# Bank Competition and Financial Inclusion: Evidence from Ghana

*Agyapomaa Gyeke-Dako*
*Vera Fiador*
*Elikplimi Komla Agbloyor*
*Joshua Yindenaba Abor*

## Research Paper 474

*Bringing Rigour and Evidence to Economic Policy Making in Africa*

# Bank Competition and Financial Inclusion: Evidence from Ghana

By

*Agyapomaa Gyeke-Dako*
*Vera Fiador*
*Elikplimi Komla Agbloyor*
*Joshua Yindenaba Abor*

*University of Ghana*

# Contents

# List of tables

# Abstract

This paper investigates how banking sector competition, measured from the consumer's perspective as well as from financial intermediary pricing behaviour, affects financial inclusion in a developing country like Ghana. Financial inclusion in Ghana has remained low, leading us to examine if competition within banks (who happen to be the largest financial institutions) promotes financial inclusion. This paper measures competition using two indicators: the consumer-level measure of competition relating to the proliferation of bank branches, and a measure for banking sector competition using the funding-adjusted Lerner index at the financial intermediary level. Using data from the 2013 Ghana Living Standards Survey, district-level data on bank branches and bank-level financials from 23 banks spanning the period 2008–2015, we found in almost all cases that competition, whether measured by bank branch proliferation or at the financial intermediary level, improves financial inclusion. These findings suggest that policies aimed at improving competition in the banking sector can yield larger societal benefits by increasing the proportion of the population included in the financial sector. We recommend that the Bank of Ghana, in consultation with the Ghana Association of Bankers, should draft a competition policy for banks in Ghana. Key areas to examine include the trend towards "open banking", and the integration of mobile money and technology into the financial sector.

**Key words:** Bank proliferation, bank competition, financial inclusion

# Acknowledgement

# 1. Introduction

Financial inclusion, which captures access to, and usage and affordability of financial services, has become a topical issue and receives significant attention from both policy makers and researchers. Globally, financial inclusion is on the ascendancy. This notwithstanding, Demirgüç-Kunt, Klapper, Singer and Van Oudheusden (2015) have noted in the global financial inclusion (findex) reports that more than 50 per cent of the world's poorest households still remain unbanked. In sub-Saharan Africa (SSA) for example, while the ascendancy is visible in account holding for example, the inclusion rate still lags behind global figures (see Demirgüç-Kunt et al, 2018).

Across the world, financial inclusion continues to be a major policy concern for many governments. This concern has increased, and attention is predicated on the notion that financial inclusion can and does play a crucial role in achieving the quest for sustainable development goals, such as tackling income inequality and poverty reduction (see Galor and Zeira, 1993; Park and Mercado, 2015) and, ultimately, economic growth (Ganti and Acharya, 2017). In fact, the early theoretical literature identified that access to financial services by individuals has the potential to alter production and employment choices and thereby reduce poverty (see Banerjee and Newman, 1993; Aghion and Bolton, 1997; Mohammed et al 2017). Mohammed et al (2017) specifically found that financial inclusion improves the welfare of the poor in SSA. According to Neaime and Gaysset (2018), there is a general realization that lack of access to financial services and finance adversely affects economic growth and poverty alleviation as the poor find it difficult to accumulate savings, build asset bases for risk protection or invest in income-generating activities.

In view of the foregoing arguments, the search for the drivers of financial inclusion has received significant research attention. Studies on the determinants of financial inclusion have transcended both the micro and macro levels (see Arora, 2010; Sarma and Pais, 2011; Sarma, 2012; Gupte et al, 2012; Allen et al, 2016; Sharma, 2016; Sethy, 2016; Asuming et al, 2019). On the macro level, a number of studies have suggested banking-sector indicators such as branch penetration, credit penetration and deposit penetration, along with macroeconomic variables such as economic volatility, weak rule of law, higher income inequality, social underdevelopment, and regulatory constraints as key determinants of financial inclusion. On the household and individual levels (micro level), factors such as relative income, education and gender are some of the factors that have been documented as influencing financial inclusion (see Cámara and Tuesta, 2015; Chikalipah, 2017; Asuming et al, 2019).

In a developing context like Ghana, financial inclusion has evolved significantly over the past three decades, mostly in response to targeted policies that have been

implemented over the years. Overall, Ghana seems to have more favourable financial inclusion variables when compared to SSA as a region. For example, on the issue of account ownership, Ghana is almost on a par with the overall lower middle-income country level, recording 57.7% in comparison to the developing economy average of 57.8%, quite significantly different from the 42.6% for SSA (Demirgüç-Kunt et al, 2018). From the establishment of the first bank in 1896 to the financial sector adjustment programme in the late 1980s, which saw bank numbers increasing and financial deepening (financial inclusion), the Ghanaian banking landscape has experienced very significant levels of liberalization and deregulation. Between the years 2012 and 2016, the banking sector deposit concentration ratio of the five largest banks declined from 52.8% to 44.4%, thus making for a less concentrated banking landscape as far as market power over deposits is concerned (PWC, 2016). However, what is less clear is whether the level of financial inclusion is related to the changing structure of the Ghanaian banking sector as a result of bank competition. That is the crux of this study.

In terms of how competition affects financial inclusion, the structure-conduct-performance hypothesis on bank competition holds that a concentrated banking sector is able to extract monopoly rents. If that were to hold, it would mean that a concentrated banking sector imposes a wedge on access to, and usage and affordability of, financial services by being uncompetitive and thus providing costly finance, thereby hampering financial access and, ultimately, financial inclusion (Beck et al, 2003). Other studies, such as those by Claessens and Laeven (2005) corroborate Beck et al (2003) by suggesting that a more competitive banking sector, indeed, enhances access to finance. By contrast, Cetorelli and Gambera (2001) suggest that a concentrated banking sector rather increases access to finance via the pathway where banks, in the short run, offer increased and affordable credit with the expectation of cashing in on successful firms in the future. This leaves open the empirical question of how access to finance and financial inclusion in general is affected by competition in the banking sector. This is particularly relevant in the African context because it has been shown in prior research that African banking systems are less inclusive compared to other financial systems (Beck and Cull, 2014).

Consequently, in this paper our main focus is to examine the effect of banking sector competition on financial inclusion. Banking sector competition is conceptualized on two dimensions: the proliferation of banks (proxied by the number of bank branches in a district) and competition in the banking sector (proxied by the funding-adjusted Lerner index). A few studies have sought to document characteristics of the financial services sector that enhance or impinge on financial inclusion. Kumar (2013), for example, explored the role of financial intermediaries as influencers of financial inclusion and arrived at the finding that branch network of banks has a positive impact on financial inclusion. Owen and Pereira (2018) examined the effect of bank competition on financial inclusion. Like most other studies on financial inclusion, they examined this question at the macro level for 83 countries in the world.

A country case study like ours, using micro-level data (both at household and financial intermediary level) to examine the influence of banking competition on financial inclusion, is the first to our knowledge. The paper contributes to the financial

inclusion discourse by incorporating all three dimensions of financial inclusion: access, usage and affordability. The paper also contributes to the literature in its measure of competition from the perspective of consumers of financial services using branch proliferation, and is augmented with competition proxied by bank pricing behaviour. The evidence from the household level also allows for an in-depth analysis on a single-country level for the purposes of delivering targeted policies to influence financial inclusion.

The rest of the paper is structured as follows: Section 2 presents a detailed literature review and hypotheses development. Section 3 provides the methodology on bank branches proliferation and bank financial intermediation levels on financial inclusion. Section 4 provides the results and discussion of the study both at the bank branch proliferation and financial intermediary levels. Section 5 concludes the study and provides policy implications.

# 2. Literature review

In this section, the literature related to bank competition and financial inclusion is reviewed. First, the determinants of financial inclusion at the household level is examined. This is followed by a review of the literature at the financial intermediary level. Finally, the hypotheses which are tested in this study are developed.

The literature shows that several factors influence financial inclusion at the household level. These factors include age, gender, income level, education, employment status and distance from the nearest financial institution. In this section, we review a number of these factors that are likely to be key determinants of financial inclusion in a developing country such as Ghana.

## Individual demographics, distance to financial intermediary and financial inclusion

The relationship between age and financial inclusion has been found to be non-linear. Studies such as those by Akudugu (2013), Allen et al (2016), Zins and Weill (2016) and Asuming et al (2019) have found that at the initial stages of life, people desire to access, use and be able to afford financial services. However, as people get older, the rate of inclusion in the financial system declines. This is mainly because at the initial stages of life, individuals have a higher tendency to work and, therefore, have a higher probability of accessing, using and affording financial services. However, beyond a certain age, when individuals retire, their propensity to access, use and afford financial services dwindles. Also, financial institutions become risk averse towards this demographic because of the higher likelihood of death (see, for example, Akudugu, 2013; Zins and Weill, 2016; Uddin et al, 2017).

With regard to education, those who are more educated are more likely to be confident to interact with financial institutions, understand loan terms as well as other terms related to making prudent financial decisions. A number of studies have shown that level of education is positively related to financial inclusion (e.g., Akudugu, 2013; Fungáčová and Weill, 2015; Allen et al, 2016; Zins and Weill, 2016; Uddin et al, 2017; Asuming et al, 2019).

