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By *Mohammed Amidu and John O.S. Wilson*

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# Competition in African Banking:

# Do Globalization and Institutional Quality Matter?

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**Abstract**

Using a sample of 330 banks in 29 African countries, this paper investigates the importance of globalization and institutional quality for bank competition. The results suggest that competition increased in the period of 2002-2005, before decreasing somewhat between 2006 and 2007 and increasing again thereafter. Globalisation enhances bank competition in African countries with stronger governance structures and institutional quality.

**Keywords** Africa, Banks, Boone Indicator, Competition, Developing countries, Globalization, Institutional Quality

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## 1. Introduction

Competition is important for efficiency in the production and allocation of goods and services. In banking, the level of competition has implications for access to finance, allocation of capital funds, competitiveness and development of manufacturing and service industries, levels of economic growth and the extent of financial stability. Competition can stimulate innovation, lower prices and increase the quality of products and services produced, which in turn enhances choice and welfare. The development of reliable and easily understandable indicators of competition is a highly relevant endeavour (Carbo et al, 2009). Furthermore, an understanding of the underlying mechanisms that drive the evolution of competition is important to government agencies tasked with ensuring that competitive outcomes prevail.

The assessment of competition in the banking industry has a long empirical tradition (Casu and Girardone, 2006). However, evidence related to bank competition in Africa is scarce. The international evidence on competition presented in previous studies includes a small number of large African countries (Claessens and Laeven, 2004; Schaeck et al., 2009; and Turk-Ariss 2010). Furthermore, most previous studies do not account for the political and institutional factors that are likely to shape competition in countries characterized by a variety of imperfections (caused by a lack of development, weak institutions, governance and barriers to entry).

This paper contributes to the limited empirical literature on African banking, by focusing on the importance of globalization, governance and institutional quality in determining competition. The empirical analysis executed in two stages. In the first stage, we estimate the extent of competition in banking for 29 African countries during 2002-2009. In order to do so, we employ the Boone indicator which measures the impact of efficiency on performance (Boone, 2008). The Boone indicator assumes that competition increases the performance of efficient banks and erodes the performance of inefficient counterparts. Thus, the Boone indicator is derived from estimating an model that explains performance based upon market structure and efficiency variables.[1] In the second stage, we conduct a multiple regression analysis to examine

[1] We improve the original Boone indicator by estimating marginal cost instead of approximating marginal costs by average variable cost. We also employ three different specifications of Lerner: a conventional Lerner, a funding-adjusted Lerner and an efficiency-adjusted Lerner to measure and analyse the factors that drive bank sector competition.

whether globalization, governance and institutional quality enhance bank competition, and whether this impact is uniform across the banking industries in our sample.

Our results suggest that bank competition in Africa increases steadily in the period 2002 through 2005, before declining somewhat between 2006 and 2007, and increasing again thereafter. The results of the multiple regression analysis suggest that globalization and institutional quality play a significant role in bank competition. Specifically, globalisation enhances competition in countries with stronger governance structures and institutional quality. The rest of the paper is organised as follows. Section 2 describes the recent evolution of banking in Africa and discusses salient literature. In section 3 we present the estimable models, while section 4 discusses the data set and results. Section 5 concludes.

## 2. Background and Literature

This section provides a brief discussion of recent developments in banking in Africa. It also provides an overview of salient literature.

### *Banking in Africa*

Financial development in Africa lags behind other areas of the world (Beck and Cull, 2014). In 2011, credit to the private sector stood at an average of 78% of GDP (compared to 132.5% for other emerging markets in East Asia and Pacific). Prior to the 2008 financial crisis, the liquid liabilities of Sub-Saharan African (SSA) averaged banks hovered around 30%, while for other developing countries was around 4% (Allen et al, 2009). The lack of financial development is in itself a function of widespread poverty and large proportion of the population in many African countires being engaged in subsistence agriculture (Honohan and Beck 2007). Moreover, the large concentration of population in subsistence production limits the financial resources available for intermediation.

In the past three decades, governments in African countries have embarked on financial sector restructuring involving deregulation and a relaxation of entry barriers to foreign investment (Beck and Cull, 2014).[2] These reforms include: reducing credit controls and reserve requirements; removing interest rate controls; reducing entry barriers to foreign banks; reducing

[2] It is argued that the reform of the financial sector is crucial for international trade and economic growth (Senbet and Otchere 2006).

state ownership; developing securities markets; strengthening prudential regulation and supervision. This led to the establishment of capital markets in many countries including the regional market that serves *Communauté Financière Africaine (*CFA) countries (comprising Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo). Reforms also led to the nationalisation and revamping of equity capital of failing private banks, the establishment of entirely new state banks, and non-bank financial institutions. These developments appear to have improved the financial soundness of SSA banks in the last decade (Amidu, 2013).

In 2005, the average interest margin of banking industries of low income African countries (12.75%) was thrice that of higher income counterparts (3.89%). Such high spreads between deposits and lending interest rates is driven mainly by the absence of scale economies, high risks and political volatility (Amidu, 2011). Despite the high cost and high risks, banks operating in Africa are very profitable. For instance, the average return on assets in 2011 was 2.1% compared to 1.5% for comparable developing countries outside Africa. This according to Beck and Cull (2014) reflects the lack of competition in most banking markets (albeit there was slight improvement in competition in early 2000s).[3] In order to further enhance credit delivery, foster a credit culture and promote economic growth in African countries, prior literature suggests that there is a need for: efficient accounting standards; collection of collateral; improved information; institutional quality and the removal of entry barriers (Sacerdoti, 2005; Demetriades and Fielding 2012; Amidu 2013).

*Literature review*

Early research on competition focuses on market structure-performance linkages originating from the Structure-Conduct-Performance (SCP) paradigm and the Chicago Revisionist School (Demsetz, 1973; Hannan, 1991). The former contests that a small number of banks are able to collude either implicitly or explicitly, or use independent market power to charge higher prices (lower rates paid on deposits, higher rates charged on loans) so as to earn abnormal profits. The latter contested that finding evidence of a positive relationship between concentration (measured by the concentration ratio and the Herfindahl index) and profitability (or price cost margin) does

[3] High minimum balance requirements for retail customers and annual fees for current accounts may explain why less than 20% of the population in many African countries have access to a bank account (Beck et al 2007).

not necessarily infer collusive behaviour as it may simply reflect the relationship between size and efficiency.[4] Larger banks gain from scale and other efficiency advantages; therefore more concentrated markets are inherently more profitable. The extent to which banks are able to earn high profits through the exercise of individual or collective market power, or as a consequence of superior efficiency, has never been satisfactorily resolved (Casu and Girardone, 2006; Goddard et al., 2007).

Later research draws on contestable markets theory and its new empirical industrial organisation (NEIO) counterpart to emphasise the influence of potential as well as actual competition, and consequently focus on competitive conduct of firms in response to changes in demand and supply conditions. The mark-up test involves estimating a structural model incorporating demand and cost equations, together with the profit-maximizing condition marginal revenue *equals* marginal cost (Bresnahan, 1982; Lau, 1982). The parameters of the model can be estimated using data either at industry level or at firm level, and can be used to derive an indication of the nature of a given firm's conjectural variation. This in turn indicates whether price-setting conduct by each firm is based on perfectly competitive, imperfectly competitive or assumptions. The Rosse–Panzar test is based on empirical observation of the impact on firm-level revenues of variations in the prices of the factors of production that are used as inputs in the production processes of a group of competing firms (Panzar and Rosse, 1987). Built into the test is an explicit assumption of profit-maximizing behaviour on the part of the firms. Rosse and Panzar show that the H-statistic, defined as sum of the elasticities of a firm's total revenue with respect to each of its factor input prices, differs under perfectly competitive, imperfectly competitive and monopolistic market conditions. The market is deemed a monopoly where the value of H-statistic is equal to or smaller than zero, a value between zero and one points to monopolistic types of competition, and a value of one indicates a perfect competitive market.[5]

[4] A traditional measure of profitability is the Price-Cost-Margin (PCM) which is frequently used in the empirical industrial organization literature as an approximation of the theoretical Lerner index. The index is derived from the monopolists profit maximization condition as price minus marginal cost divided by price. Monopolist profit is maximized when the Lerner index is equal to the inverse price elasticity of demand. Under perfect competition, the Lerner index is zero, and in monopoly it approaches one for positive marginal cost. .

