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GREEK BANKS PROFITABILITY DEVELOPMENTS IN ROMANIA AND THE BANKING STRATEGY OF THE GREEK BANKING GROUPS IN THE EASTERN EUROPE: A FORECASTING APPROACH

Abstract: The Greek banks have to limit their operations in the Southern and Eastern Europe, because the European Commission requested to stop transfer capital to their subsidiaries in this region. This means that the Greek banks have to sell some of their subsidiaries in the region, especially the non-profitable ones. The aim of this paper is to forecast the profitability ratios of the Greek capital owned-banks activating in Romania for 2013-2014 to see what would be their best option regarding these subsidiaries in Romania against the other subsidiaries of the Greek banking groups in the region. In the strategy of a multi-national bank, two categories of macroeconomic indicators forecasts are important: the ones in the countries where it has subsidiaries, and it's own forecasts, in order to monitor the future evolution of their business and financial stability.

In this paper, the authors focus on forecasting the performance indicators of four Greek banks and their Romanian branches, based on artificial neural networks (ANN). The study uses various implementations of the neural network algorithm offered by GMDH Shell software and the balance sheet of the four Greek banks and their Romanian branches, during 2006-2012, in order to obtain a short term forecasting of performance indicators.

Key words: banking profitability ratios, Greek banks, Romania, Eastern Europe, neural network forecast model.

JEL Classification: C53, G14, G15, G21, G34.

1. Introduction

The internationalization of the banking system was rapidly highlighted at the macroeconomic level, as banks were included in the global movement to liberalize the financial activities this action has led to the massive growth of the

competitive pressure. The mergers seek to improve the revenue derived from the services performed later on, but the increase is offset by the personnel costs which increased, while the acquisitions are noted for the restructuring of the bank's loan portfolio acquired and the application of the improved lending policies that leads to higher profits.

The global financial crisis triggered in 2008-2009, which affected the base of the international financial system and which has affected almost all major banking groups, requires a reassessment of the elements of the financial stability of the multinational banking system. As a strong component, banks supported their subsidiaries during local crises.

It is noted that the subsidiaries of the multinational banks had to reduce the credit growth more aggressively than domestic banks, about twice as much during the recent crisis period. On the other hand, domestic banks that relied more on local deposits to fund the credit growth were better positioned so that they could to continue to lend. The subsidiaries of the multinational banking groups that were based on a greater extent on wholesale funding, had to slow down the most, the credit growth. The parent banks could not access foreign markets (wholesale), as they were no longer in a position to allocate liquidity to the branch network through the domestic capital market (De Haas and Van Lelyveld, 2011).

The average liquidity and solvency of the domestic banks were slightly higher than that of the multinational bank subsidiaries and their profitability decreased. The latter can rely on the support from the banking group to which they belong and, therefore, they tend to have a slightly lower liquidity given the various minimum levels required by local regulators. The funding received from the parent bank could not fully alleviate the financing constraints on local or external markets (De Haas and Van Lelyveld, 2011).

This paper aims to analyze the evolution of the Greek banks operating in Romania in terms of their efficiency and profitability, values expressed through specific indicators of bank management during the crisis and provides a forecast of the profitability in the next period, in order to see how these banks will perform as a result of changes imposed and as a result of the constraints that are imposed because of the strong crisis that they faced. We believe that the issue is particularly important because the Greek banks were especially vulnerable and subject to many pressures during the crisis. The analysis of their efficiency and profitability in the coming period in Romania will be compared to the prognosis for the mother bank in Greece, so that we can formulate some viable conclusions related to the banking strategies that the Greek banking groups should implement from 2013 when the EU imposed the restriction on the support offered to the subsidiaries in Central and Eastern Europe and the restriction of their presence in these markets and mergers to strengthen their position in these markets in order to be able to obtain profit again.

Section 2 presents the main findings in the economic literature on this issue, section 3 presents the methodology used, section 4 presents the results of the forecasts for the bank's profitability and efficiency indicators and analyzes these likely developments, and section 5 draws the conclusions on the paper and suggests some directions for the Greek-owned banks in Romania and in the Central and Eastern European region.

2. Literature review

In the aftermath of the financial crisis that emerged in 2007 and of the sovereign debt crisis that erupted in 2010, a valid concern of policymakers in Europe should refer to the impact of these crises on the level of capital markets (Horobet et al., 2014). The European rules on free movement of capital, the objective to create a level-playing field for different banking sectors, and the belief in the efficiency of supposed self-equilibrating financial markets, determined the inflow of relatively cheap financing turned into a huge credit boom in the countries affected by the current financial crisis (Greece, Spain, Italy, Ireland and Portugal) (Constâncio, 2013).

The entry of Greece into the euro area in 2001 seemed to mark a transformation in the country's economic performance. Between 2001 and 2008, real growth was spectacular. First, in the case of Greece it was the build-up of public-sector imbalances. In the case of Greece, it was the decline in public-sector saving that was the driver for the widening of the current-account deficit after Greece joined the euro area. Second, in the case of Greece, the sovereign debt crisis spilled over to the banking system, creating a second storm front. In contrast, in most of the other euro-area countries, the crises originated in the banking sector and spilled over to the sovereign sector. Prior to the outbreak of the sovereign crisis, the Greek banking sector had sound fundamentals - with high capital-adequacy ratios, low loan-to-deposit ratios, and essentially no toxic assets of the kind that set-off the 2007 global financial crisis. The size of the banking sector (relative to GDP) in Greece at the outset of the crisis was considerably smaller than in some other euro-area countries that experienced crises. The deteriorating situation led to downgrades of Greek banks, forcing the banks out of the global financial markets, and further affecting their capacity to provide liquidity to the economy (Provopoulos, 2013).

