

# MEASURING BANKING EFFICIENCY BY USING ROAA AND ROAE: EVIDENCE FROM THE EUROPEAN UNION

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**Abstract:** *In this paper, we want to analyse how efficiency evolves in the European Union 28 over the period 2003 – 2012. This period is selected to highlight the evolution before and after the global financial crisis. We used a sample of over 1000 banks with data available for at least ten years and at least three banks for each country. For measuring bank efficiency, we used two of the most popular financial ratios, Return on Average Assets (ROAA) and Return on Average Equity (ROAE). Our results showed that European Union integration can be improved and further reforms could be implemented and bank are affected differently by the international financial crisis.*

**Keywords:** European Union; ROAA; ROAE; Bank Efficiency.

**JEL Classification:** F15; F36; G21.

## INTRODUCTION

European financial market integration has been a long time objective of the European Union. This process has known significant movers in the early '90 and later by the introduction of the single currency. The objective of financial integration is a deeper intermediation at lower costs. A better financial intermediation translates into higher economic growth. Along with the deepening of the European integration process appeared the need of measuring the effects of single market on banking efficiency. However, it is difficult to measure the benefits of integration and researchers have not reached a consensus on the best method.

In the literature four methods are mainly known for measuring performance, so efficiency. The methods for measuring the efficiency are Least Square Method (LSM), Total Factor Productivity (TFP), Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA). The first two methods are commonly applied to aggregated time series and provide measurements of technical progress that measure the variation in total factor productivity. Both methods assume that the economy is in full employment point of factor, so it is an efficient one. The third and the fourth method do not start from the assumption of efficiency and therefore can be observed what causes inefficiency. TFP can be used to compare relative productivity of two economies at some point in time. Data Envelopment Analysis and

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the Stochastic Frontier Analysis can be used to measure both changes in the efficiency and the relative efficiency, if it is a panel data available.

Another variant to measure efficiency is based on the analysis of financial ratios. From the methodological standpoint, the rate is the ratio of two variables. The main objective in the studying rates based analysis consist of three dimensions of the financial institution: profitability, liquidity and financial structure. There are many possibilities to calculate rates and grouping them homogeneous and rigorous is difficult, so we present the most significant rates: Return on Average Assets (ROAA) and Return on Average Equity (ROAE).

## 1. DEFINITIONS

*Return on Average Assets* is the ratio of annual net income to average total assets of a bank during a financial year (financial year does not always correspond with the calendar year). It measures the efficiency of a bank in using its assets to generate net income ([http://www.readyratios.com/reference/profitability/return\\_on\\_average\\_assets\\_roaa.html](http://www.readyratios.com/reference/profitability/return_on_average_assets_roaa.html)).

The formula for Return on Average Assets is:

$$ROAA = \frac{\text{Annual Net Income}}{\text{Average Total Assets}}$$

The annual net income is the portion of income remaining after tax. It can be found on the bank income statement. Average total assets are calculated by dividing the sum of total assets at the beginning and at the end of the financial year by two. Total assets at the beginning and at the end of the year can be obtained from year ending balance sheets of two consecutive financial years.

Return on Average Assets represents the number of cents earned on each dollar of assets. The higher the value the more profitable is the bank. This ratio should be used only to compare entities in the same sphere of activity. Some areas need more assets to operate and therefore the rate will be lower compared to other areas where demand for assets is lower and the ratio is higher.

*Return on Average Equity* is an adjusted version of the Return on Equity (ROE) that measures the profitability of a company. It can provide a more accurate picture of the bank`s profitability, particularity

in situations where the value of shareholder's` equity has changed significantly during the financial year. In circumstances where the shareholders` equity do not change over the year or change in a small proportion, the Return on Equity and the Return on Average Equity should be similar, or identical ([http://www.readyratios.com/reference/profitability/return\\_on\\_average\\_equity\\_roae.html](http://www.readyratios.com/reference/profitability/return_on_average_equity_roae.html)).