[5] This measure has been applied extensively to the banking systems in both static and dynamic frameworks (Claessens and Laeven, 2004; Goddard and Wilson, 2009)

Recent literature draws on the insights afforded by the SCP and NEIO literatures to assess the relationship between the elasticity of performance and marginal cost. The Boone (2008) indicator gauges the strength of the relation between efficiency (measured in terms of average or marginal cost) and performance (measured in terms of market share or profitability). In general, this indicator is based on the efficient hypothesis that associates performance with differences in efficiency. Under this hypothesis, more efficient banks (i.e. banks with lower marginal costs), achieve superior performance at the expense of their less efficient counterparts. As a consequence, there is a monotonic increase in the degree of competition when firms interact more aggressively and when entry barriers decline.

A number of studies suggest that industry structure and regulatory environment are important determinants of bank competition. Barth et al. (2004) find that tightening entry requirements reduces bank efficiency, which leads to higher net interest margin and overhead costs. Restrictions on foreign bank participation tend to an increase in financial instability. Demirguc-Kunt et al. (2004) and Goddard et al (2011) argue that restrictions to foreign bank entry and the scope of bank activities leads to a lack of competition. Thus, banking systems with liberal policies toward foreign bank involvement in domestic banking and fewer restrictions on entry and scope of activities tend to be more competitive, more stable and more efficient (Hasan and Marton 2003; Claessens and Laeven 2004; and Andrianova et al. 2008). Financial reforms and the quality of institutions are also important factors in promoting the competitive conduct of banks. Delis (2012) finds that financial reforms increase bank competition in countries with stronger institutions. This is not the case in banking industries located in countries with weak institutions and a low level of institutional development.[6]

## 3. Methods

This section describes the empirical methods used in this paper. A two stage approach is employed. In stage one, the Boone indicator is used to measure bank competition in a given

[6] Structural and institutional impediments are of particular importance to banks in developing countries. Globalization enhances competition; as it allows free entry and exit of foreign banks, integrates national economies, governance, and produces complex relations of mutual interdependence (Norris, 2000). Globalization appears to propel economic growth in countries with stronger institutions and effective governance structures (Roa and Vadlamannati, 2011).

banking industry. In the second stage, the Boone indicator is used as the dependent variable in a dynamic panel model which seeks to explain the factors that influence bank competition.

**Stage 1: Estimating the level of competition**

The Boone indicator is based on the efficient structure hypothesis that links performance with differences in efficiency. This indicator suggests that increased competition (given some level of efficiency of each bank), leads to an increase in the market shares of more efficient banks in relation to less efficient counterparts. The estimable model is:

$$\ln s_{it} = \alpha + \beta \ln(mc_{it}) \tag{1}$$

Where: $s_{it}$ measures the market share of bank $i$ at time $t$: the parameter $\beta$ is the Boone indicator; and $mc_{it}$ is the marginal cost. Market share, $s_{it}$ is regressed on the marginal cost to obtain information on how market share co-varies with costs. That is, efficiency gains lead to lower output prices, which in turn increase market shares. As marginal cost cannot be observed directly, the $mc_{it}$ is derived from the following trans-log cost function as:

$$\ln Cost_{it} = \beta_0 + \beta_1 \ln q_{it} + \frac{\beta_2}{2} \ln q_{it}^2 + \sum_{k=1}^{3} \gamma_{kt} \ln W_{k,it} + \sum_{k=1}^{3} \phi_k \ln q_{it} \ln W_{k,it} +$$
$$\sum_{k=1}^{3}\sum_{j=1}^{3} \delta_{ij} \ln W_{k,it} \ln W_{j,it} + \sum_{i=1}^{3} (\delta_i / 2) \ln W_{t,ij}^2 + \sum_{k=1}^{2} \eta_k trend^k +$$
$$\sum_{i=1}^{3} \varsigma_i \ln W_{t,ij} trend + v \ln q_{tj} trend + \varepsilon_j \tag{2}$$

Where: $Cost_{it}$ is the bank's total costs including financial and operating cost; and $q_{it}$ represents a proxy for bank output measured as total assets. $W_1$, $W_2$ and $W_3$ indicate the input price of deposit funds, labour and capital, and are calculated as the ratio of interest expenses to total deposits and money market funds, labour cost to total assets, and other operating expenses to total assets respectively. The cost function is estimated separately for each bank industry in the

sample. Once the cost function is estimated, its first derivative with respect to the output evaluated for each bank in the sample, is the marginal cost:

$$mc_{it} = \frac{\cos t_{it}}{q_{it}}\left[\beta_1 + \beta_2 \ln q_{it} + \sum_{k=1}^{3} \phi_k \ln W_{k,it} + vTrend_{it}\right] \quad (3)$$

To allow for heterogeneity in the empirical model, a bank-specific effect is included to estimate the Boone indicator as:

$$\ln s_{it} = \alpha + \sum_{t=1}^{T} \beta_t d_t \ln mc_{it} + \sum_{t=1}^{T-1} \gamma_t d_t + \mu_{it} \quad (4)$$

Where: $s_{it}$ measures the loan market share of bank $i$ at time $t$; $mc_{it}$ is the marginal cost as estimated in Equation 2 and 3; $d_t$ is a time dummy; and $\mu_{it}$ is the error term. As the Boone indicator is time dependent, $\beta_t$ is estimated separately for each year for each country reflecting changes in competition over time. Market share may reduce marginal cost due to the market power, therefore the influences on a bank's market power through higher market share could cause it to adjust its marginal cost.[7] It is expected that banks with low marginal cost gain market share (that is $\beta < 0$). Competition thus tends to increase this effect as more efficient banks outperform less efficient ones. This implies that the more negative $\beta$ is, the more intense competition is. However, in some cases a positive value for $\beta$ is possible, implying that the higher a bank's marginal cost, the higher its market shares. This may arise if the market is characterised by collusion or because banks are competing on quality.

An endogeneity issue is likely to arise when estimating Equation (4) given that performance and cost are determined simultaneously. To correct this, a test is first conducted to examine whether endogeneity is present in the model specification.[8]. Given that there is no consensus in the literature regarding how best to assess the degree of bank market power (e.g. Carbó et al. 2009), this paper in addition to the Boone indicator, employs three different

[7] If higher marginal cost may lead to higher prices, output is reduced and market share declines (Schaeck and Cihak 2010).

[8] This test comprises the difference of two Sargent-Hansen statistics, where (i) MC is treated as endogenous or (ii) MC is treated as exogenous.

specifications of Lerner: a conventional Lerner, a funding-adjusted Lerner and an efficiency-adjusted Lerner to measure competition in African banking industries.[9]

**Stage 2: Assessing the determinants of competition**

The second stage of our analysis uses the Boone indicator as the dependent variable in a dynamic panel model which seeks to explain the factors that influence bank competition. In common with previous literature our estimable model includes variables to capture activity restrictions and entry barriers. We supplement this with dimensions of global integration (economic, political and social) and interact these with measures of institutional quality. The approach is based on the assumption that competitive conduct of banks, in each of the selected banking industries depends on the institutional quality (measured by transparency, quality of the legal system, bureaucratic quality and legislative strength). The general model used is as follows:

$$Comp_{itj} = a_1 Comp_{itj\text{-}1} + a_2 GI_{tj} + a_3 IPE_{tj} + \sum_{j=3}^{k} a_j X_{ij} + a_4 (GI_{tj} * X_{ij}) + a_5 (IPE_{tj} * X_{ij}) + e_{it} \qquad (5)$$

Where: $Comp_{itj}$ is the competition indicator measured by the Boone indicator of bank $i$ in a country $j$ at period $t$ and $Comp_{it,j\text{-}1}$ is $Comp_{itj}$ of bank $i$ in country $j$ at period $t$ in the previous period. $GI_{tj}$ is the globalization index of country $j$ at period $t$. $IPE_{tj}$ is the institutional and political environment of country $j$ at period $t$. $X_{i,j}$ is a set of $\{k\}$ variables controlling for bank-specific characteristics and respective countries' macroeconomic environments. $\left(GI_{tj} * X_{ij}\right)$ is the interaction between the level of globalization index of a country $j$ at period $t$ and bank-specific and macroeconomic variables of bank $i$ in country $j$ at period $t$, $\left(IPE_{tj} * X_{ij}\right)$ is the interaction between the institutional and political environment of a country $j$ at period $t$ and bank-specific and macroeconomic variables of bank $i$ in country $j$ at period $t$. $\alpha's$ are the parameter vectors. $\varepsilon_{it}$ has two components: the $\mu_i$ is an unobserved time-invariant bank-specific effect, and $v_{it}$ is the disturbance term.

[9] Appendix 1 reports the detailed results of different specifications of the Lerner index.

