# Measuring the efficiency in the Romanian banking system through the method of the Data Envelopment Analysis (DEA)

**Lect. Alina Georgiana Manta Ph.D**
**University of Craiova**
**Faculty of Economics and Business Administration**
**Craiova, Romania**
**Assoc. Prof. Roxana Maria Bădîrcea Ph.D**
**University of Craiova**
**Faculty of Economics and Business Administration**
**Craiova, Romania**

**Abstract:** The purpose of this paper is to reveal an alternative method of measuring the banking performance through the banking efficiency. In order to estimate the banking efficiency we have applied the Data Envelopment Analysis – DEA technique. In the analysis we made, we have used the approach of the banking intermediation which supposes that the banks intermediate the funds between the deponents and the debtors with the lowest costs. Therefore, the inputs we will use are: the expenses with the personnel and the expenses with the interests, the outputs: the investments and the credits and the prices of the inputs: the expenses with the personnel reported to the number of employees and the expenses with the interests reported to the volume of the deposits. For the estimation of the DEA model we used the data taken from the financial reports of 11 most important banks in Romania for 2008 – 2011. The data were processed in the DEAP 2.1. program. Therefore, the obtained results can be materialized in the following directions: most of the banks in Romania are inefficient from the cost management perspective; during the crisis, the foreign banks proved to be more inefficient than the local ones on the background of the propagation of the negative effects from the parent-banks; in the case of the smaller banks, one states that they are more efficient than the greater banks because of the fact that the totality of the expenses with the interests and of the expenses with the personnel has not been correlated with the volume of the granted loans and of the investments and because of holding a greater volume of nonperforming loans.

**JEL classification: G01, G17, G21, G24**

**Key words: crisis; efficiency; banking system; estimation; data envelopment analysis**

## 1. Introduction

Another modality of quantification of the banking performances is made through the banking efficiency. In the efforts of maximizing the profitability and of the value of the shareholders, many banks admit the necessity of a greater efficiency in their activity.

The economic efficiency[7] measures the competence with which the inputs are turned into results within the crediting process. It also describes the ability to combine the inputs and the results in an optimal distribution from their price perspective. Thus, the economic efficiency points out the waste of resources and their improper allocation in report to the technological potential. The intuitive representation of the efficiency degree is the following:

$$E_f = \frac{\sum o}{\sum o^*}$$

where $O$ is the obtained result and $O^*$ is the potential result.

Farrell[8] has proposed (1957) that the efficiency of a firm consists of two components: the technical efficiency which reflects a company's ability to obtain the maximum of output of a given set of inputs and the allocative efficiency which reflects a company's ability to use the inputs in an optimal proportion, being given the respective prices and the production technology. These two measures of the efficiency of a company are combined to assure the measure of the total economic efficiency.

These components can be extended from the microeconomic level to the macroeconomic level in order to analyse the efficiency of a national economy and also the way the production factors are used. In the context of this paper we are interested on the efficiency of the use of labour force on the national economy level.

## 2. APPROACHES IN THE STUDY OF EFFICIENCY

In the specialty literature[9] one knows especially four methods of measuring the performance, thus, the efficiency. These methods of measuring the efficiency are: The least squares method; The total factors productivity indexes method (TFP); The data envelopment analysis technique (DEA); The stochastic frontier method.

Roman and Suciu (2011)[10] state that the first two methods are most often applied to the aggregate series of time and assure the measuring of the variation of the total productivity of factors. Both methods suppose that the economy is at the point of full occupation of factors, being therefore an efficient economy. While as methods 3 and 4 do not start from the hypothesis of the existence of the efficiency, and for this reason one can observe the causes and dimension of inefficiency. The method of TFP indexes can be used to compare the relative productivity of two economies at a given moment in time. DEA and the stochastic frontier method can be used to measure both the modifications in the technical efficiency and both those in relative efficiency, if there is an available significant data panel. The four methods can be grouped by the

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[7]Dardac N., Moinescu B. (2005) –„Evaluation of the credit institutions management by quantitative methods" Teorie Economica si Aplicata Magazine.

[8]Farrell, M.J.(1957) – "The Measurement of Productive Efficiency", Journal of Royal Statistical Society, A120, 1957, p. 253-290.