Greek banks are extremely constrained in their lending because of the losses that they have realized or are expecting to realize in their asset portfolios. The losses stem from banks' holdings of Greek government bonds, as well as from banks' non-performing loans to the private sector. Some politicians and economists argued that an essential solution is greater state control of banks, in the form of state ownership of some key banks. But La Porta et al. (2002) find that greater state ownership of banks predicts low growth of GDP and of productivity across a cross section of countries.

The control of banks by the state was declining in Greece. Yet, the state's influence is still present, and its costs are visible (banks' holdings of Greek government bonds). First four large Greek banks that hold Greek government bonds are Piraeus Banks, National Bank of Greece, EFG Eurobank and Alpha Bank.

In order to mitigate the contagion effects, the Greek government extended state-support facilities to the banking sector. That was capital injections and liquidity provisions (state guarantees and asset swaps). In 2010, the Greek government has further increased the amount of state guarantees to the banking sector. Under Greece's scheme, support to the banking sector has been effectively unconditional, without an explicit mechanism for sharing the benefits commensurate to such support with the real economy. In the absence of such conditionality, the banking sector had been facing the risk of diverting valuable financial resources to non-productive investments.

As a result, in 2009 the amount of government securities held on major Greek banks' balances sheets increased year-on-year, in contrast with the loans increase which was much smaller. Holding ECB-eligible securities, such as government bonds, would meet two objectives at the same time: first, liquidity; second, to borrow at low rates from the ECB and lend at higher rates to the government. So, they could preserve their net interest revenue. Greece was in an inefficient, self-reinforcing cycle of tightening credit conditions and economy-wide recession.

Policy initiatives to improve credit conditions and increase the lending capacity of the Greek banking sector should have complemented government policies to restore its fiscal position and efforts by banks to raise new equity in capital markets (Pagratis S., 2010): extending support facilities to the banking system with explicit conditionality on new lending to key sectors of the economy; designing and implementing mechanisms for efficient sharing of financial risks between the government and banks; sponsoring the creation of a market mechanism to enhance the credit quality and ratings of bank-issued paper, such as asset backed securities (Economic and Financial Policies Programs with EU, ECB and IMF).

The crisis and the deep recession of the Greek economy have made the Greek institutions extremely vulnerable to any negative assessment of the credit rating of the Greek government bonds (the Greek banks had a high percentage of Greek government bonds in their portfolios and a high share of non-performing loans). So, there has been a drastic decrease in their profitability and their efficiency ratios (influencing in certain cases their capital base as well) and made the Greek banks incapable to draw liquidity from the financial markets. This was attributed to the adverse developments in the Greek economy, as well as the skepticism of the international investment markets regarding the future of Greece within the Euro-zone (Georgikopoulos, 2011).

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The Greek banking system has shown significant resilience in the crisis frame, both during the international financial crisis and the Greek fiscal crisis. Nevertheless, banks should not forget their most fundamental role in the economy, which is to provide liquidity to enterprises and households. Therefore, they should carefully examine the existing plans for efficient mergers and acquisitions in the banking system. Otherwise, they will be forced to utilize either the Financial Stability Fund of the IMF, or to divest themselves of some of their assets at substantially lower prices compared to the investments they have made (Georgikopoulos, 2011).

Calomiris et al. (2004) point out that efficient liquidation requires an efficient justice system and a strong regulator that can withstand political pressures. For example, in Mexico and Indonesia, the liquidation of assets was slow and inefficient. Given the institutional weaknesses in Greece, this solution is likely to be problematic especially if used at a large scale. Still, this solution worked in the Sweden case in the 90's.

The most important advantage of the foreign property is the lower sensitivity of the foreign banks to the conditions from the host-country and the much better access on the international markets. At the same time, the activity of the foreign banks can be influenced negatively by the weak results of by the modification of the strategy of the parent-banks. The profitability of the domestic banking sector in the Eastern Europe region is declining, but it continues to exceed the levels of parent banks' countries (Radulescu and Tanascovici, 2012).

In some countries, like Romania, the lending in foreign currency was encouraged by restrictive monetary policies trying to compensate for pro-cyclical fiscal stances. Financial instruments denominated in or indexed to foreign currencies, in particular the euro, are widely used in the region, in particular in the Baltic States, Hungary, Romania and Croatia. So the exposure of these CEE countries to the foreign subsidiaries is great.

In the CEE region, many countries are exposed to the same external lenders via cross-border loans to banks from their international parent banks. From a creditor perspective, bank claims are concentrated in few countries—Austria, France, the Netherlands and Greece. In principle, foreign ownership can be a source of stability for emerging market banking systems, but the reliance on cross-border funding also exposes these banks to the potential balance sheet pressures of their parent banks in mature markets. A foreign bank's exposure might be small in the CEE region relative to its overall portfolio, but its exposure could be a significant share in the local market. The stability of parent bank funding and thus the prospect for a rollover depend also on the composition of assets on the balance sheets of subsidiaries (Radulescu, 2010).

Foreign banks exposed countries to greater risk. Cross-border banks play a major role in many CEE countries, and this raises important issues of supervision for home and host countries. Host countries can ring-fence subsidiaries to protect

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depositors and limit costs to the deposit guarantee system. And home countries can centralize a bank's assets while keeping its liabilities decentralized (Radulescu, 2010).

The banks' return on equity (ROE) may be regarded as the core measure of the overall bank profitability in accounting based studies (Frazer & Zhang 2009). Generally the bank's ROE is first broken down into return on assets (ROA) and an equity multiplier.

