ISO Certification and Technical Efficiency in the Banking Sector: An Evidence from WAEMU's Countries Using the DEA Method

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In the view of the international organization of standardization, the introduction of ISO standards is typical of quality management systems oriented towards strengthening the efficiency of enterprises. Business banks are not excluded from this requirement. The current study aims to evaluate the effect of ISO certification on the technical performance of WAEMU banks. Using BCEAO data (2020), the DEA model and Tobit estimates show that ISO certification has no effect on the efficiency scores of the banks in the sample. It is therefore appropriate for these banks to work on improving their business climate.

Keywords: business banks, DEA, technical efficiency, ISO, WAEMU, Tobit

Introduction

Nowadays, ISO certification is omnipresent, from product quality to environmental friendliness. In an environment of increased competition, many companies are adopting the quality management system and the corresponding certification. The standard ISO 9001 has become very popular in Africa. It is also the most recognized and popular management standard in the world with more than 1.1 million certified organizations in 2014, according to a 2015 ISO survey.

The banking world is not immune to the application of ISO certification. Indeed, the management of the quality of banking services, aimed at ensuring the compliance of the offer of banking products, with the expectations of customers, involves the formation of the strategy and tactics of quality management, as well as the development and implementation of specific measures to improve it. Simultaneously, quality management must coincide with the general strategy of development of the bank and correspond to the market trends in the development of banking business, which requires the formation of a set of principles, which are the basis of managerial actions. International level, the basic principles and requirements of a quality management system are defined in the form of ISO 9001, which at this stage is actively implemented by banks in various countries of the world. ISO 9001 is typical of quality management systems that are oriented towards strengthening the ability of an organization to meet the expectations of its customers. Thus, customer requirements are one of the input factors for the development of a quality management system, and customer satisfaction is considered an indicator

of system performance. Meanwhile, the financial aspect is not generally considered to be the main objective of certifying banks according to international quality standards, given the lack of direct causal relationships.

Numerous researchers have investigated the financial impact of implementing ISO 9001 certification. However, there is no consensus on the financial impact of certification. Some research has shown that there is a positive financial effect, mainly through increased sales and improved operational efficiency, due to customer satisfaction and streamlined production processes (Mokhtar, & Muda, 2012; Psomas, & Pantouvakis, 2015). Some other studies indicate that this link cannot be proven, as the best performing companies choose to implement these quality management systems (QMS) and obtain certification themselves (Dick, Heras, & Casadesus, 2008; Lo, Teug, & Chen, 2011). However, to date, very few studies have examined the impact of ISO certification on the efficiency of banks, and there are almost no studies on banks in the WAEMU zone.

As an extension of existing studies, the main objective of this analysis is to answer the following research question: In other words, the main objective of this study is to analyze the effect of ISO certification on banking efficiency in the WAEMU zone. To carry out this investigation, specific objectives are formulated, namely: (i) to evaluate the efficiency scores of banks in the WAEMU zone on the one hand and on the other hand (ii) to evaluate the impact of ISO certification on the different efficiency scores achieved by banks in the WAEMU zone. Furthermore, this analysis assumes that certification allows banks to be more efficient and more specifically that certification allows banks to increase their performance and market share.

The remainder of the paper will be presented as follows. After the introduction in Section 1, Section 2 will deal with the general context of the study of ISO certification and the evolution of the data. Section 3 will focus on the literature review. The methodology used to conduct our investigation will be described in Section 4. The presentation and interpretation of the results of our estimations will be done in Section 5, and Section 6 will highlight the conclusion and policy recommendations.

Background and Data Evolution

Background of ISO certification

The standard ISO 9001 is published by the technical subcommittee 176 (TC 176) of the ISO (International Organization for Standardization). It sets out requirements for the implementation of a quality management system for organizations wishing to continuously improve customer satisfaction and provide products and services that meet their requirements. ISO 9001 is relevant to all organizations regardless of their size or sector of activity. ISO 9001 is part of the ISO 9000 series of standards (ISO 9000, ISO 9001 and ISO 9004).

The first edition of ISO 9001 was published in 1987 and is regularly revised. Its first revision dates back to 1994, the next one in 2000, the others took place in 2008 and the latest version of ISO 9001 was published in September 2015 and now allows to take into account the internal and external issues of an organization and the associated risks.

The 2015 version has undergone major changes compared to the 2008 version in order to offer a standard that is adapted to the current economic context and, above all, to the performance requirements of the various sectors of activity in force throughout the world.

Data Evolution

This sub-section of the study will examine the deposits recorded by the banks over the period of analysis, banks' overall deposits year by year, the evolution of deposits, relative to the period of analysis and finally the

share of deposits for each bank over the period of analysis.

