

## INVESTIGATION OF THE FACTORS THAT INFLUENCE THE EVOLUTION OF BANK EMPLOYEES

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**Abstract:** The present paper analyses the factors that influence the number of employees in the banking system. The aim of our research was to determine the influence of bank profitability (ROA), the number of branches and the number of ATM machines per 100.000 adults on evolution of the number of employees in the Central and Est European banking system (11 countries) and compare with Romanian banking system. It was used a model that refers to a multidimensional data collected for a period (Panel Data Regression) for eleven countries analyzed. For the analysis of the Romanian indicators, the multiple linear regression model was used. The analysis shows that both the Romanian model and the model performed on the 11 countries (panel data) registered a positive and direct relationship between number of banking units (BRANCHES) and number of bank employees, and an inverse correlation between number of ATM machines per 100,000 adults and number of bank employees.

**Key words:** bank profitability, bank employees, bank branches, regression model.

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### Introduction

During the last two decades, the bank system worldwide passed through major transformations, with a significant impact on its performance. The financial crisis which hit the banking sectors in European Union countries affected the number of banks operated in individual countries (Gavurova et al., 2017). The external factors, as well as the internal factors, affected the profitability of the banks in time. The identification of the main factors of success of the commercial banks allows the formulation of a policy for the growth of the profitability in the bank system. As a result, the determinants of the profitability of the bank attracted the interest of the academic research, together with the management of the banks, the financial markets and the bank supervisors. The study of the performance of the banks becomes even more important due to the present financial and economic crises, with a fundamental impact on the bank industry in many countries around the world (Dietrich, 2009).

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In order to conform to the new market conditions, banks focused on attracting and retaining customers. Thus, innovative forms of service have been introduced using multichannel distribution as a strategy to reach more customers through technology channels such as ATMs, Internet and smartphones. However, the most important form of interaction continues to be through the services provided by the bank branches, which provide the foundation of the unique relationships between customers and banking institutions through office employees. These branches represent the core of the strategy that the banks are trying to project, as well as the quality of the services offered. In this context, the bank's employees play a fundamental role, as, firstly, they represent the values of the institutions in relation to the customers and, secondly, they function as the key element of the sales channels through the new commercial role of these employees. (FAIR COUNTRY, 2020). After the emergence of the bank branches and the creation of the role of customer manager, the first signs of innovation in these facilities were the appearance of the ATMs that provide secure access to the bank accounts. (Ramos et al., 2011; Hoehle et al., 2012; Reis et al., 2019).

Nowadays, an important role in people's daily life played ATMs and the evolution of technology, which led to the adjustment of banking services by introducing digital banking services.

In the new millennium, customers are more connected to technology, and this has forced banks to structure banking applications that allow customers to consult and manage their accounts, cards and balance in real time. This fact affects the number of bank employees. There are few studies that analyze the relationship between profitability, number of ATMs, number of branches and bank employees.

After presenting the research framework, the paper offers an analysis of the factors that influence the number of bank employees. The paper shows how our research fits into the theoretical context and methodological framework that follows. There are presented the results and conclusion, the contribution of the research results, followed by practical implications of the results, limits and additional directions of research.

The subject of our study, the factors influencing the evolution of the number of employees in the Central and Est European countries banking system, is connected to the reorganization of the bank system which started more than 10 years ago and continues to reduce the number of employees.

### **Literature review**

The banking activity has long been recognized as a major driving-force for economic development, and few would contest that the vast majority of the population has a close business relationship with their banks (Ferreira et al., 2013). In the dedicated literature, there are many works analysing the profitability of the banks, its determinants and the factors influencing the profitability of the bank system. Musa et al. (2020) highlight that different approaches have to be applied

when measuring the efficiency of banks. However, most studies are centred on the analysis of the factors influencing the profitability of a certain bank system: Fuwei Jiang, Xinlin Qi, Guohao Tang - China (2018), Raymond F.D.D. – Germany (2018), Anke Weber – Italy (2017), Fernanda Dantas Almeida and Jose Angelo Divino –Brazil (2015), Antti Fredriksson and Andrea Moro – Finland (2014), Oyvind Bohren and Morten G. Josefsen - Norway (2013), Panayiotis P. Athanassoglou, Sophocles N. Brissimis, Matthaïos D. Delis - Greece (2008), Iuga (2014).

