

Study regarding the influence of the endogenous and exogenous factors on credit institution's return on assets

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Abstract. *The goal of each credit institution is represented by profitability, an objective hardly to be achieved, taking into account that banks are practicing their usual activities within a banking system that hardly tries to recover. The main purpose of this research is to identify the existence of a dependency relationship between return on assets and endogenous factors (growth rate of the loan portfolios; the rate of growth of the provisions and solvency ratio) and the exogenous ones (GDP and inflation rate). The analysis done over the horizon of the last 10 years, a period that includes both economic boom, recession and recovery, illustrated the vulnerability of the credit institution in front of the business environment. The study demonstrated a significant dependence relationship, between return on assets recorded by Carpatica Commercial Bank and the intern determinants, while the variation of the exogenous factors does not explain the variation of ROA recorded by the bank.*

Keywords: ROA, endogenous and exogenous factors, profitability, write-off processes, regression equation.

JEL Classification: G32.

1. Introduction

Macroeconomic conditions, the volatility of the business environment that appeared after the outbreak of the financial crisis determined the supervisory authority to tighten the capital requirements and also the liquidity ones in order to avoid further bankruptcies such as those that characterized the year 2008. The Romanian banking system is in the full process of re-stabilizing and strengthening the commercial banks that operates in the Romanian banking market as a result of:

- The obligation to be aligned to the capital requirements and the liquidity ones etc. imposed by the International Agreements. This determine credit institutions to resort to capital increases through various ways (subordinated loans, contribution of capital or mergers).
- The non-performing loans rate arrived at alarming shares for many banks that are activating in the system, thus the management of credit institutions was determining to use the write-off operations or their full provisioning.

In these circumstances, the profitability of credit institutions is a goal difficult to be achieved due to the instability of the business environment, the low growth rate of the new credit portfolio that is characterizing the Romanian banking system.

2. Literature review

The determinants of the credit institution's profitability have been widely studied by many researchers especially in times of economic crisis due to the need to identify a relationship between this one and other exogenous and endogenous factors.

The credit and risk policy adopted by credit institutions directly affects all indicators obtained by a bank. The literature shows that in times of economic boom, the banks reduce their lending standards and the requirements regarding the warranties due to mainly positive forecasts of future income; higher values of price guarantee (Ruckes, 2004); reduce information asymmetry (Dell'Arricia and Marquez, 2006).

Regarding the evolution of the provisions, an intern determinant extensively studied by researchers, because this indicator, on the one hand expresses the evolution of credit portfolio quality and on the other hand it affects the profitability of the credit institution. In 2008 the researcher Kosmidou defines credit risk as the quality of assets through risk provisions. According to Greek researchers, Athanasoglou, Brissimis and Delis (2008) an upward trend of provisions indicates an increased risk and a greater probability of deteriorating the loan portfolio by higher values of the non-performing loans. As such there emerges an inverse relationship between profitability and the volume of provisions. Several researchers have found conclusive evidence to support the theory according to that provisions are made for the management of income (Greenawalt and Sinkey, 1988; Wahlen, 1994; Laeven and Majnoni, 2003; Liu and Ryan, 2006).

Return on assets and capital (the solvency ratio) are the main indicators that provide the image on the bank's ability to recover after capital losses incurred. Indeed, the profitability is the first line of defense of any bank against credit risk, but not only. A

sufficiently profitable bank can earn enough to restore its level of capitalization, either by attracting promising new capital gains dividends or fix earnings. A bank with a low profitability will be less able to recover itself even the smallest shock (Hardy and Schmieder, 2013).

Among the determinants of foreign origin with impact on the profitability of credit institutions we mention the GDP and the inflation rate. The researchers Pasiouras and Kosmidou in 2007 identified the existence of a positive relationship between real GDP and profitability of a credit institution. The inflation rate has a significant impact in a financial year of expenditure and revenue of the credit institution. In the year 1992, the researcher Perry have appreciated that the relationship between inflation and profitability depends on the type of inflation (expected / unexpected).

3. Data and methodology

The purpose of this research is to identify the dependency relationship between the indicator of profitability (return on assets – ROA) and internal and external determinants of banking environment. Internal determinants considered in this study are: the growth rate of the loan portfolio; the growth rate of provisions and the solvency ratio. GDP and inflation are considered to be external determinants of the banking environment.

The research focuses on a credit institution listed on the Bucharest Stock Exchange, as Carpatica Commercial Bank. The data involved in the model are the results obtained by the bank over a horizon of 10 years (2004-2013), taken from the financial statements and annual reports. As regards the external data bank's environment (GDP and the inflation rate), they were purchased by calling the databases available on the website of the National Institute of Statistics. The data were processed using statistical and mathematical software. The dependency relationship between variables was identified using Multilinear Regression and F tests and Student.