A globalization index is used to measure the level of integration (Dreher, 2006). Globalisation is thought to erode national boundaries, allow free entry and exit of foreign banks, integrate national economies, cultures, technologies and governance, and produce complex relations of mutual interdependence (Norris 2000). This index affects the competitive environment as it integrates countries economically, socially and politically. The index enables us to employ three dimensions (economic, social and political) to describe the extent of integration and globalization. *Economic integration* is characterised by long distance flows of goods, capital and services as well as information and perceptions that accompany market exchanges. Two variables measure economic globalization (actual flows and restrictions). *Political integration* is characterised by a diffusion of government policies and is measured as the number of embassies in a country, the number of international organisations of which the country is a member and the number of UN peace missions a country has participated in. *Social integration* is expressed as the spread of ideas, information, images and people. It is made up of personal contact, information flows and cultural proximity. Surprisingly, South Africa is ranked third with respect to economic integration within African countries. According to the index, Egypt has the highest political integration with the rest of the African countries, followed by Nigeria, Morocco and Tunisia follows in that order of political integration. Thus the northern African countries are well integrated politically. Regarding political integration, Swaziland is the country with the lowest average score during the period, 2002-2009. Table 1 also shows that overall the African country's least globalised country is Rwanda, followed by Sierra Leone and Sudan. As discussed below, wars, genocide and weak institutions have accounted for this phenomenon and affected their economic growth and development.

**Insert table 1 here**

A number of indices are used to assess institutional and political environments of selected African countries. The strength and quality of a country's institutions reflect the ability of policy authorities to identify various forms of anticompetitive conduct in banking and impose appropriate sanction where appropriate. We employ four indices obtained from the International Country Risk Guide (ICRG). This represents *transparency* (inverse of corruption) within the political system and the quality of the judicial system and the general observance of the law is

denoted by *law quality*. Corruption especially financial corruption makes financial markets less efficient by generating networking effects that lead to anticompetitive behaviour. We expect that in countries with high corruption (i.e. low transparency), competitive conditions tend to be very low, and this is more pronounced for large banks with greater political power. Our corruption variable captures the extent to which public power is exercised for private gain, including petty and grand forms of corruption. Zimbabwe has the lowest score with regard to transparency index. *Bureaucratic quality* represents the quality of administrative infrastructure. The quality and relevance of laws enacted is denoted as the *legislative quality*. Higher values for these indices reflect higher institutional quality. The variables' transparency and the law quality range in value between zero and six, while the variables' bureaucratic quality and legislative strength range between zero and four. In our sample, Malawi has the lowest score with regards to legislative strength while Cote d'Ivoire is the least in terms of the quality of bureaucracy. Table 1 reports the summary statistics of globalization and institutional quality variables. We assume that banks view institutional quality as predetermined in that they observed the level of institutional strength and quality in the previous period and set their lending rates and overall strategy accordingly. This therefore means that a change in institutions today will affect the bank competition in the next period. Thus all the institutional variables in Equation (5) are lagged.

We employ a number of additional control variables which prior studies have shown to affect the level of bank competition (van Leuvensteijn et al, 2011; Delis, 2012; Amidu, 2013). For bank-level controls, the ratio of equity to total assets **(***bank equity*) is used as a measure of the level of capitalization. The logarithm of total assets is employed as a proxy for bank *size*. Table 2 presents mean value of bank-specific variables of the selected banks. GDP growth, Inflation, and GDP per capita growth are included in the regression to account for differences in macroeconomic environments. *GDP per capita growth* is used to control for the general economic development. The banking system is less likely to be competitive when it is subject to high inflation, in that, prices of financial services such as interest rates will be less informative. Accordingly we define *Inflation* as the rate of annual growth in the consumer price index (CPI).

Insert table 2 here

## 4 Data and Results

*Data*

This study employs both bank and country level data for the period 2002-2009. Bank level data are collected from the Bankscope database. Series are yearly, covering a sample of 330 banks across 29 African countries during the eight year period. In order to reduce the possibility of introducing aggregated bias for the empirical analysis, we opt for unconsolidated financial statements. The sample includes all commercial banks, cooperative banks, and development banks for which annual data is available. We apply several exclusion criteria. First, all bank observations with negative values of equity are dropped. Second, bank observations with interest, labour and operating expenses exceeding 100% of total deposit and total assets are dropped. Finally, observations for equity above the 99$^{th}$ percentile are also dropped. Macroeconomic variables (GDP per capita growth and inflation) are sourced from the World Development Indicator (World Bank, 2011). We use the globalization index developed by Dreher (2006). Governance and institutional quality measures are obtained from ICRG.

*Results*

*Measurement of competition*

We estimate Equation 4 in order to derive a Boone indicator for each banking industry in our sample. Banking industries are grouped on the basis of the regional location of the banks. Figure 1 shows the trend in bank competition over time by plotting the average Boone indicator estimates across (i) all sample; (ii) Northern (iii) Central; and (iii) Southern Africa countries. This categorisation of countries is made by the World Bank.[10] This allows us to examine whether there are regional differences in competition over time. The overall result from the average score of competition for the African countries sampled is mixed. On the whole the estimates show that competition steadily increases in the period 2002-2005, but declines between 2006 and 2007 and then marginally increases thereafter. Differences across regional groups are observed. In central Africa and part of southern African countries, competition is on average high between 2003 and

[10] Countries included in analysis for Northern Region of Africa are Algeria, Egypt, Morocco, Sudan, and Tunisia; that of Central Africa countries included are Benin, Burkina Faso, Cameroon, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Mali, Mauritania, Nigeria, Rwanda, Senegal, Sierra Leone and Uganda; while Angola, Botswana, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, and Zimbabwe are included for Southern Africa countries.

2005, but starts decreasing thereafter to 2008. This finding is in line with Amidu and Wolfe (2013).[11] In northern countries, the trend is rather different. The bank competition is at its lowest in 2005, but gradually increases after 2007. Finally, in the southern African countries, bank competition is relatively stable even though the observed estimates are lower than that of northern African countries in 2006 and 2007.

In order to explain these different levels of competition, we turn to the yearly estimations of the Boone indicator as presented in Table 3. Generally, the estimated Boone indicators for each country are negative and do not differ significantly from each other. However, positive $\beta_t$ values are occasionally obtained.[12]

Insert table 3 here

Contrary to the criticisms on the functioning of the banking industry of Benin (e.g. World Bank 2005 report), our estimates of the Boone indicator suggest that bank competition is more intense here than any other countries in our sample. This reflects significant changes in Benin's legal and regulatory frameworks (regarding licensing, bank activities, organisational and capital requirements) during the sample period. Bank competition improves in Malawi, Ghana, Ethiopia and Mali respectively. The improvement of the competitive environment in these countries is likely to be driven by the deregulation and liberalization of the entire financial sector. For instance in Ghana, two very important reforms to the banking industry within the past two decades include the Bank of Ghana Act, 2002, which was enacted to give the central bank more independence and the Banking Act, 2004, which was passed to replace the obsolete law - Banking Law, 1989, (PNDC Law 225).

Bank competition is low in Tanzania, Mozambique, Uganda, Zimbabwe, Nigeria, Rwanda, and Kenya. The level of bank competition in Egypt, Cameroon, South Africa, Tunisia

[11] Competition proxied by the Lerner index has been increasing steadily. A six and three quarter percent price mark up over marginal cost in 2000, increased to a 23.55% mark up in 2005, then fell slightly to 19.26% in 2007. Overall figures from the Lerner index vary across countries by over 18% on average, with African banks pricing their products at around 20% on average over marginal cost. It should be noted that the competitive environments of emerging markets have improved since 2005 (Amidu and Wolfe 2013).

[12] One possible explanation according to van Leuvensteijn et al. (2011) is that competition on quality may lead to both higher marginal cost and higher market share.

and Senegal is largely driven by excessive regulation of the banking industry during late 1990s[13] as well as the dominance of the few state-owned banks.[14]

Insert table 4 here

*Determinants of competition*

Table 4 presents the regression results using the Boone indicator (a measure of competition) as the dependent variable. The columns in Table 4 relate to different empirical approaches to institutional quality and environments (Column 1 for transparency, column 2 for bureaucratic, column 3 for law quality and column 4 for legislative quality). [15]

With the exception of GDP growth, the results show that in general, all the variables considered in the study significantly influence bank competition. The lagged dependent variable is positive and statistically significant. Beginning with column (1), the results show that the size of the bank affects all the Boone indicators positively, implying that larger banks have more market power. The result is consistent with the argument that larger banks to a large extent are efficient and able to gather resources; giving them the ability to accrue more power. Our findings also conform to the view that in emerging and developing countries, bank market power (competition) increases (decreases) especially when large banks use internally generated funds to diversify into non-interest generating activities. On bank capitalization level, the results suggest that competition flourishes in an economy where stringent capital levels are required and enforced. Similarly, transparency has a negative and statistically significant relationship with the Boone indicators. The negative coefficient for transparency (an inverse of corruption), re-enforces the argument that competition is very intense in African countries with low corruption (high transparency). Both the measure of the state of the economy (GDP growth) and the stability in the monetary conditions (inflation) enhance competition in the African banking sector (although the coefficient on the GDP growth is insignificant).

