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Alexandra Zins & Laurent Weill

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Université de Strasbourg
Pôle Européen de Gestion et d'Economie
61 avenue de la Forêt Noire
67085 Strasbourg Cedex
http://large.em-strasbourg.eu/

IFS
Institut de Finance
de Strasbourg

Do Pan-African Banks Have the Best of Both Worlds?

Alexandra Zins
University of Strasbourg

Laurent Weill*
EM Strasbourg Business School, University of Strasbourg

Abstract

There has been a large expansion of foreign banks in Africa over the two decades with Pan-African banks playing a key role in this phenomenon. This paper questions if this development is beneficial for bank efficiency in African countries by investigating if Pan-African banks are more efficient than other types of foreign banks and domestic banks. We analyze the relation between ownership type and bank efficiency on a large sample of African banks covering 39 African countries over the period 2002-2015. We find that Pan-African banks are the most efficient banks in African banking industries. We explain this finding by the fact that these banks combine the best of both worlds: they have the global advantages of foreign banks and the home field advantages of domestic banks. They are then able to be more efficient than foreign banks from developed countries but also than domestic banks. This suggests that favoring entry of Pan-African banks would be beneficial to bank efficiency in Africa.

JEL Codes: G21, G32, N27.
Keywords: Africa, bank, efficiency, ownership.

* Corresponding author. Institut d'Etudes Politiques, Université de Strasbourg, 47 avenue de la Forêt Noire, 67082 Strasbourg Cedex. Email: laurent.weill@unistra.fr

1. Introduction

There has been a large expansion of foreign banks in Africa over the last two decades. According to Beck et al. (2014), the number of cross-border banks present on the continent increased from 120 in 1995 to 227 in 2009. Liberalization and privatization reforms enforced on the continent associated with increased integration of Africa in international trade have contributed to favor this evolution.

This trend is comparable to what has been observed in other emerging and developing countries, such as European transition countries and Latin American countries in the 90s. However foreign bank expansion in Africa presents a major difference. While the development of foreign banks in other regions of the world has been fueled by banks from developed countries, in Africa it associates foreign banks from countries of the same continent with Pan-African banks (PABs).

PABs are banks headquartered in African countries that expand their activities on the African continent. Their expansion has mainly occurred since the mid-2000s leading to a very important role in African banking systems today. They are present in 36 African countries, with the seven major PABs having activities in at least ten African countries (Enoch, Mathieu and Mecagni, 2015).

The expansion of PABs raises major questions about its consequences on bank efficiency. Literature on the relation between foreign bank ownership and bank efficiency has shown that this link can vary with the country of origin of the foreign bank. Berger et al. (2000) propose two hypotheses to explain this relation. Under the home field advantage hypothesis, domestic banks are more efficient than foreign banks because they have informational advantages relative to their foreign counterparts. Their better knowledge of the local customers and environment give them an advantage. Under the global advantage hypothesis, foreign banks would be more efficient than domestic banks since they would benefit from lower costs thanks to their better management abilities and best-practice policies.

Therefore foreign banks would be more efficient in developing and emerging countries since they come from developed countries with better expertise, which would dominate the informational advantage of domestic banks (Berger, Hasan and Zhou, 2009; Karas, Schoors and Weill, 2010). But foreign banks would be less efficient in developed countries, since then domestic banks would not suffer from a disadvantage in such expertise (DeYoung and Nolle, 1996; Sathye, 2001).

The aim of this study is to examine whether PABs are more efficient than other types of banks in African countries. Our hypothesis is that PABs can combine the best of both worlds. On the one hand, they have the global advantages of foreign banks by working on a broader scale and by having better expertise from larger experience. As a consequence, they have greater efficiency than domestic banks. On the other hand, Pan-African banks have the local advantages of domestic banks with a better knowledge of local customers and environment. Their managers would have a better appraisal of the institutional framework and of the way banking activities take place in African countries, making the Pan-African banks the most efficient.

To investigate this issue, we measure cost efficiency on a large sample of African banks covering 39 African countries over the period 2002-2015. All ownership types of banks observable in Africa are considered: Pan-African banks, foreign banks from developed economies, foreign banks from developing countries, domestic private banks, and domestic state-owned banks. We analyze the relation between bank ownership and cost efficiency via the one-step stochastic frontier model proposed by Battese and Coelli (1995). This model is commonly adopted in studies comparing bank efficiency by ownership in developing and emerging countries (e.g., Fries and Taci, 2005; Karas, Schoors and Weill, 2010).

Our contribution is twofold. First, we help understanding the implications of the expansion of PABs which are still understudied. Few studies have been done to examine how the development of PABs can influence African banking systems, exceptions being Kodongo, Natto and Biekpe (2015) on the drivers of cross-border bank expansion in East Africa,Beck (2015) on the impact of the forms of foreign banks on access to finance for firms in Africa and Léon (2016) on the link between PABs and bank competition in the WAEMU region. By providing the first study on the efficiency impact of PABs, we bring information for policymakers to favor or discourage this expansion. Second, we contribute to the literature on foreign ownership and bank efficiency by analyzing the case of PABs. By studying whether PABs can combine global and local advantages to dominate domestic and other foreign banks in terms of efficiency, we add to the debate on both hypotheses pioneered by Berger et al. (2000).

The paper is organized as follows. Section 2 provides the background of the research question. Section 3 presents data and methodology. Section 4 reports the results. Section 5 provides concluding remarks.

2. Background

2.1 Cross-border banking in Africa

Foreign-owned banks' presence across the African continent has almost doubled over the past decades, increasing from 120 to 227 cross-border banks over the period 1995 to 2009 (Beck et al., 2014). This presence however differs across African countries which can be broadly divided into four groups. A first group includes a few countries with banking systems exclusively domestic such as Eritrea and Ethiopia. A second group represents the other extreme with banking systems fully dominated by foreign banks. It contains Benin, Burkina Faso, Lesotho, Madagascar, Mozambique, and Zambia. A third group gathers countries with a large market share of foreign banks with foreign bank presence controlling 60 to 80 percent of total banking assets. Botswana, Chad, Côte d'Ivoire, Guinea-Bissau, Mali, Mauritania, Namibia, Niger and Senegal belong to this category. Finally, the fourth group includes countries with lower market share of foreign banks ranging from 20 to 35 percent of total banking assets. It gathers Morocco, Nigeria, South Africa, and Kenya, which are home to many Pan-African banks.

A first type of foreign banks concerns the ones from developed countries. They are mainly European, even if some US banks are also present. For historical and economic reasons, European groups are concentrated in Anglophone countries for British banks like Standard Chartered, Francophone countries for French banks like Société Générale, and Lusophone countries for Portuguese banks like Caixa Geral de Depósitos. A second type of foreign banks comes from emerging countries with the presence of banks from China, India, Bahrain, or Pakistan. Their presence on African banking markets is a recent phenomenon.