Deposits recorded by banks over 2009-2019 time period. During the analysis period, the deposits recorded by the banks amounted to more than 10 billion. SGBCI (Society General of Bank in Côte d'Ivoire) is at the top of the list (with more than 10 thousand billion in deposits), followed by the West African Banking Company (CBAO Senegal) with 7 thousand billion, and BACI (Atlantique bank of Côte d'Ivoire) and ECOBANK Côte d'Ivoire, which are relatively close to 6 thousand billion. CBI (Coris Bank International Burkina) is close to 4 trillion in recorded deposits, as is BDM (Development Bank of Mali) and then BOACI (Bank of Africa Côte d'Ivoire). Other banks in the sample, notably UTB (Union togolaise de Banque), SNB (Society Nigerians de Banque), CITIB (CITI BANK Côte d'Ivoire), BBG CI (Bridge Bank Grouped Côte d'Ivoire) and BIIC (International Bank for Industry of Benin), have recorded less than 2 thousand billion deposits.
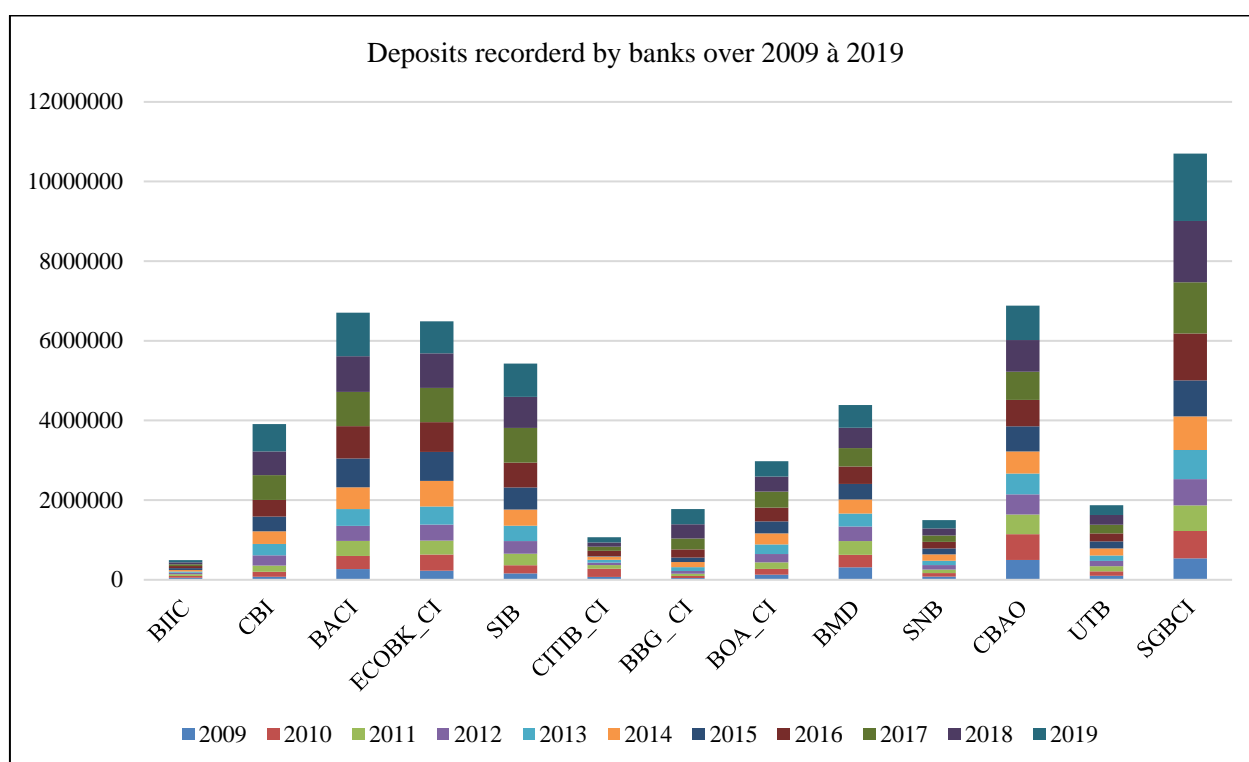

Figure 1. Deposits recorded by banks over 2009-2019.

Source: Author based on BCEAO data 2009-2019.

Global deposits of banks. The pattern of banks' aggregate deposits by year shows a clear improvement in their deposits from 2009 to 2019. The total deposits, which amounted to about 20 trillion in 2009, reached the threshold of 80 trillion in 2019, as shown in this diagram.

