

ANALYZING AND FORECASTING KEY PROFITABILITY INDICATORS OF BANKING SYSTEM IN ROMANIA

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Abstract: Banking institution have a significant contribution to the functioning of the national economy. Through its activities, any banking institution aims to achieve a return in condition of specific risks. In this article we present the analysis and forecast key indicators of banking profitability. To determine the correlation between banking profitability indicators we used econometric models of multifactor regression. We also used dynamic models to determine the trend and forecast development banking institutions.

Key words: the banking system, the profit, assets utilization rate, economic rate of return, financial rate of return, indebtedness

INTRODUCTION

The main objective of banking institutions is to make the highest possible profit which leads to the performance of the banking system.

The economic and financial situation of the banking system is evaluated using a banking performance indicator system that includes: the profit rate, the assets utilization ratio (AUR), the return on assets (ROA), the return on equity (ROE), and the leverage or the indebtedness ratio.

In order to analyze the profitability indicators of the Romanian banking system we conducted an annual analysis of the data collected from the annual reports of the National Bank of Romania on a period of 12 years (2000 - 2011)

MATERIALS AND METHODS

The linear mathematical functions are used both for analysis and for forecasting the evolution of the main indicators of profitability of the banking system:

$$y_t = a + b \cdot t + \varepsilon_t$$

Where y= the dependent variable

t=the independent variable

ε = the random variable of the model

An important condition to be met by the series of time analysed is to check the stationary nature by means of the Augmented Dickey-Fuller test. The time series are stationary if $t_Statistic \geq t_Critical$ and the probability p is smaller than the threshold of significance $\alpha = 0,05$.

The analysis of the forecasting capacity of the model concerning the evolution of the profitability indicators of the Romanian banking system is made with the help of the statistical indicators proposed by H. Theil: Theil Inequality Coefficient, Bias Proportion, Variance Proportion, Covariance Proportion.

The standard deviation of the predicted level of the phenomenon will be equal to:

$$S_{y_{n+1}} = \sqrt{S_u^2 \left(1 + \frac{1}{n} + \frac{(t_{n+1} - \bar{t})^2}{\sum (t - \bar{t})^2} \right)}$$

Where S_u^2 =dispersion of the residual variation and is equal to:

$$S_u^2 = \frac{\sum u^2}{n-k-1}$$

k=the number of explanatory variables
n=the number of terms in the series

The confidence interval of the forecast of the analysed indicators, estimated with a significance threshold $\alpha = 0,05$ and with the value of t_α taken from the Student's T distribution table is calculated using the formula:

$$y_t - t_\alpha \cdot S_{y_t} \leq y \leq y_t + t_\alpha \cdot S_{y_t}$$

The certainty of the forecast is given by the probability (p) with which the confidence interval is assessed, and the accuracy of the forecast by the formula:

- absolute error: $e_a = |t_\alpha \cdot S_y|$
- relative error: $e_r = \frac{e_a}{y_{n+1}} \cdot 100$

The analysis of the links between the banking profitability indicators is made with the help of the regression multifactorial econometric models defined with the help of the formula:

$$y = f(x_j) + \varepsilon$$

Where y= endogenous variable, dependent or explained;

x_j = exogenous variables, independent or explanatory, $j = \overline{1, k}$, k the number of exogenous variables;

$f(x_j)$ = the regression function with which the values of the variable y will be estimated.

The parameters of the linear regression model are estimated with the method of the ordinary least squares (OLS).

RESEARCH RESULTS

From 2000 to 2008, the profitability of the Romanian banking system increased annually on average by 206.66 million RON (from 221.04 million RON in 2000 to 1874.28 million RON in 2008). Starting with 2009, due to the economic and financial crisis, the profitability of the banking system started to decrease. Thus in 2009, the profit decreased by 80.48% (by 1508.36 million RON) compared to 2008. For the first time after 1999, in 2010, the profit of the banking system became loss (262.95 million RON). In 2010 the loss kept rising reaching 402.34 million RON (an increase by 53.01% compared to 2010).