The formula for the Return on Average Equity is:

$$ROAE = \frac{Net\ Income}{Average\ Stockholders'\ Equity}$$

ROAA and ROAE are used in several studies of bank efficiency by many researchers. To compare bank profitability in Fiji with the banks in New Zealand, Australia and USA (Kishore, 2012), to assess the results of China banking reform (Heffernan and Fu, 2010), to examine the performance of 37 Bangladeshi commercial bank between 1997 and 2004 (Sufian and Habibullah, 2009). More studies are conducted on the European Union: to investigate the relationship between bank risk and product diversification in the European banking industry (Lepetit et al., 2008), to examine the determinants of performance of Greek banks over the period 1990-2002 (Kosmidou, 2008), to examines how bank`s specific characteristics and the overall banking environment affect the profitability of banks in the 15 EU countries over the period 1995-2001 (Pasiouras and Kosmidou, 2007).

## 2. METHODOLOGY

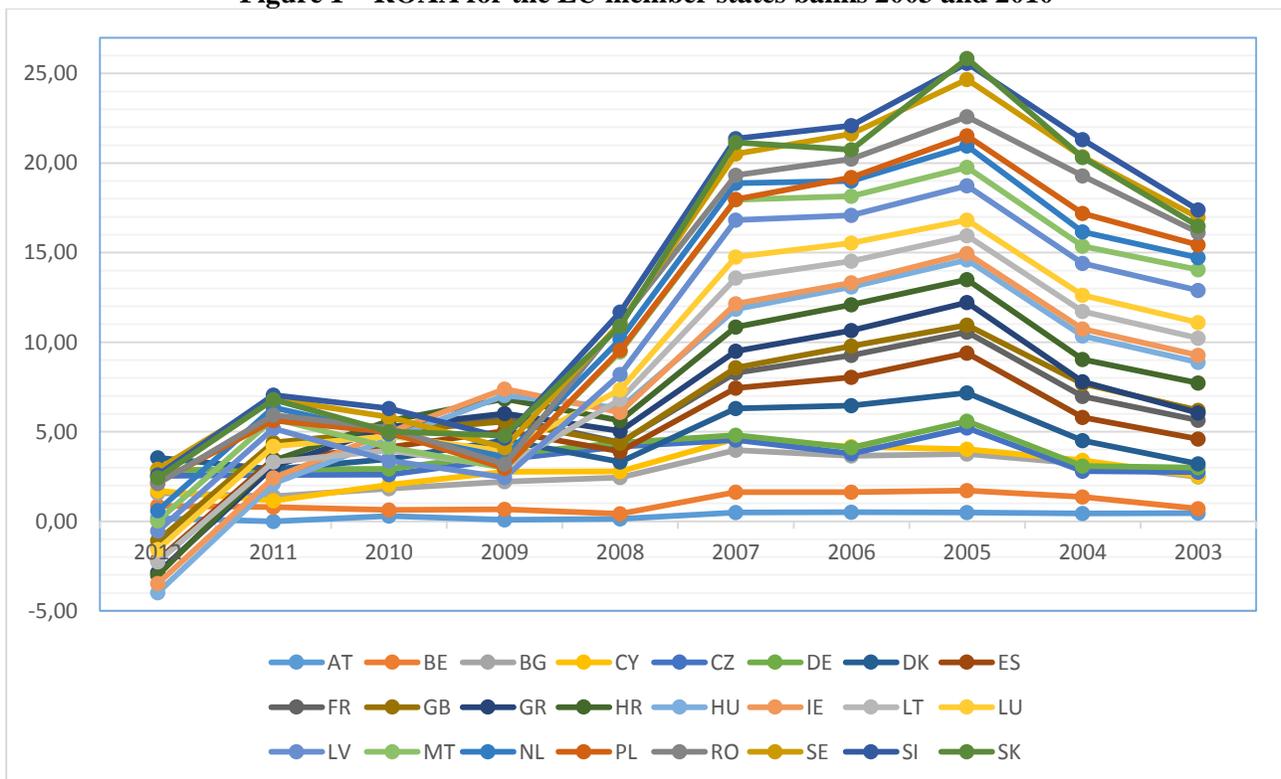
All information in this paper is taken from the Bankscope database. In the first step, we selected all active banks from the European Union 28. We removed banks that had not information for at least 10 years, 2003 – 2010. More, we eliminated countries that had not information for at least three banks (Estonia, Finland, Italy, and Portugal). After a quick analysis, we removed banks with ROAA greater than 10 or lower than -10 to remove outliers. In the final stage, we calculated the arithmetic mean for each country and for the entire period.

