EVALUATION OF THE EFFICIENCY OF ALGERIAN BANKS USING DATA ENVELOPEMENT ANALYSIS APPROACH (DEA)

تقييم كفاءة البنوك الجزائرية باستخدام مغلف البيانات DEA

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Abstract: This paper aims to follow the historical evolution of the Algerian banking system and to estimate the performance of Algerian banks both public and private using the Data Envelopment Analysis (D.E.A), The most commonly used method in measuring efficiency.
The sample of the study included 11 banks, 6 of which were public. She used the data collected for her represented in the inputs Total Invested Funds and Total Operating Expenses as inputs and operating Income, total loans and Net Income as outputs . The study concluded that the public banks are technically more efficient than private banks. Multiple reasons, perhaps the most important we find the size of assets, Intensive distribution of public banking agencies as well as Policies being undermined by the public banking sector under environmental and competitive pressures to improve banking services. **keyword**: Algerian Banking System; technical Efficiency; scale Efficiency; Data envelopment Analysis.
JEL classification code : E5, E58, G21

ملخص: تهدف هذه الورقة البحثية إلى تتبع مراحل تطور النظام المصرفي الجزائري وتقييم أداء البنوك الجزائرية (عمومية وخاصة)، باستخدام أسلوب مغلف البيانات (DEA).
تضمنت عينة الدراسة إحدى عشر بنك 6 منها عمومية ، حيث استخدمت البيانات المجمعة لها والمتمثلة في المدخلات (مجموع الأموال المستثمرة و مجموع مصاريف الاستغلال) والمخرجات (الإيرادات التشغيلية، إجمالي القروض وصافي الدخل).خلصت الدراسة أن البنوك العمومية اكثر كفاءة تقنية من البنوك الخاصة لعدة أسباب أهمها حجم أصول هذه البنوك وعدد وكالاتها وكذا توجهها نحو تحسين خدماتها.
الكلمات المفتاحية : النظام المصرفي الجزائري؛ الكفاءة التقنية؛ كفاءة النطاق؛ تحليل مغلف البيانات.
تصنيف JEL : E58,G21 ، E5

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1. Introduction :

Banks and financial institutions play an important role in the economic development and development of the economies of countries, whether they are developed or developing countries, through the provision of quality banking services and the provision of funding for economic institutions. To ensure the achievement of the goal, Algeria has worked to develop this sector through many reforms, especially the issuance of the loan law (10-90) and cash and the openness of the Algerian banking system to private banks, national or foreign, and activate the role of the central bank regulatory and control of the money market.

Since then, the Algerian economy has witnessed a remarkable openness to international markets and the granting of licenses to many Arab and foreign banks to operate in Algeria. In order to know the performance of private banks compared to public banks, this paper answers the following main question through the use of the DEA: What is the efficiency of Algerian banks (public and private) and what are the most efficient banks?

I. THE THEORETICAL FRAMEWORK OF THE STUDY:

First: The evolution of the structure of the Algerian banking system:

The Algerian banking system was subject to the rules of control in a regulated economy, but it has undergone a great transformation, especially after the issuance of the Money and Loan Law, which is the main turning point of the banking system, it has a set of rules that allow banks to play their roles in the free economy.

1. The stage of the formation of the Algerian banking system:

On the eve of its independence, Algeria inherited a broad banking system, but it was based on a liberal economic system, contrary to Algeria's political orientation, which aspired to a socialist economy. The result was the emergence of two banking systems, one based on liberalism and the other on the basis of a socialist state, which necessitated the construction of an independent Algerian banking system. It initiated the establishment of an Algerian banking system, either through the nationalization of foreign banking branches or through the establishment of new banks.

1-1- Stage of establishing a national banking system:

After independence Algeria worked to shape the banking system by giving sovereignty to financial institutions.

a) On August 29, 1962, the Algerian treasury was separated from the French treasury, which allowed it to carry out some of the traditional functions of the treasury and to intervene in certain economic fields such as ensuring traditional agricultural and industrial activities in response to the requirements of the economy. (Belazouz Ben Ali, 2006,p173)

b) The Central Bank of Algeria: It was established under Law No. 62-144, which was ratified by the Constituent Assembly on December 13, 1962, and was established as a bank for banks. Consequently, it was prevented from carrying out any private transactions except in the case of the exception required by the national interest. The law is regulating the circulation of cash, managing and controlling the distribution of the loan by all appropriate means within the framework of the policy determined by the public authorities. (Mohamed Hamidat, 2005,p127)

In reality, it was established for the Treasury, to which it gives unlimited advances and loans. Thus it became nothing more than an accountant for the public treasury.

c) Algerian Development Bank: This bank was created on May 7, 1963 to fill the void created by the reserve and the refusal of foreign banks to participate in the financing of the national economy.