In the Romanian banking system, the return on equity (ROE) recorded losses from one year to the next with the exception of 2008 when this indicator grew 1.81 times compared to 2007. From the analysis of data presented in the chart in Figure 1 it can be seen that the return on equity has a similar evolution that of net profit.

The negative evolution of the leverage determined the reduction of the return on assets, from 1.5% in 2000 to -0.23% in 2011. In 2011, ROA decreased by 1.4 times compared to 2010.

With the beginning of the financial crisis in Romania, the indebtedness ratio of the banking system, measured by help of the leverage, increased by 0.81 percentage points in 2008 compared to 2007 and in 2011 it decreased by 0.04 percentage points compared to 2010 and by 0.06 percentage points compared to 2008.

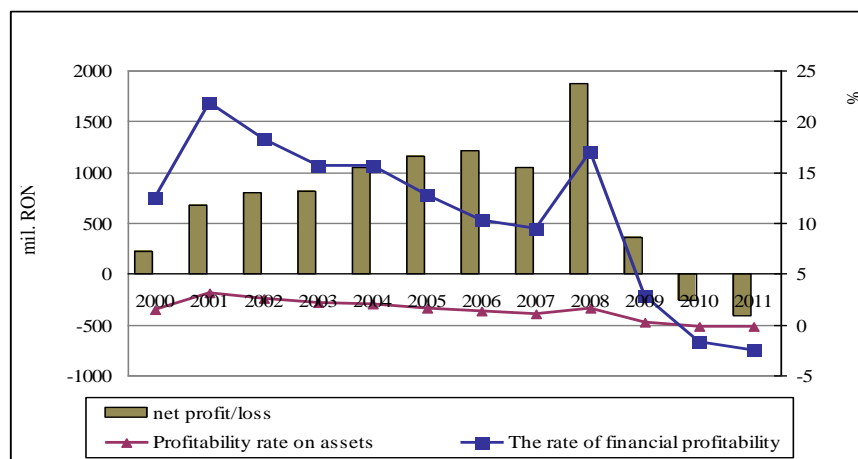


Fig 1 The evolution of the financial result, the rate of profitability of financial and economic profitability

In order to verify the stationary nature of the data series concerning the profitability indicators of banking system we will use the *Augmented Dickey-Fuller* test provided by Eviews. In the case of the ROE we can say that the series is stationary if we accept a significance level of 1% and for the other profitability indicators the accepted significance level is 10%.

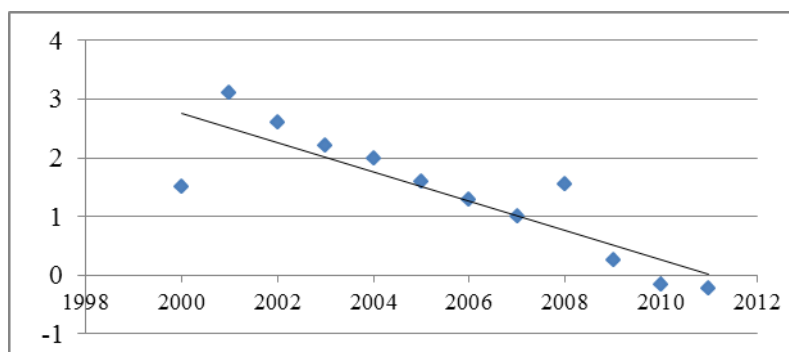


Fig 2 The trend rate of profitability of assets

THE EVOLUTION OF THE RETURN ON ASSETS IS DESCRIBED BY THE FUNCTION:

$$ROA_t = 2,90 - 0,22 * t + \varepsilon$$

The increase of the time by one unit determines the reduction of the return on assets by 0.22 percentage points.

The analysis of the model forecasting capacity concerning the return on assets in the period 2012 – 2013 is made with the help of the statistical indicators proposed by H. Theil.