The recent study by Lindblom et al (2011) of Swedish banks' returns and risk-taking during the financial crisis demonstrates both advantages and short-comings of this kind of analysis. As expected the analysis shows that the overall profitability of EU banks, in terms of return on equity (ROE), was clearly affected by the financial crisis. The crisis did also affect banks in different regions, but the regional effects seem to differ both with respect to timing and strength. Already in 2008 many banks seem to have suffered severely, particularly in the West European region. Banks in Eastern Europe appear to be better off on average, but these banks were facing a significant decrease in their overall profitability in 2009. Still these banks were on average displaying a higher return in nominal terms than the average EU bank (Lindblom, Olsson and Willesson, 2011).

Greece has a significant presence in the CEE region. It is one of the countries whose main banks are also present in Romania and in the CEE region through mergers and acquisitions. As the economic crisis has intensively imposed its presence in its market on the banking system both in Greece and Romania, the Greek banks faced massive difficulties during the economic downturn, leaving only three major competitors, Piraeus, National Bank of Greece (NBG) and Alpha Bank. However, Eurobank is almost entirely owned by the Greek Financial Stability Fund (HFSF). Eurobank is one of the four largest banks in Greece that failed to attract sufficient private capital in the recapitalization process in order to avoid the taking over of the management by the state. The Eurobank management and Greek governmental representatives affirmed that the Greek State had aimed at a swift return to the bank under private control.

Greek banks will be forced to limit their operations in Southeastern Europe, after the European Commission asked them to pledge that they will not transfer funds in order to strengthen their subsidiaries in the region. The measures are intended, on the one hand, to target the sale of assets outside Greece, especially those from countries with unprofitable subsidiary. On the other hand, the representatives of the European Commission force Greek banks to consolidate their operations in other countries through mergers, so the resulting banks would occupy an important position in the banking system of a particular country, in order to achieve the critical mass in order to have the chance to become profitable. The Community Government believes that the banks receiving state aid may not use this support to develop their operations in other countries. The Commission also requires that the credit institutions should make faster and more determined steps towards the sale of assets, so that they can return the funds received from the state

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as quickly as possible. If Greek banks would be forced to sell their operations in
the Balkans, the price received would represent only a small fraction of the actual
value and the amount would cover only a part of the support received from the
state. Therefore, mergers and acquisitions are recommended.

On the other hand, the Greek banks claim that it would be a major strategic
mistake to sell their subsidiaries in Southeast Europe during a difficult period of
time. Adjustments and possibly some sales will be necessary, but maintaining a
presence in the region is crucial for their survival in the future, but also for the
Greek economy in general.

The four largest banks in Greece, active in Romania, own, in total, about
12 % of the local banking system assets. In 2012, when Greece's economic future
was extremely uncertain, Romania was financially very dependent on Greece, both
in terms of the banking system, and in terms of investment and GDP in general.
According to the assets held in Romania, the first place is held in order by Alpha
Bank, then Bancpost (which are among the top ten banks in Romania), Piraeus
Bank, and then Romanian Bank (positions 11 and 12 in the top of mid-2013). The
National Bank of Greece owns the Romanian Bank, EFG Eurobank controls
Bancpost, while Piraeus Bank and Alpha Bank operates under its own brand. The
largest banks in Romania with Greek capital did not have a satisfactory evolution
in recent years after 2010.

In terms of GDP, Romania is placed on fourth place in Europe as the level
of net liabilities compared to Greece. We have many Greek-owned banks and,
importantly, the ratio between loans and deposits is more unbalanced for Greek
banks than to the whole banking system in Romania. This means that in the
unfortunate event when Greek banks would be forced to diminish more business
locally, a large infusion of capital from the state will be needed, which will trigger
panic and will lead to a massive depreciation of the national currency and so on.
Greece is a risk that hovers over Romania.

3. Methodology
**3.1. Overview of the forecasting model based on artificial neural
networks**
Inspired from human brain structure and functionality, the artificial neural
networks (ANN) are similarly to a map of processing units (neurons), organized on
layers, and capable to approximate with accuracy any continuous function.

The architecture of the one hidden-layer feed forward network (Zhang et
al., 1998) have four input neurons (X_i) on the input layer, three hidden neurons
grouped in one hidden layer (H_j), and one output neuron (Y). Each connection has
associated a parameter indicating the strength (a degree of importance), so-called
weight (β_{jk} and α_k).

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Generally, the connections among the inputs, hidden(s) and output(s) layers are more complexes, and by model testing it will be optimized the layer numbers, the number of neurons in each layer, and the weights.

A widely used type of ANN is the non-linear relationships between input and output neurons, by a function like the following (Tkacz & Hu, 1999):

$$Y = f(x) = g\left(\sum_i \alpha_i x_i\right)$$

where g is a predicted function, such as any type of sigmoid function:

$$g(a) = \frac{1}{1 + e^{-a}}$$

If a hidden layer is placed between the *Xi* and *Y*, the intermediate variables (H_j) are their corresponding weights β_j which will affect *Y*.

For the ANN, with N = four input neurons, M = three hidden neurons, one hidden layer, and one output neuron, the function has two connection strengths:

1. α_k, *k* = 1,2,3 which link the output Y with hidden neurons H_j;

2. β_{jk}, *j* = 1,2,3,4, and *k* = 1,2,3 which link the input neurons (X_i) to the hidden neurons (H_j).

So, the neural network function is (Tkacz & Hu, 1999):

$$Y = g\left(\sum_{k=1}^{M} \alpha_k h\left(\sum_{j=1}^{N} \beta_{jk} X_j\right)\right)$$

(1)

Usually, in order to simplify the analytical representation, the functions g and h may be identically.

The forecasting models based neural networks are the property to learn, they are also called training algorithms. In such a model, the input dataset is divided into two parts: the training and the validation samples, generally having the training/test ratio: 60% / 40%.

