countries.

The few studies on competition and bank stability in developing countries and emerging economies such as Turk-Ariss (2010), Amidu (2013) and Kouki and Al-Nasser (2017) suggest that competition has a negative effect on bank stability. Hence, our hypothesis is that increasing competition will result in instability in banking in Sub-Saharan Africa.

2.3 Economic freedom and bank performance

Theoretical models that directly analyze the impact of economic freedom on bank performance are yet to be developed, but the effects of restrictions on various aspects of banking have been well established (Chortareas *et al.*, 2013). However, there is extensive literature on the effect of economic freedom on growth. Most of these studies, such as De Haan and Sturm (2000), Adkins *et al.* (2002), Bengoa and Sanchez-Robles (2003) and Farhadi *et al.* (2015), generally show that greater economic freedom has a positive impact on economic performance. Indeed, Ahmed (2013) finds that institutional factors (including economic freedom) are important in explaining growth and financial development in Sub-Saharan Africa. However, the links between economic freedom and bank performance is scarce in the banking literature. Sufian and Habibullah (2010) provide empirical evidence on the positive impact of economic freedom on banks' performance in Malaysia. Chortareas *et al.* (2013), possibly the first to directly investigate the dynamics between the financial freedom counterparts of the economic freedom index drawn from the Heritage Foundation database and bank efficiency levels, suggest that the higher the degree of an economy's financial freedom, the higher the benefits for banks in terms of cost efficiency.

The economic freedom index of the Heritage Foundation measures the ability of individuals to exercise their fundamental right to control their own labor and property. In an economically free society, individuals have the freedom to work, produce, consume and invest in any way they please. Also, in such societies, governments allow labor, capital and goods to move freely and desist from coercion or restriction of liberty beyond the extent needed to protect and maintain liberty itself (Heritage Foundation, 2015). Financial freedom (one of the components of economic freedom) is a measure of the degree of restrictions and controls in the financial sector. When financial institutions operate in a less restricted environment, they are more likely to engage in competitive policies, resulting in higher levels of efficiency.

Sarpong-Kumankoma *et al.* (2018) assert that both financial freedom and economic freedom have a positive impact on bank profits in SSA countries. They find evidence that banks with higher market power operating in countries with greater freedom for banking activities are more profitable than their counterparts in countries with greater restrictions on banking activities.

Similarly, Sufian (2014) suggests that greater financial freedom positively influences the profitability of Islamic banks operating in the Middle East and North Africa (MENA) banking sectors. Lin *et al.* (2016) also examine how financial freedom moderates the effect of changes in bank ownership on cost efficiency in 12 Asian developing countries during the period 2003–2012. Using the stochastic frontier method for estimating bank efficiency scores, they report that foreign presence improves bank efficiency, mainly in countries with high financial

freedom. Additionally, they find evidence that increased government (domestic) ownership of banks seems to enhance (hamper) bank efficiency in economies with more financial freedom following the financial crisis.

However, Cubillas and González (2014) show that financial liberalization (financial freedom) increases bank risk-taking through different channels depending on economic development or institutions. In developing countries, financial liberalization negatively impacts bank stability, not as a result of changes in bank competition, but by expanding opportunities to take risk. It is in economically and institutionally developed countries that financial liberalization reduces bank stability through increases in bank competition.

Also, although very little is known about the effect of freedom on bank stability, Mavrakana and Psillaki (2019) report that economic freedom improves bank performance and contributes to financial stability and soundness. On the other hand, Ghosh (2016) argues that higher levels of economic freedom associate with lower bank stability or higher risk-taking. Moreover, Asterious *et al.* (2016) maintain that the impact of increasing economic freedom is not so clear-cut, and that greater economic freedom can decrease or increase bank stability depending on the measure used. They suggest that policies promoting greater economic freedom should be more targeted to reflect the diversity of the banking sector environment in various countries.

Of course, in developing countries where institutions are not well developed, one could expect that higher freedom (or less restrictions in the banking sector) is likely to open up banking markets and engender greater competition, which could in turn result in instability. Thus, we posit that the effect of competition on bank fragility will increase with economic freedom.