[9]Roman M., Suciu C. –„The Analysis of the Efficiency of the Innovation Development Research Activity by the DEA method". A version of this article has been presented at The 7th International Conference on Management of Technological Changes, Alexandrupolis, Greece, September 2nd-4th, 2011.

[10]Quoted work.

way in which they recognise the inefficiency, while the last two are part of the category of those through which the inefficiency can be recognised.

An alternative modality to group these methods is based on the way in which these methods use the econometric instruments. Methods 1 and 4 involve the econometric estimation of the parametric functions, while methods 2 and 3 do not require this estimation. The two so formed groups can be called "parametric methods" namely "non parametric methods".

We will next approach the problem of measuring the efficiency from the perspective of the mathematical programming of the analysis of the efficiency by applying the Data Envelopment Analysis – DEA technique. Charnes, Cooper and Rhodes[11] define the methodology of the data envelopment (DEA), in the study published in 1978, as being "a model of mathematical programming for observing the data which assure a new way of obtaining empirical estimates of the external relations such as the production functions and/or the surfaces of the efficient production possibilities which represent the fundamental stone of the modern economy".

Farrell (1957) has proposed that the efficiency consists of two components: the technical efficiency which reflects the ability to obtain the maximum of output from a given set of inputs and the allocative efficiency which reflects the ability to use the inputs in an optimum proportion, being given the prices and the production technology. These two measures of the efficiency are combined to assure the total economical efficiency.

There are two types of models within DEA which refer to constant returns to scale (CRS) variable returns to scale (VRS) respectively. As it is indicated by the name itself, an implicit supposition regarding the returns to scale is associated to each type of surface and this way, the opportunity of a particular model is frequently determined by the economic or other suppositions made on the set of data which is to be analysed.

Although there are many ways to quantify the efficiency of the commercial banks, the data envelopment method is the most often used one. Dardac and Moinescu[12] (2005) considered that the evaluation of the credit institutions management is based on quantitative estimations which can be most of the time subjective. That is why, this problem can be solved by using the DEA method. Also, there are studies which make comparisons between more countries. For instance, Andrieş and Cocriş (2010)[13] have analysed the efficiency of the main banks in Romania, Czech Republic and Hungary using both the non parametric DEA method, and also a parametric method SFA (scholastic frontier analysis). The obtained results show that the banks from the three analysed countries registered low levels of the technical efficiency and cost efficiency, especially in the banks from Romania. On the other hand, NiŢoi (2009)[14] has analysed the efficiency and productivity of the banks from Romania during 2006-2008 and has showed that, although the efficiency of the commercial banks from Romania have improved starting from 2006, however the cost efficiency scores are quite low. On the

[11]Charnes, A., Cooper W.W.M, Rhodes ,E. – "Measuring the Efficiency of Decisions Making Units", in European Journal of Operations Research, 2, p. 429-444, 1978.
[12]Dardac N., Moinescu B. (2005) – quoted work.
[13]Andrieş A., Cocriş V. (2010) – "A Comparative Analysis of the Efficiency of Romanian Banks", Romanian Journal of Economic Forecasting, nr.4.
[14]Niţoi M. (2009) – "Efficiency in the Romanian Banking System: An Application of Data Envelopment Analysis", Romanian Journal of Economics, Vol. 29, no. 38, December, Pages: 162-176.

international level, Casu and Molyneux (2000)[15] have used the DEA method to quantify the efficiency in the European banking systems. They started to analyse whether the efficiency in the European banking systems has improved at the same time with the European legislation harmonisation process. Murat and Kurtaran (2013)[16] have measured the relative efficiency of 13 commercial banks from Turkey in 2011 and have reached the conclusion that the commercial banks with state capital are efficient in both variants of DEA model. However, the banks with foreign capital have registered weaker efficiency scores than the banks with state capital and also than the banks with private capital. Barr and others (2002)[17] have evaluated the efficiency of the American commercial banks. The results of the study showed that there is a tight interdependence between efficiency and other indicators for measuring the banking performance, such as the banking ratings.

## 3. METHODOLOGY

### 3.1. THE DEA MODEL WITH CONSTANT RETURNS TO SCALE (CRS)

Roman and Suciu (2011) believe that one of the intuitive ways to introduce the DEA is given as a report. For each company, we wish to obtain a measure of the report between all the outputs and all the inputs, such as $uy_i / vx_i$ where $u$ is an estimation vector for the dimension output *Mx1* and $v$ is an estimation vector for the dimension input *Kx1*.