On the training set the estimated model is built, in fact, a class of patterns that differ based on the input variables and their weights, the number of hidden layers and the number of neurons in each layer. The next step of the algorithm applies the patterns to the second sample, the test dataset, and compares the real function with the simulations, choosing the more accurate model. This will be applied to forecasting, meaning that the establishing of the neural network model depends on selected inputs, on historical data, on user requests and on the accuracy. Also, we must say that the forecast horizon (short-term or long-term) depends on historical dataset, having a powerful influence on accuracy.

According to Davydenko and Fildes: "The choice of an error measure for assessing the accuracy forecasts across time series is itself an important topic for forecasting research" (Davydenko & Fildes, 2014).

After applying several forecasting ANN models on input dataset, the next operation consists in assessing the accuracy by using error measures.

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In the forecasting domain, the most common error measures are: mean absolute error (MAE), mean squared error (MSE) and root mean squared error (RMSE).

Mean absolute error is the average result over the errors in a set of forecasts, including both of positive and negative values (Saigal & Mehrotra, 2012).

The MAE is calculated as the absolute value of the difference between the estimated forecast and the actual value at the same time.

$$\text{MAE} = \frac{1}{n} \sum_{t=1}^{n} |Y_t - F_t| \qquad (2)$$

where Y_t is the estimated forecast at t moment and F_t is the actual value at the same time.

The mean squared error (MSE) is computed as the squared difference between forecast and corresponding observed values and then averaged over the sample:

$$\text{MSE} = \frac{1}{n} \sum_{t=1}^{n} (Y_t - F_t)^2 \qquad (3)$$

The root mean square error (RMSE) measures the average magnitude of the error:

$$\text{RMSE} = \sqrt{\text{MSE}} \qquad (4)$$

An important observation refers to the measure unit of the errors for the compared models, which must be the same. Having the same measurement units as the input data (rather than in squared units), MAE and RMSE are representative for the purpose of communicating the performance of forecasting results.

In order to choose the optimal models in our forecasting research study, we used both the error measures MAE and RMSE.

3.2. Using GMDH Shell as an ANN forecasting tool

Intelligent Forecasting has become an important part of the software market, this kind of applications being required especially by the business and financial environments.

The IT market offers a large number of forecasting tools based on a complex set of forecasting methods, including neural networks, support vector regression, and statistical tests.

Also, the applications allow forecasting analysis using error measures (MAE, MSE, RMSE, etc.) for model performance comparison.

We can give a few examples of forecasting software: Intelligent Forecaster, by BIS[3]Lab (Business Intelligent Laboratory, 2014), IBM® SPSS® Forecasting by IBM (IBM SPSS Forecasting, 2012) or GMDH Shell, by Geos Research Group (Geos Research Group, 2013).

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For our study we consider that GMDH Shell environment is the most appropriate, as it has a very powerful neural network module, which solves time series forecasting (Geos Research Group, 2013).

According to the documentation of the Group Method of Data Handling (GMDH) „GMDH Shell is an advanced but easy to use tool for predictive analytics and data mining, able to automatically detect usable data inside a file, transform data according to a problem type, drop irrelevant inputs and, finally, construct a set of predictive models at the base of optimal complexity detection and self-organization principals" (Geos Research Group, 2013).

The algorithm referred as GMDH-type Neural Network is equivalent to the Artificial Neural Network with polynomial activation function of neurons (Geos Research Group, 2013):

$$Y = a_0 + \sum_{i=1}^{n} a_i x_i + \sum_{i=1}^{n}\sum_{j=1}^{n} a_{ij} x_i x_j + \sum_{i=1}^{n}\sum_{j=1}^{n}\sum_{k=1}^{n} a_{ijk} x_i x_j x_k \qquad (5)$$

, where $X(x_1, x_2, ..., x_n)$ is the input data vector and $A(a_1, a_2, ..., a_n)$ is the vector of weights.

There are five steps in order to perform a forecast with GMDH Shell, as follows:

1. Accessing input dataset, from CSV or XLS files;
2. Defining the target and the corresponding variables;
3. Choosing the algorithm and, depending on it, the learning and validation dataset;
4. Generating several models by changing the number of hidden layers and the input neurons;
5. Evaluating the accuracy of models, by comparing the error measures.

Among the strategies offered by the GMDH Shell software for model validation, we choose those that correspond to a relatively reduced input dataset and a short-term forecasting:

- Training/testing	Splits dataset into two parts, uses the training part to find model coefficients and uses the testing part to compare all generated models.
- k-fold validation	Splits dataset onto k parts, trains a model k times using k-1 parts, each time measuring model performance using a new remaining part. Finally residuals obtained from all testing parts are summarized in order to compare the model with other competing models.

The study used various implementations of the neural network algorithm offered by GMDH Shell software and the balance sheet of the four Greek banks and their Romanian branches, during 2006-2012, in order to obtain a short-term forecast for the performance indicators.

We presented the forecast for three important bank indicators: equity, assets and gross profit/loss. The functions used for modelling of these target variables (both for Romanian branches and Greek banks) are presented below:

1. **Assets** = f (gross profit/loss, liabilities except equity, assets)
2. **Equity** = f (gross profit/loss, liabilities except equity, assets)

The function for the Gross profit variable differs between Romanian and Greek banks:

3. **Gross profit/loss** $_{Greece}$ = f (f (total incomes, total expenses, assets, liabilities except equity, inflation rate Greece)
4. **Gross profit/loss** $_{Romania}$ = f (total incomes, total expenses, assets, liabilities except equity, inflation rate Romania, exchange rate)

Also, another major characteristic of the experiment refers to keeping the same ANN type algorithm for each target variable and applying it to the different bank datasets.