According to the above-mentioned studies, the factors determining the profitability of the banks can be classified in two main groups. Firstly, there is a group of factors of profitability which are specific to each bank and which, in many cases, are the direct result of the managerial decisions. They include: the structure of the assets, the quality of the assets, the capitalisation, the financial structure, the efficiency and the diversification of the activity. The second group includes the factors related to the profitability of the industry structure and to the macro-economic environment where the bank system operates, e.g. the concentration of the industry, the inflation and the interest rates. Balcerzak et al. (2017) recommend measuring the efficiency of the banking sector by non-parametric approach. Marinković & Radović (2014) sustained that foreign banks that borrow substantially from their parent groups – and that are at the same time industry leaders – are not ruthless in competing with domestic-owned banks for domestic sources. As bank branches represents the way banks define their market strategy and manage their quality of services, branches play an important role in the sustainability of banks (Ferreira et al., 2016). The physical spaces of the bank's branches also have a commercial function, the employees who want to attract new customers and sell financial products and / or services (Eskelinen and Kuosmanem, 2013). These branches also represent an extremely important link between banks and older customers who are unable to use other distribution channels (Szopiński, 2016). In general, bank branches represent the main link between customers and their bank, disseminating the values and commitment of these institutions to their clients, as well as the need to meet quality standards, because subsidiaries are the public image of banks (Athanassopoulos, 1997; Quaranta et al., 2018 ). Among the factors that influence the number of bank employees are the new technology (Surin, 2019).

It is well known that human resources are one of the most important factors for business companies' long-term success (Diskiene et al., 2019).

There have been numerous studies targeting employees (Chatzoglou, 2009), but there are very few that analyze the decline in the number of employees in banking systems in different countries. At the level of Romania there is no such study. The results from the recent international literature are mixed. Some studies (for example, Voulgaris, Papadogonas and Agiomirgianakis, (2005) for Greece, Neumark et al., (2011) for the USA) found a negative relationship between firm

size and number of employees and some [e.g., Hohti, (2000) for Finland, Juniper, Mitchell, and Myers, (2004) for Australia] found a positive relationship. Also, there were studies that analyzed the connection between "job satisfaction" and the number of employees.

Harmider et al. (2019) research present the construction and application of a comprehensive balance model based on the development of intersectoral and interproduct balances of labor costs and the use of labor resources.

Bakotić study (2016) show the existence of a clear link between employees' job satisfaction and organisational performance in both directions, but with pretty weak intensity.

Maja Pervan et al. (2015) defined and estimated a model that would enable the identification of the profitability determinants of Croatian banks.

Stančić et al. (2014) investigated the impact of board and ownership structure on profitability of 74 commercial banks from four transition economies of South East Europe (including Romania) over the 2005–2010 period.

Available data suggests that the level of job satisfaction in Central and Eastern Europe countries was relatively small compared to Western and Northern Europe. Four countries from Central and Eastern Europe - Hungary, Slovenia, Bulgaria and the Czech Republic - are among the eight countries with the lowest job satisfaction (Mohelska, 2020).

With this background, this study aims to examine the factors (models) important for the number of employees evolution. Our research had the following objectives:

O1: The types of factors identification (by their classification) that could influence the profitability of the bank system and number of employees

O2: The choice of three representative factors that influence number of employees

O3: The econometric method identification

O4: Highlight the results obtained after using the econometric model.

Then we formulated the following research hypothesis:

H: there is a link between ROA, number of BRANCHES, number of ATM machines per 100.000 adults and number of employees

In order to achieve these objectives and test the econometric model, it was necessary to collect the data from 2003-2018. The data for our study were taken, from the database of the National Bank of Romania ([www.bnr.ro](http://www.bnr.ro)), World Bank and Bankscope and Statistical Data Warehouse.

***Central and Eastern European Countries study case:***

We conducted a study choosing 11 countries from Central and Eastern Europe (including Romania): Bulgaria, Cyprus, Czech Republic, Greece, Hungary, Lithuania, Latvia, Poland, Romania, Slovak Republic and Slovenia. Through this study, we considered the influence of ROA, number of BRANCHES, number of ATM machines per 100,000 adults on the evolution of bank employees in the 11 countries.