According to Demirgüç-Kunt, Klapper and Singer (2013) and Zins and Weill (2016), when it comes to gender, women tend to be more disadvantaged in many societies across the world and consequently tend to be less included in the financial system. One of the reasons for this is that women are less likely to be interested in taking out loans even when credit is available as they consider borrowing against collateral a

risky transaction (see, e.g., Boucher et al, 2008; Gneezy et al, 2009; Fletschner et al 2010; Ghosh and Vinod, 2017). However, a number of studies show that being a woman increases access to informal savings (see Aterido et al, 2013; Zins and Weill, 2016).

The level of wealth has also been seen as a significant determinant of financial inclusion. This is because financial services can be expensive, although these costs can reduce with the level of income or transaction size. Indeed, the literature shows that people with higher incomes are more likely to be included in the financial system (see, for example, Akudugu. 2013; Fungáčová and Weill, 2015; Allen et al, 2016; Zins and Weill, 2016). However, a few studies such as that by Uddin et al (2017) find that income level is negatively related to financial inclusion. Further, employment status is one of the factors that have been examined as a determinant of financial inclusion. This is because those who are employed are more likely to have access to bank accounts, receive loans from financial institutions, save, invest and take out insurance policies (Allen et al, 2016). The distance from a financial institution, especially in reference to formal financial indicators, is likely to lead to a reduction in participation in the financial sector due to time and cost constraints as well as higher levels of information asymmetry (see for example, Deng and Elyasiani, 2008; Akudugu, 2013; Allen et al, 2016).

## Banking sector competition, efficiency and bank size

At the financial intermediary level, several factors have been shown to be related to financial inclusion. These factors include competition, bank efficiency, bank stability, bank size, deposit and lending rates. These factors are reviewed in this section.

The ability of financial institutions to extend financial services usually depends on their asset size. Studies such as Uddin et al (2017) report a positive relationship between bank size and financial inclusion, suggesting that bigger banks are in a better position to promote the financial inclusion agenda. However, there is also the possibility that bigger banks, due to inefficiencies and diseconomies of scale, may be less able to promote financial inclusion despite their large size.

The theoretical and empirical literature on banking sector competition and financial inclusion does not suggest a clear-cut prediction of the effect of competition on financial inclusion. Some theoretical models posit that less competition in the banking system results in less credit at a higher cost (Pagano, 1993). This position is supported by empirical literature that shows that banks with higher rates on deposits (Uddin et al, 2017) and banks with lower rates on their loans are better able to promote financial inclusion. In addition, in periods when credit must be rationed, the possibility for credit to be rationed for a more concentrated banking sector is higher than that of a competitive banking sector. Even without credit rationing, banks with market power will usually charge higher rates on loans compared to what they offer on deposits, leading to a reduction in financial inclusion. Indeed, several studies find that a competitive, efficient and stable banking sector is better placed to promote the

financial inclusion agenda (see Uddin et al, 2017; Owen and Pereira, 2018).

Conversely, models such as that by Petersen and Rajan (1995) suggest that a concentrated banking sector leads to more supply of credit/financial inclusion. They show that young firms that have a shorter time record may receive more credit in situations where banks have a lot of market power. This is because such banks may be able to reduce the lending rate in the short term so that they can establish long-lasting relationships with successful firms because they do not fear that the competition will steal these firms once they become successful. Furthermore, other channels such as information asymmetry can lead to a lesser supply of loans in the presence of intense competition (Shaffer, 1998), increasing defaults by borrowers (Cao and Shi, 2001) and lack of screening by banks during economic booms (Dell'Arriccia, 2000).

A third strand of the literature suggests a non-linear relationship between competition and financial inclusion. Dinc (2000) shows a non-linear relationship between bank competition and the amount of lending that takes place. The study suggests an inverted U-shaped relationship between the amount of lending and the number of banks.

In summary, the literature on the effect of banking sector competition on financial inclusion remains inconclusive (based on theoretical predictions and empirical findings) and scanty, especially in the context of developing countries such as Ghana. Interestingly, no empirical study has investigated the relationship between bank competition and financial inclusion at both the household and the bank level.

## Stylized facts and hypotheses development

The level of financial inclusion evident in the Ghanaian economy may be attributable to the evolving structure of banking in Ghana as well as the changing competitive landscape. Between the years 2012 to 2016, the banking sector deposit concentration ratio of the five largest banks declined from 52.8% to 44.4% (PWC, 2016), thus making for a less concentrated banking landscape as far as market power over deposits is concerned (PWC, 2016). This could reflect the amendment in Ghanaian banking laws that allowed all banks to perform universal banking, thereby fostering some level of choice for consumers and competition for the banks. Currently, there are about 26 banks in Ghana, and all of them perform universal banking functions. In terms of market power in the loan market, there was only a negligible change of 0.2% in the share of loans held by the five largest banks, declining from 47.2% in 2012 to 47% in 2016.

Following the liberalization of the banking sector, there has been a significant influx of foreign banks, with the foreign share of banks currently at about 50 per cent. These developments have also begun to change the narrative on the competitiveness of the Ghanaian banking industry from being uncompetitive or having monopolistic competition to one that is competitive. In general, the increasing number of banks in the Ghanaian banking sector as well as the influx of foreign banks make for increased

competition that ultimately benefits the consuming public by increasing the pool and cost of financial services available, and thus affecting inclusion positively. Another outcome of the increasingly competitive banking landscape is the provision of innovative products and services: for example, electronic banking, mobile banking, and banking for small and medium enterprises (SMEs).

Therefore, this study contributes to the literature by using household data and bank level data to unravel the complex link between banking sector competition and financial inclusion. Based on the literature and the stylized facts presented, two main hypotheses are formulated for this study.

**Hypothesis 1:** The number of bank branches in a district promotes access to, and usage and affordability of, financial services.

**Hypothesis 2:** Bank competition (proxied by an adjusted Lerner index) promotes access to, and usage and affordability of, financial services.

# 3. Methodology

The research methodology is presented in two parts. The first concentrates on bank branch proliferation and financial inclusion with key household level characteristics as determinants of financial inclusion. The second looks at bank competition and financial inclusion at the financial intermediary level.

## Bank branch proliferation and financial inclusion

### Data source

In assessing the effect of bank branch proliferation on financial inclusion, the study employs data from the Ghana Living Standards Survey 6 (GLSS6), which is a nation-wide household survey targeted at understanding the living conditions of individuals in Ghana. The GLSS6 data are used because, unlike other data that were collected earlier, the GLSS6 data have the unique feature of including a Labour Force Survey module with additional sections on household financial services. The questionnaire from the GLSS6 provides detailed information on financial inclusion/exclusion and contains a large set of questions on the individual's personal characteristics (age, gender, education, marital status and income) that are useful for this study. The GLSS6 data were collected between 2012 and 2013 and was designed to be nationally representative. The survey covered about 18,000 households in 1,200 enumerating areas (EAs) consisting of 655 rural EAs and 545 urban EAs. The data are supplemented by using hand-collected data from banks on bank branches to find the proxy for bank branch proliferation.

### Model specification

We first examine the relationship between bank branch proliferation and the three dimensions (access, usage and affordability) of financial inclusion. This is done using a binary probit model as each of the dependent variables is dichotomous. Modifying Fungáčová and Weill (2015), Efobi et al (2014) and Asuming et al (2019), the specification of the functional form of the model is:

$$Finc_i = \alpha_0 + \alpha_1 Comp_i + \alpha_2 HHH\_CH_i + \varepsilon_i \qquad (1)$$

$Finc_i$ measures each of the three dimensions (access, usage and affordability) of financial inclusion at a point in time. In terms of access, the proxy variable captures whether an individual has an account or not. Access is a dummy equal to 1 if the

individual has a bank account, and 0 otherwise. To capture usage, the study uses a variable that indicates whether an individual has been granted a loan or not. Thus, usage is also a dummy equal to 1 if the individual's loan application has been granted, and 0 otherwise. Finally, affordability is represented by a dummy equal to 1 if an individual does not anticipate having a regular income and/or having enough income as a problem in accessing financial services, and 0 otherwise.

$Comp_i$ is bank branch proliferation, measured as the number of bank branches available to households per district. We expect districts with more bank branches to have more intense competition than those with fewer bank branches. Thus, having more branches in a district should enhance access to financial services, usage of credit and affordability of financial services.

$HHH\_CH_i$ is a vector of household head characteristics or covariates from the GLSS6 data. These include age, household size, marital status, education, income and religion of the individuals. Household size is a continuous variable. We expect that an increase in the size of the household should increase the probability of opening accounts and taking loans. However, the probability of being able to afford financial services should decrease as the burden on households increases.

**Age groups** is a categorical variable split into ages below 18 years, between 18 and 60 years, and above 60 years, with the reference category being ages below 18 years. The study expects access to account, usage of credit and affordability of financial services to improve as people get older, but during retirement (ages above 60 years), the relationship between age and the measures of financial inclusion would dwindle (Demirgüç-Kunt et al, 2013).

**Gender** is a dummy equal to 1 if an individual is male and 0 if an individual is female. From Ghana's cultural perspective, men are more involved in formal and stable jobs and, therefore, are more likely to earn regular income compared to women. This should make it easy for them to open accounts, be granted credit and afford financial services (see Demirgüç-Kunt et al, 2013; Asuming et al, 2019). Also, as Fletschner et al (2010) and Croson and Gneezy (2009) suggest, because women have been classified as more risk averse than men, they are likely to forego activities that offer higher returns if these opportunities require them to bear too much risk. Consequently, women should have a lower probability of taking loans compared to men.

