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Analysis of the quiet life hypothesis implications in the WAEMU banking sector

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Abstract

This paper investigates the relationship between market power and cost efficiency for a sample of 63 banks in the West African Economic and Monetary Union (WAEMU) from seven countries over the period of 2004–2016. Our empirical methodology relies on a panel data analysis. Our results show that an increase in market power reduces banking efficiency in the WAEMU countries, and therefore suggest that competition in the banking sector improves cost efficiency. These findings are consistent with the quiet life hypothesis. However, our nonlinear investigation indicates that beyond a specific threshold of competition, this latter deteriorates the cost efficiency of banks, thus confirming the efficient structure hypothesis. These results indicate the efficiency improvement of the banking system in the WAEMU countries by the control of operating costs. Moreover, the central bank and the banking regulators must increase their supervision over the most competitive banks of the WAEMU.

1 | INTRODUCTION

In the West African Economic and Monetary Union (WAEMU), the banking sector is oligopolistic, and the supervision of each bank traditionally ensures financial stability through a micro-prudential approach of risk assessment. Even if these banks were saved after the financial crisis of 2008, the previous banking crisis in the 1980s was linked to financial institutions mismanagement, a depressive economic environment, and the state's majority shareholding in the bank. The WAEMU financial system is characterized by an irregular dynamic that varies slightly across member countries. Indeed, the financial system in the WAEMU countries in the 1970s and 1980s was a quasi-monopoly, where the governments were the majority shareholders of the banks and beneficiaries of the most credit to the economy. Government control over the financial system facilitated unproductive public investments, which negatively affected the banking sector and resulted in the deterioration of the terms of trade. The bankruptcy of the West African financial system came at the end of the 1980s when nonperforming loans reached 80% (Caprio & Klingebiel, 1996). Subsequently, some reforms have been implemented by liberalizing the banking sector to improve bank efficiency, foster competition, and allow financial services diversification. The financial liberalization in the WAEMU countries led to disconnection of the States from bank ownership, liberalization of banking market conditions, and an increase in the number of financial institutions operating in the financial system. However, there is a high concentration on the financial market, since few banks hold a large share of deposits, credits, and customers. For instance, the seven larger banking groups[1] of the WAEMU possess 60% of total assets in 2018 (Union Economique Monétaire Ouest-Africaine

[UEMOA], 2019). This concentration of the WAEMU banking market may jeopardize the financial liberalization aims and question the efficiency of the banking sector in the WAEMU. In particular, one can ask whether the functioning conditions and the structure of the banking market could lead to greater efficiency of the banking sector in the WAEMU.

Following the financial liberalization policies in the WAEMU, the banking landscape has significantly changed, moving from a state monopoly to a competitive banking sector. State banks have been privatized, and the region has registered numerous banks, subsidiaries of large foreign banking groups. In 2018, the WAEMU banking system included 143 banks and financial institutions distributed as follows: 59 large banks, 30 medium banks, and 54 small establishments.[2] International banks dominate the market with 50.4% of the Union's banking assets. They account for 34.9% of the branches network, have 41.4% of ATMs, hold 54% of bank accounts, and employ 47.9% of the workforce (UEMOA, 2019). Moreover, at the end of 2018, the total balance sheet of the credit institutions of the Union, the savings, and the gross domestic credits increased by 6.8%, 10.4%, and 9.4%, respectively. The short-term loans, which accounted for 49.9% of total loans, recorded a moderate increase in 2018 (10.4%), while the medium- and long-term loans grew by 21.4%. The banking network (agencies, offices, and retail outlets) has grown by 13% between 2017 and 2018, reaching 3619 units. The number of customer accounts was 12,056,074 in 2018 and showed an increase of 5% compared to 2017. The market structure of the WAEMU banking sector is oligopolistic as the banking landscape is characterized by 12 main groups and 17 other smaller groups (less than 2% of assets, each) controlling 106 credit institutions, holding 86.8% of total assets. Furthermore, these banks possess 83.4% of customer accounts and employ 77.9% of the banking sector workforce (UEMOA, 2019).

Despite the relative concentration of the banking market in the WAEMU, many banking groups compete fiercely to attract more customers and increase their market share. This competition will intensify in the following years, given the low bank account penetration rate in the area (17.7% in 2017) (Banque Centrale des Etats de l'Afrique de l'Ouest [BCEAO], 2018a).