A third type of foreign banks is PABs, which are financial institutions headquartered in African countries. This expansion has started in the 1990s but the most part of this trend has occurred since the mid-2000s. The expansion of PABs takes place through subsidiaries, with the parent bank providing a common framework – for risk sharing and internal audit for example – and centralized services – such as information technologies or centralized treasury. Most PABs resort to stand-alone subsidiaries with limited integration across affiliate networks or with parent banks in order to bring about an "indigenization" process (Beck et al., 2014). Thus, PABs are integrated but use local IT functions, local labor and local management functions.

Arising from their home markets, PABs generally spread their activities first to neighboring economies, then across the region and, for some of them, even across the continent and beyond (Beck et al., 2014). Push and pull factors explain this expansion.

Push factors are events and circumstances in the home country that drive banks to move beyond their borders. In South Africa, the end of the apartheid increased the potential for South African banks to expand abroad. In Kenya, the innovations and the increased depth of the Kenyan market allowed banks to broaden their activities across East Africa. In Nigeria, the regulatory changes increased the capabilities of banks to expand abroad.

Pull factors are opportunities in host countries that encourage a bank to expand abroad. First, economic integration favors cross-border banking. African regional economic communities allow PABs to follow their clients while trade between the African continent and emerging economies leads to the expansion of cross-border banks from developing countries, especially from China, India or Brazil (Beck et al., 2014). Second, the reduced presence of foreign banks from developed countries following the 2007 crisis has open opportunities for PABs. This has been illustrated with the acquisition of French bank Crédit Agricole's banking network in five West African countries in 2008 by the Moroccan bank Attijariwafa. A final factor has been the fact that cross-border banking has been eased thanks to the liberalization that occurred in the late 1980s and early 1990s among the continent.

Research remains however very limited on the expansion of PABs. Kodongo, Natto and Biekpe (2015) examine the drivers of cross-border bank expansion in East Africa. They analyze the factors pushing Kenyan banks to expand in three neighboring countries (Rwanda, Tanzania, and Uganda). They conclude that Kenyan banks expand abroad because of their deeper home financial markets and their more efficient operations, while the follow-the-client hypothesis does not play a role. Macroeconomic factors of the host country exert an impact on the decision to expand abroad with a positive influence of institutional quality and a negative influence of inflation perceived as a signal of macroeconomic instability.

In his investigation of bank competition in seven Western African countries, Léon (2016) shows that competition has increased over the period 2002-2009 coinciding with the rapid expansion of African banking groups and the relative decline of incumbent foreign banks from developed countries.

Beck (2015) examines the impact of cross-border banking on access to finance for firms using data on 29 African countries. He considers separately the three different forms of foreign banks in African countries (PABs, from developing countries, from developed

countries) and performs regressions to check whether their market shares influence access to finance for firms. He finds that greater market shares of PABs and of foreign banks from developing countries have a positive relation with access to finance while the relation is negative with the market share of foreign banks from developed countries.

2.2 Bank ownership and efficiency

The influence of foreign ownership on bank efficiency has been extensively tackled in the literature. We present the main results of this debate by distinguishing geographic areas.

First, a bunch of works has been done in European transition countries in which foreign banks have gradually reached a large market share during the 90s. These studies conclude to better cost efficiency of foreign banks relative to domestic banks (Weill, 2003, in the Czech Republic and Poland; Yildirim and Philippatos, 2003, in 12 transition economies; Bonin, Hasan and Wachtel, 2005, in six transition countries; Fries and Taci, 2005, in twelve transition countries; Karas, Schoors and Weill, 2010, in Russia).

Second, studies on emerging countries from Asia and Latin America tend to find greater efficiency for foreign banks. In China, Berger, Hasan and Zhou (2009) conclude that foreign banks are more cost and profit efficient than all types of domestic banks. In India, Gulati and Kumar (2016) observe that foreign banks are more profit efficient than domestic banks. In Pakistan, Bonaccorsi di Patti and Hardy (2005) find that domestic state-owned banks are less efficient than domestic private banks and foreign banks, while privatized domestic banks can outperform foreign banks. Figueira, Nellis and Parker (2009) do not find significant differences between foreign and domestic banks for a sample of 20 Latin American countries.

Third, no consensus tends to emerge from the scarce literature on Africa regarding the most efficient ownership type of banks. In a study on six West African countries over the period 1996-2004, Kablan (2007) finds that domestic private banks are more cost efficient than foreign banks, which outperform domestic state-owned banks. But Okeahalam (2008), using data for 1998-2003 for two African countries, concludes that foreign banks are less cost efficient than domestic banks in Namibia while they are more cost efficient than domestic banks in Tanzania. However Chen (2009) concludes that foreign banks are more efficient than domestic private and state-owned banks in ten Sub-Saharan African middle-income countries over the period 2000–2007. Similarly, Hauner and Peiris (2008) find that foreign banks are more efficient than any other bank type in Uganda over the period 1999–2004. Additionally,

Kirpatrick, Murinde and Tefula (2008) find that foreign bank entry enhances efficiency in a study on nine Anglophone African countries over the period 1992–1999.

Fourth, domestic banks tend to outperform foreign banks in developed countries. Overall the question of foreign ownership of banks is less studied in developed countries given the lower presence of foreign banks in these countries relative to developing and emerging countries. DeYoung and Nolle (1996) find that foreign banks are significantly less profit efficient than domestic banks in the US. Sathye (2001) points out that domestic banks are more efficient than foreign banks in Australia. On a global scale, Claessens, Demirgüc-Kunt and Huizinga (2001) investigate how foreign bank presence shapes bank performance with a cross-country sample of banks from 80 developing and developed countries over the period 1988-1995. They find that foreign banks have higher profits and interest margins than domestic banks in developing countries while the opposite is observed in developed countries.

To sum it up, literature tends to show that foreign banks would be more efficient than domestic banks in developing and emerging countries, but less efficient than domestic banks in developed countries. How can these contrasted results be interpreted? Berger et al. (2000) have proposed two key hypotheses on the link between foreign ownership and bank efficiency which can provide an explaining pattern: the home field advantage hypothesis versus the global advantage hypothesis. Under the home field advantage hypothesis, domestic banks are more efficient than foreign banks since they have informational advantages. Foreign banks can endure various managerial costs such as hard monitoring from abroad and high costs in persuading managers to work out of the country. Thus, managerial efficiency may be more complicated to ensure. Foreign banks can also suffer from having difficulties to build deposit and lending relationships with local clients. They can require more information and suffer from barriers due to country-specific characteristics, such as language, culture, law enforcement, currency, regulatory and supervisory frameworks, etc.

Under the global advantage hypothesis, foreign banks are more efficient than domestic banks and would be able to overcome the cross-border drawbacks mentioned above. They would succeed in lowering their costs by expanding abroad their superior management abilities and best-practice policies. They would also resort to better risk management expertise and would be able to reach customers with superior service quality and diversity.

Therefore, in developing countries, the global advantage hypothesis can play a greater role given the better expertise of foreign banks from developed countries, while the home field advantage hypothesis can be more relevant in developed countries in which domestic banks do not suffer from lower expertise in comparison to foreign banks.