**Marital status** is categorized into single, not married and married. Not married refers to individuals who have ever been married before but are not currently married (divorcees and/or widows/widowers), and single refers to those who have never been married. The reference category is single. The expected relationship between marital status and all three dimensions of financial inclusion is ambiguous. While in one breadth, individuals who have ever been married (whether they are still in the marriage, divorced or widowed) have the potential of enhancing financial inclusion through the pooling of spousal resources so that opening accounts, being granted loans and being able to afford financial services improves, in another breadth, it can put an extra burden on people and make it more difficult for them to open accounts, take loans and afford financial services.

**Income group** is categorized into high income, middle income and low-income using percentiles based on wealth quintiles. Below the 25th quintile is regarded as low income, between the 50th quintile and 75th quintile is regarded as middle income and higher income is at the 75th quintile and above, based on the GLSS classifications. The higher the income, the easier it becomes for people to access, use and afford financial services.

**Education** is categorized into five parts. No education is the reference category. Primary or lower education equals 1, and 0 otherwise. Secondary education equals 1, and 0 otherwise. Tertiary education equals 1, and 0 otherwise. Other forms of education equal 1, and 0 otherwise. Generally, we expected educated people to be more financially included than those without education.

**Religion:** The study introduces religion as a control variable. Four categories are considered: Christianity, Islam, Traditional and Atheism with Islam being the reference category. The consideration of selecting Islam as a reference category is based on the premise that Muslims prefer financial services and products that are consistent with their religious beliefs. Chief among these is the prohibition on interest, or riba, stipulated in the Quran. It is expected that Christians, traditionalists and atheists would have a higher probability of opening accounts (see Demirgüç-Kunt et al, 2013) and taking loans compared to Muslims. See Table 1 below for detailed definitions of the variables.

**Table 1: Variable selection and justification**

| Variable | Measurement | Source |
|---|---|---|
| *Dependent variable* | | |
| Financial inclusion | **1. Bank account:** Measured as a dummy variable; equals 1 if any member of the household possesses a bank account otherwise 0.<br>**2. Loans granted:** Measured as a dummy variable; equals 1 if any member of a household obtained a loan facility in 2013 and 0 otherwise.<br>**3. Affordability:** Measured as a dummy variable; equals 1 if any member of a household does not see having regular income and/or having enough income as a problem in accessing financial services, and 0 otherwise. | Ghana Living Standard Survey (GLSS 6) Round 6 |
| *Independent* | | |
| *variables* | | |
| Bank branch proliferation (competition) | Number of bank branches per district. | Bank of Ghana and commercial banks' websites |
| Gender | Dummy variable equals 1 if male and 0 otherwise. | GLSS6 |

| Age | Age is grouped into three different categories. Those below 18 years equal 1, otherwise 0. Those 18–60 years equal 1, otherwise 0. Those 60 years and above equal 1, 0 otherwise. Those below 18 years are the reference category. | GLSS6 |
|---|---|---|
| Household size | Continuous variable showing the number of members in a household. | GLSS6 |
| Marital status | This is categorized into three categories. Single equals 1 if head of the household is single, otherwise 0. Not married equals 1 if head of household is separated, widowed or divorced, 0 otherwise.<br>Married equals 1 if the head of household is married or living together with a woman, 0 otherwise. The reference category is single. | GLSS6 |
| Education | Education is categorized into five parts. No education is the reference category. Primary or less education equals 1, 0 otherwise. Secondary education equals 1, 0 otherwise. Tertiary education equals 1 and otherwise. Other forms of education equal 1, 0 otherwise. | GLSS 6 |
| Income | Income is grouped into three categories. Lower income, middle income and higher income based on wealth quintiles. Below the 25$^{th}$ quintile is regarded as lower income, between 50$^{th}$ quintile and 75$^{th}$ quintile is regarded as middle income and higher income is at 75$^{th}$ quintile and above based on the GLSS classifications. | GLSS 6 |
| Religion | Grouped into four categories. Islam equals 1 if the respondent is a Muslim, 0 otherwise. Christianity equals 1 if the respondent is Christian, 0 otherwise. Atheist equals 1 if respondent is an atheist, 0 otherwise. Finally, Traditionalist equals 1 if the respondent belongs to this category, 0 otherwise. | GLSS 6 |

Source: Authors' compilation

# Bank competition and financial inclusion at financial intermediary level

In this section, we examine the impact of bank competition on financial inclusion. We first describe the data source and model specification, and the implications of the various variables on the study.

## Data source

The study uses the financial statements of 23 commercial banks covering the period 2008 to 2015. The financial statements of banks provide their profit and loss information. These data are unbalanced and therefore takes away survivor bias and allow banks to transit in between years.

### 3.2.2  Model Specification

Modifying Uddin et al (2017) our model is given by:

$$FIN\_INCL_{it} = \beta_1 Bank\_Comp_{it} + \delta_j \boldsymbol{Bank\_Specific}_{it} + \eta_i + \pi_t + \zeta_{it} \quad (2)$$

Where $FIN\_INCL_{it}$ is financial inclusion and is the dependent variable that captures the individual dimensions of financial inclusion for bank $i$ at time $t$. For access, we use number of automatic teller machines (ATMs) per 1,000 people and number of bank branches per 1,000 people. For usage, we use loan-to-operating income and deposit-to-income ratio and, finally, for affordability we use the ratio of interest income to loan advances. $Bank\_Comp_{it}$ is bank competition measured as the Lerner index and Boone indicator computed below in appendix B. $\boldsymbol{Bank\_Specific}_{it}$ is a vector of bank-specific factors that might affect financial inclusion such as funding sources, efficiency, return on equity, bank growth and bank size. $\eta_i$ indicates bank fixed effect, $\pi_t$ indicates time fixed effect and $\zeta_{it}$ indicates error term.

As suggested by Carbó et al (2009), studies that have attempted to examine the impact of competition on financial inclusion have had varying outcomes because their results have been sensitive to the way in which competition has been measured. Consequently, finding an appropriate way to measure competition has become a topical issue. The literature categorizes the measures of competition into two. These include using the structure-conduct-performance linkages and the non-structural measures of competition, which were developed in response to the weaknesses identified with the former approach. Typical structure variables include relative size of firms, number of firms in the industry, and the ratio of elasticity of the firm to the elasticity of the industry. Although many measures of an industry's structure had been proposed, most empirical studies previously focussed on the number of firms and the relative size of firms in an industry. Consequently, three measures of concentration were widely used. These are the number of firms, the concentration ratio and the Herfindahl-Hirschman Index (HHI).

The concentration ratio measures the top N firms in the industry's deposit (loans) as a ratio of the total industrial deposit (loans). Thus, insofar as researchers need information on the top N firms' market shares, the concentration ratio provides more information than just the number of firms in the industry. The downside of using the concentration ratio is that it neglects the contribution of the other firms in the industry as it focusses on the top N firms in the industry.

Unlike the concentration ratio, the HHI considers the deposit (loan) contribution of all the firms in the industry, and also assigns more weight to the larger firms by squaring each firm's contribution. This means that the distribution of all firms in the industry are considered. Both the concentration ratio and the HHI can only examine one side of the market at a time. Thus, for the banking sector, both structural measures can either examine the loan market or the deposit market. However, having market

power in the loan market may not necessarily mean that a bank may have market power in the deposit market. Consequently, using these structural measures may not help in examining market power in general.

The problems associated with the structural approach have led to the use of variables measuring conduct directly. Examples of models associated with this include the Lerner index, the conjectural variation models developed by Iwata (1974) and Bresnahan (1982) and Lau (1982), and the Panzar–Rosse (1987) model. Although all these models have one foundation, they give different results (Carbo-Valverde et al, 2009; Liu et al, 2013).

The traditional Lerner index provides a direct measure of the degree of market power as it represents the mark-up of price over marginal cost. Unlike the HHI and the concentration ratio that looks at one side of the market only, that is either the loan market or the deposit market, the Lerner index considers both markets. This is especially important at the bank level because having market power in one market does not necessarily mean that a bank will have market power in the other market as well.

There is a possible limitation associated with using the conventional Lerner index. The marginal cost (MC) estimation in the adjusted Lerner index is likely to reflect some form of monopoly emanating from deposit markets, based on the bank's ability to fund at a relatively low price. In pricing their loans, bank managers cover their funding costs, factor in a risk premium to reflect the uncertainty surrounding the loan-contracting problem and charge an extra premium to reflect their market power (Ariss, 2010). Thus, a form of deposit market power is already reflected in the loan pricing. According to Maudos and De Guevera (2007), adding financing costs and, consequently, the price of deposits in the cost function captures the effect of market power in banking and this may bias results. They add that excluding funding costs from the equation will lead to "raw" pricing power that is not biased by market power, which had already been obtained in the deposit market while securing funds. On the basis of this, the efficiency-adjusted Lerner index suggested by Koetter et al (2008) that takes care of the bias in the traditional Lerner index is used as a measure of competition. This means that we use the cost of only two factors: cost of labour and physical capital, to derive the efficiency-adjusted Lerner index.

The efficiency-adjusted Lerner index[1] is given by:

$$(\widehat{AR_{it}} - \widehat{MC_{it}})/\widehat{AR_{it}} \tag{3}$$

Where $AR_{it}$ is the average revenue computed as TR/Q, and TR = profit before tax + total operating cost. $MC_{it}$ is the marginal cost of producing an additional unit of output and it is derived from finding the translog cost function stated in Appendix B.