Table 1

The results of the test of foresight of the linear model of evolution of the ROA

Name of the indicator	An econometric model of linear
Coeficientul Theil	0,142
Ponderea abaterii	0
Ponderea dispersiei	0,103
Ponderea covarianței	0,897

Following the analysis of the data we can see that the linear econometric model has a good forecasting capacity, as a result of the low values recorded in the case of the Theil statistical indicators, so it can be accepted for forecasts.

Table 2

Forecast for ROA in the period 2012-2013 based on the linear model

Ani	Forecast ROA (%)	The range of the forecast (%)	Absolute error	Relative error (%)
2012	-0,25	[-1,09 ÷ 1,59]	0,0134	5,47
2013	-0,30	[-1,33 ÷ 1,38]	0,0136	5,53

The forecast relative error does not exceed the threshold of 15%, so the forecast accuracy is ensured.

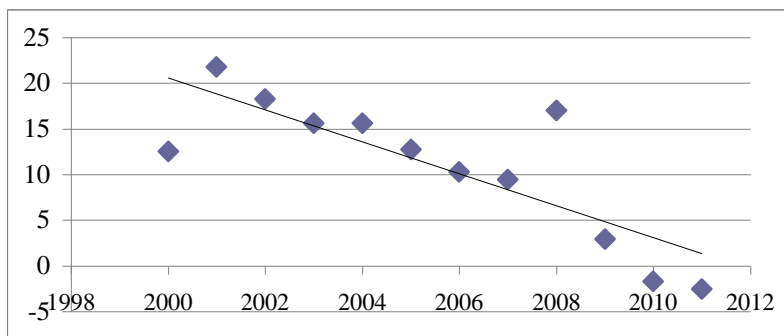


Fig 3 Financial profitability rate trend

In the analysed period, 2000 ÷ 2011, the return on equity recorded a downtrend. The model that can be used to approximate the evolution of the phenomenon is as follows:

$$ROE_t = 20,77 - 1,37*t + \varepsilon$$

With the increase in the time variation by one unit, the return on equity decreases by 1.37 percentage units.

Table 3

The results of the test of foresight of the linear model of evolution of the ROE

Name of the indicator	An econometric model of linear
Coeficientul Theil	0,1473
Ponderea abaterii	0
Ponderea dispersiei	0,1523
Ponderea covarianței	0,8477

The statistical indicators Theil have low values therefore the selected econometric model has a good forecast capacity.

Table 4

Forecast for ROE in the period 2012-2013 based on the linear model

Ani	Forecast ROE (%)	The range of the forecast (%)	Absolute error	Relative error (%)
2012	-3,36	[-6,44 ÷ 15,05]	0,108	2,50
2013	-4,30	[-7,93 ÷ 13,79]	0,1086	3,70

In this case the forecast relative error does not exceed the threshold of 15% either, so the forecast accuracy is ensured.

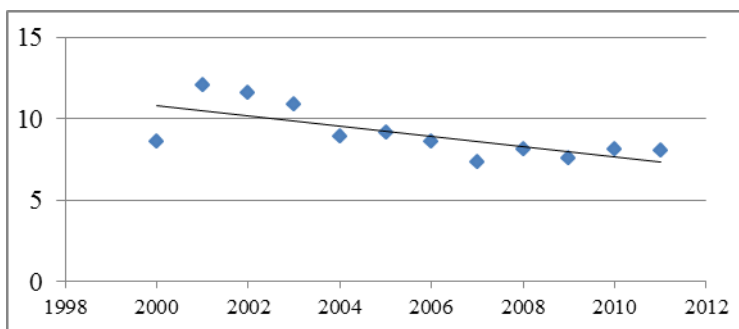


Fig 4 The trend of lever

In the analysed period, 2000 ÷ 2011, the leverage was on a downtrend, (the indebtedness of the banking system was decreasing). The econometric model describing the evolution of the phenomenon is as follows:

$$EM_t = 11,29 - 0,35*t + \varepsilon$$

Table 5

The results of the test of foresight of the linear model of evolution of leverage effect

Name of the indicator	An econometric model of linear
Coeficientul Theil	0,058
Ponderea abaterii	0
Ponderea dispersiei	0,165
Ponderea covarianței	0,835

The linear model has a good leverage forecast capacity.