Due to the implications of competition on the bank's performance, it would be interesting to analyze the influence of the market structure on banking efficiency in the WAEMU. The theoretical studies on the relationship between market power and banking efficiency can be summed up through two main approaches: the structure–conduct–performance (SCP) approach (Bain, 1956) and the efficient structure hypothesis (ESH) (Demsetz, 1973; Peltzman, 1977). The first one supports the quiet life hypothesis and suggests that a considerable market power creates a higher cost inefficiency, while the latter argues that a higher banking market concentration leads to less competitive bank conduct, which can improve bank profitability. The empirical literature that analyzes the relationship between market power and bank efficiency provides mixed results. For instance, the quiet life hypothesis is confirmed by Delis and Tsionas (2009) and Turk Ariss (2010) while Koetter et al. (2012) and Williams (2012) reject it. Although many empirical investigations have been conducted to explore the relationship between banking efficiency and market power in developed and emerging countries, very few studies are carried out on Africa and specifically on the WAEMU. To the best of our knowledge, only work by Léon (2012) analyzed the relationship between banking efficiency and market power in the WAEMU over the period 2002–2007 and suggests that competition negatively affected banking efficiency. However, the relatively small-time dimension of the data does not make it possible to consider the dynamics of market power in the WAEMU, to provide robust results. This study fills this gap by providing a new investigation using the panel data of 63 commercial banks from seven WAEMU countries over the period 2004–2016. Then, we analyze the impact of market power on banking efficiency in the WAEMU and assess whether the larger banks are the most efficient.

The remainder of this paper is organized as follows. Section 2 surveys the empirical literature, and Section 3 presents methodological approaches. Section 4 is devoted to empirical findings, and Section 5 provides some concluding remarks.

2 | AN OVERVIEW OF THE EMPIRICAL LITERATURE

The theoretical studies that analyze the relationship between market power and efficiency are grounded through two leading schools of thought: the SCP hypothesis and the ESH. The SCP hypothesis developed by Bain (1956), suggests that higher banking market concentration involves less competitive bank conduct, which can lead to higher bank profitability. According to this approach, a positive (negative) relationship exists between competition (concentration) and cost efficiency. The quiet life hypothesis of Hicks (1935) is often considered as a specific case of SCP hypothesis because it establishes that concentrated bank markets reduce competitive pressure as managers put less effort into

maximizing the firm's efficiency. Since banks that compete in a market with higher concentration can set prices above marginal costs, managers do not have incentives to work hard to keep costs under control to maximize the profit. Finally, in a noncompetitive scenario, managers devote resources to obtaining and maintaining market power, which raises costs and reduces cost efficiency. Alternatively, the ESH developed by Demsetz (1973) and Peltzman (1977), posits that more efficient banks are better equipped to survive competitive pressures and these banks gain market share at the expense of less efficient banks. Following the ESH, we expect a positive relationship between bank efficiency and market power.

After these theoretical considerations, empirical evidence on the relationship between banking market power and efficiency provided mixed results and can be divided into two groups, that is, studies which support the quiet life hypothesis, and those which confirm the ESH.

Regarding the first stream that supports the quiet life hypothesis, Berger and Hannan (1998) employ data from the commercial banking industry, which produces very homogeneous products in multiple markets with different degrees of market concentration. They find that banks in more concentrated markets were less cost efficient than those with more competitors. Similarly, Delis and Tsionas (2009) use a sample of European Economic and Monetary Union (EMU) commercial banks over the period 1999–2006. They find a negative relationship between efficiency and market power. An extension of the analysis of Delis and Tsionas (2009) is carried out by Turk Ariss (2010) for developing countries. Based on data from 821 banks in 60 developing countries over the period 1999–2005, the author suggests a significant negative association between bank market power and cost efficiency, whereas there is a significant positive relationship between market power and profit efficiency of each bank. Chen (2009) also provides additional evidence using a more comprehensive sample of sub-Saharan African countries and suggests that the degree of competitiveness varies across countries. He finds that greater competition increases cost efficiency.

Unlike previous works, Koetter et al. (2012) provide evidence on a positive relationship between market power and both cost and profit efficiency, based on a sample of 4000 US banks, over the period 1986–2006. They reject the quiet life hypothesis and conclude that improving efficiency with the market power indicates that the banks are better at screening borrowers in the absence of highly competitive pressure. Maudos and de Guevara (2007) also analyze the efficiency in the European Union (EU-15) countries over 1993–2002 and explore the nexus between market power on loan and deposit markets. They confirm the existence of a positive relationship between market power and cost X-efficiency, leading to the rejection of the quiet life hypothesis. Moreover, Lapteacru and Nys (2011) study the cost efficiency implications of the market structure in the Central and Eastern Europe (CEE) countries and suggest that the cost efficiency of banks increases when the level of competition decreases. In the same vein, works by González (2005) carried out on a sample of 69 countries, over the period 1996–2002, also suggest a positive relationship between market power and efficiency. Furthermore, Williams (2012) examines the relationship between bank efficiency and market power from a sample of 419 Latin American commercial banks between 1985 and 2010, and firmly rejects the quiet life hypothesis. Léon (2012) also finds a positive and significant effect of market power on cost efficiency, based on a sample of 93 banks in the WAEMU, over the period 2002–2007. Despite the pioneering nature of Léon's (2012) study, his results remain questionable since the increase in competition does not deteriorate banking efficiency in WAEMU. Moreover, the results of the study are not very robust to the various market power indicators and the time dimension of the study remains relatively weak.