### 3. RETURN ON AVERAGE EQUITY

Until the financial international crisis was triggered, banks from most countries of the European Union had a similar evolution from Return on Average Equity standpoint. Since 2008, the effects of crisis began to be felt by all member states.

In 2009, some member countries (Lithuania, Slovakia, Sweden, Romania, Netherlands, Poland, Malta, Latvia, and Luxembourg) have experienced a deepening of the crisis, compared to other states that maintained ROAA at the same level or eased. In 2012, almost all countries experienced a deterioration of ROAA, except Denmark, Germany, Czech Republic, Bulgaria, Cyprus, Belgium and Austria.

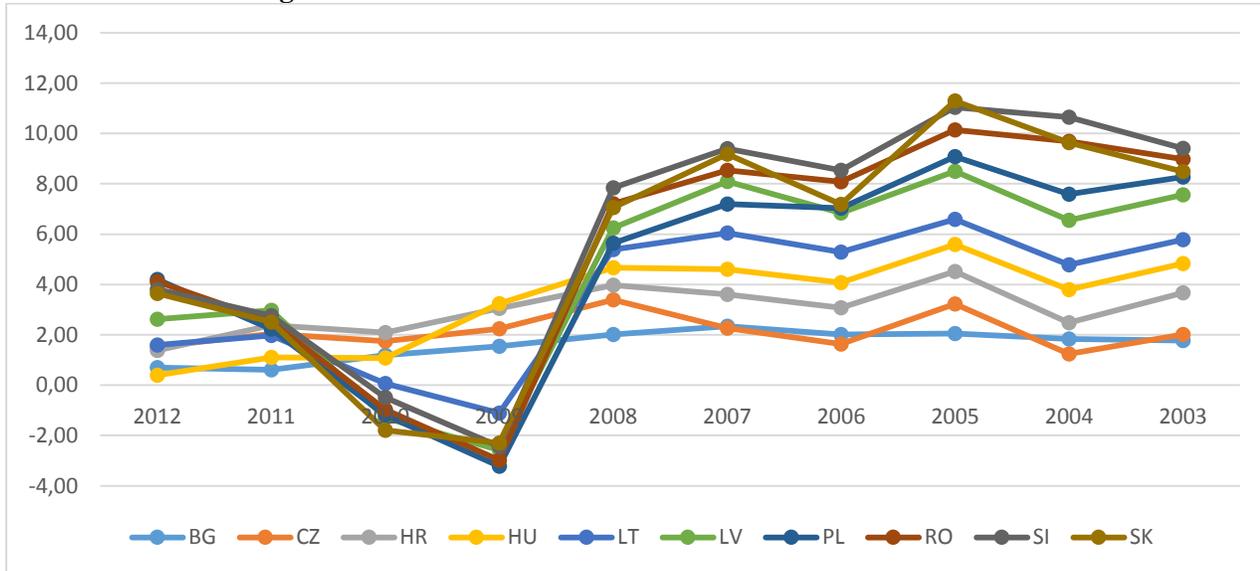
Figure 1 – ROAA for the EU member states banks 2003 and 2010



Source: Author's calculations

Second, we will look on the Central and Eastern Europe member states. Countries can be grouped into two subgroups: Bulgaria, Czech Republic, Croatia and Hungary, that experienced low variation over the period analysed and Lithuania, Latvia, Poland, Romania, Slovenia and Slovakia that experienced a steep drop once the crisis began and then a period of convergence to the level reached by other member states.