It was also responsible of the completion and implementation of the planned investment programs as well as the management of the processing budget. (Belazouz Ben Ali, 2006,p173) It was renamed the Algerian Development Fund when it was created and then changed status and was renamed by the Algerian Development Bank.

d) The National Fund for Saving and Reserve: It was established by Law No. 64-227 of 10 October 1964. The Fund's activity was based on raising funds with social loans. In 1971, a directive was issued instructing the Fund to fund programs for the completion of public treasury housing and sale to owners of savings books.

At the beginning of the 1980s, the Fund was commissioned to grant property-oriented mortgages to build housing and finance housing for the benefit of the providers.

1-2- Nationalization of banks and establishment of commercial banks:

This phase began in 1966, by the nationalization of foreign banks and the emergence of a banking system, which resulted in the establishment of a group of banks.

a) National Bank of Algeria: It is the first national commercial bank, established on 13 June 1966, where all the activities licensed to commercial banks were conducted, as well as funding for the agricultural sector (www.bna.dz, 2018). Its establishment was replaced by the following foreign banks: Algeria and Tunisia, the Industrial and Commercial Loan, the National Bank for Trade and Industry in Africa, the Bank of Paris and the Netherlands, and finally the Office of the Discount Camp. The merger of these banks into the Algerian National Bank has been on different dates. (Tahar Latrache, 2005,p188)

b) The Algerian People's Loan: Established on December 29, 1966, following the dissolution of the following banks: the Popular Commercial and Industrial Bank (Algeria, Oran, and Constantine), the Regional Commercial and Industrial Bank in Annaba, the Regional Bank for the People's Loan in Algiers. (Order No. 67-68 of the first of Safar 1387 c. t., May 16, 1967,p.2)

And then merged into three foreign banks: the Marseille Loan Company, the French Foundation for the loan and the mixed bank Algeria - Egypt. (Tahar Latrache, 2005,p189)

The Algerian People's Loan has the status of a deposit bank. Its mission is specifically to carry out all banking operations, to grant loans and credits in various forms, to develop activity, to develop traditional industries, hotels, tourism, fishing, non-agricultural cooperatives and small enterprises. (Order No. 67-68 of the first of Safar 1387 c. t., the Basic Law of National People's Credit, May 16, 1967,p.3)

c) The Algerian Foreign Bank: This bank was established on October 1, 1967. It was acquired by Credit Lyonnais, which in turn incorporated the French Foreign Trade Bank. In 1968, the Bank of Algeria had the public company, Barclays France, the Algerian Industrial Bank, the Mediterranean Bank, Northern lending. (Mohamed Hamidat, 2005,p132)

This bank specializes in operations abroad and also practices all traditional banking operations.

1-3- The financial and banking reform phase (1971):

From 1971, amendments were made to the monetary and banking policy in line with the general policy of the state. The Technical Authority of Banking Institutions and the General Authority for Money and Credit was established. The Finance Law also forced public institutions to concentrate their accounts and all its operations at the level of one bank determined by the State according to the Bank's competence in the sector. (Belazoz Ben Ali and Katoush Ashour, 14-15 December 2004, p 492)

The new rules for financing the production sector, under which the treasury has become a basic financial intermediary, have been established, and thus the role of the Central Bank of Algeria has shrunk.

1- 4 - The reorganization of the banking institutions:

In the framework of the reorganization of the economy, the banking system was restructured along the lines of other sectors of activity. The Agricultural and Rural Development Bank (BADR) was established in March 1982, which was entrusted with financing the agricultural sector, (BDL) in April 1985, which provides financing to local public institutions, ensures planned and planned productive investment by local communities, and also exceptionally on loanholding operations. These banks also perform all normal operations provided by commercial banks. (National Economic and Social Council, 16 November 2000,p18)

In order to enable these two banks to start the activity, the Agricultural and Rural Development Bank was provided with a section of the network of agencies belonging to the National Bank of Algeria, and the Local Development Bank was equipped with a number of agencies belonging to the Algerian People's Loan. (National Economic and Social Council, 16 November 2000 ,p18)

2- The stage of reforming the banking system before the Monetary and Credit Law:

This stage witnessed reforms in the banking system, after the difficulties on the economic level as a whole. These reforms included the monetary reform in 1986 and the reform of 1988.