Overall, only a few studies focus on the link between market power and banking efficiency in developing countries. Moreover, the existing literature on the United States and the EU provides mixed results, due to the specificities of the study areas often characterized by different banking structures, and the differences in the choice of market power indicators (structural or nonstructural indicators). In Africa, most of the studies just analyze the market structure, following banking liberalization policies.[3] However, given the increase of data on banks in WAEMU, the studies on the impact of the banking market structure on cost efficiency can offer support for monetary and banking policies.

Unfortunately, except for the work by Léon (2012), no study to the best of our knowledge has been carried out on the WAEMU countries. This study fills this gap by providing an in-depth investigation into the impact of market power on banking efficiency and assessing whether the larger banks are the most efficient. A shortage of literature on the subject is due to the difficulty of collecting individual data from banks.

3 | METHODOLOGY

In this section, we describe the determinants of market power and cost efficiency and then present our empirical framework.

3.1 | Market power calculation

Market power refers to the ability of a firm to raise the price without losing all its sales. Due to the rapid increase in the number of banks in the WAEMU and the resulting competition, it would be interesting to assess the dynamics structure of the banking market in the zone using indicators of the market power.

The most readily available measure of the market concentration is the Herfindahl–Hirschman Index (HHI). It is the sum of the squares of the market share held by each bank in the market as follows:

$$HHI_t = \sum_{i=1}^{m} ms_{it}^2, \tag{1}$$

where ms represents the share of assets, deposits, and loans of the i bank at the time t. The HHI is an indicator of market structure where higher values reflect more concentrated banking markets and potentially less competition. Therefore, the HHI tends to 0 if there is perfect competition with an infinite number of banks, while the HHI is 10,000 and can be normalized to the unit in a monopoly structure with only one bank. The HHI has several shortcomings. For instance, it does not consider some crucial factors determining concentration, such as costs of the entry (e.g. input cost) and asymmetries in cost or demand. Moreover, HHI is a structural indicator, and there are several cases where an increase in competition does not lower concentration. So, we used an alternative measure, the Lerner index, to assess the degree of competition in the banking sector. In its conventional form, the Lerner index is the difference between price and marginal cost scaled by the price of bank i at time t. Thereby assessing the degree to which each bank can increase its marginal price beyond marginal cost is given as:

$$Lerner_{it} = \frac{p_{it} - cm_{it}}{p_{it}}, \tag{2}$$

where p indicates the output price, which is the ratio of total revenues to total assets, and cm is the marginal cost of total assets. If we have a competitive market, the Lerner Index will be equal to 0 ($p = cm$), and it will be 1 if we have a monopolistic market with only one bank. Finally, when the Lerner index varies between 0 and 1, we have an oligopoly market. To compute the marginal cost, we estimate the following translog cost function:

$$\ln C_{it} = \theta_0 + \theta_1 \ln Q_{it} + \frac{\theta_2}{2}(\ln Q_{it})^2 + \sum_{j=1}^{3} \lambda_j \ln W_{j,it} + \sum_{j=1}^{3} \varphi_k \ln W_{j,it} \ln Q_{it} + \frac{1}{2}\sum_{k=1}^{3}\sum_{j=1}^{3} \rho_{kj} \ln W_{k,it} \ln W_{j,it} + \varepsilon_{it}, \tag{3}$$

where bank costs (C_{it}) are defined as a function of bank output represented by total assets for bank i at time $t(Q_{it})$. We assume that banks use three inputs $W_{j,it}$: labor, capital, and deposit. Then, W_1 is the labor cost represented by the ratio of wages to total assets, W_2 is the cost of fixed capital calculated as the ratio of other operating and administrative expenses to total assets, and W_3 indicates the cost of bank deposits appraised by the interest expenses divided by total deposits. Once the previous regression has been performed under the symmetry and homogeneity constraints on price coefficients,[4] the marginal cost Cm_{it} is then derived as:

$$Cm_{it} = \frac{\partial C_{it}}{\partial Q_{it}} = \frac{C_{it}}{Q_{it}}\left[\theta_1 + \theta_2 \ln Q_{it} + \sum_{j=1}^{3} \varphi_k \ln W_{j,it}\right]. \tag{4}$$

3.2 | Bank efficiency indicator

Cost efficiency refers to the performance of the resource allocation by fitting banks to each other. It measures the difference between the costs incurred by a bank and the minimum cost necessary to produce the same output under the same exogenous conditions. We assume that the frontier efficiency scores are deprived of market price effects and other exogenous factors that may influence the observed performance of banks. The specification of the cost function is based on the intermediation approach,[5] which suggests that banks collect deposits and other liabilities and convert them into interest-earning assets such as investments and loans.