**Figure 2 - ROAA for the CEE member states banks 2003 and 2010**



Source: Author's calculations

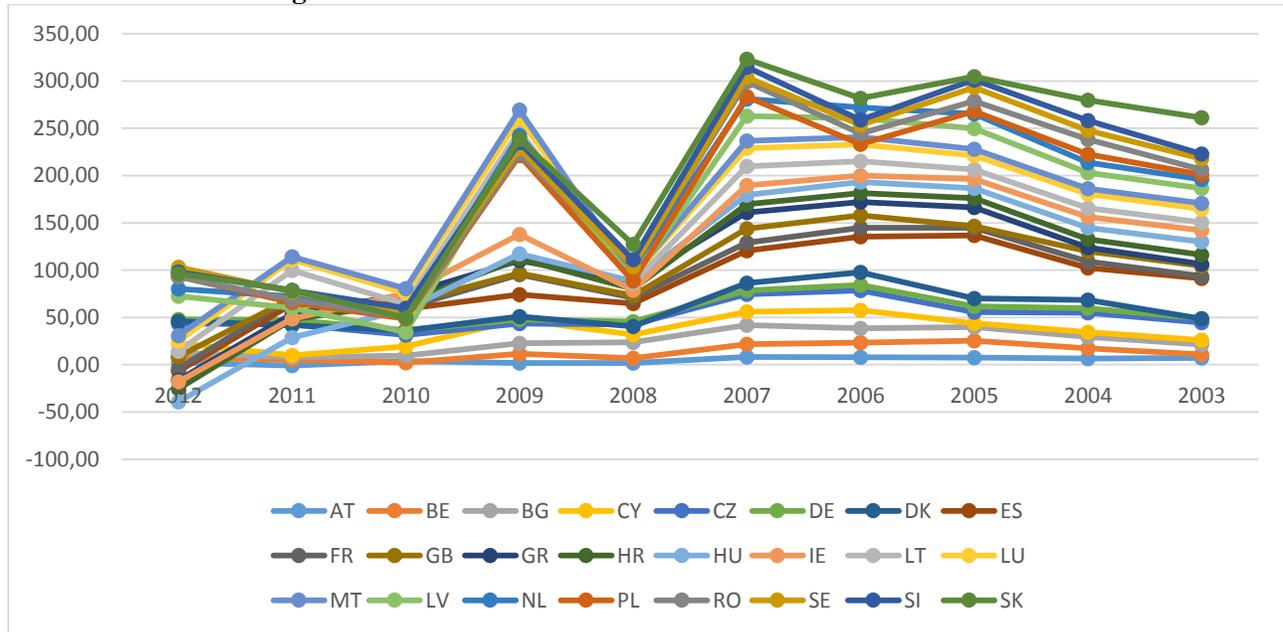
Surprisingly the group of countries that has been most affected by the crisis in 2009 shows higher levels of ROAA in 2012 compared with states that had a lower reduction of ROAA in 2009. On long-term a lower and stable rate is preferred than one that shows significant variations in high stress conditions. High ROAA in period of economic growth involves high risks and variations in time of crisis.

#### 4. RETURN ON AVERAGE EQUITY

The evolution of Return on Average Equity is similar with the Return on Average Assets. All countries experienced a reduction in 2008, but year 2009 highlights two groups. First, one with a stronger recovery (Lithuania, Luxembourg, Malta, Latvia, Poland, Netherlands, Romania, Sweden, Slovenia and

Slovakia) and second with a mild recovery (Ireland, Hungary, Croatia, Greece, United Kingdom, France, Spain, Denmark, Germany, Czech Republic, Cyprus, Bulgaria, Belgium, and Austria).

