# Financial freedom, market power and bank margins in sub-Saharan Africa

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## Abstract

**Purpose** – This paper examines the effect of financial (banking) freedom and market power on bank net interest margins (NIM).

**Design/methodology/approach** – The study uses data from 11 sub-Saharan African countries over the period, 2006-2012, and the system generalized method of moments to assess how financial freedom affects the relationship between market power and bank NIM.

**Findings** – The authors find that both financial freedom and market power have positive relationships with bank NIM. However, there is some indication that the impact of market power on bank margins is sensitive to the level of financial freedom prevailing in an economy. It appears that as competition intensifies, margins of banks in freer countries are likely to reduce faster than those in areas with more restrictions.

**Practical implications** – Competition policies could be guided by the insight on how financial freedom moderates the effect of market power on bank margins.

**Originality/value** – This study provides new empirical evidence on how the level of financial freedom affects bank margins and the market power-bank margins relationship.

**Keywords** Competition, Market power, Banks, Financial freedom, Lerner, Net interest margins

**Paper type** Research paper

## 1. Introduction

Empirical research on the impact of market power or market structure on bank net interest margins (NIM) has produced conflicting results. Studies that have found a positive (negative) relationship between market power (competition) and NIM include Almarzoqi and Naceur (2015), Hawtrey and Liang (2008), Poghosyan (2013), Aboagye *et al.* (2008) and Chirwa and Mlachila (2004). In contrast, Maudos and de Guevara (2004) show that the fall of margins in the European banking system is compatible with a relaxation of the competitive conditions (increase in market power and concentration), as this effect has been counteracted by a reduction of interest rate risk, credit risk and operating costs. On the other hand, while Kasman *et al.* (2010) found market power to be a vital determinant of bank interest margin in both new and old EU member countries, the effect was opposite for the two groups. Beck and Hesse (2009) also found little evidence for market structure explaining variation in spreads or margins over time for Uganda.

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The lack of consensus in the literature suggests the need to identify channels through which market power affects bank interest margins. One potential channel is the freedom with which banks are allowed to operate. In an ideal banking and financing environment where a minimum level of government interference exists, independent central bank supervision and regulation of financial institutions are limited to enforcing contractual obligations and preventing fraud. Credit is allocated on market terms, and the government does not own financial institutions. Financial institutions provide various types of financial services to individuals and companies, and banks are free to extend credit, accept deposits and conduct operations in foreign currencies. Foreign financial institutions operate freely and are treated the same as domestic institutions (Heritage Foundation, 2015). In such an environment, banks may feel compelled to operate more efficiently and reduce intermediation cost.

Even so, an examination of the links between economic freedom and bank performance is very scanty in the literature. This is surprising given the importance of bank lending in promoting economic development and the impact that economic freedom is likely to have on the banking sector (Sufian and Habibullah, 2010). Sufian and Habibullah (2010) provide empirical evidence on the positive impact of economic freedom on banks' performance in Malaysia. Chortareas *et al.* (2013), also suggest that the higher the degree of an economy's financial freedom, the higher the benefits for banks in terms of cost efficiency. Financial 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 efficiencies.

Given the difficulty in understanding the channels between market power and bank interest margins, this study seeks to assess the potential effect of financial freedom on the market power–NIM relationship.

Beck *et al.* (2011) report that African banking is very expensive as reflected by high interest spreads and margins. Decompositions of interest rate spreads and margins point to high overhead costs as the main driver. For instance, Beck and Cull (2013) report that net interest margins in the median African country stood at 5.9 per cent in 2011, while they stood at 4.7 per cent outside Africa. Similarly, the interest rate spread between lending and deposit rate was 10.3 per cent in Africa and 8.2 per cent outside. According to Honohan and Beck (2007), the high spread between deposit and lending interest rates provides disincentives for both savings and lending and is driven mainly by the absence of scale economies and very high risks because of weak and underdeveloped contractual frameworks and economic and political volatility. Indeed, as noted by Senbet and Otchere (2006), savings mobilization and credit allocation have generally not improved by as much as expected, after years of reforms.

Further, 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; Beck *et al.*, 2011). But as competitive conditions continue to improve with the gradual relaxation of remaining restrictions on banking activities as reflected in the index of financial freedom (Heritage Foundation, 2015), how will bank efficiency be affected? Will the comparatively high net interest margins decline or increase? Our study contributes to the literature by addressing these issues and other related matters.

The results reveal that both financial freedom and market power have positive relationships with bank net interest margins. However, there is some indication that the impact of market power on bank margins is sensitive to the level of financial freedom prevailing in an economy. It appears that as competition intensifies, margins of banks in freer countries are likely to reduce faster than those in areas with more restrictions.

The rest of the paper is as follows. Section 2 reviews literature on freedom, market power and bank NIM. Section 3 presents the methodology and data for the study. Section 4 presents the results, and Section 5 concludes the paper and outlines some policy implications.

## 2. Literature review

### *2.1 Theoretical review*

Ho and Saunders (1981) proposed a "dealership model" to explain the determinants of bank margins. The model considers a bank as a risk-averse dealer between the users and suppliers of funds. Given that the arrival of deposits and loans are not synchronized, the bank has to set interest rates on loans and deposits in such a way as to compensate it for providing immediate liquidity service at the risk of losing money, as a result of exposure to changes in money market interest rates (i.e. interest rate risk).