Deposit trends over 2009-2019 period. An analysis of deposit trends from 2009 to 2019 shows that SGBCI recorded a higher deposit rate than the other banks, followed by UTB, CBAO, SNB, BMD, BOA CI, SIB, BBG CI, CITI CI, BIIC, ECOBANK CI, BACI and BOA.
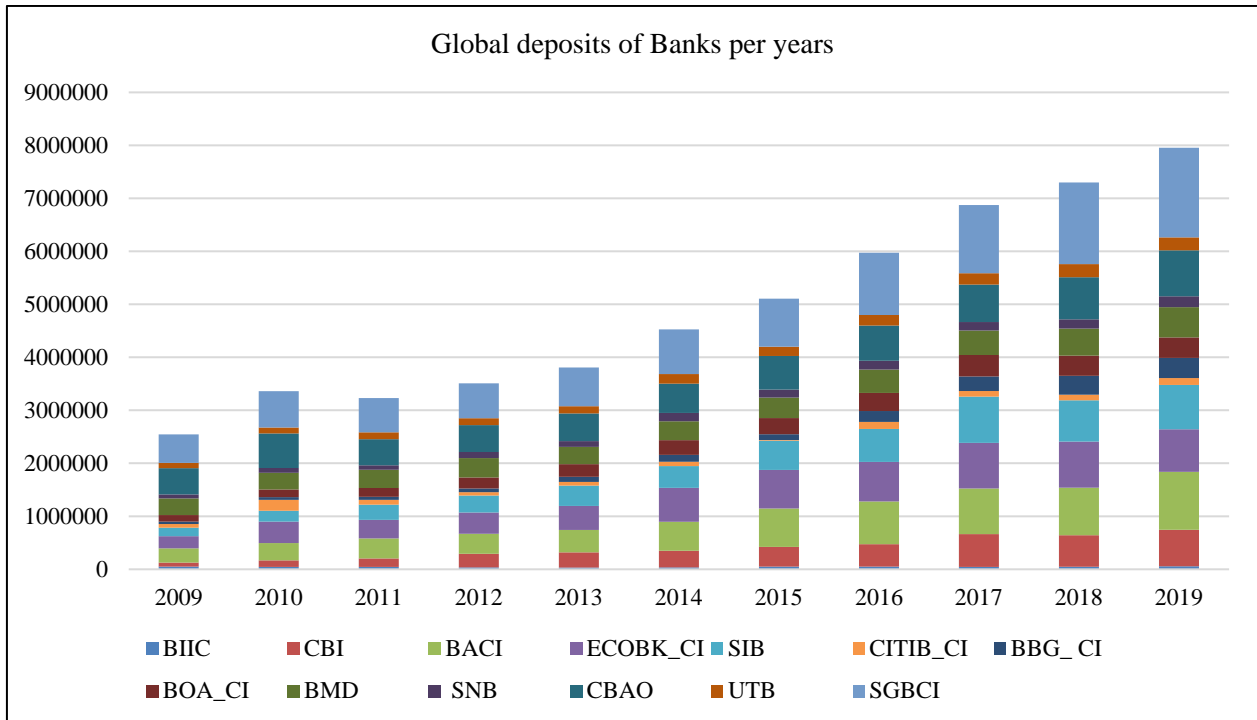
Figure 2. Global deposits of banks per years.
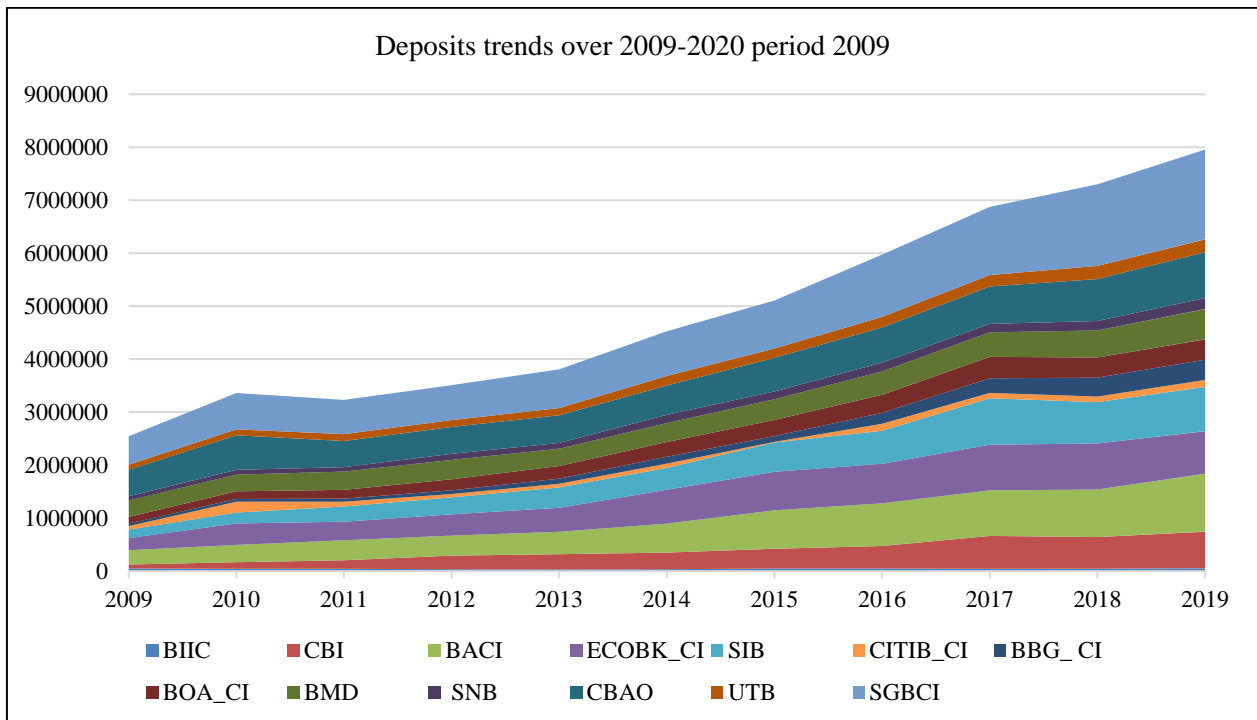
Source: Author based on BCEAO data 2009-2019.

Figure 3. Deposits trends over 2009-2020 period 2009.

Source: Author based on BCEAO data 2009-2019.