In the determining of the dependency relationship between return on assets (ROA) and the internal factors, we start with the following model:

$$\overline{ROA}_i = \alpha_0 + \alpha_1 * RGLP_1 + \alpha_2 * RGP_1 + \alpha_3 * S_r + \varepsilon_i,$$

Where:

$i = \overline{1,10}$;

ROA – Return on assets;

α – Percentage contribution rate fluctuation growth of the loan portfolio (RCPC), growth rates provisions (SPC) and the solvency ratio (Is) to the variation of the return on assets;

S_r – indicator of solvency;

RGLP – Growth rate of the loan portfolio;

RGP – growth rate provisions;

ε – residual.

In the determining of the dependency relationship between return on assets (ROA) and the external factors it was taken into consideration the following model:

$$\widehat{ROA}_i = \alpha_0 + \alpha_1 * GDP_i + \alpha_2 * RI_i + \varepsilon_i,$$

Where:

$i = \overline{1,10}$;

ROA – Return on assets;

α – Percentage contribution rate fluctuation of the Gross Domestic Product, inflation rate to the variation of the return on assets:

GDP – Gross Domestic Product;

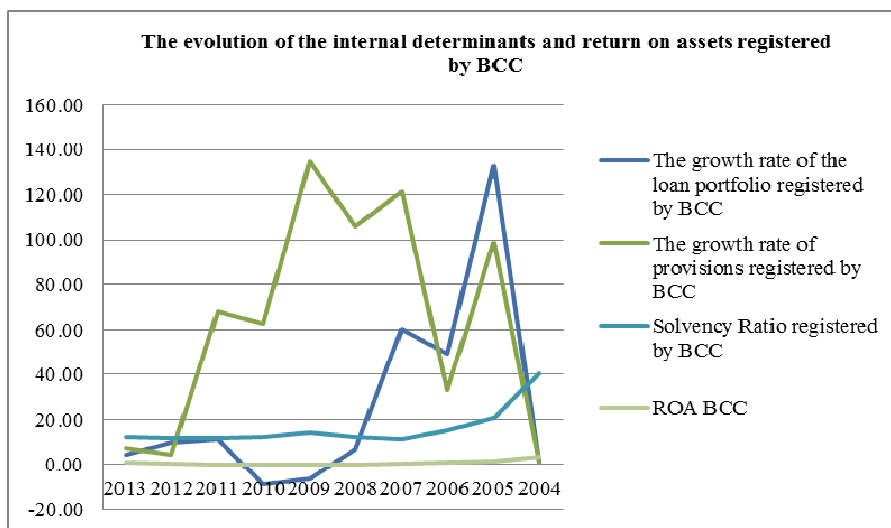
RI – inflation;

ε – residual.

4. Study regarding the impact of the internal determinants on ROA

The evolution of endogenous factors and rates of return on assets registered by Carpatica Commercial Bank (BCC), during 2004-2013 is shown in Figure 1.

Figure 1. The evolution of the internal determinants and return on assets registered by BCC



Source: authors, according to the Bank's financial statements Carpathian during 2004-2013.

In this study the goal was to identify a dependency relationship between return on assets of the credit institution (ROA), an indicator considered explained variable and determinants of domestic and foreign origin, considered explanatory variables.

The result of applying multiline regression model, using statistical and mathematical software Excel, we think it is an acceptable one (Table 1). From the analysis of the regression model ROA – internal determinants (growth rate loan portfolio growth rate provisions and the solvency ratio), the variation of return on assets is explained in the proportion of 95.80% by their variation. The adjusted value of the determination coefficient is 93.70%. Since the coefficient of determination is not significantly different

from the one registered by the adjusted one, the acceptability of the model is demonstrated.

Table 1. Regression Statistics

Regression Statistics					
Multiple R	0,978753602				
R Square	0,957958613				
Adjusted R Square	0,936937919				
Standard Error	0,258253378				
Observations	10				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	9,118281158	3,039427053	45,57216955	0,000159963
Residual	6	0,400168842	0,066694807		
Total	9	9,51845			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0,53991	0,24916	-2,16692	0,07337	-1,14958	0,06976	-1,14958	0,06976
The growth rate of the loan portfolio	0,00550	0,00164	3,34858	0,01545	0,00148	0,00952	0,00148	0,00952
The growth rate of the provisions	-0,00558	0,00184	-3,02929	0,02312	-0,01009	-0,00107	-0,01009	-0,00107
Solvency Ratio	0,09237	0,01025	9,00835	0,00010	0,06728	0,11746	0,06728	0,11746

Source: data processed by the authors based on the financial statements of Carpatica Bank, during 2004-2013.