Suppose a new deposit (loan) is contracted at a long-term interest rate $r_{\mathrm{D}}$ ($r_{\mathrm{L}}$). If this deposit (loan) arrives earlier than a new loan (deposit), the bank will have to invest (borrow) the funds at the short-term money market rate $r$. In providing these services, the bank faces a reinvestment (refinancing) risk at the end of the decision period should the short-term rate, $r$, fall (rise). Hence, the bank will transfer these financial costs which arise from the uncertainty in the provision of deposit and loan operations to economic agents.

As a result, each bank participating in the market will set a loan and deposit interest rate, $r_{\mathrm{D}}$ (and $r_{\mathrm{L}}$) that reflects these financial costs as follows:

$$r_D = r - a; r_L = r + b \tag{1}$$

where $a$ and $b$ represent the financial costs related to the provision of deposits and loans, respectively, and $r$ is the expected money market interest rate. Thus, the net interest spread is given as:

$$r_L - r_D = (a + b) \tag{2}$$

Maudos and de Guevara (2004) extended the Ho and Saunders (1981) model by explicitly taking into account, banks' operating costs. They postulate that, given the initial wealth of the bank as the difference between its assets and liabilities and incorporating the production costs associated with intermediation (which are assumed to be a function of the deposits and loans), the final wealth of the bank will be:

$$\mathrm{E}[\mathrm{U}(\mathrm{W})] = \mathrm{U}(\mathrm{W}^*) + \mathrm{U}'(\mathrm{W}^*)\mathrm{E}[\mathrm{W} - \mathrm{W}^*] + {}^1\!/_2\mathrm{U}''(\mathrm{W}^*)\,\mathrm{E}[\mathrm{W} - \mathrm{W}^*]^{\,2} \tag{3}$$

This assumes that banks are maximizers of expected utility, and that a bank's utility function, U, is approximated using the Taylor expansion around the expected level of wealth. It is also assumed that the bank's utility function is continuous and doubly differentiable such that Ú′ 0 and Ú″ $< 0$, so that the bank is risk averse.

Hence, the optimal interest margin is determined principally by the following:

- the competitive structure of the markets;
- average operating costs;
- degree of risk aversion;
- volatility of money market interest rates;

- credit risk;
- the covariance or interaction between interest rate risk and credit risk; and
- the average size of the credit and deposit operations.

A number of other extensions have been made to the basic Ho and Saunders (1981) model. As noted by Almarzoqi and Naceur (2015), some simplifying assumptions of the Ho and Saunders (1981) model have since been relaxed. For example, Allen (1988) provides for heterogeneity in the model (as banks offer different types of deposit and loan services) and show that pure interest margins may be reduced as a result of diversification of bank services and products. This approach deals with the cross-elasticities of demand between bank products and services. McShane and Sharpe (1985) replaced the volatility of the deposit or loan rates, as in Ho and Saunders (1981), with a more relevant variable, the volatility of the money market interest rate. Angbazo (1997) also extended the Ho and Saunders (1981) model by incorporating credit risk and its interaction with interest rate risk. Wong (1997) derived an alternative model to explain the bank's optimal net interest spread in which banks are assumed to set the deposit and loan rate simultaneously. More recently, Carbo and Rodriguez (2007) further developed the model of Ho and Saunders (1981) by including both traditional and non-traditional activities to study the effect of specialization on bank spreads, using a multi-output model for European banking.

Moreover, the banking industry is heavily regulated for a number of theoretical reasons, including consumer protection, promotion of systemic stability, market imperfections and failures, as well as the special nature of financial products (Bikker and Bos, 2008). These may have justified state intervention in regulating and supervising banks. However, interventions in less developed countries for reasons such as active industrial policies, etc. may be debatable, given its flawed impact on economic development. Most economies in the developing world faced financial repression until the past few decades when widespread financial liberalization resulted in expanded credit and business growth. Even so, this may have also led to financial fragility, because of abuse of the regulatory relaxation or poor business practices. Indeed, liberalization or freedom may result in fierce competition and efficiency, which may in turn bring about mergers, more concentration (less competitors) and maybe even higher margins. Hence, a balanced position may be the need for some degree of freedom but not complete relaxation of all restrictions in the banking sector.

### *2.2 Empirical evidence on market power and bank interest margins*

Empirical research on the impact of market power or market structure on bank interest margins has produced conflicting results. As noted by Saunders and Schumacher (2000), the effect of market structure on bank spreads appears to vary across countries. The more segmented or restricted the banking system, in terms of geographic restrictions on branching and universality of banking services, the larger appears to be the monopoly power of existing banks and the higher their spreads. Other studies that have found a positive relationship between market power and NIM or a negative relationship between competition and NIM include Almarzoqi and Naceur (2015) for Caucasus and Central Asia, Hawtrey and Liang (2008) for OECD countries, Hossain (2012) for Bangladesh, Chortareas *et al.* (2012) for Latin American banking and Maudos and Solis (2009) for Mexico.