**Data & Method. Variables analyse**

The study used an explanatory analysis and an econometric analysis based on the data of the panel from 2004 until 2018, in order to investigate the relation between number of the employees and number of branches, number of ATM machines per 100.000 adults and ROA. 165 values were taken for each variable. The data were analysed using the model of Panel Data Regression. The evolution of the employees in specific countries bank system was analyzed using as independent variables: number of branches, number of ATM machines per 100.000 adults and the profitability indicator Return on Assets (ROA). The evolution of the dependent variable – number of the employees in the specific banking systems - as well as the dependent variables were collected for the period of time from 2004 to 2018 for the following countries: Bulgaria, Cyprus, Czech Republic, Greece, Hungary, Lithuania, Latvia, Poland, Romania, Slovak Republic and Slovenia. The World Bank and Bankscope and Statistical Data Warehouse data were used.

The use of the statistic tests implemented in the Eviews software for the series of data related to the number of employees, number of branches, number of ATM machines per 100.000 adults and the profitability indicator ROA in the specific countries bank systems allowed us to obtain the following information (Table 1.):

**Table 1: The main statistic tests on the number of employees in the specific countries bank system in 2004-2018** (authors' calculations).

|              | EMPLOYEES | BRANCHES | ATM      | ROA       |
|--------------|-----------|----------|----------|-----------|
| Mean         | 41731.07  | 2643.994 | 60.94728 | 0.761091  |
| Median       | 30953.00  | 1276.000 | 58.92543 | 1.240000  |
| Maximum      | 188969.0  | 10913.00 | 104.8059 | 3.530000  |
| Minimum      | 7266.000  | 219.0000 | 18.32355 | -9.980000 |
| Std. Dev.    | 45637.12  | 2833.208 | 18.43216 | 1.870218  |
| Skewness     | 2.151761  | 1.528998 | 0.467033 | -3.091456 |
| Kurtosis     | 6.807587  | 4.425502 | 2.852656 | 15.62664  |
| Jarque-Bera  | 226.9989  | 78.26083 | 6.147541 | 1358.915  |
| Probability  | 0.000000  | 0.000000 | 0.046246 | 0.000000  |
| Sum          | 6885626.  | 436259.0 | 10056.30 | 125.5800  |
| Sum Sq. Dev. | 3.42E+11  | 1.32E+09 | 55718.11 | 573.6254  |
| Observations | 165       | 165      | 165      | 165       |

After analysing Table 1, we observe that the medium number of employees for the countries we collected the data, covering the time period from 2004 to 2018 is 41.731, the medium number for the ATM machines per 100.000 adults is 60, the medium number of branches is 2.643 and the medium value of the profitability indicator ROA is 0.76%. It means that half of the bank systems analysed by us, for the time period 2004-2018 had the average 41.731 employees, 60 ATM machines