We used annual data series of total assets, equity, liabilities except equity, total incomes, total expenses, gross profit/loss (denominated in thousand ROL for the Greek subsidiaries in Romania and denominated in thousand Euro for the Greek Group Banks), inflation rate in Romania (%), inflation rate in Greece (%), nominal exchange rate fluctuation (%) between our domestic currency (ROL) and Euro. We used the banks' results published by the Ministry of Finance of Romania and of Greece. The annual inflation rate for Romania and for Greece and the nominal exchange rate fluctuations were published by Eurostat.

There are a few differences between those functions. For the Greek parent banks we didn't used the exchange rate as an exogenous variable (Greece uses euro as currency), but for the banks that activate in Romania we introduced the exchange rate fluctuations between our domestic currency (ROL) and euro.

The exogenous variables are total incomes, total expenses, the inflation rate in Romania and in Greece, exchange rate fluctuations between ROL-EUR. The endogenous variables are assets, equity, liabilities except equity (assets-equity), gross profit/loss. After forecasting assets, equity, liabilities except assets and gross profit/loss, we determined some relevant percentage ratio for those banks' profitability, namely: return on assets (ROA=net result/assets), return on equity (ROE=net result/equity) and a multiplier, namely leverage ratio (assets/equity). To determine the net profit we used the forecasted gross profit and applied a tax on profit of 16%. If the gross result was negative, the net loss is equal with the forecasted gross loss. We used the variables and ratios according to the economic literature presented in section 2.

4. Forecasts results and results discussion

The forecast results for the Greek banks operating in Romania are presented in table 1. In the case of Alpha Bank, the analysis of the banking efficiency and profitability indicators show an increase of ROA and ROE until

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2008 when the crisis began to be felt in the Romanian banking system, and then a decrease in 2009-2010, but at positive values, then the drastic decrease in 2011 when there was a big loss and the balance sheet of the assets was reduced to half compared to 2010. In 2011, the loss increased by 75 % compared to 2010 due to weaker operating revenues and to the stagnation of the operating expenses. The loans were still experiencing a pronounced decrease, so that banks were betting at the time only the gap between the revenues and operational expenses. Moreover, in mid-2011, the shares of Alpha Bank Group in Greece were suspended from trading on the Athens stock exchange. The capital multiplier was experiencing an ongoing decrease for Alpha Bank, it dramatically decreased 7 times in the last three years until 2012 (from 22,5 in 2009 down to 3,7 in 2012). It shows the capacity of a bank to attract resources from the market on which the bank may place them at a rate of return at least equal to the overall average of the bank expressed by ROA. This explains the stronger decrease of ROE compared to ROA during the crisis. The share of income-bearing assets has increased in the analyzed period, which explains the better results of the bank compared to those of other two banks with Greek capital analyzed namely the Romanian Bank NBG and EFG Bancpost.

In 2013, it is predicted that the loss will increase by 20 %, and it will return to 2012 values in the year 2014. The income-bearing assets will continue to grow in the total assets, but in 2014 it is predicted a decrease of the balance sheet and equity, while the liabilities without equity would stabilize. This development will lead to a stabilization of spending at levels somewhat close in two years forecasting and the slight increase in revenue from 2013 to 2014. The equity multiplier will increase slightly in 2014 after its decrease in 2013 compared to that of the previous year (Table 1, Figure 1).

Table 1. Forecast results for the Greek capital owned banks in Romania (Thousand ROL)

Bank/ Forecast Indicator	Assets		Equity		Gross profit MAE/RMSE	
ALPHA BANK ROMANIA 2013	5167740	0.01358 0.02352	2078810	0.00373 0.00646	-60411	0.014 0.0231
ALPHA BANK ROMANIA 2014	5012960	0.00073 0.0008	1920570	0.00612 0.0106	-47911	0.00921 0.00154
PIRAEUS BANK ROMANIA 2013	7916640	0.005793 0.01738	1512120	0.000967 0.001291	13690	0.00036 0.00037

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PIRAEUS BANK ROMANIA 2014	8002630	0.00351 0.00402	1469950	0.000268 0.000279	7046	0.0054 0.0105
ROMANIAN BANK - NATIONAL BANK OF GREECE 2013	6361360	0.09053 0.1568	882802	0.01468 0.02853	- 166850	0.0357 0.0613
ROMANIAN BANK - NATIONAL BANK OF GREECE 2014	5643210	0.00246 0.00424	975238	0.0179 0.031	- 164558	0.0255 0.0442
BANCPOST - EUROBANK 2013	11808600	0.02767 0.04793	1368280	0.001647 0.002852	- 167557	0.2671 0.4597
BANCPOST - EUROBANK 2014	11631300	0.0336 0.0582	1344040	0.00113 0.00197	- 178757	0.0078 0.0135

Source: own calculations

For the NBG Romanian Bank, ROA increased slightly until 2009, but after
2010 until now, the values become negative and decreased strongly due to lower
balance sheet assets and increased loss. In 2013, after the Greek NBG Group
leaving in the fall, the bank's situation worsened. The ROE evolution is similar to
that of ROA, increasing until 2009 and then faced a pronounced decrease in
negative values and declining until now, due to the lightweight increasing capital
(it only slightly decreased in the period between 2011 and 2012). On average, the
Romanian Bank capital has recorded substantial changes in the analyzed period.
The bank's profitability has declined sharply since 2010 due to the accumulation of
bad loans in the banking system, increasing the risk provisions, even if the
operating revenues were growing. The equity multiplier decreased until 2010 (8,7),
then began to rise from 2011 to 2012 when it reached 10,2, indicating the
possibility of a recovery of the bank, but the changes in the fall of 2013 led to its
sharp decline. The share of income generating assets (RUA) in total assets declined
dramatically in recent years (from 55,1% in 2009 down to 6,6% in 2012) with a

focus in 2013 and the bank's loss sharpened (from -72228 thousand RON in 2010 down to 166849 thousand RON in 2012).