From Equation (3), we assume that $\varepsilon_{it} = v_{it} + u_{it}$, where $v_{it} \sim N(0, \sigma_v^2)$ is a two-sided disturbance that accounts for random factors and $u_{it} \sim N(0, \sigma_u^2)$ is a one-sided nonnegative inefficiency term independent of v_{it}. Using the stochastic frontier version of Equation (3), we estimate the coefficients and both components of the error term v_{it} and u_{it} through the means of maximum likelihood, and then compute the cost efficiency EC_{it} of each bank. This approach, however, requires initial values for the coefficients. We use the Frontier 4.1 software, developed by Coelli (1996), that allows direct calculation of efficiency scores Eff_{it}. Since the efficiency scores range between 0 and 1, following works by Solis and Maudos (2008), we apply a logistic transformation to the cost efficiency:

$$EC_{it} = \frac{\exp(Eff_{it})}{1 + \exp(Eff_{it})}. \tag{5}$$

3.3 | Empirical framework

The last step of our methodological approach consists of estimating the relationship between banking efficiency and market power. It takes the following form:

$$EC_{it} = \alpha_i + \beta MP_{it} + \lambda' X_{it} + \varepsilon_{it}, \tag{6}$$

where *EC* is cost efficiency; *MP* is the market power index calculated earlier as HHI or the Lerner index; *X* is a set of control variables including bank size measured by the total assets (*Size*), the density of bank network is the number of agencies, offices, and retail outlets (*Network*), and the ratio of capital to assets (*Capitalization*). Following Williams (2012), we use four other exogenous variables to account for country-specific effects. We disaggregate the bank ownership into three classes—state-ownership (*State*), private-ownership (*Private*), and foreign-ownership (*Foreign*)[6]—account for the growth rate of GDP per capita (*GDP growth*) and the credit by the banking sector to GDP (*Credit/GDP*) to capture financial depth. Our estimation method can be described in two steps. First, we present pooled and panel regressions of the relationship between banking efficiency and market power. Second, to check the robustness of our results, we deal with potential nonlinearities and endogeneity. Our data includes 63 commercial banks[7] from 7 WAEMU's countries[8] over the period 2004–2016. Our sample is well representative of the WAEMU banking structure. For example, the banks in our sample hold 79.67% of bank assets, control 83.51% of the deposit market, and 78.17% of the loan market in 2018. We derive the macroeconomic variables data from World Development Indicators (World Bank, 2018), and compute the market power and cost efficiency indicators using data from Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO) (2018b).

4 | ANALYSIS OF THE RESULTS

In this section, we present the descriptive analysis and the empirical results.

4.1 | Descriptive analysis

Table 1 presents the descriptive statistics of the variables under consideration in this study. The banking sector performance is assessed through the cost efficiency that measures the relative specific bank cost, which is what the best-practice bank cost would be if both were producing the same output under the same conditions. The average level of cost efficiency is 0.82 and ranges from 0.80 to 0.87, suggesting a similar level of cost efficiency in the WAEMU

TABLE 1 Descriptive statistics

Variables	Obs.	Mean	SD	Min.	Max.
EC	819	0.828	0.017	0.802	0.874
HHI	819	0.161	0.055	0.066	0.242
Lerner	819	0.220	0.143	−0.255	0.546
Size (billion FCFA)	819	149.407	145.387	3.398	865.432
Network	819	15.850	16.182	1	91
Capitalization	819	0.097	0.125	−0.851	0.691
State	819	0.182	0.182	0	1
Private	819	0.281	0.302	0	1
Foreign	819	0.538	0.371	0	1
GDP growth	819	0.035	0.039	−0.194	0.118
Credit/GDP	819	0.515	0.219	0.237	1.349

banking system. This result can be explained by the low diversification of the banking sector, which is controlled by a few banking groups. The banking sector is less efficient in Niger, while the highest cost efficiency is obtained in the Côte d'Ivoire.

As soon as the market power index is concerned, the higher values of the HHI reflect a more concentrated banking market and (potentially) less competition. The average level of HHI (0.161) highlights the moderate concentration in the WEAMU banking sector, despite the mixed nature of the competition. Our HHI is close to those obtained by Léon (2016) for the WAEMU banking system. The Lerner index (the mark-up of price over marginal cost) is the most comprehensive measure of banking competition. The average value of the Lerner index is 0.22, and this value varies slightly across countries despite its increasing trend over the study period. These findings highlight the oligopolistic structure of WAEMU banking markets.