The impact of state-ownership on bank efficiency has also been studied in the literature. We will briefly present the main conclusions.

First, Figueira, Nellis and Parker (2009) give two theories that would explain why state-owned banks may be less efficient than privately-owned banks: the principal-agent theory and the public choice theory. Under the principal-agent theory, managers' profit maximization strategies are more likely to be enhanced by private market pressures than government departments. Under the public choice theory, government agents and civil servants would be motivated by electoral goals and vote maximization. Such attitude leads to waste and inefficiencies.

Second, studies measuring state-owned banks' efficiency do not lead to the same conclusion. In their global study, Lensink, Meesters and Naaborg (2008) find that state-owned banks are generally less efficient than non-state owned banks. In transition countries, Karas, Schoors and Weill (2010) do not find any cost efficiency difference between domestic private and domestic state-owned banks in Russia, whereas Bonin, Hasan and Wachtel (2005) find that state-owned banks are least cost and profit efficient in 6 transition countries. In developing countries, Bonaccorsi di Patti and Hardy (2005) find that state-owned banks are the least efficient in Pakistan. Berger, Hasan and Zhou (2009) also conclude that Chinese state-owned Big Four banks are the least efficient. However, Bhattacharrya, Lowell and Sahay (1997) find that Indian state-owned banks have been the most efficient, followed by foreign banks and domestic private banks. Figueira, Nellis and Parker (2009) do not find significant differences between private and state-owned banks in Latin America.

Third, studies in Africa mainly conclude that privatization leads to efficiency improvements. Kablan (2007) concludes that state-owned banks are the least efficient ones in six WAEMU countries. Profitability and portfolio quality increased after the privatization of Tanzania's National Bank of Commerce (Cull and Spreng, 2011) while ROE increased and NPLs decreased in Nigeria, indicating performance improvements thanks to the privatization program launched in the early 1990s (Beck, Cull and Jerome, 2005). The privatization of Uganda Commercial Bank (UCB) to the South Pan-African bank Stanbic led to profitability improvement while no outreach deterioration was observed (Clarke, Cull and Fuchs, 2009). Finally, Omran (2007) finds that reducing state presence in banks is related to higher performance in Egypt.

From this literature, we can extract hypotheses on efficiency of banks in African countries. First, we assume that foreign banks are more efficient than domestic banks. In Africa, the global advantage hypothesis should have the upper hand over the home field advantage hypothesis in line with what has been found in studies in developing and emerging countries.

Second, our key hypothesis is that PABs are more efficient than other types of foreign banks. On the one hand, they have the global advantages of foreign banks by working on a broader scale and by having better expertise from larger experience. As a consequence, they have greater efficiency than domestic banks. On the other hand, PABs have the local advantages of domestic banks with a better knowledge of local customers and environment in comparison to other foreign banks. Their managers have a better knowledge of the institutional framework and of the way banking activities take place in African countries, which makes them suffer less than other types of foreign banks from informational disadvantages. Among others, PABs share a lot of similar characteristics like cultural features, language but also legal characteristics and even currency for economic communities. Thus PABs can also benefit from the home field advantage. In a nutshell, PABs would then combine the best of both worlds to be the most efficient banks in African banking systems.

3. Econometric framework

3.1. Methodology

In this work, we measure cost efficiency of banks. Cost efficiency measures how close a bank's cost is to its optimal cost when producing the same bundle of outputs. Distance from an efficient cost frontier can be measured using a non-parametric technique such as Data Envelopment Analysis (DEA) or a parametric technique such as the stochastic frontier approach. In our study, we resort to the stochastic frontier approach to measure cost efficiency for African banking industries as it has been widely used to estimate cost efficiency scores in the literature on foreign ownership and bank efficiency (e.g., Berger, Hasan and Zhou, 2009; Karas, Schoors and Weill, 2010). The main advantage, compared to a non-parametric approach, is in separating inefficiencies from external random shocks or data measurement errors.

Two approaches are proposed in the literature to study determinants of banking efficiency. The two-step approach, which involves first the estimation of the cost frontier,

predicts efficiency by decomposing the error term between its random and inefficiency components. The second step is the regression of efficiency scores on a set of explanatory variables. This approach entails two econometric problems. First, the first step assumes that the inefficiency terms are identically distributed, whereas the second-step regression assumes that the distributions of inefficiency terms are conditional on a set of explanatory variables. Second, including explanatory variables in a second-step regression means that the first-step frontier estimation might suffer from omitted variables bias if the explanatory variables are correlated with the variables of the cost frontier model.

Hence we use the 'one-step approach' proposed by Battese and Coelli (1995) for panel data, which solves these issues. This approach consists of estimating a model that includes the cost frontier and the equation modeling the inefficiency term as a function of several explanatory variables. The general framework can be expressed as:

$$TC_{it} = f(Y_{it}, P_{it}) + \varepsilon_{it} \quad (1)$$

where TC_{it} represents total cost for bank *i* at time *t*, Y_{it} is the vector of outputs, P_{it} the vector of input prices, and ε_{it} the error term. The error term is the sum of a random error component v_{it} , representing external shocks or data measurement errors, and a positive cost-inefficiency term u_{it}. The v_{it} is assumed to be i.i.d and normally distributed with mean 0 and standard deviation σ_v^2. u_{it} follows a truncated normal distribution (at zero) with mean $z_{it}\delta$ and standard deviation σ^2, where z_{it} is a vector of explanatory variables associated with bank inefficiency over time and δ is a vector of parameters to be estimated. Consequently, the u_{it} are independently but not identically distributed, as they are each expressed as a function of z_{it}:

$$u_{it} = z_{it}\delta + W_{it} \quad (2)$$

where W_{it} is a random variable defined by the truncation of the $N(0, \sigma^2)$ distribution, with the point of truncation $-z_{it}\delta$. The coefficients in equations (1) and (2) are then estimated simultaneously using the method of maximum likelihood.

We adopt the intermediation approach for the specification of inputs and outputs which is widely chosen in the literature (Bonaccorsi di Patti and Hardy, 2005; Hauner and Peiris, 2008; Chen, 2009). This approach considers that the bank collects deposits to transform them with labor and capital into loans. We consider two outputs: total loans and other earning assets. The inputs, whose prices are used to estimate the cost frontier, include labor, physical capital, and borrowed funds. Since data on the number of employees are not available, the price of labor is defined as the ratio of personnel expenses to total assets

following Karas, Schoors and Weill (2010). The price of physical capital is measured by the ratio of other non-interest expenses to fixed assets. The price of borrowed funds is defined as the ratio of paid interests to deposits and short-term funding. Total cost is the sum of personnel expenses, other non-interest expenses, and paid interests. Following Berger, Hasan and Zhou (2009), we employ a translog form to model the cost function of banks.