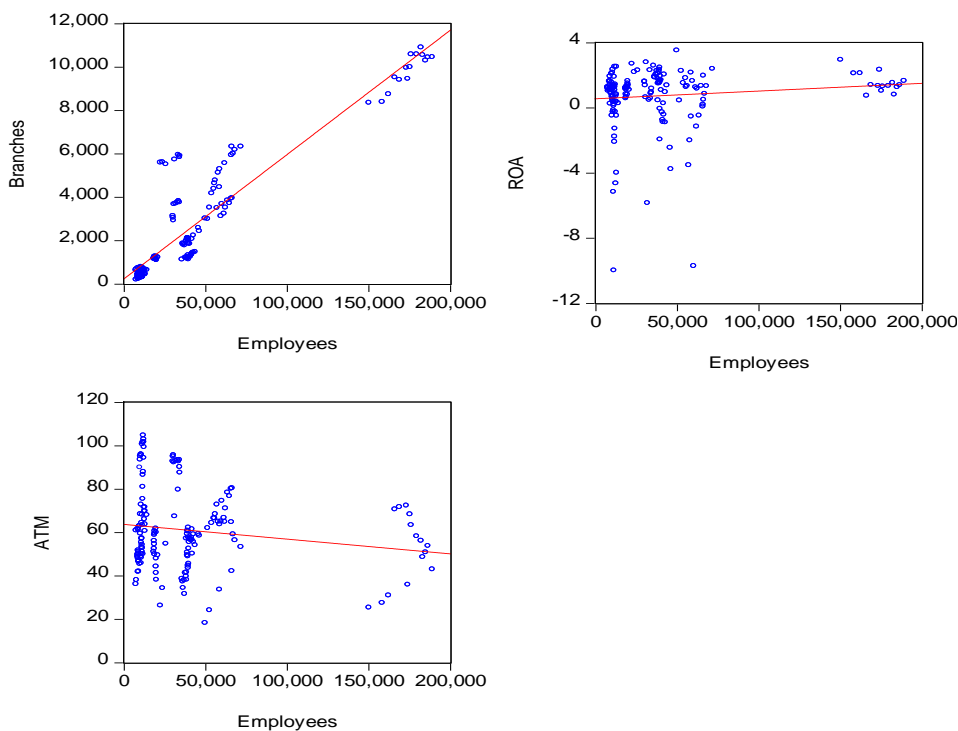
per 100.000 adults, 2.643 branches and the profitability indicator ROA reached the value of 0.76%. The number of employees varies inside the interval between the minimum of 7.266 thousand and a maximum of 188.969 thousand. The number of ATM machines per 100.000 adults varies inside the interval between the minimum of 18 and a maximum of 104 ATM machines. The number of branches varies inside the interval between the minimum of 219 and a maximum of 10.913. The value of the profitability indicator fluctuated between the minimum of -9,98% and a maximum of 3.53%. "Skewness" measures the asymmetry of the function of the density repartition for the series around its medium value. Analysing Table no.1, we can affirm that the distribution of the values for the considered intervals are not perfectly symmetrical for any of the analysed variables, because the values of the Skewness test are different of zero.

The value of the Kurtosis test is lower than 3 just in case of the ATM machines per 100.000 adult's variable. Therefore, we have a platykurtic distribution, flatter than a normal distribution, with values dispersed on a larger interval around the media. The probability of extreme values is smaller than in the case of a normal distribution. In the case of the other variables Kurtosis is higher than 3, so, we have leptokurtic distribution. "Jarque-Bera" represents the statistic of a test for the verification of the hypothesis that the series is normally distributed. When the variables present a value of the Jarque-Bera indicator which is higher than zero, it is a proof that the series were normally distributed.

An idea on the relation between the dependent variable and the independent variable can be obtained using the "Point cloud" diagram, as represented in the Figure 1 .

As useful statistic instrument, the dispersion diagram offers important information on the relation between the two-statistic series. The role of the chart is to establish a relation of linear or non-linear dependence. The existence of a linear relation between the two variables determines the preferential repartition of the points in the diagram in certain quadrants (II and IV or I and III). When the points are equally dispersed in all the four quadrants, the dispersion diagram shows a null correlation.

After the analysis of the diagram, we can affirm that there is a linear relation between dependent variable and the independent variable – number of branches - the dispersion diagram presenting the upward trend, with the points distributed in the quadrants I and III. This aspect signals a positive dependence between variables. Another useful instrument that shows the correlation between variables is correlation matrix.



**Figure 1: “Point cloud” diagram** (prepared by the authors with the help of Eviews econometric software).

**Table 2: Correlation matrix**

| Correlation | EMPLOYEES | BRANCHES  | ATM       | ROA      |
|-------------|-----------|-----------|-----------|----------|
| EMPLOYEES   | 1.000000  |           |           |          |
| BRANCHES    | 0.922471  | 1.000000  |           |          |
| ATM         | -0.168109 | -0.085376 | 1.000000  |          |
| ROA         | 0.115695  | 0.130166  | -0.386883 | 1.000000 |

From Table 2 we observe a close and direct correlation between EMPLOYEES and BRANCHES; a direct and weak correlation between EMPLOYEES and ROA; and an inverse but weak correlation between EMPLOYEES and ATM.

