Pan-African Banks on the Rise: Do Cross-Border Banks Increase Firms' Access to Finance in WAEMU?[1]

Désiré Kanga, Victor Murinde, Lemma Senbet, Issouf Soumare[2]

ABSTRACT

We study how the recent rise of Pan-African cross-border banks, affect the level of bank competition in the West African Economic and Monetary Union (WAEMU), particularly the ultimate impact on firms' access to bank finance. We use hand-collected bank level data from all WAEMU countries and the World Bank Enterprise Surveys data, 2005-2016. We uncover new evidence to suggest that the presence of pan-African banks in the WAEMU enhances banking sector competition. Also, we find that cross-border banks are associated with improvements in firms' access to bank finance. Our findings are robust to alternative empirical specifications and competing measures of key variables.

Keywords: Pan-African cross-border banks, WAEMU, bank competition, firms' access to finance.

JEL codes: G21, G28

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[2] Kanga is at ENSEA, Abidjan, Côte d'Ivoire and SOAS University of London, UK; Murinde is at School of Management and Finance, SOAS University of London, UK; Senbet is at University of Maryland, USA; Soumaré is at the Department of Finance, Insurance and Real Estate & Laboratory for Financial Engineering of Université Laval, Faculty of Business Administration, Laval University, Quebec, Canada.
Corresponding author Email: v.murinde@soas.ac.uk

THE PAN-AFRICAN BANKING REVOLUTION is in full swing. Financial systems in Africa are dominated by banks, characterized by their small size, lack of depth and inefficient intermediation. However, during the past two decades, the African financial landscape has dramatically changed. Cross-border banks from other African countries have not only become the norm, but also these foreign banks have become key players in the banking system of many African countries. In fact, since the adoption of financial liberalization policies in the early 90s by the majority of African countries, cross-border financial flows have dramatically increased, and cross-border banks activities have become an increasingly important component of African financial landscape. This increasing entry of foreign banks, particularly pan-African banks, raises several unanswered questions. For instance, what does this expansion imply for the domestic economy? Do these foreign banks create more efficient and competitive banking environment in the host countries?

Much anecdotal evidence suggests that foreign banks are different from their domestic counterparts in terms of business models and balance sheets. However, empirical studies conclude that the behaviors of foreign banks are heterogeneous, vary from country to country and over time. For example, in advanced economies, foreign banks are more involved in investment banking as opposed to emerging countries where they focus on deposit-taking and lending activities (Claessens and van Horen, 2012). Some argue that foreign banks are generally more efficient and more active in lending than domestic banks in developing economies (e.g., Cihák and Podpiera, 2005; Pelletier, 2018) and facilitate trade beyond what domestic banks do (e.g., Claessens *et al.*, 2016). But, in the USA and other high-income countries, foreign owned banks perform less than domestic banks (e.g., Grosse and Golberg, 1991; DeYoung and Nole, 1996; Correa, 2009).

This paper aims to respond to some of the issues raised above by investigating the lending implication of the expansion of cross-border banks and competition in the banking sector of the West African Economic and Monetary Union (WAEMU)[3]. More specifically, we are interested in providing answers to the following research questions. Does the entry of foreign banks increase competition in the WAEMU banking system? What are the effects of foreign ownership on bank lending in WAEMU region? Does the increasing presence of foreign

[3] The WAEMU countries are: Benin, Burkina Faso, Ivory Coast, Guinea-Bissau, Mali, Niger, Senegal and Togo. These countries share the same currency, the CFA Franc, which was previously pegged to the French Franc and is now pegged to the Euro.

banks alleviate the credit constraint facing firms in the region? Do the above effects vary across countries of the region?

Several reasons justify the relevance of this study on the WAEMU banking sector. First, the WAEMU region is composed of eight least developed countries[4] which share a common currency (the CFA Franc). This region is a monetary zone with a single monetary policy and banking sector regulation applied to all eight countries. Like many other developing countries characterized by under-developed bond markets, a low level of international integration and a strong intervention of the central banks in the foreign exchange markets (Mishra *et al.*, 2012), WAEMU features a financial system where banks are the predominant source of finance for businesses and households. Moreover, Figure 2 below shows that the banking sector ownership in the WAEMU countries has been dominated by foreigners (particularly French banks), and over the last decade, there has been a steady increase in the share of cross-border pan-African banks. This increase in the presence of banks dominated by foreigners may expose the banking sector to external adverse shocks. However, despite the increase in the share of foreign owned banks, the banking sector of the region was less affected by the 2007-2009 crisis as compared to the banking sector of Europe and U.S. where cross-border lending dropped significantly and remained at low level (Claessens and van Horen, 2014b).

Second, although a substantial body of research exists on the global banking system[5], less attention has been paid to the banking sector in less developed economies, especially those of Africa. Even when research is conducted on Sub-Saharan African (SSA) economies, only limited attention is paid to the WEAMU region; nor do the current studies analyze simultaneously the impact of cross-border banks on competition and firm access to financing at the micro level. This region is, therefore, an interesting laboratory for investigation.

From the existing literature, although cross-border banks could positively affect the banking sector of the host country in terms of lending, competition and stability, the presence of foreign banks may increase the risk of contagion and concentration in the banking industry. On the one hand, Beck (2015) and Beck *et al.* (2004), among many others, provide evidence the presence of foreign banks leads to a greater availability of credit for SMEs, while Clarke *et al.* (2001) conclude that large firms benefit the most to foreign bank presence. In addition to

[4] Based on the World Bank 2016's country classification, two of the eight countries of the region, Ivory Coast and Senegal, are lower-middle-income economies, while the other six countries are low-income.
[5] See Claessens (2016) and Claessens and van Horen (2012) for a comprehensive literature review.

the increase in financing, the presence of foreign banks can enhance competition or mitigate concentration (e.g.; Bremus, 2015; Léon, 2016), hence leading to low costs of domestic financial intermediation (e.g.; Berger *et al.*, 2005). A necessary condition for this evidence is the local context and not necessarily the number of foreign banks (Claessens and Laeven, 2004). On the other hand, in financial systems with limited competition, foreign banks may decide to participate in oligopolistic rents of existing banks rather than trying to reduce them through intense competition. This is the case, for example, if a foreign bank acquires an existing major bank for its entry into the domestic market as shown by Delis et al. (2016).

The presence of foreign banks can also lead to more cherry-picking and negatively affect overall domestic credit expansion (Claessens and van Horen, 2014a; Detragiache *et al.*, 2008). Therefore, the effects of foreign banks depend on conditions in the host countries. Moreover, Beck (2015) and Pelletier (2018) stresses the need to differentiate between different types of cross-border banks when assessing their impacts on firm access to bank finance in Africa.

These above existing studies rely mostly on Bankscope data to construct the sample of banks, perhaps missing valuable information in the WAEMU context. In particular, in the WAEMU case, Bankscope covers only 70 percent of the region's banking sample. Moreover, as we pointed out above, to the best of our knowledge, this is the first study to investigate the effect of ownership status of banks on lending and competition in the WAEMU region. Hence, we use hand-collected bank level data from all West African Economic and Monetary Union (WAEMU) countries for 2000-2015 and the World Bank Enterprise Surveys data available for 2005-2016. We use two indicators of competition to access the effect of bank ownership on competition. The first indicator is the Herfindahl-Hirschmann Index (HHI), a structural measure of competition, and the second indicator is bank market power proxied by the Lerner index, which is a non-structural measure of competition. We then analyse the extent to which banking sector competition affects bank lending using these banking sector competition measures.

There are two conflicting views regarding the effect of bank competition on lending. The *market power theory* argues that competition in the banking system increases lending by reducing the cost of finance (e.g., Guzman, 2000). However, in the presence of information asymmetries and agency costs, bank competition can reduce bank lending by making it more difficult for banks to internalize the costs of investing in building lending relationships, especially with opaque borrowers according to the *information theory* (Petersen and Rajan,

1995; Marquez, 2002; Hauswald and Marquez, 2006).[6] To test which of these two views dominates in the WAEMU region, we use bank-level micro-data and apply quantile regression technique that has the advantage of displaying the non-linear effect of competition on bank lending. Further, we split our sample by bank size and country income category.

Furthermore, we examine whether the rise in foreign and cross-border pan-African banks increases firm access to credit and thereby alleviate firm credit constraints. We use an objective indicator of access to credit and build an indicator of credit constraint following the recent literature (e.g., Léon, 2015; Love and Martinez-Peria, 2014; Popov and Udell, 2012; Beck, 2014; Ongena and Popov, 2016). We use firm level micro-data for the purpose of our analysis. We split our sample by size of firms (small, medium and large) and by industry sector (manufacturing, service and other sector). To gauge the relative effect of cross-border pan-African banks in comparison to other foreign owned banks on access of credit or credit constraint, we use the ratio of the number of cross-border pan-African banks over the total number of foreign banks as control variable in our regressions.

We find that cross-border banks expansion into WAEMU banking system enhances competition in the region's banking sector. This may be driven by the entry of foreign banks primarily through greenfield investments and not through mergers or acquisitions. This enhanced competition facilitates firm access to financing. However, because of the increased competition following foreign banks entry, credit growth does not follow asset growth, which means that banks look for alternative sources of revenues to maintain their profit.

We undertake further econometric analysis to ascertain the robustness of our findings to alternative empirical specifications and competing measurement of the key variables. We apply the "*quantile regression estimator for panel data (QRPD) with nonadditive fixed effects"* approach suggested by Powell (2016) to examine the effects of banking sector competition on bank lending by quantile and sub-panels. Our results are found to be robust to all these alternative econometric specifications and variables measurement.

Our finding on the positive effect of the presence of pan-African banks on banking sector competition is in line with Claessens and Laeven (2004), Gelos and Roldós (2004), Wang and Bayyraktar (2004) among other authors. This is in contrast with another strand of literature

[6] It may well be the case that both forces co-exist.

that has highlighted that foreign bank presence has a positive and significant impact on market power (Delis et al., 2016).

These studies while focusing on foreign ownership status of banks, do not deal with pan-African or the presence of French banks in the WAEMU. Foreign banks have been analysed as a homogenous group without distinguishing between developing and developed multinational banking groups. Yet, recent studies conclude that the type of foreign banks matters (Beck, 2015; Pelletier, 2018). As stated earlier, our paper focuses on the behaviour of the recent rise of pan-African banks in the WAEMU region, which has received substantial attention in policy circles. However, this relative new phenomenon has not been subjected to evidence-based analytical rigor, for policy making. One purpose of this paper is to provide such analytical rigor and evidence, to inform policy. Our finding also suggests that the type of ownership of banks matters in assessing their effect on competition.[7]

Our paper also relates to the literature on bank competition and lending. Empirical investigations have shown that greater competition may improve the efficiency of banks, leading to more lending (Jayaratne and Strahan, 1996; Bertrand et al., 2007) and therefore increase firms' access to finance (Léon, 2015; Love and Martinez-Peria, 2014). These findings are consistent with the *market power hypothesis* that competition in the banking sector increases lending. Consistent with this literature, our results support the *market power* view for small banks and banks operating in lower-middle income countries. However, we provide evidence for *information hypothesis* for big banks as well. This last finding is consistent with Ayalew and Xianzhi (2018) who show that bank competition worsens financial constraints in African economies. It is worth noting that Ayalew and Xianzhi (2018), Léon (2015) and Love and Martinez-Peria (2014) do not look at bank-level lending but instead access to finance from the perspective of the firms.

In what follows, section 2 presents an overview of the WAEMU banking system and foreign bank entry. Section 3 studies the impact of foreign bank presence on bank competition and lending in the WAEMU countries banking sector. Section 4 investigates the effect of foreign bank presence on firm access to financing in WAEMU countries. We conclude in section 5.

[7] In addition, these studies rely on Bankscope data to construct the sample of banks, perhaps missing valuable information in the WAEMU context. We use the unique dataset made available by the Banking Commission of WAEMU, which contains all the existing banks while Bankscope only covers 70 percent of the sample.

1. OVERVIEW OF WAEMU BANKING SYSTEM AND FOREIGN BANKS ENTRY

The financial system of the WAEMU is dominated by banks. In 2015, the banking sector comprised 115 banks and 14 other bank-like financial companies. Most of these banks are located in Cote d'Ivoire (24) and Senegal (23). Guinea-Bissau has the lowest number of banks (4). The banking sector in the region (excluding the central bank) is small compared to developed countries, such as the Euro area or the U.S. Credit is largely short-term (more than 54% of loans are less than one year). About 90% of the loans are either short-term or medium-term loans. Long term loans are less than 4% of the total loans granted by banks. This obviously raises the issue of long-term financing of investment projects needed to sustain economic development in the region.

On average, the banking system is well-capitalised, profitable and liquid (see Table 1). In 2015, fifteen banks representing 7.6% of the total assets of the banking sector do not comply with the risk coverage ratio of 8% (Commission Bancaire, 2015). The banking sector is mainly exposed to nonperforming loans risk. The ratio of nonperforming loans is more than 6% of total loans granted and represent a third of the banking sector equity. The average return on equity is more than 10% and reached 15% in 2013. This high profitability of the region's banking sector comes mainly from the high interest rate margin, due to the high interest rate charged on loans combined with the low cost paid for borrowed funds.

Table 1: WAEMU banking sector financial soundness indicators, 2009-2015 (in percent)

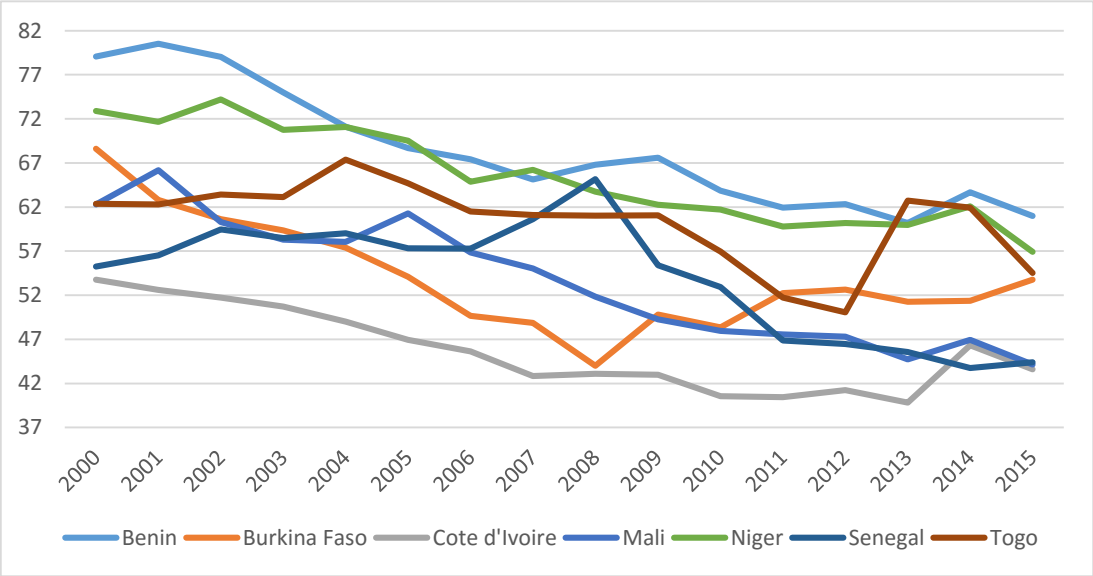
This table shows some indicators of the financial soundness of the WAEMU banking sector. The data are from the Central Bank of West African States (BCEAO) and Imam and Kolerus (2013). NPLs denotes non-performing loans. We start the analysis from 2009 to give a recent snapshot of the banking sector in the WAEMU region.

	2009	2010	2011	2012	2013	2014	2015
Total loans to total assets	50.94	47.98	48.74	49.13	49.61	47.58	46.45
Short-term loans to total loans	55.38	54.63	56.06	55.33	54.79	54.43	53.17
Medium-term loans to total loans	33.40	34.93	34.18	34.71	35.56	35.94	37.64
Long-term loans to total loans	3.52	3.62	3.29	3.46	3.25	3.58	3.37
NPLs to total loans	7.70	6.83	6.47	6.51	6.40	6.04	5.82
NPLs to Equity	38.69	31.42	30.55	31.82	33.31	33.54	33.10
Equity to total assets	10.14	10.42	10.32	10.05	9.52	8.57	8.17
Average cost of borrowed funds	2.27	2.21	2.20	2.17	2.20	2.20	2.18
Average interest rate on loans	12.56	12.32	12.48	12.22	11.89	10.97	10.64
Average interest margin	10.29	10.11	10.28	10.05	9.69	8.77	8.64
Return on Equity	13.24	10.36	10.70	10.76	14.83	12.67	12.00
Salaries and wages / Net banking income	27.10	36.77	27.51	25.01	24.02	23.36	26.46
Total loans to total deposits	73.34	69.51	71.09	73.23	76.49	75.26	74.03
Total deposits to total liabilities	69.46	69.02	68.56	67.10	64.86	63.22	62.75

The banking sector is also concentrated, but the ratio of concentration – measured by the share of the three largest banks assets – is decreasing over time (Figure 1). The behavior of bank concentration is similar across the countries in the region, showing a decreasing trend implying an increase in competition over time.