The cost frontier is given by:

$$\ln \mathrm{TC} = \beta_0 + \sum_m \alpha_m \ln y_m + \sum_n \beta_n \ln w_n + \frac{1}{2}\sum_m \sum_j \alpha_{mj} \ln y_m \ln y_j + \frac{1}{2}\sum_n \sum_k \beta_{nk} \ln w_n w_k + \sum_n \sum_m \gamma_{nm} \ln w_n \ln y_m + \varepsilon \quad (3)$$

where TC is total costs (computed as the sum of interest expenses, personnel expenses, and other operating expenses), y_m is the mth bank's output (m=1,2), w_n is the nth input price (n=1,2), and w_3 is the price of borrowed funds. For simplicity of presentation, the indices for each bank have been dropped. We consider several specifications of the cost frontier in the estimations. The basic one is as presented before, while we test the inclusion of year dummy variables and of country-specific variables to control for the evolution of technology over time and the influence of macroeconomic environment.

Following Fries and Taci (2005) among others, we use the Battese and Coelli (1995) model first to compute cost efficiency scores for each type of banks and each year. This way, we can compare efficiency by ownership type and consider the evolution over time of efficiency. In that case, the second equation of the model does not include tested determinants. We then include determinants in the second equation to analyze the relation between ownership type and efficiency.

3.2 Data and variables

The sample includes 248 banks covering 39 African countries over the period 2002–2015, which represents 2,196 observations. Unconsolidated accounting data come from the Bankscope database issued by Bureau van Dijk. Ownership information is collected from Bankscope database and from banks' websites and newspaper releases. We then build a comprehensive database that gives the ownership structure of each bank of the panel for every year.

Table 1 gives the composition of the sample by bank type for each country. For a total of 248 banks in our sample, 67 banks are Pan-African, 55 are non-African foreign banks from developed countries, 22 are foreign banks from developing countries, 90 are domestic privately-owned and 30 are domestic publicly-owned.

A bank is considered as foreign when the majority of the shares is controlled by foreign companies or when a foreign organization is the first shareholder and the rest of the shares are divided between several shareholders. The same definition is used for the other ownership types. We have five ownership types in our sample, corresponding to five dummies: *Pan African Bank, Foreign Developed, Foreign Developing, Domestic Private and Domestic Public*. Table 2 provides additional information on Pan-African banks in the sample by mentioning their home country and their host countries in Africa.

Table 3 displays descriptive statistics for variables considered in the estimation of cost efficiency scores for the full sample while Table 4 provides this information by ownership type. In terms of total assets, domestic banks – both private and public – are larger than foreign banks in Africa. PABs have the smallest mean of total assets.

We include three control variables in the equation explaining inefficiency. We consider bank size through two dummy variables. *Medium Bank* is equal to one if the bank ranges between the 25^{th} and the 75^{th} percentile of total assets of the sample and zero otherwise. *Large Bank* is equal to one if the bank has a size above the 75^{th} percentile of total assets. *Loans to Other Earning Assets* is the ratio of loans to investment assets which allows controlling for the asset mix.

We include four country-level variables in some specifications of the cost frontier to control for the macroeconomic environment. *GDP per capita*, *Domestic credit to private sector* and *Inflation* are obtained in the World Bank World Development Indicators (WDI). *GDP per capita* is gross domestic product divided by midyear population and is expressed in current US$. *Domestic credit to private sector* refers to financial resources provided to the private sector by financial institutions divided by GDP. It measures the level of banking development in the economy. *Inflation* as measured by the consumer price index in annual percent is a proxy for macroeconomic instability. *Rule of law*, which is a measure for the quality of the institutions, is extracted from the World Bank World Governance Indicators (WGI). The score for *Rule of law* is between 0 and 10, 0 being the worse score and 10 the best.

4. Results

This section compares the efficiency for the different types of banks. We first present the efficiency scores by ownership type. We then perform a multivariate analysis to study the link between ownership type and bank efficiency.

4.1. Efficiency scores by ownership type

Table 5 reports the efficiency scores for each ownership type and each year of the period of the sample with significance tests for differences in Table 6. We find that the mean cost efficiency score is 77.1% for all African banks, which means that the average African bank produces 77.1% of the maximal production it could have for its level of total cost. This figure is of the same order of magnitude than what has been found in other studies on African banks. Kablan (2007) finds that the mean cost efficiency score in the WAEMU region is 70% in 2004 while Chen (2009) observes an average cost efficiency score ranging from 72.5 to 78 % in ten Sub-Saharan African middle-income countries for the 2000–2007 period with a mean score for the full sample being overall constant over time.

The key finding is the greatest efficiency for PABs relative to all other types of banks. PABs have the highest mean cost efficiency score (79.1%) among all five types of banks over the period. Efficiency of PABs is significantly higher than efficiency of all other types of banks over the period. These results then support the view that Pan-African banks are the most efficient banks since they combine advantages of foreign banks relative to domestic banks and of African banks relative to foreign banks from developed countries.

After PABs, we observe that foreign banks from developed economies (77.6%) are the most efficient. Foreign banks from developing countries have the lowest mean efficiency score (71.9%) which is significantly lower than for all other types of banks. These results tend to indicate the impact of the origin of the foreign shareholder on the efficiency of foreign-owned banks.

Interestingly domestic public and private banks have very similar mean efficiency scores with respectively 76.5% and 76.2%. The mean efficiency scores for foreign banks from developed countries, domestic public banks, and domestic private banks over the period are not significantly different.

The finding that domestic state-owned do not have lower efficiency than domestic private banks accords with Karas, Schoors and Weill (2010) in Russia and Figueira, Nellis and Parker (2009) in Latin America who do not find that privately-owned banks perform

better than state-owned banks. It nonetheless contrasts with Bonin, Hasan and Wachtel (2005) for European transition countries and Berger, Hasan and Zhou (2009) for China. According to Berger, Hasan and Zhou (2009), government subsidies can in part reduce costs of state-owned banks. Indeed, public banks may benefit from below-market rates on deposits, lower rents for offices or grant-aided equity capital. Such advantages can reduce total costs and explain the positive cost efficiency score of state-owned banks.

4.2. Multivariate analysis

The comparison of mean efficiency scores has shown that Pan-African banks are the most efficient banks. We now proceed to a multivariate analysis on efficiency scores to confirm the observed difference in efficiency by controlling for other characteristics which can influence this finding. We perform the Battese and Coelli (1995) model in which inefficiency is explained by a set of variables in the second equation. As a consequence, a minus sign for a tested determinant indicates that an increase in the explanatory variable leads to less inefficiency, or in other words that there is a positive relation between the variable and efficiency.

We provide two tables of estimations in which we consider four specifications to test the robustness of our results. In all four specifications, we include bank-level control variables in the equation explaining inefficiency. The specification (1) only includes the input and output mix in the frontier. The specification (2) adds year dummies in the frontier. The specification (3) adds country-level variables in the frontier but does not include year dummies. Finally, the specification (4) contains year dummies and country-level variables in the frontier.