For a robustness check we use another measure of competition, the Boone indicator. The Boone indicator is given by:

$$In(ROA)_i = \alpha + \beta In(MC)_i + \varepsilon_j \tag{4}$$

Where $ROA_i$ is the return on asset for bank $i$; $MC_i$ is the marginal cost of bank $i$; and $\varepsilon_j$ is the unobserved error term. In line with Schaeck and Cihák (2014), marginal cost is estimated as the ratio of average cost (operating expense and staff cost) to total income as marginal costs are not directly observable. When β < 0, it implies a competitive banking industry and β > 0 indicates an uncompetitive or concentrated industry.

## Control variables

Profitability is measured by return on equity. We expect profitability to have a positive relationship with all the financial inclusion indicators. This is because more profitable firms should have more ATMs and bank branches. These banks should also be able to give out more loans and provide financial services at a lower cost. We expect a positive relationship between return on equity and financial inclusion.

Bank cost-inefficiency is measured by the ratio of total cost to total operating income (Uddin et al, 2017). All things being equal, banks that have a higher cost-to-income ratio should have fewer ATMs and branches. These banks would provide loans and mobilize more deposits at a higher cost. Hence, a bank-cost-to-income ratio should have a negative relationship with financial inclusion (Uddin et al, 2017). Finally, we measure bank growth as the change in interest income from the previous year's interest income. Banks with high growth should be able to provide more ATMs and bank branches, give out more loans and be able to provide financial services at a cheaper cost. Hence, we expect a positive relationship between bank growth and the different measures of financial inclusion.

## Econometric technique

A pooled ordinary least squares (OLS) estimation does not consider individual specific effects, which are common in panel data. This clearly violates the assumption of independence of the error term, which is a basic assumption to employ the OLS method. As the OLS technique is usually not ideal for panel data, we use the Hausman test to select between a random-effects and fixed-effects model. The null hypothesis for the Hausman test is distributed under a chi-square and states that the differences in coefficients are not systematic. The results shown in Appendix A suggest that the differences in coefficients are systematic. This implies that the individual heterogeneous effects are not correlated with the explanatory variables. Therefore, we use the random effects model in our estimation.

# 4. Results and discussion

## Summary statistics for household level

Table 2 shows the detailed descriptive statistics of the household level data. Panel A shows the household head characteristics while Panel B shows the financial inclusion indicators.

**Table 2: Descriptive statistics**

| Panel A: Characteristics of respondents | | |
|---|---|---|
| | **Freq.** | **Per cent** |
| Gender | | |
| Female | 4,729 | 28.2 |
| Male | 12,043 | 71.8 |
| Age group | | |
| Under 18 years | 19 | 0.11 |
| 18–60 years | 13,642 | 81.34 |
| Above 60 years | 3,111 | 18.55 |
| Educational level | | |
| No education | 4,755 | 28.37 |
| Primary or less | 3,534 | 21.09 |
| Lower and upper secondary | 7,043 | 42.02 |
| Tertiary | 867 | 5.17 |
| Other education | 561 | 3.35 |
| Marital status | | |
| Single | 1,757 | 10.48 |
| Not married | 3,693 | 22.02 |
| Married | 11,322 | 67.51 |
| Employment status | | |
| Unemployed | 59 | 0.36 |
| Employed | 16,202 | 99.64 |
| Wealth quintile | | |
| Lower income | 4,193 | 25 |

| | | |
|---|---|---|
| Middle income | 8,386 | 50 |
| High income | 4,193 | 25 |
| Religion | | |
| Islam | 4,292 | 25.6 |
| Christianity | 11,283 | 67.29 |
| Traditional | 19 | 0.11 |
| Atheist | 1,173 | 7 |
| Household size | 16772 | 4.26 average |
| Panel B: Financial inclusion | | |
| Affordability | | |
| Cannot afford | 9,325 | 55.6 |
| Can afford | 7,447 | 44.4 |
| Bank account | | |
| No | 8,734 | 52.07 |
| Yes | 8,038 | 47.93 |
| Credit granted | | |
| No | 14,979 | 89.31 |
| Yes | 1,793 | 10.69 |

Before carrying out a formal analysis on the relationship between financial inclusion and bank competition, we provide a description of the data. The household data show there are more male household heads than female household heads. Specifically, 71.8% of household heads are male and the remaining 28.2% female. Almost all sampled household heads are employed: while 99.64% of household heads are employed, about 0.36% are unemployed. In terms of the composition of those employed, males dominate. Specifically, 72.42% of those employed are male, while roughly 27.22% of the employed are female, and 0.36% are unemployed. Regarding marital status, 10.48% of the respondents are single. The data also show that 22.02% of respondents are currently not married, which means that they are either divorced, separated or widowed, and roughly 67.51% of respondents are married.

Further, a greater percentage of household heads had  secondary education qualification,.  Roughly about 21.09%  of the sampled population have obtained primary-level education, while 42.02%  secondary level. Those with tertiary education constitute about 5.17% of respondents. Those with other forms of education account for 3.35%, and those without any education constitute about 28.37% of respondents. In terms of religion, Christians dominate those active in the economy. They account for about 67.29% of the entire sample, followed by Muslims (25.6%), atheists (7%) and, finally, traditionalists (0.11%).

Similarly, the data show that those within the lower wealth quintile constitute 25% of respondents, those in the middle-income tier make up 50% of respondents,

while those in the higher income category make up 25% of respondents. This shows a quite proportional distribution of wealth in Ghana with the majority of households belonging to the middle-income category.

The data also show that, on average, there are 19 bank branches serving 1,000 people in a district. Some districts having no bank branches while others have as many as 265 (Accra Metropolitan). This clearly shows huge disparities in the distribution of bank branches in Ghana.

With respect to the financial inclusion variables, the number of households who indicate that they have a bank account and those who indicate they do not have a bank account are almost even. While about 47.93% of households indicate that they have a bank account, about 52.07% of surveyed households indicate that they do not have one. The story is different when we consider those individuals who have been granted loans. A mere 11% of sampled Ghanaians indicate that they have been granted loans. This is reflective of the Ghanaian situation as many find it difficult to obtain credit because they cannot satisfy the necessary requirements for obtaining loans. Finally, about 44.4% of household heads indicate that they do not see having regular income and/or having enough income as a problem in accessing financial services. This suggests that fewer than half of the sampled households do not consider financial services to be expensive.

## Results for bank branch proliferation and inclusion

In this section, we present results on the regressions that examine the relationship between bank branch proliferation and financial inclusion in Ghana. Table 3 provides detailed results.

## Table 3: Probit regression of bank competition and financial inclusion in Ghana

|              | Column 1   | Column 2   | Column 3   |
|--------------|------------|------------|------------|
| **Variables** | **Bank_Acct** | **Credit_Acct** | **Afford** |
|              |            |            |            |
| Competition  | 0.0012***  | -0.0002*** | 0.001***   |
|              | (8.87E-05) | (4.87E-05) | (7.47E-05) |
| Male         | -0.005     | -0.018**   | -0.0048    |
|              | (0.012)    | (0.007)    | (0.011)    |
| 18–60 years  | 0.450***   | 0.292***   | 0.442***   |
|              | (0.115)    | (0.021)    | (0.085)    |
| Above 60 years | 0.437*** | 0.953***   | 0.468***   |

| | | | |
|---|---|---|---|
| | (0.131) | (0.018) | (0.112) |
| Primary or less | 0.207*** | 0.022*** | 0.008 |
| | (0.010) | (0.006) | (0.010) |
| Secondary | 0.430*** | 0.056*** | 0.106*** |
| | (0.010) | (0.010) | (0.014) |
| Tertiary | 0.327*** | 0.055*** | 0.088*** |
| | (0.013) | (0.012) | (0.016) |
| Other Education | 0.425*** | 0.119 | 0.212 |
| | (0.106) | (0.175) | (0.195) |
| Not married | -0.108*** | 0.055*** | -0.183*** |
| | (0.018) | (0.014) | (0.016) |
| Married | -0.0401** | 0.043*** | -0.154*** |
| | (0.016) | (0.009) | (0.015) |
| Household size | 0.006*** | 0.006*** | -0.006*** |
| | (0.002) | (0.001) | (0.002) |
| Middle income | 0.113*** | 0.027*** | 0.0180* |
| | (0.011) | (0.007) | (0.010) |
| High income | 0.321*** | 0.082*** | 0.077*** |
| | (0.011) | (0.009) | (0.012) |
| Christianity | 0.093*** | 0.010 | -0.043*** |
| | (0.011) | (0.006) | (0.010) |
| Atheist | -0.042** | 0.011 | 0.003 |
| | (0.018) | (0.011) | (0.017) |
| Traditional | -0.088 | -0.052 | -0.230** |
| | (0.117) | (0.051) | (0.093) |
| Pseudo $R^2$ | 0.170 | 0.033 | 0.026 |

| | | | |
|---|---|---|---|
| Wald Test | 3827.64 | 372.13 | 572.33 |
| Observations | 16,251 | 16,251 | 16,251 |

Note: The table reports marginal effects from probit regressions. Robust standard errors clustered at the district level are reported in parentheses. Omitted age group category is those younger than 18 years. Omitted category for education is those with no education. Omitted category for marital status is never married. Omitted religion is Islam. The reference category for income is poor. The main variable of interest is bank competition measured as the number of bank branches competing for household inclusion in a district.