Percentage of deposits in the sample. Examination of this pie chart on the shares of deposits recorded by the banks confirms to some extent the observations made in the previous charts. Indeed, SGBCI is still in the lead here with 21% of the share of deposits followed by CBAO 19%, BMD 12%, BACI 11%, ECOBANK CI 9% and SIB 6%. The share of deposits of other banks remained relatively low overall.
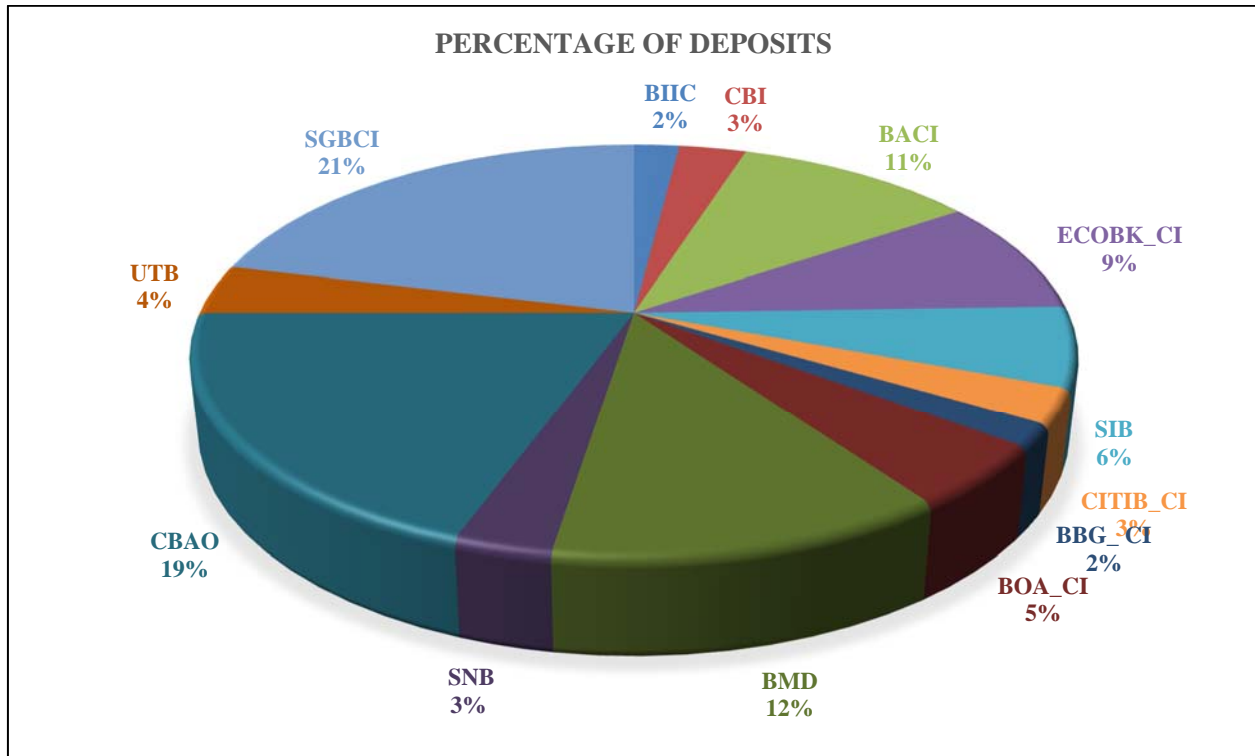

Figure 4. Percentage of deposits.

Source: Author based on BCEAO data 2009-2019.

Literature Review

In this part, we will first present the literature on the impact of certification on the performance of companies in general and then we will present its impact on the performance of banks in general.

Business Performance Analysis Studies

Sharma (2005) explores the association between ISO 9000 certification and financial performance at the organizational level in a mature quality initiative market. For this purpose, he uses a sample of 35 ISO 9000-certified firms across a range of industries and 35 non-ISO-certified firms matched in size and industry. The results of Charma's work (opacity) show that ISO 9000 certification is associated with improvements in financial performance. They suggest that ISO 9000 certification brings benefits to the company and its stakeholders. Specifically, multivariate tests showed that ISO 9000 certification is associated with significant improvements in profit margin, sales growth.

Following Ullah et al. (2014) using a single Second, to examine whether ISO certification can signal a firm's financial constraints and strengths. Finally, to examine the firm-level benefits of ISO certification in terms of labor productivity and cost of sales.

Evidence from Ullah et al. (2014) empirically suggests that larger and older firms are more likely to adopt

ISO certification. Furthermore, while private ownership concentration and public ownership are not significant determinants of ISO adoption, Ullah et al. (opacity) find that exporters and foreign-owned firms are more likely to adopt ISO certification. Their cross-sectional, multi-country studies show that ISO-certified firms perform significantly worse than non-ISO firms. This result is robust after controlling for several relevant firm- and country-level characteristics, as well as country fixed effects. The result is also robust to several alternative measures of financial strength and/or liquidity of the firms studied.

Wu et al. (2011) using primarily structural equation modeling, investigates the impact of a travel agency's ISO certification on consumers' perceived quality, brand image, brand attitude, brand preference, and purchase intention. A well-known ISO-certified travel agency in Taiwan was chosen as a case. A total of 500 valid questionnaires were collected for further analysis. The research results showed that informing the consumer about a travel agency that had obtained ISO certification could more directly improve the consumer's quality and brand image, and indirectly improve the brand attitude, brand preference, and then purchase intention. Thus, a travel agency with ISO certification was an important message and key antecedent for improving consumer purchase intention.

Drawing on a sample of 44 Moroccan SMEs in equal parts (22 non-certified and 22 certified SMEs), Laaguili et al. (2017), based on a comparative analysis between the performance of certified and non-certified SMEs, show that the ISO 9001 standard can contribute to relatively improved quantitative performance and significantly improved qualitative performance.

Bayo-Moriones et al. (2009) examine operational and organizational factors that increase the probability of adopting ISO certification and the impact of certification and ownership structure on firm performance. Using a sample of 163 Spanish manufacturing firms for the period 1995-2000, they perform a rare event Logit model and regression analysis. Findings show that firms producing intermediates that have implemented just-in-time practices are more likely to adopt ISO certification. Empirical evidence confirms that ISO certification and ownership structure have a positive impact on firm performance. However, the findings indicate that the positive impact of ISO certification on performance decreases in firms with high ownership concentration.