The optimal estimations are obtaining by solving the program:

$$\begin{cases} \max_{u,v}(uy_i/vx_i) \\ \dfrac{uy_i}{vx_i} \leq 1, i = 1,2, \dots, N \\ u, v \geq 0 \end{cases}$$

Solving this program involves finding those values for $u$ and $v$ so that we can maximise the efficiency of the company $i$ under the restriction that all the efficiencies be unitary. Such a program can have an infinite number of solutions as $(\alpha u^*, \alpha v^*)$ where $(u^*, v^*)$ is the solution of the system. In order to avoid such a situation, we impose the restriction $vx_i = 1$ and we obtain a new program:

$$\begin{cases} \max_{\mu,v}(\mu y_i) \\ vx_i = 1 \\ \mu y_i - vx_i \leq 0, \quad i = 1,2, \dots, N \\ u, v \geq 0 \end{cases}$$

[15]Casu, B., Molyneux, P. (1998) - "A Comparative Study of Efficiency in European Banking", Center for Financial Institutions Working Papers, University of Pennsylvania.
[16]Murat Ar I, Kurtaran A. (2013) – "Evaluating the Relative Efficiency of Commercial Banks in Turkey: An Integrated AHP/DEA Approach", International Business Research; Vol. 6, No. 4.
[17]Barr, R.S. (2002) - "Evaluating the productive efficiency and performance of U.S. commercial banks", Managerial Finance, Vol. 28, No.8, pp.3-25.

The above program is known as multiplying form or multiple of a problem of DEA linear programming problem.

Using the duality from the linear programming, we can determine an equivalent covering form of this problem:

$$\begin{cases} \min_{\theta,\delta}(\theta) \\ -y_i + Y\lambda \geq 0 \\ \theta x_i - X\lambda \geq 0 \\ \lambda \geq 0 \end{cases}$$

where $\theta$ is a scalar and $\lambda$ represents a vector of dimension constants Nx1. The obtained value $\theta$ will measure the efficiency for the company i. If $\theta \leq 1$, where a value equal to 1 represents a point from the frontier thus a technically efficient company, we have the definition given by Farrell in 1957.

We remember the fact that the program must be solved N times, for each observed unit (company) at a time obtaining thus a value of $\theta$.

### 3.2. THE DEA MODEL WITH VARIABLE RETURNS TO SCALE (VRS)

Roman and Suciu (2011) observe that the supposition of the constant returns to scale is possible only when the companies operate on an optimal scale. The imperfect competition, the financial restrictions, etc. can make a company not operate on optimum scale. Banker, Charnes and Cooper[18] (1984) suggested an extension of the DEA model with constant returns to scale (DEA CRS) to explain the situations with variable returns to scale. The use of the CRS specification when not all the companies operate to optimal scale, results in the TE measuring which will be mistaken for the scale efficiencies (SE). The CRS linear programming problem to explain VRS, adding the convexity condition:

$$\begin{cases} \min_{\theta,\delta}(\theta) \\ -y_i + Y\lambda \geq 0 \\ \theta x_i - X\lambda \geq 0 \\ N_1\lambda = 1 \\ \lambda \geq 0 \end{cases}$$

where $N_1$ is a vector with elements equal to 1, of dimension *Nx1*. A VRS covering surface forms a convex cover of plans which intersect and which cover more „tightly" the points represented by the data than the conical cover determined by the CRS covering surface.

If there are differences between the technical efficiency obtained with CRS respectively with VRS for a certain company, then the company has an inefficient scale which is given by the difference between TE obtained with VRS (noted $TE_{VRS}$) and TE obtained with CRS (noted $TE_{CRS}$).

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[18]Banker, R.D., Charnes, A., Cooper, W.W. (1984) – "Some Methods for EstimatingTechnical and Scale Inefficiencies in Data Envelopment Analysis", in Management Science,30:1078-1092.