In addition, Amidu and Wolfe (2013) found that the high NIM of banks in emerging and developing countries can be explained by the degree of market power. Poghosyan (2013) also analyze factors driving persistently higher financial intermediation costs in 48 low-income countries (LICs), relative to 67 emerging market country comparators for the period

1996-2010. Overall, he finds that concentrated market structures and lack of competition in LICs banking systems and institutional weaknesses constitute the key impediments preventing financial intermediation costs from declining. The results provide strong evidence that policies aimed at fostering banking competition and strengthening institutional frameworks can reduce intermediation costs in LICs.

For Africa, Ahokpossi (2013) examined the determinants of bank interest margins using a sample of 456 banks in 41 sub-Saharan African (SSA) countries. The results show that market concentration is positively associated with interest margins, but the impact depends on the level of efficiency of each bank. In particular, compared to inefficient banks, efficient ones increase their margins more in concentrated markets. This indicates that policies that promote competition and reduce market concentration would help lower interest margins in SSA. Similarly, while Aboagye *et al.* (2008) found that increases in bank market power (or concentration) significantly increase net interest margin in Ghana, Chirwa and Mlachila (2004) suggest that the observed high spreads in Malawi can be attributed to high monopoly power.

In contrast, Maudos and de Guevara (2004) analyze the interest margin in the principal European banking sectors in the period 1993-2000 using a panel of 15,888 observations. They followed the methodology developed in the original study by Ho and Saunders (1981) and later extensions but widened it to take banks' operating costs explicitly into account. The results show that the fall of margins in the European banking system is compatible with a relaxation of the competitive conditions (increase in market power and concentration), as this effect has been counteracted by a reduction of interest rate risk, credit risk and operating costs. On the other hand, while Kasman *et al.* (2010) found market power to be a vital determinant of bank interest margin in both new and old EU member countries, the effect was opposite for the two groups. Beck and Hesse (2009) also found little evidence for market structure explaining variation in spreads or margins over time for Uganda.

### *2.3 Freedom and bank performance*

There are several studies on the effect of economic freedom on growth, but theoretical models on the effect of freedom on bank performance have not been well developed. Even so, the impact of restrictions on banking markets have been extensively analyzed (Chortareas *et al.*, 2013). Previous 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 positive impact on economic performance. Indeed, Ahmed (2013) finds that institutional factors (including economic freedom) are important in explaining growth and financial development in SSA.

Carow and Kane (2002) report that the new financial freedoms in the USA, following the relaxation of long-standing geographic and product-line restrictions on financial institutions may have redistributed value rather than created value. In addition, Demirgüc-Kunt *et al.* (2004) indicate that tighter regulations on bank entry, restrictions on bank activities and regulations that inhibit the freedom of bankers to conduct their business boost bank NIM. Also, Mirzaei and Moore (2014) report that less intervention of government contributes to bank competition in LICs, but financial freedom is one of the main drivers of increasing competition in developed countries.

Sufian and Habibullah (2010) provide new empirical evidence on the positive impact of economic freedom on banks' performance in Malaysia. They find that overall economic freedom and business freedom exert positive impacts, implying that higher (lower) freedom on the activities that banks can undertake and entrepreneurs to start businesses increases

(reduces) banks' profitability. Chortareas *et al.* (2013) investigate the dynamics between the financial freedom counterparts of the economic freedom index drawn from the Heritage Foundation database and bank efficiency levels and suggest that the higher the degree of an economy's financial freedom, the higher the benefits for banks in terms of cost efficiency. Lin *et al.* (2016) 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. 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. More recently, Sarpong-Kumankoma *et al.* (2018a, 2018b) examined the effects of freedom and competition on bank profitability in SSA. The results show that both financial freedom and economic freedom have a positive impact on bank profits. And that banks with higher market power operating in countries with higher freedom for banking activities are more profitable than their counterparts in countries with greater restrictions on banking activities.

## 3. Methodology and Data

### *3.1 Measuring bank market power*

In this study, we use a direct measure of bank market power, the Lerner index, defined as:

$$Lerner_{it} = \left(P_{TA,it} - MC_{TA,it}\right)/P_{TA,it} \tag{4}$$

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

$$\begin{aligned} \ln TOC_{it} = {} & \beta_0 + \beta_1 \ln TA_{it} + \frac{\beta_2}{2}(\ln TA)^2_{it} + \sum_{k=1}^{3} \lambda_k \ln W_{k,it} + \sum_{k=1}^{3} \varphi_k \ln TA_{it} \ln W_{k,it} \\ & + \sum_{k=1}^{3}\sum_{j=1}^{3} \delta_{ij} \ln W_{k,it} \ln W_{j,it} + \sum_{j=1}^{3} (\delta_j/2)(\ln W)^2_{j,it} \\ & + \sum_{k=1}^{2} \eta_k trend^k + \sum_{j=1}^{3} \varsigma_j \ln W_{j,it} trend + \wp \ln TA_{it} trend + \varepsilon_{it}, \end{aligned} \tag{5}$$

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. They are 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, respectively. *Trend* is a time trend which captures movements in the cost function over time or technical change.