[13] For instance in South Africa, the Bank Act (94 of 1990) forced a number of smaller banks to seek financial assistance from their foreign shareholders by 2002.

[14] For example, even though the government of Egypt successfully privatised the Bank of Alexandria in 2006, the banking system is still dominated by two large state owned commercial banks, National Bank of Egypt and Bank Misr. These banks together with three largest private commercial banks represent approximately half of Egyptian banking system assets and deposit (Allen at al 2011)

[15] All regressions are estimated using two stage least squares dynamic panel estimation techniques**.**

In column (2), bureaucratic quality enters the regression with a positive and significant coefficient. However, these results are not uniform across banks in the sample as the level of economic development can reinforce the effect of bureaucratic quality on bank competition. While the law quality (column 3) increases competition the reverse is the case of legislative strength (column 4) of African countries. Finally, column (5) is estimated employing all the institutional quality variables. The overall results suggest that bank competition is more intense in banking industries located in countries with stronger governance structures and institutional quality.

We now turn our attention to how competition is affected by globalization. The findings are presented in Table 5 and in columns similar to Table 4. Column (1) is for overall globalization index, column (2), (3) and (4) relate to economic, social and political integration respectively. The relationship between economic globalization and the Boone indicator is positive and statistically significant. This finding suggests that when countries are integrated economically, banks tend to take this opportunity to consolidate their market power. Similar to the result on economic globalization, social, political, and overall globalization index have significant positive relation with our measure of competition. The economic significance of these results is that, a percentage increase in globalization (in terms of economic, political and social), banks operating in Africa will be in position to increase their share of market power by more than 2.5 per cent. Thus globalization does not necessarily enhance competition. This finding corroborates the results of previous research which suggests that African countries have not integrated their economic, social and political activities to take the full advantage of globalization (Rao and Vadlamannati, 2011**).**

Insert table 5 here

Table 6 partitions African countries into regions (Northern, Central and Southern) and the level of economic development (Middle income and Low income). Transparency, bureaucratic and law quality have negative relationships with Boone indicator in column (1) and (4).[16] This implies that institutional quality enhances competition in a country of relatively higher economic development**.** The coefficient of legislative quality and that of globalization remained

[16] All the countries in the Northern region as grouped in column (1) are either lower middle income or upper middle income.

unchanged. Thus, African countries are relatively less able to develop independent and well-resourced legislative bodies that promote competition among banks. The overall results point to the fact that African countries are less developed and less positioned to take full advantage of globalization.

Insert table 6 here

**The sensitivity of competition to institutional quality and globalization**

This subsection analyses the sensitivity of competition to the interaction of globalization and institutional quality on one hand and bank size on the other. Previous studies suggest that larger banks are efficient, access cheaper sources of finance and are cope better with issues of moral hazard associated with borrowers. These factors enable the banks to absorb the effects of institutional and competition policies. The results of the sensitivity analysis are presented in Table 7. The results show that larger banks operating in Africa are less sensitive to institutional quality in promoting bank competition. This means that the institutional strength of a country is less effective in promoting competition especially when large banks are prevalent. Policy implications of this finding are: regulators and policy authorities must design anti-competition conduct in the banking sector and impose appropriate sanctions, bearing in mind bureaucracy and law quality available to supervise the rules and regulations. It is even more important when the level of economic development is considered.

Insert table 7 here

Table 8 on the other hand presents the results of the findings taking into consideration the level of development. Columns 1, 2 and 3 represent middle income, low income and the entire sample respectively. Here, the relationship between the indicator of competition and the interaction between bureaucratic quality and bank size is positive in column (2). This result indicates that the sensitivity of market power to bureaucratic quality increases as the size of the bank increases. Thus the bureaucrats are more effective at regulating and supervising competition in low-income than in the middle-income African countries. Similarly, the coefficient of the legal quality and globalization interaction with bank size is positive and

significant among middle-income economies. On the whole, the results suggest that countries with better quality judicial systems reduce the sensitivity of their market power to bank size by more than 38 per cent.

**Insert table 8 here**

## 5. Final Remarks

In the past three decades governments in African countries have embarked on a variety of financial sector reforms involving deregulation and a relaxation of entry barriers to foreign banks. Against this background, this paper examines the level and determinants of competition in African banking. A two stage approach is employed. In stage one, the Boone indicator is used to measure the extent of competition in a given country. In the second stage, the Boone indicator is used as the dependent variable in a dynamic panel model which seeks to explain the factors that influence bank competition in Africa. We find that globalisation and institutional quality enhance bank competition in African countries with stronger governance structures. Our empirical findings support the importance of institutional quality in terms of a positive association with bank competition in relatively emerging and developed economies. In particular, legislative strength, transparency, rule of law and bureaucratic quality increases competition in middle-income countries in Africa. Relating globalization to competition, this result suggests that African countries have not integrated their economic, social and political activities to take the full advantage of globalization.

In conclusion, this paper makes important public policy recommendations. First, in introducing any competitive code of conduct in the banking sector as well as in imposing appropriate sanction, policy makers should bear in mind the capacity of bureaucrats and the quality of the judiciary to supervise and adjudicate rules and regulations. Second, given that the relationship between Boone indicator (the measure of competition) and globalization is positive, authorities in Africa should integrate their economic, social, political and banking activities so as to take full advantage of globalization. Finally, the level of country economic development should be considered in analysing the strength of institutions as the effect of the quality of governance is not uniform across countries.

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## Table 1
## Sample coverage and average of country level variables

Table 1 shows the average of country-level variables on globalization index and instructional quality. *Economic integration* is characterised as long distance flows of goods, capital and services as well as information and perceptions that accompany markets exchanges. *Political integration* is characterised by a diffusion of government policies while s*ocial integration* is expressed as the spread of ideas. *Transparency* presents (inverse of corruption) within the political system and the quality of the judicial system and the general observance of the law is denoted by *law quality*. *Bureaucratic quality* represents the quality of the selected countries bureaucracy. The quality of legislative organ of the governance represents the *legislative strength.*

| | **Globalization** | | | | **Institution quality** | | | |
|---|---|---|---|---|---|---|---|---|
| | Economic | Social | Political | Index | Bureau. quality | Corrupt | Law quality | Legisl. Strength |
| Algeria | 50.864 | 33.553 | 82.583 | 52.719 | 2.000 | 1.500 | 2.677 | 3.229 |
| Egypt | 46.943 | 43.055 | 91.856 | 57.269 | 2.000 | 1.719 | 3.870 | 3.880 |
| Morocco | 47.084 | 48.566 | 88.460 | 58.487 | 2.000 | 2.927 | 5.146 | 3.313 |
| Sudan | 39.488 | 19.333 | 55.038 | 36.042 | 1.000 | 1.000 | 2.500 | 3.474 |
| Tunisia | 58.309 | 39.501 | 87.231 | 58.872 | 2.000 | 2.000 | 5.000 | 4.000 |
| Benin | 35.734 | 25.413 | 71.957 | 41.380 | …. | ….. | …. | …. |
| Burkina Faso | 38.596 | 24.428 | 71.026 | 41.811 | 1.000 | 2.000 | 3.510 | 2.917 |
| Cameroon | 39.893 | 27.630 | 71.722 | 43.662 | 1.104 | 2.646 | 2.063 | 4.000 |
| Cote d'Ivoire | 49.239 | 35.352 | 57.323 | 46.175 | 0.000 | 2.245 | 2.500 | 2.714 |
| Ethiopia | 32.217 | 15.632 | 77.061 | 37.785 | 1.208 | 2.000 | 4.839 | 3.031 |
| Ghana | 51.887 | 33.070 | 84.543 | 53.426 | 2.229 | 1.932 | 2.271 | 3.031 |
| Kenya | 40.287 | 28.459 | 84.220 | 47.392 | 2.000 | 1.417 | 2.073 | 2.443 |
| Mali | 48.835 | 19.760 | 73.942 | 44.565 | 0.000 | 2.198 | 3.000 | 3.198 |
| Mauritania | 56.717 | 25.114 | 52.053 | 43.697 | ….. | …. | …. | … |
| Nigeria | 63.275 | 23.099 | 89.758 | 55.222 | 1.000 | 1.292 | 1.771 | 2.344 |
| Rwanda | 26.929 | 25.821 | 55.318 | 33.960 | …. | …. | …. | … |
| Senegal | 40.384 | 37.758 | 86.687 | 51.545 | 1.000 | 2.396 | 3.000 | 4.000 |
| Sierra Leone | 39.910 | 17.803 | 56.623 | 36.040 | 0.000 | 1.927 | 3.344 | 3.797 |
| Uganda | 48.562 | 22.619 | 65.873 | 43.417 | 2.000 | 2.000 | 3.844 | 4.000 |
| Angola | 71.798 | 17.605 | 48.159 | 45.369 | 1.167 | 2.000 | 3.000 | 4.000 |
| Botswana | 68.658 | 37.495 | 48.487 | 51.736 | 2.000 | 3.266 | 3.693 | 3.990 |
| Malawi | 49.685 | 26.724 | 46.599 | 40.305 | 2.078 | 1.865 | 3.000 | 1.984 |
| Mauritius | 64.566 | 63.297 | 56.246 | 61.910 | …. | ….. | …. | …. |
| Mozambique | 56.126 | 26.848 | 65.765 | 47.724 | 0.958 | 1.667 | 3.000 | 2.995 |
| Namibia | 61.410 | 42.962 | 65.140 | 55.502 | 2.000 | 1.760 | 5.323 | 3.510 |
| South Africa | 67.360 | 45.448 | 85.333 | 63.893 | 2.000 | 2.375 | 2.286 | 3.484 |
| Swaziland | 58.370 | 46.442 | 36.072 | 48.070 | …. | ….. | …. | … |
| Tanzania | 40.011 | 20.438 | 57.096 | 37.185 | 1.000 | 2.474 | 5.000 | 4.000 |
| Zimbabwe | 45.974 | 33.052 | 70.667 | 47.625 | 1.693 | 0.000 | 2.167 | 3.411 |