2-1- Banking Reform through the Loan Law and the Bank in 1986:

Under Law No. 86-12 of 19 August 1986 on the Loan Law and the Bank, a reform was introduced in the banking function. The most important provisions of this law are as follows: (Tahar Latrache, 2005,p.194-195)

- The Central Bank restored its role as a bank of banks and became responsible of the traditional functions of central banks;
- The establishment of a banking system at two levels, whereby the Central Bank was separated as a last resort for lending and the activities of commercial banks;
- Restoration of funding institutions by financing institutions through mobilization of savings and loan distribution within the framework of the national loan scheme;
- Reducing the role of the public treasury in the financing system;
- Establishment of oversight institutions on the banking system and other advisory institutions.

2-2- Banking Reform in 1988:

Law No. 88-06 of 12 January 1988 amending and supplementing Law 86. According to article 2 of the law, the Central Bank and the loan institutions are considered as public economic institutions with moral character and financial independence and under its normal function of banking operations. (Law No. 88-06 of 12 January 1988, 13 January 1988,p35)

The law also supported the role of the central bank in controlling and managing monetary policy, in addition to enabling non-bank financial institutions to employ a proportion of their financial assets in the acquisition of shares and bonds issued by institutions inside and outside the country.

3. The reform and opening up of the banking system through the Monetary and Credit Law:

Despite the reforms introduced by the banking system in the 1980s, it turned out that it was not compatible with the new economic situation, especially after the transition to a market economy, which necessitated the ratification of a new law represented in the Money and Credit Law 90-10.

3.1 Content of the Money and Loan Law (90-10):

According to the Law of Money and Credit 90-10 of 14 April 1990, the Central Bank is considered a national institution with moral personality and financial independence. It is also alleged in its dealings with others as "Bank of Algeria", and is considered a trader in its relations with others and its capital is fully subscribed by the state. (Law No. 90-10 of 14 April 1990, P.451-452.)

According to Article 19, it is managed by a governor assisted by three deputies, the Monetary and Credit Board, which is considered as its board of directors and an administrative authority, as well as two observers. (Law No. 90-10 of 14 April 1990, P. 452.)The State Budget Department was also separated from the Monetary Department by setting a ceiling for the Central Bank's borrowing to finance the budget deficit, while determining its duration and forcing it back each year.

The law considered the banks according to Article 110 as: "moral persons whose primary and main function is to receive funds from the public and loan operations and to put payment methods at the customers' disposal and to manage these means." (Law No. 90-10 of 14 April 1990, P461.)

As for financial institutions, according to article 115, they are defined as: "moral persons whose primary task is to carry out banking activities except to receive funds from the public." (Law No. 90-10 of 14 April 1990, P.461.)

The law also liberalizes the banking market and allows national and foreign private banks and financial institutions to operate freely, guaranteed by law. The Monetary and Credit Council grants licenses to establish them, in addition to granting licenses to open offices to represent banks and foreign financial institutions.

3-2- The most important modifications defined by the monetary law and loan 90-10:

These modifications are the following ones:

a) Amendments to the Law on Money and Loan for the year 2001: The first amendment to the money and the loan came by Decree No. 01-01 of 27 February 2001, which amends and supplements the provisions of Law No. 90-10 at the administrative level, without prejudice to the right crucify.

This law was that Monetary Council and the loan is divided into two: the board of directors, which oversees the administration and management of the Central Bank, the Monetary Board and the loan, which plays the role of the monetary authority.

b) Amendments to the law on Money 2003: After the scandals related to the bankruptcy of the commercial Al Khalifa Bank and the Industrial Bank of Algeria, which shows the lack of effective monitoring and supervision tools were 03-11 of command is issued on August 26, 2003, which stressed the monetary authority of the central bank, the power of state intervention in the banking system, as he added two people in the Monetary Council and credit to strengthen supervision, recruited from the presidency of the Republic affiliated with the Ministry of Finance.

c) Amendments to the Law on Money and Loan 2004 by Decree No. 04-01 of 4 March 2004 relating to the minimum capital of banks and financial institutions operating in the capital Algeria, the banking capital to determine once established Two billion five hundred million Algerian dinars, at least, financial institutions have been identified by five hundred million Algerians. (Regulation No. 04-01 of March 4, 2004, 28 April 2004 ,p30)