\*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% levels, respectively.

Table 3 shows the results on the relationship between each of the dimensions of financial inclusion and their determinants. The estimates of the probit models are on the whole very intuitive. Columns 1, 2 and 3 show the results for those with accounts in general, those who had loan applications granted and whether financial services are affordable or not, respectively. From columns 1 and 3 we find the main variable of interest, competition, has a statistically significant and positive relationship with having access to a bank account, and being able to afford financial services. These results indicate that the prevalence of many banks in a district increases the probability that households will open accounts, and also makes financial services cheaper for households.

The results on affordability (column 3) are in line with Carbo-Valverde et al's (2009) findings and clearly support the market power hypothesis, where intense competition reduces the cost of credit and increases the supply of loans. Contrary to this finding, the results from column 2 reveal that the number of applicants whose loan applications are granted reduces when bank competition increases. This is because intense competition means that banks will be going after the same clients and banks may fear that they would lend to the wrong borrower and thus be exposed to adverse selection. Indeed, intense competition may lead to a relaxation of credit standards, which may ultimately cause banks to reduce credit supply when default rates spike. Consequently, the findings support the information hypothesis, where intense competition lowers investment in banking relationships and impairs access to credit. Thus, it is clear from these results that the relationship between financial inclusion and bank competition depends on the measure of financial inclusion being examined. This provides the justification for using different measures of financial inclusion, as using just one measure may lead to an incomplete picture of the effects of bank competition on financial inclusion.

Turning to individual characteristics, we find that while males are less likely to be granted loans compared to their female counterparts, there is no difference between females' and males' ability to open accounts and afford financial services. The results on account opening deviates from that of Aterido et al (2013) and Demirgüç-Kunt et al (2013) who suggest that females, who are usually considered less privileged in most African societies, would have a lower probability of opening an account compared to their male counterparts. Compared to households whose heads are younger than 18 years old, households whose heads are 18 years and older have a higher probability of opening an account, having their loan applications granted and affording financial

services. This means that the older households heads are, the greater their inclusion in the financial system. These findings are in line with our a priori expectations.

The results on education are also consistent with our a priori expectations. We find that individuals who are educated have a higher probability of accessing, using and affording financial services compared to their uneducated counterparts. This positive relationship could flow from the fact that being educated can affect a person's income and employment status, and thus influence their propensity to engage with the formal financial sector. Another effect of education on inclusion could flow from the diverse exposures that education affords people, and thus influence their appreciation of the benefits of being included in the formal financial sector. These findings support earlier studies, such as those by Efobi et al, 2014; Allen et al, 2016; and Asuming et al, 2019.

Compared to individuals who have never been married, individuals who are either currently married or have been married before but not currently married have a lower probability of opening an account and affording financial services. Conversely, they are more likely to have loans approved should they be able to access and afford financial services. The findings thus suggest that persons who have been married but are not currently married, or are currently married have challenges in terms of accessing and affording financial services, but once they are able to cross the access and affordability barrier, they utilize financial services.

Regarding household size, the results are also interesting. As household size increases, the probability that households will have an account and get their loan applications granted improves. Yet, the probability that they will be able to afford financial services reduces. Intuitively, this finding suggests that an increase in household size pushes households to open accounts and makes it easier for members to combine their resources to take out loans. However, with household size increasing, their financial burden also increases. This makes it difficult for them to afford financial services.

On the religion front, compared to Muslims, Christians are more likely to have bank accounts, but are not likely to afford the services of the banking sector. Atheists, on the other hand, are not likely to have bank accounts at all, while traditionalists are likely to face affordability challenges, like their Christian counterparts. In essence, religion has no role in influencing the utilization of financial services.

# Descriptive statistics for financial intermediary analysis

This section presents the results of the descriptive statistics for the financial intermediary level.

Table 4: Descriptive statistics

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Loans/total asset | 180 | 0.643 | 0.198 | 0.015 | 1.771 |
| Deposit/total assets | 173 | 0.440 | 0.141 | 0.011 | 0.735 |
| Affordability | 173 | 0.429 | 1.509 | 0.119 | 19.979 |
| No of branches | 181 | 33.039 | 35.606 | 1.000 | 159.0 |
| No of ATMs | 161 | 31.603 | 35.345 | 0.000 | 202.0 |
| Lerner index | 177 | 0.316 | 0.313 | -1.172 | 1.136 |
| Funding sources | 165 | 0.839 | 0.149 | 0.295 | 1.937 |
| Efficiency | 180 | 0.613 | 0.288 | 0.096 | 3.204 |
| Return on equity | 180 | 0.024 | 0.029 | -0.171 | 0.085 |
| Bank growth | 168 | 1.122 | 3.970 | -0.962 | 34.325 |
| Bank size | 180 | 13.508 | 1.166 | 9.296 | 15.701 |

Table 4 shows detailed statistics of the data for the bank level. Overall, the ratio of average loans to total assets is 64.25%. This shows that banks in Ghana advance most of their total assets as loans and 43.98% of the total assets of banks in Ghana over the study period are made up of customer deposits. However, the variation in terms of minimum and maximum deposit mobilization is high. The results show that, on average, each bank has 33 branches in the country. A bank with the minimum bank branch has one branch and the bank with the maximum number of branches has 159 branches in the country. This shows a huge disparity in the number of bank branches provided by banks and suggests that only a few banks are driving the financial inclusion process in terms of the provision of bank branches. Similarly, with an average number of 31 and a maximum of 202 ATMs provided by banks, we can conclude that only a few banks drive the financial inclusion process in terms of the provision of ATMs.

Our descriptive statistics also show that roughly a third of the price charged by banks is because of the market power they wield. This is shown by the average value of the Lerner index (31%). This average value clearly shows some inefficiency in the banking system arising from the oligopolistic nature of the banking system.

With regard to the other variables, an average of 83.9% of banks' funding sources are obtained from deposits, interbank borrowings, fixed deposits and other loans that banks receive. This means that equity holders only provide the remaining 16.1% of funding. The cost-to-income ratio of the banks is about 61.3%, on average, suggesting that most banks in Ghana are somewhat inefficient as these banks used 61.3% of their income generated on operational and other institutional expenses over the sampled period. This high cost-to-income ratio also shows that managers of banks are not cost sensitive. The return on assets recorded over the period is 2.4%, implying that bank managers are not able to turn their assets into profitable ventures for the bank. Regarding growth, the banks experienced phenomenal growth in their revenue over the sampled period. On average, banks in Ghana are relatively large as there is not much variation in terms of the minimum and maximum size of the banks considered in the study.

## Results of bank competition and financial inclusion at financial intermediary level

This section presents detailed regression results of the study for the bank competition and financial inclusion relationship in Ghana. Table 5 shows the results for the random effects model. Columns 1 and 2 show the results for access to financial services (represented by number of ATMs per 1,000 people and number of bank branches per 1,000 people), columns 3 and 4 give the results for usage of financial services (represented by the ratio of loan advances to total operating income and the ratio of total deposits to total operating income) and column 5 has the results for affordability (ratio of interest income to loan advances).

## Table 5: Bank competition and financial inclusion at the bank level

| Variables | Column 1<br>Number of branches per 1,000 | Column 2<br>Number of ATMs per 1,000 | Column 3<br>Ratio of loans and advances to total assets | Column 4<br>Ratio of customer deposits to total assets | Column 5<br>Affordability |
|---|---|---|---|---|---|
| Lerner index | -0.0221** | 0.00186 | -0.185*** | -0.128** | 0.102** |
| | (0.009) | (0.007) | (0.051) | (0.054) | (0.052) |
| Funding sources | | | | | -18.28*** |
| | | | | | (0.601) |

| | | | | | |
|---|---|---|---|---|---|
| **Funding sources[2]** | | | | | 12.78*** |
| | | | | | (0.193) |
| **Cost inefficiency** | 0.0164*** | 0.0132** | 0.0157 | 0.141*** | 0.0811 |
| | (0.004) | (0.005) | (0.038) | (0.043) | (0.080) |
| **Return on equity** | 0.010*** | 0.003 | 0.048*** | 0.017 | 0.089*** |
| | (0.002) | (0.002) | (0.017) | (0.040) | (0.034) |
| **Bank growth** | 0.0005 | -0.00024 | 0.007*** | 0.006*** | -0.007 |
| | (0.0004) | (0.0002) | (0.001) | (0.001) | (0.007) |
| **Bank size** | 0.015*** | 0.024*** | 0.005 | 0.028** | 0.055** |
| | (0.002) | (0.004) | (0.010) | (0.013) | (0.025) |
| **Constant** | -0.180*** | -0.294*** | 0.400** | 0.206 | 5.681*** |
| | (0.031) | (0.051) | (0.165) | (0.185) | (0.519) |
| **R-square** | 0.350 | 0.378 | 0.240 | 0.151 | 0.959 |
| **Observations** | 164 | 149 | 158 | 165 | 150 |
| **No of years** | 8 | 8 | 8 | 8 | 8 |
| **Hausman test** | | | | | |
| **Chi-square (p-value)** | 4.57(0.471) | 1.80(0.877) | 5.65(0.342) | 2.58(0.764) | 47.69(0.000) |

Note: Insignificant coefficient of the Hausman test shows that a null hypothesis of fixed effects is rejected in favour of the alternative hypothesis of random effects. Thus, the model is estimated using random effects for no significant effects and fixed effects for significant effects.