The output oriented DEA models are similar to the corresponding input oriented models. For instance, an output oriented DEA model with variable returns to scale ($DEA_{VRS}$) is given by the program:

$$\begin{cases} \max_{\emptyset,\delta}(\emptyset) \\ -\emptyset y_i + Y\lambda \geq 0 \\ x_i - X\lambda \geq 0 \\ N_1\lambda = 1 \\ \lambda \geq 0 \end{cases}$$

where $1 \leq \emptyset \leq \infty$ and $\emptyset$-1 represents the proportional growth which can be brought to the output keeping constant the input level, for company i. The $1/\emptyset$ report defines the TE size which varies between zero and one.

We must remember the fact that, the input or output oriented models will estimate the same frontier and that is why, by definition, they will identify the same set of companies who are efficient. Only the sizes of the efficiencies associated to the inefficient companies obtained by the two methods can differ.

## 4. RESULTS OBTAINED REGARDING THE EFFICIENCY OF THE BANKING SYSTEM IN ROMANIA BY USING THE DEA METHOD

In order to determine the economic efficiency the choice of the input variables and the output variables included in the analysis has been imposed. There are more approaches to define the inputs and the outputs. The first of them considers that the banks are intermediaries between the shareholders and the beneficiaries of the respective funds (Sealey Şi Lindley (1977)[19]). The credits and other assets are considered the outputs of the bank, while the deposits and other liabilities are inputs in the intermediation process. Taylor (1997)[20] has analysed the economic efficiency for a sample of 13 Mexican banks and used as inputs: the total deposits and the expenses of the bank, other than those with the interests and as output he considered the total incomes. On the other hand, Weiguo Şi Ming (2008)[21] have evaluated five commercial banks and five Chinese commercial banks and used the operational expenses, the total deposits and the provisions for nonperforming loans as inputs for the American banks and the expenses with the personnel, the corporal assets and other funds borrowed as inputs for the Chinese banks. The used outputs were: the net profit and the total credits for the American banks and the incomes from interests and the incomes from other resources than the interests for the Chinese banks.

In the analysis we made, we have used the approach of the banking intermediation which supposes that the banks intermediate the funds between the deponents and the debtors with the lowest costs. Therefore, the inputs we will use are: the expenses with the personnel and the expenses with the interests; the outputs: the

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[19]Sealey, C.W., Lindley J.T. (1977) - "Inputs, Outputs and a Theory of Production and Cost at Depository Financial Institutions," Journal of Finance, Vol. 32, No. 4, pp. 1251-66.
[20]Taylor, W. M., Thompson, R. G., Thrall, R. M., Dharmapala, P. S. (1997) – "DEA/AR efficiency and profitability of Mexican banks a total income model", European Journal of Operational Research, 98, 346-363. http://dx.doi.org/10.1016/S0377-2217(96)00352-9.
[21]Weiguo, X., Ming, L. (2008) – "Empiricalresearch of M&A impact on Chinese and American commercial banks' efficiencybased on DEA method", Management Science and Engineering, 2(1), 38-47.

investments and the credits; and the prices of the inputs: the expenses with the personnel reported to the number of employees and the expenses with the interests reported to the volume of the deposits. The justification of choosing these inputs and outputs is based on the difficult economic context generated by the international financial crises which was felt in the profit and loss accounts of the banks some of them registering massive profit decreases (almost half) obtaining losses. In this regard, the used program (DEAP 2.1) does not compile negative results. Therefore, the use of operational expenses as input and of the operational profit as output would not have been possible.

For the estimation of the DEA model we used the data taken from the financial reports of 11 most important banks in Romania for 2008 – 2011. The data were processed in the DEAP 2.1. program. The assets held by the banks included in the study represent more than 80% of the total of the assets held by the banks in Romania. Therefore, we consider that the results of this study are relevant. The estimation of the model will be made in the variant with constant returns to scale (CRS) and with variable returns to scale (VRS), both being input – oriented. If the VRS model, the efficiency scores of the banks are greater because the banks are analysed in accordance to banks of similar size. On the other hand, within the CRS model, the banks are compared on global level, not taking into consideration the size differences. The banks included in the study are pointed out in the table below:

**Table no. 1.**
**The banks included in the study**

| | |
|---|---|
| 1. | BCR ERSTE |
| 2. | BRD GSG |
| 3. | BANCA TRANSILVANIA |
| 4. | BANCPOST |
| 5. | UNICREDIT ȚIRIAC BANK |
| 6. | ALPHA BANK |
| 7. | VOLSKBANK |
| 8. | RAIFFEISEN BANK |
| 9. | BANCA COMERCIALĂ CARPATICA |
| 10. | BANCA ROMÂNEASCĂ |
| 11. | OTP BANK |

We have illustrated in the tables below the SE inefficiency scales calculated as difference between the TE technical efficiency scores obtained within the VRS model and the TE technical efficiency scores obtained within the CRS model and the SE efficiency scales calculated as report between the TE technical efficiency scores obtained within the CRS model and the TE technical efficiency obtained within the VRS model.