For the year 2013, the forecast shows a strong balance sheet total decreased after the NBG group left, but a growth of equity and a decrease of liabilities outside the capital. This will generate both income reduction, but also that of expenses. The share of income-generating assets in the assets remains very low from 2012 to end of 2014. The bank losses will be maintained at similar values in the range 2012-2014. ROA will be declining in 2013-2014, compared to ROE that grows in 2014 and the equity multiplier will drop in 2014, which indicates that the bank will still face problems and shows no signs of recovery, thing revealed by the projected worsening of bank profitability and efficiency indicators in 2013-2014. The bank will have to go through a restructuring of the balance sheet after changing of capital in 2013 and after the efforts to maintain the solvency predicted to be achieved by the bank in the next period from 2013 to 2014 (Table 1, Figure 1).

Figure 1. The evolution of the gross profit/loss of the Greek banks operating in Romania
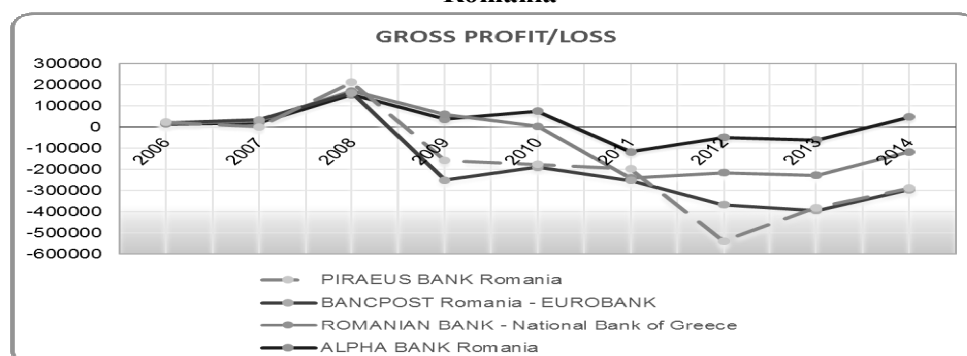
Source: Banks financial reports and our own calculations

EFG Bancpost recorded only a modest profit in 2006-2007, and since 2008 until now has faced permanent loss. The year 2008 marked a sharp decline in profit, and in 2009 it immediately recorded the lowest value by 2012. The ROA values, although negative, recorded a mild growth until 2012, and in 2013 it faced again a strong decrease of profit and profitability indicators of the bank, under the continuous reduction of the total balance sheet assets in 2008. ROE values dropped dramatically in 2009, then rose until 2011, and then began decreasing in 2012 up to the present. Considering the doubling of equity in 2009 compared to 2008, its trend remained upward. Although the equity decreased in 2013 compared to 2012, the loss has doubled and ROE continued its sharp decline begun in 2012. The equity multiplier decreased continuously, the greatest reduction, to half, being the one in 2009 (from 24,1 in 2008 down to 11,4 in 2009). At the end of the analyzed period

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2012-2013 it shows a slight stabilization, even a slight increasing trend, indicating the possibility of a revival of the bank profitability indicators. The income generating assets increased until 2009, then declined steadily (from 40,2% in 2009 down to 9,1% in 2012) and in 2013 started to grow again, this also being a sign of a possible future return of the bank, which is also highlighted by the slight increase of the capital multiplier.

For EFG Bancpost the forecast shows a slight decrease from year to year in the period 2012-2014 in the total assets of equity and liabilities without capital, which emphasizes the losses suffered by the bank. The revenues grow more slowly than the expenses and the efficiency and profitability indicators worsen in the forecast horizon of two years from 2013 to 2014 (Table 1, Figure 1).

Bancpost paid a particular attention in 2009, primarily to the bank's stability and security, and less to the profitability. Moreover, since early 2008, when the crisis seemed to elude Romania, at the urging of the parent bank (EFG Eurobank) began to pay greater attention to the attraction of deposits in order to reduce the dependence on funding from the parent bank. This was due to difficult access to financing in foreign markets and higher provisions for bad loans, which resulted in increased costs sustained by Bancpost.

Piraeus Bank is a particular case in the analyzed group of Greek-owned banks, banks operating in Romania. This bank recorded profit in the majority of the time, except for the years 2007 and 2012 (the greatest loss was in 2012, 94992 thousand RON), but their return has fluctuated widely over time. The bank made profit in 2013 being the only one of the four which had a positive result in 2013. ROA followed the trend of profit, but unlike it, it did not have such large fluctuations from one year to another, complying with the limits. Unlike ROA, ROE followed the trend of profit, but with greater fluctuations from one year to another and with values below 10%. By the years 2009-2010, the balance sheet for assets increased then decreased slightly. The equity has been growing steadily but by 2012-2013, reflecting the bank's focus on strengthening the capitalization through a solvency above the average Romanian banking system. With the exception of 2007, until 2010 the equity multiplier has been increasing, expressing the growth potential of the bank, and in 2011 it began to decline (from 7,5 in 2011 down to 5,9 in 2012). The income-generating assets in the total assets increased until 2010, but declined sharply in 2011-2012 (from over 100% in 2010 down to 11,8% in 2012). In 2013, it followed a reorganization of Piraeus by taking over ATE Bank Romania. If in 2007, before the crisis, the bank focused on expansion, the opening of branches, hence the loss in 2007 due to higher operating expenses in 2012, the bank has focused on ensuring solvency and liquidity at the expense of profitability, the total assets declined, and the equity increased, as several branches in the country were closed, and deposits expenses increased, although the revenues increased significantly in 2012. Greece's Piraeus Group has begun the reorganization by taking over ATE Bank of Greece, something that Piraeus Bank

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Romania will do a year later in 2013 when it took over the healthy part of the portfolio of ATE Bank Romania.