In its configuration of reserve requirements for banks of total benefits received and / or borrowed in dinars and benefits associated with operations outside the budget, with the exception of benefits to the Bank of Algeria and may be subtracted benefits borrowed to other banks, in accordance with the conditions set by the Bank of Algeria, where it may not exceed 15% and may be equal to 0%. (Regulation No. 04-02 of March 4, 2004, 28 April 2004,p30)

d) Amendments to the Law on Currency and Loan 2008 by Decree No. 08-04 of December 23, 2008, it changed the minimum capital of banks and financial institutions operating in Algeria, money, and the abolition of the provisions of Ordinance No. 04-01, in which ten billion Algerian dinars were determined, at least for banks, and three billion five hundred million for financial institutions. (Regulation No. 08-04 of December 23, 2008 , 24 December 2008,p.27)

e) Amendments to the Law on Currency and Loan 2014: According to Ordinance No. 14-01 of 16 February 2014, has been applied to determine the solvency of banks and financial institutions, as a factor is determined to a minimum of 9.5% between the total of its own funds from the legal point of view ratios, the total risk Loan, operational risk and weighted market risk. It must also cover the private capital base with both credit risk and operational risk and market risk of at least 7%. Must also be a safety cushion, consisting of private fund base covering 2.5% ofprobable risks(http://www.bank-ofalgeria.dz/html/legist014.htm,2018

Second: Envelope data as a method to assess banking efficiency

1- Defining banking efficiency:

Banks are efficient if they can direct the economic resources available to them to achieve the greatest possible returns with the minimum amount of waste, ie, the successful control of their financial and human capacity on the one hand, and their investigation of the optimal size and presentation of a wide variety of products Finance on the other hand. (Haddah Rais and Fatima Zahra Noui, December 2016,p62)

2. Types of banking efficiency:

Banking efficiency is divided into: (Farrell, MJ , 1957,p. 253-281)Technical efficiency: The ability of a particular bank to produce the largest volume of output from a certain amount of production factors (inputs) or to use a lower volume of production factors to produce a certain level of output.

Customary Efficiency: The Bank shall be a personal accountant if it is technically competent and uses its resources, taking into consideration the level of prices to reduce production costs or maximize revenues.

The efficiency of the range: we obtain from the division of technical efficiency in the stability of yield on technical efficiency in light of the change in yield. In our study we will be limited to the study of technical efficiency and efficiency of scope.

3. Data Envelopment Analysis:

In 1978, a development in the field of performance measurement, Charnes and his colleagues developed the basis of the method of data analysis, one of the linear programming methods based on the reduction methodology, which is due to Farrell's work in 1957.

The data envelope is one of the most important quantitative tools used to distinguish the relative efficiency of decision-making units through inputs and outputs. It is a quantitative methodology in comparative measurement of best and performance evaluation and measurement of the relative efficiency of a number of similar organizational units in the objectives and work activity depends on the existence of accurate quantitative data for each input and output organizational unit and the overall objective is to achieve best practices to maximize output and reduce organizational inputs and thus achieve organizational objectives efficiently. (Mohammed A. Al-Saidi and others,2011,p.03)

4. Conditions of use of the data envelope method:

The good application of the envelope mode provides several conditions: (Mohammed A. Al-Saidi and others, 2011, p.24)

- Inputs and outputs should be positive rather than negative;
- The relationship between inputs and outputs should be a positive one;
- The number of decision-making units (study sample) should not be less than two or three times the total of inputs and outputs;
- Relative homogeneity of decision-making units, in the sense that all units evaluated are identical in terms of inputs and outputs and are similar in their basic purpose and nature of their activity.

5. The most important models of data envelope analysis method:

There are many models for the envelope mode. In this study we will limit the presentation of the two most important models for evaluating the efficiency of banks.

5-1- CCR model: Also referred to as (Rhond, Channes and Cooper), it provides an assessment of efficiency and determines the source and amount of inefficiency. (Mohammed Shamil Bahaa Eddin Mostafa Fahmy, 2009 ,p266)

The CCR model is the basic model. It is possible to transform the fractional (nonlinear) process in this equation into a linear formula that can be treated as a traditional linear programming problem by rephrasing the target function with a constant value (defined by the correct one and included as a constraint within a set of constraints). Thus the goal becomes maximizing.

Generally, the general principle of good efficiency is the lower input and higher output, and the measurement units do not have to match both inputs and outputs.

The mathematical formulation of the model is as follows:

$$Maxh_o = \frac{\sum_{r=1}^{s} u_r . y_{ro}}{\sum_{i=1}^{m} v_i . x_{io}}$$

$$\frac{\sum_{r=1}^{s} u_r . y_{rj}}{\sum_{i=1}^{m} v_i . x_{ij}} \leq 1; \quad j = 1, \dots\dots, n$$

$$u_r, v_i \geq 0; \quad r = 1, \dots\dots, si = 1, \dots\dots, m$$

Where (h_o) is the efficiency index, (y_{rj}) and (x_{ij}) are inputs and outputs for each (J^{th}) The decision-making unit (v_r) and (u_r) are input and output weights.