The marginal cost, $MC_{TA,it}$ is then derived from the translogarithmic cost function by taking the first derivative with respect to the output (total assets) for each bank in the sample as follows:

$$MC_{it} = \frac{TOC_{it}}{TA_{it}}\left[\beta_1 + \beta_2 \ln TA_{it} + \sum_{k=1}^{3} \varphi_k \ln W_{k,it} + \wp trend_{it}\right] \quad (6)$$

*3.2 Modeling freedom, market power and bank net interest margins*

We specify a dynamic model to determine the effect of freedom and market power on bank interest margins. This approach follows several studies on bank net interest margins such as Almarzoqi and Naceur (2015), Amidu and Wolfe (2013) and Maudos and Solis (2009).

$$NIM_{it} = \Phi NIM_{it-1} + \rho_1 Lerner_{it} + \rho_2 Freedom_{it} + \rho_3 Lerner_{it} * Freedom_{it} + \sum_{n=1}^{8} \Theta_n Z_{it}^n + \epsilon_{it} \quad (7)$$

where, $\epsilon_{it} = \Psi_t + \zeta_t + \varphi_{it}$ and $i$ and $t$ represent bank $i$ at year $t$. $NIM_{it}$ is the ratio of net interest income to total assets, and $NIM_{it-1}$ is the observation on the same bank in the previous year. *Lerner* represents the Lerner index and is our measure of market power. *Freedom* is the degree of financial freedom or economic freedom, and *Lerner* × *Freedom* is the interaction between market power and the freedom variables. The variable $X_{it}$ is a vector representing control variables. The error term, $\epsilon_{it}$ has three components: the unobserved time-invariant bank-specific effect ($\Psi_i$), the unobserved time effects ($\zeta_t$) and the random error ($\varphi_{it}$). This is a two-way error component regression model, where $\Psi_i \sim$ IIN (0, $\sigma_v^2$) and independent of $\varphi_{it} \sim$ IIN (0,$\sigma_\mu^2$).

Financial freedom, one of Heritage Foundation's ten measures of economic freedom, is a measure of banking efficiency as well as a 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, reduces competition and generally lowers the level of available services (Heritage Foundation, 2015). An overall score on a scale of 0 to 100 is given to an economy's financial freedom through deductions from the ideal score of 100, which reflects negligible government interference.

We control for a number of variables that generally affect the relationship between competition and bank profitability. These include bank-specific and country-level characteristics. The bank-level variables are *cost to income* (ratio of non-interest operating expenses to operating income), *bank size* (natural logarithm of total assets), *capitalization* (ratio of equity to total assets), *credit risk* (ratio of total loans to total assets) and *diversification* (ratio of non-interest income to total income). The country-level variables are *concentration* (Hirschman–Herfindahl Index, the sum of the squares of the market share of assets of each bank), *financial development* (domestic credit to the private sector as a percentage of GDP) and *economic development* (natural logarithm of per capita GDP).

*3.3 Estimation strategy*

We estimate the regressions 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 NIM. 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).

Even so, the consistency of the system GMM estimator depends on two key assumptions, first, the error term is not auto correlated 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 used the two-step system GMM estimator with Windmeijer-corrected standard errors, small-sample adjustments and orthogonal deviations for the estimations (Windmeijer, 2005). The difference and system GMM estimators have one-step 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.

### *3.4 Data and sample*

The source of most of the banking data is the Bankscope database, which reports published financial statements from banks across the globe. The data has been standardized into a common format to facilitate comparison across countries and therefore suitable for a cross-country study. Unconsolidated financial accounts available for the seven-year period from 2006 to 2012 were used. 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. This data is available on the Heritage Foundation Website (www.heritage.org). The economic freedom of the World (EFW) and Doing Business indicators are from the Fraser Institute (www.fraserinstitute.org) and the World Bank (www.doingbusiness.org), respectively. The macroeconomic data, domestic credit to the private sector as a percentage of GDP, and GDP per capita are from the World Development Indicators produced by the World Bank, and available on the Website of the World Bank. Our initial sample comprised of banks in all SSA countries, but owing 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 SSA. The final sample is an unbalanced panel with 700 bank-year observations. Countries included in the study are Ethiopia, Ghana, Kenya, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Uganda and Zambia.

## 4. Empirical results

### *4.1 Descriptive statistics*

A summary of descriptive statistics for the key variables are presented in Table I. Among the countries in SSA included in this study, NIM is about 5.5 per cent. The mean of the index of financial freedom (53.6) indicates that the countries in SSA 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. On the other hand, the mean level of economic freedom (60.2) signifies a reasonable level of liberty to own and employ capital in these countries. Market power, represented as the Lerner index, show a moderate level in most of the countries, averaging about 0.22.

With a mean of about 14 per cent capitalization ratio, banks in SSA appear to be generally well-capitalized. On average, about 54 per cent of banking assets in these SSA countries are devoted to lending activities (credit risk). Also, a significant portion of bank income (about 28 per cent) is earned from non-interest activities (diversification). However, domestic credit to the private sector as a percentage of GDP (financial development) remains relatively low at about 45 per cent, and a significant portion of bank income (66 per cent) is consumed by costs (cost to income).