3. Methodology and data

3.1 Measuring bank competition

In this study, we use a direct measure of bank competition (market power), the Lerner index. Given that other key variables used in this study are obtained at the bank level, it is appropriate to use Lerner index, unlike other competing proxies for bank competition. For instance, the Panzar and Rosse (1987) model, which has also been a popular measure of competition in banking markets, produces an aggregate measure of competition at the industry level. The Lerner index is the markup of price over marginal costs for a bank, with higher values denoting higher pricing power and less competitive market conditions. The Lerner indicator of market power is defined as:

$$\text{Lerner}_{it} = (P_{TA,it} - MC_{TA,it})/P_{TA,it}, \tag{1}$$

where $P_{TA,it}$ refers to the price of total assets (ratio of total revenues to total assets) and $MC_{TA,it}$ is the marginal cost of producing an additional unit of output. We use the following translogarithmic function to model the underlying cost structure of the banking sector:

$$\begin{aligned}\ln TOC_{it} = {} & \beta_0 + \beta_1 \ln TA_{it} + \frac{\beta_2}{2}(\ln TA)^2_{it} + \sum_{k=1}^{3} \lambda_k \ln W_{k,it} + \sum_{k=1}^{3} \phi_k \ln TA_{it} \ln W_{k,it} \\ & + \sum_{k=1}^{3}\sum_{j=1}^{3} \delta_{ij} \ln W_{k,it} \ln W_{j,it} + \sum_{j=1}^{3} (\delta_j/2)(\ln W)^2_{j,it} + \sum_{k=1}^{2} \eta_k \text{trend}^k \\ & + \sum_{j=1}^{3} \varsigma_j \ln W_{j,it} \text{trend} + \wp \ln TA_{it} \text{trend} + \varepsilon_{it},\end{aligned} \tag{2}$$

where $\ln TOC$ represents the natural logarithm of a bank's total costs (financial and operating costs), and $\ln TA$ is a proxy for bank output measured as total assets. W_1, W_2 and W_3 are the prices of funds, labor and physical capital, respectively, calculated as the ratio of interest expenses to total deposits and money market funds, personnel expenses to total assets and other operating expenses (excluding personnel expenses) to total assets. Trend is a time trend that captures movements in the cost function over time or technical change. We also scale the input prices and TOC by W_3 to ensure homogeneity of degree one in input prices of the cost function.

The marginal cost, $MC_{TA,it}$, is derived by taking the first derivative with respect to the output for each bank as follows:

$$MC_{it} = \frac{TOC_{it}}{TA_{it}}\left[\beta_1 + \beta_2 \ln TA_{it} + \sum_{k=1}^{3} \phi_k \ln W_{k,it} + \wp\, \text{trend}_{it}\right] \tag{3}$$

The Lerner index specified above is basically the conventional Lerner index. However, as noted by Turk-Ariss (2010), this approach is likely to result in biased estimates because of a bank's ability to exercise some form of monopoly power in the deposit market. Usually, when pricing their loans, managers of banks endeavor to cover their cost of funds, and charge a premium to reflect their exercise of market power, in addition to charging a risk premium for the uncertainty of repayment. Hence, to obtain a "raw" or "clean" proxy of pricing power that is not distorted by market power in the deposit market, cost of funds should be excluded. Thus, we estimate the funding-adjusted Lerner index by including only two inputs, the price of labor and the price of physical capital. However, to check for robustness, we also estimate competition using the Hirschman–Herfindahl Index (HHI) – the sum of the squares of the market share of assets of each bank.

3.2 Measurement of bank stability

As in Beck *et al.* (2013), we measure bank stability or risk by the *Z*-score as:

$$Z - \text{score}_{it} = (ROA_{it} + E/TA_{it})/\sigma_{ROA_{it}} \tag{4}$$

Here, ROA is return on assets, E/TA refers to the bank equity to total assets ratio, and σROA represents the standard deviation of return on assets. We use a three-year rolling time window to obtain values of standard deviation of ROA, just like Beck *et al.* (2013). This approach allows for time variation in the denominator of the *Z*-score and also avoids suggesting that the *Z*-scores are solely driven by variation in the levels of capital and profitability. The *Z*-score indicates the number of standard deviations by which profitability would have to fall from the mean before wiping out bank capitalization, with larger values reflecting greater bank stability and less bank risk potential. And, to reduce scale bias, we use the natural logarithm of the *Z*-score in the empirical estimation.