***Selection of explanatory variables. Descriptive statistics and baseline empirical evidence***

As our data includes observations for multiple variables collected for a group of countries (Bulgaria, Cyprus, Czech Republic, Greece, Hungary, Lithuania, Latvia,



Poland, Romania, Slovak Republic and Slovenia) over different time period, Panel Data Regression was used. So, it is a model that refers to a multidimensional data collected for a period.

The general form a simple Panel Data Regression can be specified thus:

$$Y_{it}=a+bX_{it}+\varepsilon_{it} \quad (1)$$

Y.....dependent variable

X.....independent variables

a,b...coefficients

$\varepsilon$ ....error term

Also, in order to determine the econometric model, we used Fixed Effect technique to analyze the Panel Data Regression. Panel Data Regression with Fixed Effect allows individuality or heterogeneity for each cross-section, it means that each cross-section will have its own intercept.

To analyse the evolution of the number of employees in the specific countries bank system, we used the number of employees in the specific countries bank systems as dependent variable and the number of the branches, ATM machines per 100.000 adults and ROA as dependent variables. We obtained the synthesis presented in Table no.3. Analyzing the results and interpreting the resulted parameters, we can formulate conclusions on the probability of the model. One of the most important parameters showing if a regression model is correct, allowing a good estimation of the evolution of the estimated indicator, is the R-squared ( $R^2$ ) parameter. The parameter  $R^2$  is very high, representing 99.48%. Therefore, our model explains the variation in the number of employees in the specific bank system in a proportion of 99.48%. Used as alternative, the Adjusted R-squared have the advantage of “penalizing” the addition of regressors that do not contribute to the explanatory power of the model. Therefore, this statistic can decrease when regressors are added and can be negative for the models where the data “matching” is not very good. Adjusted R-squared presents values close to 1, confirming the “success” of the estimated regression equation. The value of the F test is 2229,615 confirming the validity of the regression model. The voidness of the Prob (F-statistic) test confirms once more the validity of the estimated model. Akaike and Schwarz criteria register low values, indicating a good specification of the model. Also, the Hannan-Quinn criterion has the same purpose as Akaike and Schwarz criteria.

**Table 3: Parameters estimation of the of the panel data regression model using the least squares model** (authors' calculations)

|  |
|--|
| Dependent Variable: EMPLOYEES            |
| Method: Panel Least Squares              |
| Sample: 2004 2018                        |
| Total panel (balanced) observations: 165 |



| Variable                              | Coefficient | Std. Error            | t-Statistic | Prob.  |
|---------------------------------------|-------------|-----------------------|-------------|--------|
| BRANCHES                              | 5.386028    | 0.470005              | 11.45952    | 0.0000 |
| ATM                                   | -169.7258   | 24.79678              | 6.844672    | 0.0000 |
| ROA                                   | 195.0283    | 166.1987              | 1.173465    | 0.2425 |
| C                                     | 16997.68    | 1954.590              | 8.696290    | 0.0000 |
| Effects Specification                 |             |                       |             |        |
| Cross-section fixed (dummy variables) |             |                       |             |        |
| R-squared                             | 0.994817    | Mean dependent var    | 41731.07    |        |
| Adjusted R-squared                    | 0.994371    | S.D. dependent var    | 45637.12    |        |
| S.E. of regression                    | 3423.933    | Akaike info criterion | 19.19600    |        |
| Sum squared resid                     | 1.77E+09    | Schwarz criterion     | 19.45953    |        |
| Log likelihood                        | -1569.670   | Hannan-Quinn criter.  | 19.30298    |        |
| F-statistic                           | 2229.615    | Durbin-Watson stat    | 0.366326    |        |
| Prob(F-statistic)                     | 0.000000    |                       |             |        |

The value of the Hannan-Quinn criterion shows us also a low value, confirming once again the viability of the model, and, in the same time, is close as value to the values of the other two criteria. The values of the Durbin-Watson statistics are under 2, and exactly 0.366326.

### Romanian study case

#### Data & Method. Variables analyse

We use the model of multiple regression, and we study the relation between a dependant or endogenous variable, and other two (or more) independent or exogenous variables. Therefore, in the model of multiple regression, the dependent variable noted with  $Y$  is explained through a set of explanatory variables,  $X_1, \dots, X_p$ .