Figure 1: Evolution of the market share of the 3 largest banks in terms of assets (in percent)

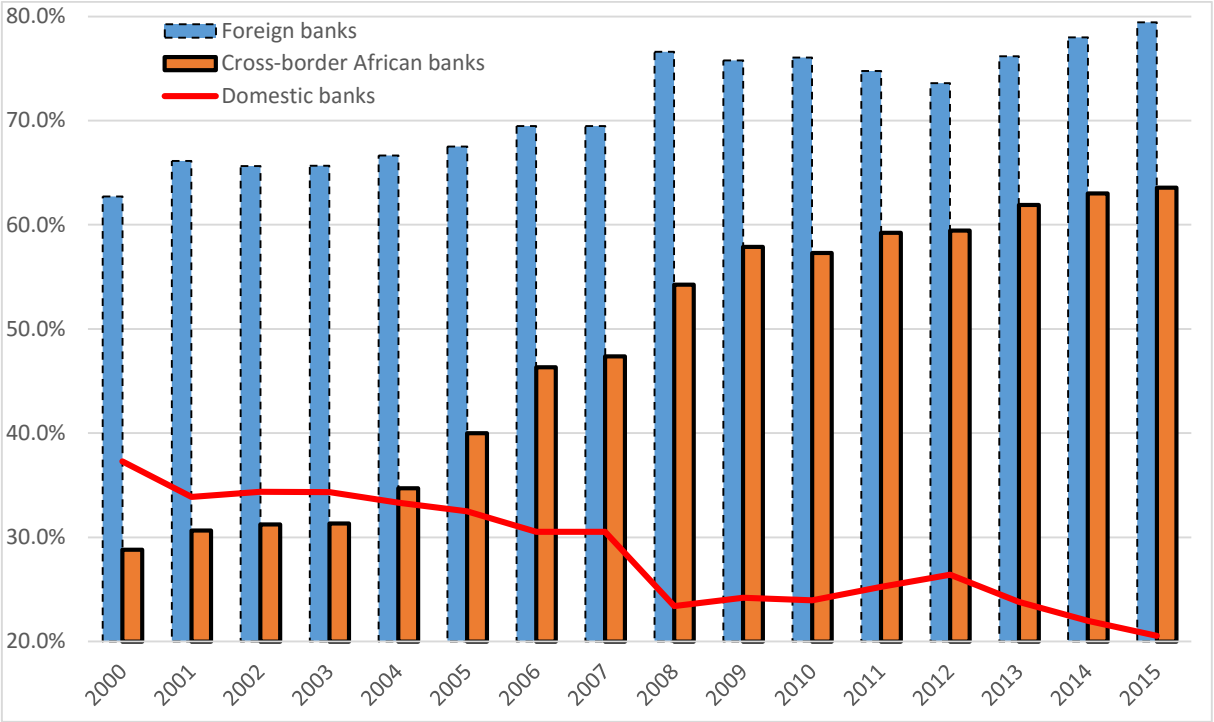
This figure plots the share of the three largest banks assets in each country by year. The data come from banks balance sheets obtained from the Central Bank of West African States (BCEAO). We omit Guinea-Bissau because its data starts in 2001 instead of 2000. The concentration index in Guinea-Bissau moves from 100% (between 2001 and 2007) to 85.6% (in 2015).



The decreasing trend observed in asset concentration may be explained by the increasing number of banks, and particularly cross-border pan-African banks. Indeed, the ownership structure of the sector is changing fast with the rapid rise of foreign-owned (pan-African) banks (Imam and Kolerus, 2013). For instance, as highlighted in Figure 2, the proportion of foreign banks grew from 63% in 2000 to 79.4% in 2015. Although, the proportion of foreign banks has always been important in the region, it is worth noting that the share of cross-border pan-African banks was only 29% in 2000, with less than the third of the banking sector investors were coming from African countries. From 2000 to 2015, the share of cross-border African banks steadily increased and reached 64%. In 2005 alone, 17 banks got their licence to operate as banks in the WAEMU compared to the years before when at most 4 banks entered the market each year.

Figure 2: Evolution of the proportion of cross-border banks in WAEMU

This figure plots the evolution of the proportion of foreign and cross-border African banks in the WAEMU banking system from 2000 to 2015. The data come from the Central Bank of West African States (BCEAO).



These patterns in the banking sector of the region raise a question: how do the new foreign banks penetrate the WAEMU market? First, most of the entering foreign banks do not merge with existing domestic banks, except one in 2013. Second, the new foreign banks are affiliates of foreign banking groups. As Table 2 shows, most foreign owned banks outside Africa come from France (the number of banks from other non-African countries does not exceed three per year compared to at least seven French banks). The colonial history may have played a big role in the presence of French banks in the region since the independence of the countries. As pointed out by Focarelli and Pozzolo (2005), the location decision of foreign banks can be driven by economic opportunities (i.e. host country expected economic prospect). It may also be driven by *follow-the client* motives (Goldberg and Saunders, 1980), geographic and cultural proximity (Claessens and Van Horen, 2014) and quality of the institutions (Levine, 1998). Kodongo *et al.* (2015) find that quality of the institutions, macroeconomic stability, level of competition and market power at home, as well as bank efficiency, are the key drivers of regional banks expansion in East Africa.

With regard to pan-African banks with headquarters located outside the WAEMU region, we denote an increase in the number of Moroccan, Libyan and Nigerian banks over the

years. Finally, the last category of cross-border pan-African banks are those with headquarters located in the region: in Burkina Faso, Mali and Togo. The number of these regional banks, especially those from Togo, tripled between 2000 and 2015. Indeed, many banks holding companies have settled in Togo and created subsidiaries and branches in other countries of the WAEMU region. They are, therefore, involved in cross-border banking activities even if their headquarters are located in the region. This intensive entry of foreign non-African and cross-border pan-African banks within the region's banking sector justifies the current study to understand the possible interactions between these foreign banks and the domestic banks, and their combined effects on the domestic economies.

Table 2: Headquarters of foreign owned banks, 2000-2015

This table reports the headquarters of foreign owned banks in the WAEMU region. Banks with headquarters in Burkina Faso, Mali and Togo have at least one subsidiary (or branch) in one country of the WAEMU region. The data come from the Central Bank of West African States (BCEAO).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Belgium	3	3	3	3	3	3	2	2	1	1	1	1				
Benin																1
Burkina Faso														1	1	3
Cameroon												1	1	1	1	
China		1	1	1	1		1	1	1	1	1	1	1	1	1	1
Cote d'Ivoire																7
France	10	10	10	11	10	10	10	10	10	9	9	9	9	9	9	7
Gabon												2	2	2	2	3
Libya	4	4	4	5	9	8	10	10	10	10	10	10	10	10	9	9
Mali	6	7	7	7	7	7	8	9	9	9	10	9	10	10	10	11
Mauritania			1	1	1			1	1	1	1	1	1	1	1	1
Morocco							1		2	4	4	5	4	5	5	3
Nigeria	1	2	2	2	2	3	3	3	7	8	8	10	11	11	11	11
Saudi Arabia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Senegal																3
Switzerland	2	2	2	2	3	3	3	3	3	1	2					1
Togo	8	8	8	8	8	16	23	23	24	24	23	24	25	25	24	14
United Kingdom		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
United States	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2
Total	37	41	42	44	48	54	66	66	72	72	73	77	78	80	78	78

2. THE IMPACT OF FOREIGN BANK PRESENCE ON BANK COMPETITION AND LENDING

This section uses bank level micro-data to investigate the impact of foreign ownership on competition and lending in WAEMU. The analysis considers all of the eight countries of the region: Benin, Burkina Faso, Guinea-Bissau, Côte d'Ivoire, Mali, Niger, Senegal and Togo.

2.1 Methodology

Following the literature, this paper aims to test two ideas. The first idea is related to the ownership and competition nexus in the banking sector. While the presence of foreign banks

can enhance competition (Bremus, 2015), these banks may decide to participate in oligopolistic rents and therefore reduce competition, especially if a foreign bank acquires an existing major bank. Although we observe a low level of competition in the WAEMU region, we expect a positive effect of foreign ownership on banking sector competition in the WAEMU. This is because foreign banks enter WAEMU mainly through greenfield investments rather than through mergers and acquisitions.

Second, we examine the relationship between banking sector competition and lending. The existing literature, which focuses on domestic banking, offers two contrasting views on the effects of banking sector competition on lending. While the market power view argues that bank competition increases lending, the information view states that banking sector competition can reduce lending. We expect a positive relationship between banking sector competition and lending in the WAEMU region supporting the market power view. Given the finite number of creditworthy potential borrowers (usable collateral and reliable accounting information), the entry of pan-African banks puts pressure on the loan market by increasing competition and reducing the cost of credit.

To address our main ideas above, we specify the following two regression equations:

$$y_{j,t} = \alpha + \beta f_{j,t} + \gamma \boldsymbol{X}_{j,t-1} + c_j + \delta_t + \varepsilon_{j,t}, \quad (1)$$

$$z_{i,j,t} = \alpha_0 + \beta_1 y_{j,t-1} + \beta_2 f_{i,j,t} + \gamma \boldsymbol{X}_{i,j,t-1} + \mu_i + c_j + \delta_t + v_{i,j,t}, \quad (2)$$

where $y_{j,t}$ is the competition indicator in country *j* at year *t*; $z_{i,j,t}$ is the lending variable of bank *i* located in country *j* at year *t*, proxied by the growth rate of loan (LOAN); $f_{i,j,t}$ is the foreign ownership indicator of the bank *i* and $f_{j,t}$ is the proportion of foreign owned banks in country *j* at year *t*. The ownership structure of the bank's capital endowment is used to discriminate between foreign and domestic banks. The dummy variable FOREIGN takes 1 when foreign investors hold more than half (50%) of the bank equity capital, and zero otherwise. The dummy variable AFRICAN captures the African origin of foreign banks; i.e. cross-border pan-African bank versus other banks. We also introduce a FRENCH dummy to capture the French bank ownership. $\boldsymbol{X}_{i,j,t}$ is a matrix of control variables described in more details below. μ_i, c_j and δ_t are bank, country and time fixed effects, respectively. $\varepsilon_{i,t}$ and $v_{i,j,t}$ are the error terms. To reduce endogeneity problems, the control variables are introduced with one lag.

The first equation helps understand how cross-border banks affect competition in the banking sector, while the second equation aims at evaluating the effect of foreign banks on banks' lending.

The estimation of the equation (1) is performed by using random effects, while quantile regression is used to estimate equation (2). These estimation techniques are discussed in what follows.

2.2 Variables and data

Dependent variables

Bank lending (LOAN) is measured by the growth rate of its loan portfolio from previous year. Our main indicator to measure the banking sector competition is the Herfindahl-Hirschman index. The Herfindahl-Hirschman index (HHI) is defined as the sum of the squares of market shares of the bank within the industry. The market share of each bank (SHARE) is measured in terms of its total assets within the industry. The HHI captures the concentration in the country banking industry. We also use as alternative measure for competition in our robustness analysis, namely the Lerner index. The Lerner index is defined as the mark-up of price over the marginal cost. It is a deviation of prices from marginal costs. The Lerner index measures the pricing power of the banks and corresponds to an inverse proxy of competition. We rely on the efficiency-adjusted Lerner index proposed by Koetter et *al*. (2012) (see this paper for the justification of the use of this latter method). The methodology to calculate the Lerner index is provided in the online Appendix.

Control variables

We use two types of control variables: bank characteristics and macroeconomic or country-specific factors. Bank-specific factors are used to control for bank idiosyncratic characteristics and the banking industry common factors. These variables are:

- *Liquidity (LIQ)*, defined as customers' deposits to total assets ratio, is used to measure the effect of bank liquidity on lending. We expect a positive effect of liquidity on lending (e.g.; Gambacorta, 2005; Ivashina and Scharfstein, 2010; Kashyap and Stein, 2000).

- *Bank's size (SIZE)* is measured by the logarithm of total assets.

- *Capital (CAR)* used to capture the effect of bank capital on bank lending. CAR is defined as the ratio of bank capital and dotation over its total asset. We expect a positive effect of bank capital on lending (e.g., Berger and Bouwman, 2009; Levieuge, 2005).

- *Z-SCORE* is a risk measure used to reflect a bank's probability of insolvency. The *Z-SCORE* is computed as follows: $Z\text{-}SCORE = \frac{E[ROA]+E[CAR]}{\sigma(ROA)}$, where $E[ROA]$ is the expected return on average assets, $\sigma(ROA)$ is the standard deviation of the return on assets and $E[CAR]$ is the average bank's capital-to-assets ratio. We use three-year rolling window to compute the average and standard deviation. An increase in the *Z-SCORE* shows a decrease in the bank's insolvency risk. We slightly modify the measure of the *Z-SCORE*; that is ($\widetilde{Z\text{-SCORE}} = \max(Z\text{-SCORE}) - Z\text{-SCORE}$) to capture the banks' risk exposure.

Macroeconomic and country-specific indicators are used to control for external factors. These variables are:

- *Output gap (OUTGAP)* used to capture business cycle (demand side effect) obtained as the cyclical component of real gross domestic product (GDP) growth by applying the Hodrick-Prescott filter. We use this cyclical output gap instead of the real GDP growth because it removes the time series trend.

- *Real interest rate (INTEREST)* is a proxy for the borrowing cost in the economy and is used in the model to control for the impact of the interest rate on bank lending. Higher borrowing costs to households and firms generate high profits for the bank but can also reduce loan demand. Therefore, we expect a negative effect of *INTEREST* on bank lending.

- *Regulatory quality index (*RQ*)* captures "perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development." This variable is used to control for the institutional quality within the country. It is one of the indicators of the World Governance Indicators available at the World Bank. A high value of *RQ* is associated with low regulatory and law enforcement risk and better business development environment. Hence, we expect this indicator to positively impact bank lending (e.g.; Andrianova, 2015; Mishra *et al.*, 2014; Sacerdoti, 2005). However, an increase in the quality of the institutions may change the composition of the lending from lending to low asymmetric customers – such as large and government-owned enterprises – when the quality of institutions are bad to information opaque

borrowers – such as SMEs – when bankers have positive perceptions of the legal environment (Haselmann and Wachtel, 2010).

- *REG2008:* We add a dummy to capture the change of capital requirement in 2008. *REG2008* takes the value of 1 after 2008 and zero before. Indeed, the minimum capital threshold was 1 billion CFAF from 2000 until 2008. At the Council of Ministers of the Union regular session of September 17th, 2007, it was raised to 8 billion CFAF with effect from 2008. Following the Council of Ministers meeting on March 30th, 2015, it was raised further to 10 billion CFAF, with a grace period which allows banks to conform to this new standard by July 1st, 2017 at the latest. According to the Union decision makers, these successive increases in the minimum capital level aim at promoting a healthy and strong banking and financial system, which in turn, is expected to effectively contribute to the financing of the economic development of WAEMU member States. However, because of the contrasting views in the literature concerning bank capital increase, the effect of this regulatory dummy on bank lending can be negative or positive.

Bank level micro-data

Banks level data are drawn from the balance sheets of the banks obtained from the Banking Commission of WAEMU, the banking sector regulatory arm of the Central Bank of the West African States (BCEAO) (available on the BCEAO website). We use the data from annual balance sheet reports of banks operating in the WAEMU region from 2000 to 2015. This unique dataset made available by the Banking Commission of WAEMU. Table 3 reports the total number of banks (121) and their distribution across countries. In 2015, the total number of banks in the region was 115. This gap in the data is due to mergers and acquisitions over the sample period. We consider a bank over its period of existence and combine some observations in case of mergers and acquisitions. Côte d'Ivoire (27) and Senegal (23) have the largest number of banks and they belong to the lower-middle income group in the region.

Our dataset is preferable to Bankscope data, because it helps to avoid the selection bias issue due to the fact that all the banks of the region do not necessarily report to Bankscope, whereas they all report to the Banking Commission of WAEMU. Indeed, the two last columns of Table 3 compares our sample with the number of banks in Bankscope. It appears that 37 out of 121 banks do not report to Bankscope, representing 31% of the sample. In addition, we report the number of listed banks. Only ten banks are listed. Moreover, in the regional stock market, due to many imperfections characterizing this kind of underdevelopd stock market, many of the

listed stocks do not trade more frequently, making the market observed variables less reliable in this context. We, therefore, prefer to rely on accounting audited financial statements data, which are readily available and more reliable.

Table 3: Numbers of banks and country income level

This table reports, for each of the WAEMU countries, the country income level and the number of banks. The data for the number of banks are from the Banking Commission of WAEMU, while the data on income levels are from the World Bank classification of countries for 2016.

Country	Income level	Number of banks		
		used in this paper	in Bankscope	listed
Benin	Low	13	9	1
Burkina Faso	Low	14	10	2
Côte d'Ivoire	Lower-middle	27	18	4
Guinea-Bissau	Low	4	1	0
Mali	Low	14	11	0
Niger	Low	11	7	1
Senegal	Lower-middle	23	20	1
Togo	Low	15	8	1
Total		121	84	10

Macroeconomic variables data are obtained from the BCEAO and the World Bank's World Development Indicators (WDI) databases. Finally, the institutional quality data are obtained from the World Bank's World Governance Indicators (WGI) database. Table 4 gives a summary of the variables, their description and sources of data.

Table 4: Description of the variables

This table presents the dependent variables and the explanatory variables used in equations (1) and (2), their definitions, the abbreviations used in empirical results, and sources of observed data.

Bank characteristics		
LOAN	Growth rate of total loan	Banks balance sheet (from the BCEAO)
SHARE	Share of the bank asset in the total asset of the country banking sector	
HHI	Herfindahl-Hirschman Index: sum of the squares of market shares of banks within the country banking sector	
LERNER	Lerner Index is the mark-up of price over the marginal cost	
FOREIGN	1 if foreigners own at least 50% of the bank capital, 0 otherwise	
AFRICAN	1 if cross-border pan-African bank status = yes, 0 otherwise	
FRENCH	1 if the foreign bank is a French bank, 0 otherwise	
Z-SCORE	Z-score used as proxy for bank risk	
CAR	Capital-to-asset ratio	
LIQ	Deposits-to-asset ratio	
SIZE	Log of total assets	
Macroeconomic and institutional quality variables		
OUTGAP	Output gap: Cyclical component of the logarithm of real GDP	World Bank's WDI
INTEREST	Real interest rate	BCEAO
RQ	Regulatory quality index	World Bank's WGI

REG2008	Dummy capturing capital change in 2008: takes the value of 1 after 2008 and zero before	
Pan-African presence	Number of cross-border pan-African banks over the total number of banks	
Foreign presence	Number of foreign owned-banks over the total number of banks	

2.3 Data cleaning

We hand-collect the data from annual balance sheet reports of banks operating in the WAEMU region from 2000 to 2015 as follows. First, we convert the data publicly available in PDF format (the only available format) to Excel. Second, we check for each bank entry if the information in Excel matches with the information in the PDF format. Third, we winsorize all variables by using the (upper and lower) adjacent values (Tukey, 1977). Indeed, let x represent a variable for which adjacent values are being calculated. Define $x_{[25]}$ and $x_{[75]}$ as the 25th and 75th percentiles of the variable x. The upper adjacent value of x is given by $x_{[75]} + 1.5(x_{[75]} - x_{[25]})$ and the lower adjacent value is defined by $x_{[25]} - 1.5(x_{[75]} - x_{[25]})$. Any data greater (lower) than the upper (lower) adjacent value are considered outliers. This is a non-parametric way to clean the data based on Tukey's procedure[8].

2.4 Empirical results

Summary statistics are provided in Table 5. The average growth rate of loans is 22% with a high dispersion rate (29%), meaning that the growth rate of loans is heterogeneous within the region. The ratio of deposits to assets (LIQ) is 0.69 on average and ranges between 0.16 and 1.11. The banking sector of the WAEMU region seems to be highly liquid. The average real interest rate (real borrowing cost) is 2.16% and fluctuates between -1.6% and 6.5%. The average market share of each bank is 2%. The banking industry in some countries seems to be more concentrated. Almost three-third (72%) of the banks are owned by foreign investors, and approximately half of the banks in the sample are cross-border pan-African banks.

