

PROFITABILITY OF THE CENTRAL AND EASTERN EUROPEAN BANKING SYSTEM

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Abstract

Profitability has been and will remain the main concern of all entities including banking institutions. The purpose of this article is to determine the factors that influence the bank return. For this purpose we developed a panel consisting of 25 commercial banks in Central and Eastern Europe that captures the relationship between bank return and various macroeconomic and specific banking indicators. Given the negative impact of financial crisis on the banking sector we aimed to analyze the impact of these disturbances on the level of return. For this purpose we introduced a dummy variable which takes values 1 during the crisis financial. There are a number of studies in financial literature concerning the evolution of profitability, both for developed and emerging countries. The most important to the for our research are Ahmad Salloum and Jamal Hayek (2012), Rama Mohamo Rao and Tekeste Berhanu Lakev (2012), Alper and Anbar (2011), Davidenko (2011) and Kosmidou et al. (2002) . The period analyzed in this study is Q12005: Q42011. In order to analyze the impact of internal and external factors we used a Panel Regression Model. To choose the most appropriate regression model (pooled OLS model, fixed effects and random effects model) we applied two tests Breusch-Pagan Lagrange multiplier test (LM) and Hausman test. In order to highlight the evolution of profitability we use macroeconomic factors such as, domestic product growth rate, inflation rate, interbank interest rate and market capitalization together with specific banking indicators as follows logarithm of total bank assets, the ratio of net loans to total deposits, the ratio of total deposits to total assets and aggregate risk. As we expected specific banking factors have greater impact on bank return than macroeconomic factors.

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1. Introduction

The purpose of any banking institution is to get a high return level with lower resources committed and costs. The level of return in any banking institution is influenced by internal and external factors. To ensure the proper management of banking activities is needed to identify these factors and analyse it.

Specific banking factors or internal factors can be controlled by the management with positive or negative treatments. On the other hand macroeconomic factors or external factors are those on which banks have no control (Rao si Lakew: 2012).

The purpose of this paper is to make a new contribution to the literature by analyzing the factors that influence the return of banks in Central and Eastern Europe, including on the one hand, internal factors: the ratio between total net loans to total assets, the ratio between total net loans to total deposits, the value of total assets, the ratio between salaries and benefits to total assets, the ratio between total deposits to total assets, aggregate risk, and on the other macroeconomic factors: the growth rate of GDP, inflation rate, interest rate on interbank transactions, financial market volatility and a dummy variable for financial crisis.

2. Literature review

There are a number of studies in financial literature concerning the evolution of profitability, both for developed and emerging countries. Moreover, we present only the most relevant studies for our research.

Kosmidou et al. (2002) have realized a study for 32 banks in the United Kingdom, during the period 1995-2002. Indicators that measure the bank's profitability are ROA and NIM. The results indicate that the variable loans/reserves has an insignificant impact on ROA, but positive influences NIM. Macroeconomic variables, such as GDP, inflation, market capitalization, and concentration in banking industry positively influence the evolution of profitability. Alper and Anbar (2011) studied the profitability of banking

sector in Turkey, using ROA and ROE, during the period 2002-2010. In this study the authors used both banking sector variables (total assets, capital adequacy, asset quality, liquidity, total deposits, net interest margin) and the macroeconomic variables (GDP growth, inflation, real interest rate. The size of assets, non-financial income and interest rate have a positive impact on profitability and the loan portfolio has a negative impact.

Another study was made by Davidenko (2011) for the banking sector in Ukraine, which concluded that the lagged values of ROA are significant and indicate a persistence of profits. GDP, inflation and the exchange rate have a positive effect on profits. Andreas Dietrich and David Wanzenried (2010) have analyzed the profitability for 453 commercial banks in Switzerland during the period 1999-2008. To highlight the impact of the financial crisis on profitability, the authors analyzed both precrisis and the crisis periods. The loans quality has an insignificant impact on profitability for the precrisis period and a significant and negative impact for the crisis period.

Also, there are studies conducted for groups of countries. Athanasoglou et al. (2006) studied the factors affecting the profitability of banks in Central and Eastern Europe in the period 1998-2002. The authors concluded that the liquidity risk has a negligible impact and the credit risk has a negative impact on profitability. Moreover, Havrylchyk and Jurzyk (2006) studied the difference between banks' profitability with domestic capital and foreign capital in Central and Eastern Europe. The study was realized using a sample of 265 banks, during the period 1965-2003 and showed that foreign-owned banks have obtained a higher profit than the domestic banks.