For the dependent variable, as well as for the explanatory variables, the values registered to the level of  $n$  statistic units are considered. A series of data for these variables is obtained:

$$Y = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix} \in M_{(n,1)}; X = \begin{pmatrix} x_{11} & \cdots & x_{p1} \\ \vdots & \ddots & \vdots \\ x_{1n} & \cdots & x_{pn} \end{pmatrix} \in M_{(n,p)} \quad (2)$$

The multiple regression, defined based on  $p$  explanatory variables, is presented in the form of the linear relation:

$$y_i = \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_p x_{pi} + u_i, \quad (3)$$

where  $i = 1, \dots, n$ , and  $y_i$  represents the values of the explained variable  $Y$  and  $x_{1i}, x_{2i}, \dots, x_{pi}$  are the values of the independent variables  $X_1, \dots, X_p$ . The coefficients  $\beta_1, \beta_2, \dots, \beta_p$  are called the parameters of the regression model, and  $u_i$  are the values of the residual variable. This variable included in the regression model can represent values of other variables not taken in consideration but influencing the explained variables, as well as certain components that cannot be numerically explained.

Hence, in order to formulate the regression model, we define the number of employees (EMPLOYEES) as dependent variable.

**Table 4: The main statistic tests on the number of employees in the Romanian bank system in 2004-2018** (authors' calculations).

|              | EMPLOYEES | ROA       | BRANCHES  | ATM       |
|--------------|-----------|-----------|-----------|-----------|
| Mean         | 59799.47  | 1.142667  | 5058.867  | 54.19648  |
| Median       | 58536.00  | 1.350000  | 5140.000  | 63.84271  |
| Maximum      | 71622.00  | 3.530000  | 6340.000  | 68.56562  |
| Minimum      | 49702.00  | -1.990000 | 3031.000  | 18.32355  |
| Std. Dev.    | 6487.151  | 1.459909  | 1029.556  | 16.55641  |
| Skewness     | 0.290042  | -0.687097 | -0.392680 | -1.147121 |
| Kurtosis     | 1.934865  | 2.871488  | 2.165781  | 2.854796  |
| Jarque-Bera  | 0.919382  | 1.190579  | 0.820444  | 3.302891  |
| Probability  | 0.631479  | 0.551403  | 0.663503  | 0.191772  |
| Sum          | 896992.0  | 17.14000  | 75883.00  | 812.9472  |
| Sum Sq. Dev. | 5.89E+08  | 29.83869  | 14839796  | 3837.605  |

After analysing the Table 4, we observe the fact that the medium number of employees in the Romanian bank system in 2004-2018 was 5.9799, the medium number of branches is 5.058, the medium number of ATM machines per 100.000 adults is 54, and the medium value of the profitability indicator ROA is 1,14% .

The number of employees varies inside an interval between the minimum of 49.702 thousand and a maximum 71.622 thousand. The number of branches varies in an interval between a minimum of 3.031 thousand and a maximum of 6.340 thousand. The number of ATM machines per 100.000 adults varies inside an interval between the minimum of 18 and maximum of 64 units. The profitability indicators fluctuated in an interval between a minimum of -1.99% and a maximum of 3.53% for ROA.



**Figure 2: “Point cloud” diagram** (prepared by the authors with the help of Eviews econometric software).

Analysing the Figure No.2 above, we observe that the number of employees and the number of branches from the Romanian bank system registered a constant growth until 2008, reaching a maximum of 71.622 employees (2008) and 6.340 branches (2007). In 2009-2018, with small fluctuations, the number of employees and the number of the branches continuously diminished.

We can conclude that the evolution of number of employees is similar to that of the number of branches and both has an inversely proportional relation with the number of ATM machines per 100.000 adults. Also, there is no significant influence of the ROA variable for the evolution on the other variables.

The parameter  $R^2$  is very high, representing 95,46 % (Table No. 5). Therefore, our model explains the variation in the number of employees in the Romanian bank system in a proportion of 95,46%. *Adjusted R-squared* presents values close to 1, confirming the “success” of the estimated regression equation. The value of the *F test* is 77.18813 confirming the validity of the regression model. The voidness of the *Prob (F-statistic)* test in both cases confirms once more the validity of the estimated model. Hence *Akaike and Schwarz criteria* register low values, indicating a good specification of the model. The value of the *Hannan-Quinn criterion* is lower, confirming once again the viability of the model.