Regarding our banking variables, the average of the bank's total asset (*Size*) in WAEMU is 149.407 billion CFA francs. This variable is characterized by high variability and highlights the unequal distribution of assets within the banking sector. This inequality is confirmed by the distribution of the banking network (number of offices and retail outlets) with values ranging from 1 to 91. The average capitalization (capital to assets) of WAEMU banks is low (0.097), sometimes negative, but the highest value is 0.691. Regarding the distribution of bank ownership in the WAEMU countries, foreign groups hold a majority stake (53.8%), followed by private shareholders (28.1%), and the State shareholding is 18.2%. Indeed, financial liberalization occurred in the WAEMU countries in the 1990s and intensified in the 2000s. This led to a withdrawal of the State from the banking sector. Thus, the shares sold by the State and often purchased by foreign banking groups, increases foreign ownership in the banking sector. Also, over the last decade, many foreign banking groups were established in WAEMU and increased their influence in the WAEMU financial system. Finally, the macroeconomic aggregates show a moderate trend over the studied period. For instance, the average GDP growth is about 3.50%, and the average level of credit by the banking sector to the GDP is 51.50%, suggesting that the financial sector is less developed and can lead to competition among the actors of the banking sector.

4.2 | Empirical results

We present the empirical findings in two parts. First, we display the relationship between cost efficiency and market power index. Second, we account for the nonlinearity between both variables and deal for potential endogeneity through instrumental variables regressions.

TABLE 2 Market power and efficiency relationship in the WAEMU countries

	Pooled regressions		Panel fixed effects		Panel random effects	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
HHI	−0.296***		−0.123***		−0.134***	
	(0.031)		(0.018)		(0.018)	
Lerner		0.001		−0.003***		−0.003***
		(0.003)		(0.001)		(0.001)
Size	0.004**	0.000	0.004***	0.006***	0.004***	0.006***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Network	0.015***	0.013***	0.002***	0.002***	0.002***	0.002***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.0005)	(0.001)
Capitalization	−0.040***	−0.053***	−0.003	−0.004*	−0.003	−0.005*
	(0.010)	(0.011)	(0.002)	(0.003)	(0.002)	(0.003)
State	−0.012***	−0.020***	−0.004***	−0.005***	−0.005***	−0.005***
	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)
Private	−0.016***	−0.012***	−0.012***	−0.012***	−0.013***	−0.012***
	(0.005)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
GDP growth	−0.005	−0.110***	−0.004	−0.006	−0.004	−0.006
	(0.032)	(0.033)	(0.005)	(0.006)	(0.006)	(0.006)
Credit/GDP	0.013*	0.034***	0.027***	0.022***	0.027***	0.021***
	(0.007)	(0.006)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.906***	0.824***	0.791***	0.749***	0.793***	0.749***
	(0.019)	(0.020)	(0.008)	(0.007)	(0.009)	(0.008)
R^2	0.396	0.310	0.569	0.545	0.274	0.097
Fisher/χ^{2a}	50.86***	34.81***	92.28***	83.87***	736.09***	652.47***
LM Lagrange test					2322.82***	2229.18***
Hausman test					7.41	6.04
Observations	819	819	819	819	819	819

Notes: Robust standard errors in parentheses.

[a]χ^2 test is only for the panel random effects.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

4.2.1 | Relationship between bank efficiency and market power

Table 2 presents the outcomes of the simple panel regressions, through pooled regressions, fixed, and random effects specifications. The use of multiple specifications allows better assessment of the relationship between market power and cost efficiency and appraising the stability of the coefficients. Although most of the regressions provide conclusive results, the Hausman test accepts the null hypothesis in favor of the random effects.

Turning now to the nexus between market power and efficiency. The coefficients of the HHI and the Lerner index are negative and significant at the conventional level of 1%. This result suggests that an improvement in market power, that is, a decrease in competitiveness (an increase of HHI and Lerner index) implies a decrease in cost efficiency. Our outcome shows that considerable market power involves increasing operating banking costs in WAEMU. In other words, increasing banking competition improves cost efficiency. Banking competition leads banks to reduce their

operating costs and to include financial innovations, such as multifunction ATMs, telephone banking, and internet banking. In addition, the competition involves lowering the banks' margins through an increase in deposit rates and a reduction in lending rates. All these changes in the bank's functioning due to competition lead to an improvement in the cost efficiency. This supports the quiet life hypothesis of Hicks (1935), which established that concentrated markets give a monopolistic power as managers make less effort to maximize the bank's efficiency. Our result is consistent with the vast empirical literature on the relationship between efficiency and market power in developing countries.

Overall, the competition structure allows better cost optimization in the WAEMU banking sector. This result supports financial liberalization policies, which aim to improve efficiency through competition that can reduce costs. However, despite the competition between the various banks in the area and the introduction of many foreign banking groups, the WAEMU banking market is controlled by a few banking groups. For example, the five most prominent banking groups in the WAEMU (Ecobank, Société Générale, BOA, Atlantic Business International, and Attijariwafa bank) control 49.7% of the total assets and 57.1% of the total of bank accounts (UEMOA, 2019).