Some of the perception studies indicate a disappointment with the impact of ISO 9000 certification on business effectiveness by managers even though it is initially cited as a primary motivation for certification (Skrabee, 1997; Ragothaman, & Korte, 1999).

Chiu, Lo, and Tsai. (2012), through a Case Study titled "Establishing an Integration-Energy-Practice Model for Improving Energy Performance Indicators in ISO 50001 Energy Management Systems", attempt to assess the effect of ISO certification on the performance of certain companies of businesses that implemented an ISO 50001 energy management system. To achieve their goals, they adopt a particular model that is based on an integration-energy-practice model to enhance energy performance indicators and successfully navigate the international auditing and certification procedures for ISO 50001 energy management system. By integrating internal and external technical resources, their model establishes energy technology think tanks, promotes successful technology and experiences across various sectors, and enables enterprises to enhance energy efficiency while meeting the ISO 50001 international standard for energy management systems.

Romain, P. et al., (2018), have tried in their investigations to shed light on the effect of ISO certification on the dynamism of Spanish industry; including the ISO 9001 Standard. It was for them to analyze the results of adhering to this standard for construction companies in Spain, and on the other, to examine whether these results are affected by the size of the organization and the seniority of the certification. To this end, a questionnaire was

sent to quality managers of 302 companies in the industry and Some of the most significant internal benefits mentioned were improvements to the organizational processes, while among the external benefits, commercial aspects, such as better chances of competing on the market, were mentioned most frequently. Besides, it was also observed that the size of the organization does not significantly modify the positive effects of adherence to the standard, while the age of the certification itself, has a significant influence on the positive results of the adherence.

The purpose of Psomas, E. L., and Fotopoulo, C. V., in their 2009 investigation, is to review and classify the main findings of the studies undertaken on ISO 9001:2000 certified companies and to present future research proposals. To achieve this purpose, a literature review is carried out by the authors focusing on research papers published in academic literature. It should be remembered that both, the most recently published papers as well as those concerned only with the 2000 version of the ISO 9001 standard are chosen. The findings from the research papers used are classified according to the issues examined. The many studies undertaken regarding the ISO 9001:2000 implementation show that although there are signs that the initial results are not so positive. For the authors, the general conclusion of this research is that the standard has positive impact on the company's operational as well as business performance and on the company's effort to move towards total quality management.

Bank Performance Surveys

As mentioned in the introduction, there are few studies that focus on analyzing the impact of ISO certification on bank efficiency. One of the few studies is that of Demkiv (2018). Indeed, using a stochastic frontier analysis considering the parameters of income, expenses and other parameters of banking activity over the period of 2008-2017, he checks the hypothesis of the impact of banking quality standards on the efficiency of banking activities in Ukraine. Econometric modeling results confirmed the positive effect of commercial banks' introduction of ISO 9001 group quality standards on the efficiency of their activities. In addition, the results show that the successful completion of the certification procedure of the bank's quality management system not only plays an important role in terms of forming a positive image of the bank in the market of banking services, but also creates significant prospects for increasing the efficiency of its activities.

In this study, Kablan (2007) uses a DEA model to assess technical efficiency and stochastic frontier analysis (SFA) for cost efficiency. His purpose was to measure the efficiency of WAEMU banks, and its determinants, after the 1993 to 1996 banking reforms. The findings suggest similar trends for both types of efficiency for all WAEMU countries except Cote d'Ivoire and Burkina Faso. Kablan (opacity) also shows that local private banks are more efficient, followed by foreign banks and then public banks.

Methodology

DEA (Data Envelopment Analysis) Model

The Data Envelopment Analysis (DEA) model is an evaluation method of the performance of organizational units called DMUs or Decision-Making Units. This method is used to evaluate the performance of decision-making organizations that transform resources (inputs) into services (outputs). It is suitable for both private and public sector organizations. It was developed by Charnes et al. (1978; 1981) to evaluate the efficiency of a federal program for allocating resources to schools (Follow Through Program). Today, the DEA method can be applied in all organizations (public and private).

Each organization's efficiency score is calculated in relation to an efficiency frontier. Organizations that are

located on the frontier have a score of 1 (or 100%). Those below the frontier have a score of less than 1 (or 100%) and therefore have room to improve their performance.

There are two basic models used in DEA, each leading to the identification of a different efficiency frontier. The first model assumes that organizations evolve in a situation of constant returns to scale (CRS). This is appropriate when all organizations have reached their optimal size. In addition, the second model assumes that organizations evolve in a situation of variable returns to scale (VRS). It is appropriate when organizations are not operating at their optimal size.

Mathematical models of the DEA method. This sub-section describes the two main DEA models, namely the model assuming constant returns to scale (Charnes et al., 1978) and the model assuming variable returns to scale (Banker et al., 1984). DEA is a non-parametric method, unlike parametric methods (such as ordinary least squares, maximum likelihood or stochastic frontier analysis), outputs and inputs are used to calculate an envelope representing the efficiency frontier using linear programming. Therefore, a non-parametric method does not require the specification of a prior functional form.