Source: Dreher (2006) globalization index and institutional quality from ICRG
--------Information not available

**Table 2**
**Bank-specific variables: averages for the period 2000-2007**

Table 2 presents the mean value of bank-specific variables of the selected banks. Revenue is measured as total income divided by total assets. Interest cost, price of labour and capital indicate the input price of deposit funds, labour and capital and these are respectively calculated as the ratio of interest expenses to total deposits and money market funds, labour cost to total assets, and other operating expenses to total. The *bank size* is the average total assets and bank equity represents average *capitalization* of respective countries' banks. The mean values of the selected banks over the period 2002-2009 are in percentage terms except for bank size which is in millions of US dollars.

| Countries | Revenue | Interest cost | Price of labour | Price of capital | Bank size | Capitalization |
|---|---|---|---|---|---|---|
| Algeria | 0.0597 | 0.0238 | 0.0070 | 0.0122 | 4112.90 | 0.1253 |
| Egypt | 0.0807 | 0.0572 | 0.0118 | 0.0066 | 3811.39 | 0.1053 |
| Morocco | 0.0600 | 0.0227 | 0.0104 | 0.0102 | 8048.41 | 0.0839 |
| Sudan | 0.0942 | 0.0579 | 0.0244 | 0.0260 | 1561.69 | 0.1300 |
| Tunisia | 0.0693 | 0.0479 | 0.0156 | 0.0088 | 1367.00 | 0.1470 |
| Benin | 0.0833 | 0.0241 | 0.0178 | 0.0293 | 291.00 | 0.0982 |
| Burkina Faso | 0.1042 | 0.0255 | 0.0196 | 0.0319 | 256.04 | 0.0807 |
| Cameroon | 0.0904 | 0.0264 | 0.0147 | 0.0150 | 515.83 | 0.0725 |
| Cote d'Ivoire | 0.1011 | 0.0239 | 0.0220 | 0.0401 | 566.99 | 0.0977 |
| Ethiopia | 0.0764 | 0.0215 | 0.0093 | 0.0112 | 538.85 | 0.1082 |
| Ghana | 0.1657 | 0.0820 | 0.0314 | 0.0373 | 248.56 | 0.1138 |
| Kenya | 0.1221 | 0.0380 | 0.0265 | 0.0330 | 337.48 | 0.1663 |
| Mali | 0.0894 | 0.0155 | 0.0190 | 0.0284 | 323.11 | 0.1077 |
| Mauritania | 0.1020 | 0.0241 | 0.0211 | 0.0334 | 124.61 | 0.2280 |
| Nigeria | 0.1386 | 0.0583 | 0.0233 | 0.0379 | 2139.35 | 0.1610 |
| Rwanda | 0.1206 | 0.0431 | 0.0279 | 0.0410 | 76.22 | 0.1420 |
| Senegal | 0.0878 | 0.0218 | 0.0150 | 0.0290 | 426.78 | 0.0847 |
| Sierra Leone | 0.1832 | 0.0348 | 0.0437 | 0.0578 | 36.42 | 0.1910 |
| Uganda | 0.1347 | 0.0304 | 0.0362 | 0.0272 | 176.82 | 0.1367 |
| Angola | 0.1017 | 0.0298 | 0.0184 | 0.0246 | 1274.59 | 0.8821 |
| Botswana | 0.1408 | 0.1099 | 0.0173 | 0.0194 | 538.57 | 0.1776 |
| Malawi | 0.2029 | 0.0682 | 0.0478 | 0.0540 | 99.10 | 0.1418 |
| Mauritius | 0.0973 | 0.0579 | 0.0109 | 0.0304 | 962.95 | 0.1868 |
| Mozambique | 0.1585 | 0.0407 | 0.0374 | 0.0555 | 331.50 | 0.1397 |
| Namibia | 0.1261 | 0.0875 | 0.0215 | 0.0178 | 899.69 | 0.3483 |
| South Africa | 0.1736 | 0.1566 | 0.0202 | 0.0490 | 18251.52 | 0.1997 |
| Swaziland | 0.1356 | 0.0470 | 0.0349 | 0.0294 | 149.84 | 0.1552 |
| Tanzania | 0.1089 | 0.0332 | 0.0215 | 0.0340 | 249.42 | 0.1177 |
| Zimbabwe | 0.6164 | 0.3498 | 0.0994 | 0.0813 | 2227.26 | 0.1848 |

**Source: Bankscope and author's own calculation**
**The data comprises of 330 banks across 29 countries over the period 2002-2009**

## Table 3
### Estimates of bank competition using Boone method

Table 3 represents mean values (by country and year) of bank-level estimates of competition obtained using Boone (2008) methods

| Countries | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| Algeria | -0.4282 | -0.2505 | 0.0851 | 0.1324 | -0.4152 | -0.5289 | -1.305 |
| Egypt | 0.9112 | 0.2949 | 0.2321 | -0.1811 | 0.6981 | 0.3074 | -0.6028 |
| Morocco | -0.0542 | -0.5619 | -0.8328 | -0.0423 | -1.0608 | -0.1866 | 0.5419 |
| Sudan | 5.3657 | 2.8622 | 2.8565 | 5.8035 | 3.8058 | 1.3357 | 1.5787 |
| Tunisia | 0.3995 | -0.2376 | -0.1358 | 1.1404 | 0.3306 | 0.4765 | 0.7898 |
| Benin | -3.9892 | -3.3947 | -1.5437 | -4.8123 | -2.3722 | -2.9497 | -2.5617 |
| Burkina Faso | 4.0529 | 0.7714 | 0.1586 | -0.2702 | -0.3007 | -0.6419 | -1.0513 |
| Cameroon | 0.1995 | 0.9451 | -1.6111 | -0.301 | 0.2221 | 0.4899 | 0.3612 |
| Cote d'Ivoire | -0.3261 | 0.8975 | 1.0353 | 0.251 | -0.935 | -0.8448 | -0.7326 |
| Ethiopia | ….. | -2.5026 | -2.5184 | -2.1072 | -2.1841 | -3.4275 | -2.8187 |
| Ghana | -4.4918 | -4.7215 | -3.1684 | -3.244 | -2.4152 | -1.6122 | -0.9443 |
| Kenya | 0.6385 | 0.1804 | -0.6539 | -0.743 | -1.0393 | -0.8843 | -1.1045 |
| Mali | -1.7549 | -3.3587 | -3.0669 | -3.8446 | -2.4829 | -2.5738 | -1.4188 |
| Mauritania | -0.9417 | -1.7375 | -1.3357 | -1.8743 | -0.5262 | -1.2596 | -2.0886 |
| Nigeria | -1.5259 | -1.5413 | -1.559 | -1.3344 | 0.1058 | -0.0522 | 0.5282 |
| Rwanda | 1.3071 | -0.3875 | -0.8452 | -0.542 | -0.5571 | -1.5486 | -1.6728 |
| Senegal | -2.3707 | 0.8152 | 0.1352 | 2.2306 | 1.8327 | 2.3498 | 0.4799 |
| Sierra Leone | -0.795 | -1.3456 | -0.5357 | 0.3291 | 0.2608 | 0.194 | -1.5246 |
| Uganda | -2.9929 | -3.1281 | -2.897 | 0.0696 | -0.9371 | -0.8697 | 0.4083 |
| Angola | -0.2966 | 0.4676 | -1.1467 | -0.4687 | -0.4522 | -1.2438 | -2.1936 |
| Botswana | 1.895 | 3.7451 | 3.5279 | 3.8907 | 2.7496 | 2.7959 | 1.4226 |
| Malawi | -3.3783 | -2.4837 | -2.6662 | -2.5198 | -1.4568 | -2.2863 | -4.1239 |
| Mauritius | 1.5671 | 0.2612 | -0.3185 | -0.9284 | -0.5467 | -1.4696 | -1.3229 |
| Mozambique | 0.5126 | -1.5158 | -1.5732 | -1.1611 | -1.6439 | -0.9373 | -2.1481 |
| Namibia | ….. | ….. | 7.8478 | 4.1969 | 3.7951 | 3.0401 | 2.4705 |
| South Africa | -2.2906 | -0.5794 | -2.0574 | -1.7863 | 3.8781 | 3.4365 | 4.249 |
| Swaziland | 0.074 | 0.7275 | 0.8368 | 1.2403 | 1.6616 | 2.0219 | 1.7056 |
| Tanzania | -0.0364 | -1.853 | -1.0866 | -1.6703 | -1.8527 | -1.7963 | -1.4442 |
| Zimbabwe | -2.1993 | 3.1759 | -3.5222 | -3.1614 | 2.7753 | 0.2995 | ….. |