Table 6

Forecast effect of p in the period 2012-2014 based on the linear model

Ani	Forecast EM (%)	The range of the forecast (%)	Absolute error	Relative error (%)
2012	7,08	[4,17÷9,99]	0,029	0,41
2013	6,73	[3,79÷9,67]	0,029	0,044

We used regression multifactorial models to analyse the correlation between the main profitability indicators of the Romanian banking system. The econometric multifactorial model is built based on the simultaneous influence exercised by the return on assets and the return on equity on the leverage. The form of the econometric model is as follows:

$$EM = a + b*ROA + c*ROE + \varepsilon$$

Table 7

Estimating an econometric model parameters using the smallest squares method

Dependent variable: effect of lever				
OLS				
Included observations: 12				
EM = a + b*ROA + c*ROE				
	Coefficient i	t-Statistic	Prob	
a	7,46	17,41	0	
b	3,93	5,26	0,0008	
c	-0,35	3,26	0,0114	
R-squared	90,71%	Mean dependent var	9,18	
Multiple R	0,9491	F-statistic	36,28	
		Prob	0	
Durbin – Watson stat	1,91	JB	0,822	
		Prob	0,663	

THE PROBABILITIES THAT THE THREE PARAMETERS A, B AND C ARE NOT CORRECTLY ESTIMATED ARE VERY SMALL (P = 0) SO THE ESTIMATED PARAMETERS ARE SIGNIFICANTLY

DIFFERENT FROM ZERO. THE CALCULATED VALUE OF THE TEST F IS BIGGER COMPARED TO THE VALUE IN THE TABLE, WHICH MEANS THAT THE MODEL IS ALSO SIGNIFICANT WHEN THE RETURN ON ASSETS AND THE RETURN ON EQUITY ARE IMPORTANT VARIABLES INFLUENCING THE LEVERAGE.

THE RELATIONSHIP BETWEEN ROA AND THE LEVERAGE IS HIGHLY INTENSE AND DIRECT (THE CORRELATION RATIO IS 0.83). THE ROA INCREASE BY ONE PERCENTAGE POINT DETERMINES THE INCREASE OF INDEBTEDNESS BY 1.25 PERCENTAGE POINTS. IN A PROPORTION OF 68% THE LEVERAGE VARIATION IS JUSTIFIED BY THE VARIATION OF ROA.

BETWEEN ROE AND THE LEVERAGE WE HAVE A MEDIUM-INTENSITY AND DIRECT RELATIONSHIP (THE CORRELATION RATIO IS 0.69). ONLY 48% OF THE LEVERAGE VARIATION IS JUSTIFIED BY THE VARIATION OF ROE.

APPROXIMATELY 90.71% OF THE LEVERAGE VARIATION IS JUSTIFIED BY THE VARIATION OF ROA AND ROE AND THE REMAINING 9.29% BY THE VARIATION OF OTHER RANDOM FACTORS.

$$EM = 7,46 + 3,93*ROA - 0,35*ROE + \varepsilon$$

AMONG ROA, ROE AND THE LEVERAGE, IN THE PERIOD 2000 – 2011, THERE IS AN INTENSE AND DIRECT RELATIONSHIP (0.9491). WITH THE NEGATIVE INCREASE OF THE INFLUENCE FACTOR, ROA, BY ONE PERCENTAGE UNIT, THE INDEBTEDNESS INCREASES BY 3.93 PERCENT. THE DEPRECIATION OF THE ROE FACTOR BY ONE PERCENTAGE UNIT DETERMINES THE REDUCTION OF THE INDEBTEDNESS BY 0.35 PERCENT.

CONCLUSIONS

Following the analysis of the evolution of the main profitability indicators of the banking system we found a negative evolution of these indicators. In 2010 as well as in 2011, ROA and ROE have negative values due to the net deficit of the banking system and to the high indebtedness.

The return on equity influences the indebtedness of the banking system to a lower extent compared to the return on assets.

Following the analysis the level of influence of the return on assets and the return on equity on the leverage we found that their effects are major.

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