3.3 The economic freedom index

There are two major measurements of economic freedom, the Economic Freedom of the World Index produced by the Fraser Institute (Gwartney *et al.*, 2014) and the Economic Freedom Index constructed by the Heritage Foundation (Heritage Foundation, 2015) in collaboration with the Wall Street Journal. As noted by Heckelman and Stroup (2000), the Heritage index focuses on policy variables controlled by the government, while the Fraser index stresses on outcome variables. Even so, De Haan and Sturm (2000) show that both measures produce similar overall rankings. Even though the Economic Freedom of the World Index has been used extensively in the literature, we use the Heritage Foundation's Index of

Economic Freedom for this study because one of its components, the Financial Freedom Index is also of interest in this study (Chortareas *et al.*, 2013).

Economic freedom refers to the right of individuals to work, produce, consume and invest in any way they please. Where economic freedom exists, governments allow labor, capital and goods to move freely and avoid coercion or constraint of liberty beyond what is needed to protect and maintain liberty itself (Heritage Foundation, 2017). It is measured based on 12 quantitative and qualitative factors, grouped into four broad categories, or pillars, of economic freedom:

(1) rule of law (property rights, government integrity, judicial effectiveness);

(2) government size (government spending, tax burden, fiscal health);

(3) regulatory efficiency (business freedom, labor freedom, monetary freedom); and

(4) open markets (trade freedom, investment freedom, financial freedom).

Each of these is graded on a scale of 0–100, and a country's overall score is determined by taking the average of the 12 economic freedoms, with equal weight being given to each.

Financial freedom, one of Heritage Foundation's 12 measures of economic freedom, is a measure of banking efficiency as well as freedom from restrictions or government control and interference in the financial sector. State ownership of banks and other financial institutions such as insurers and capital markets reduce competition and generally lower the level of available services (Heritage Foundation, 2015). The Financial Freedom Index scores an economy's financial freedom by looking into the following five broad areas:

(1) the extent of government regulation of financial services;

(2) the degree of state intervention in banks and other financial firms through direct and indirect ownership;

(3) the extent of financial and capital market development;

(4) government influence on the allocation of credit; and

(5) openness to foreign competition.

These five areas are considered to assess an economy's overall level of financial freedom that ensures easy and effective access to financing opportunities for people and businesses in the economy. An overall score on a scale of 0–100 is given to an economy's financial freedom through deductions from the ideal score of 100, which reflects negligible government interference. A score of 50 indicates the existence of considerable government interference in credit allocation and significant restrictions on the ability of financial institutions (especially foreign institutions) to offer financial services. Economies scoring below 50 are considered to have repressive policies with strong or extensive government control over the central bank and credit allocation.

3.4 Estimating effect of economic freedom and competition on bank stability

Our empirical model below, which investigates how competition and economic freedom impact bank stability, is similar to Liu *et al.* (2013):

$$\mathrm{Risk}_{it} = \lambda \mathrm{Risk}_{it-1} + \alpha_1 \mathrm{Comp}_{it} + \alpha_2 \mathrm{Comp}^2{}_{it} + \alpha_3 \mathrm{Freedom}_{it} + \alpha_4 \mathrm{Comp}_{it} * \mathrm{Freedom}_{it} + \sum_{n=1}^{4} \omega_n X_{it}^n + \xi_{it}, \quad (5)$$

where, $\xi_{it} = \varkappa_i + \gamma_t + \varrho_{it}$ and the subscripts i, and t represent bank i, in year t, respectively. Risk_{it} is our measure of bank stability, and Risk_{it-1} is the observation on the same bank in the same country in the previous year. *Comp* represents the Lerner index or the HHI and is our measure of competition. Following the findings of Martinez-Miera and Repullo (2010), we include a quadratic term, $Comp^2$ to account for a possible nonlinear relationship between competition and bank stability. *Freedom* is the degree of financial freedom or economic freedom. *Comp* * *Freedom* is the interaction between competition and the freedom variables. The variable X_{it} is a vector representing control variables. The error term, ξ_{it} has three components: the unobserved time-invariant bank-specific effect ($\varkappa_i$), the unobserved time effects (γ_t) and the random error (ϱ_{it}).