5-2- The BCC model: also called the Variable Size Economies Model. This model is attributed to Banker-Charns-Copper in 1984. It is distinguished from the previous model (CCR) that gives an estimate of the technical efficiency under the scale of operations) Applicable to the unit to provide its services to beneficiaries at the time of measurement, ie it gives the efficiency associated with a certain volume of operations. The model also determines the possibility of a variable rate of return (constant, increasing or decreasing) on the amount of inefficient units resulting from changing the quantity of inputs to the extent of efficiency, ie, this model is characterized by variable value on services (VRS).

The difference between the fixed-size economies model and the other models can be summarized in the following Figure

Fig.1 : The difference between the fixed-size economies model and the other models

Frontier Type	Input-Oriented	Output-Oriented
CRS	$\min \theta - \varepsilon(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+)$ subject to $\sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta x_{io} \quad i = 1,2,\dots,m;$ $\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = y_{ro} \quad r = 1,2,\dots,s;$ $\lambda_j \geq 0 \quad j = 1,2,\dots,n.$	$\max \phi + \varepsilon(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+)$ subject to $\sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = x_{io} \quad i = 1,2,\dots,m;$ $\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = \phi y_{ro} \quad r = 1,2,\dots,s;$ $\lambda_j \geq 0 \quad j = 1,2,\dots,n.$
VRS	Add $\sum_{j=1}^{n} \lambda_j = 1$	
NIRS	Add $\sum_{j=1}^{n} \lambda_j \leq 1$	
NDRS	Add $\sum_{j=1}^{n} \lambda_j \geq 1$	

Source: WedeD.Cook, Joe Zhu, **Modeling performance measurement: Applications and implimentation Issues in DEA**, edition Springer, 20015, p.10

II. The practical framework of the study:

This section will deal with two elements. First, a look at the components of the banking system through the definition of banks approved until 2017 and the size of deposits and loans by banks, public and private and the second part is an evaluation of the efficiency of the eleven banks study sample of 2014.

First: The components of the Algerian banking system:

The Algerian banking system has developed significantly in terms of the number of banks and financial institutions. It consists of 29 banks and financial institutions divided as follows:

- 06 Public, including the Savings and Reserve Fund (CNEP);
- 14 private banks with foreign and mixed capital;
- 02 public financial institutions;
- 05 rental loan companies, including 3 public;
- One agricultural subsidy for agricultural insurance approved for banking operations since 2009.

Banks approved in Algeria can be summarized as follows until 2017:

Table 1: Banks approved in Algeria until January 2017

BANK	CAPITAL OWNERSHIP
National Bank of Algeria	Public bank
External Bank of Algeria	Public bank
Local Development Bank	Public bank
Agricultural and Rural Development Bank	Public bank
National People's Credit	Public bank
National Fund for Saving and Reserve	Public bank
National Fund for Agricultural Cooperation	Public bank
Al Baraka Bank of Algeria	Bahraini-Algerian
Arab Banking Corporation Algeria	Bahraini-Algerian
Arab Bank Algeria	Jordanian-Algerian
Gulf Bank Algeria	Kuwaiti-Algerian
Trust Bank of Algeria	Kuwaiti-Algerian
The Housing Bank for Trade and Finance	Jordanian-Algerian
Peace Algeria	Bahraini
Citibank Algeria	American
The Housing Bank for Trade and Finance	British
Natixis Algeria	French
General Company of Algeria	French
BNP Paribas Algeria	French
Agricultural Loan and Investment Bank of	French

Source: Prepared by the researchers based on the Bank of Algeria website.

It is clear from the table's data that the number of banks approved in Algeria according to the latest report of the bank, most of which are private banks, is distributed as follows:

Fig.2: Classification of banks approved by ownership of capital.

Source: Based on the report of the Bank of Algeria 2014-2015

Public banks lead the number of banking agencies open on the national territory. The following table shows:

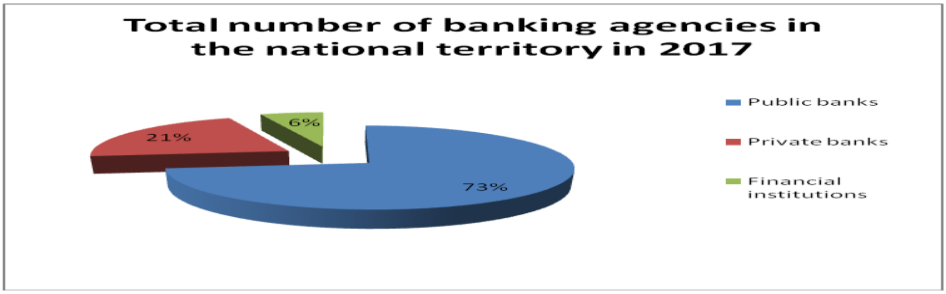
Table 2: Number of bank agencies open in the national territory:

BANKS	2014	2015	Evolution of the number of agencies
Public	1113	1123	10
Private	325	346	21
Financial institutions	88	88	00
Total	1526	1557	2%

Source: Based on the report of the Bank of Algeria, November 2016.