**Table 5: Parameters estimation of the of the panel data regression model using the least squares model (authors' calculations).**

| Dependent Variable: EMPLOYEES |             |                       |             |          |
|-------------------------------|-------------|-----------------------|-------------|----------|
| Method: Least Squares         |             |                       |             |          |
| Sample: 2004 2018             |             |                       |             |          |
| Variable                      | Coefficient | Std. Error            | t-Statistic | Prob.    |
| ROA                           | 647.2288    | 377.9300              | 1.712563    | 0.1148   |
| BRANCHES                      | 6.783054    | 0.462898              | 14.65345    | 0.0000   |
| ATM                           | -60.00869   | 34.92181              | -1.718373   | 0.1137   |
| C                             | 27997.60    | 2785.921              | 10.04967    | 0.0000   |
| R-squared                     | 0.954651    | Mean dependent var    |             | 59799.47 |
| Adjusted R-squared            | 0.942283    | S.D. dependent var    |             | 6487.151 |
| S.E. of regression            | 1558.492    | Akaike info criterion |             | 17.76400 |
| Sum squared resid             | 26717864    | Schwarz criterion     |             | 17.95282 |
| Log likelihood                | -129.2300   | Hannan-Quinn criter.  |             | 17.76199 |
| F-statistic                   | 77.18813    | Durbin-Watson stat    |             | 2.569896 |
| Prob(F-statistic)             | 0.000000    |                       |             |          |

### Results Of The Study

Analysing the results obtained by estimating the parameters with the help of the method of the least squares, we can affirm that the econometric model is correctly formulated, because the most important estimated parameters (R-squared and Adjusted R-squared, the probability of Fisher test) show us the “the success” of the analysed linear regression model.

#### *Central and Eastern European Countries:*

We extract regression model:

$$\text{EMPLOYEES} = 5.38602772014 * \text{BRANCHES} - 169.725808737 * \text{ATM} + 195.028325393 * \text{ROA} + 16997.6818331$$

Analysing the received model, we can observe that an increase of the BRANCHES by one unit, leads to an increase of the number of employees with 5 employees. An increase of the ATM machines per 100.000 adults by one unit leads to a decrease of the number of employees with 169. Also, an increase of the profitability indicator

ROA with one unit (1%) leads to an increase of the employees in the banking system with 195.

**Romanian Case:**

$$\text{EMPLOYEES} = 6.78305373861 \times \text{BRANCHES} - 60.0086892673 \times \text{ATM} + 647.228762248 \times \text{ROA} + 27997.5952289$$

We observe that the increase of ROA profitability indicator with one unit (1%) leads to an increase of the number of employees with 647 employees and if the number of branches increases with one unit, the number of employees will increase with 6 employees. In the same time, if the number of ATM machines per 100.000 adults increases by one unit, the number of employees will decrease by 60.

**Results Discussion**

The firm size and job growth relationship is important for policy as well. In many countries' governments have financial and other types of support programs in place, costing the taxpayers large sums of money (Dogan, 2017). The section Literature Review presents some studies [for example, Voulgaris, Papadogonas and Agiomirgianakis, (2005) for Greece, Neumark et al., (2011) for USA] that found a negative relationship between firm size and number of employees and some [e.g., Hohti, (2000) for Finland, Juniper, Mitchell, and Myers, (2004) for Australia] found a positive relationship. Both in Romania and in the 11 countries (panel data) there was a positive, direct relationship between number of banking units (BRANCHES) and number by bank employees.

After bank branches appeared and the client manager role was created, the first signs of innovation in these facilities were the emergence of automatic teller machines that provide safe access to bank accounts (Paes De Faria, 2020). This means an inverse correlation between number of ATM machines per 100,000 adults and number of bank employees. This correlation can be found in our models made on both the 11 countries of Central and Eastern Europe and the model made on Romania.