Constant scale efficiency. As noted above, the constant returns to scale hypothesis (CRS model) was developed by Charnes et al. (1978). This is appropriate when all organizations are operating at their optimal size. Efficiency is defined by Charnes et al. (1978) as the maximum value of the ratio of weighted output to weighted inputs, subject to the constraint that similar ratios for each organization are less than or equal to unity. According to the notation used by Johnes (2004), efficiency corresponds to:

$$TE_k = \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} V_i X_{ik}} \tag{1}$$

where:

TE_k: is the technical efficiency of the organization k using m inputs to produce s outputs;

y_{rk}: is the output quantity r produced for input i consumed by organization k;

u_r: is output weight r;

V_i: is input weight i;

n: number of organizations to be evaluated;

s: number of outputs;

m: number of inputs.

The technical efficiency of organization k is maximized under two constraints. Firstly, the weights applied to the outputs and inputs of each organization in the sample (equation 3). Secondly, the weights applied to outputs and inputs are strictly positive (equation 4).

We arrive at the following maximization program:

$$Maximization \ \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} V_i X_{ik}} \tag{2}$$

$$under \ contraintes \ \frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} V_i X_{ij}} \leq 1 \ j = 1, \dots, n \tag{3}$$

$$u_r, v_i > 0 \ \forall_r = 1, \dots, s; i = 1, \dots, m \tag{4}$$

Based on these different equations, two approaches can be used to solve the linear programming problem. The first one consists in maximizing the weighted sum of the outputs while keeping the inputs constant (output-oriented model). The second approach consists in maximizing the weighted sum of the inputs while keeping the outputs constant (output-oriented model). The initial equations of each of the two approaches are as follows:

CRS model, output oriented (primal equation).

$$Minimization \sum_{i=1}^{m} V_i X_{ik} \tag{5}$$

Under constraints.

$$\sum_{i=1}^{m} V_i X_{ij} - \sum_{r=1}^{s} u_r y_{rj} \geq 0 \; j = 1, \dots, n \tag{6}$$

$$\sum_{r=1}^{s} u_r y_{rk} = 1 \tag{7}$$

$$u_r, V_i > 0 \; \forall_r = 1, \dots, s; i = 1, \dots, m \tag{8}$$

Input-oriented CRS model (primal equation).

$$Maximizationer \sum_{r=1}^{s} u_r y_{rk} \tag{9}$$

Under constraints.

$$\sum_{i=1}^{m} v_i x_{ij} - \sum_{r=1}^{s} u_r y_{rj} \geq 0 \; j = 1, \dots, n \tag{10}$$

$$\sum_{i=1}^{m} v_i x_{ik} = 1 \tag{11}$$

$$u_r, v_i > 0 \; \forall r = 1, \dots, s; i = 1, \dots, m \tag{12}$$

Scaling efficience. Banker et al. (1984) developed a model assuming variable returns to scale. This model is suitable when all organizations do not operate at their optimal size. Using the VRS model, we can calculate the technical efficiency without the scale effect. In order to incorporate the assumption of varying returns to scale, the CRS model is modified by relaxing the assumption of constant returns to scale. To achieve this, a measure of returns to scale is added to the primal equation for the organization k $\left(where\ convexity\ constraint\ \sum_{j=1}^{n} \lambda_j = 1\ into\ the\ dual\ equation \right)$.

VRS efficiency frontier is shown in Figure 5 for a simple example with one output and one input. Only firm B is 100% efficient under the assumption of variable returns to scale. C and A are inefficient under the assumption of variable returns to scale. For C and A to be efficient, a shift to point B is required.
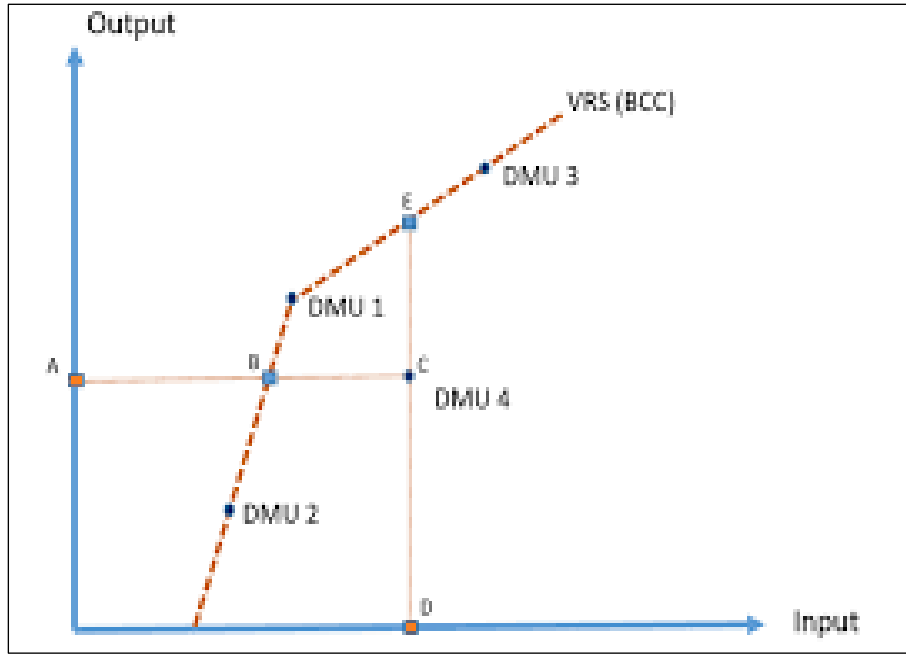
Figure 5. Variable scale efficiency.