### *4.2 Regression results*

Table II presents the results of the regression. The suitability of the dynamic model used for the study is reflected in the significantly positive coefficient of the lagged dependent variable ($NIM_{t-1}$) in all the estimations. 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,

| Variable | Obs | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|---|
| NIM | 700 | 0.0552 | 0.0306 | 0.0000 | 0.2943 |
| Lerner index | 700 | 0.2243 | 0.3255 | −3.7698 | 1.0300 |
| Concentration cost to income | 700 | 7.4258 | 0.5379 | 6.6984 | 8.7064 |
| Economic freedom (Heritage | 700 | 0.66455 | 0.4001 | 0.6540 | 5.7877 |
| Foundation) | 700 | 60.1826 | 5.0582 | 50.5000 | 77.0000 |
| Financial freedom (Heritage | | | | | |
| Foundation) | 700 | *53.6000* | *9.6229* | *20.0000* | *70.0000* |
| *Doing Business* | *700* | *69.4473* | *13.1043* | *27.9500* | *91.4300* |
| *Economic Freedom of the World* | | | | | |
| *(Fraser Inst.)* | *700* | *6.8124* | *0.5383* | *5.2000* | *8.1000* |
| 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 |
| 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 |

**Notes:** The dependent variable NIM (net interest margin) is defined as the ratio of the net interest income to total assets as a measure of spread. The degree of market power is proxied by the *Lerner Index*. The *Lerner Index* is the price mark-up over marginal cost, with higher scores indicating a higher degree of pricing power. *Concentration* is measured by natural logarithm of HHI, measured as the sum of the squares of the market share of assets of each bank. *Cost to income* ratio is measured by the ratio of non-interest operating expenses to operating income. *Economic freedom* and *Financial freedom* are from the Economic Freedom Indicators of Heritage Foundation. They are scaled from 0 to 100 with higher values, indicating greater freedom. *Doing Business from the World Bank, scores an economy's ease of doing business from 0 to 100, where 0 represents the lowest and 100 represents the best performance. Economic freedom of the World from Fraser Institute measures the level of economic freedom, on a scale from 0 to 10, with higher values reflecting greater freedom. Financial development* is measured as domestic credit to private sector as a percentage of GDP. *Capitalization* is the bank total equity to total assets ratio. *Credit risk* is measured as total loans to total 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 I.**
Summary descriptive statistics

**Table II.**
Effects of competition and freedom on bank NIM

| Dependent variable: NIM | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| $NIM_{t-1}$ | 0.5836*** (0.0560) | 0.5619*** (0.0622) | 0.5759*** (0.0552) | 0.5765*** (0.0532) | 0.5764*** (0.0490) |
| Lerner | 0.0145*** (0.0053) | 0.0202*** (0.0061) | 0.0172*** (0.0062) | −0.0438* (0.0250) | −0.1759*** (0.0612) |
| Financial freedom | | 0.0004*** (0.0001) | | 0.0000 (0.0001) | |
| Economic freedom | | | 0.0004 (0.0002) | | 0.0000 (0.0002) |
| Lerner* Fin. freedom | | | | 0.0012** (0.0005) | |
| Lerner* Econ. freedom | | | | | 0.0033*** (0.0010) |
| Concentration | −0.0031* (0.0017) | −0.0009 (0.0015) | −0.0037** (0.0018) | 0.0014 (0.0017) | −0.0011 (0.0018) |
| Cost to income | −0.0028 (0.0044) | −0.0015 (0.0042) | −0.0012 (0.0048) | −0.0040 (0.0039) | −0.0034 (0.0047) |
| Bank size | −0.0007 (0.0008) | −0.0004 (0.0007) | −0.0005 (0.0007) | −0.0003 (0.0007) | −0.0006 (0.0007) |
| Capitalization | 0.0239 (0.0333) | 0.0172 (0.0336) | 0.0221 (0.0334) | 0.0123 (0.0326) | 0.0078 (0.0318) |
| Credit risk | 0.0154*** (0.0056) | 0.0195*** (0.0054) | 0.0158*** (0.0055) | 0.0186*** (0.0051) | 0.0165*** (0.0054) |
| Diversification | −0.0215*** (0.0070) | −0.0197*** (0.0075) | −0.0202*** (0.0070) | 0.0205*** (0.0071) | −0.0200*** (0.0073) |
| Financial development | −0.0050* (0.0026) | −0.0056** (0.0026) | −0.0042 (0.0028) | −0.0061** (0.0025) | −0.0048 (0.0033) |
| Economic development | −0.0027** (0.0013) | −0.0053*** (0.0014) | −0.0043** (0.0018) | −0.0049*** (0.0013) | −0.0054*** (0.0019) |
| Constant | 0.0652*** (0.0194) | 0.0397** (0.0187) | 0.0548*** (0.0198) | 0.0437** (0.0187) | 0.0681*** (0.0211) |
| No. of observations | 561 | 561 | 561 | 561 | 561 |
| No. of instruments | 54 | 55 | 55 | 56 | 56 |
| *F*-test | 42.97*** | 62.99*** | 41.62*** | 60.31*** | 60.26*** |
| AR(2) *P*-value | 1.21 (0.225) | 1.27 (0.203) | 1.15 (0.251) | 1.25 (0.212) | 1.11 (0.269) |
| Hansen *P*-value | 40.23 (0.372) | 40.32 (0.368) | 39.95 (0.384) | 41.46 (0.322) | 38.87 (0.430) |