***, ** and * are 1%, 5% and 10% significance levels, respectively, and robust standard errors are reported in parentheses.

From column 1, we see that the Lerner index has a negative and significant relationship with the number of bank branches. This suggests that high bank competition proxied by the Lerner index leads to the provision of more bank branches. Put differently, less competition leads to a reduction in bank branches. This supports the market power hypothesis. As expected, bank size and profitability have a positive and significant relationship with number of bank branches. This means that more profitable banks and larger banks have the capacity to provide more bank branches. The latter result supports the findings of Uddin et al (2017). From Table 5, it can be seen that bank cost inefficiency is significant and positive. This is inconsistent with our expectations and with the results of Uddin et al (2017). However, as setting up bank branches cost banks more compared to using more cost-efficient methods like

online platforms, inefficient banks with high cost-to-income ratios would exhibit higher bank branching compared to efficient banks. Bank growth is not significant in this estimation.

In column 2, the results for the relationship between competition and the number of ATMs per 1,000 people is shown. Contrary to the results for bank branches, we find that the Lerner index is statistically insignificant. As with the results for the number of bank branches, the results also show banks' cost inefficiency to be positive and significantly related to the number of ATMs. This suggests that banks that have high cost-to-income ratios provide more bank branches and ATM networks. Bank size shows a positive and significant relationship with number of bank ATMs, suggesting that the larger the bank, the greater its probability of opening more bank branches due to capacity/ability. Unlike the results for the number of bank branches, return on equity is statistically insignificant. This is inconsistent with the a priori expectations. Bank growth remains insignificant in this estimation.

Columns 3 and 4 show the results for usage of financial services, which is measured in two ways: the ratio of loans and advances to total assets shown in column 3, and the ratio of customer deposits to total assets shown in column 4. The results in both columns 3 and 4 are somewhat consistent with the study's expectations. Specifically, a negative and significant relationship between the ratio of loans and advances to total assets and the Lerner index is found. Similar results are found for the relationship between the ratio of customer deposits to total assets. This indicates that a competitive financial landscape improves mobilization of funds by the banks, and also increases the amount of loans that these banks grant. As expected, bank growth shows a positive relationship with the ratio of loan advances to total assets, and the ratio of customer deposits to total assets, suggesting that banks that see high growth in their interest income attract more deposits and also give out more loans. Interestingly, whilst the study finds that depositors consider the size of the bank making any deposit the size of the bank plays no role in determining whether loans are granted or not. This is shown by the positive and significant coefficient of the size variable in column 4 and the statistically insignificant size variable in column 3. Another interesting finding has to do with profitability. While profitability matters for the probability of banks giving out loans, it appears not to matter for deposit mobilization. This finding is consistent with what depositors will do, as they usually will not consider whether a bank is more profitable or not before they deposit their money into that bank.

Column 5 shows the results for affordability, measured by lending rate. This is proxied as the ratio of interest income to loan advances. The results show that the coefficient of the Lerner index is positive and statistically significant. This is consistent with the a priori expectations and suggests that bank competition has a higher probability of driving the lending rate down. The coefficients of return on assets and bank size are also positive and significant. These are consistent with the study expectations and suggest that more profitable and larger banks have a higher probability of making lending rates less affordable than their less profitable and smaller counterpart banks. For this estimation, in this model the funding sources

and their square were included because the study expects banks with a high debt-to-asset ratio to initially be able to mobilize funds at a cheaper cost initially and translate this into a lower lending rate. However, as these banks become more leveraged, the expectation is that they will have a high lending rate. This is because higher leverage means that banks have a higher probability of entering into financial distress. This will lead to them obtaining funds at a higher cost due to their high-risk nature. To cover this cost, banks would have to charge a higher lending rate. Indeed, the study results support this expectation. While the study finds a negative result for debt-to-asset ratio, a positive result was found for its square term. Bank growth and efficiency are not statistically significant in this estimation.

## Robustness checks

For robustness, the Boone indicator was used as a measure of competition and the results from this are presented in Appendix C (Table C1). Contrary to the results for the Lerner index, the study finds the number of bank branches per 1,000 people to be insignificant. Specifically, the study finds that more competition makes financial services more affordable. The ratio of deposits to total assets was also significant but positive. This signifies that low competition increases the ratio of deposits to total assets. The difference in the results is because of the different ways in which the measures are computed. Interestingly, the results for affordability are consistent with what we find using the Lerner index. Also consistent with the results of the Lerner index is size. The study finds that larger banks improve access to financial services and usage of financial services. Moreover, bank growth also facilitates usage of financial services.

# 5.   Conclusion

This paper examined the impact of bank competition on financial inclusion at the household and bank level. To examine the impact of bank competition on financial inclusion at the household level, we made use of GLSS6 data, which were collected between 2012 and 2013. A cross-sectional regression was used to estimate the effect of bank competition on financial inclusion at the household level. Bank competition was measured using the number of bank branches in a district. The argument is that more branches in a district will lead to higher competition effects. The findings of the study provide evidence that suggests that higher bank competition leads to an increase in account usage and affordability of financial services. However, higher competition leads to a reduction in access to credit because competition leads to a reduction in the quality of borrowers due to an increase in adverse selection problems.

Next, the paper examined the effects of bank competition on financial inclusion at the bank level. Data on 23 banks from 2008 to 2015 was utilized. Here, competition was measured using the funding-adjusted Lerner index. The panel regressions revealed that bank competition leads to an increase in bank branching, ATM networks and deposit mobilization in the economy. It was also found that a less competitive banking environment leads to an increase in bank lending costs. Put differently, an increase in competition leads to a reduction in bank lending rates. The findings of the study suggest that policies geared towards improving bank competition can lead to improvements in the usage of bank services, affordability of bank services, and extension of bank services through bank branching and ATM outlays. It would be important to adopt measures that reduce adverse selection to mitigate the negative impact of bank competition on access to credit.

We recommend that the Bank of Ghana, in consultation with the Ghana Association of Bankers, should draft a competition policy for banks in Ghana. Key areas to examine include the trend towards "open banking", and the integration of mobile money and fintech into the financial sector. These have the potential of making it easier to switch financial service providers and leveraging technology to enhance financial inclusion. The aims of the proposed policy should be balanced with financial stability. Finally, mobile money has greatly improved financial inclusion in Ghana and provided banks with some level of competition. Education targeted towards enhancing the usage of mobile money to cover various services such as investments, insurance and pensions can contribute greatly towards financial inclusion while promoting competition in the financial services sector.

# Notes

1   See Appendix B for a detailed explanation of how this is derived.

# References

Aghion, P., and P. Bolton. 1997. "A theory of trickle-down growth and development". *The Review of Economic Studies,* 64(2): 151–72.

Akudugu, M.A. 2013. "The determinants of financial inclusion in Western Africa: Insights from Ghana". *Research Journal of Finance and Accounting,* 4(8): 1–9.

Allen, F., A. Demirgüç-Kunt, L.F. Klapper and M.S. Martinez Peria. 2016. "The foundations of financial inclusion: Understanding ownership and use of formal accounts". *Journal of Financial Intermediation,* 27: 1–30.

Ariss, R.T. 2010. "On the implications of market power in banking: Evidence from developing countries". *Journal of Banking & Finance*, 34(4): 765–75.

Arora, R.U. 2010. *Measuring Financial Access*. Griffith Business School Discussion Papers, Economics. Griffith University, Brisbane.

Asuming, P.O., L.G. Osei-Agyei and J.I. Mohammed. 2019. "Financial inclusion in sub-Saharan Africa: Recent trends and determinants". *Journal of African Business*, 20(1): 112–34.

Aterido, R., T. Beck and L. Iacovone. 2013. "Access to finance in Sub-Saharan Africa: Is there a gender gap?" *World Development,* 47: 102–20.

Banerjee, A.V. and A.F. Newman. 1993. "Occupational choice and the process of development". *Journal of Political Economy,* 101(2): 274–98.

Beck, T. and R. Cull. 2014. "SME finance in Africa". *Journal of African Economies,* 23(5): 583–613.

Beck, T., A. Demirgüç-Kunt and R. Levine. 2003. "Law, endowments, and finance". *Journal of Financial Economics,* 70(2): 137–81.

Boucher, S.R., M.R. Carter and C. Guirkinger. 2008. "Risk rationing and wealth effects in credit markets: Theory and implications for agricultural development". *American Journal of Agricultural Economics,* 90(2): 409–23.

Bresnahan, T.F. 1982. "The oligopoly solution concept is identified". *Economics Letters,* 10(1–2): 87–92.

Cámara, N. and D. Tuesta. 2015. "Factors that matter for financial inclusion: Evidence from Peru". Aestimatio, *The IEB International Journal of Finance,* 10: 10–31.

Cao, M. and S. Shi. 2001. "Screening, bidding, and the loan market tightness". *Review of Finance,* 5(1–2): 21–61.

Carbo-Valverde, S., Kane, E.J. and Rodriguez-Fernandez, F., 2009. *Evidence of regulatory arbitrage in cross-border mergers of banks in the EU* (No. w15447). National Bureau of Economic Research. https://www.nber.org/papers/w15447

Carbó, S., D. Humphrey, J. Maudos and P. Molyneux. 2009. "Cross-country comparisons of competition and pricing power in European banking". *Journal of International Money and Finance,* 28(1): 115–34.

Cetorelli, N. and M. Gambera. 2001. "Banking market structure, financial dependence and growth: International evidence from industry data". *The Journal of Finance,* 56(2): 617–48.