We first provide estimations comparing foreign banks, domestic state-owned banks, and domestic private banks. We want to check whether foreign banks and domestic banks differ in terms of cost efficiency and whether state-owned banks perform better or worse than their domestic private counterparts. Therefore, we include two dummies for the ownership – *Domestic Private* and *Foreign Bank* – and we omit the dummy *Domestic Public*. The dummy *Foreign Bank* covers PABs and banks headquartered in both developed and developing countries. These results are displayed in Table 7. Two main conclusions emerge. First, we observe that foreign banks are significantly more efficient than domestic state-owned banks. *Foreign Bank* is significantly negative in all estimations. This means that being a foreign-owned bank reduces cost inefficiency relative to state-owned banks. Managers from foreign banks are more efficient in handling their costs than their domestic public counterparts. In

addition, we have also tested the estimations by omitting *Domestic Private* instead of *Domestic Public,* which is not reproduced for conciseness. We also obtain a significant and negative coefficient for *Foreign Bank*, confirming that foreign-owned banks are most efficient than both types of domestic banks.

Our first hypothesis seems to be confirmed: foreign banks perform more efficiently than domestic banks. As the African continent is in the developing world, we expected the global advantage hypothesis to overtake the home field advantage hypothesis. Moreover, Claessens, Demirgüc-Kunt and Huizinga (2001) find that foreign banks have higher profits than domestic banks in developing countries while the opposite occurs in developed economies. Our result is in line with many findings in the developing world and in transition economies (Weill, 2003; Bonin, Hasan and Wachtel, 2005; Berger, Hasan and Zhou, 2009; Chen, 2009; Karas, Schoors and Weill, 2010).

Second, we find that domestic private banks are more efficient than domestic state-owned banks. *Domestic Private* is negative in the four estimations with a significant coefficient in the three last specifications. Managers in privately-owned banks seem to handle costs in a more efficient way than their publicly-owned counterparts. Therefore the comparison of mean cost efficiency scores suggests that domestic state-owned banks are the least efficient banks relative to foreign and private banks in African banking systems.

The second table of estimations compares all types of banks. It therefore allows analyzing if types of foreign banks differ in efficiency. We are then able to test our hypothesis that Pan-African banks are the most efficient banks over the African continent. We include four dummy variables for ownership – *Pan African*, *Foreign Developing, Domestic Private* and *Domestic Public* – and we skip *Foreign Developed*. By omitting this latter variable, our estimations allow analyzing if a difference exists between Pan-African banks and foreign banks from developed countries, which have been shown to be the most efficient types of banks in the comparison of efficiency scores. The results are reported in Table 8. Several findings are fairly striking.

First, PABs are the most efficient banks. *Pan African* is significantly negative in all four estimations, while no other ownership dummy variable is significantly negative. Therefore, these results show that PABs are the only type of banks being more efficient than foreign banks from developed countries. They confirm our comparative analysis of the mean efficiency scores according to which PABs have the highest average cost efficiency. We thus provide strong evidence supporting our hypothesis that PABs are the most efficient banks in African banking systems.

Our interpretation of this result is that PABs benefit from both the global advantage and the home field advantage. By expanding their activities abroad, PABs have developed higher skills like their counterparts from developed economies. Moreover, PABs resort to an "indigenization" process as suggested by Beck et al. (2014). Their subsidiaries are integrated in the group but are generally separate legal entities in host countries using local labor and local management functions. Thanks to this strategy, they obtain an edge over their foreign counterparts because they do not suffer from informational problems.

Second, foreign banks from developing countries tend to be less efficient than other banks. *Foreign Developing* is positive in all four estimations and significant in two. Therefore, being a bank from a developing country reduces cost efficiency relative to banks from developed economies.

Third, we do not observe a significant difference in efficiency between foreign banks from developed countries and domestic banks. Neither *Domestic Public*, nor *Domestic Private* are significant in all estimations. Therefore, foreign banks from developed countries do not have an advantage in efficiency relative to domestic banks in African countries. This result suggests that the global advantage of these foreign banks would compensate the home field advantage from domestic banks without being sufficient to exceed it.

Fourth, we point out that size and output mix have an impact on cost efficiency of African banks. Namely, *Medium Bank* is significantly negative in three specifications while *Large Bank* is never significant. These results support the view that medium-sized banks are the most efficient, suggesting that size would favor cost efficiency until a certain scale. In addition, *Loans to Other Earning Assets* is significantly negative in two specifications, which suggests that a greater share of loans relative to other earning assets would be beneficial to cost efficiency. In other words, asset mix does not seem to be neutral to cost efficiency.

4.3. Robustness checks

The intermediation approach has been used to specify inputs and outputs. However the production approach according to which the bank uses labor and physical capital to produce loans and deposits has also been often adopted to measure bank efficiency in developing and emerging countries (e.g., Karas, Schoors and Weill, 2010).

We can therefore question whether our main findings are robust to the specification of the production approach to select inputs and outputs. In this aim, we redo the multivariate estimations by using the production approach. We then consider two outputs, total loans and

total deposits, and two input prices, price of labor and price of physical capital defined as before.

Table 9 provides the new estimations comparing foreign banks, domestic state-owned banks, and domestic private banks. We find support for the findings obtained in the main estimations with the intermediation approach: foreign banks and domestic private banks are significantly more efficient than domestic state-owned banks. *Foreign Bank* and *Domestic Private* are significantly negative in all four estimations.

Table 10 displays the new estimations comparing all types of banks. They confirm our key finding that Pan-African banks are the most efficient banks. We again observe that *Pan African* is significantly negative in all estimations while no other ownership dummy variable is significantly negative. In addition, we still find evidence that foreign banks from developing countries are less efficient than foreign banks from developed countries, the omitted category, with *Foreign Developing* being significantly positive in all estimations. For the rest, we observe differences for domestic banks. While *Domestic Public* and *Domestic Private* were not significant in the main estimations with the intermediation approach, they are now significantly positive in all estimations with the production approach. This latter result suggests that foreign banks from developed countries are more efficient than domestic banks when considering the production approach. Therefore, the choice of the approach for the specification of inputs and outputs does not influence our findings with the exception of the efficiency comparison between foreign banks from developed countries and domestic countries.

5. Conclusion

The development of PABs has been a major change for African banking systems in the recent years. In this study, we examine if these banks are more efficient than domestic banks and other forms of foreign banks. Our major conclusion is that PABs are the most efficient banks in African banking industries. They have greater efficiency than domestic banks, either privately-owned or state-owned, but also than foreign banks originating from developed or developing countries.

We explain this finding by the fact that these banks have the best of both worlds. PABs benefit from the global advantage relative to domestic banks since they work on a broader scale and have better expertise from larger experience. Simultaneously PABs have the

home field advantage relative to foreign banks from non-African countries with a better knowledge of local environment.

Additionally, we do not find robust evidence that foreign banks from developed countries would be more efficient than domestic banks. Finally, foreign banks from developing countries tend to be less efficient than all other forms of banks.

Therefore this paper provides a contribution to the debate on the link between foreign ownership and bank efficiency. While the debate tends to find opposing conclusions in developed and developing countries, we show that the origin of the bank associated with the host region can influence the efficiency of foreign banks with the case of Pan-African banks.