**Notes:** The dependent variable *Net Interest Margin* (NIM) is defined as the ratio of the net interest income to total assets as a measure of spread. The degree of market power is proxied by the *Lerner* Index or the price mark-up over marginal cost, with the higher scores indicating a higher degree of pricing power. *Financial freedom* and *Economic freedom* are from the Economic Freedom Indicators of Heritage Foundation. They are scaled from 0 to 100 with higher values, indicating greater freedom. *Concentration* is measured by natural logarithm of HHI, measured as the sum of the squares of the market share of assets of each bank. *Cost to income* ratio is measured by the ratio of non-interest operating expenses to operating income. *Bank size* is the natural logarithm of total assets. *Capitalization* is the bank total equity to asset ratio. *Credit risk* is total loans to total assets. *Diversification*, is measured as the ratio of non-interest income to total income. *Financial development* is measured as domestic credit to private sector as a percentage of GDP. *Economic development* is the natural logarithm of GDP per capita. All the regressions were estimated with the Windmeijer-corrected standard error version of the two-step system GMM model, with small-sample adjustments and orthogonal deviations. Robust standard errors are in parentheses. ***, **, and * show 1, 5 and 10% levels of significance, respectively

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 positive and significant coefficients of *Lerner* (market power) in most of the estimations reveal that market power in the banking market is significantly and positively related to NIM. This indicates that banks earn higher margins on loans, as banks gain more market power or the market becomes less competitive. This is consistent with what Amidu and Wolfe (2013) reported for emerging and developing countries, as well as that of Hawtrey and Liang (2008) for OECD countries. This result is also in line with the expectation that banks who have monopoly power can charge higher rates on loans and pay lower rates on deposits.

*Financial freedom* has a positive and significant coefficient, an indication that less restrictions in the banking sector boosts bank margins. Similarly, economic freedom is positively related to NIM but insignificant. The results are generally in line with recent empirical evidence that banks operating in countries where government intervention in the banking sector is minimal earn higher returns (Sarpong-Kumankoma *et al.*, 2018a, 2018b). A greater degree of freedom in an economy is likely to result in more intense competition and expansion of credit to more risky clients. However, as noted by Maudos and de Guevara (2004), banks that make risky loans may also be obliged to hold a higher amount of provisions. And to compensate for the higher risk of default, they may also charge higher margins.

Also, there is some indication that the impact of market power on bank margins is sensitive to the level of freedom prevailing in an economy. The coefficients of the interaction terms (*Lerner* × *Financial freedom* and *Lerner* × *Economic freedom*) are both positive and significant. But we also find that the sign on *Lerner* changes to negative when interacted with the freedom variables. It appears that as competition intensifies, margins of banks in freer countries are likely to reduce faster than those in areas with more restrictions. Greater freedom and more entry may reduce market power of banks, resulting in less opportunities for charging higher rates on loans and paying lower rates on deposits.

An analysis of the control variables show that banking market concentration is negatively related to bank margins, meaning that banks in highly concentrated markets earn lower margins. Our measure of bank operating efficiency (cost to income) and bank size enter the regression with negative but insignificant coefficients in all the estimations. The coefficient of bank capitalization is also positive but insignificant in all the estimations.

Credit risk appears to be an important determinant of bank margins. Higher credit risk associates with higher bank margins. Thus, as banks use a higher proportion of their assets to lend, they thereby increase their level of margins relative to assets, ostensibly as a result of additional risk premium charges. This is consistent with Naceur and Omran (2011), Hossain (2012), Chortareas *et al.* (2012), Amidu and Wolfe (2013) and Ahokpossi (2013). Our measure of diversification, non-interest income to total income, shows up negative and significant in all the estimations, implying that banks that engage in other activities earn lower margins, as they lose focus on their core activity. It is also possible that diversified banks may demand lower spreads for loans to gain higher income from non-interest activities, because they consider the two sources of income as substitutes for each other (Kalluci, 2010).

Both domestic credit to the private sector as a percentage of GDP (financial development), and per capita GDP (economic development) have a negative and significant coefficient in most of the regressions, denoting that banks operating in countries with higher levels of financial and economic development earn reduced margins. This implies that improvements in the development of the banking sector may be associated with greater competition and less excess profitability (Sarpong-Kumankoma *et al.*, 2018b).

*4.3 Robustness check: alternative indicators of economic freedom*

There are two major measurements of economic freedom, the economic freedom of the world (EFW) index produced by the Fraser Institute (Gwartney *et al.*, 2019) and the economic freedom index constructed by the Heritage Foundation (Heritage Foundation, 2015) in collaboration with the Wall Street Journal. As noted by Chortareas *et al.* (2013), both indices are highly credible and their results are compatible in general. Although the EFW 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 captures the issues of interest (Chortareas *et al.*, 2013).

Financial freedom, one of Heritage Foundation's ten measures of economic freedom, is a measure of banking efficiency as well as a 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, reduces competition and generally lowers 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:

- the extent of government regulation of financial services;
- the degree of state intervention in banks and other financial firms through direct and indirect ownership;
- the extent of financial and capital market development;
- government influence on the allocation of credit; and
- 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 to 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.