For the bank-specific variables, we find that the banking network and the size of banks measured by the volume of assets positively affect cost efficiency. Then, banks that have many customers can achieve economies of scale and therefore improve their cost efficiency. This result can justify the WAEMU banks' strategies consisting of conquering many customers. Furthermore, the ownership of bank capital also influences cost efficiency. Indeed, the increase in state or private ownership reduces cost efficiency. This may justify the banking liberalization in WAEMU and improve the efficiency of the banking sector through the privatization of state banks, opening to foreign shareholders, and the establishment of foreign bank branches. The impact of bank capitalization on cost efficiency is negative and significant in most cases. When a bank is capitalized, it reduces the cost efficiency since the capitalization is associated with bank restructuring. As a result, bank capitalization is linked with lower-cost efficiency.

As regards country-specific variables, GDP growth is not significant, while banking credit over GDP has a positive and significant impact on cost efficiency. Indeed, the increase in the aggregate level of credit stimulates the activity of individual banks, enhances their profit, and consequently improves the cost efficiency. At the same time, the economic downturn will lead to a credit contraction and an increase in operating costs, given the incompressible charges.

Although competition can improve banking efficiency, it can also worsen the situation of some banks. Therefore, the fragility of the banking system, due to competition, leads to the study of the nonlinear relationship between bank competition and cost efficiency in WAEMU.

4.2.2 | Nonlinear investigations

The previous linear specification assumes homogeneity of the relationship between cost efficiency and market power. This can be misleading. Indeed, the market share is heterogeneous because small banks coexist with large banking groups, and we can expect divergence in cost efficiency and market power relationship. Moreover, we attempt to reconcile the quiet life hypothesis and the ESH that support a negative and positive relationship between market power and cost efficiency. Therefore, we explore whether a threshold of market power can exist in the market power and cost efficiency nexus in WAEMU. In this regard, we develop a nonlinear model, through quadratic specification in Table 3.

Concerning our main variables of interest, we find that the HHI and the Lerner index have a negative and significant coefficient, whereas the squared market power coefficient is positive and significant and highlights the reversal of the trend in the relationship between cost efficiency and market power index. The first stage of the relationship is characterized by a negative coefficient for HHI and Lerner index. Under this regime, a decrease in market power involving more competition leads to an increase of the efficiency cost. This finding is in line with the results of the linear specification (see Table 2) and confirms the quiet life hypothesis. However, beyond a given level of competition, cost efficiency decreases, suggesting that fierce competition can lead banks to take more risk, and thereby achieve cost inefficiency. The ESH prevails under this second regime, where lower banking market concentration reduces cost efficiency. The market power threshold is 0.227 and 0.167 for the HHI and the Lerner index, respectively (for the random-effects model). These thresholds, relatively close to the average values of the market power indicators of our sample, suggest that banking competition is reaching a worrying level in the area. Consequently, prudential

TABLE 3 Market power and efficiency: nonlinear investigations

	Pooled regressions		Panel fixed effects		Panel random effects	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
HHI	−0.741***		−0.864***		−0.847***	
	(0.168)		(0.169)		(0.134)	
HHI2	1.600***		1.906***		1.867***	
	(0.591)		(0.432)		(0.348)	
Lerner		−0.008***		−0.002**		−0.002**
		(0.005)		(0.001)		(0.001)
Lerner2		0.018***		0.006***		0.006***
		(0.002)		(0.0002)		(0.0003)
Size	−0.004**	0.0004	0.004***	0.006***	0.004***	0.006***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Network	0.015***	0.013***	0.002***	0.002***	0.002***	0.002***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.0005)
Capitalization	−0.036***	−0.061***	−0.004	−0.004*	−0.004*	−0.005*
	(0.010)	(0.011)	(0.002)	(0.003)	(0.002)	(0.003)
State	−0.013***	−0.020***	−0.004***	−0.005***	−0.004***	−0.005***
	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)
Private	−0.009**	−0.011**	−0.010**	−0.011**	−0.011**	−0.011**
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
GDP growth	0.011	−0.099***	−0.001	−0.006	−0.001	−0.006
	(0.032)	(0.032)	(0.005)	(0.006)	(0.005)	(0.006)
Credit/GDP	0.014*	0.033***	0.026***	0.022***	0.026***	0.021***
	(0.007)	(0.006)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.912***	0.829***	0.855***	0.749***	0.853***	0.748***
	(0.021)	(0.020)	(0.017)	(0.007)	(0.014)	(0.008)
R^2	0.404	0.323	0.584	0.546	0.304	0.100
Fisher/χ^{2a}	46.74***	34.33***	86.90***	74.54***	801.44***	638.33***
LM test					2384.61***	2066.82***
Hausman test					8.97	10.33
Thresholds	0.231	0.222	0.227	0.167	0.227	0.167
Observations	819	819	819	819	819	819

Notes: Robust standard errors in parentheses.

[a]χ^2 test is only for the panel random effects.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

supervision must be strengthened in the direction of the most competitive banks. For instance, the deterioration of bank balance sheets, as well as the bank restructuring in WAEMU, can be explained by cost inefficiency due to increased competition.