According to our forecasts the bank's assets will return to the level of 2011 only in 2014, although the highest values recorded in the balance sheet were in 2009. The bank focused a long time on strengthening the capitalization. The capital increases including in 2013 and only in 2014 we can notice a tendency to relax of the bank about its efforts to ensure solvency. The liabilities without capital decreased continuously since 2009, but in 2014 they started again to increase, which will lead to an increase of costs more than the revenue and the profit forecast of the bank in 2014 will be down compared to the forecast for 2013. ROE will decrease as well as ROA, and the equity multiplier will increase slightly in 2014 compared to 2013. At the same time the share of income generating assets in total balance sheet will increase, the balance sheet restructuring is encouraging as a trend in 2014. All the other indicators of profitability and efficiency will all drop 2014 compared to 2013 (Table 1, Figure 1).

Next, we analyzed the profitability ratios for the Greek banking groups and we compared them with the ones of the Greek banks operating in Romania, to see how they developed against the entire network of the Greek banking groups. This way we can conclude which Greek bank should sell its subsidiary in Romania and which should sell in other country in the Eastern Europe region.

Analyzing the data and the forecasts for the Greek banking group which own banks in Romania, we see that only Piraeus supports with capital the bank subsidiaries in 2013, while in 2012 all the analyzed banks (except Alpha Bank Group) have supported the subsidiaries through capital injections. This is explained by the capital increase carried out in 2013 by Piraeus, when it became the best-capitalized banks in Greece. The most important change of capital will be recorded 2013 by NBG Group that dropped the Romanian Bank of Romania. Eurobank Group reorganized its balance sheet in Greece also, as well as in Romania, while the Alpha Group and NBG will face the process of expansion of the balance sheet starting with 2013. Piraeus Group has kept a relatively equal balance in 2012 (Table 2).

Liabilities will be maintained for Piraeus and Alpha Group, while those for NBG increased and for Eurobank Group is following a downward trend (which will lead to a decrease in costs), the bank is concerned about maintaining its solvency in the next period from 2013 to 2014 (Table 2).

Piraeus and NBG Group will end 2013 with gross profit, partially confirmed by the results published in the fall by them, while Eurobank and Alpha will continue their series of recorded losses, although they will be less significant for Alpha Group (Figure 2).

Greek Banks Profitability Developments in Romania and the Banking Strategy of
the Greek Banking Groups in the Eastern Europe: A Forecasting Approach

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Table 2. Forecast results for the Greek banking groups
 (Thousand RON)

Bank/ Forecast Indicator	Assets		Equity		Gross profit MAE/RMSE	
ALPHA BANK GROUP 2013	59785600	0.3385 0.5863	1880000	0.0113 0.0127	-875496	0.000017 0.000019
ALPHA BANK GROUP 2014	60209600	0.0574 0.0995	2633040	0.1794 0.3107	-567650	0.000033 0.000035
PIRAEUS BANK GROUP 2013	69536800	0.00020 0.00022	- 2073220	0.0009 0.0010	720528	0.1932 0.3346
PIRAEUS BANK GROUP 2014	69934700	0.00271 0.00365	- 1422900	0.00585 0.00632	509273	0.0019 0.0024
NATIONAL BANK OF GREECE GROUP 2013	109577000	0.0188 0.0225	503782	0.00073 0.00076	358737	0.0628 0.1089
NATIONAL BANK OF GREECE GROUP 2014	126144000	0.0261 0.0291	625268	0.1569 0.2717	971394	0.00001 0.00011
EUROBANK EFG GROUP 2013	60115900	0.00030 0.00036	615594	0.00025 0.00026	- 1651750	0.00020 0.00024
EUROBANK EFG GROUP 2014	54156130	0.0043 0.0052	519174	0.00013 0.00016	- 1359900	0.00298 0.00362

 Source: own calculations

As a result of these predicted developments, the most significant growth of the capital multiplier is registered by NBG in 2013, followed by Eurobank Group. For Piraeus and Alpha Group we notice a decrease in this indicator. ROA values improve for three banks, except Eurobank Group, currently undergoing the process of reorganizing the balance (it reduced its assets and increased equity). ROE decreased for Piraeus and Eurobank, while for Alpha Bank it grew. So for the Alpha Group, ROA rose strongly compared to the lowering capital multiplier, while the ROE increased. For NBG, the evolution of this ratio is fluctuant, first it decreases in 2013, and then it increases sharply in 2014. So, the overall profitability and the capital efficiency will drop for Eurobank. For NBG, all the profitability ratios will improve and we have the same trend for Alpha Bank Group. Piraeus Group will face a drop of its capital efficiency because this bank will continue to inject capital to its subsidiaries in the near future, during 2013-2014 (Table 2, Figure 2).

Figure 2. The evolution of the gross profit/loss of the Greek banking groups
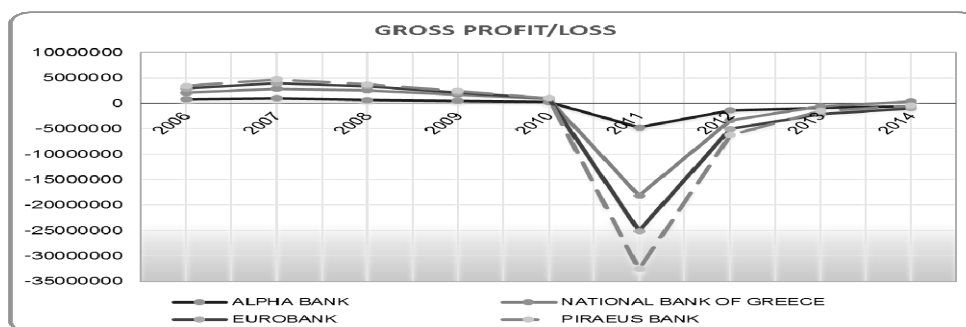
Source: Banks financial reports and our own calculations

Piraeus Group has a share in income-generating assets to total assets down (as the other three banks) and the lowest value among the banks analyzed in this work (4.13% in 2012). NBG and Alpha Group have equal shares (5.7 % in 2012), while Eurobank has the largest share (6.02% in 2012).