Model Tobit

After applying the DEA model to capture the efficiency scores of the different banks in our analysis sample, we use a second model, namely the Tobit model, to assess the impact of ISO certification on the efficiency scores obtained by each bank. Tobit models generally refer to regression models in which the domain of definition of the dependent variable is constrained in one form or another. Such models in economics were initiated by James Tobin (1958).

The Tobit model is written in the form:

$$Y_i^* = X_i\theta + \varepsilon_i$$
$$Y_i = \begin{cases} Y_i^* \ si \ Y_i^* > 0 \\ 0 \ si \ Y_i^* \le 0 \end{cases}$$

θ and X_i belong to in $\mathbb{R}^p$ and the residues ε_i are homoscedastic Gaussian: $\varepsilon_i \sim N(0, \sigma)$. Of course, one can specify a non-Gaussian distribution, such as the Weibul distribution or the Logistic distribution.

Data

This paper uses data from 12 commercial banks in the WAEMU zone over 11 years, i.e. from 2009 to 2019. Four variables are used in this study, two of which are inputs (net fixed assets, number of employees) and two as outputs (loans and deposits).

To examine the impact of ISO certification on bank efficiency, we use the efficiency obtained under the constant returns to scale hypothesis and the variable returns to scale hypothesis as the explained variable, and we consider ISO certification, the density of credit demand, the intermediary ratio, the average capital ratio, the population density and the share of loans and deposits in the total assets of the banks studied as the explanatory variables.

Results and Interpretation

Technical Efficiency Scores of WAEMU Banks Estimated with the DEA Method

Table 1

Assumption of Constant Return to Scale (CRS)

Années	BIBI	CBI	BACI	ECO_CI	SIB	CITI	SGBCI	BRI_CI	BOACI	BDM	SONIB	CBAO	UTB
2009	0.21	0.66	0.36	0.51	0.42	1	0.47	0.62	0.59	0.55	0.39	0.66	0.29
2010	0.39	1	0.69	1	0.61	1	0.8	0.9	0.77	0.81	0.64	0.67	0.5
2011	0.22	0.78	0.42	1	0.46	1	0.53	0.56	0.96	0.53	0.5	0.31	0.41
2012	0.2	0.65	0.71	0.56	0.39	1	0.39	0.43	0.21	0.57	0.43	0.35	0.4
2013	0.37	1	0.78	0.94	0.73	1	1	0.78	0.7	0.61	0.81	0.6	0.55
2014	1	0.76	0.5	0.46	0.54	1	0.41	0.63	1	0.41	0.68	0.5	0.49
2015	0.12	0.7	0.8	0.69	0.61	1	0.51	0.56	0.6	0.6	0.51	0.42	0.47
2016	0.13	0.55	0.58	0.37	0.48	1	0.06	0.42	0.46	0.44	0.39	0.35	0.35
2017	0.58	0.62	0.74	0.56	0.92	1	0.52	0.51	1	0.46	0.62	0.5	0.31
2018	0.53	0.48	0.68	0.53	0.72	1	0.48	0.57	0.36	0.4	0.54	0.34	0.32
2019	1	0.37	0.78	0.47	0.82	1	0.45	0.35	0.41	0.2	0.55	0.4	0.15
Mean	0.43	0.69	0.64	0.64	0.61	1	0.51	0.57	0.64	0.51	0.55	0.4	0.38

Table 2

Assumption of Variable Return to Scale (VRS)

Years	BIBI	CBI	BACI	ECO_CI	SIB	CITI	SGBCI	BRI_CI	BOACI	BDM	SONIB	CBAO	UTB
2009	0.28	0.78	0.51	1	0.77	1	1	0.75	0.84	1	0.45	1	0.34
2010	0.56	1	0.7	1	1	1	1	1	0.78	0.82	0.67	1	0.54
2011	0.31	1	0.74	1	0.95	1	1	0.6	0.97	0.97	0.95	1	0.41
2012	0.28	1	0.92	1	0.71	1	1	0.49	0.37	1	0.59	1	0.56
2013	0.38	1	1	1	0.88	1	1	0.79	0.91	0.9	0.91	0.86	0.56
2014	1	1	1	1	0.9	1	1	0.75	1	0.8	0.76	1	0.65
2015	0.28	1	1	1	1	1	1	0.8	0.83	0.63	0.98	1	0.62
2016	0.34	0.96	1	0.84	1	1	1	0.65	0.79	0.73	0.92	1	0.51
2017	1	0.9	1	0.91	1	1	1	0.77	1	0.68	0.62	0.6	0.44
2018	1	0.82	1	0.92	1	1	1	1	0.54	0.74	0.67	0.6	0.51
2019	1	0.59	1	0.6	1	1	1	1	0.5	0.62	0.65	0.51	0.6
Mean	0.58	0.91	0.9	0.93	0.93	1	1	0.78	0.77	0.8	0.74	0.87	0.47

The DEA estimated efficiency score results under the CRS and VRS assumptions are given in Tables 1 and 2, respectively. Efficiency scores are given by calculating the average score for each bank. There is some heterogeneity in the level of efficiency among the banks. Indeed, Union Togolese Union Banks (UTB) has the lowest efficiency score (0.38 with CRS and 0.47 with VRS). This confirms the findings of Kablan (2007) who found that in the WAEMU zone, Togolese banks as a whole have a low efficiency score. CITI Bank (Côte d'Ivoire) has the highest average score, i.e., 1 according to the CRS model and the VRS model. CITI Bank and General Company of Banks of Côte d'Ivoire (SGBCI) are the most efficient because they have an efficiency score of 1 under the VRS hypothesis. Banks such as: Development Bank of Mali (BMD); Coris bank international Burkina Faso (CBI), Compagny Bank of West Africa (CBAO); SONIBANK (Niger); ECOBANK Côte d'Ivoire,

Bank Union of Togo (UTB), Bridge Bank (Côte d'Ivoire), show a downward trend under the CRS hypothesis in their efficiency scores.