It is clear from the above table that the Algerian banking system is based in terms of number of agencies and its geographic distribution. These are public banks with 1123 agencies in 2015 against 325 private banks and 88 financial institutions. This may be explained by the recent openness of the banking sector in Algeria to foreign banks. Most of them are modern and active in Algeria. Compared with the number of these agencies, the ratio of private banks is 21% compared to 10% for public banks, reflecting the intention of some private banks to get closer to customers for the coming years.

Fig.3: Total number of banking agencies in the national territory in 2017



Source: prepared by the researcher based on the above table data.

Second: Evaluation of the efficiency of Algerian banks:

The objective of the applied study was to measure the efficiency of public and private banks for the year 2014. The reason for choosing the year 2014 is the availability of the data of eleven banks, five of which are public and six foreign.

First: **An overview of the outcome of the activities of Algerian banks:**

The following table summarizes the resources collected by public banks (including the savings fund) and private banks.

Table 3: Development of resources collected at public banks (including The Savings Fund) and private banks: milliard DZD

Frozen deposits	**2011**	**2012**	**2012**	**2014**	**2015**
A - Demand deposits	**3495.8**	**3356.4**	**3537.5**	**4434.8**	**3891.7**
Public banks	3095.8	2823.3	2942.2	3712.1	3297.7
Private banks	400.0	533.1	595.3	722.7	594.0
B - Time deposits	**2787.5**	**3333.6**	**3691.7**	**4083.7**	**4443.3**
Public banks	2552.3	3053.6	3380.4	3793.6	4075.7
Including foreign currency deposits	272.4	295.9	324.2	348.8	428.8
Private banks	235.2	280.0	311.3	290.1	367.6
Including foreign currency deposits	31.2	43.3	45.7	56.0	67.2
C - Deposits placed as collateral	**449.7**	**548.0**	**558.2**	**599.0**	**865.7**
Public banks	351.7	426.2	419.4	494.4	751.3
Including foreign currency	1.2	3.8	3.0	1.4	8.8

deposits					
Private banks	98.0	121.8	138.8	104.6	114.4
Including foreign currency deposits	1.6	1.1	1.4	1.9	1.8
D - Total consolidated loans	**6733.0**	**7238.0**	**7787.4**	**9117.5**	**9200.7**
Share of public banks	% 89.1	% 87.0	% 86.6	% 87.7	% 88.3
Share of private banks	% 10.9	% 12.9	% 13.4	% 12.3	% 11.7

Source: Bank of Algeria Annual Report, 2016, p.99

The table above shows that demand deposits declined in total in 2015 to KD 3891.70 billion against KD 4428.10 billion in 2014. It is also noted that demand deposits deposited in public banks amounted to JD 3297.7 billion compared to JD 594 billion for private banks.

While time deposits in public banks reached 4075.70 billion dinars, including hard currency deposits, while time deposits in private banks including foreign currency deposits amounted to 367.60 billion dirhams.

The interpretation of this can be summed up in the following points:

- The recent emergence of private banks compared to public banks;
- Public companies have current accounts in public banks such as Sonatrach, Naftal, cement industry, etc.
- The efforts of public banks to diversify their banking products and improve their services;
- Lower oil prices and economic decline led to a natural decline in deposits;

Loans granted by public and private banks are distributed as follows:

Table 4: Distribution of loans by public banks and private banks: milliard DZD

Type of deposits	**2011**	**2012**	**2013**	**2014**	**2015**
A - Loans to the public sector:	**1742.3**	**2040.7**	**2434.3**	**3382.9**	**3689.0**
	1742.3	2040.7	2434.3	3373.4	3679.5
Public banks	1703.3	2010.6	2409.4	3210.3	3521.9

Direct loans	39.0	30.1	24.9	163.1	157.6
Buy bonds	0.0	0.0	0.0	9.5	9.5
Private banks	0.0	0.0	0.0	0.0	0.0
Direct loans	0.0	0.0	0.0	9.5	9.5
Buy bonds					
B - Loans to the private sector	**1982.4**	**2244.9**	**2720.2**	**3120.0**	**3586.6**
Public banks	1451.7	1675.4	2023.2	2338.7	2687.1
Direct loans	1442.8	1669.0	2016.8	2338.5	2685.4
Buy bonds	8.9	6.4	6.4	0.2	1.7
Private banks	530.7	569.5	697.0	781.3	899.5
Direct loans	530.6	569.4	696.9	781.3	899.5
Buy bonds	0.1	0.1	0.1	0.0	0.0
C - Total loans granted (net of loans repurchased)	**3724.7**	**4285.6**	**5154.5**	**6502.9**	**7275.6**
Share of public banks	% 85.8	% 86.7	% 86.5	% 87.8	% 87.5
Share of private banks	% 14.2	% 13.3	% 13.5	% 12.2	% 12.5