The correlation matrix is provided in Table 6. The correlation between the cross-border pan-African status of the bank and lending is positive. Specifically, the lending growth rate seems to be higher for cross-border pan-African banks. Finally, the correlation coefficients between

[8] As a robustness, we compare our results to the common practice as robustness check by winsorizing all variables at 1 percent level. The Tukey's procedure gives a better result. The results of the comparisons are available upon request.

the independent variables are not too high (less than 30%). Therefore, the risk of multicollinearity is very low in this study.

Table 5: Summary statistics over the sample, 2000-2015

The sample size is 1,400 except for ZSCORE because of the rolling window that leads to a loss of observations. The sample size for the Lerner index is 965 because the full income statements are available only since 2002, and we drop the observations of Guinea-Bissau. The quantitative variables have been winsorized by using the Tukey's procedure described above.

	Obs.	Mean	Std. Dev.	Min	Q1	Q2	Q3	Max
LOAN	1400	0.22	0.29	-0.43	0.02	0.15	0.39	0.73
SHARE	1400	0.02	0.07	0.00	0.00	0.00	0.02	1.00
LERNER	965	0.30	0.12	-0.04	0.23	0.29	0.37	0.73
SIZE	1400	11.13	1.26	7.84	10.35	11.22	12.03	13.94
CAR	1400	0.09	0.07	-0.07	0.05	0.08	0.12	0.24
LIQ	1400	0.69	0.16	0.30	0.59	0.71	0.80	1.11
ZSCORE	1268	0.84	0.14	0.00	0.82	0.86	0.92	1.00
INTEREST	1400	2.16	1.99	-1.60	1.15	2.47	3.31	6.50
OUTGAP	1400	0.00	0.01	-0.03	-0.01	0.00	0.01	0.03
RQ	1400	-0.78	0.37	-1.60	-1.08	-0.72	-0.52	0.02
AFRICAN	1400	0.50	0.50	0	-	-	-	1
FRENCH	1400	0.11	0.31	0	-	-	-	1
FOREIGN	1400	0.72	0.45	0	-	-	-	1

To address our research questions, we first examine all banks together and then run the estimation for the different sub-panels separately. Sub-panels are first built on the basis of country gross national income (GNI) per capita. Based on the 2016 classification of the World Bank, the full sample is divided into two sub-panels: low income countries (Benin, Burkina Faso, Guinea-Bissau, Mali, Niger and Togo) and lower-middle income countries (Côte d'Ivoire and Senegal). We also build sub-samples based on bank size (small and big). A small bank has total assets less than the median total bank asset, while a big bank has total assets greater than the median bank asset value.

Although cross border banks provide additional external financing and enhanced competition (e.g., Léon, 2016), leading to lower rents, higher efficiency and lower intermediation costs,, foreign bank presence could negatively affect private credit by cherry-picking borrowers (Detragiache *et al.*, 2008; Claessens and van Horen, 2014a). Therefore, the anticipated impacts of cross border banks on competition and lending in the WAEMU region are uncertain and remain a matter of rigorous empirical studies.

Table 6: Pair-wise correlation matrix

This table reports the pair-wise correlation matrix for the dependent and explanatory variables. *SHARE* stands for Market Share. Values in parentheses are *p*-values which reflected the significance of each correlation coefficient. ***p<0.01, **p<0.05, *p<0.1.

	LOAN	*SHARE*	*LERNER*	*SIZE*	*CAR*	*LIQ*	*Z-SCORE*	*INTEREST*	*OUTGAP*	*RQ*
LOAN	1									
SHARE	0.049*	1								
	(0.068)									
LERNER	0.162****	-0.236***	1							
	(0.000)	(0.000)								
SIZE	-0.237***	0.026	0.011	1						
	(0.000)	(0.335)	(0.743)							
CAR	0.139***	0.047*	0.136***	-0.242***	1					
	(0.000)	(0.078)	(0.000)	(0.000)						
LIQ	-0.244***	0.040	-0.219***	0.208***	-0.606***	1				
	(0.000)	(0.132)	(0.000)	(0.000)	(0.000)					
Z-SCORE	0.019	-0.222***	0.041	-0.092***	-0.219***	0.095***	1			
	(0.490)	(0.000)	(0.213)	(0.001)	(0.000)	(0.001)				
INTEREST	0.107***	0.031	0.116***	0.026	0.035	-0.050*	0.025	1		
	(0.000)	(0.247)	(0.000)	(0.339)	(0.189)	(0.061)	(0.380)			
OUTGAP	0.056**	-0.019	0.049	0.049*	-0.021	-0.016	0.015	0.013	1	
	(0.035)	(0.471)	(0.128)	(0.067)	(0.426)	(0.548)	(0.592)	(0.621)		
RQ	0.064**	-0.100***	0.073**	0.146***	0.063**	-0.039	0.222***	0.139***	0.032	1
	(0.016)	(0.000)	(0.024)	(0.000)	(0.019)	(0.141)	(0.000)	(0.000)	(0.239)	

Foreign banks presence and competition:

Our key competition measure is the banking sector concentration indicator, the Herfindahl index (HHI). To obtain the HHI index, we use the market share of each bank in terms of asset (SHARE). The sum of the squares of the market shares is the HHI index reported in Table 7. An increase in the Herfindahl index generally indicates a decrease in competition and an increase in market concentration, whereas a decrease indicates the opposite. We notice that the index is decreasing over time in each country[9]. This evolution is consistent with the increasing presence of cross-border banks. Similar results have been found by Léon (2016). Over the sample period, the index ranges from 1 (Guinea-Bissau) to 0.09 (Côte d'Ivoire). Indeed, the banking sector of the region, which was highly concentrated before 2000, is going through a deep transformation of its competitive environment with the growing number of cross-border pan-African banks entering the market.

Table 7: Evolution of the HHI index by country, 2000-2015

This table displays the HHI index by country from 2000 to 2015. The last column reports the country averages per year and the last line reports the year averages by country. The index is displayed as 10,000 points.

	Benin	Burkina Faso	Côte d'Ivoire	Guinea-Bissau	Mali	Niger	Senegal	Togo	WAEMU
2000	2 720	2 046	1 421		1 810	2 104	1 463	1 709	1 896
2001	2 894	1 813	1 395	10 000	2 256	2 113	1 459	1 728	2 957
2002	2 749	1 738	1 303	10 000	1 896	2 134	1 523	1 829	2 896
2003	2 535	1 650	1 212	10 000	1 778	2 082	1 455	1 756	2 809
2004	2 425	1 578	1 124	10 000	1 677	2 042	1 470	1 875	2 774
2005	2 199	1 471	1 086	10 000	1 875	2 009	1 387	1 755	2 723
2006	1 916	1 349	1 064	4 960	1 593	1 785	1 405	1 611	1 960
2007	1 855	1 314	1 019	5 045	1 450	1 865	1 477	1 542	1 946
2008	1 921	1 195	1 093	3 434	1 345	1 766	1 696	1 566	1 752
2009	1 941	1 313	1 091	3 319	1 250	1 710	1 341	1 562	1 691
2010	1 728	1 258	989	3 104	1 198	1 710	1 272	1 442	1 588
2011	1 618	1 328	977	2 864	1 180	1 602	1 053	1 354	1 497
2012	1 624	1 309	953	2 926	1 180	1 640	1 010	1 262	1 488
2013	1 498	1 281	910	3 016	1 131	1 592	968	1 659	1 507
2014	1 618	1 273	1 079	2 658	1 152	1 605	930	1 599	1 489
2015	1 558	1 324	996	2 825	1 058	1 457	952	1 391	1 445
Average	1 947	1 407	1 086	4 107	1 436	1 793	1 266	1 573	

Table 8 compares the average market share (in terms of assets), the lending volume and the size of the banks for different sub-samples of banks. The market share of cross-border pan-African banks is lower than those of domestic and French banks. The market share of the French owned banks is higher than that of domestic banks. This may be due to their long existence and

[9] The same trend is also observed with the CR3 index calculated as the asset share of the three largest banks in the country (see Figure 1 above).

information advantage over the other banks regarding the region's market. French banks are large (in terms of total assets) and their total volume of lending (loan-to-asset) is high, compared to domestic and pan-African banks.

Table 8: Difference test across bank category

This table compares the average market share (in terms of assets), the lending volume and the size of the banks for different sub-samples of banks. We use 100 times the market share that is why the average values are greater than one. The values in parentheses are the number of observations. Diff. refers to the p-value associated with the comparison test statistics. The comparison tests are performed using the t-test with unequal variance. The raw data are from the BCEAO.

	Domestic	Pan-African	Diff. p-value	French	Pan-African	Diff. p-value	Domestic	French	Diff. p-value
Market share	1.08	0.86	0.006	1.49	0.86	0.000	1.08	1.49	0.002
	(379)	(703)		(152)	(703)		(379)	(152)	
Loan-to-asset	0.75	0.75	0.763	0.79	0.75	0.000	0.75	0.79	0.000
	(379)	(703)		(152)	(703)		(379)	(152)	
Size	11.19	10.93	0.001	11.90	10.93	0.000	11.19	11.90	0.000
	(379)	(703)		(152)	(703)		(379)	(152)	

To sum-up, pan-African banks are small and their total lending volume is low, compared to French banks, and they have lower market share. These comparisons show that pan-African banks must compete to increase their market share. This competition can be done either by targeting new clients not covered by traditional banks or by more advantageous offers (lower prices[10], rewards, opening account without minimum deposits).

To further analyse the impact of foreign banks presence on competition within the WAEMU banking sector, we run the regression equation (1) to capture the direct impact of foreign ownership on the banking sector competition. For that purpose, we use the aggregate market concentration HHI index with country-year data as our dependent variable. some may argue that the increasing competition (decreasing HHI index value) over time observed is simply an increasing bank number phenomenon., this issue is addressed by controlling for time effect. We thus, add a time dummy variable to capture the time effect. The results of the regressions are reported on Table 9. We find that foreign banks presence in general has a non-significant positive effect on the banking sector competition in the WAEMU region. However, when foreign banks are split in terms of origin (i.e. pan-African versus French), we observe that cross-border pan-African banks have a decreasing market share effect, while the number of French banks increases it. This result supports our previous findings. That is, the presence of cross-border pan-African banks improves market competition in the WAEMU countries. The

[10] The dataset does not allow us to analyse the prices of loans between pan-African and the other banks.

non-significant positive impact of foreign banks presence on the concentration index is driven mainly by the effect of French banks. As we argued before, these French owned banks are well grounded and are the oldest, with strong market power.

In addition to the presence of foreign banks, we show that the level of the banking sector capital level has a positive effect on market power. This can be attributed to the fact that banks in this region rely on customer deposits and their own funding, and these sources of funding are inexpensive. This is consistent with the fact that the cost of deposits is low in the region, which leads to high interest margin (9% on average as shown in Table 1 above). Other interesting results are the positive relationship between bank lending and competition. This later relationship is explored in more detail below. Next, we analyse the impact of foreign ownership and their competitive environment on the banking sector lending.

Table 9: Effects of foreign banks presence on banking sector competition (HHI)

This table reports the estimation results for the determinants of the HHI index using country-year data. The raw data were obtained from the BCEAO and the World Bank World Development Indicators and World Governance Indicators databases. All the macro and bank level controls are lagged. The foreign (resp. cross-border pan-African and French banks) presence is computed as the number of foreign (resp. cross-border pan-African and French) owned banks over the total number of banks in the country each year. Size is the log of the average total asset of the banks in the country at each given year. The estimations are performed using random effects. Standard errors are in parentheses. ***p<0.01, **p<0.05, *p<0.1.

	(1)	(2)	(3)	(5)	(6)
CAR	0.177***	0.149***	0.162*	0.057	0.085
	(0.057)	(0.050)	(0.092)	(0.070)	(0.077)
Log(LOAN-TO-ASSET)	-0.372***	-0.445***	-0.373***	-0.368***	-0.366***
	(0.142)	(0.099)	(0.135)	(0.100)	(0.099)
SIZE	0.027	0.055	0.016	-0.029	-0.003
	(0.059)	(0.047)	(0.068)	(0.038)	(0.051)
OUTPUT	0.055	0.189	0.045	-0.165	-0.046
	(0.316)	(0.326)	(0.335)	(0.285)	(0.307)
INTEREST	0.004	0.003	0.004	0.004	0.005
	(0.005)	(0.003)	(0.006)	(0.005)	(0.005)
Foreign presence	0.051				
	(0.086)				
Pan-African presence		-0.471***			
		(0.173)			
French bank presence			0.149		
			(0.297)		
Number of pan-African banks				0.012	
				(0.011)	
Number of French banks				0.039***	0.031***
				(0.014)	(0.010)
Constant	0.499	0.518*	0.634	1.098***	0.836**
	(0.389)	(0.306)	(0.521)	(0.282)	(0.391)
Time Dummy	Yes	Yes	Yes	Yes	Yes
Observations	119	119	119	119	119
Number of country	8	8	8	8	8
R2	0.740	0.817	0.741	0.772	0.763

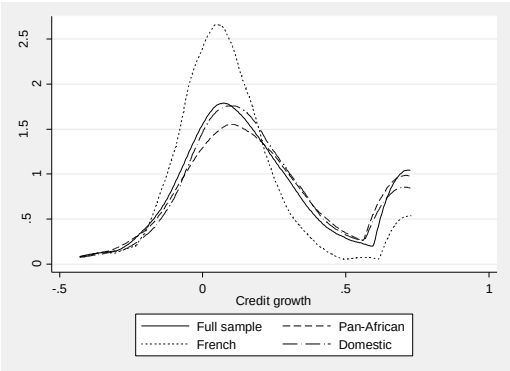
Foreign banks presence and lending:

We now turn to the analysis of the effects of foreign bank, presence and competition on bank lending by using equation (2). Estimation of this equation, using panel data techniques, requires that the distribution of the error terms is independently and identically distributed (*i.i.d*) for the estimated parameters to have the desired properties. Figure 3a shows that the distribution of credit growth is bimodal (a second mode at the right tail), positively skewed and leptokurtic (see Figure 3b). Therefore, the loan growth departs from the *i.i.d* assumption given the heterogeneity characterizing banks in our sample. Some banks may lend faster than others for reasons that are not captured by the model and are of an idiosyncratic nature. Indeed, pan-African, domestic and French banks exhibit very particular patterns (Figure 3a). The distribution of loan growth of French banks is sharper than the other banks. Least squares estimation technique is not appropriate for the estimation of equation (2) as it gives an incomplete picture on the impact of competition.

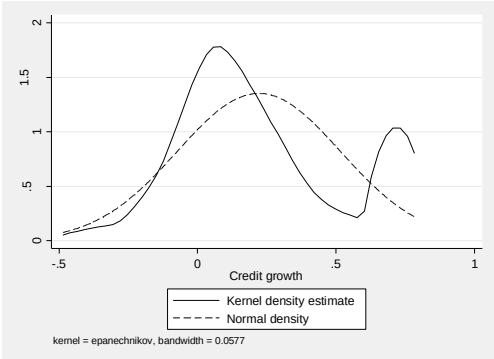
Figure 3: Bank loan growth distribution for the 2000-2015 period

These graphs are the kernel density of bank loan growth. Figure (a) plots the distribution by sub-sample while figure (b) compares the density with that of the Normal distribution with same mean and standard deviation.

a. Distribution by sub-sample



b. Comparison with the Normal distribution

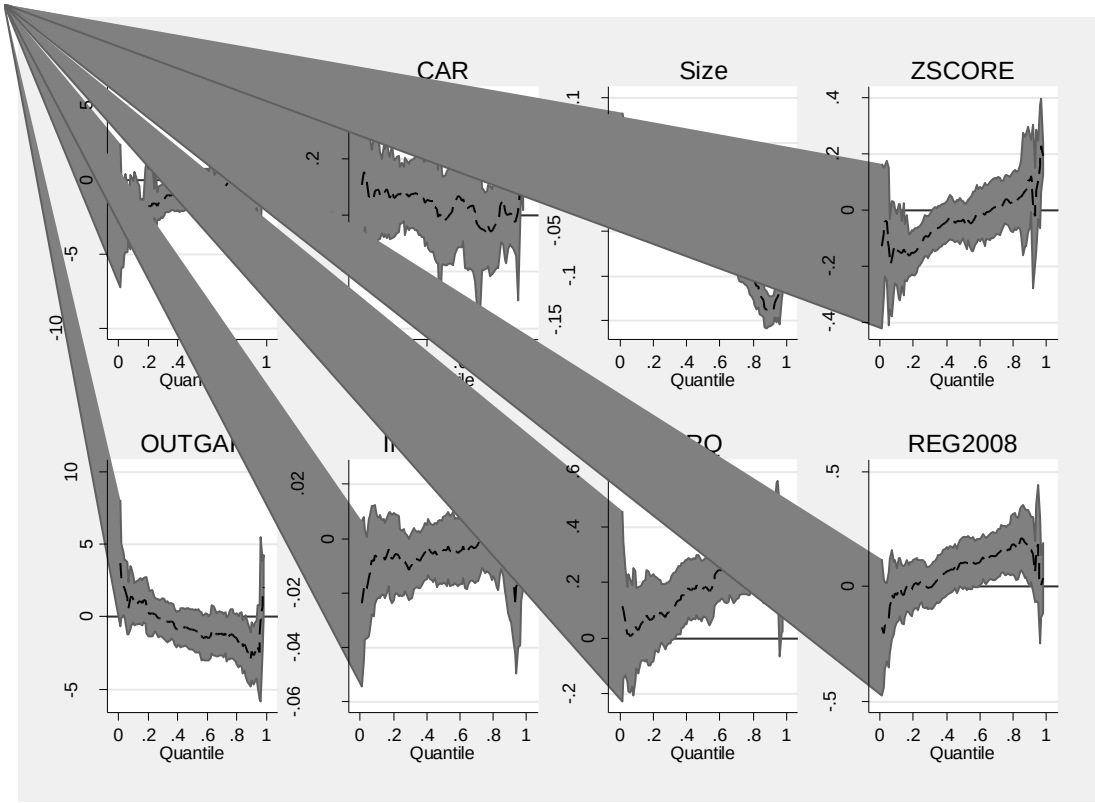


One approach to deal with non-*i.i.d.* distributions in linear regression models is to use quantile regression techniques (e.g., Buchinski, 1994; Dimelis et *al*., 2017). We use the quantile regression approach to estimate the regression equation (2). Figure 4 displays the estimated parameters. As we can see, the effect of competition on lending growth is not linear. Our results show a positive relationship between banking sector competition and bank lending at the lower tail of the distribution (lower quantile), meaning that when competition improves (lower values of HHI) bank lending increases mainly for less dynamic banks. In addition, our results reveal

that the size of the bank, the bank risk, the regulatory quality, the output gap as well as the change in capital requirement in 2008 have non-linear impacts on bank lending (Figure 4). These results also justify the use of quantile regression.