**Source: Bankscope and author's own calculation**
**The data comprises of 330 banks across 29 countries over the period 2002-2009**
**--------Information not yet available**

**Table 4**
**Determinants of bank competition with institutional quality**

The dependent variable is the degree of competition which is proxied by the Boone indicator with more negative value showing higher competition. *Bank size* is proxied by the natural logarithm of total assets valued in US dollars. Banks' *capitalization* is the bank total equity to asset ratio, measured as equity as a percentage of total assets. *Transparency* presents (inverse of corruption) within the political system and the quality of the judicial system and the general observance of the law is denoted by *law quality*. *Bureaucratic quality* represents the quality of the selected countries bureaucracy. The quality of legislative organ of the governance represents the *legislative strength.* The *GDP growth* accounts for the differences in economic development across countries. *Inflation* is the rate of inflation based on the CPI. The parameters are estimated with the small sample adjusted standard errors in parenthesis. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level respectively. Panel B reports diagnostic test: Sargan $N*R^2$ test are reported for overidentifying restrictions measures instruments exogeneity. The R2 measures the goodness of fit while the p-value of F-test measures the significance of identifying instruments. The Wu-Hausman F-test and Durbin-Wu-Hausman chi2 specification compare the difference between the IV and the OLS estimators. Bank and country fixed effects are excluded from the estimation.

| **Panel A** | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $Competition_{-1}$ | 0.7116** | 0.6954*** | 0.6992*** | 0.6763*** | 0.6769*** |
| | (0.1683) | (0.0166) | (0.0168) | (0.0173) | (0.0173) |
| Bank size | 0.1136*** | 0.1055*** | 0.1132*** | 0.1017*** | 0.0907*** |
| | (0.0167) | (0.0167) | (0.0166) | (0.0167) | (0.0168) |
| Capitalization | -0.2045* | -0.1428 | -0.1707 | -0.2225 | -0.4175** |
| | (0.1685) | (0.1665) | (0.1693) | (0.1663) | (0.1726) |
| Transparency | -0.1442*** | | | | -0.2233*** |
| | (0.0475) | | | | (0.0527) |
| Bureaucratic quality | | 0.1557*** | | | 0.1438*** |
| | | (0.0464) | | | (0.0466) |
| Law quality | | | -0.0118 | | -0.0726** |
| | | | (0.0261) | | (0.0314) |
| Legislative quality | | | | 0.1786*** | 0.3352*** |
| | | | | (0.0445) | (0.0548) |
| GDP growth | -0.8462 | -0.9225 | -1.1239 | -1.5690* | -0.4380 |
| | (0.9211) | (0.9099) | (0.9322) | (0.9051) | (0.9327) |
| Inflation | -0.0077*** | -0.0063*** | -0.0065*** | -0.0068*** | -0.0087*** |
| | (0.0024) | (0.0024) | (0.0024) | (0.0024) | (0.0024) |
| **Panel (B)** Diagnostics tests | | | | | |
| Sargen $N*R^2$ test | 0.004 | 0.109 | 0.074 | 0.206 | 0.05 |
| Observation | 1383 | 1383 | 1383 | 1383 | 1383 |
| $R^2$ (uncentered) | 64.92 | 65.53 | 65.52 | 65.88 | 65.95 |
| F-test (P-value) | 206.19*** | 210.09*** | 207.97*** | 212.71*** | 169.82*** |
| Wu-Hausman test | 42.898*** | 31.039*** | 9.416*** | 0.3503 | 16.794*** |
| Durbin-Wu-Hausman | 41.990*** | 30.638*** | 9.441*** | 0.3535 | 64.918*** |
| Anderson canon test | 1009.8*** | 1365*** | 1339.5*** | 1152.44*** | 1007.20*** |
| Cragg-Donald Wald | 1854.04 | 5.0005 | 2.004 | 3424.034 | 732.2 |

**Table 5**
**Determinants of bank competition using globalization index**

The dependent variable is the degree of competition which is proxied by the Boone indicator with more negative value showing higher competition. *Bank size* is proxied by the natural logarithm of total assets valued in US dollars. Banks' *capitalization* is the bank total equity to asset ratio, measured as equity as a percentage of total assets. *Economic integration* is characterised as long distance flows of goods, capital and services as well as information and perceptions that accompany markets exchanges. *Political integration* is characterised by a diffusion of government policies while s*ocial integration* is expressed as the spread of ideas. The *GDP growth* accounts for the differences in economic development across countries. *Inflation* is the rate of inflation based on the CPI. The parameters are estimated with the small sample adjusted standard errors in parenthesis. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level respectively. Panel B reports diagnostic test: Sargan $N*R^2$ test are reported for overidentifying restrictions measures instruments exogeneity. The R2 measures the goodness of fit while the p-value of F-test measures the significance of identifying instruments. The Wu-Hausman F-test and Durbin-Wu-Hausman chi2 specification compare the difference between the IV and the OLS estimators. Bank and country fixed effects are excluded from the estimation.

| **Panel (A)** | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $Competition_{-1}$ | 0.6901*** | 0.6918*** | 0.6832*** | 0.7032*** | 0.6892*** |
| | (0.0141) | (0.0141) | (0.0146) | (0.0144) | (0.0147) |
| Bank size | 0.0616*** | 0.0917*** | 0.0972*** | 0.1084*** | 0.0656*** |
| | (0.0174) | (0.0158) | (0.0161) | (0.0166) | (0.0175) |
| Capitalization | 0.1206 | -0.3007* | 0.2055 | 0.2126 | -0.0777 |
| | (0.1404) | (0.1550) | (0.1423) | (0.1489) | (0.1612) |
| Globalization index | 0.0253*** | | | | |
| | (0.0036) | | | | |
| Economic globalization | | 0.0170*** | | | 0.0144*** |
| | | (0.00262) | | | (0.0027) |
| Social globalization | | | 0.0116*** | | 0.0067** |
| | | | (0.0025) | | (0.0026) |
| Political globalization | | | | 0.0037** | 0.0045** |
| | | | | (0.0018) | (0.0018) |
| GDP per capita | -2.569*** | -3.027*** | -2.2549*** | -2.8710*** | -2.736*** |
| | (0.8041) | (0.8047) | (0.8167) | (0.8137) | (0.8159) |
| Inflation | -0.0051** | -0.0051** | -0.0059*** | -0.0063*** | -0.0049** |
| | (0.0024) | (0.0024) | (0.0024) | (0.0024) | (0.0023) |
| **Panel (B):** Diagnostics tests | | | | | |
| Sargen $N*R^2$ test | 0.715 | 0.935 | 0.607 | 0.443 | 0.864 |
| Observation | 1735 | 1735 | 1735 | 1735 | 1735 |
| $R^2$ (uncentered) | 67.35 | 67.28 | 66.99 | 66.53 | 67.5 |
| F-test (P-value) | 254.39*** | 253.39*** | 249.52*** | 244.66*** | 219.31*** |
| Wu-Hausman test | 4.489** | 1.959*** | 7.450*** | 13.760*** | 9.259*** |
| Durbin-Wu-Hausman | 4.514** | 1.972*** | 7.478*** | 13.762*** | 9.295*** |
| Anderson canon test | 1642.6*** | 1553.6*** | 1710.68*** | 1634.02*** | 1630.4*** |
| Cragg-Donald Wald | 1.0005 | 7373.878 | 6.0004 | 1.0004 | 1.0003 |