The results of the nonlinear investigation between cost efficiency and market power has the advantage of reconciling the quiet life and the efficient structure hypotheses. Moreover, these findings make it possible to anticipate

the implications of the changes in the banking market structure on cost efficiency in the WAEMU countries. Nevertheless, the above estimates may suffer from a potential endogeneity bias. We deal with this limit in the next paragraph by proposing a robustness analysis through 2SLS IV regressions.

4.2.3 | Robustness analysis: 2SLS IV estimations

The estimation of the relationship between efficiency and market power can involve endogeneity bias due to reverse causality. Indeed, the structure of the market depends on cost efficiency and vice versa. Moreover, the main streams of the literature support this reverse causality: for instance, the quiet life hypothesis and the SCP theory argue that market structure influences the cost efficiency, while Demsetz (1973) suggests the reverse causality. The author postulates that

TABLE 4 Market power and efficiency: robustness analysis of linear model with 2SLS IV regressions

	2SLS IV pooled		2SLS IV fixed effects		2SLS IV random effects	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
HHI	−0.314***		−0.205***		−0.282***	
	(0.038)		(0.024)		(0.0395)	
Lerner		0.00423		−0.003**		−0.003**
		(0.005)		(0.001)		(0.001)
Size	−0.004*	−0.0015***	0.004***	0.007***	0.004***	0.007***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)
Network	0.015***	0.0142***	−0.0002	0.002***	−0.0004	0.002***
	(0.002)	(0.002)	(0.0008)	(0.001)	(0.0008)	(0.001)
Capitalization	−0.041***	−0.051***	−0.003	−0.006**	−0.009***	−0.006**
	(0.011)	(0.012)	(0.002)	(0.003)	(0.003)	(0.003)
State	0.014***	0.021***	−0.00002	0.004***	0.003	0.005***
	(0.004)	(0.007)	(0.002)	(0.001)	(0.002)	(0.001)
Private	−0.004	−0.0017	−0.004**	−0.002**	−0.002*	−0.002**
	(0.005)	(0.005)	(0.001)	(0.001)	(0.0009)	(0.001)
GDP growth	−0.007	−0.121***	0.003	0.002	0.002	0.002
	(0.034)	(0.039)	(0.004)	(0.005)	(0.004)	(0.006)
Credit/GDP	0.016**	−0.033***	0.024***	0.021***	0.028***	0.020***
	(0.008)	(0.007)	(0.002)	(0.002)	(0.003)	(0.002)
Constant	0.892***	0.842***	0.795***	0.743***	0.819***	0.742***
	(0.026)	(0.026)	(0.009)	(0.008)	(0.015)	(0.009)
R^2	0.394	0.295	0.516	0.10	0.250	0.10
Fisher/χ^{2a}	48.94***	22.96***	2.52e + 07***	2.01e + 07***	272.90***	586.75***
Fisher/χ^{2a} 1st stage	3900.21***	410.02***	433.997***	46.25***	502***	470***
Sargan test	3.04	4.751	6.484	0.207	4.94	0.226
Observations	819	819	819	819	819	819

Notes: Robust standard errors in parentheses.

[a]χ^2 test is only for the panel random effects.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

TABLE 5 Market power and efficiency: robustness analysis of nonlinear model with 2SLS IV regressions

	2SLS IV pooled		2SLS IV fixed effects		2SLS IV random effects	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
HHI	−0.714***		−1.984***		−1.347***	
	(0.179)		(0.336)		(0.191)	
HHI2	1.494**		4.874***		3.230***	
	(0.630)		(0.878)		(0.507)	
Lerner		−0.014		−0.003*		−0.003*
		(0.009)		(0.001)		(0.001)
Lerner2		−0.005		0.008**		0.007**
		(0.002)		(0.004)		(0.003)
Size	−0.004*	0.001	0.005***	0.007***	0.005***	0.007***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Network	0.015***	0.014***	0.001**	0.002***	0.002***	0.002***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Capitalization	−0.038***	−0.061***	−0.006**	−0.006**	−0.006**	−0.006**
	(0.011)	(0.012)	(0.003)	(0.003)	(0.002)	(0.003)
State	0.013***	0.020***	0.004***	0.004***	0.004***	0.005***
	(0.004)	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)
Private	−0.004	−0.001	−0.002**	−0.002**	−0.002**	−0.002*
	(0.004)	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)
GDP growth	0.003	−0.110***	0.009	0.002	0.007	0.001
	(0.033)	(0.034)	(0.006)	(0.005)	(0.006)	(0.006)
Credit/GDP	0.014*	−0.033***	0.019***	0.021***	0.022***	0.020***
	(0.007)	(0.007)	(0.003)	(0.002)	(0.002)	(0.002)
Constant	0.909***	0.824***	0.939***	0.743***	0.885***	0.742***
	(0.029)	(0.022)	(0.030)	(0.008)	(0.018)	(0.001)
R^2	0.40	0.33	0.51	0.55	0.26	0.55
Fisher/χ^{2a}	45.32***	23,63***	1.84e + 07***	2.1e + 07***	675.53***	579.22***
Fisher/χ^{2a} 1st stage	99990***	247.55***	13536.8***	82.72***	137162***	935***
Sargan test	0.224	1.519	0.478	0.356	1.056	0.375
Thresholds	0.238	–	0.204	0.188	0.209	0.214
Observations	819	819	819	819	819	819

Notes: Robust standard errors in parentheses.