In terms of policy implications, this work contributes to a better understanding of the implications of the expansion of Pan-African banks. We argue that foreign bank entry can favor bank efficiency in African countries, which is a major issue for these bank-based financial systems. However, the type of foreign banks matters since Pan-African banks can contribute to favor efficiency relative to domestic banks. Favoring Pan-African bank entry appears to be a relevant policy.

Our research is an initial step towards understanding the effects of Pan-African banking development. This expansion can have key implications for financial stability by fostering contagion effects across African countries and by creating systemic banks leading to moral hazard issues for financial authorities. We let these questions for further research.

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Table 1: Sample information

This table shows the number of banks in the sample by category and country. Some banks might be included twice when a change in ownership occurred during the sample period.

Country	N	Banks by ownership				
			Foreign		Domestic	
		Pan African	Developed	Developing	Private	Public
Algeria	13	0	3	4	1	5
Angola	11	1	4	0	4	2
Benin	4	4	0	0	0	0
Botswana	5	3	1	0	1	0
Burkina Faso	5	4	0	0	2	0
Cameroon	6	3	3	0	1	0
Cape Verde	2	0	1	0	1	0
Congo	4	4	1	0	0	0
Cote d'Ivoire	6	4	3	0	0	0
Dem. Rep. of Congo	4	0	2	0	2	1
Djibouti	2	1	2	0	0	0
Egypt	24	0	5	9	4	6
Equatorial Guinea	2	1	1	0	0	0
Eritrea	1	0	0	0	0	1
Ethiopia	7	0	0	0	6	1
Gabon	3	1	1	0	1	0
Ghana	10	5	2	0	2	1
Kenya	17	4	2	1	10	1
Lesotho	1	1	0	0	0	0
Libya	9	0	1	3	3	2
Madagascar	2	1	1	0	0	0
Mali	5	4	1	0	2	0
Mauritius	12	4	3	2	5	0
Morocco	9	0	2	0	6	1
Mozambique	5	2	2	0	1	0
Namibia	4	3	0	0	1	0
Niger	1	1	0	0	0	0
Nigeria	18	2	2	0	14	1
Rwanda	1	0	0	0	0	1
Senegal	8	4	2	0	2	1
Seychelles	1	0	1	0	0	0
South Africa	8	0	1	0	7	0
Sudan	4	0	0	1	1	2
Tanzania	7	2	2	0	3	0
Togo	2	0	0	0	2	0
Tunisia	13	2	3	2	5	3
Uganda	5	2	1	0	2	0
Zambia	5	3	2	0	0	1
Zimbabwe	2	1	0	0	1	0
Total	248	67	55	22	90	30

Table 2: Pan-African banks in the sample

This table shows Pan-African banks in the sample with home country and host countries in Africa.

Bank	Home country	Host countries in Africa
Standard Bank Group	South Africa	Angola, Botswana, Democratic Republic of Congo, Ghana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Nigeria, South Africa, Swaziland, Uganda, Tanzania, Zambia, Zimbabwe
Bank of Africa	Mali (Morocco since 2010)	Benin, Burkina Faso, Burundi, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Ethiopia, Ghana, Kenya, Madagascar, Mali, Niger, Rwanda, Senegal, Tanzania, Togo, Uganda
Banque Marocaine du Commerce Extérieur (BMCE)	Morocco	Benin, Burkina Faso, Burundi, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Ethiopia, Ghana, Kenya, Madagascar, Mali, Morocco, Niger, Rwanda, Senegal, Tanzania, Togo, Uganda
Ecobank	Togo	Angola, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Cote d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Liberia, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, South Sudan, South Africa, Tanzania, Togo, Uganda, Zambia, Zimbabwe
Diamond Bank	Nigeria	Benin, Cote d'Ivoire, Nigeria, Senegal, Togo
Groupe Banque Centrale Populaire (GBCP)	Morocco	Benin, Burkina Faso, Central African Republic, Cote d'Ivoire, Guinea, Mali, Niger, Morocco, Senegal, Togo
United Bank for Africa	Nigeria	Benin, Burkina Faso, Cameroon, Chad, Congo, Cote d'Ivoire, Democratic Republic of Congo, Gabon, Ghana, Guinea, Kenya, Liberia, Mali, Mozambique, Nigeria, Senegal, Sierra Leone, Tanzania, Uganda, Zambia
Firstrand Limited	South Africa	Bostwana, Ghana, Lesotho, Mauritius, Mozambique, Namibia, Nigeria, South Africa, Swaziland, Tanzania, Zambia
Barclays Africa Group	South Africa	Botswana, Ghana, Kenya, Mauritius, Mozambique, Namibia Nigeria, Seychelles, South Africa, Uganda, Tanzania, Zambia
BGFI Bank	Congo	Benin, Cameroon, Congo, Côte d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Gabon, Madagascar
Access Bank	Nigeria	Democratic Republic of Congo, Gambia, Ghana, Nigeria, Rwanda, Sierra Leone, Zambia

Afriland first bank	Cameroon	Cameroon, Congo, Democratic Republic of Congo, Equatorial Guinea, Guinea, Liberia, Sao Tome and Principe, South Sudan, Zambia
Zenith Bank	Nigeria	Gambia, Ghana, Nigeria, Sierra Leone
Nedbank Group	South Africa	Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zimbabwe
Investec Bank Limited	South Africa	Botswana, Mauritius, Namibia, South Africa
CIEL Limited	Mauritius	Botswana, Kenya, Madagascar, Mauritius, Seychelles, South Africa, Tanzania, Uganda, Zambia
Attijariwafa Bank	Morocco	Benin, Burkina Faso, Cameroon, Congo, Côte d'Ivoire, Gabon, Guinea Bissau, Mali, Mauritania, Morocco, Niger, Senegal, Tunisia, Togo
Banque Atlantique	Togo (Morocco since 2012)	Benin, Burkina Faso, Central African Republic, Cote d'Ivoire, Guinea, Mali, Niger, Senegal, Togo
Libyan Foreign Bank	Libya	Algeria, Burkina Faso, Chad, Egypt, Libya, Mali, Mauritania, Niger, Sudan, Tunisia, Togo, Uganda, Zimbabwe

Table 3: Descriptive statistics

This table indicates the mean values and standard deviations for the variables used for efficiency scores for the full sample. All statistics are computed for observations over the period 2002–2015.

Variable	All banks	
	Mean	**Std Dev.**
Total costs	243 706.7	862 066.3
Loans	2 093 456	7 773 007
Other earning assets	1 339 957	4 073 008
Price of labor (%)	1.81	1.10
Price of borrowed funds (%)	3.75	9.64
Price of physical capital (%)	157.87	271.09
Loans to other earning assets	2.07	2.43
Total assets	3 897 652	12 100 000
GDP per capita	2 743.71	2 657.99
Domestic credit to private sector to GDP	33.54	32.21
Inflation	7.77	9.18
Rule of law	4.02	1.26

Table 4: Descriptive statistics by ownership type

This table indicates the mean values for the bank-level variables used for efficiency scores for each ownership type. All statistics are computed for observations over the period 2002–2015.