Figure 4: Estimated parameters of equation (2) using quantile regression

The shade area is the 95% confidence interval and the dashed line is the mean estimation. We estimate the quantile regression with heteroskedasticity-robust standard errors[11].



We also examine the direct effect of foreign banks, pan-African banks and French banks on lending. We estimate equation (2) by adding a dummy variable to take into account the category of a given bank. We do not add all the dummies simultaneously to avoid multicollinearity. The results of the estimations are presented on Figure 5 and Table 10. We find that the observed increasing competition has a significant positive effect on loan growth, especially in low-income countries and in small banks. Indeed, the increasing presence of cross border pan-African banks among foreign banks leads to an increase in lending (positive effect on lending growth) even though the impact is non-linear. The non-significant coefficients of the pan-African dummy in the regressions are certainly due to the fact that their effects are already captured by the competition variable HHI. Hence, improved competition following the

[11] The software is provided by Machado et al. (2011).

entry of a significant number of cross-border pan-African banks, creates a favourable environment for loan growth. For example, the average annual loan growth rate for pan African banks is 25% while the average sample annual growth rate is 19% for non-pan African banks.

By contrast, the presence of French banks has a strong and negative impact on lending, especially in low-income countries and in small banks. French banks have a negative impact on bank lending from the 15th percentile. This is consistent with our previous affirmation that French banks are bigger in size and cherry pick in their lending behaviour to firms. Indeed, Detragiache et al. (2008) show that foreign bank presence results in a large reduction in lending because they only lend to hard information borrowers with low risk while domestic banks lend to strong and weak borrowers. This result is partially due to the lower cost related to the monitoring of hard information. Inline with this argument, in the WAEMU context, French owned banks pay lower costs for monitoring hard and soft information due to their long existence in the WAEMU. Combining their expertise and their knowledge of the banking sector of the region, French banks can better target their customers.

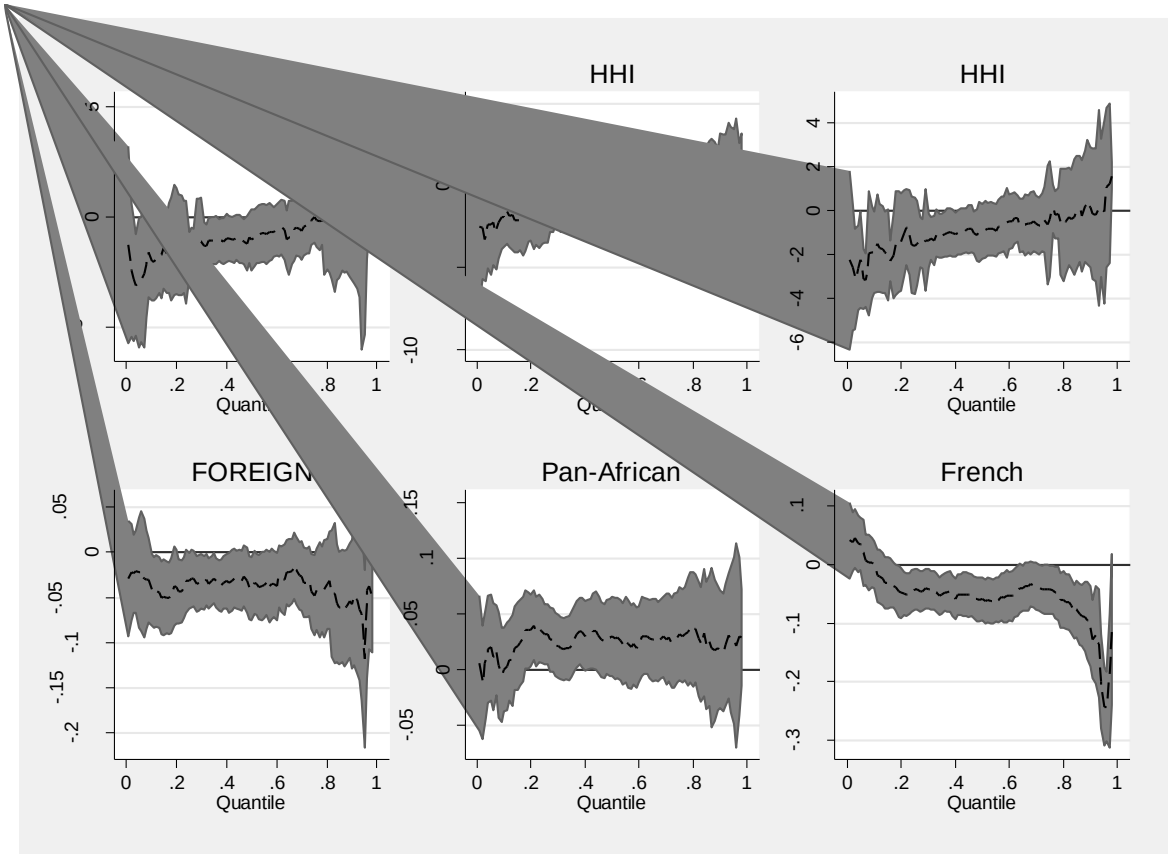
Table 10. Effects of banking sector competition on bank lending by quantile and sub-panels

This table reports the estimation results for the effects of banking sector competition on bank loan growth. The raw data were obtained from the BCEAO and the World Bank World Development Indicators and World Governance Indicators databases. The dependent variable is the growth rate of bank loan. Pan-African is a dummy which takes 1 for Pan-African owned banks and zero otherwise. French is a dummy which takes 1 for French owned banks and zero otherwise. The estimations are performed using quantile regression with heteroskedasticity-robust standard errors in parentheses. All the independent variables are lagged in order to reduce the endogenous bias due to inverse causality. In each sample, the first column is for the 25% quantile, the second column for the 50% quantile and the third column for the 75% quantile. ***p<0.01, **p<0.05, *p<0.1.

	Full sample			Low income countries			Lower-middle income countries			Small banks			Big banks		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
HHI (growth rate)	-1.252	-0.979*	-0.217	-2.074***	-1.497**	-0.047	-0.947	-2.116	-3.699	-1.942**	-1.303**	-0.169	0.541	-1.080	-1.016
	(1.080)	(0.585)	(0.526)	(0.629)	(0.724)	(1.506)	(1.842)	(2.218)	(2.642)	(0.779)	(0.637)	(1.941)	(1.000)	(0.905)	(1.351)
AFRICAN	0.016	0.011	0.017	-0.005	-0.020	-0.027	0.034	0.059	0.057	-0.029	-0.049	-0.035	0.044	0.029	0.022
	(0.019)	(0.021)	(0.028)	(0.020)	(0.025)	(0.029)	(0.037)	(0.039)	(0.049)	(0.038)	(0.039)	(0.041)	(0.035)	(0.026)	(0.034)
FRENCH	-0.042*	-0.059***	-0.042	-0.055*	-0.076*	-0.050	-0.018	-0.030	-0.053	-0.136**	-0.182**	-0.183**	-0.039	-0.020	-0.028
	(0.022)	(0.022)	(0.031)	(0.030)	(0.040)	(0.042)	(0.032)	(0.034)	(0.054)	(0.068)	(0.077)	(0.081)	(0.030)	(0.025)	(0.035)
CAR	0.061	0.016	-0.068	0.085	0.093	0.030	-0.077	0.005	-0.073	-0.011	-0.022	-0.073	0.494*	0.033	0.079
	(0.061)	(0.085)	(0.080)	(0.059)	(0.244)	(0.118)	(0.092)	(0.099)	(0.138)	(0.065)	(0.129)	(0.085)	(0.284)	(0.221)	(0.224)
SIZE	0.007	-0.030***	-0.081***	-0.007	-0.042**	-0.089***	0.033***	-0.012	-0.068***	-0.019	-0.115***	-0.198***	-0.016	-0.065***	-0.131***
	(0.008)	(0.010)	(0.013)	(0.010)	(0.018)	(0.014)	(0.013)	(0.013)	(0.022)	(0.025)	(0.033)	(0.034)	(0.017)	(0.015)	(0.025)
ZSCORE	-0.108**	-0.076*	0.011	-0.065	-0.051	0.028	-0.107	-0.100	-0.048	-0.110	-0.102	-0.060	-0.069	-0.027	0.041
	(0.045)	(0.040)	(0.052)	(0.052)	(0.063)	(0.065)	(0.091)	(0.145)	(0.177)	(0.088)	(0.089)	(0.110)	(0.042)	(0.074)	(0.102)
OUTPUT	-0.008	-1.204	-1.449	-0.810	-2.267**	-1.712*	0.928	-0.554	1.432	-1.003	-1.427	-1.790	0.400	0.079	-1.210
	(0.714)	(0.741)	(0.938)	(0.848)	(0.942)	(1.032)	(1.921)	(2.092)	(2.933)	(1.252)	(1.268)	(1.235)	(0.807)	(0.883)	(1.022)
INTEREST	-0.002	-0.005	0.004	0.007	0.001	-0.010	-0.007	0.004	0.029*	-0.000	0.001	-0.000	-0.011*	-0.004	-0.001
	(0.007)	(0.005)	(0.008)	(0.009)	(0.010)	(0.015)	(0.021)	(0.015)	(0.016)	(0.014)	(0.012)	(0.017)	(0.006)	(0.005)	(0.011)
RQ	0.113*	0.162***	0.255***	0.010	0.037	0.113	0.208**	0.375***	0.480***	0.215	0.192	0.278*	0.070	0.185**	0.306***
	(0.058)	(0.060)	(0.080)	(0.076)	(0.077)	(0.082)	(0.104)	(0.117)	(0.179)	(0.138)	(0.118)	(0.144)	(0.075)	(0.074)	(0.093)
REG 2008	0.037	0.096*	0.168***	0.062	0.100	0.080	0.009	-0.047	-0.131	0.055	0.082	0.253***	0.024	0.062	0.147**
	(0.044)	(0.050)	(0.053)	(0.075)	(0.081)	(0.117)	(0.091)	(0.106)	(0.106)	(0.071)	(0.098)	(0.085)	(0.072)	(0.053)	(0.070)
Constant	-0.005	0.523***	1.186***	0.099	0.599**	1.327***	-0.089	0.738***	1.603***	0.326	1.414***	2.570***	0.308	1.098***	2.098***
	(0.120)	(0.146)	(0.162)	(0.157)	(0.278)	(0.270)	(0.231)	(0.256)	(0.358)	(0.319)	(0.407)	(0.382)	(0.240)	(0.205)	(0.346)
Country dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dumy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,146	1,146	1,146	711	711	711	435	435	435	493	493	493	653	653	653
Quantile	0.250	0.500	0.750	0.250	0.500	0.750	0.250	0.500	0.750	0.250	0.500	0.750	0.250	0.500	0.750
Value of the quantile	0.000	0.112	0.266	0.007	0.116	0.279	-0.010	0.108	0.248	-0.020	0.107	0.301	0.021	0.118	0.246

Figure 5: Effect of competition and foreign banks on bank lending

The first row displays coefficients of HHI when we control for foreign owned banks, pan-African bank and French bank respectively. The second row shows the coefficients foreign dummy, pan-African dummy and French dummy. The shade area is the 95% confidence interval and the dashed line is the mean estimation. We estimate the quantile regression with heteroskedasticity-robust standard errors.



2.5 Robustness

In the previous subsection, we use a structural measure of bank level competition (i.e. the market share). Now, we use a non-structural measure: that is Lerner index. The Lerner index follows the New Empirical Industry Organisation (NEIO) and tries to observe the conduct of firms in the market to draw conclusion about competition. Recall, the Lerner index is defined as the mark-up of price over the marginal cost. It is a deviation of prices from marginal costs. It measures the pricing power of the banks and corresponds to an inverse proxy of competition. As we mentioned above, we rely on the efficiency-adjusted Lerner index proposed by Koetter et *al*. (2012) and present in more detail in the online appendix.

We also use the Boone indicator and the Panzar-Rosse H-statistic, alternative competition measures. The unreported results for these two indicators available in the online appendix confirm our findings.

Pan-African versus French banks: pricing behaviour

We have argued that foreign bank presence enhances competition, measured by market shares, in the WAEMU banking sector. A question arises as to how the different categories of foreign banks behave in terms of pricing, particularly French banks and pan-African banks, the two main dominant forms of foreign banks. To answer this question, we compare the average Lerner index of French banks and pan-African banks from 2002 to 2015 (Table 11). On average, from 2002 to 2007, French banks had more competitive pricing practice than pan-African banks. Indeed, as Table 8 above indicates French banks had high market shares and were well-grounded on the WAEMU region. Therefore, they can reduce their mark-up without jeopardising their financial strength through economies of scale. The increasing number of pan-African banks entering the market and probably a better understanding of the environment contribute to lower their prices over the years. As a result, since 2007 (except for 2015), we observe no significant differences in the pricing practices of the two categories of banks possibly due to intense competition.

Table 11: Market power difference test across French and pan-African banks

This table compares the average Lerner index between French and pan-African banks. The comparison tests are performed using the t-test with unequal variance. The raw data are from the BCEAO.

	French banks		Pan-African Banks		Comparison	
	Obs.	Avg.	Obs.	Avg.	Diff.	P-value
2002	9	0.18	17	0.34	-0.16	0.095
2003	7	0.14	17	0.32	-0.18	0.014
2004	9	0.17	16	0.28	-0.12	0.019
2005	8	0.19	15	0.27	-0.08	0.067
2006	10	0.20	40	0.32	-0.11	0.002
2007	10	0.22	43	0.27	-0.05	0.078
2008	10	0.23	44	0.25	-0.02	0.327
2009	8	0.24	29	0.25	-0.00	0.825
2010	9	0.25	33	0.27	-0.02	0.417
2011	9	0.29	38	0.28	0.01	0.606
2012	8	0.31	41	0.32	-0.01	0.838
2013	7	0.37	46	0.33	0.04	0.202
2014	8	0.38	48	0.34	0.04	0.500
2015	7	0.46	46	0.35	0.12	0.005

Do foreign banks increase price competition?

We now conduct a robustness analysis of the effects of foreign ownership on competition measured by the Lerner index. From the regressions results reported in Table 12, we find that foreign bank presence (mainly French and pan-African) increases price competition, particularly in lower-middle income countries (Côte d'Ivoire and Senegal). In addition, pan-African bank presence improves the pricing competition in the small banks segment, while

French bank presence improves price competition among big banks. For example, the increase in the proportion of pan-African banks from 31% in 2002 to 64% in 2015 resulted in a decrease in the Lerner index by 0.12 points within small banks. Nonetheless, French banks presence had an even bigger effect within the big banks segment, a Lerner index decrease of 0.8 points for one unit increase in French banks presence. We can then support our previous findings that foreign bank entry improves banking sector competition in the WAEMU region. It is worth noting that, except for small banks, the change in minimum capital requirement in 2008 decreases banking sector competition. It may be because banks try to rebuild their capital by increasing their mark-up (i.e. banks accumulate capital by retaining earnings).

Table 12. Effects of foreign banks presence on bank market power

This table report the estimation of Lerner index on a set of controls including the status of the bank. The dependent variable is the Lerner Index. Pan-African is a dummy which takes 1 for Pan-African owned banks and zero otherwise. French is a dummy which takes 1 for French owned banks and zero otherwise. Pan-African (resp. French) Presence is the ratio of the number of pan-African (resp. French) banks over the total number of all banks. The estimations are performed using fixed effects. Most French banks are medium or big sized banks, therefore, after splitting by bank size, we are not able to identify the effects of French dummy using the within estimator in "small banks" category (perfectly predictable). Robust Standard errors are in parentheses. ***p<0.01, **p<0.05, *p<0.1.

	Full sample		Low income countries		Lower-middle income countries		Small banks		Big banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pan-African	-0.008	-0.001	0.030	0.035	-0.080*	-0.078*	-0.036**	-0.006	-0.001	0.013
	(0.023)	(0.026)	(0.034)	(0.035)	(0.042)	(0.042)	(0.017)	(0.014)	(0.027)	(0.023)
Pan-African Presence		0.033		-0.113		-0.033		-0.359***		0.148
		(0.126)		(0.164)		(0.220)		(0.082)		(0.109)
French	-0.063**	-0.028	-0.019	-0.033	-0.110*	-0.093			-0.065*	0.008
	(0.032)	(0.037)	(0.045)	(0.045)	(0.058)	(0.059)			(0.035)	(0.048)
French Presence		-0.465*		0.278		-0.673**		0.387		-0.807***
		(0.247)		(0.186)		(0.321)		(0.264)		(0.221)
CAR	0.146	0.120	0.188	0.198	0.004	-0.001	0.103	0.142	0.356	0.128
	(0.196)	(0.188)	(0.239)	(0.244)	(0.253)	(0.243)	(0.127)	(0.136)	(0.453)	(0.273)
LOAN GROWTH	0.055***	0.055***	0.041*	0.040*	0.056	0.061*	0.017	0.002	0.006	0.005
	(0.019)	(0.019)	(0.021)	(0.021)	(0.034)	(0.034)	(0.023)	(0.023)	(0.025)	(0.018)
SIZE	-0.033*	-0.030*	-0.010	-0.008	-0.013	-0.024	-0.057***	-0.046***	0.082***	0.067***
	(0.018)	(0.017)	(0.023)	(0.023)	(0.022)	(0.023)	(0.015)	(0.016)	(0.017)	(0.018)
OUTPUT	0.427*	0.421*	0.203	0.162	0.707**	0.586	0.552	0.796**	0.142	0.037
	(0.252)	(0.246)	(0.278)	(0.280)	(0.335)	(0.352)	(0.346)	(0.315)	(0.274)	(0.173)
INTEREST	0.001	0.001	0.002	0.002	0.003	0.003	-0.003*	-0.005***	0.004***	0.005***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
REG2008	0.173***	0.128**	0.070	0.082	0.128***	0.080***	-0.042**	-0.015	0.093***	0.053***
	(0.051)	(0.055)	(0.063)	(0.070)	(0.029)	(0.028)	(0.019)	(0.019)	(0.023)	(0.019)
Constant	0.598***	0.624***	0.344	0.354	0.439	0.701**	0.900***	0.879***	-0.776***	-0.545***
	(0.194)	(0.192)	(0.243)	(0.254)	(0.271)	(0.293)	(0.150)	(0.164)	(0.182)	(0.197)
Observations	938	938	572	572	366	366	371	371	567	567
Number of banks	105	105	61	61	44	44	78	78	77	77
R-squared	0.215	0.235	0.129	0.137	0.259	0.280	0.328	0.416	0.487	0.566

Price competition and lending

How do these pricing behaviours affect lending in the WAEMU region? To answer this question, we re-estimate equation (2), but this time using the Lerner index as our main competition variable. The regression results reported in Table 13 show a positive relationship between banking sector competition and banks' lending at the upper (resp. lower) tail of the distribution for small banks (resp. banks in lower-middle income countries). This suggests that when competition improves bank lending, it increases mainly for small banks and less dynamic banks in lower-middle income countries. Competition by pricing does not play a significant role on the lending growth of big banks. We also find that the average lending growth rate of French banks is lower than that of non-French banks. By contrast, pan-African bank presence has a positive impact on lending in lower-middle income countries and among big banks, even if the sign is not always significant, probably due to the significant effect of the competition variable.