In line with the existing literature on the factors that influence bank stability, we control for a number of variables, including *Capitalization* (ratio of equity to total assets), *Credit risk* (ratio of total loans to total assets), *Diversification* (ratio of non-interest income to total income) and *Financial development* (domestic credit to the private sector as a percentage of GDP).

We estimate Equation (5) based on the system generalized method of moments (GMM) estimator (Arellano and Bover, 1995). We used this dynamic panel model to deal with possible endogeneity of some of the variables used in the estimations and to account for persistence of bank risk. The model includes the first lag of the dependent variable as part of the covariates and unobserved individual bank effects. Hence, the standard fixed effects or random effects estimators would be inconsistent, as by construction, the individual bank effects are correlated with the lagged dependent variable. To address these issues, Arellano and Bond (1991) use a GMM estimator for such models, popularly known as the difference GMM. In the difference GMM model, lagged exogenous variables in levels are used as instruments for the first-differenced, lagged dependent variable. However, Arellano and Bover (1995) and Blundell and Bond (1998) have shown that these lagged variables may provide little information about the first differences. Consequently, Blundell and Bond (1998) expanded the work of Arellano and Bover (1995) to develop a system estimator that exploits additional moment conditions on both first differences and levels, with lagged first differences of the series employed as instruments in the levels equation. The system GMM estimator reduces potential bias in finite samples as well as asymptotic imprecision associated with the difference estimator (Blundell and Bond, 1998).

The system GMM is more suitable compared with other panel regression methods, when the cross sections (N) is large, but the number of periods (T) is small; the dependent variable is dynamic (persistent); explanatory variables are not exogenous (or may correlate with the error term), there are heteroscedastic, time-invariant individual fixed effect and autocorrelation within individual entities, as is the case with the bank-level data used for this study (Noman *et al.*, 2018). Also, the standard approach when dealing with heteroskedasticity of an unknown form is to use the GMM (Berger *et al.*, 2009). Moreover, the GMM does not require distributional assumptions on the error terms and is also more efficient than 2SLS because it accounts for heteroskedasticity (Hall, 2005).

Even so, the consistency of the system GMM estimator depends on two key assumptions: that the error term is not autocorrelated, and that the instruments used are valid. The presence of first-order autocorrelation in the differenced residuals does not imply that the estimates are inconsistent. But, the presence of second-order autocorrelation suggests that the estimates are inconsistent. We test the hypothesis of no autocorrelation in the error term and report the results together with the main results. We also use the Hansen test of over-identifying restrictions to examine the validity of the instruments. We estimate the equations using the two-step system GMM estimator with Windmeijer-corrected standard errors, small-sample adjustments and orthogonal deviations (Windmeijer, 2005). The difference and system GMM estimators have one- and two-step variants. The two-step system GMM uses residuals from the one-step estimates and is asymptotically more efficient than the one-step.

3.5 Data and sample

The source of most of the data is the Bankscope database. Extensive data covering a much longer period and including more recent years would have been ideal for the study. However, due to inaccessibility of the full complement of data, the period covered is 2007–2012. Unconsolidated financial accounts for 139 banks across 11 SSA countries were used. Even so, it is worthy of note that some aspects of the results of this study are consistent with recent studies in Africa, which also supported the competition–fragility view such as Kouki and Al-Nasser (2017) and Dwumfour (2017). The financial freedom and economic freedom variables were obtained from the Heritage Foundation's indices produced in collaboration with the Wall Street Journal annually since 1995. The macroeconomic data are from the World Bank's World Development Indicators. Our goal was to use as much data as possible to allow for generalization of our results. We focused on the dominant financial institutions, commercial banks and specialized financial institutions whose nature and operations are akin to that of commercial banks. Our initial sample comprised of banks in all SSA countries, but due to data limitations, especially inadequate data points at the country level required for some of the regression estimates, we settled on data from 139 banks operating in 11 countries in Sub-Saharan Africa. The final sample is an unbalanced panel with banks from Ethiopia, Ghana, Kenya, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Uganda and Zambia. Table 1 shows the number of banks per country included in the sample.