On an average the observed values are deviating from the theoretical values situated on the regression line with 25.82%. The results of the ANOVA table as well as the connection obtained between the coefficient of determination ($R^2 = 0.958$), standard error ($S\hat{\epsilon} = 0.07$) and the calculated value of the F Test (Snedcor = 45.57) demonstrates that the model is significant in the whole. The probability in which the null hypothesis can be validated in the model (0.02%) is positioned further more below the materiality threshold chosen by 5%, which shows that the null hypothesis cannot be validated into the model.

The resulting regression equation is as follows:

$$ROA_{BCC} = -0.54 + 0.005 * RGLP - 0.005RGP + 0.092S_r.$$

For the materiality chosen, $\alpha = 0.05$, the null hypothesis over the coefficients is rejected for the growth rate of the loan portfolio, the growth rate provisions and for the solvency ratio ($0.05 > 0.015 - RGLP$; $0.023 - RGP$ and $0.0001 S_r$). In case of the intercept the null hypothesis cannot be invalidated due to the calculated value of the T test, which registered values above the chosen materiality.

Basically the regression equation's coefficients can take values between -1.15 and 0.07 – in case of intercept, 0.001 and 0.009 – in case of the growth rate of the loan portfolio -0.01 and -0.001 – in case of the growth rate provision, 0, 07 and 0.12 – in case of the solvency ratio.

The estimated value of the growth rate of the loan portfolio of 0,005 shows that an increase of 1% of the loan portfolio will result in an increase in return on assets acquired by BCC 0.5%.

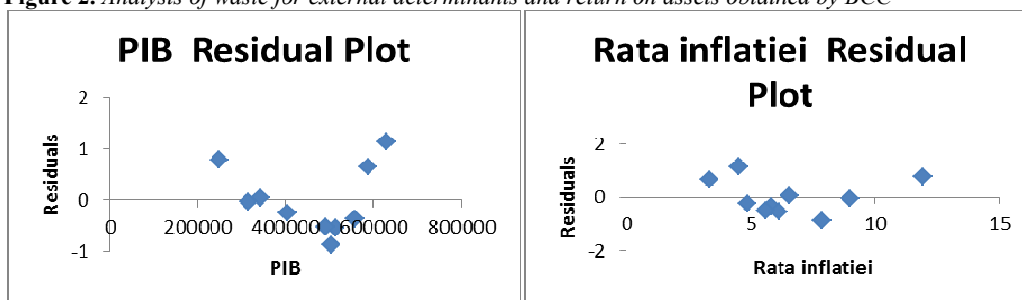
5. Study regarding the impact of external determinants of ROA indicator

The two external determinants analyzed illustrates the actual state of the national economy at time. Starting from the assumption that domestic product illustrates the welfare of the players from the economical environment and the inflation rate through its consequences on the monetary devaluation and the purchasing power affects the costs and revenues within a financial year, it was considered that the two determinants have a significant role in identifying their dependency relationships on return on assets of the credit institution.

The undertaken study identifies a dependency relationship between return on assets and external determinants (Fig. 2) showed that in case of the analyzed credit institution the regression equation obtained is hardly to be validated and to be accepted. The considerations invalidate the model for Carpatica Commercial Bank are:

- In case of the equation's coefficients the null hypothesis cannot be countered if any of them.
- The determinant coefficient value (0.59) illustrates a weak significant regression equation as a whole. Furthermore the coefficient of determination differ significantly from the adjusted one denoting a hardly validated model (0.59/0.47).
- Dispersion of errors is not a constant one.

Figure 2. Analysis of waste for external determinants and return on assets obtained by BCC



Source: Data processed by the authors, according to the financial statements and the Carpathian National Institute of Statistics.

In case of Carpatica Commercial Bank the variation of the return on assets is not justified by varying GDP or inflation rate. This may be due to the financed sectors is not in line with GDP structure and developments in their fields.

6. Conclusions

The study showed that in case of the analyzed credit institution, return on assets is mainly influenced by intern determinants, so the top management have a decisive central role in increasing the profitability of the credit institution.

The external determinants have no decisive influence on profitability of the analyzed commercial bank assets, due to the fact that the write-off processes and full provisioning of the non-performing loans have an important contribution in the minimization of the unwanted effects generated by the business environment and strengthen their positions at the expense of profitability. To obtain a higher return on assets, Carpathian Commercial Bank should have mainly focused on increasing the loan portfolio and a decrease of provisions to improve the solvency ratio.

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