**Table no. 2.**

| The inefficiency scales (TE$_{VRS}$ − TE$_{CRS}$) | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| BCR ERSTE | 0,588 | 0,568 | 0,550 | 0,324 |
| BRD GSG | 0 | 0,083 | 0,138 | 0,122 |
| BANCA TRANSILVANIA | 0 | 0,328 | 0,365 | 0,419 |
| BANCPOST | 0 | 0,006 | 0 | 0 |
| UNICREDIT ȚIRIAC BANK | 0 | 0,358 | 0,278 | 0,113 |
| ALPHA BANK | 0 | 0,241 | 0 | 0 |
| VOLSKBANK | 0 | 0 | 0 | 0,015 |
| RAIFFEISEN BANK | 0 | 0,589 | 0,634 | 0,231 |
| BANCA COMERCIALĂ CARPATICA | 0 | 0 | 0 | 0 |
| BANCA ROMÂNEASCĂ | 0 | 0 | 0 | 0 |
| OTP BANK | 0 | 0 | 0 | 0 |
| Average | 0,053 | 0,198 | 0,178 | 0,112 |

**Table no. 3.**

| The efficiency scales (TE$_{CRS}$ / TE$_{VRS}$) | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| BCR ERSTE | 0,412 | 0,432 | 0,450 | 0,676 |
| BRD GSG | 1,000 | 0,695 | 0,596 | 0,710 |
| BANCA TRANSILVANIA | **1,000** | **0,591** | **0,482** | **0,581** |
| BANCPOST | 1,000 | 0,985 | 1,000 | 1,000 |
| UNICREDIT ȚIRIAC BANK | 1,000 | 0,642 | 0,623 | 0,806 |
| ALPHA BANK | 1,000 | 0,749 | 1,000 | 1,000 |
| VOLSKBANK | 1,000 | 1,000 | 1,000 | 0,980 |
| RAIFFEISEN BANK | 1,000 | 0,411 | 0,299 | 0,567 |
| BANCA COMERCIALĂ CARPATICA | **1,000** | **1,000** | **1,000** | **1,000** |
| BANCA ROMÂNEASCĂ | 1,000 | 1,000 | 1,000 | 1,000 |
| OTP BANK | 1,000 | 1,000 | 1,000 | 1,000 |
| Average | 0,934 | 0,746 | 0,748 | 0,839 |

## Table no. 4.
### Results obtained within the DEA model with constant returns to scale (CRS) – input oriented

|  | 2008 | | | 2009 | | | 2010 | | | 2011 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | T.E. | A.E. | C.E. | T.E. | A.E. | C.E. | T.E. | A.E. | C.E. | T.E. | A.E. | C.E. |
| **1.** | 0.412 | 0.987 | 0.406 | 0.432 | 0.304 | 0.131 | 0.450 | 0.244 | 0.110 | 0.676 | 0.230 | 0.155 |
| **2.** | 0.285 | 0.862 | 0.246 | 0.189 | 0.360 | 0.068 | 0.204 | 0.300 | 0.061 | 0.299 | 0.290 | 0.087 |
| **3.** | 0.735 | 1.000 | 0.735 | 0.474 | 0.435 | 0.206 | 0.339 | 0.409 | 0.139 | 0.581 | 0.371 | 0.216 |
| **4.** | 1.000 | 1.000 | 1.000 | 0.390 | 0.316 | 0.123 | 0.387 | 0.302 | 0.117 | 0.402 | 0.294 | 0.118 |
| **5.** | 0.550 | 0.744 | 0.409 | 0.642 | 0.353 | 0.226 | 0.460 | 0.301 | 0.138 | 0.469 | 0.252 | 0.118 |
| **6.** | 0.721 | 0.420 | 0.303 | 0.720 | 0.170 | 0.122 | 0.504 | 0.151 | 0.076 | 0.502 | 0.160 | 0.081 |
| **7.** | 0.934 | 0.111 | 0.104 | 0.723 | 0.117 | 0.085 | 0.724 | 0.107 | 0.077 | 0.728 | 0.122 | 0.089 |
| **8.** | 0.829 | 1.000 | 0.829 | 0.411 | 0.767 | 0.316 | 0.270 | 0.585 | 0.158 | 0.302 | 0.465 | 0.140 |
| **9.** | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| **10.** | 0.872 | 0.511 | 0.446 | 0.580 | 0.368 | 0.213 | 0.643 | 0.313 | 0.201 | 0.675 | 0.325 | 0.219 |
| **11.** | 0.934 | 0.576 | 0.538 | 0.844 | 0.583 | 0.492 | 0.837 | 0.533 | 0.446 | 0.797 | 0.501 | 0.399 |
| **Average** | **0.752** | **0.746** | **0.547** | **0.582** | **0.434** | **0.271** | **0.529** | **0.386** | **0.229** | **0.584** | **0.365** | **0.238** |