In sum, as found previously with the market share competition indicator, price competition positively influences lending growth in the WAEMU banking sector following the massive entry of pan-African banks; in other words, pan-African bank presence improves competition, and via competition, enhances lending.

Alternative estimation technique

In addition to the above variables, we introduce in equation (2) the first lag of the dependent variable to take into account systematic variations in bank lending. The presence of lagged dependent variable in the equation suggests the use of dynamic panel data estimation techniques. For that purpose, we use the "*quantile regression estimator for panel data (QRPD) with nonadditive fixed effects"* approach developed by Powell (2016). We use the difference of the first lag of the lending growth as instrument to deal with the endogeneity bias as in Blundell and Bond (1998). The results of the estimation are reported in Table 14. Our results are found to be robust. Adding the lag of the dependent variable as an explanatory variable does not alter our previous findings. Furthermore, these new results clearly support the *market power hypothesis* within small banks and in lower-middle income countries while they suggest the *information hypothesis* for big banks. The effect of pan-African banks presence on lending in lower-middle income countries is also confirmed by the new estimations results.

Table 13. Effects of banks market power on bank lending

This table reports the estimation results for the effects of banking sector competition on bank loan growth. The raw data were obtained from the BCEAO and the World Bank World Development Indicators and World Governance Indicators databases. The dependent variable is the growth rate of bank loan. Pan-African is a dummy which takes 1 for Pan-African owned banks and zero otherwise. French is a dummy which takes 1 for French owned banks and zero otherwise. The estimations are performed using quantile regression with heteroskedasticity-robust standard errors in parentheses. All the independent variables are lagged in order to reduce the endogenous bias due to inverse causality. In each sample, the first column is for the 25% quantile, the second column for the 50% quantile and the third column for the 75% quantile. ***p<0.01, **p<0.05, *p<0.1.

	Full sample			Low income countries			Lower-middle income countries			Small banks			Big banks		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Lerner	-0.049	-0.109	-0.019	-0.094	-0.046	0.105	-0.221*	-0.098	-0.327	-0.154	-0.644***	-0.394**	0.034	0.062	-0.092
	(0.111)	(0.100)	(0.119)	(0.090)	(0.158)	(0.150)	(0.130)	(0.120)	(0.209)	(0.334)	(0.138)	(0.187)	(0.152)	(0.154)	(0.169)
AFRICAN	0.010	0.014	0.027	0.008	-0.000	-0.018	0.042	0.059*	0.059	-0.059	-0.080*	-0.056	0.047*	0.041	0.013
	(0.016)	(0.019)	(0.028)	(0.020)	(0.037)	(0.030)	(0.034)	(0.031)	(0.040)	(0.061)	(0.044)	(0.040)	(0.025)	(0.028)	(0.032)
FRENCH	-0.043*	-0.054**	-0.027	-0.063***	-0.050	-0.043	-0.023	-0.024	-0.030	-0.154**	-0.176**	-0.162***	-0.020	-0.031	-0.045*
	(0.023)	(0.024)	(0.027)	(0.023)	(0.049)	(0.039)	(0.031)	(0.028)	(0.036)	(0.076)	(0.087)	(0.045)	(0.023)	(0.026)	(0.027)
CAR	0.131	0.228***	0.083	0.137	0.073	-0.114	0.058	0.157	0.002	0.014	0.102	0.083	0.577**	0.151	-0.183
	(0.120)	(0.075)	(0.199)	(0.174)	(0.205)	(0.142)	(0.170)	(0.123)	(0.423)	(0.133)	(0.147)	(0.124)	(0.237)	(0.315)	(0.448)
SIZE	0.001	-0.034***	-0.080***	-0.011	-0.049***	-0.095***	0.021	-0.020	-0.063***	-0.055	-0.180***	-0.240***	-0.022	-0.043**	-0.112***
	(0.010)	(0.011)	(0.013)	(0.010)	(0.016)	(0.014)	(0.014)	(0.014)	(0.022)	(0.056)	(0.031)	(0.027)	(0.026)	(0.019)	(0.036)
ZSCORE	-0.079*	0.010	0.021	-0.068	-0.017	0.018	-0.060	0.054	-0.020	-0.091	0.020	0.171**	-0.015	-0.016	0.039
	(0.040)	(0.046)	(0.060)	(0.045)	(0.066)	(0.092)	(0.047)	(0.125)	(0.166)	(0.104)	(0.076)	(0.080)	(0.070)	(0.067)	(0.092)
OUTPUT	0.531	0.000	-0.277	-0.272	-1.139	-1.559	2.378	0.471	1.745	-0.245	0.584	1.203	1.669**	0.743	-0.649
	(0.743)	(0.703)	(0.736)	(0.785)	(1.079)	(0.960)	(1.849)	(1.725)	(2.099)	(1.607)	(1.017)	(1.423)	(0.847)	(0.994)	(1.846)
INTEREST	-0.006	-0.011*	-0.005	-0.002	-0.007	-0.013	0.003	0.003	0.029*	0.002	-0.008	-0.012	-0.008	-0.008	0.009
	(0.007)	(0.006)	(0.008)	(0.008)	(0.011)	(0.014)	(0.013)	(0.014)	(0.016)	(0.015)	(0.009)	(0.014)	(0.007)	(0.006)	(0.009)
RQ	0.108*	0.148**	0.224***	0.035	0.048	0.063	0.261***	0.434***	0.330***	0.144	0.079	-0.067	0.155*	0.155*	0.176*
	(0.059)	(0.066)	(0.070)	(0.097)	(0.087)	(0.112)	(0.100)	(0.115)	(0.118)	(0.183)	(0.184)	(0.177)	(0.084)	(0.080)	(0.098)
REG 2008	0.014	0.026	0.031	0.016	0.041	0.149***	-0.006	0.085	0.061	0.063	0.153	0.251*	-0.068	0.063	-0.027
	(0.072)	(0.046)	(0.055)	(0.051)	(0.050)	(0.054)	(0.059)	(0.059)	(0.079)	(0.193)	(0.202)	(0.150)	(0.047)	(0.046)	(0.085)
Constant	0.199	0.715***	1.438***	0.191	0.743***	1.314***	-0.037	0.424**	0.999***	0.811	2.214***	2.558***	0.481	0.785***	1.839***
	(0.200)	(0.160)	(0.220)	(0.187)	(0.230)	(0.204)	(0.179)	(0.211)	(0.306)	(0.746)	(0.428)	(0.459)	(0.339)	(0.279)	(0.427)
Country dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dumy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	850	850	850	523	523	523	327	327	327	311	311	311	539	539	539
Quantile	0.250	0.500	0.750	0.250	0.500	0.750	0.250	0.500	0.750	0.250	0.500	0.750	0.250	0.500	0.750
Value of the quantile	0.00524	0.111	0.256	0.0149	0.116	0.268	-0.00743	0.105	0.227	-0.0146	0.110	0.296	0.0213	0.111	0.238

Table 14: Effects of banks market power on bank lending (with first lag)

This table reports the estimation results for the effects of banking sector competition on bank loan growth. We add the first lag of the loan growth as explanatory variable. The raw data were obtained from the BCEAO and the World Bank World Development Indicators and World Governance Indicators databases. The dependent variable is the growth rate of bank loan. Pan-African is a dummy which takes 1 for Pan-African owned banks and zero otherwise. French is a dummy which takes 1 for French owned banks and zero otherwise. The coefficients are estimated following the "quantile regression estimator for panel data (QRPD) with nonadditive fixed effects" approach developed by Powell (2016). For identification purposes, the estimators are conditioning on (time and banks) fixed effects. Therefore, constant of the model is not estimated and the regulation variable is dropped. We use the adaptive MCMC optimization procedure. We perform 10,000 draws and drop the first 3,000 (burn-in). The point estimates correspond to mean of draws and standard errors (in parentheses) are derived from variance of draws. In each sample, the first column is for the 25% quantile, the second column for the 50% quantile and the third column for the 75% quantile. Asterisks ***, ** and * indicate significant difference from zero at 1%, 5% and 10% levels, two-sided.

	Full sample			Low income countries			Lower-middle income countries			Small banks			Big banks		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(16)	(17)	(18)
Credit(-1)	0.006	0.131***	0.196***	0.005	0.217***	0.251***	-0.133***	0.076***	-0.018***	0.045***	0.316***	0.206***	-0.274***	0.067***	0.094***
	(0.020)	(0.001)	(0.001)	(0.023)	(0.001)	(0.002)	(0.007)	(0.010)	(0.004)	(0.007)	(0.114)	(0.000)	(0.042)	(0.000)	(0.022)
Lerner	0.019	0.008**	0.102***	-0.149***	0.027***	0.302***	-0.056***	0.073*	-0.045***	-0.141***	-0.657*	-0.320***	0.190**	0.223***	0.147***
	(0.026)	(0.003)	(0.003)	(0.052)	(0.001)	(0.007)	(0.018)	(0.043)	(0.011)	(0.010)	(0.384)	(0.000)	(0.085)	(0.000)	(0.050)
AFRICAN	0.032***	0.020***	0.016***	0.018	-0.001	0.023***	0.023***	0.060***	0.025***	0.001	0.185	-0.010***	-0.032	0.045***	-0.017
	(0.008)	(0.001)	(0.001)	(0.016)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.006)	(0.119)	(0.000)	(0.028)	(0.000)	(0.023)
FRENCH	-0.027**	-0.009***	-0.014***	-0.051***	-0.049***	0.016***	0.012***	-0.010*	-0.077***	-0.108***	-0.403**	-0.126***	-0.029**	0.007***	-0.065***
	(0.012)	(0.000)	(0.000)	(0.019)	(0.002)	(0.001)	(0.002)	(0.005)	(0.002)	(0.004)	(0.197)	(0.000)	(0.013)	(0.000)	(0.009)
CAR	-0.002	0.127***	0.023***	0.265***	0.046***	-0.131***	0.154***	0.133***	-0.085***	0.160***	-0.215	0.039***	0.171	0.241***	0.699**
	(0.028)	(0.001)	(0.002)	(0.039)	(0.001)	(0.006)	(0.008)	(0.016)	(0.010)	(0.012)	(0.250)	(0.001)	(0.259)	(0.001)	(0.332)
SIZE	0.007*	-0.029***	-0.066***	-0.060	-0.038***	-0.071***	0.016***	-0.024***	-0.053***	-0.078***	-0.391***	-0.173***	-0.142***	-0.044***	-0.159***
	(0.004)	(0.000)	(0.000)	(0.037)	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.104)	(0.000)	(0.028)	(0.000)	(0.034)
ZSCORE	-0.041**	-0.019***	0.019***	-0.040**	-0.023***	-0.005	-0.029***	-0.002	-0.044***	-0.169***	-0.091	0.085***	-0.026	-0.011***	-0.006
	(0.020)	(0.000)	(0.001)	(0.017)	(0.002)	(0.006)	(0.009)	(0.019)	(0.008)	(0.008)	(0.130)	(0.001)	(0.050)	(0.000)	(0.033)
OUTPUT	0.391**	-0.180***	0.367***	0.021	-1.879***	-1.418***	4.161***	2.148***	2.060***	1.882***	0.749	0.125***	1.330**	0.307***	0.911**
	(0.167)	(0.029)	(0.013)	(0.696)	(0.017)	(0.042)	(0.162)	(0.201)	(0.058)	(0.140)	(1.631)	(0.003)	(0.558)	(0.002)	(0.412)
INTEREST	-0.007*	-0.009***	-0.005***	0.001	-0.010***	-0.010***	-0.001	-0.013***	-0.006***	0.000	-0.026	-0.009***	-0.001	-0.011***	-0.008**
	(0.004)	(0.000)	(0.000)	(0.005)	(0.000)	(0.000)	(0.001)	(0.002)	(0.001)	(0.000)	(0.026)	(0.000)	(0.004)	(0.000)	(0.003)
RQ	0.043***	0.081***	0.087***	0.069***	0.097***	-0.028***	0.058***	0.060***	0.090***	0.082***	0.525***	0.058***	0.141***	0.038***	0.015
	(0.004)	(0.001)	(0.001)	(0.010)	(0.001)	(0.003)	(0.004)	(0.005)	(0.002)	(0.004)	(0.199)	(0.000)	(0.047)	(0.000)	(0.016)
Observations	850	850	850	523	523	523	327	327	327	311	311	311	539	539	539
Number of banks	104	104	104	61	61	61	43	43	43	72	72	72	78	78	78

3. THE IMPACT OF FOREIGN BANK PRESENCE ON FIRM ACCESS TO CREDIT

While bank level micro-data helps us to analyze the effect of cross-border banks on competition and lending in the WAEMU banking system, it does not tell us if the increase in bank lending translates into an increase in loan access by firms located in the region. Because loan portfolio size can grow without reaching necessarily more borrowers. The main reason is that bank balance sheets data available publicly do not contain detailed information by type of borrowers. Yet, we know from the literature that one, and more prominent, effect of cross-border banks expansion is access to financing. To address this issue, as in Beck *et al.* (2004), we use data from the Enterprise Survey database[12] conducted by the World Bank in the countries of the region. Note, however that, Beck *et al.* (2004) study was on a sample of 74 countries around the World. However, conclusions cannot be specifically applied to WAEMU region with its distinctiveness as a monetary union with countries with similar cultural language background.[13] These data allow us to examine whether or not the foreign ownership structure of banks alleviates the credit constraints on firms within the WAEMU region, and hence improve the likelihood of private companies to access bank loans. In this analysis, we expect a positive relationship between the entry of foreign owned-banks and firm access to finance.

Table 15: Sample size by year and country

This table describes the sample size of our dataset by country and by year. Data come from World Bank Enterprise Survey database. More details on sampling methodology could be found at http://www.enterprisesurveys.org/methodology.

	2005	2006	2007	2009	2010	2012	2014	2016	Total
Benin				150				150	**300**
Burkina Faso		139		394					**533**
Ivory Coast				526		727			**1,253**
Mali			490		360			185	**1,035**
Niger	125			150					**275**
Senegal			506				601		**1,107**
Togo				155					**155**
Total	**125**	**139**	**996**	**1,375**	**360**	**727**	**601**	**335**	**4,658**

[12] "An Enterprise Survey is a firm-level survey of a representative sample of an economy's private sector. The surveys cover a broad range of business environment topics including access to finance, corruption, infrastructure, crime, competition, and performance measures" (http://www.enterprisesurveys.org/methodology).

[13] The only exception being Guinea-Bissau, which is a Portuguese speaking country, but is a very small economy in the region and also due to data limitation, this country is not included in the sample for this part of the analysis.

Table 15 gives an overview of the sample size by year and by country. We use one to three rounds of surveys in each country when data are available. The data collection period ranges from 2005 to 2016, which gives us a sample of 4,658 firms.

3.1 Methodology and variables

To examine the effect of foreign banks presence on firms' access to bank loan, we run the following Probit model:

$$P(Credit_{i,j,t} = 1) = \Phi(\beta f_{j,t-1} + \gamma \boldsymbol{W}_{i,j,t-1}), \quad (3)$$

where *i* and *j* are firm and country indices, $f_{j,t-1}$ captures the share of either foreign banks in general or cross-border pan-African banks in country *j* at date *t-1* (one year before the survey), and $\boldsymbol{W}_{i,j,t-1}$ is a matrix of control variables. We use country-specific and firm-specific factors that are able to influence the likelihood of a firm to have access to bank loan.

We use two dummy dependent variables to analyse the effect of cross-border banks on the likelihood of firms to access credit. The first variable, *Credit access*, takes the value of 1 if a firm has borrowed from a bank. More specifically, a question was asked to the firms if they have a *line of credit or loan from a financial institution*. In case of "yes", a second question is asked to know the type of the financial institution. *Credit access* takes the value 1 if a firm answers "yes" to the first question and "bank" to the second one. In addition, *Credit access* takes the value 1 if the percentage of working capital borrowed from banks or the percentage of fixed assets funded by bank borrowing is strictly positive. Otherwise, *Credit access* takes the value 0. This is an objective measure of access to credit that has been used in the literature (e.g., Love and Martinez-Peria, 2014; Popov and Udell, 2012).

For the second variable, we use the same definition of *Credit constraint*[14] as in Beck (2014) or Popov and Udell (2012). That is the firm is credit constrained if *Credit access* equals 0 and it does not apply for a loan because interest rates or collateral requirements are too high or other elements of the loan conditionality are not favorable (complex application procedures and insufficient size of loan and maturity).

Figure 6 reports the proportion of firms that have access to credit and those that are credit constrained in the WAEMU region. We observe that, less than 25% of the firms in the

[14] Similar definition is used by Ongena and Popov (2016) and labelled "firm discouraged from applying for a loan".

WAEMU region have access to credit line with a bank. This proportion ranges from 9% in Côte d'Ivoire to 52% in Niger. These firms are medium sized (39% of medium sized enterprises have access to credit) or large sized (53% of large firms have access to credit). At the opposite side, micro and small firms are financially constrained: 37% of micro and 43% of medium-sized enterprises do not have access to credit. These firms are located in Côte d'Ivoire (46.1%), Mali (40.8%), Senegal (38.1%) and Togo (38.2%). These results highlight some informational issues that give preferential treatment to large firms by banks. In fact, Haselmann and Wachtel (2010) show that when the quality of institutions is less good in countries where the banks operate, they lend more to large enterprises and to the government. This may be the case in the WAEMU countries as well.

Figure 6: Proportion of firms that have access to credit or are credit constrained, by country

This figure plots the proportion of firms that have access to credit or are credit constrained in each WAEMU country. The sum of the two proportions does not add up to 100% because some firms with no credit line have not applied for a loan for other raisons than those used to define credit constraint.