Moreover, Ahmad Salloum and Jamal Hayek (2012), Rama Mohamo Rao and Tekeste Berhanu Lakev (2012) have analyzed the evolution of banking sector in Africa. Ahmad Jamal Hayek Salloum (2012) have examined the factors that have influenced the evolution of profitability for 54 commercial banks from the Lebanese banking sector. The results indicate that the profitability is positive influenced by the capitalization, market size and negative influenced by the credit risk. Also, GDP has a positive impact and the inflation has an insignificant impact on profitability. Rama Mohamo Rao and Tekeste Berhanu Lakev (2012) have analyzed the banking sector in Ethiopia during the period 1999-2008 and have concluded that capital adequacy, diversification and the bank size have a positive and significant impact on profitability.

3. Data analysis

In order to identify the determinants of banks' profitability level we have used a panel that includes 25 commercial banks from Central and Eastern Europe analyzed for a period of 28 consecutive quarters, respectively Q1 2005 - Q4 2011.

Commercial banks used in our analysis are from: Bulgaria (3), Czech Republic (1), Lithuania (2), Poland (14), Romania (1), Slovakia (1), Slovenia (2) and Hungary (1).

In order to identify the factors that influence the banks' profitability level we have use a Panel Regression model, within three dependent variable: return on equity, return on assets and net interest margin. The profitability indicators are determined from data supplied by Worldscope database.

Return on assets (ROA) measures the efficiency and economic profitability of assets in terms of capital raised and is determined as the ratio between net profit and total assets of the bank. Return on equity (ROE) indicate the capacity of the management of bank to utilises the money made available to shareholders and is determined as a ratio between net profit and equity. Net interest margin (NIM) is determineted as a ratio between net interest income and total assets. This variable takes into account the success of investment decisions.

The explanatory variables are represented by macroeconomic indicators and banking sector specific indices. These were determined using quarterly data extracted from the Worldscope, IMF and Eurostat databases.

From the macroeconomic indicators set we want to test the significance of the following variables in explaining the return level:

- *GDP* – gross domestic product growth rate (gross domestic product growth rate (unit of measure: gdp expressed as volume, 2005=100, estimated effect: +);
- *INF* - inflation rate (unit of measure: Consumer Price Index, 2005=100, estimated effect: +);
- *IRB*- interbank interest rate (unit of measure:basis points/year, estimated effect: +);
- *MC*- logarithm of market capitalization (estimated effect: +);
- *VOL* – volatility (estimated effect: +);
- *FIC* - dummy variable for financial crises (1 for 2007, 2008 și 2009 and 0 for remainder period, estimated effect: -);

From the specific banking indicators set we want to test the significance of the following variables in explaining the return level:

- *TOA* – the logarithm of total bank assets (estimated effect: +/-);
- *LTA* - the ratio of net loans to total assets (estimated effect: +);
- *LDT* - the ratio of net loans to total deposits (estimated effect: +);
- *SBA* - the ratio of salaries and benefits paid by the bank to total assets (estimated effect: -);
- *DAT* - the ratio of total deposits to total assets (estimated effect: -);
- *AR* - Aggregate risk measure as a ratio of total debt to total liabilities(estimated effect: -).

2. Methodology

For identifying the determinants of profitability level of banks we have used a panel approach that includes 25 commercial banks from Central and Eastern Europe analyzed for a period of 28 consecutive quarters, during Q1 2005 - Q4 2011.

The first step in methodology was to check the stationarity of the variables in the Panel Regression Model with Fisher Test. Next we apply the Lagrangian-Multiplier test for serial correlation. Serial correlation causes the standard errors of the coefficients to be smaller than they actually are and higher R-squared. The null hypothesis is no serial correlation. Above we fail to reject the null and conclude the data does not have first-order.

Also we have applied Wald Test to detect the presence of heteroskedasticity. The null hypothesis is homoskedasticity or constant variance. Above we reject the null and conclude that heteroskedasticity is present in our data. In order to control heteroskedasticity we use “robust” option proposed by Oscar Torres-Reyna (Oscar Torres-Reyna: 2011).

For each profitability rate, we have estimated two regressions. The first regression captures the relationship between return (dependent variable) and macroeconomic indicators and the second regression analyzes the influence of bank specific indicators on profitability. For each regression we have applied three panels models: pooled OLS, fixed effects model (FE) and random effects model (RE).