## Table no. 5.
### Results obtained within the DEA model with variable returns to scale (VRS) – input oriented

|  | 2008 | | | 2009 | | | 2010 | | | 2011 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | T.E. | A.E. | **C.E.** | T.E. | A.E. | **C.E.** | T.E. | A.E. | **C.E.** | T.E. | A.E. | **C.E.** |
| **1.** | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| **2.** | 0.285 | 0.862 | 0.246 | 0.272 | 0.621 | 0.169 | 0.342 | 0.983 | 0.336 | 0.421 | 0.908 | 0.382 |
| **3.** | 0.735 | 1.000 | 0.735 | 0.802 | 0.716 | 0.574 | 0.704 | 1.000 | 0.704 | 1.000 | 1.000 | 1.000 |
| **4.** | 1.000 | 1.000 | 1.000 | 0.396 | 0.327 | 0.129 | 0.387 | 0.302 | 0.117 | 0.402 | 0.294 | 0.118 |
| **5.** | 0.550 | 0.744 | 0.409 | 1.000 | 0.650 | 0.650 | 0.738 | 0.943 | 0.696 | 0.582 | 0.681 | 0.396 |
| **6.** | 0.721 | 0.420 | 0.303 | 0.961 | 0.271 | 0.260 | 0.504 | 0.151 | 0.076 | 0.502 | 0.160 | 0.081 |
| **7.** | 0.934 | 0.111 | 0.104 | 0.723 | 0.117 | 0.085 | 0.724 | 0.107 | 0.077 | 0.743 | 0.143 | 0.106 |
| **8.** | 0.829 | 1.000 | 0.829 | 1.000 | 1.000 | 1.000 | 0.904 | 1.000 | 0.904 | 0.533 | 1.000 | 0.533 |
| **9.** | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| **10.** | 0.872 | 0.511 | 0.446 | 0.580 | 0.368 | 0.213 | 0.643 | 0.313 | 0.201 | 0.675 | 0.325 | 0.219 |
| **11.** | 0.934 | 0.576 | 0.538 | 0.844 | 0.583 | 0.492 | 0.837 | 0.533 | 0.446 | 0.797 | 0.501 | 0.399 |
| **Average** | **0.805** | **0.748** | **0.601** | **0.780** | **0.605** | **0.507** | **0.707** | **0.667** | **0.505** | **0.696** | **0.637** | **0.476** |

In tables no. 2, 3, 4 and 5 one can observe that the levels registered by the technical efficiency and the cost efficiency are lower than for the DEA – CRS model than in the DEA – VRS variant. Generally, the obtained scores have been good enough at the level of 2008 and have started to decrease once the effects of the international financial crisis on the activities of the banks got intensified, as the average obtained at the banking system level shows: in the case of the CRS approach, the average value decreases from 0.752 in 2008 to 0.584 in 2911 for the technical efficiency; in the case of the VRS approach, the average value decreases from 0.805 in 2008 to 0.696 in 2011

for the technical efficiency. If we analyse the evolution of the costs registered in the case of cost efficiency, the obtained results are even weaker: in the case of the CRS approach, the average value decreases from 0.547 in 2008 to 0.238 in 2011; in the case of the VRS approach, the average value decreases from 0.547 in 2008 to 0.238 in 2011; in the case of the VRS approach, the average value decreases from 0.601 in 2008 to 0.476 in 2011.