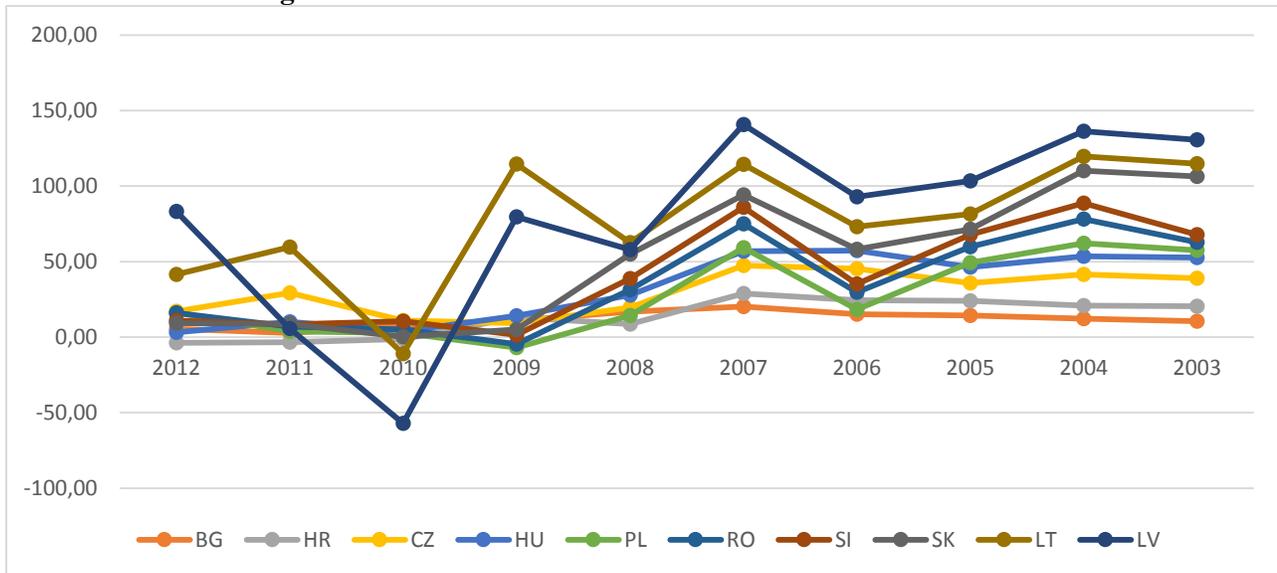
**Figure 3 - ROAE for the EU member states banks 2003 and 2010**



Source: Author's calculations

On the long-term a stable and lower ROAE is recommended, because it allows reducing financial crisis effects. As can be seen in 2012, Malta, Luxembourg, Lithuania, United Kingdom, France, Spain, Greece, Ireland, Croatia and Hungary have experienced a reduction in ROAE.

**Figure 4 - ROAE for the CEE member states banks 2003 and 2010**



Source: Author's calculations

ROAE shows a different pattern in Central and Eastern Europe member states. Surprisingly, many countries (Latvia, Lithuania, Slovakia, Slovenia, Romania and Poland) show a reduction of ROAE in 2006, before the financial crisis began. This group shows an improvement of ROAE in 2007, but then there is a decrease as in the rest of the group. Since 2009, states have maintained similar levels of ROAE, with the exception of Latvia and Lithuania, both Baltic States, which show high variation between 2009 and 2012.

## CONCLUSIONS

The European Union has made many steps in the right direction towards deeper financial integration. Many economists consider the financial crisis of 2007-2008 as the worst crisis since the Great Depression of 1929-1933. It resulted in bankruptcies of banks, bailouts of banks by national governments and a steep drop in the stock market. It further transformed into a sovereign debt crisis that has gripped many countries in the European Union. Italy, Greece, Spain, Ireland and later Cyprus needed financial assistance to avoid default. Our results suggest that too little was done after the crisis, and more changes are needed to a true banking and fiscal union that could minimize the effects of a future financial crises. We can also observe differences between member states and we can speak about a two tier Europe.

This suggests the need to implement reforms towards convergence of ROAA and ROAE. In future research, we will extend the efficiency study on other aspects that we have not mentioned in this paper to get better results and a better image of European integration and banking efficiency.

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