4. Empirical results

4.1 Descriptive statistics

A summary of descriptive statistics for the key variables is presented in Table 2. Among the countries in Sub-Saharan Africa included in this study, mean *Z*-score (log) is 3.1. Competition (market power), represented as Lerner index, shows a moderate level with an average of 0.23. The mean of the index of financial freedom (53.6) indicates that the countries in Sub-Saharan Africa portray significant restrictions on banking activities and the provision of other financial services for the study period (2006–2012). This may have adverse implications for the efficient operation of banks in this region. However, the average level of economic freedom (60.2) signifies a reasonable level of liberty to own and employ capital in these countries.

Domestic credit to the private sector as a percentage of GDP (financial development) averages about 45%, but there are significant variations among the countries as reflected in the standard deviation. With an average of about 14% capitalization ratio, banks in

Country	2006	2007	2008	2009	2010	2011	2012
Ethiopia	0	0	2	5	8	7	7
Ghana	2	12	16	19	21	21	16
Kenya	2	6	22	24	27	27	25
Malawi	0	0	4	4	5	5	4
Mauritius	6	7	9	9	10	9	7
Mozambique	0	0	6	7	8	8	7
Namibia	3	4	4	4	4	3	3
South Africa	11	14	15	15	16	12	12
Tanzania	10	11	13	12	13	13	11
Uganda	0	5	9	12	13	13	12
Zambia	0	2	7	7	11	11	11
Total	*34*	*61*	*107*	*118*	*136*	*129*	*115*

Source(s): Compilation from Bankscope database

Table 1. Number of banks for each country

Variable	Observations	Mean	SD	Min	Max
lnzscore (natural log of *Z*-score)	692	3.1443	1.2494	−2.9957	7.6673
Lerner index	643	0.2330	0.3946	−5.3563	0.9830
lnHHI	700	7.4258	0.5379	6.6984	8.7064
Economic freedom	700	60.1826	5.0582	50.5000	77.0000
Financial freedom	700	53.6000	9.6229	20.0000	70.0000
Financial development	700	0.4518	0.4737	0.1023	1.6754
Capitalization	700	0.1400	0.0810	0.0107	0.8358
Credit risk	700	0.5355	0.1579	0.0970	1.0071
Market share	700	9.0060	12.0375	0.0078	76.4275
Bank size	700	6.0505	1.6135	3.0000	11.7500
Diversification	700	0.2864	0.1293	−0.3889	0.9091
Economic development	700	7.1209	1.0453	5.5858	9.0895

Note(s): Bank stability is measured by the natural log of the *zscore*. The degree of market power (competition) is proxied by the *Lerner Index* and *HHI* (measured as the sum of the squares of the market share of assets of each bank). The *Lerner Index* is the price markup over marginal cost, with higher scores indicating a higher degree of pricing power. *Economic freedom* and *Financial freedom* are from the Economic Freedom Indicators of Heritage Foundation. They are scaled from 0–100 with higher values, indicating greater freedom. *Financial development* is measured as domestic credit to private sector as a percentage of the GDP. *Capitalization* is the bank total equity to total assets ratio. *Credit risk* is measured as total loans to total assets. *Market share* is the percentage of bank assets to total industry assets. *Bank size* is measured as the natural logarithm of total assets. *Diversification* is the ratio of non-interest income to total income. *Economic development* is measured as the natural logarithm of GDP per capita

Table 2. Summary descriptive statistics

Sub-Saharan Africa appear to be generally well capitalized. On average, about 54% of the banking assets in these SSA countries are devoted to lending activities (credit risk), but there are wide differences, as shown in the standard deviation. Also, a significant portion of bank income (close to 29%) is earned from non-interest activities (diversification) in these countries.