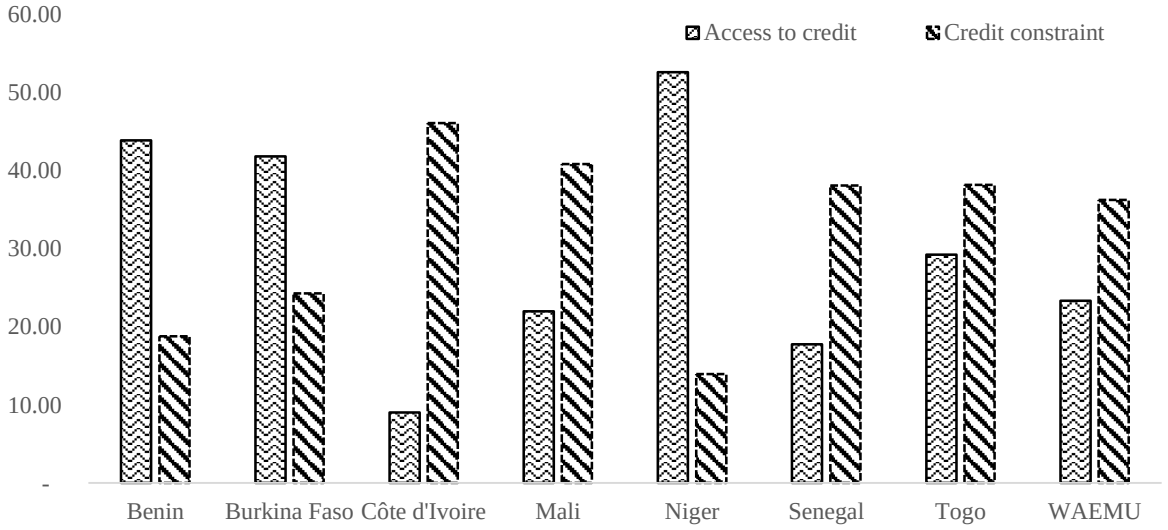


Table 16 displays some descriptive statistics on the sample of firms. About two-third of the firms are located in large cities (cities with more than one million inhabitants). The survey focuses on small and medium sized enterprises (SMEs) which represent 92.7% of the sample. The firms operate essentially in manufacturing (41.7%) or in the services[15] (43.7%) sector. This distribution of the sample is also a good representation of the reality of firms in these developing

[15] According to the methodology (see http://www.enterprisesurveys.org/methodology) of the enterprise surveys, the manufacturing and services sectors are the primary business sectors of interest. This corresponds to firms classified with ISIC codes 15-37, 45, 50-52, 55, 60-64, and 72 (ISIC Rev.3.1). Services firms include construction, retail, wholesale, hotels, restaurants, transport, storage, communications, and IT. Other sector includes companies operating, for example, in education or health-related businesses.

economies, where most firms are of small or medium size. Almost seven firms out of ten is a sole proprietorship, which is a business that legally has no separate existence from its owner. And finally, only 12% of firms have a female in the top-management. Due to the large number of missing values in that variable, it will not be integrated into the regressions. Apart from macro-variables (foreign ownership, cross-border banks presence, bank capital), we control for firms characteristics following the recent literature (e.g., Popov and Udell, 2012; Ongena and Popov, 2016; Love and Martinez-Peria, 2014) by focusing on firm size, sector of activity, legal status and location of the firm (size of the city).

In the analysis, we use only the available information on the sample without imputing the missing data, nor weighting the observations. The conclusions from the analysis are drawn on the sample.

Table 16: Sample firms statistics

The number of observations of some variables does not give the number of firms due to missing data. In the regression, we use only the available information in the dataset. We do not impute missing data. Given the large number of missing values in the "female in the top-management" variable, that variable will not be used in the regressions.

	Obs.	Proportion (in %)		Obs.	Proportion (in %)
Size (Population) of the city where the firm operates			**Firm size**		
Capital city	1,565	33.61	Micro (1 to 4)	688	14.77
Over 1 million	1,709	36.70	Small (5 to 19)	2,692	57.81
250,000 to 1 million	903	19.39	Medium (20 to 99)	937	20.12
50,000 to 250,000	474	10.18	Large (100 or more)	340	7.3
Less than 50,000	6	0.13			
Total	*4,657*	*100*	*Total*	*4,657*	*100*
Industrial sector			**Female in the top-management**		
Manufacturing	1,944	41.74	Yes	371	7.97
Service	2,034	43.68	No	2,651	56.93
Other	679	14.58	Missing	1,635	35.11
Total	4,657	100	Total	3,022	100
Legal status					
Shareholding company	164	3.52			
Shareholding company	822	17.65			
Sole proprietorship	3,150	67.64			
Partnership	177	3.80			
Limited partnership	102	2.19			
Other	242	5.20			
Total	4,657	100			

3.2 Firm level evidence

In this section, we are interested in establishing whether the presence of foreign banks improves firm access to finance. For that purpose, we use two indicators of financial inclusion:

Credit access and *Credit constraint* as defined above. We first examine all firms together and then run the estimations according to the size of the firms. We use the share of the number of foreign banks (cross-border pan-African banks) over the total number of banks as the measure of foreign banks presence (cross-border pan-African banks presence). We use the values of these indicators the year before the survey. That is, for instance, in Benin where the survey is conducted in 2009, we use the values of these indicators for the banking sector in 2008.

The results of the estimations are reported in Table 17 and Table 18. At a first glance, it appears that an increase in the shares of foreign banks increases the probability of credit access in the WAEMU region. As a corollary, a larger presence of foreign banks reduces the credit constraint of firms. Cross-border pan African banks, however, have a much higher impact on facilitating firm access to credit than the other foreign banks. Additional analyses show that the effect is greater for small and medium sized firms. Furthermore, we compute the ratio of the number of cross-border pan-African banks over the total number of foreign banks to gauge the relative effect of cross-border pan-African banks, compared with other foreign owned banks. This ratio is positively (resp. negatively) and significantly related to the access to credit (resp. credit constraint). It indicates that cross border pan-African banks have more marginal effects on firm access to credit than the typical foreign bank from outside the continent.

Overall, a larger presence of foreign banks leads to a greater availability of credit to SMEs, but does not alleviate the credit constraint of large firms. This may be explained by the fact that large firms are usually less financially constrained, and even sometimes not at all, because they have access to various sources of financing, which is not the case for small and medium sized firms[16]. This is very noticeable in the countries under study, where firms rely mostly on bank loans as formal way of financing their activities. Our results are consistent with the findings of Beck (2014), Beck *et al.* (2004) and Berger *et al.* (2004), who found that foreign banks entry improves financing conditions for firms, especially SMEs, but using different country sample.

We also include in the regression the level of banking sector capitalization within each country by using the ratio of total bank equity divided by country GDP. Similar to the case of the other country-specific control variables, we use the value of this indicator the year before the survey in the estimations. We take into account non-linear effect of bank capital on access

[16] This result is consistent with the prior literature (e.g., Ongena and Popov, 2016): small firms and sole proprietorships are more credit constrained.

to credit by using the square of the equity to GDP ratio. The results show a non-linear effect of bank equity on access to credit. The likelihood of access to credit decreases with equity to GDP until the equity to GDP ratio reaches a certain level (a threshold). After this threshold, bank capital has a positive effect on the likelihood of access to credit[17]. Therefore, lower level of bank capital reinforces the credit constraint of firms. Our findings support the view that a high level of bank capital enhances the lending ability of banks. Interestingly, the WAEMU banking regulator has adopted recently new capital adequacy rules in the spirit of Basel III which became effective in January 1st, 2018[18] to promote a healthy, strong and stable banking and financial system, which in turn, is expected to effectively contribute to the financing of the economic development of WAEMU member States. This finding shows that the current regulatory framework of the WAEMU banking sector can benefit companies.

[17] The correlation between equity, deposits and total assets (in percent of GDP) is high (more than 90%). Therefore, using these indicators leads to qualitatively similar results.

[18] BCEAO, "Dispositif prudentiel applicable aux établissements de crédit et aux compagnies financières de l'Union Monétaire Ouest Africaine", Annexe de la Décision 013 du 24/06/2016.

Table 17: Results on credit-access

This table reports the estimation results for the Probit model with access to credit as dependant variable. We control for Equity-to-GDP ratio. Due to the high correlation between Equity-to-GDP ratio, Deposits-to-GDP ratio and Asset-to-GDP ratio (>90%), we do not add these last two variables as additional controls. Furthermore, we do not add country fixed effects because of macro-variables which do not vary for a given round of survey and the short number of survey rounds. All the macro controls are lagged. The raw data for computing firm-specific variables were obtained from the World Bank Enterprise Survey, while the data for computing the rest of the variables were obtained from the BCEAO. The differences in the sample size (full sample) is due to missing values in the dependant variable. We are not able to compute coefficient for the "less than 50,000 inhabitants" modality because the sample size is not sufficient when we split the sample by size. Robust standard errors are in parentheses. ***p<0.01, **p<0.05, *p<0.1.

	Full sample			Small firms (5-19 employees)			Medium firms (20-99 employees)			Large firms (more 100 employees)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Cross-border pan-African banks presence	2.649***			3.057***			2.004***			1.383**		
	(0.199)			(0.276)			(0.363)			(0.601)		
Foreign owned banks presence		2.488***			2.470***			1.948***			1.396**	
		(0.258)			(0.363)			(0.452)			(0.706)	
Ratio Cross-border pan-African/Foreign			2.966***			3.813***			2.202***			1.460*
			(0.261)			(0.359)			(0.510)			(0.875)
Equity-to-GDP ratio	-0.790***	-0.664***	-0.788***	-0.508***	-0.364*	-0.457**	-0.709***	-0.626***	-0.617***	0.599	0.779	0.743
	(0.122)	(0.123)	(0.123)	(0.187)	(0.194)	(0.187)	(0.239)	(0.238)	(0.237)	(0.527)	(0.510)	(0.529)
(Equity-to-GDP ratio)^2	0.086***	0.084***	0.072***	0.052**	0.050**	0.026	0.071**	0.072**	0.049*	-0.074	-0.086	-0.097*
	(0.014)	(0.015)	(0.014)	(0.022)	(0.023)	(0.022)	(0.028)	(0.029)	(0.028)	(0.060)	(0.059)	(0.058)
Firm age	0.116***	0.139***	0.143***	0.056	0.095**	0.101***	0.106*	0.125**	0.112*	0.221**	0.224**	0.224**
	(0.029)	(0.029)	(0.028)	(0.040)	(0.040)	(0.039)	(0.059)	(0.059)	(0.058)	(0.095)	(0.095)	(0.095)
Size (Population) of the city where the firm operates (Ref.: capital city)												
Over 1 million	-0.184***	-0.345***	0.010	-0.174**	-0.348***	0.099	-0.392***	-0.505***	-0.234*	0.139	0.055	0.259
	(0.059)	(0.058)	(0.062)	(0.082)	(0.079)	(0.085)	(0.111)	(0.109)	(0.120)	(0.182)	(0.184)	(0.200)
250,000 to 1 million	-0.151**	-0.277***	-0.042	-0.011	-0.178*	0.192**	-0.422***	-0.500***	-0.355**	-0.066	-0.091	-0.002
	(0.071)	(0.071)	(0.073)	(0.091)	(0.091)	(0.093)	(0.155)	(0.153)	(0.159)	(0.333)	(0.337)	(0.328)
50,000 to 250,000	-0.275***	-0.567***	-0.062	-0.323***	-0.653***	-0.006	-0.347*	-0.577***	-0.168	-0.195	-0.386	-0.091
	(0.094)	(0.092)	(0.100)	(0.124)	(0.122)	(0.131)	(0.185)	(0.182)	(0.196)	(0.311)	(0.304)	(0.345)
Less than 50,000	-0.281	-0.500	-0.147							0.839	0.713	0.888
	(0.485)	(0.481)	(0.491)							(0.687)	(0.680)	(0.690)
Industrial sector (Ref.: manufacturing)												
Service	0.126**	0.132***	0.140***	0.144**	0.136**	0.129*	0.045	0.062	0.050	-0.113	-0.094	-0.042
	(0.050)	(0.049)	(0.049)	(0.066)	(0.065)	(0.066)	(0.099)	(0.099)	(0.099)	(0.182)	(0.181)	(0.174)
Other	0.300***	0.292***	0.280***	0.388***	0.388***	0.332***	0.310**	0.300**	0.288**	-0.054	-0.048	-0.016
	(0.071)	(0.071)	(0.070)	(0.104)	(0.105)	(0.103)	(0.136)	(0.136)	(0.133)	(0.212)	(0.210)	(0.211)
Legal status of the firm (Ref.: shareholding company with shares traded)												
Shareholding company with non-traded share	0.066	0.028	-0.054	0.002	-0.069	-0.167	-0.115	-0.154	-0.186	0.247	0.265	0.179
	(0.119)	(0.117)	(0.117)	(0.207)	(0.200)	(0.197)	(0.203)	(0.200)	(0.207)	(0.226)	(0.228)	(0.225)
Sole proprietorship	-0.531***	-0.609***	-0.599***	-0.416**	-0.537***	-0.519***	-0.785***	-0.864***	-0.789***	-0.455*	-0.480*	-0.501**
	(0.115)	(0.112)	(0.113)	(0.195)	(0.186)	(0.185)	(0.196)	(0.193)	(0.202)	(0.247)	(0.245)	(0.246)
Partnership	-0.333**	-0.463***	-0.391**	-0.175	-0.339	-0.303	-0.489	-0.634**	-0.462	-0.134	-0.216	-0.129
	(0.162)	(0.159)	(0.159)	(0.251)	(0.241)	(0.244)	(0.301)	(0.294)	(0.303)	(0.384)	(0.381)	(0.390)
Limited partnership	-0.112	-0.263	-0.158	0.216	-0.012	0.170	-0.531*	-0.681**	-0.531*	0.272	0.230	0.233
	(0.181)	(0.178)	(0.183)	(0.322)	(0.314)	(0.317)	(0.315)	(0.311)	(0.321)	(0.408)	(0.408)	(0.409)
Other	0.087	0.022	-0.016	0.225	0.098	0.052	-0.041	-0.099	-0.079	0.070	0.074	0.047
	(0.142)	(0.138)	(0.139)	(0.242)	(0.232)	(0.231)	(0.238)	(0.234)	(0.242)	(0.278)	(0.276)	(0.275)

Firm size (Ref.: micro)												
Small	0.065	-0.007	0.247***									
	(0.071)	(0.075)	(0.070)									
Medium	0.463***	0.385***	0.675***									
	(0.080)	(0.083)	(0.078)									
Large	0.720***	0.615***	0.948***									
	(0.105)	(0.107)	(0.104)									
Constant	-0.656**	-1.331***	-1.431***	-1.355***	-1.909***	-2.373***	0.472	-0.144	-0.078	-2.456**	-3.216***	-2.979***
	(0.281)	(0.315)	(0.312)	(0.431)	(0.480)	(0.462)	(0.526)	(0.583)	(0.574)	(1.099)	(1.115)	(1.105)
Observations	4,546	4,546	4,546	2,638	2,638	2,638	913	913	913	325	325	325
R2	0.179	0.165	0.168	0.115	0.0840	0.110	0.126	0.118	0.116	0.081	0.078	0.075
Wald Stat	769.7	715.1	719.4	241.7	179.1	227.9	141.2	130.7	130.6	33.77	32.28	31.56
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.006	0.007

Table 18: Results on credit-constraint

This table reports the estimation results for the Probit model with credit constraint as dependant variable. We control for Equity-to-GDP ratio. Due to the high correlation between Equity-to-GDP ratio, Deposits-to-GDP ratio and Asset-to-GDP ratio (>90%), we do not add these last two variables as additional controls. Furthermore, we do not add country fixed effects because of macro-variables which do not vary for a given round of survey and the short number of survey rounds. All the macro controls are lagged. The raw data for computing firm-specific variables were obtained from the World Bank Enterprise Survey, while the data for computing the rest of the variables were obtained from the BCEAO. The differences in the sample size (full sample) is due to missing values in the dependant variable. We are not able to compute coefficient for the "less than 50,000 inhabitants" modality because the sample size is not sufficient when we split the sample by size. Robust standard errors are in parentheses. ***p<0.01, **p<0.05, *p<0.1.