Chikalipah, S. 2017. "What determines financial inclusion in Sub-Saharan Africa?" *African Journal of Economic and Management Studies,* 8(1): 8–18.

Claessens, S. and L. Laeven. 2005. "Financial dependence, banking sector competition, and economic growth". *Journal of the European Economic Association,* 3(1): 179–207.

Croson, R. and U. Gneezy. 2009. "Gender differences in preferences". *Journal of Economic literature*, 47(2): 448–74.

Dell'Arriccia, G. 2000. "Learning by lending, competition, and screening incentives in the banking industry". Centre for Financial Institutions Working Papers No. 00-10. Wharton School Center for Financial Institutions, University of Pennsylvania.

Demirgüç-Kunt, A., L. Klapper and D. Singer. 2013. "Financial Inclusion and Legal Discrimination against Women: Evidence from Developing Countries. " Policy Research Working Paper No. 6416 (WPS 6416). The World Bank, Washington, D.C.

Demirgüç-Kunt, A., L. Klapper, D. Singer and P. Van Oudheusden. 2015. "The Global Findex Database 2014: Measuring Financial Inclusion around the World." Policy Research Working Paper No. 7255 (WPS 7255). The World Bank, Washington, D.C.

Demirgüç-Kunt, A., L. Klapper, D. Singer, S. Ansar and J. Hess. 2018. "The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution." Washington, D.C.: The World Bank.

Deng, S. and E. Elyasiani. 2008. "Geographic diversification, bank holding company value, and risk". *Journal of Money, Credit and Banking,* 40(6): 1217–38.

Dinc, I.S. 2000. "Bank reputation, bank commitment, and the effects of competition in credit markets". *The Review of Financial Studies,* 13(3): 781–812.

Efobi, U., I. Beecroft and E. Osabuohien. 2014. "Access to and use of bank services in Nigeria: Micro-econometric evidence". *Review of Development Finance,* 4(2): 104–14.

Fletschner, D., C. Guirkinger and S. Boucher. 2010. "Risk, credit constraints and financial efficiency in Peruvian agriculture". *The Journal of Development Studies,* 46(6): 981–1002.

Fungáčová, Z. and L. Weill. 2015. "Understanding financial inclusion in China". *China Economic Review,* 34: 196–206.

Galor, O. and J. Zeira. 1993. "Income distribution and macroeconomics". *The Review of Economic Studies,* 60(1): 35–52.

Ganti, S. and D. Acharya. 2017. "Financial inclusion fosters growth: Simple multiplier and "AK" Growth Model Analysis". *Universal Journal of Accounting and Finance,* 5(3): 55–9.

Gneezy, U., K. Leonard and J. List. 2009. "Gender differences in competition: Evidence from a matrilineal and a patriarchal society". *Econometrica*, 77(5): 1637–64.

Ghosh, S. and D. Vinod. 2017. "What constrains financial inclusion for women? Evidence from Indian micro data". *World Development,* 92: 60–81.

Gupte, R., B. Venkataramani and D. Gupta. 2012. "Computation of financial inclusion index for India". *Procedia-Social and Behavioral Sciences,* 37: 133–49.

Iwata, G. 1974. "Measurement of conjectural variations in oligopoly". *Econometrica: Journal of the Econometric Society,* 42(5): 947–66.

Koetter, M., J. Kolari and L. Spierdijk. 2008. "Efficient competition? Testing the 'quiet life' of US

banks with adjusted Lerner indices". Paper presented at the Proceedings of the 44th Bank Structure and Competition Conference, Federal Reserve Bank of Chicago.

Kumar, N. 2013. "Financial inclusion and its determinants: Evidence from India". *Journal of Financial Economic Policy,* 5(1): 4–19.

Lau, L.J. 1982. "On identifying the degree of competitiveness from industry price and output data". *Economics Letters,* 10(1–2): 93–9.

Liu, B., X. Wang, Y. Chen and Y. Shen. 2013. "Market structure of China's construction industry based on the Panzar–Rosse model". *Construction Management and Economics,* 31(7): 731–45.

Maudos, J., and J.F. de Guevara. 2007. "The cost of market power in banking: Social welfare loss vs. cost inefficiency". *Journal of Banking & Finance,* 31(7): 2103–25.

Mohammed, J.I., L. Mensah and A. Gyeke-Dako. 2017. "Financial inclusion and poverty reduction in Sub-Saharan Africa". *African Finance Journal*, 19(1): 1–22.

Neaime, S. and I. Gaysset. 2018. "Financial inclusion and stability in MENA: Evidence from poverty and inequality". *Finance Research Letters,* 24, 230–7.

Owen, A.L. and J.M. Pereira. 2018. "Bank concentration, competition, and financial inclusion". *Review of Development Finance,* 8(1): 1–17.

Pagano, M. 1993. "Financial markets and growth: An overview". *European Economic Review,* 37(2–3): 613–22.

Panzar, J.C. and J.N. Rosse. 1987. "Testing For 'Monopoly' Equilibrium". *The Journal of Industrial Economics,* 35(4): 443–56.

Park, C.-Y. and R. Mercado. 2015. "Financial inclusion, poverty, and income inequality in developing Asia". Asian Development Bank Economics Working Paper Series No. 426. Manila, January.

Petersen, M.A. and R.G. Rajan. 1995. "The effect of credit market competition on lending relationships". *The Quarterly Journal of Economics,* 110(2): 407–43.

PWC. 2016. *How to win in an era of mobile money. Ghana banking survey*. Retrieved from:https:// www.pwc.com/gh/en/assets/pdf/2016-banking-survey-report.pdf Accra, Ghana

Sarma, M. 2012. "Index of financial inclusion – A measure of financial sector inclusiveness". Working Paper No. 07/2012. Centre for International Trade and Development, School of International Studies, Jawaharlal Nehru University, Delhi.

Sarma, M. and J. Pais. 2011. "Financial inclusion and development". *Journal of International Development,* 23(5): 613–28.

Schaeck, K. and M. Cihák. 2014. "Competition, efficiency, and stability in banking". *Financial Management,* 43(1): 215–41.

Sethy, S.K. 2016. "Developing a financial inclusion index and inclusive growth in India". *Theoretical and Applied Economics,* 23(2): 607.

Shaffer, S. 1998. "The winner's curse in banking". *Journal of Financial Intermediation,* 7(4): 359–92.

Sharma, D. 2016. "Nexus between financial inclusion and economic growth: Evidence from the emerging Indian economy". *Journal of Financial Economic Policy*, 8(1): 13–36.

Uddin, A., M.A.F. Chowdhury and M.N. Islam. 2017. "Determinants of financial inclusion in

Bangladesh: Dynamic GMM and quantile regression approach". *The Journal of Developing Areas,* 51(2): 221–37.

Zins, A. and L. Weill. 2016. "The determinants of financial inclusion in Africa". *Review of Development Finance,* 6(1): 46–57.

# Appendix A: Hausman specification test for various regression models

## Table A1: Hausman test number of branches per 1,000 model

```
. hausman fe

                  ———— Coefficients ————
               (b)           (B)            (b—B)      sqrt(diag(V_b—V_B))
               fe            re          Difference          S.E.
```

|             | (b) fe    | (B) re    | (b—B) Difference | sqrt(diag(V_b—V_B)) S.E. |
|-------------|-----------|-----------|------------------|--------------------------|
| LernerIndex | −.015979  | −.0198009 | .0038219         | .0028972                 |
| Efficiency  | .0145794  | .0158893  | −.0013098        | .0019356                 |
| ROE         | .0083517  | .0091179  | −.0007662        | .0020129                 |
| BGROWTH     | −.0001976 | .0002199  | −.0004174        | .0002298                 |
| BSIZE       | .0204083  | .0164934  | .0039149         | .0019471                 |

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

    Test:  Ho:  difference in coefficients not systematic

            chi2(5) = (b—B)'[(V_b—V_B)^(−1)](b—B)
                    =           4.57
            Prob>chi2 =       0.4707
```

## Table A2: Hausman test number of ATMs per 1,000 model

```
. hausman fe
```

|  | ———— Coefficients ———— | | | |
|  | (b) | (B) | (b-B) | sqrt(diag(V_b-V_B)) |
|  | fe | re | Difference | S.E. |
|---|---|---|---|---|
| LernerIndex | .0050963 | .0029998 | .0020964 | .0026426 |
| Efficiency | .0106462 | .0123848 | −.0017387 | .0017848 |
| ROE | .0010654 | .0022322 | −.0011668 | .0016655 |
| BGROWTH | −.0004729 | −.0003249 | −.000148 | .0001548 |
| BSIZE | .0254153 | .0236626 | .0017528 | .0017204 |

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

    Test:  Ho:  difference in coefficients not systematic

            chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =        1.80
         Prob>chi2 =       0.8767
```

## Table A3: Hausman test of ratio of loans and advances to total assets

```
. hausman fe
```

|  | ———— Coefficients ———— | | | |
|  | (b) | (B) | (b-B) | sqrt(diag(V_b-V_B)) |
|  | fe | re | Difference | S.E. |
|---|---|---|---|---|
| LernerIndex | −.1934309 | −.1793293 | −.0141015 | .0102798 |
| Efficiency | .0133051 | .0146086 | −.0013035 | .0055984 |
| ROE | .045974 | .0472461 | −.0012722 | .007099 |
| BGROWTH | .0072078 | .0067818 | .0004261 | .0005915 |
| BSIZE | .0040228 | .0070471 | −.0030243 | .00751 |