The EFW index from the Fraser Institute is based on the idea of self-ownership. The key elements of this index are personal choice, voluntary exchange, open markets and clearly defined and enforced property rights. In an economy in which economic freedom prevails, individuals are able to decide what and how goods and services are produced (Gwartney *et al.*, 2019). Five major areas are assessed to determine the degree of economic freedom in a country: size of government, legal system and property rights, sound money, freedom to trade internationally and regulation of credit, labor and business. There are 25 components and several sub-components within the five major areas. In total, the index incorporates 43 different variables. Each component (and sub-component) is scaled from 0 to 10. Sub-component ratings are averaged to obtain the component rating. The component ratings within each area are then averaged to derive ratings for each of the five areas, which are in turn averaged to determine the rating for each country (Gwartney *et al.*, 2019).

While Heritage Foundation's Index of economic freedom focuses directly on the components of "financial freedom," the corresponding counterpart of the Fraser Institute's EEFW focuses on the "regulation of credit". Thus, the two indices are not exactly identical (Chortareas *et al.*, 2013). The difference as highlighted by Heckelman and Stroup (2000) is

that whereas the Heritage index of freedom reflects mostly policy variables which are under the control of government, the Fraser index is dominated by outcome variables. Even so, De Haan and Sturm (2000) show that the two indices produce consistent overall rankings.

Another alternative measure of economic freedom is the World Bank's Ease of Doing Business. It reflects the gap of each economy from the best economy, in terms of regulatory performance. The Ease of Doing Business is scored from 0 to 100, with 0 as the lowest and 100 as the best performance (World Bank, 2020). Economies are also ranked on their ease of doing business. A high score suggests a more conducive regulatory environment for starting and operating a business. A total of 10 areas are considered: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts and resolving insolvency. A simple average of the scores in these areas is used to determine the aggregate ease of doing business score for each country. All the areas are equally weighted (World Bank, 2020).

In Table III below, we explore the correlation among the freedom variables and other macro variables such as GDP growth and the ratio of public expenditure to GDP. The results show fairly high correlation between economic freedom (Heritage Foundation) and EFW (Fraser) and between economic freedom and financial freedom, as well as between economic freedom and Doing business. The rest of the correlations are quite low. This suggests that EFW and Doing business may be considered as alternatives to the Economic freedom index which was the focus of our study.

Hence, to check for robustness of our results, we use the same methodology and controls, but with these alternative measures of economic freedom, namely, *Doing Business* of the World Bank, and *economic freedom of the world* (EFW) by Fraser Institute. Table IV presents the results of the estimations. The results are largely consistent with what we found with Heritage Foundation's economic freedom and financial freedom. Doing business shows a positive and significant effect on bank margins, just like financial freedom. Similarly, EFW is positively related to NIM, just like economic freedom, but insignificant.

Again, similar to what we found with Heritage Foundation's freedom indices, the coefficients of the interaction terms (*Lerner* × *Doing business* and *Lerner* × *EFW*) are both positive and significant. This confirms our earlier findings that the impact of market power on bank margins is sensitive to the level of freedom prevailing in an economy, or ease of doing business. Furthermore, the effects of the control variables are largely the same when Heritage Foundation's freedom indices were replaced with the World Bank's Doing Business and Fraser Institute's EFW indicators. The only exception is that the positive effect of capitalization on bank margins now turns out to be significant.

**Table III.** Correlation matrix

| | GDP Growth | Pub. Exp/ GDP | EFW | Economic freedom | Doing business | Financial freedom |
|---|---|---|---|---|---|---|
| GDP growth | 1.0000 | | | | | |
| Pub. Expenditure/GDP | −0.0778 | 1.0000 | | | | |
| EFW | −0.0369 | −0.0086 | 1.0000 | | | |
| Economic freedom | −0.1924 | −0.0137 | 0.7216 | 1.0000 | | |
| Doing business | −0.0969 | 0.0916 | 0.3514 | 0.5744 | 1.0000 | |
| Financial freedom | −0.1082 | −0.1121 | 0.5027 | 0.6813 | 0.5207 | 1.0000 |