As for the efficiency scales (table 3), one can notice that in 2008 almost all the banks benefit from scale economy, while in 2011 only 5 of them report scale economy, which denotes an increase of the competition in the banking sector. However, the differences on the efficiency scales are quite big, as those registered in the case of the technical efficiency and the cost efficiency which points out different policies of administration of the report between costs and incomes and because of the influence of the foreign shareholding on the Romanian banks considering the fact that during the crisis, the problems occurred in the host countries of the parent-banks affected the banks in Romania also. On the sample level, one can state that during 2009-2011 approximately 73% of the banks have been inefficient which leads us to the conclusion that the banks use more inputs than necessary to obtain the same level of the output.

Also, the obtained decreased levels reveal the fact that the products and services offered by the analysed banks are very expensive. The state banks (Banca Transilvania and Banca Comercială Carpatica) registered levels of the technical efficiency which were good enough in comparison to other banks (for instance other great banks as BRD-GSG, BCR ERSTE) which show the fact that a lower market share means lower costs. Although it obtained negative results during that period, the objective of Banca Comercială Carpatica was to maintain the market share of one percent according to a release from Rompres.

One states in the case of BCR-ERSTE that in the case of the CRS approach, the bank registers a very low cost efficiency (0.406 in 2008 in decrease to 0.155 in 2011) and in the case of the VRS approach, the situation changes completely, the bank registering the maximum value of 1,000 to all the efficiency categories. An explanation for this situation can be the high cost of the capital in Romania, the very high level of the expenses with the interest and of the expenses with the personnel registered by the Romanian banks, especially by BCR-ERSTE and BRD-GSG. Manfred Wimmer, CFO of the Austrian group Erste which controls BCR, says in an interview for the Ziarul Financiar[22] that the present financial situation of BCR-ERSTE Bank must be reported to the difficult context in which the bank operated during the last years, in the conditions in which its exposure is manifested on about a quarter of the economy.

## 5. CONCLUSIONS

Surprisingly, the general conclusion which comes out of this study is that the banks with a lower market share obtained greater cost economies than the banks which hold a greater market share. Similarly, the banks with national capital obtained better results than the banks with foreign capital. This can be explained by the fact that great banks have greater exposures and implicitly the negative effects from the economy have a greater negative impact on the costs of the banks. On the other hand, the problems occurred in the host countries of the parent-banks also affected the banks with

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[22]Voican R. (2013) - "The Head of Erste Group: BCR consciously ceded a market share before the crisis", Ziarul Financiar, January 12th.

mostly foreign capital from our country, being exposed to greater risks and costs than the banks with mostly national capital.

Therefore, the obtained results can be concretised in the following directions: most of the banks in Romania are inefficient from the cost management perspective; during the crisis, the foreign banks proved to be more inefficient than the local ones on the background of the propagation of the negative effects from the parent-banks; in the case of the smaller banks, one states that they are more efficient than the greater banks because of the fact that the totality of the expenses with the interests and of the expenses with the personnel has not been correlated with the volume of the granted loans and of the investments and because of holding a greater volume of nonperforming loans.

The results of the study must be correlated with the negative evolution obtained by the banking sector in Romania. In this regard, it is confirmed the fact that the banks acted in the conditions of a difficult economic environment, characterised by a low level of trust which affected the consumption, a weak external demand which hindered the growth of the exports and a weak performance of the agricultural sector, with a below average harvest. The economic difficulties reflected in the activity of the banking sector by reducing the volume of gross loans. At the same time, the companies limited their investments, inducing a negative impact in the loan demand.

On the other hand, the estimations obtained within the study can become very important from the perspective of the banks and of the regulatory authorities. This, in order to improve their efficiency, the banks must improve the quality of their assets held through the increase of the quality of the crediting process and the decrease of the weight of the nonperforming credits. At the same time, the banks must reduce their costs with the interests which had a negative effect on the cost efficiency. Also, in order to increase the efficiency of the banks, the monetary authorities should accelerate the liberalisation and reform process of the banking sector and consolidate their efforts to assure a lower inflation rate.

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