4.2 Effect of freedom and competition on bank stability

The results of the effects of freedom and competition on bank stability are presented in Tables 3 and 4. Table 3 shows the results for various estimations using the Lerner index, while Table 4 shows those for the HHI. The dynamic panel data model used takes into consideration the fact that the level of bank stability in one period depends to some extent on its previous level. And, the significantly positive coefficient of the lagged dependent variable (lnzscore_{t-1}) in all the estimations shows the validity of this assumption. The results of the robustness tests indicate that the model seems to fit the panel data reasonably well. The *F*-test shows overall goodness of fit, the Hansen test for the validity of the over-identifying restrictions in the GMM estimation is accepted for all the specifications and the presence of second-order autocorrelation in the errors is also rejected by the test for AR (2).

The results of the study show that higher bank market power (lower competition) is significantly and positively associated with greater bank stability (lnzscore). This suggests that when banks have the ability to price their products in a monopolistic fashion (because of less competition), it translates into less likelihood of the banks becoming insolvent, and rather makes banks more sound. This is in line with recent studies in developing countries and emerging economies such as Amidu (2013) and Turk-Ariss (2010). The evidence also supports the competition–fragility hypothesis (Keeley, 1990). However, to unravel the ambiguous relationship between competition and bank stability, some recent studies suggest the need to allow for a nonlinear relationship (Martinez-Miera and Repullo, 2010).

Table 3.
Effect of competition and freedom on bank stability (Lerner Index)

Dependent variable: Lnzscore	(1)	(2)	(3)	(4)	(5)
lnzscore $_{t-1}$	0.4613*** (0.0872)	0.4384*** (0.0913)	0.4692*** (0.0853)	0.4372*** (0.0942)	0.4903*** (0.0867)
Lerner	1.9143*** (0.5221)	1.9467*** (0.5296)	1.8761*** (0.5176)	1.8584 (1.7808)	20.9613*** (7.3742)
Lerner-squared	−1.4897* (0.7870)	−1.6850** (0.7775)	−1.4611* (0.8066)	−1.6794** (0.7992)	−2.1113** (0.9360)
Financial freedom		−0.0176** (0.0073)		−0.0184 (0.0175)	
Economic freedom			−0.0070 (0.0244)		0.1169** (0.0570)
Lerner * Financial freedom				0.0013 (0.0322)	
Lerner * Economic freedom					−0.3236*** (0.1239)
Capitalization	1.6520 (1.2174)	1.7383 (1.2153)	1.5401 (1.2545)	1.7712 (1.2158)	1.8077 (1.3621)
Credit risk	−0.2567 (0.3070)	−0.4504 (0.3142)	−0.2666 (0.3160)	−0.4661 (0.3074)	−0.2976 (0.3186)
Diversification	−0.9286** (0.4013)	−1.2954*** (0.4109)	−0.9602** (0.4328)	−1.2943*** (0.4176)	−1.0200** (0.4262)
Financial development	0.2137*** (0.0705)	0.3170*** (0.0895)	0.2381* (0.1253)	0.3227*** (0.1094)	−0.0137 (0.1768)
Constant	1.4393*** (0.3804)	2.5854*** (0.6161)	1.8251 (1.5299)	2.6371** (1.0975)	−5.3774 (3.3637)
Marginal effect of Lerner	1.119	1.0391	1.0891	1.0243	0.7206
No. of observations	504	504	504	504	504
No. of instruments	52	53	53	54	54
F-test	14.68***	15.43***	14.39***	14.85***	15.57***
AR(2) *p*-value	0.56 (0.575)	0.51 (0.607)	0.57 (0.565)	0.51 (0.613)	0.67 (0.503)
Hansen *p*-value	38.74 (0.481)	37.92 (0.519)	39.8 (0.434)	38.41 (0.497)	37.99 (0.516)