The relationship between the macroeconomic variables and the return, in Pooled OLS model is the following:

$$P_{it} = \alpha + \beta_1 * dgdip_{it} + \beta_2 * dinf_{it} + \beta_3 * dirb_{it} + \beta_4 * dlnmc_{it} + \beta_5 * dvol_{it} + \beta_6 * fic_{it} + \varepsilon_{it}$$

The relationship between the specific banking variables and the return, in Pooled OLS model is the following:

$$P_{it} = \alpha + \beta_1 * dtoa_{it} + \beta_2 * dlta_{it} + \beta_3 * dldt_{it} + \beta_4 * dsab_{it} + \beta_5 * dar_{it} + \beta_6 * ddat_{it} + \varepsilon_{it}$$

The relationship between the macroeconomic variables and the return, in fixed effects model is the following:

$$P_{it} = (\alpha + \delta_{it}) + \beta_1 * dgdip_{it} + \beta_2 * dinf_{it} + \beta_3 * dirb_{it} + \beta_4 * dlnmc_{it} + \beta_5 * dvol_{it} + \beta_6 * fic_{it} + \varepsilon_{it}$$

The relationship between the specific banking variables and the return, in fixed effects model is the following:

$$P_{it} = (\alpha + \delta_{it}) + \beta_1 * dtoa_{it} + \beta_2 * dlta_{it} + \beta_3 * dldt_{it} + \beta_4 * dsab_{it} + \beta_5 * dar_{it} + \beta_6 * ddat_{it} + \varepsilon_{it}$$

The relationship between the macroeconomic variables and the return, in random effects model is the following:

$$P_{it} = \alpha + \beta_1 * dgdip_{it} + \beta_2 * dinf_{it} + \beta_3 * dirb_{it} + \beta_4 * dlnmc_{it} + \beta_5 * dvol_{it} + \beta_6 * fic_{it} + (\delta_{it} + \varepsilon_{it})$$

The relationship between the specific banking variables and the return, in random effects model is the following:

$$P_{it} = \alpha + \beta_1 * dtoa_{it} + \beta_2 * dlta_{it} + \beta_3 * dldt_{it} + \beta_4 * dsab_{it} + \beta_5 * dar_{it} + \beta_6 * ddat_{it} + (\delta_{it} + \varepsilon_{it})$$

P_{it} is one of the three return rates calculated for bank i at the moment t , $dgdip_{it}$, inf_{it} , irb_{it} , $lnmc_{it}$, vol_{it} , fic_{it} , toa_{it} , lta_{it} , ldt_{it} , sab_{it} , ar_{it} , dat_{it} , are the independent variables vectors for bank i at moment t , α is a constant, β is the coefficient vector of independent variables, δ_{it} represents the fixed or random effect for bank i and ε_{it} is the error.

5. Results

In order to identify the most suitable panel model we have applied Breusch-Pagan Lagrange multiplier test (LM) and Hausman test.

Breusch-Pagan LM Test for Random Effects examines if individual specific variance components are zero. This test compare Pooled OLS model with random effects model.

If the null hypothesis is rejected therefore, we can conclude that the random effect model is able to deal with heterogeneity better than does the pooled OLS. Table 1 indicates the results obtained from the Breusch-Pagan test.

Table 1: Breusch-Pagan Lagrange multiplier test results

	Dependent variable	Prob > chi2	Suitable model
Specific banking indicators	ROE	0.69 54	Pooled OLS model
	ROA	0.26 72	Pooled OLS model
	NIM	0.01 01	Random effects model
Macroeconomic indicators	ROE	0.15 44	Pooled OLS model
	ROA	0.01 08	Random effects model
	NIM	0.01 58	Random effects model

Source: authors' calculations

Hausman Test examines if individual effects are uncorrelated with any regressor in the model. This test compare fixed effect model with random effect model. If the null hypothesis is rejected therefore, we can conclude that the fixed effect model is better than the random effect model. After applying Hausman test we obtained in all cases probabilities greater than 5% therefore, is indicate to use a panel with random effects.

Based on the results of the two tests, in table 2 we presented in an optimal way macroeconomic and specific banking indicators which influence return on equity, return on assets and net interest margin.

From the table above it could be seen all the factors that influence return on equity. Studying the regression results we could observe an inverse relationship between the return on equity and market capitalization indicators, according to the initial hypothesis settings. Normally, developed capital markets attract more investors in the detriment of banking sector. Inverse effect is because banking sector from Central and Eastern Europe is more preferred in the detriment of capital market.

Specific banking return that influence profitability are logarithm of total bank assets, the ratio of net loans to total deposits and the ratio of total deposits to total assets.

Table 2: Determinants of ROE

Macroeconomic indicators	Pooled OLS model			Specific banking indicators	Pooled OLS model		
	Coefficient	Robust SE	P > /t/		Coefficient	Robust SE	P > /t/
DGDP	-.01918	.10992	0.86	TOA	-.3408	.4880	0.03
INF	-.20762	.21098	0.33	LTA	.8045	.4510	0.46
IRB	.24722	.31538	0.43	LDT	.28527	.12473	0.02
LNMC	.72882	.9653	0.00	SAB	-.2818	.4915	0.72
VOL	.37325	.5490	0.79	RA	.07799	.26105	0.77
FIC	-.05753	.30310	0.85	DAT	.15049	.07027	0.03
CONST.	-.00723	.18614	0.97	CONST	-.12990	.22510	0.57
F/Wald chi2	2.48			F/Wald chi2	1.63		
Prob > F	0.0237			Prob > F	0.1401		

Source: authors' calculations

The banking institution size negatively influence profitability, large banks practice lower interest than small banks so it obtain lower profits, also the greater the size is the greater the bureaucratic costs are, so the profits decrease. We could see that the ratio between net loans to total assets influence positively the bank return level as in the originally hypothesis. An increase of loans much more than the deposits determine an increase of the interests received which positively influence the profitability.