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

    Test:  Ho:  difference in coefficients not systematic

            chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =        5.65
         Prob>chi2 =       0.3422
```

## Table A4: Hausman test for customer deposit to total assets

`. hausman fe`

|  | ——— Coefficients ——— |  |  |  |
|---|---|---|---|---|
|  | (b) | (B) | (b–B) | sqrt(diag(V_b–V_B)) |
|  | fe | re | Difference | S.E. |
| LernerIndex | −.0649482 | −.0710749 | .0061267 | .0083859 |
| Efficiency | .1136052 | .1120426 | .0015626 | .005233 |
| ROE | −.0091184 | −.0070062 | −.0021122 | .0056743 |
| BGROWTH | .0033571 | .0038173 | −.0004602 | .0004893 |
| BSIZE | .0422488 | .0349525 | .0072962 | .0059971 |

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


    Test:  Ho:  difference in coefficients not systematic


            chi2(5) = (b–B)'[(V_b–V_B)^(−1)](b–B)
                    =            2.58
          Prob>chi2 =        0.7640
```

## Table A5: Hausman test for affordability

`. hausman fe`

|  | ——— Coefficients ——— |  |  |  |
|---|---|---|---|---|
|  | (b) | (B) | (b–B) | sqrt(diag(V_b–V_B)) |
|  | fe | re | Difference | S.E. |
| LernerIndex | .1137156 | .1024494 | .0112662 | . |
| Fundingsou~s | −17.48871 | −18.27932 | .7906095 | .3141832 |
| Fundingsou~2 | 12.5519 | 12.7848 | −.2329049 | .1194016 |
| Efficiency | .0429038 | .0811337 | −.0382299 | . |
| ROE | .126217 | .0884959 | .037721 | . |
| BGROWTH | −.0085102 | −.0072062 | −.0013041 | . |
| BSIZE | −.0151586 | .0544756 | −.0696342 | .0283178 |

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


    Test:  Ho:  difference in coefficients not systematic


            chi2(7) = (b–B)'[(V_b–V_B)^(−1)](b–B)
                    =           47.69
          Prob>chi2 =        0.0000
          (V_b–V_B is not positive definite)
```

# Appendix B: Derivation of competition variables (Lerner Index and Boone Indicator)

There are three different specifications of the Lerner index: a conventional Lerner index (see Berger et al., 2009), a funding-adjusted Lerner index (see Maudos and De Guevara, 2007) and an efficiency-adjusted Lerner index (see Koetter et al., 2008). The conventional Lerner index is represented by:

$$Lerner_{it} = (Price_{it} - MC_{it})/Price_{it}$$

(B1)

where $Price_{it}Price_{it}$ is the price of total assets. $MC_{it}MC_{it}$ is the marginal cost of producing an additional unit of output. The $MC_{it}MC_{it}$ is derived from the translog cost function as:

$$In\ Cost_{it} = \beta_0 + \beta_1 In\ Q_{it} + \frac{\beta_2}{2} InQ_{it}^2 + \sum_{k=1}^{3} \gamma_{kt} In\ W_{k,it} + \sum_{k=1}^{3} \varphi_k In\ W_{k,it}$$
$$+ \sum_{k=1}^{3}\sum_{j=1}^{3} \delta_{ij} In\ W_{k,it} In\ W_{j,it} + \sum_{i=1}^{3} (\delta_i/2) In\ W_{it}^2$$
$$+ \sum_{k=1}^{2} \eta_k trend^k$$

(B2)

$$\sum_{i=1}^{3} \varsigma_i In\ W_{t,ij} trend + v In\ Q_{tj} trend + \varepsilon_j$$

Where $Cost_{it}$ is the bank's total costs, including financial and operating cost; $Q_{it}$ represents a proxy for bank output measured as total assets; and $W_1$, $W_2$ and $W_3$ indicate the input price of deposit funds, labour and capital, and these are calculated, respectively, 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. The cost function is estimated separately using a panel data for each country in the sample. This allows for the parameters of the cost function to vary from one country to another, reflecting different technology. Fixed effects are also introduced to capture

the influence of variables specific to each bank. 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 as:

$$MC = \frac{Cost_{it}}{Q_{it}}\left[\beta_1 + \beta_2 In\ Q_{it} + \sum_{k=1}^{3} \varphi_k In\ W_{k,it}\right.$$
$$\left. +\ vtrend_{it}\right]$$

(B3)

The index is interpreted as follows: the Lerner index with higher value implies higher pricing power and less competitive market conditions. There are two possible setbacks associated with the conventional Lerner index estimated above. First, the $MC_{it}$ estimation following Equation B2 is likely to reflect some form of monopoly power emanating from deposit markets, based on the bank's ability to fund at a relatively low price. In pricing their loans, bank managers cover their funding costs, factor in a risk premium to reflect the uncertainty surrounding the loan contracting problem and charge an extra premium to reflect their market power (Turk-Ariss, 2010). Thus, a form of deposit market power is already reflected in the loan pricing. According to Maudos and De Guevara (2007), adding financing costs and consequently the price of deposits into the cost function captures the effect of market power in banking, and this may bias the results. Excluding funding costs in Equation B2 will lead to what they term a "raw" pricing power that is not biased by market power that had already been obtained in the deposit market while securing funds. Therefore, a version of Equation 2B is estimated to exclude financing costs in the translog cost function. After calculating an operating $MC_{it}$ for each bank at each time period following Equation B3, but including only two factors (labour cost and physical cost of capital), a funding-adjusted Lerner index is derived from the structural model specified in Equation 1B.

The second issue with the conventional Lerner is that it implicitly assumes full bank efficiency and therefore does not account for the possibility of banks failing to fully exploit pricing opportunities because of market power. Following Koetter et al. (2008), an efficiency-adjusted Lerner index is constructed by using the estimated total operating cost (TOC) function in Equation 2B, the corresponding MC function in Equation 3B, the estimated profit ($P\hat{B}T$) function and the total assets (Q) in a single structural model as:

$$(\widehat{AR_{it}} - \widehat{MC_{it}})/\widehat{AR_{it}}$$

(4)

where $\widehat{AR_{it}}$ is the average revenue computed as TR/Q, where TR = PBT+TOC. In contrast to the conventional Lerner index in Equation 1B, the efficiency-adjusted Lerner allows estimation of both bank efficiency and degree of market power simultaneously.

# Appendix C: Robustness check

**Table C1: Bank competition and financial inclusion in Ghana: Boone indicator measure**

| Variables | Model 1<br>Number of branches per 1,000 | Model 2<br>Number of ATMs per 1,000 | Model 3<br>Ratio of loans and advances to total assets | Model 4<br>Ratio of customer deposits to total assets | Model 5<br>Affordability |
|---|---|---|---|---|---|
| Boone indicator | 0.001 | -0.001 | -0.012 | 0.029** | 0.073*** |
| | (0.0012) | (0.002) | (0.014) | (0.013) | (0.020) |
| Funding sources | | | | | -17.56*** |
| | | | | | (0.962) |
| Funding sources$^2$ | | | | | 12.52*** |
| | | | | | (0.397) |
| Efficiency | 0.038*** | 0.012 | 0.213*** | 0.438*** | -0.0544 |
| | (0.014) | (0.016) | (0.062) | (0.098) | (0.313) |
| Return on equity | 0.038 | 0.052** | -0.381** | 0.252 | 0.249 |
| | (0.041) | (0.025) | (0.175) | (0.155) | (0.493) |
| Bank growth | 0.0001 | -0.001*** | 0.009*** | 0.003*** | -0.0101 |
| | (0.0002) | (0.0002) | (0.001) | (0.001) | (0.007) |
| Bank size | 0.016*** | 0.020*** | 0.060*** | 0.023 | 0.0221 |
| | (0.002) | (0.003) | (0.017) | (0.014) | (0.030) |
| Constant | -0.219*** | -0.249*** | -0.421** | 0.037 | 5.759*** |
| | (0.018) | (0.046) | (0.187) | (0.150) | (0.479) |
| R-square | 0.311 | 0.357 | 0.322 | 0.212 | 0.959 |
| Observations | 138 | 126 | 139 | 139 | 139 |
| No. of years | 8 | 8 | 8 | 8 | 8 |
| *Hausman test* | | | | | |
| Chi-square (p-value) | 1.50(0.827) | 1.05(0.903) | 41.23(0.00) | 1.25(0.869) | 16.11(0.013) |

Note: No significant coefficient of the Hausman test shows that a null hypothesis of fixed effects is rejected in favour of the alternative hypothesis of random effects. So, the model is estimated using random effects for no significant effects and fixed effects for significant effects.

***, ** and * are 1%, 5% and 10% significance levels, respectively, and robust standard errors are reported in parentheses.

# Mission

To strengthen local capacity for conducting independent,
rigorous inquiry into the problems facing the management of economies in sub-
Saharan Africa.

The mission rests on two basic premises:  that development is more likely to
occur where there is sustained sound management of the economy, and that such
management is more likely to happen where there is an active, well-informed group of
locally based professional economists to conduct policy-relevant research.

www.aercafrica.org

## Learn More

www.facebook.com/aercafrica

www.instagram.com/aercafrica_official/

twitter.com/aercafrica

www.linkedin.com/school/aercafrica/