**Table IV.**
Effects of competition and ease of doing business or freedom on bank NIM

| Dependent variable: NIM | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| $NIM_{t-1}$ | 0.5836*** (0.0560) | 0.5644*** (0.0543) | 0.5830*** (0.0554) | 0.5874*** (0.0500) | 0.5942*** (0.0527) |
| Lerner | 0.0145*** (0.0053) | 0.0181*** (0.0060) | 0.0154*** (0.0054) | −0.0753** (0.0301) | −0.0765** (0.0368) |
| Doing business | | 0.0004*** (0.0000) | | −0.0000 (0.0002) | |
| Econ. Freedom of the World (EFW) | | | 0.0013 (0.0016) | | −0.0014 (0.0017) |
| Lerner* Doing business | | | | 0.0013*** (0.0004) | |
| Lerner* EFW | | | | | 0.0136** (0.0057) |
| Concentration | −0.0031* (0.0017) | −0.0006 (0.0018) | −0.0024 (0.0017) | 0.0026 (0.0022) | −0.0004 (0.0017) |
| Cost to income | −0.0028 (0.0044) | −0.0031 (0.0038) | −0.0025 (0.0041) | −0.0066* (0.0036) | −0.0024 ( 0.0040) |
| Bank size | −0.0007 (0.0008) | −0.0005 (0.0006) | −0.0006 (0.0006) | −0.0003 (0.0005) | −0.0005 (0.0006) |
| Capitalization | 0.0239 (0.0333) | 0.2572* (0.0140) | 0.0255* (0.0140) | 0.0203 (0.0130) | 0.0261* (0.0136) |
| Credit risk | 0.0154*** (0.0056) | −0.0186*** (0.0056) | 0.0151*** (0.0056) | 0.0154* (0.0054) | 0.0144** (0.0055) |
| Diversification | −0.025*** (0.0070) | −0.0232*** (0.0069) | −0.0220*** (0.0073) | −0.0262*** (0.0083) | −0.0216*** (0.0075) |
| Financial development | −0.0050* (0.0026) | −0.0026 (0.0026) | −0.0048* (0.0027) | −0.0053*** (0.0020) | −0.0054** (0.0027) |
| Economic development | −0.0027** (0.0013) | −0.0079*** (0.0018) | −0.0031** (0.0014) | −0.0060*** (0.0015) | −0.0031** (0.0014) |
| Constant | 0.0652*** (0.0194) | 0.0533*** (0.0181) | 0.0519*** (0.0193) | 0.0525*** (0.0166) | 0.0548*** (0.0192) |
| No. of observations | 561 | 561 | 561 | 561 | 561 |
| No. of instruments | 54 | 56 | 56 | 57 | 57 |
| *F*-Test | 42.97*** | 62.01*** | 39.57*** | 53.50*** | 45.62*** |
| AR(2) *P*-value | 1.21 (0.225) | 1.23 (0.218) | 1.21 (0.225) | 1.18 (0.239) | 1.21 (0.225) |
| Hansen *P*-value | 40.23 (0.372) | 38.48 (0.493) | 42.04 (0.341) | 41.52 (0.362) | 43.30 (0.293) |

**Notes:** The dependent variable *Net Interest Margin* (NIM) is defined as the ratio of the net interest income to total assets as a measure of spread. The degree of market power is proxied by the *Lerner* Index or the price mark-up over marginal cost, with the higher scores indicating a higher degree of pricing power. *Doing business* scores an economy's ease of doing business from 0 to 100, where 0 represents the lowest and 100 represents the best performance. *Economic freedom of the World* from Fraser Institute, measures the level of economic freedom, on a scale from 0 to 10, with higher values reflecting greater freedom. *Concentration* is measured by natural logarithm of HHI, measured as the sum of the squares of the market share of assets of each bank. *Cost to income* ratio is measured by the ratio of non-interest operating expenses to operating income. *Bank size* is the natural logarithm of total assets. *Capitalization* is the bank total equity to asset ratio. *Credit risk* is total loans to total assets. *Diversification*, is measured as the ratio of non-interest income to total income. *Financial development* is measured as domestic credit to private sector as a percentage of GDP. *Economic development* is the natural logarithm of GDP per capita. All the regressions were estimated with the Windmeijer-corrected standard error version of the two-step system GMM model, with small-sample adjustments and orthogonal deviations. Robust standard errors are in parentheses. ***, **, and * show 1, 5 and 10% levels of significance, respectively

## 5. Conclusions and policy implications

This paper examines the effect of financial (banking) freedom and market power on bank NIM. We used data from 11 SSA countries over the period 2006-2012 and the system GMM to assess how financial freedom affects the relationship between market power and bank NIM. The results reveal a positive relationship between market power and bank net interest margins, indicating that banks with market power charge a higher loan rate and offer a lower deposit rate. Financial freedom shows a positive relationship with NIM, suggesting that less restrictions in the banking sector boosts bank margins. However, there is some indication that the impact of market power on bank margins is sensitive to the level of freedom prevailing in an economy. It appears that as competition intensifies, margins of banks in freer countries are likely to reduce faster than those in areas with more restrictions.

An analysis of the control variables shows that higher credit risk associates with higher bank margins, ostensibly as a result of additional risk premium charges. Also, diversification shows a negative relationship with NIM, implying that banks that engage in other activities earn lower margins, as they lose focus on their core activity. Both financial development and economic development appear to have a negative impact on NIM, denoting that banks operating in countries with higher levels of financial and economic development earn reduced margins. However, banking market concentration, operating efficiency, bank size and the level of capitalization do not appear to be important determinants of bank net interest margins in SSA.

The results of the study have important policy repercussions. The fact that higher market power associates with greater bank margins suggests that banks may be earning part of their margins at the expense of the rest of the economy which needs to be controlled. It would appear that policy measures to minimize bank market power moderately may be well placed. Also, higher financial freedom may dampen bank market power. Hence, as competition intensifies, margins of banks in freer countries are likely to reduce faster than those in areas with more restrictions. Thus, policy measures aimed at limiting restrictions in the banking sector may help minimize bank intermediation costs for the benefit of the entire economy.

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