Variable	Pan African banks	Foreign developed banks	Foreign developing banks	Domestic private banks	Domestic public banks
Total costs	63 235.72	87 729.17	86 268.61	524 933.3	269 761.6
Loans	439 136.4	746 594.4	663 321.2	4 675 826	2 145 793
Other earning assets	280 852.6	634 909.8	635 043.7	2 297 907	3 041 748
Price of labor (%)	2.11	1.85	0.99	1.74	1.66
Price of borrowed funds (%)	2.87	2.51	3.82	4.88	5.09
Price of physical capital (%)	170.36	221.62	83.84	145.29	82.90
Loans to other earning assets	2.07	39.85	24.44	14.91	2.42
Total assets	892 874.7	1 634 851	1 594 284	7 714 873	6 096 978

Table 5: Cost Efficiency Scores by Ownership Type

This table shows the cost efficiency scores obtained with the Battese and Coelli (1995) model. Means are displayed with standard deviations between parentheses.

Year	All banks	Pan African banks	Foreign developed banks	Foreign developing banks	Domestic private banks	Domestic public banks
All	0.771	0.791	0.776	0.719	0.762	0.765
	(0.139)	(0.118)	(0.137)	(0.170)	(0.146)	(0.142)
2002	0.800	0.838	0.825	0.851	0.810	0.633
	(0.134)	(0.083)	(0.120)	(0.045)	(0.032)	(0.145)
2003	0.805	0.825	0.815	0.833	0.790	0.772
	(0.115)	(0.094)	(0.096)	(0.089)	(0.144)	(0.125)
2004	0.792	0.808	0.794	0.661	0.809	0.783
	(0.144)	(0.095)	(0.139)	(0.327)	(0.142)	(0.108)
2005	0.801	0.835	0.804	0.800	0.780	0.780
	(0.122)	(0.069)	(0.135)	(0.080)	(0.151)	(0.110)
2006	0.794	0.822	0.799	0.761	0.775	0.778
	(0.135)	(0.099)	(0.148)	(0.108)	(0.156)	(0.135)
2007	0.793	0.803	0.801	0.684	0.800	0.774
	(0.113)	(0.099)	(0.110)	(0.192)	(0.119)	(0.091)
2008	0.773	0.784	0.784	0.736	0.754	0.796
	(0.121)	(0.096)	(0.120)	(0.113)	(0.148)	0.102
2009	0.762	0.770	0.772	0.651	0.768	0.780
	(0.138)	(0.121)	(0.119)	(0.217)	(0.145)	(0.111)
2010	0.763	0.773	0.757	0.705	0.773	0.767
	(0.154)	(0.131)	(0.145)	(0.223)	(0.159)	(0.161)
2011	0.755	0.781	0.741	0.731	0.745	0.755
	(0.149)	(0.135)	(0.149)	(0.161)	(0.152)	(0.176)
2012	0.749	0.764	0.745	0.708	0.736	0.787
	(0.149)	(0.146)	(0.161)	(0.161)	(0.139)	(0.161)
2013	0.762	0.782	0.754	0.727	0.754	0.776
	(0.146)	(0.135)	(0.166)	(0.147)	(0.136)	(0.173)
2014	0.758	0.787	0.774	0.697	0.743	0.745

	(0.140)	(0.119)	(0.122)	(0.166)	(0.147)	(0.169)
2015	0.759	0.797	0.770	0.723	0.742	0.721
	(0.138)	(0.110)	(0.126)	(0.133)	(0.150)	(0.178)

Table 6: Significance of Differences in Cost Efficiency between Ownership Types

This table reports the differences in cost efficiency scores between ownership types of banks. Pan : Pan-African banks. Fod: Foreign developed banks. Fog: Foreign developing banks. Pri: Domestic private banks. Pub: Domestic public banks. *,**,*** indicates a significant mean difference at 10%, 5% and 1% level.

Year	Diff (Pan – Fod)	Diff (Pan-Fog)	Diff (Pan-Pri)	Diff (Pan-Pub)	Diff (Fod-Fog)	Diff (Fod-Pri)	Diff (Fod-Pub)	Diff (Fog-Pri)	Diff (Fog-Pub)	Diff (Pri-Pub)
All	0.015**	0.072***	0.029***	0.026***	0.057***	0.013	0.011	-0.043***	-0.046***	-0.003
2002	0.013	-0.012	0.029	0.205***	-0.026	0.015	0.191***	0.041	0.217**	0.176***
2003	0.010	-0.008	0.035	0.053	-0.018	0.025	0.044	0.043	0.061	0.018
2004	0.014	0.147*	-0.001	0.025	0.133	-0.015	0.011	-0.147*	-0.121	0.026
2005	0.030	0.035	0.055*	0.054**	0.004	0.024	0.024	0.020	0.020	-0.000
2006	0.023	0.061	0.047	0.044	0.038	0.023	0.021	-0.014	-0.017	-0.003
2007	0.002	0.119**	0.003	0.029	0.117**	0.001	0.027	-0.116**	-0.090	0.026
2008	0.000	0.048	0.030	-0.012	0.047	0.030	-0.012	-0.017	-0.060	-0.042
2009	-0.001	0.120***	0.002	-0.009	0.121**	0.004	-0.008	-0.117**	-0.129**	-0.012
2010	0.016	0.068	-0.000	0.006	0.052	-0.016	-0.010	-0.068	-0.062	0.006
2011	0.040	0.050	0.036	0.026	0.010	-0.004	-0.014	-0.014	-0.024	-0.010
2012	0.018	0.055	0.028	-0.023	0.037	0.009	-0.042	-0.027	-0.079	-0.051
2013	0.028	0.055	0.028	0.006	0.027	0.000	-0.022	-0.027	-0.049	-0.022
2014	0.013	0.091**	0.045*	0.043	0.078*	0.032	0.030	-0.046	-0.048	-0.002
2015	0.028	0.075**	0.055**	0.076**	0.047	0.027	0.048	-0.020	0.001	0.021

Table 7: Efficiency Estimations: The Role of Foreign Banks

This table shows estimations with the one-step model of Battese and Coelli (1995). We only report estimates of the tested country-level variables for the cost frontier. We report all estimates of the equation explaining inefficiency. *Foreign Bank* and *Domestic Private* are dummy variables representing foreign ownership and domestic private ownership. *Domestic Public* is the omitted dummy variable. Values of t-statistics are shown in parentheses. *, **, *** denote statistical significance at the 1, 5 and 10% levels.