Note(s): The dependent variable bank stability is measured by the natural log of the *zscore*. The degree of market power (competition) is proxied by the *Lerner Index*. The *Lerner Index* is the price markup over marginal cost, with higher scores indicating a higher degree of pricing power. The *Marginal effect* of Lerner on *zscore* (obtained as the partial derivatives evaluated at the sample means) indicates the overall impact where the quadratic term is also significant. *Financial freedom* and *Economic freedom* are from the Economic Freedom Indicators of Heritage Foundation. They are scaled from 0–100 with higher values, indicating greater freedom. *Capitalization* is the bank total equity to asset ratio. *Credit risk* is measured as total loans to total assets. *Diversification*, measured as the ratio of non-interest income to total income, measures the exposure of a bank to non-interest-generating income. *Financial development* is measured as domestic credit to private sector as a percentage of the GDP. Robust standard errors are in parentheses. ***, **, and * show 1, 5 and 10% levels of significance, respectively

Table 4.
Effect of competition and freedom on bank stability (HHI)

Dependent variable: Lnzscore	(1)	(2)	(3)	(4)	(5)
lnzscore $_{t-1}$	0.3904*** (0.0701)	0.3958*** (0.0688)	0.4040*** (0.0703)	0.3922*** (0.0666)	0.3983*** (0.0641)
lnHHI	−2.2715 (2.5245)	0.3646 (2.6314)	−2.4984 (2.5618)	1.6155 (2.8980)	1.0662 (3.1047)
lnHHI-squared	0.1539 (0.1692)	−0.0286 (0.1771)	0.1673 (0.1718)	−0.0690 (0.1848)	0.1701 (0.1652)
Financial freedom		−0.0158* (0.0081)		0.0891 (0.0838)	
Economic freedom			0.0096 (0.0118)		0.5056** (0.2354)
lnHHI * Financial freedom				−0.0132 (0.0106)	
lnHHI * Economic freedom					−0.0629** (0.0299)
Capitalization	0.8175 (1.4537)	0.2646 (1.551)	0.6471 (1.4704)	0.0367 (1.5483)	0.2013 (1.4143)
Credit risk	−0.0601 (0.3686)	−0.2509 (0.3347)	−0.0096 (0.3559)	−0.1650 (0.3475)	0.0871 (0.3496)
Diversification	0-0.6010 (0.4421)	−0.8835** (0.4462)	−0.4895 (0.4420)	−0.8229* (0.4437)	−0.4044 (0.4303)
Financial development	0.1882 (0.1246)	0.3096** (0.1382)	0.1521 (0.1329)	0.3171 ** (0.1399)	0.1837 (0.1370)
Constant	10.2281 (9.3978)	1.8839 (9.6388)	10.6440 (9.4470)	−5.5388 (11.6254)	−17.7018 (16.8241)
No. of observations	549	549	549	549	549
No. of instruments	52	53	53	54	54
F-test	4.55***	6.66***	4.70***	6.69***	5.34***
AR(2) *p*-value	0.14 (0.888)	0.23 (0.821)	0.19 (847)	0.27 (0.789)	0.22 (0.826)
Hansen *p*-value	38.63 (0.487)	39.89 (0.431)	37.51 (0.538)	39.49 (0.448)	34.40 (0.680)

Note(s): The dependent variable bank stability is measured by the natural log of the *zscore*. The degree of market power (competition) is proxied by the natural log of *HHI,* measured as the sum of the squares of the market share of assets of each bank. *Financial freedom* and *Economic freedom* are from the Economic Freedom Indicators of Heritage Foundation. They are scaled from 0–100 with higher values, indicating greater freedom. *Capitalization* is the bank total equity to asset ratio. *Credit risk* is measured as total loans to total assets. *Diversification*, measured as the ratio of non-interest income to total income, measures the exposure of a bank to non-interest-generating income. *Financial development* is measured as domestic credit to private sector as a percentage of the GDP. Robust standard errors are in parentheses. ***, **, and * show 1, 5 and 10% levels of significance, respectively

Similar to Liu *et al.* (2013) for European banks, we test this possibility in our model and find evidence that indeed, there is a quadratic relationship between competition and bank stability. Whereas *Lerner* (market power) shows a mostly positive and significant relationship with bank stability, the quadratic form (*Lerner-squared*) is consistently negatively and significantly related with bank stability (lnzscore). Even so, the results in the HHI model are not significant. However, to determine the overall impact of market power on bank stability, we took partial derivatives of *lnzscore* with respect to *Lerner* and evaluated the resulting expressions at the sample means. For example, in column (1) of Table 3, the *marginal effect* of 1.119 is obtained from $\partial(lnzscore)/\partial(Lerner) = \alpha_1 + 2\alpha_2\, Lerner$, which is then evaluated at the sample means, where α_1 and α_2 are the estimated coefficients. This indicates an overall positive (negative) impact of market power (competition) on bank stability.