We considered as an important "moment" to detail in our study, because phenomena as the globalization, the digitization and the external migration also have a significant impact on the evolution of the number of employees in the European banking system.

But not only the increase of ATM's numbers led to the decrease of the employees' number in the banking system. The main cause of this phenomena is the recent financial crisis. Other causes would be digitization, competition at the banking level that leads to the creation of banking products and services without moving the customer to the bank's headquarters.

## Conclusions

A powerful, stable and sustainable economy represents the condition for a solid and performant bank system. The banks, as financial intermediators, play an important role on the financial scene, directing the funds from deponents to investors. The bank system has a significant impact on the entire economy, the strong and profitable banks are necessary conditions for the functioning of the market economy. Financing the economy in a percentage of 90, the banks are the main "job creators". Still, the number of employees in the UE bank system was considerably reduced. Thus, to the UE level, the number of bank units was reduced with approximately 31%, and the number of branches was reduced with 21% between 2007 and 2018. The number of employees in the bank system was reduced at the EU level with 440.212 employees, representing 14%. Therefore, the downward trend of the number of bank units, branches and employees determined the upward trend of the average number of citizens attributed to an employee from the bank system.

The financial crisis was not the only cause of the restructuration. As cause, the digitization is more and more present in the European banking system. One of the most important causes for the downward trend of number of employees in Romania as well as in the entire EU is the intensification in the distribution of the bank services through the digital channel. In the context of globalization, in order to avoid the gap between the members of the European Union, Romania and all the other EU countries, must invest as much as possible in order to benefit of a unique digital market and avoid a digital Europe with two speeds. The gap between Romania and the rest of the EU will grow without digitization (Moroşan, 2017). Another cause for restructuration is the high salaries of the bank employees. The salaries grew after the number of employees had been reduced.

## Future research

Some additional issues remain open for further research. For example, it would be beneficial as a measure of the analysis of bank profitability and the evolution of the employees, we will consider the digitization indicators.

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## ŚLEDZENIE CZYNNIKÓW WPŁYWAJĄCYCH NA EWOLUCJĘ PRACOWNIKÓW BANKU

**Streszczenie:** Niniejszy artykuł analizuje czynniki wpływające na liczbę pracowników w systemie bankowym. Celem naszych badań było określenie wpływu rentowności banków (ROA), liczby oddziałów i liczby bankomatów na 100 000 osób dorosłych na ewolucję liczby pracowników w centralnym i estońskim systemie bankowym (11 krajów) oraz porównanie z rumuńskim systemem bankowym. Zastosowano model odnoszący się do danych wielowymiarowych zebranych dla okresu (regresja danych panelowych) dla jedenastu analizowanych krajów. Do analizy wskaźników rumuńskich zastosowano model regresji wielokrotnej liniowej. Analiza pokazuje, że zarówno model rumuński, jak i model wykonany w 11 krajach (dane panelowe), zarejestrowały dodatni i bezpośredni związek między liczbą jednostek bankowych (ODDZIAŁY) a liczbą pracowników banków, a także odwrotną korelację między liczbą bankomatów na 100 000 osób dorosłych i liczbą pracowników banków.

**Słowa kluczowe:** rentowność banku, pracownicy banku, oddziały banku, model regresji.

### 影響銀行僱員發展的因素的調查

**摘要:** 本文分析了影響銀行系統僱員人數的因素。我們研究的目的是確定銀行利潤率 (ROA), 每100.000名成年人的分支機構數量和ATM機數量對中歐和Est歐洲銀行系統 (11個國家) 的員工人數演變的影響, 以及與羅馬尼亞的銀行體系比較。它使用了一個模型, 該模型是指針對一個所分析的11個國家/地區在一段時間內收集的多維數據 (面板數據回歸)。為了分析羅馬尼亞指標, 使用了多元線性回歸模型。分析表明, 羅馬尼亞模型和在11個國家/地區執行的模型 (面板數據) 均顯示, 銀行單位數量 (BRANCHES) 與銀行員工數量之間存在正相關和正相關關係, 而每個ATM機數量之間呈反相關關係 100,000名成年人和銀行僱員人數。

**關鍵詞:** 銀行盈利能力, 銀行僱員, 銀行分行, 回歸模型。