[a]χ^2 test is only for the random effects.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

the nexus between market concentration and bank profitability is the result of the underlying relationship between profit and the firms' efficiency. Then, efficient firms compete effectively and increase their market share, which in turn improve market concentration. Endogeneity bias can also be linked to measurement errors on the variables, the problem of simultaneity, and the omitted variables issue (for instance, technological infrastructure, populations' size, level of education, etc.) Another problem is that the cost efficiency and market power are both driven by countries'

institutions such as the reliability of countries' legal rights and countries' policies in protecting some particular banks. Then, the market concentration may be related to these unobserved factors that also affect banking efficiency. To address the endogeneity issue, we use 2SLS IV estimations, where the lagged value of market power indicators are used as instruments. Tables 4 and 5 show the coefficients of linear and nonlinear models with 2SLS IV estimations, respectively.

The Fisher and χ^2 statistics of the first stage are significant, and the Sargan test confirms the validity of the instruments used. Our outcomes obtained from the linear (Table 4) and nonlinear (Table 5) specifications, after the control of the endogeneity bias, are consistent with the previous results. For instance, in the linear regressions, there is a negative and significant relationship between market power indicators and efficiency cost. In the nonlinear specifications, the market power index conserves a negative sign, and the coefficients of the squared variables are positive and significant. Then, the instrumental variable regressions confirm our findings that increasing banking competition improves cost efficiency. However, a reversal effect prevails in this relationship because of the positive and significant sign of the squared market power variables. This suggests that, at the given threshold, banking competition can have adverse effects on cost efficiency. Regarding the control variables, the signs are consistent with those obtained previously, suggesting the overall robustness of our results.

5 | CONCLUSION

This paper investigates the relationship between cost efficiency and market power in the WAEMU countries. Our empirical methodology relies on a panel data analysis, based on a sample of 63 WAEMU banks from seven countries over the period 2004–2016. We find that an increase in market power reduces banking efficiency in the WAEMU countries. The inefficiency of more concentrated banks in WAEMU is linked to an increase in banking operating costs. Our nonlinear investigation shows that there is a threshold effect in the cost efficiency and market power relationship in the WAEMU countries. Therefore, our findings support the ESH at the given level of market power. Beyond this threshold, the quiet life hypothesis holds.

The main policy implication may aim to improve efficiency in the WAEMU banking system through better control of operating costs. To do this, WAEMU banks should develop e-banking services and set up modern ATMs that allow the direct performance of many banking transactions. Since the negative effect of market power on efficiency is increased beyond a given threshold of banking competition, the central bank and the banking regulators will have to increase their supervision over the most competitive banks of the WAEMU.

Finally, banks should rethink their strategies with regard to increasing their customer base. Specifically, they should be more careful about customer quality rather than quantity, because banks with the largest number of customers are not necessarily the most efficient. Beyond the impact on banking efficiency of market power highlighted in this article, future works can investigate the effects of competition on the stability of the banking system in WAEMU.

ENDNOTES

[1]Ecobank (13.2%), Société Générale (10.1%), Bank of Africa (9.6%), Atlantic Business International (9.3%), Attijariwafa bank (7.5%), NSIA Banque (5.3%), and Coris Bank International (5%).

[2]The total balance sheet is greater than 200 billion CFA francs for large banks, between 100 and 200 billion for medium-sized banks, and less than 100 billion for small banks.

[3]For instance, Biekpe (2011) for Ghana, Hauner and Peiris (2008) for Uganda, Mwenda and Mutoti (2011) for Zambia, Taoufik and Hatem (2011) for Algeria, Poshakwale and Qian (2011) for Egypt, Djiogap and Song (2016) for CEMAC (Central African Economic and Monetary Community) countries and Léon (2016) for WAEMU countries.

[4]These constraints $\left(\sum\theta_j = 1 \text{ and } \sum\rho_k = 0\right)$ ensure that only a change in input price ratios can affect the production factors allocation during the minimization process.

[5]Unlike the intermediation approach, deposits are treated as output in the production approach.

[6]Foreign ownership is not included in the regression due to the multicollinearity bias with the other ownerships.

[7]The list of the banks can be provided upon request to the authors.

[8]Benin, Burkina-Faso, Côte d'Ivoire, Mali, Niger, Senegal, and Togo. Guinea Bissau has been excluded from our sample, given the noncontinuity of the data over the study period.

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