The direct effect of *financial freedom* is negative and significant in both models showing that banks operating in environments with greater financial freedom generally tend to be less stable or more risky. This is not consistent with Chortareas *et al.* (2013) who found that financial freedom improves bank efficiency. Where banks have more freedom to operate, they may have the tendency to undertake more risky activities compared to when they are restricted. However, we did not find any concrete evidence of the possible conditional effect of financial freedom on the competition–stability relationship. On the other hand, while *Economic freedom* by itself appears not to have a direct effect on bank stability, its interaction with market power (competition) (*Lerner * Economic freedom or HHI * Economic freedom*) indicates a negative and significant effect on bank stability in both models. This suggests that banks with higher market power in countries with greater economic freedom are more unstable. In other words, bank failure is more likely to occur in countries with low competition in the banking sector, but with greater economic freedom.

This is contrary to Lin *et al.* (2016), who found that increased government (domestic) ownership of banks appears to improve (impede) bank efficiency in countries with more financial freedom after the financial crisis.

With respect to the control variables, we find that both bank capitalization and credit risk are not important determinants of overall bank stability. On the other hand, diversification enters the regression with a negative and significant relationship with bank stability in most of the estimations, denoting that highly diversified banks are more risky and unstable. This is in contrast with Kohler (2015) for European Union (EU) countries who found that banks can improve their stability by increasing their share of non-interest income, and Amidu and Wolfe (2013) for emerging and developing countries. The results of the study suggest that banks in Sub-Saharan Africa tend to be more risky when they get involved in non-traditional business activities. Domestic credit to the private sector as a percentage of GDP (financial development) has a significantly positive relationship with bank stability in most of the estimations, meaning that increases in the amount of bank credit to the private sector make banks less risky and more stable.

5. Conclusions

This study analyzes the implications of competition and economic freedom for bank stability. Using system GMM and data from banks in 11 SSA countries over 2006–2012, this study considers whether the degree of economic freedom affects the relationship between competition and bank stability. Our results show evidence of the competition–fragility hypothesis in SSA banking. Higher market power (or less competition) may generally result in enhanced bank stability. But, the relationship between competition and bank stability in Sub-Saharan Africa is found to be quadratic, implying that beyond a setting threshold, increases in market power may also be damaging to bank stability. This suggests to policy

makers that a moderate level of competition in banking may be the appropriate policy to ensure the stability of banks.

The direct effect of financial freedom on bank stability is negative, suggesting that banks operating in environments with greater financial freedom generally tend to be less stable or more risky. Economic freedom does not appear to have a direct effect on bank stability, but there is evidence of a conditional effect of economic freedom on the competition–stability relationship. The results indicate that banks with higher market power in countries with greater economic freedom are more unstable. In other words, bank failure is more likely to occur in countries with low competition in the banking sector, but with greater economic freedom.

With regard to the control variables, diversification shows a negative and significant relationship with bank stability, denoting that highly diversified banks are more risky and unstable. On the other hand, financial development has a significantly positive relationship with bank stability, implying that increases in the amount of bank credit to the private sector make banks less risky and more stable. The results of the study have important policy repercussions. Policy makers usually take the view that opening up banking markets to greater competition may lead to higher efficiency, as it reduces the monopoly power of banks and challenge them to be innovative. However, our results have shown that allowing banks to maintain some level of market power may be necessary to ensure bank stability. Hence, caution is needed in implementing policies that will flood the market and eliminate pricing power of banks. Also, given that higher financial/economic freedom harms bank stability, especially for banks in countries with less competition, suggests that policies that ensure some level of restrictions in the banking sector may improve bank stability in the developing country context.

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