The ratio between total deposits and total assets has a positive impact on profitability, contrary to the hypothesis originally stated. If the level of deposits increase, a bank should pay much more interests to their depositors so the profits should decrease. The inverse effects could indicate that the management fructify the deposits above the interests paid to depositors.

From the table above it could be seen all the factors that influence return on assets. A high value of this ratio indicate a high banking return. Macroeconomic indicators that influence return on assets are gross domestic product growth rate, inflation rate and logarithm of market capitalization. Likewise equity return we got an inverse effects of market capitalization and return of assets.

Table 3: Determinants of ROA

Macroeconomic indicators	Pooled OLS model			Specific banking indicators	Random effects model		
	Coefficient	Robust SE	> /t/		Coefficient	Robust SE	> /t/
DGDP	-.03503	.02105	.09	TOA	-.28959	.12634	.02
INF	-.05392	.02563	.04	LTA	.178667	.21830	.41
IRB	.00800	.04715	.87	LDT	.018445	.01286	.15
LNMC	.69219	.13229	.00	SAB	-1.0049	.9216	.95
VOL	.9656	.936	.08	RA	-.13118	.02243	.00
FIC	.02282	.06960	.74	DAT	.012768	.00669	.08
CONST.	.00831	.02979	.70	CONST	-.00298	.02701	.91
F/Wald chi2	7.49			F/Wald chi2	991.25		
Prob > F	0.0000			Prob > F	0.0000		

Source: authors' calculations

Also, gross domestic product and inflation rate negatively influence profitability, contrary to the hypothesis originally stated. However this macroeconomic indicators can influence profitability after a period, so in this case, it should be proper to introduce lags or previous periods. Specific banking variables that influence return on assets are logarithm of total bank assets, aggregate risk and the ratio of total deposits to total assets. Likewise equity return, we obtained that banking institution size negatively influence the profitability of commercial banks, and the ratio between total deposits and total assets positively influence the return on assets, contrary to the hypothesis originally stated. Negative impact of aggregate risk can be explained by the fact that an increase in debt determine an increase of interests paid and costs so the profits will decrease.

From the table above it could be seen all the factors that influence net interest margin. A high value of this ratio indicate a high banking return. Macroeconomic indicators that influence net interest margin are gross domestic product growth rate, inflation rate and interbank interest rate.

Table 4: Determinants of NIM

Macroeconomic indicators	Random effects model			Specific banking indicators	Random effects model		
	Coefficient	Robust SE	> /t/		Coefficient	Robust SE	> /t/
DGDP	-.00971	.00466	.04	TOA	-.077961	.11704	.51
DINF	.02833	.01610	.08	LTA	.164661	.18827	.38
DIRB	.05324	.01682	.00	DLDT	-.00501	.01502	.74
DLNMC	.12338	.09115	.18	SAB	-0.938	.43051	.19
DVOL	.22061	.14310	.46	RA	-.07516	.03409	.03
FIC	.00004	.02185	.99	DAT	-.00613	.00896	.43
CONST.	-.01147	.01081	.29	CONST	-.00153	.00633	.81
F/Wald chi2	74.30			F/Wald chi2	79.23		
Prob > F	0.0000			Pr ob > F	0.0000		

Source: authors' calculations

Likewise equity return gross domestic product will influence bank return on following periods. We could see that the inflation rate influence positively the bank return level as in the originally hypothesis, which means that banks anticipated the growth of this indicator and had the opportunity to properly adjust their interest rates. Obvious an increase of interbank interest rate will determine the increase of profits. The specific banking return that influence net interest margin is aggregate risk. This indicator negatively influence the return as in the originally hypothesis.

1. Conclusions

The purpose of this paper is to determine the factors that influence the profitability level in the Central and Eastern European banking system. Using a panel of 25 commercial banks from this zone, we have found several factors that determine the return on assets, return on equity and net interest margin. Macroeconomic factors that influence the profitability are the domestic product growth rate, inflation rate, interbank interest rate and market capitalization. Specific banking indicators that influence profitability are

logarithm of total bank assets, the ratio of net loans to total deposits, the ratio of total deposits to total assets and aggregate risk. In all the situation, the dummy variable for financial crisis is insignificant. Considering these factors and their impact on banks activity, the managers should properly use this information in order to built their portfolios and achieve desired profitability.

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