Overall, the efficiency scores displayed by various banks in our sample follow a downward trend under different CRS and VRS hypotheses.

Table 3

Growth Rate of Total Factor Productivity (Malmquist Index) and Its Components from 2009 to 2019

Bank	total factor productivity change	efficiency change 1	technological change 2	pure technical efficiency change	scale efficiency change
BACI	1.23	1.16	1.2	1.07	1.07
BDM	1.12	0.94	1.39	0.96	1
BIBE	1.56	1.62	1.16	1.38	1.1
BOA_CI	1.25	1.25	1.06	1.06	1.07
BRIDGE_BANK	1.12	1	1.27	1.07	0.93
CBAO	1.01	1	1.11	0.95	1.13
CBI	1.06	0.98	1.16	0.98	0.99
CITIBANK_CI	1.36	1	1.36	1	1
ECOBANK_CI	1.12	1.11	1.15	0.96	1.15
SGBCI	1.40	1.73	1.17	1	1.73
SIB	1.09	1.14	1.07	1.04	1.09
SONIBANK	1.09	1.1	1.12	1.09	1.09
UTB	1.32	0.98	1.73	1.08	0.92
Mean	1.21	1.15	1.23	1.05	1.1

Malnquist's index and its components are described in Table 3. The variation in overall technical efficiency is 15% for all banks over the study period. This increase is driven by the change in scale efficiency which is 10% and pure technical efficiency under the VRS assumption which increased by 5% over the period. This means that the WAEMU banks considered (except BBG CI, CBI and UTB) were able to exploit the change in scale that occurred during the period, while the increase in pure technical efficiency is due to the following banks: BACI, BIIC, BOA - COTE D'IVOIRE, BBG CI and SIB. Growth in total factor productivity was 21 percent over the period. This increase is due not only to the increase in technical efficiency but also to the incorporation by the banks of technological changes. Indeed, the latter increased by 23% during the study period. This rise was observed at the level of all the banks considered.

Tobit Estimation Results

Result of the regression on constant returns.

Table 4

Result of the Regression on Constant Return

CRS	Coef.	Std. Err	Z	$P > |Z|$
ISO	-0.0135192	0.0920803	-0.15	0.883
DEP	-0.0015895	0.003394	-0.47	0.640
DD**	-0.0614169	0.0321111	-1.91	0.056
IR	0.1410359	0.1097303	1.29	0.478
ACR	0.0039886	0.0056238	0.71	0.478
POP_d	0.0010623	0.0022728	0.47	0.640

Result of the regression on variable returns.

Table 5

Result of the Regression on Variable Returns

VRS eff	Coef.	Std. Err	Z	$P > |Z|$
ISO	0.0747762	0.1255098	0.60	0.551
DEP	0.0323564	0.0286782	1.13	0.259
DD	0.0122323	0.0509927	0.24	0.810
IR	0.0465019	0.1442249	0.32	0.747
ACR	-0.0398164	0.0336041	-1.18	0.236
POP_D	-0.0008761	0.003248	-0.27	0.787

In the Tobit regression, the purpose was to assess the impact of ISO certification on the efficiency scores achieved by the banks in our study sample. In Table 4, only the variable DD (Density of credit demand) is significant when the regression is done under the assumption of constant returns. Indeed, when credit demand is dense at the level of the banks, they have less and less control over their command variables, which are the level of production on the one hand and the factors of production on the other. This finding could be explained in the following way: when they provide a lot of consumer credit or to support any economic activity, banks think they have enough resources to satisfy their clients' demand and thus become less vigilant about the fundamentals of their efficiency, which we have called inputs and outputs respectively. Under both hypotheses, the result of certification seems to be neutral because it is a non-significant variable under both hypotheses, although it has a positive sign under the second hypothesis (variable returns) and a negative sign under the first hypothesis (constant returns). This is consistent with work that finds ISO certification to be a disappointment in the impact of ISO certification on managers' business effectiveness (Skrabee, 1997; Ragothaman, & Korte, 1999).

Conclusion and Policy Recommendations

The purpose of this paper was to analyze the impact of ISO certification on banking efficiency. In order to achieve this main objective, two more specific objectives are defined. First of all, to evaluate the efficiency of the banks in our sample and second of all to test the impact of ISO certification on the level of efficiency achieved by the banks in our analysis area. To achieve the first objective, we used a DEA model. Finally, we found that the results were heterogeneous among the banks selected. Indeed, the Union of Togolese Banks has the lowest degree of efficiency. This result confirms the conclusions of Kablan (2007). CITI Bank and the General Bank of Côte d'Ivoire are the most efficient according to the two hypotheses of the DEA model. With regard to the second specific objective, we used a Tobit model to test the impact of ISO certification on the efficiency of banks. The results show that ISO certification has no impact on bank efficiency. Only credit demand density has an effect on bank eff[icenc]e.

The various member countries of the WAEMU zone should therefore work to improve their business climate and ease the thorny issue of financial repression as much as possible. Moreover, according to their room for maneuver, banks can either reduce their inputs (employees, net fixed assets) or increase their outputs (credit and deposits) to achieve an optimal level of efficiency.

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