	Full sample			Small firms (5-19 employees)			Medium firms (20-99 employees)			Large firms (more 100 employees)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Cross-border pan-African banks presence	-1.877***			-1.878***			-1.831***			0.154		
	(0.198)			(0.246)			(0.425)			(0.678)		
Foreign owned banks presence		-1.277***			-1.390***			-1.320***			1.158	
		(0.213)			(0.274)			(0.459)			(0.707)	
Ratio Cross-border pan-African/Foreign			-2.506***			-2.158***			-2.929***			-1.718
			(0.243)			(0.298)			(0.564)			(1.106)
Equity-to-GDP ratio	0.303***	0.188*	0.385***	0.028	-0.085	0.034	0.570**	0.415*	0.617**	-0.517	-0.751	-0.003
	(0.113)	(0.111)	(0.115)	(0.156)	(0.155)	(0.157)	(0.236)	(0.231)	(0.240)	(0.587)	(0.546)	(0.727)
(Equity-to-GDP ratio)^2	-0.028**	-0.023*	-0.025*	-0.000	0.003	0.011	-0.060**	-0.051*	-0.049*	0.063	0.092	0.019
	(0.013)	(0.013)	(0.013)	(0.018)	(0.019)	(0.018)	(0.028)	(0.028)	(0.029)	(0.068)	(0.064)	(0.080)
Firm age	-0.051**	-0.077***	-0.063**	0.001	-0.025	-0.024	-0.124**	-0.151**	-0.116*	-0.138	-0.149	-0.119
	(0.025)	(0.025)	(0.025)	(0.033)	(0.032)	(0.032)	(0.062)	(0.061)	(0.062)	(0.109)	(0.113)	(0.108)
Size (Population) of the city where the firm operates (Ref.: capital city)												
Over 1 million	-0.066	0.079	-0.240***	-0.124*	0.025	-0.271***	0.090	0.216*	-0.125	0.028	-0.008	-0.141
	(0.054)	(0.052)	(0.061)	(0.068)	(0.065)	(0.076)	(0.118)	(0.114)	(0.136)	(0.225)	(0.235)	(0.269)
250,000 to 1 million	-0.117*	0.005	-0.254***	-0.215***	-0.084	-0.346***	-0.064	0.033	-0.215	0.043	0.049	-0.088
	(0.064)	(0.062)	(0.068)	(0.080)	(0.078)	(0.086)	(0.172)	(0.167)	(0.180)	(0.357)	(0.360)	(0.369)
50,000 to 250,000	-0.125	0.087	-0.360***	-0.182**	0.040	-0.375***	0.017	0.216	-0.282	0.317	0.326	-0.051
	(0.078)	(0.076)	(0.088)	(0.091)	(0.088)	(0.103)	(0.192)	(0.183)	(0.213)	(0.341)	(0.339)	(0.385)
Less than 50,000	0.159	0.343	-0.023									
	(0.523)	(0.526)	(0.531)									
Industrial sector (Ref.: manufacturing)												
Service	-0.080*	-0.081*	-0.092**	-0.066	-0.059	-0.061	-0.097	-0.110	-0.098	0.088	0.023	0.143
	(0.044)	(0.044)	(0.044)	(0.055)	(0.054)	(0.055)	(0.106)	(0.105)	(0.106)	(0.221)	(0.219)	(0.210)
Other	-0.159**	-0.155**	-0.136**	-0.357***	-0.369***	-0.315***	-0.239	-0.228	-0.214	0.004	-0.018	0.018
	(0.066)	(0.066)	(0.066)	(0.099)	(0.099)	(0.098)	(0.155)	(0.154)	(0.154)	(0.271)	(0.269)	(0.273)
Legal status of the firm (Ref.: shareholding company with shares traded)												
Shareholding company with non-traded share	0.061	0.119	0.139	-0.004	0.058	0.111	0.314	0.378	0.356	0.125	0.172	0.142
	(0.148)	(0.145)	(0.145)	(0.218)	(0.213)	(0.211)	(0.314)	(0.309)	(0.314)	(0.324)	(0.332)	(0.310)
Sole proprietorship	0.656***	0.745***	0.698***	0.539***	0.638***	0.624***	0.944***	1.043***	0.909***	0.772**	0.820**	0.718**
	(0.141)	(0.138)	(0.138)	(0.205)	(0.199)	(0.198)	(0.303)	(0.297)	(0.303)	(0.333)	(0.335)	(0.323)
Partnership	0.426**	0.539***	0.452***	0.368	0.478**	0.460*	0.659*	0.814**	0.541	0.331	0.362	0.185
	(0.173)	(0.170)	(0.171)	(0.242)	(0.236)	(0.236)	(0.390)	(0.385)	(0.392)	(0.507)	(0.505)	(0.506)
Limited partnership	0.403**	0.535***	0.400**	0.377	0.518*	0.436	0.507	0.659*	0.431			
	(0.195)	(0.193)	(0.193)	(0.313)	(0.308)	(0.307)	(0.400)	(0.395)	(0.403)			
Other	0.191	0.273*	0.252	0.069	0.169	0.186	0.349	0.429	0.344	0.301	0.314	0.308
	(0.169)	(0.165)	(0.165)	(0.250)	(0.245)	(0.243)	(0.345)	(0.338)	(0.344)	(0.371)	(0.375)	(0.369)
Firm size (Ref.: micro)												
Small	0.237***	0.255***	0.090									
	(0.061)	(0.064)	(0.060)									
Medium	-0.085	-0.068	-0.261***									

	(0.074)	(0.077)	(0.073)									
Large	-0.313***	-0.277**	-0.510***									
	(0.112)	(0.113)	(0.111)									
Constant	-0.480*	-0.292	0.191	0.421	0.706*	0.830**	-1.233**	-0.874	-0.378	-0.193	-0.547	-0.095
	(0.281)	(0.301)	(0.306)	(0.378)	(0.406)	(0.398)	(0.573)	(0.620)	(0.654)	(1.327)	(1.338)	(1.596)
Observations	4,293	4,293	4,293	2,488	2,488	2,488	870	870	870	306	306	306
R2	0.083	0.072	0.084	0.047	0.036	0.044	0.091	0.078	0.098	0.059	0.065	0.068
Wald Stat	402.1	363	435.5	143.3	111.1	143.4	80.86	71.02	93.59	18.4	20.58	19.93
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.143	0.082	0.097

For further analysis, we investigate whether the effects of foreign ownership structure vary across economic sectors. For that purpose, we split our sample into three sub-samples according to the industrial sector (manufacturing, services, and others) and redo the same Probit regression on each sub-sample. Table 19 reports the results of the regression with Credit access as dependant variable. From the results, we conclude that the expansion of cross-border banks has increased lending to firms in each of the economic sectors. Nonetheless, firms in sectors other than manufacturing and services do benefit the most. The marginal effect of an increase in cross-border banking activities is 0.56 for firms operating in the manufacturing sector, 0.68 for firms operating in the services sector, and 1.03 for firms operating in other sectors. An increase in the ratio of cross-border banks leads to an increase in the lending to the firms operating in these other industries. We find qualitatively similar results with credit constraint as dependant variable as well (see Table 20).

Table 21 displays additional robustness regression results which take into account the small proportion of firms having access to bank credit or financially constrained. In fact, a low number of one may bias logistic or probit regression. For this purpose, we use penalized maximum likelihood logistic regression proposed by Firth (1993) and implemented by Heinze and Schemper (2002) in the case of the logistic regression. In addition, we implement the procedure suggested in King and Zeng (2001) that takes into account small samples and rare events to generate approximately unbiased and lower-variance estimates of logit coefficients. The results of both approaches confirm our previous findings.

Table 19: Results on credit-access by industry sector

This table reports the estimation results for the Probit model with access to credit as dependant variable. The raw data for computing firm-specific variables were obtained from the World Bank Enterprise Survey, while the data for computing the rest of the variables were obtained from the BCEAO. We are not able to compute coefficient for the "less than 50,000 inhabitants" modality because the sample size is not sufficient when we split the sample by sector. Robust standard errors are in parentheses. ***p<0.01, **p<0.05, *p<0.1.

	Manufacturing			Service			Other		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cross-border pan-African banks presence	2.402***			2.616***			4.541***		
	(0.327)			(0.282)			(0.654)		
Foreign owned banks presence		1.955***			2.452***			5.316***	
		(0.428)			(0.336)			(0.785)	
Ratio Cross-border pan-African/Foreign			3.138***			2.779***			5.886***
			(0.419)			(0.370)			(1.050)
Equity-to-GDP ratio	-0.638***	-0.505**	-0.657***	-0.654***	-0.569***	-0.626***	-2.276***	-1.331**	-2.814***
	(0.201)	(0.204)	(0.200)	(0.174)	(0.173)	(0.173)	(0.584)	(0.521)	(0.671)
(Equity-to-GDP ratio)^2	0.072***	0.068***	0.058**	0.065***	0.067***	0.048**	0.246***	0.158***	0.290***
	(0.023)	(0.024)	(0.023)	(0.021)	(0.021)	(0.021)	(0.062)	(0.056)	(0.070)
Firm age	0.059	0.083*	0.087**	0.113***	0.139***	0.133***	0.223***	0.214***	0.274***
	(0.045)	(0.045)	(0.044)	(0.043)	(0.042)	(0.042)	(0.082)	(0.082)	(0.079)
Size (Population) of the city where the firm operates (Ref.: capital city)									
Over 1 million	-0.349***	-0.478***	-0.099	-0.084	-0.291***	0.145	-0.028	0.014	-0.162
	(0.095)	(0.094)	(0.099)	(0.087)	(0.085)	(0.097)	(0.166)	(0.168)	(0.160)
250,000 to 1 million	-0.155	-0.275**	0.025	-0.126	-0.272***	0.017	-0.027	0.065	-0.299
	(0.116)	(0.114)	(0.118)	(0.103)	(0.101)	(0.107)	(0.203)	(0.209)	(0.190)
50,000 to 250,000	-0.417***	-0.695***	-0.123	-0.160	-0.453***	0.060	-0.744	-0.842*	-0.801*
	(0.139)	(0.138)	(0.148)	(0.130)	(0.127)	(0.142)	(0.469)	(0.482)	(0.460)
Less than 50,000				0.237	-0.025	0.330			
				(0.619)	(0.618)	(0.633)			
Legal status of the firm (Ref.: shareholding company with shares traded)									
Shareholding company with non-traded share	0.058	-0.006	-0.077	0.018	-0.005	-0.058	0.211	0.238	0.098
	(0.178)	(0.176)	(0.173)	(0.199)	(0.198)	(0.194)	(0.278)	(0.278)	(0.274)
Sole proprietorship	-0.576***	-0.688***	-0.660***	-0.481**	-0.548***	-0.496***	-0.573**	-0.592**	-0.595**
	(0.173)	(0.169)	(0.167)	(0.190)	(0.189)	(0.186)	(0.270)	(0.269)	(0.267)
Partnership	-0.131	-0.291	-0.232	-0.284	-0.397*	-0.289	-0.993**	-1.117**	-0.982**
	(0.255)	(0.250)	(0.249)	(0.242)	(0.241)	(0.238)	(0.445)	(0.444)	(0.440)
Limited partnership	-0.112	-0.303	-0.181	-0.342	-0.503	-0.296	0.267	0.242	0.218
	(0.275)	(0.271)	(0.272)	(0.309)	(0.308)	(0.306)	(0.439)	(0.441)	(0.437)
Other	0.077	-0.027	-0.045	0.180	0.136	0.120	-0.024	-0.082	-0.030
	(0.228)	(0.221)	(0.222)	(0.220)	(0.219)	(0.216)	(0.330)	(0.328)	(0.328)
Firm size (Ref.: micro)									
Small	0.365**	0.320*	0.564***	-0.179*	-0.270**	-0.045	0.095	-0.007	0.366**
	(0.164)	(0.169)	(0.157)	(0.108)	(0.110)	(0.106)	(0.193)	(0.201)	(0.178)
Medium	0.843***	0.780***	1.059***	0.201*	0.120	0.391***	0.368*	0.276	0.617***
	(0.173)	(0.178)	(0.167)	(0.119)	(0.121)	(0.118)	(0.211)	(0.217)	(0.200)
Large	1.238***	1.124***	1.434***	0.291*	0.207	0.576***	0.312	0.201	0.634**
	(0.195)	(0.196)	(0.191)	(0.174)	(0.176)	(0.170)	(0.267)	(0.274)	(0.254)
Constant	-0.983**	-1.394***	-1.965***	-0.532	-1.106**	-1.241***	1.607	-2.064	0.984
	(0.459)	(0.516)	(0.511)	(0.396)	(0.436)	(0.442)	(1.290)	(1.263)	(1.345)
Observations	1,905	1,905	1,905	1,993	1,993	1,993	647	647	647
R2	0.199	0.182	0.199	0.150	0.135	0.136	0.288	0.286	0.264
Wald Stat	333.3	315.5	341.3	326.7	294.5	296.7	213.4	212.2	195.5
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 20: Results on credit constraint by industry sector

This table reports the estimation results for the Probit model with credit constraint as dependant variable. The raw data for computing firm-specific variables were obtained from the World Bank Enterprise Survey, while the data for computing the rest of the variables were obtained from the BCEAO. We are not able to compute coefficient for the "less than 50,000 inhabitants" modality because the sample size is not sufficient when we split the sample by sector. Robust standard errors are in parentheses. ***p<0.01, **p<0.05, *p<0.1.

	Manufacturing			Service			Other		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cross-border pan-African banks presence	-1.512***			-2.117***			-2.175***		
	(0.305)			(0.283)			(0.670)		
Foreign owned banks presence		-0.930***			-1.394***			-2.111***	
		(0.352)			(0.312)			(0.736)	
Ratio Cross-border pan-African/Foreign			-2.235***			-2.804***			-3.348***
			(0.378)			(0.362)			(1.108)
Equity-to-GDP ratio	0.172	0.084	0.236	0.435**	0.323*	0.501***	0.152	-0.350	0.763
	(0.172)	(0.171)	(0.172)	(0.180)	(0.177)	(0.182)	(0.556)	(0.518)	(0.696)
(Equity-to-GDP ratio)^2	-0.020	-0.017	-0.016	-0.039*	-0.036*	-0.031	0.006	0.052	-0.051
	(0.020)	(0.020)	(0.020)	(0.021)	(0.021)	(0.021)	(0.060)	(0.056)	(0.072)
Firm age	0.005	-0.018	-0.005	-0.064*	-0.096**	-0.075*	-0.137**	-0.139**	-0.153**
	(0.040)	(0.039)	(0.039)	(0.039)	(0.038)	(0.039)	(0.067)	(0.067)	(0.066)
Size (Population) of the city where the firm operates (Ref.: capital city)									
Over 1 million	-0.021	0.074	-0.187**	-0.079	0.125	-0.333***	-0.161	-0.137	-0.107
	(0.084)	(0.082)	(0.094)	(0.081)	(0.077)	(0.096)	(0.170)	(0.169)	(0.164)
250,000 to 1 million	-0.188*	-0.094	-0.342***	-0.148	0.001	-0.351***	0.085	0.097	0.173
	(0.103)	(0.101)	(0.110)	(0.096)	(0.093)	(0.104)	(0.183)	(0.186)	(0.174)
50,000 to 250,000	-0.120	0.046	-0.345***	-0.166	0.083	-0.477***	-0.040	0.005	-0.032
	(0.116)	(0.113)	(0.130)	(0.111)	(0.108)	(0.127)	(0.374)	(0.377)	(0.371)
Less than 50,000				0.198	0.456	-0.008			
				(0.600)	(0.601)	(0.610)			
Legal status of the firm (Ref.: shareholding company with shares traded)									
Shareholding company with non-traded share	0.028	0.099	0.105	-0.022	0.019	0.029	0.599	0.588	0.650
	(0.210)	(0.207)	(0.209)	(0.242)	(0.239)	(0.245)	(0.483)	(0.478)	(0.486)
Sole proprietorship	0.599***	0.709***	0.642***	0.599***	0.672***	0.589**	1.217***	1.213***	1.233***
	(0.201)	(0.196)	(0.199)	(0.228)	(0.224)	(0.230)	(0.472)	(0.466)	(0.476)
Partnership	0.237	0.363	0.278	0.447*	0.542**	0.420	1.013*	1.045**	1.005*
	(0.275)	(0.270)	(0.274)	(0.266)	(0.262)	(0.268)	(0.535)	(0.530)	(0.538)
Limited partnership	0.154	0.308	0.178	0.536*	0.662**	0.443	0.936	0.940	0.955
	(0.290)	(0.286)	(0.288)	(0.316)	(0.313)	(0.319)	(0.583)	(0.579)	(0.586)
Other	-0.035	0.078	0.033	0.237	0.290	0.260	0.992*	1.015**	0.971*
	(0.267)	(0.261)	(0.264)	(0.260)	(0.257)	(0.263)	(0.522)	(0.515)	(0.526)
Firm size (Ref.: micro)									
Small	0.268**	0.265**	0.107	0.468***	0.505***	0.361***	-0.136	-0.125	-0.241*
	(0.110)	(0.117)	(0.108)	(0.102)	(0.103)	(0.104)	(0.147)	(0.152)	(0.139)
Medium	-0.085	-0.080	-0.266**	0.118	0.143	-0.041	-0.285	-0.273	-0.389**
	(0.128)	(0.135)	(0.126)	(0.120)	(0.121)	(0.121)	(0.190)	(0.194)	(0.184)
Large	-0.422**	-0.382**	-0.601***	0.040	0.056	-0.191	-0.361	-0.350	-0.505*
	(0.168)	(0.170)	(0.169)	(0.192)	(0.193)	(0.192)	(0.277)	(0.281)	(0.269)
Constant	-0.374	-0.319	0.343	-0.884**	-0.734	-0.095	-0.665	0.923	-0.808
	(0.428)	(0.468)	(0.471)	(0.440)	(0.468)	(0.473)	(1.323)	(1.382)	(1.420)
Observations	1,793	1,793	1,793	1,900	1,900	1,900	599	599	599
R2	0.0839	0.0756	0.0877	0.0897	0.0744	0.0913	0.117	0.113	0.115
Wald Stat	167.4	158.2	180.7	223.1	185	227.1	87.70	85.16	86.45
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 21: Results from relogit and firthlogit models

This table reports the estimation results using relogit and firthlogit models. These models deal with the small number of one in the sample. The raw data for computing firm-specific variables were obtained from the World Bank Enterprise Survey, while the data for computing the rest of the variables were obtained from the BCEAO. Robust standard errors are in parentheses. ***p<0.01, **p<0.05, *p<0.1.