**Table 6**

**Determinants of competition: Regional analysis versus level of development**

The dependent variable is the degree of competition which is proxied by the Boone indicator with more negative value showing higher competition. *Bank size* is proxied by the natural logarithm of total assets valued in US dollars. Banks' *capitalization* is the bank total equity to asset ratio. *Transparency* presents (inverse of corruption) within the political system and the quality of the judicial system and the general observance of the law is denoted by *law quality*. *Bureaucratic quality* represents the quality of the selected countries bureaucracy. The quality of legislative organ of the governance represents the *legislative strength. Economic integration* is characterised as long distance flows of goods, capital and services as well as information and perceptions that accompany markets exchanges. *Political integration* is characterised by a diffusion of government policies while s*ocial integration* is expressed as the spread of ideas. The *GDP growth* accounts for the differences in economic development across countries. *Inflation* is the rate of inflation based on the CPI. The parameters are estimated with the small sample adjusted standard errors in parenthesis. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level respectively. Panel B reports diagnostic test: Sargan $N*R^2$ test are reported for overidentifying restrictions measures instruments exogeneity. The R2 measures the goodness of fit while the p-value of F-test measures the significance of identifying instruments. The Wu-Hausman F-test and Durbin-Wu-Hausman chi2 specification compare the difference between the IV and the OLS estimators. Bank and country fixed effects are excluded from the estimation.

| Panel (A) | (1) Northern | (2) Central | (3) Southern | (4) Middle-income | (5) Low income | (6) All countries |
|---|---|---|---|---|---|---|
| Competition$_{-1}$ | 0.1171** | 0.6511*** | 0.3926*** | 0.7287*** | 0.3930*** | 0.6616*** |
| | (0.0526) | (0.0218) | (0.0445) | (0.0217) | (0.0432) | (0.0171) |
| Bureaucratic quality | -5.5302*** | 0.1503*** | 1.0123*** | -0.0608 | 0.2001*** | -0.0404 |
| | (0.4503) | (0.0472) | (0.3307) | (0.0912) | (0.0706) | (0.0534) |
| Law quality | -0.2258* | 0.1667*** | 0.6187*** | -0.1607*** | 0.3276** | -0.0383 |
| | (0.1286) | (0.0635) | (0.1105) | (0.0448) | (0.1525) | (0.0314) |
| Transparency | -0.3290* | -0.4470*** | -0.3930** | -0.2983*** | -0.0412 | -0.244*** |
| | (0.1685) | (0.0746) | (0.1706) | (0.0676) | (0.1069) | (0.0519) |
| Legislative quality | 0.5802** | 0.4085*** | 0.5212** | 0.3758*** | 0.2679** | 0.3042 |
| | (0.2571) | (0.0611) | (0.2073) | (0.0888) | (0.1089) | (0.0541) |
| Global. index | 0.1647*** | 0.0561*** | 0.1237*** | 0.0383*** | 0.1274*** | 0.0354*** |
| | (00224) | (0.0092) | (0.0161) | (0.0080) | (0.0265) | (0.0052) |
| Bank size | 0.0189 | 0.0682** | 0.0393 | 0.0278 | -0.0039 | 0.0234 |
| | (0.0255) | (0.0268) | (0.0478) | (0.0238) | (0.0349) | (0.0192) |
| Capitalization | 0.1501 | 0.6762 | -0.4911 | -0.2516 | 0.8630 | -0.440*** |
| | (0.3732) | (0.4747) | (0.3944) | (0.1981) | (0.7087) | (0.1693) |
| GDP growth | -7.2348*** | -3.3744** | 5.2158* | -0.4906 | -3.4752 | 0.1535 |
| | (2.2277) | (1.5266) | (2.6402) | (1.2740) | 2.8418 | (0.9188) |
| Inflation | -4.6273*** | -3.4063** | -0.0026* | -1.8722*** | -0.0030 | -0.007*** |
| | (1.3524) | (0.5886) | (0.0034) | (0.6841) | (0.0023) | (0.0024) |
| Panel (B):Diagnostics tests | | | | | | |
| Sargen $N*R^2$ test | 0.629 | 2.019 | 0.019 | 0.031 | 0.049 | 0.084 |
| Observation | 413 | 617 | 352 | 888 | 495 | 1383 |
| $R^2$ (uncentered) | 68.32 | 82.83 | 72.93 | 65.71 | 78.03 | 67.24 |
| F-test (P-value) | 54.20*** | 106.33*** | 59.93*** | 112.92*** | 20.79*** | 167.71*** |
| Wu-Hausman test | 0.197 | 15.865*** | 10.659*** | 14.897*** | 21.607*** | 12.684*** |
| Durbin-Wu-Haus. | 0.411 | 72.476*** | 48.818*** | 70.256*** | 91.882*** | 61.534*** |
| Anders. canon test | 327.811*** | 331.646*** | 243.09*** | 707.182*** | 210.74*** | 999.62*** |
| Cragg-Donald Wald | 761.913 | 116.22 | 124.633 | 567.74 | 59.06 | 593.63 |

**Table 7**

## The sensitivity of competition to institutional quality and bank size

The dependent variable is the degree of competition which is proxied by the Boone indicator with more negative value showing higher competition. The indicator is regressed against *Bank size* is proxied by the natural logarithm of total assets, banks' *capitalization*, globalization index, *Transparency*, *law quality*, *Bureaucratic quality*, the quality of the *legislature, GDP growth and inflation.* These variables are interacted with bank size The *GDP growth* accounts for the differences in economic development across countries. *Inflation* is the rate of inflation based on the CPI. The parameters are estimated with the small sample adjusted standard errors in parenthesis. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level respectively.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $Competition_{-1}$ | 0.6864*** | 0.6827*** | 0.6745*** | 0.6599*** | 0.6902*** |
| | (0.0214) | (0.0164) | (0.0164) | (0.0171) | (0.0142) |
| Bank size | -1.1678*** | 0.2004*** | 0.2154*** | 0.0962 | 0.0834 |
| | (0.2501) | (0.0606) | (0.0589) | (0.1436) | (0.1150) |
| Capitalization | -0.1876 | -0.3174* | -0.2513 | -0.2592 | 0.1153 |
| | (0.2110) | (0.1658) | (0.1637) | (0.1614) | (0.1432) |
| Globalization index | 0.0263*** | 0.0374*** | 0.0405*** | 0.0352*** | 0.0277** |
| | (0.0059) | (0.0049) | (0.0045) | (0.0043) | (0.0137) |
| Transparency | -4.2193*** | | | | |
| | (0.8675) | | | | |
| Transparency*bank size | 0.6346*** | | | | |
| | (0.1313) | | | | |
| Bureaucratic quality | | 0.5387*** | | | |
| | | (0.2054) | | | |
| Bureaucratic quality *bank size | | -0.0976*** | | | |
| | | (0.0336) | | | |
| Law quality | | | 0.3639*** | | |
| | | | (0.1194) | | |
| Law quality'*bank size | | | -0.0567*** | | |
| | | | (0.0176) | | |
| Legislative quality | | | | 0.2670 | |
| | | | | (0.2682) | |
| Legislative qty*bank size | | | | -0.0198 | |
| | | | | (0.0422) | |
| Globalization*bank size | | | | | -0.0004 |
| | | | | | (0.0021) |
| GDP per capita | -0.3185 | 0.2862 | -0.0749 | -0.4422 | -2.550*** |
| | (1.2723) | (0.9756) | (1.0025) | (0.9714) | (0.8108) |
| Inflation | 0.0059 | -0.0047** | -0.0045* | -0.0047** | -0.0052** |
| | (0.0038) | (0.0023) | (0.0023) | (0.0023) | (0.0024) |
| Sargen $N*R^2$ test | 0.232 | 0.104 | 0.233 | 0.278 | 0.7 |
| Observation | 1383 | 1383 | 1383 | 1383 | 1735 |
| $R^2$ (uncentered) | 44.44 | 66.89 | 67.63 | 67.45 | 67.33 |
| Wu-Hausman test | 48.32*** | 25.89*** | 5.038** | 0.864 | 5.094** |
| Durbin-Wu-Hausman | 47.18*** | 25.69*** | 5.075** | 0.873 | 5.124** |