Source: Bank of Algeria Annual Report, p98

From the above table, we note that public banks finance the public and private sector by 87.50% in 2015, compared to only 12.5% for private banks. This leads us to consider the type of loans granted to both public and private sector institutions.

To analyze the volume of financing with long-term, medium and short-term loans, we analyze the following table data:

Table 5: Distribution of loans to banks by type

Type of deposits	2011	2012	2013	2014	2015
A – Short-term loans	1363.0	1361.6	1423.4	1608.7	1710.7
Public banks	999.6	973.9	936.4	1091.0	1152.5
Private banks	363.4	387.7	487.0	517.7	558.2
B - Medium and long term loans	**2361.7**	**2924.0**	**3731.1**	**4894.2**	**5564.9**
Public banks	2194.4	2742.2	3521.0	4621.1	5214.1
Private banks	167.3	181.8	210.1	273.1	350.8
C - Total loans granted (net of loans repurchased)	**3724.7**	**4285.6**	**5154.5**	**6502.9**	**7275.6**
Share of short-term loans	% 36.6	% 31.8	% 27.6	% 24.7	% 23.5
Share of medium and long term loans	% 63.4	% 68.2	% 72.4	% 75.3	% 76.5

Source: Bank of Algeria Annual Report 2015, Bank of Algeria, November 2016, p100

It is clear from the table data that the largest financier of long-term or short-term financial institutions is public banks. However, if the proportion of private banks' financing of short-term loans is taken into consideration, their resources are considered 32.60% This is due to the decrease in time deposits or demand deposits deposited with private banks, which affects the volume of loans granted or the total of private banks to finance the actual investments of the high degree of risk and restrict them to various types of exploitation loans, And low risk.

Second: Evaluation of the efficiency of Algerian banks using DEA:

1- Data of the study: The data of the study collected for the banks studied in terms of inputs (total invested funds and expenses of exploitation) and outputs (operating income, total loans and net income) for 2014 can be summarized in the following table:

Table 6: Commercial banks data for the year 2014: million DZD

Bank	Total invested funds	Total operating expenses	Operating income	Total loans	Net income
BNA	2620619,3	17196,2	89106,5	1831665,6	29784,5
BEA	2581398,4	13096,4	61663,3	877652,6	29807,7
CPA	1512,1	14,2	44,1	756,5	19,5
(BADR)	1376079,1	21823,6	37272,9	659397,3	6124,7
Bank BDL	706,24	9,42	15,45	469,39	1,77
BNP BARIBAS	254285,4	6001,8	12471,7	115293,3	4336,7
S.Générale	243338,3	4685,8	13309,4	117035,2	5137
Gulf Bank	176819,5	4491,2	10579,6	103586,2	4010,4
NATEXIS	1381513,9	3222,8	7553,1	79061,3	3050,6
Housing Bank	57116,2	886,5	2789,8	17395,3	1788,4
Al Baraka Bank	162,77	2,73	7,47	78,24	4,3

Source: Prepared by the researcher based on the results of the banks for the year 2014

2 - Study of the results of data analysis:

2.1 Calculation of technical efficiency and scale efficiency of the banks under study:

Using the Data Envelope Program and entering the study data for 2014, the technical efficiency and scale efficiency values were obtained as follows:

Table 7: Technical efficiency and scope efficiency of the banks under study for 2014

Banks	Technical efficiency under constant yield Crste[1]	Technical efficiency under yield change Vrste[2]	Efficient range Scale[3]
BNA	1.000	1.000	1.000
BEA	0.692	0.735	1.000
CPA	0.377	1.000	0.377
BADR	1.000	1.000	1.000
BDL	1.000	1.000	1.000
BNP BARIBAS	0.814	0.835	0.999
S.Générale	0.667	1.000	0.667
Gulf Bank	1.000	1.000	1.000
NATEXIS	0.407	0.902	0.691
Housing Bank	1.000	1.000	1.000
Al Baraka Bank	1.000	1.000	1.000
SMA	0.814	0.918	0.885

Source: Prepared by the researcher using program data envelope - program XDEA2-0.