	Credit access						Credit constraint					
	Relogit			Firthlogit			Relogit			Firthlogit		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Cross-border pan-African banks presence	4.490***			4.490***			-3.195***			-3.195***		
	(0.347)			(0.335)			(0.339)			(0.328)		
Foreign owned banks presence		4.354***			4.354***			-2.141***			-2.141***	
		(0.468)			(0.413)			(0.352)			(0.358)	
Ratio Cross-border pan-African/Foreign			5.079***			5.079***			-4.126***			-4.126***
			(0.456)			(0.448)			(0.406)			(0.410)
Equity-to-GDP ratio	-1.372***	-1.183***	-1.357***	-1.372***	-1.183***	-1.357***	0.453**	0.276	0.591***	0.453**	0.276	0.591***
	(0.211)	(0.215)	(0.214)	(0.205)	(0.204)	(0.205)	(0.184)	(0.181)	(0.188)	(0.196)	(0.192)	(0.200)
(Equity-to-GDP ratio)2	0.148***	0.147***	0.123***	0.148***	0.147***	0.123***	-0.041*	-0.035	-0.037*	-0.041*	-0.035	-0.037
	(0.025)	(0.025)	(0.025)	(0.024)	(0.025)	(0.024)	(0.022)	(0.022)	(0.022)	(0.023)	(0.023)	(0.023)
Firm age	0.217***	0.255***	0.254***	0.217***	0.255***	0.254***	-0.076*	-0.120***	-0.100**	-0.076*	-0.120***	-0.100**
	(0.051)	(0.051)	(0.049)	(0.051)	(0.051)	(0.050)	(0.041)	(0.040)	(0.041)	(0.042)	(0.041)	(0.041)
Size (Population) of the city where the firm operates (Ref.: capital city)												
Over 1 million	-0.323***	-0.567***	0.015	-0.323***	-0.567***	0.015	-0.129	0.126	-0.404***	-0.129	0.126	-0.404***
	(0.104)	(0.101)	(0.108)	(0.102)	(0.100)	(0.109)	(0.090)	(0.085)	(0.101)	(0.090)	(0.085)	(0.101)
250,000 to 1 million	-0.278**	-0.457***	-0.107	-0.278**	-0.457***	-0.107	-0.201*	0.012	-0.419***	-0.201*	0.012	-0.419***
	(0.127)	(0.127)	(0.130)	(0.124)	(0.122)	(0.127)	(0.105)	(0.102)	(0.113)	(0.106)	(0.102)	(0.113)
50,000 to 250,000	-0.487***	-0.955***	-0.123	-0.488***	-0.955***	-0.123	-0.221*	0.140	-0.601***	-0.221*	0.140	-0.601***
	(0.173)	(0.169)	(0.181)	(0.168)	(0.165)	(0.179)	(0.129)	(0.124)	(0.145)	(0.127)	(0.123)	(0.142)
Less than 50,000	-0.323	-0.654	-0.100	-0.337	-0.668	-0.111	0.407	0.716	0.094	0.389	0.699	0.078
	(0.761)	(0.753)	(0.772)	(0.875)	(0.874)	(0.899)	(0.831)	(0.840)	(0.857)	(0.830)	(0.831)	(0.851)
Industrial sector (Ref.: manufacturing)												
Service	0.203**	0.218**	0.221**	0.203**	0.218**	0.221**	-0.129*	-0.131*	-0.148**	-0.129*	-0.131*	-0.148**
	(0.087)	(0.086)	(0.087)	(0.087)	(0.086)	(0.086)	(0.073)	(0.072)	(0.073)	(0.073)	(0.072)	(0.073)
Other	0.531***	0.516***	0.496***	0.531***	0.516***	0.496***	-0.250**	-0.249**	-0.210*	-0.250**	-0.249**	-0.210*
	(0.123)	(0.124)	(0.121)	(0.124)	(0.124)	(0.122)	(0.110)	(0.109)	(0.109)	(0.111)	(0.110)	(0.110)
Legal status of the firm (Ref.: shareholding company with shares traded)												
Shareholding company with non-traded share	0.125	0.069	-0.079	0.125	0.069	-0.079	0.124	0.211	0.233	0.124	0.211	0.233
	(0.199)	(0.194)	(0.195)	(0.192)	(0.190)	(0.188)	(0.273)	(0.268)	(0.267)	(0.268)	(0.266)	(0.267)
Sole proprietorship	-0.885***	-1.010***	-0.999***	-0.885***	-1.010***	-0.999***	1.118***	1.258***	1.169***	1.119***	1.258***	1.169***
	(0.193)	(0.187)	(0.189)	(0.185)	(0.182)	(0.182)	(0.261)	(0.255)	(0.254)	(0.255)	(0.252)	(0.254)
Partnership	-0.557**	-0.762***	-0.645**	-0.557**	-0.762***	-0.645**	0.752**	0.932***	0.777**	0.752**	0.932***	0.777**
	(0.280)	(0.272)	(0.274)	(0.270)	(0.267)	(0.266)	(0.308)	(0.303)	(0.304)	(0.303)	(0.301)	(0.303)
Limited partnership	-0.147	-0.391	-0.233	-0.148	-0.392	-0.233	0.736**	0.943***	0.713**	0.736**	0.943***	0.714**
	(0.303)	(0.297)	(0.309)	(0.298)	(0.295)	(0.298)	(0.341)	(0.338)	(0.336)	(0.340)	(0.339)	(0.340)
Other	0.164	0.058	-0.012	0.164	0.058	-0.012	0.328	0.474	0.427	0.328	0.475	0.427
	(0.242)	(0.231)	(0.233)	(0.229)	(0.224)	(0.223)	(0.307)	(0.300)	(0.300)	(0.300)	(0.297)	(0.298)
Firm size (Ref.: micro)												
Small	0.083	-0.054	0.396***	0.083	-0.054	0.396***	0.385***	0.418***	0.134	0.385***	0.418***	0.134
	(0.127)	(0.134)	(0.125)	(0.136)	(0.140)	(0.133)	(0.098)	(0.103)	(0.098)	(0.101)	(0.105)	(0.100)

Medium	0.763***	0.620***	1.128***	0.763***	0.620***	1.128***	-0.143	-0.107	-0.441***	-0.143	-0.107	-0.441***
	(0.139)	(0.144)	(0.138)	(0.146)	(0.150)	(0.144)	(0.122)	(0.127)	(0.121)	(0.125)	(0.129)	(0.124)
Large	1.181***	0.984***	1.571***	1.181***	0.984***	1.571***	-0.570***	-0.501**	-0.888***	-0.570***	-0.501**	-0.888***
	(0.181)	(0.183)	(0.180)	(0.181)	(0.183)	(0.179)	(0.197)	(0.198)	(0.195)	(0.194)	(0.196)	(0.193)
Constant	-1.049**	-2.256***	-2.398***	-1.049**	-2.256***	-2.398***	-0.676	-0.415	0.402	-0.676	-0.415	0.401
	(0.482)	(0.541)	(0.542)	(0.457)	(0.508)	(0.512)	(0.475)	(0.503)	(0.517)	(0.496)	(0.532)	(0.530)
Observations	4,546	4,546	4,546	4,546	4,546	4,546	4,293	4,293	4,293	4,293	4,293	4,293
Wald Stat				686.4	650.4	659.2				374.4	326.8	380
P-value				0.000	0.000	0.000				0.000	0.000	0.000

4. CONCLUSION

This paper studies the effects of foreign bank presence on the level of competition and lending in the WAEMU banking system. Using hand-collected bank-year data from 2000 to 2015 for the eight countries of the WAEMU region and the World Bank Enterprise Surveys data (2005-2016), we find that the increasing cross-border pan-African banks activities in the region's countries, has improved competition within the banking sector, while at the same time, it has increased access to bank loans for small and medium sized firms.

We uncover a stable correlation between the cross-border pan-African status of the bank and bank lending; specifically, the lending growth rate seems to be higher for cross-border pan-African banks. We also find robust evidence that cross border banks presence increases competition in the banking sector of WAEMU countries, which pushes banks to look for alternative sources of revenues beyond traditional lending. We conclude that cross-border banks are associated with improvements in firms' access to bank finance in the WAEMU, irrespective of whether the banks are in low income member states (Benin, Burkina Faso, Mali, Niger, Guinea-Bissau and Togo) or lower-middle income countries (Cote d'Ivoire and Senegal).

The experience in WAEMU is that commercial banks are able to set their deposits and lending rates after receiving the interest rate from the Central Bank. Outside WAEMU region, this may not always be the case. Because there are countries that have introduced interest rate cap, whereby the foreign lending may be attributed to pricing anomalies inherent in interest rate cap. In addition, the positive effect of pan-African banks presence on lending may be explained by relationship lending. Firstly, some of the pan-African banks have grown from microcredit institutions. The success of microcredit institutions relies on "soft" information which can be easily collected through a close relationship between lenders and borrowers. Through this process, pan-African banks loans do not rely heavily on collateral. Secondly, Beck et al. (2017) argue that foreign large banks have more hierarchical organisational structure that creates diseconomies in lending to smaller and more opaque firms. However, in this study we find that, as opposed to French banks, cross-border pan-African banks in the WAEMU are small (in terms of assets).

Our findings have important public policy implications. More recently the WAEMU banking regulator has issued it new banking prudential regulation in line with the Basel III guidelines, which became effective as of January 1st, 2018. In addition to this later change, the regulator had previously proceeded to the increase of the minimum capital requirement to

operate a bank within the region. Although these changes are expected to provide more capital buffer to banks and more financial stability in the region, their overall impact on access to finance remains to be proven. As shown by our results, big banks will be able to increase their lending, but access to financing for SMEs coming mainly from small and medium sized banks may remain a challenge. Special attention is therefore needed to alleviate credit constraints facing SMEs; and one way to do so, is to implement specific SMEs credit guarantee facilities and financing windows for SMEs at the regional exchange. Some of these initiatives are already underway within the region. Additionally, in the digitalization era, banks can expand their lending to SMEs by taking advantage of the new telecommunication and information technologies to offer more cost effective innovative solutions. The current rise of pan-African banks can be sustained by investing in new technologies which enable banks to go digital. Policy makers and regulators should also be sensitive to the need to promote the use of new technologies which are necessary to sustain the current rise of pan-African cross-border banks. This study will therefore help the region banking authorities improve the banking sector environment, in order to create a better environment for firms financing, especially SMEs.

In this paper, we do not consider the role of technology in shifting the bank business model. This is a separate promising idea for further research.

Overall, our findings are robust to alternative empirical specifications and use of competing measures of key variables.

REFERENCES

Andrianova, S., Baltagi, B., Demetriades, P. & Fielding, D (2015). Why do African banks lend so little? *Oxford Bulletin of Economics and Statistics* 77(3), 339-359.

Beaver, W., Kettler, P., & Scholes, M. (1970). The association between market determined and accounting determined risk measures. *The Accounting Review*, 45(4), 654-682.

Beck, T. (2015). Cross-border banking and financial deepening: The African experience. *Journal of African Economies*, 24(AERC Supplement 1), i32–i45.

Beck, T., Demirgüç-Kunt, A., & Maksimovic, V. (2004). Bank competition and access to finance: International evidence. *Journal of Money, Credit and Banking*, 627-648.

Beck, T., Fuchs, M., Singer, D., & Witte, M. (2014). Making cross-border banking work for Africa. *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Bonn and Eschborn*.

Beck, T., Ioannidou, V., & Schäfer, L. (2017). Foreigners vs. natives: Bank lending technologies and loan pricing. *Management Science*, 64(8), 3469-3970.

Berger, A.N., & Bouwman, C.H.S. (2009). Bank liquidity creation. *Review of Financial Studies*, 22(9), 3779-3837.

Berger, A. N., Buch, C. M., DeLong, G., & DeYoung, R. (2004). Exporting financial institutions management via foreign direct investment mergers and acquisitions. *Journal of International money and Finance*, 23(3), 333-366.

Berger, A. N., Clarke, G. R., Cull, R., Klapper, L., & Udell, G. F. (2005). Corporate governance and bank performance: A joint analysis of the static, selection, and dynamic effects of domestic, foreign, and state ownership. *Journal of Banking & Finance*, 29(8), 2179-2221.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115-143.

Bremus, F. M. (2015). Cross-border banking, bank market structures and market power: Theory and cross-country evidence. *Journal of Banking & Finance*, *50*, 242-259.

Buch, C. M., & DeLong, G. (2004). Cross-border bank mergers: What lures the rare animal? *Journal of Banking & Finance*, 28(9), 2077-2102.

Buchinsky, M. (1994). Changes in the US wage structure 1963-1987: Application of quantile regression. *Econometrica: Journal of the Econometric Society*, 405-458.

Cetorelli, N., & Goldberg, L. S. (2011). Global banks and international shock transmission: Evidence from the crisis. *IMF Economic Review*, 59(1), 41-76.

Cetorelli, N., & Goldberg, L. S. (2012). Follow the money: Quantifying domestic effects of foreign bank shocks in the great recession. *American Economic Review*, 102(3), 213-218.

Cihák, M., & Podpiera, R. (2005). *Bank behavior in developing countries: Evidence from East Africa* (No. 2005-2129). International Monetary Fund.

Claessens, S. & Laeven, L. (2004). What drives bank competition? Some international evidence. *Journal of Money, Credit and Banking* 36, 563–583.

Claessens, S. (2016). Global banking: Recent developments and insights from research. *Review of Finance*, rfw045v1-rfw045.

Claessens, S., & van Horen, N. (2012). Being a foreigner among domestic banks: Asset or liability? *Journal of Banking & Finance*, 36(5), 1276-1290.

Claessens, S., & van Horen, N. (2014a). Foreign banks: Trends and impact. *Journal of Money Credit and Banking*, 46(1), 295-326.

Claessens, S., & van Horen, N. (2014b). Location decisions of foreign banks and Competitor remoteness. *Journal of Money Credit and Banking*, 46(1), 145-170.

Claessens, S., & van Horen, N. (2015). The impact of the global financial crisis on banking globalization. *IMF Economic Review*, 63(4), 868-918.

Claessens, S., Demirgüç-Kunt, A., & Huizinga, H. (2001). How does foreign entry affect the domestic banking market? *Journal of Banking and Finance*, 25(5), 891–911.

Claessens, S., Hassib, O., & van Horen, N. (2016). *The role of foreign banks in trade. Working paper*. Federal Reserve Board, Bank of England.

Clarke, G. R., Cull, R., & Martinez Peria, M. S. (2001). Does foreign bank penetration reduce access to credit in developing countries? Evidence from asking borrowers. (September 2001). World Bank Policy Research Working Paper, (2716).

Correa, R. (2009). Cross-border bank acquisitions: Is there a performance effect? *Journal of Financial Services Research*, 36(2-3), 169-197.

Cull, R., & Martinez Peria, M. S. (2012). Foreign Bank Participation in Developing Countries: What Do We Know About the Drivers and Consequences of this Phenomenon? In: Caprio J. (ed.), *Encyclopedia of Financial Globalization*, London, UK: Elsevier.

Demirguc-Kunt, A., & Huizinga, H. (2000). Financial Structure and Bank Profitability. *Policy Research Working Paper* Series No. 2430. The World Bank, Washington, DC, USA.

Detragiache, E., Tressel, T., & Gupta, P. (2008). Foreign Banks in Poor Countries: Theory and Evidence. *Journal of Finance*, 63(5), 2123–2160.

DeYoung, R., & Nolle, D. E. (1996). Foreign-owned banks in the United States: Earning market share or buying it? *Journal of Money, Credit and Banking*, 28(4), 622-636.

Dietrich, A., & Wanzenried, G. (2014). The determinants of commercial banking profitability in low-, middle-, and high-Income countries. *Quarterly Review of Economics and Finance*, 54(3), 337–354.

Dimelis, S., Giotopoulos, I., & Louri, H. (2017). Can Firms Grow Without Credit? A Quantile Panel Analysis in the Euro Area. *Journal of Industry, Competition and Trade*, 17(2), 153-183.

Ehrmann, M., Gambacorta, L., Martinez-Pagés, J., Sevestre, P., & Worms, A. (2003). The effects of monetary policy in the euro area. *Oxford Review of Economic Policy*, *19*(1), 58-72.

Elsas, R. (2005). Empirical determinants of relationship lending. *Journal of Financial Intermediation*, 14(1), 32-57.

Focarelli, D., & Pozzolo, A. F. (2005). Where do banks expand abroad? An empirical analysis. *Journal of Business*, 78(6), 2435-2464.

Gambacorta, L. (2005). Inside the bank lending channel. *European Economic Review*, 49(7), 1737-1759.

Gelos, R. G., & Roldós, J. (2004). Consolidation and market structure in emerging market banking systems. *Emerging Markets Review*, 5(1), 39-59.

Giannetti, M., & Ongena, S. (2012). "Lending by example": Direct and indirect effects of foreign banks in emerging markets. *Journal of International Economics*, 86(1), 167-180.

Goldberg, L. G., & Saunders, A. (1980). The causes of US bank expansion overseas: The case of Great Britain. *Journal of Money, Credit and Banking*, 12(4), 630-643.

Guzman, Mark G. (2000). "Bank structure, capital accumulation and growth: a simple macroeconomic model". *Economic Theory*, 16, 421-455.

Grosse, R., & Goldberg, L. G. (1991). Foreign bank activity in the United States: An analysis by country of origin. *Journal of Banking & Finance*, 15(6), 1093-1112.

Hansen, L. P., Heaton, J., & Yaron, A. (1996). Finite-sample properties of some alternative GMM estimators. *Journal of Business & Economic Statistics*, 14(3), 262-280.

Haselmann, R., & Wachtel, P. (2010). Institutions and bank behavior: legal environment, legal perception, and the composition of bank lending. *Journal of Money, Credit and Banking*, 42(5), 965-984.

Imam, P., & Kolerus, C. (2013). *West African Economic and Monetary Union: Financial Depth and Macrostability*. International Monetary Fund.

Ivashina, V., & Scharfstein, D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial economics*, 97(3), 319-338.

Jeon, B. N., Wu, J., Chen, M., & Wang, R. (2016). Do foreign banks take more risk? Evidence from emerging economies. *SSRN Working Paper*.

Kashyap, A. K., & Stein, J. C. (2000). What do a million observations on banks say about the transmission of monetary policy? *American Economic Review*, 407-428.

Kireyev, A. (2015). *How to Improve the Effectiveness of Monetary Policy in the West African Economic and Monetary Union*, IMF Working Paper No. 15/99, The International Monetary Fund, Washington D.C.

Koetter, M., Kolari, J. W., & Spierdijk, L. (2012). Enjoying the quiet life under deregulation? Evidence from adjusted Lerner indices for US banks. *Review of Economics and Statistics*, 94(2), 462-480.

Kodongo, O., Natto, D., & Biekpe, N. (2015). Explaining cross-border bank expansion in East Africa. *Journal of International Financial Markets, Institutions and Money*, 36, 71-84.

Léon, F. (2015) "Does bank competition alleviate credit constraints in developing countries?". *Journal of Banking and Finance*, 57, 130-142.

Léon, F. (2016). Does the expansion of regional cross-border banks affect competition in Africa? Indirect evidence. *Research in International Business and Finance*, 37, 66–77.

Lepetit, L., & Strobel, F. (2013). Bank Insolvency Risk and Time-Varying Z-Score Measures. *Journal of International Financial Markets, Institutions and Money*, 25, 73-87.

Levieuge, G. (2005). Les banques comme vecteurs et amplificateurs des chocs financiers: le canal du capital bancaire. *Economie internationale*, (4), 65-95.

Levine, R. (1996). Foreign Banks, Financial Development, and Economic Growth. In *International Financial Markets: Harmonization versus Competition*, ed., Claude E. Barfield, Washington, D.C.: The AEI Press, Chap. 6, 224-254.

Levine, R. (1998). The legal environment, banks, and long-run economic growth. *Journal of Money, Credit and Banking*, 30(3), 596-613.

Love, I., & Martínez Pería, M. S. (2014). How bank competition affects firms' access to finance. *The World Bank Economic Review*, 29(3), 413-448.

Machado, J.A.F., Parente, P.M.D.C., & Santos Silva, J.M.C. (2011). *QREG2: Stata module to perform quantile regression with robust and clustered standard errors*. Statistical Software Components S457369, Boston College Department of Economics.

Mishra, P., Montiel, P. J., & Spilimbergo, A. (2012). Monetary transmission in low-income countries: Effectiveness and policy implications. *IMF Economic Review*, 60(2), 270–302.

Mishra, P., Montiel, P., Pedroni, P., & Spilimbergo, A. (2014). Monetary policy and bank lending rates in low-income countries: Heterogeneous panel estimates. *Journal of Development Economics*, 111, 117-131.

Pelletier, A. (2018). Performance of foreign banks in developing countries: Evidence from sub-Saharan African banking markets. *Journal of Banking and Finance*, 88, 292–311.

Popov, A., & Udell, G. F. (2012). Cross-border banking, credit access, and the financial crisis. *Journal of International Economics*, 87(1), 147-161.

Powell, D. (2016). Quantile regression with nonadditive fixed effects. Available at: http://works.bepress.com/david_powell/1/

Ryan, R. M., O'Toole, C. M., & McCann, F. (2014). Does bank market power affect SME financing constraints? *Journal of Banking & Finance*, 49, 495-505.

Sacerdoti, E. (2005). Access to bank credit in sub-Saharan Africa: key issues and reform strategies. *IMF Working Paper* 05/166.