**Table 8**
**The sensitivity of competition: the level of development**

The dependent variable is the degree of competition, which is proxied by the Boone indicator. This is regressed against *Bank size* is proxied by the natural logarithm of total assets, banks' *capitalization*, globalization index, *Transparency*, *law quality*, *Bureaucratic quality*, the quality of the *legislature*, *GDP growth and inflation.* These variables are interacted with bank size The *GDP growth* accounts for the differences in economic development across countries. *Inflation* is the rate of inflation based on the CPI. The parameters are estimated with the small sample adjusted standard errors in parenthesis. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level respectively.

| | (1) Middle-income countries | (2) Low income countries | (3) All countries |
|---|---|---|---|
| $Competition_{-1}$ | 0.7102*** | 0.4474*** | 0.6810*** |
| | (0.0214) | (0.0394) | (0.0167) |
| Bank size | -0.5660*** | -0.7342** | -0.0525 |
| | (0.2042) | (0.3458) | (0.1125) |
| Capitalization | -1.3719** | 1.3698 | -1.0186** |
| | (0.5445) | (0.9075) | (0.4652) |
| Globalization | -0.0745*** | 0.1409*** | 0.0022 |
| | (0.0277) | (0.0426) | (0.0151) |
| Bureaucratic quality | 0.1277 | -0.6940*** | 0.3155* |
| | (0.2970) | (0.2294) | (0.1880) |
| Transparency | 0.7002*** | 0.0085 | 0.3358*** |
| | (0.1241) | (0.2236) | (0.0696) |
| Law quality | -0.1494*** | 0.7954*** | -0.0100 |
| | (0.0496) | (0.1027) | (0.0367) |
| Bureaucratic quality *bank size | -0.0026 | 0.1781*** | -0.0575* |
| | (0.0471) | (0.0460) | (0.0325) |
| Transparency*bank size | -0.1268*** | 0.0225 | -0.0747*** |
| | (0.0183) | (0.0339) | (0.0111) |
| Law quality'*bank size | 0.3845** | -0.1294 | 0.2533* |
| | (0.1549) | (0.2693) | (0.1369) |
| Globalization*bank size | 0.0151*** | 0.0091 | 0.0060** |
| | (0.0040) | (0.0079) | (0.0023) |
| GDP per capita | 1.7561 | -11.6520*** | -0.4563 |
| | (1.2879) | (2.1287) | (1.0005) |
| Inflation | -2.7980*** | -0.0019 | -0.0061*** |
| | (0.6647) | (0.0022) | (0.0023) |
| **Diagnostics tests** | | | |
| Sargen $N*R^2$ test | 2.114 | 5.894** | 0.061 |
| Observation | 888 | 493 | 1381 |
| $R^2$ (uncentered) | 68.21 | 80.28 | 68.6 |
| F-test (P-value) | 103.35*** | 24.17*** | 147.77*** |
| Wu-Hausman test | 2.636 | 0.826 | 19.827*** |
| Durbin-Wu-Hausman | 2.689 | 0.859 | 19.829*** |
| Anderson canon test | 695.83 | 67.715*** | 1133.07*** |
| Cragg-Donald Wald | 1571.55 | 37.656 | 3110.09 |

**Appendix 1**

**Average bank competition in Africa**

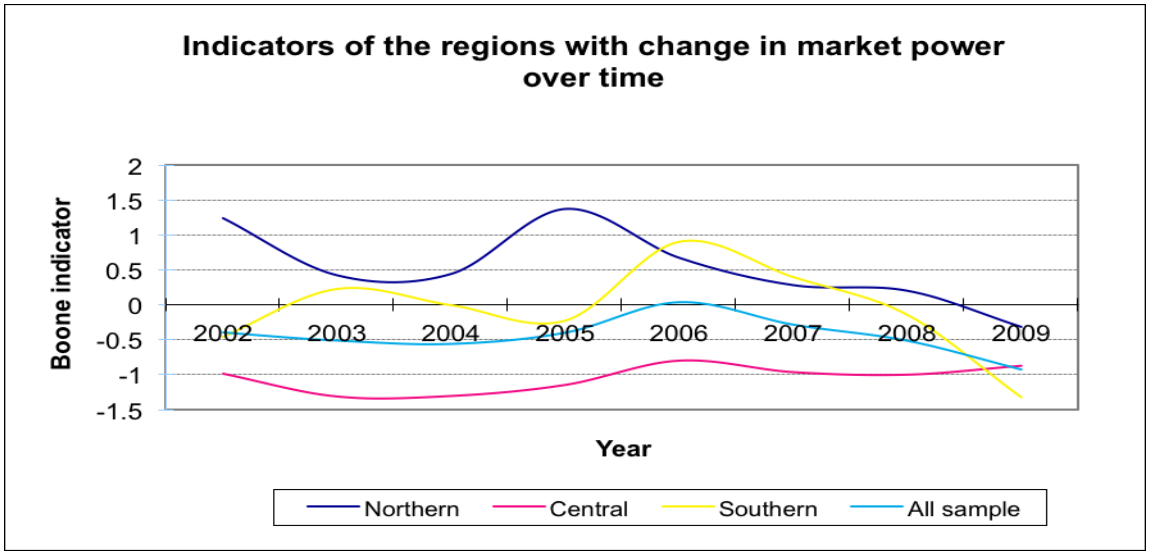
This table represents the level of competition among selected banks in Africa. The degree of competition is proxied by the Boone indicator and the Lerner index. The Boone indicator assumes that competition increases the performer of efficient banks and erodes the performance of inefficient ones. The indicator with more negative values means higher competition while the Lerner index is the price mark-up over marginal cost, with the higher scores indicating a lower level of competition. Three varieties of the Lerner index are reported: a conventional Lerner, a funding-adjusted and an efficiency-adjusted Lerner.

| | | Various Specification of Lerner index | | |
|---|---|---|---|---|
| **Countries** | **Boone Indicator** | **Conventional** | **Funding adjusted** | **Efficiency adjusted** |
| Algeria | -0.3626 | 0.6566 | 0.7734 | 0.7216 |
| Egypt | 0.1921 | 0.2619 | 0.7697 | 0.7524 |
| Morocco | -0.3539 | 0.5204 | 1.0521 | 1.0578 |
| Sudan | 3.3726 | 0.4368 | 0.4835 | 0.4498 |
| Tunisia | 0.3948 | -0.0041 | 0.6601 | 0.6132 |
| Benin | -3.0891 | 0.0448 | 0.5246 | 0.4429 |
| Burkina Faso | 0.2489 | 0.1500 | 0.6134 | 0.5427 |
| Cameroon | 0.0636 | 0.2325 | 0.6820 | 0.5929 |
| Cote d'Ivoire | -0.2134 | 0.2751 | 0.3106 | 0.2667 |
| Ethiopia | -2.5571 | 0.4822 | 0.7741 | 0.7445 |
| Ghana | -2.5973 | 0.3549 | 0.5887 | 0.5611 |
| Kenya | -0.5338 | 0.3467 | 0.6380 | 0.6118 |
| Mali | -2.4479 | 0.4137 | 0.5772 | 0.5113 |
| Mauritania | -1.3880 | -0.0598 | -0.0723 | -0.2173 |
| Nigeria | -0.6685 | 0.2517 | 0.6698 | 0.6491 |
| Rwanda | -0.7526 | -0.1803 | 0.3142 | 0.2734 |
| Senegal | 0.6659 | 0.3463 | 0.4614 | 0.4171 |
| Sierra Leone | -0.6173 | 0.6134 | 0.4763 | 0.4395 |
| Uganda | -1.4781 | 0.3625 | 0.5374 | 0.5058 |
| Angola | -0.7976 | 0.4242 | 0.6342 | 0.5531 |
| Botswana | 2.0714 | 0.5032 | 0.7280 | 0.7117 |
| Malawi | -2.8811 | 0.0545 | 0.6696 | 0.6562 |
| Mauritius | -0.3576 | 0.0630 | 0.5024 | 0.4678 |
| Mozambique | -1.1908 | 0.3251 | 0.5236 | 0.5002 |
| Namibia | 3.8584 | -0.5828 | 0.6928 | 0.6674 |
| South Africa | 0.6928 | 0.4639 | 0.6668 | 0.6392 |
| Swaziland | 1.1811 | 0.7867 | 0.6046 | 0.5965 |
| Tanzania | -1.3914 | 0.2880 | 0.5260 | 0.4910 |
| Zimbabwe | -0.4387 | 0.4314 | 0.7540 | 0.6480 |

**Source: Bankscope and authors' own calculations**

**The data comprises of 330 banks across 29 countries over the period 2002-2009**

Figure 1:




Source: Bankscope and author's own calculation. The data comprises of 330 banks across 29 countries over the period 2002-2009

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