Cost Frontier				
	(1)	(2)	(3)	(4)
GDP per capita	-	-	0.00***	0.00***
			(7.09)	(5.41)
Domestic credit to private sector	-	-	-0.00***	-0.00***
			(-9.09)	(-9.93)
Inflation	-	-	0.00	0.00
			(1.72)	(1.64)
Rule of law	-	-	-0.02**	-0.01*
			(-3.14)	(-2.24)
Year dummy variables	No	Yes	No	Yes
Equation Explaining Inefficiency				
Domestic Private	-0.41	-0.47*	-0.42***	-0.52***
	(-1.92)	(-2.32)	(-3.77)	(-4.46)
Foreign Bank	-0.68*	-0.72**	-0.67***	-0.81***
	(-2.37)	(-2.70)	(-5.42)	(-6.50)
Medium Bank	-0.17	-0.22	-0.20	-0.27**
	(-1.16)	(-1.41)	(-1.93)	(-2.75)
Large Bank	-0.38	-0.33	-0.45***	-0.47***
	(-1.37)	(-1.39)	(-3.76)	(-3.94)
Loans to Other Earning Assets	-0.00***	-0.00***	-0.00***	-0.00***
	(-6.18)	(-10.78)	(-25.64)	(-29.45)
N	2196	2196	1959	1959
Log likelihood	-215.30	-180.52	-98.80	-63.73

Table 8: Efficiency Estimations: The Role of Pan-African Banks

This table shows estimations with the one-step model of Battese and Coelli (1995). We only report estimates of the tested country-level variables for the cost frontier. We report all estimates of the equation explaining inefficiency. *Pan African Bank, Foreign Developing, Domestic Private* and *Domestic Public* are dummy variables representing the different ownership types. *Foreign Developed* is the omitted dummy variable. Values of t-statistics are shown in parentheses. *, **, *** denote statistical significance at the 1, 5 and 10% levels.

Cost Frontier				
	(1)	(2)	(3)	(4)
GDP per capita	-	-	0.00***	0.00***
			(6.46)	(4.86)
Domestic credit to private sector	-	-	-0.00***	-0.00***
			(-8.99)	(-9.88)
Inflation	-	-	0.00	0.00
			(1.65)	(1.57)
Rule of law	-	-	-0.02**	-0.01*
			(-3.09)	(-2.02)
Year dummy variables	No	Yes	No	Yes
Equation Explaining Inefficiency				
Pan African	-0.22*	-0.30**	-0.17*	-0.31***
	(-2.39)	(-3.04)	(-2.22)	(-4.57)
Foreign Developing	0.14*	0.09	0.17**	0.12
	(2.20)	(1.24)	(2.60)	(1.43)
Domestic Private	-0.00	-0.05	0.01	-0.05
	(-0.07)	(-0.82)	(0.19)	(-0.92)
Domestic Public	-0.05	-0.03	-0.08	-0.08
	(-0.73)	(-0.41)	(-1.20)	(-1.09)
Medium Bank	-0.00***	-0.09	-0.00***	-0.15**
	(-7.66)	(-1.04)	(-21.98)	(-2.75)
Large Bank	-0.02	-0.01	-0.05	-0.10
	(-0.28)	(-0.07)	(-0.71)	(-1.05)
Loans to Other Earning Assets	0.03	-0.00***	-0.02	-0.00***
	(0.27)	(-9.39)	(-0.20)	(-40.25)
N	2196	2196	1959	1959
Log likelihood	-216.30	-183.09	-101.50	-69.53

Table 9: Robustness Check: The Role of Foreign Banks with the Production Approach

This table shows estimations with the one-step model of Battese and Coelli (1995). We only report estimates of the tested country-level variables for the cost frontier. We report all estimates of the equation explaining inefficiency. *Foreign Bank* and *Domestic Private* are dummy variables representing foreign ownership and domestic private ownership. *Domestic Public* is the omitted dummy variable. Inputs and outputs are chosen following the production approach. Values of t-statistics are shown in parentheses. *, **, *** denote statistical significance at the 1, 5 and 10% levels.

Cost Frontier				
	(1)	(2)	(3)	(4)
GDP per capita	-	-	-0.00***	-0.00***
			(-5.31)	(-6.36)
Domestic credit to private sector	-	-	0.08***	-0.00
			(3.45)	(-1.78)
Inflation	-	-	0.00**	0.00***
			(3.17)	(4.06)
Rule of law	-	-	0.01	0.02**
			(1.41)	(2.67)
Year dummy variables	No	Yes	No	Yes
Equation Explaining Inefficiency				
Domestic Private	-0.37***	-0.37**	-0.58**	-0.28*
	(-3.56)	(-3.06)	(-3.26)	(-2.34)
Foreign Bank	-0.71***	-0.69***	-0.57***	-0.63***
	(-6.91)	(-4.29)	(-3.62)	(-3.79)
Medium Bank	-0.05	-0.01	-0.07	0.02
	(-0.59)	(-0.15)	(-0.66)	(0.19)
Large Bank	0.25**	0.29**	0.23*	0.27**
	(3.09)	(3.03)	(2.24)	(2.66)
Loans to Other Earning Assets	-0.01***	0.00	0.00	0.00
	(-87857.36)	(1.04)	(1.11)	(0.91)
N	2196	2196	2006	1959
Log likelihood	-688.97	-665.72	-589.31	-566.63

Table 10: Robustness Check: The Role of Pan-African Banks with the Production Approach

This table shows estimations with the one-step model of Battese and Coelli (1995). We only report estimates of the tested country-level variables for the cost frontier. We report all estimates of the equation explaining inefficiency. *Pan African Bank, Foreign Developing, Domestic Private* and *Domestic Public* are dummy variables representing the different ownership types. *Foreign Developed* is the omitted dummy variable. Inputs and outputs are chosen following the production approach. Values of t-statistics are shown in parentheses. *, **, *** denote statistical significance at the 1, 5 and 10% levels.

Cost Frontier				
	(1)	(2)	(3)	(4)
GDP per capita	-	-	-0.00***	-0.00***
			(-5.38)	(-6.49)
Domestic credit to private sector	-	-	-0.00*	-0.00*
			(-2.53)	(-2.56)
Inflation	-	-	0.00***	0.00***
			(3.85)	(3.91)
Rule of law	-	-	0.02**	0.03**
			(2.61)	(3.10)
Year dummy variables	No	Yes	No	Yes
Equation Explaining Inefficiency				
Pan African	-0.24**	-0.24**	-0.18*	-0.23**
	(-3.14)	(-3.14)	(-2.49)	(-2.99)
Foreign Developing	0.36***	0.36***	0.37***	0.33***
	(5.69)	(5.69)	(5.97)	(5.28)
Domestic Private	0.11*	0.11*	0.16***	0.14**
	(2.27)	(2.27)	(3.51)	(3.06)
Domestic Public	0.16**	0.16**	0.14*	0.15*
	(2.72)	(2.72)	(2.37)	(2.52)
Medium Bank	0.24***	0.24***	0.26***	0.28***
	(3.37)	(3.37)	(3.61)	(3.84)
Large Bank	0.00	0.00	0.00	0.00
	(1.02)	(1.02)	(1.02)	(0.79)
Loans to Other Earning Assets	-0.00	-0.00	0.05	0.05
	(-0.04)	(-0.04)	(0.80)	(0.77)
N	2196	2196	1959	1959
Log likelihood	-673.59	-658.55	-580.06	-555.58

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Université de Strasbourg
Pôle Européen de Gestion et d'Economie
61 avenue de la Forêt Noire
67085 Strasbourg Cedex

http://large.em-strasbourg.eu/