It is clear from the above table that Algerian banks are efficient at an average of 0.885, and that the banks with full efficiency (1) are all public banks except for the inefficient popular loan of 0.377. For foreign banks, BNP BARIBAS and Société Générale, a lower efficiency level of 0.691 and 0.667, respectively, while Arab and mixed banks (Algerian and Arab) achieved full efficiency.

2-2 - Study the output model:

Through this component and associated data obtained using the data envelope analysis program we will show what banks should be

[1] Crste (technicalefficiencyfrom CRS DEA
[2] Vrste (technical efficiency from VRS DEA
[3] Scale = scale efficiency =crste/vrste.

less efficient to use to improve their efficiency through the following table data:

Table 8: Level of improvement in outputs (output models)

Banks	Net income	Total loans	Operating income
National Bank of Algeria BNA	0.000	0.000	0.000
External Bank of Algeria BEA	563415.659	0.665	0.000
National People's Credit CPA	0.000	0.000	0.000
Bank of Agriculture and Rural Development (BADR)	0.000	0.000	0.000
Local Development Bank BDL	0.000	0.000	7753.043
BNP BARIBAS BANK	253217.928	0.000	0.000
Société Générale	0.000	0.000	0.000
Gulf Bank	0.000	0.000	0.000
NATEXIS Bank	70001.607	6.593	0.000
Housing Bank	0.000	0.000	0.000
Al Baraka Bank	0.000	0.000	0.000

Source: Prepared by the researcher using program data envelope - program XDEA2-0.

From the above table data, BNP PARIBAS improves its level of efficiency. It has to measure the level of output (net income) by 25,321,928 monetary units, as well as improving operating revenues under current inputs of 7753,043 units.

The Algerian Foreign Bank improves the level of efficiency. It should improve the net income of 56,342,659 monetary units and improve the total loans by 0.665 monetary units.

For NATIXIS, in order to improve its efficiency, it must improve its net income by 7,001,607 monetary units and the total loan at 6,593 units.

2-3 - Study of the introduction model:

Table 9: Level of improvement in inputs (for the model of induction).

Banks	Total loans	Net income
National Bank of Algeria BNA	0.000	0.000
External Bank of Algeria BEA	0.000	4659.043

National People's Credit CPA	0.000	0.000
Bank of Agriculture and Rural Development	0.000	0.000
Local Development Bank BDL	0.000	0.000
BNP BARIBAS BANK	0.000	0.000
Société Générale	0.000	0.000
Gulf Bank	0.000	0.000
NATEXIS Bank	0.000	0.000
Housing Bank	0.000	0.000
Al Baraka Bank	0.000	0.000

Source: Prepared by the researcher using program data envelope - program XDEA2-0.

It is clear from the above table that under the current efficiency, the Algerian foreign bank could reduce the amount of exploitation expenses by 4659,043 monetary units, ie, the Algerian foreign bank is inefficient by 0.735 or 26.5%. This is due to the increase in exploitation expenses by 4659,043 units for current outputs achieved.

The Algerian external bank can improve its efficiency by using the input / output relationship for the reference unit of the Bank for Agriculture and rural development.

BNP Paribas and NATIXIS can improve their efficiency as the reference units for them are the Agricultural and Rural Development Bank, the Gulf Bank and the Housing Bank. By using the relationship between the inputs and outputs of the return units, these banks will be able to improve their performance.

III. Conclusions:

The results of the study aimed at evaluating the efficiency of eleven Algerian banks (public and private) for 2014 showed that in terms of efficiency index, public banks are more efficient compared to private banks, and that they can improve their efficiency by improving their outputs. In the size of their inputs.

The study also showed the efficiency of the Arab banks (Gulf Bank, Housing Bank and Al Baraka Bank) to achieve full efficiency with optimum utilization of its current resources to achieve the highest rate of output compared to French banks NATIXIS and BNP PARIBAS.

The study also showed that banks' efficiency levels and their differences can be attributed to related factors in the banks themselves and others related to the efficiency of the Algerian banking system and the non-competitiveness of private banks compared to the newly established public banks, their mismanagement and their limited financing of foreign trade and exploitation loans without long-risk, in addition to the dominance of public banks on the banking sector, especially that demand deposits and term deposits, the largest proportion of them in public banks, as well as public companies have accounts in public banks, and finally programs for the establishment of small and medium enterprises (ANSEJ, ANGEM, CNAC ....) are only in agreement with the public banks without other public banks, thus enhancing the efficiency of public banks.

Finally, the study concluded that the banking system should be developed with its components, public and private banks and various financial institutions, in light of the current economic trend, globalization and Algeria's efforts to join the World Trade Organization and play the role of the Central Bank of Algeria.

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