The overall profitability of the Alpha bank group in Greece has been more seriously hit by the crisis, compared the subsidiary in Romania. Alpha Group capital increased and the bank in Greece reduced to help offered to the subsidiaries. The Greek group lowered the help given to the subsidiary so that Alpha Bank Romania indicators will begin to decline, although they were better than those of the group. The Alpha Group had lower ROE and ROA (especially ROE reached high negative values) than the Alpha Bank in Romania. All the Romanian subsidiaries performed better than their Greek groups.

For NBG group, its leaving from Romania will strongly affect the evolution of Romanian Bank's profitability indicators in the near future. The Alpha

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Group had negative equity values during 2011-2012, but we forecast turning into
positive values from 2013.

Bancpost performs weaker than the Greek group that owns it, but is one of
the largest branches of Eurobank and the Greek group has not given up on it yet,
but it was considering a merger with Alpha Bank and is currently discussing a
merger with Piraeus Bank Romania. The Eurobank Group had a negative equity in
2012, but we forecast some positive values from 2013. Eurobank Group will
continue to face losses, but NBG will obtain profit from 2013, after selling their
operations in the Eastern Europe (including in Romania).

Piraeus Group continues to support its subsidiaries in the region through
capital injections. The bank's results in Romania will be weaker compared to those
of the Group in Greece, but it is being given support. The Piraeus and Alpha
Groups will obtain profits during 2013-2014 in the future. The equity of the
Piraeus Group will stay negative in the near future.

Comparing the results of banking groups in Greece, Eurobank has
performed the worst in the entire period. NBG follow it, mentioning that it knows a
significant increase after leaving some of its subsidiaries in 2013. Best ranks
Piraeus Bank Group and is followed by Alpha Group.

5. Conclusions

Based on these results for Greek banks operating in Romania and Greek
banking groups, the most logical option for acquisitions would be for Piraeus Bank
to give up its subsidiaries in other CEE countries in favor of Eurobank (for
example in Bulgaria and Serbia, because Piraeus has a smaller network comparing
to the Eurobank's network in these countries), and in compensation Piraeus Bank
should take over Bancpost in Romania. For Piraeus 2013 was a great year, as it
registered profit after the big loss from 2012 after taking over a part of ATE Bank
Romania. In addition, it is foreseen that Bancpost will restructure its balance,
increasing the share of income generating assets and it will have a multiplier of
capital with an increasing trend. In addition, Eurobank cannot sustain Bancpost
from Romania, that is owned almost entirely by the Greek Financial Stability Fund
(HFSF), it failed to attract private equity for recapitalization and the EU and the
European Commission considers that it may use the State's funds to strengthen the
position of the subsidiaries in Central and Eastern Europe. Greek Piraeus Bank
Group increased its capital and became the largest systemic bank in Greece,
keeping its private status as one of the best capitalized banks in the EU. EFG
Bancpost in Romania still has large losses and it is predicted that the bank's
situation to worsen. Alpha Bank in Romania faces similar losses to EFG, so that a
merger between these two is neither indicated nor probable. Alpha Bank Romania
has lost more market share and in terms of assets, which is almost half the assets
owned by Piraeus Bank Romania. It is predicted that Alpha will reach a downward

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trend balance to equal that of Romanian Bank 2014. The equity, however, is slightly higher than that of Piraeus, but Piraeus Group from Greece is strongly capitalized. The Romanian Bank, due to serious difficulties it has been facing since 2013 when the Greeks withdrew their capital from the bank, must be taken over by a strong banking group. A merger with Piraeus would not be recommended which gains profit, because, although it is currently recovering, it does not have the financial strength to support a large troubled bank and because all indicators and forecasts do not indicate any recovery. The greatest assets are owned by Bancpost, but the capital is extremely small compared to that owned by other Greek banks, except the Romanian Bank which has always been the least capitalized banks among the four analyzed Greek banks in Romania.

Piraeus Bank Romania has a share of income generating assets much lower than that of Alpha Bank (which is now facing the continuous reduction of the balance), but the capital multiplier is double than that recorded by Alpha Bank Romania in 2013-2014. Comparing the future evolution of Greek banks with losses, Alpha Bank's efficiency and profitability indicators are better than those of Bancpost and the share of generating assets for Bancpost is much lower than that of Alpha Bank and even Piraeus Bank. However, Bancpost has a growing multiplier of capital at even higher values than both of the previous banks. The Romanian Bank and NBG group will obtain in the period 2013-2014 the weakest indicators of efficiency and profitability among the four Greek banks analyzed in Romania and in the CEE region. So, NBG, facing great losses will probably have to sell most of its subsidiaries in the CEE region.

The results predicted by us through this model were checked according to the partial results obtained and published in the fall of 2013 by these four banks and their subsidiaries in Romania. In Romania, Piraeus will obtain in fall a profit by more than 3 million Euros, while in Greece, the mother banking group had a profit of 600 million in the first nine months of the year Greece NBG had a profit of 200 million Euro in the first 9 months of 2013 and the Romanian Bank had losses of over 160 million lei (about 35 million Euros). Alpha Group had a loss of over 700 million Euros in the first nine months and in Romania a loss of about 10 million Euros. At Eurobank Group the loss recorded throughout 2013 was of about 1.926 million Euros, while in Romania, Bancpost had a loss of about 50 million Euros, i.e. 200 million lei. So, the resulted forecast using ANN is validated.

An issue for further research would be to elaborate this forecast using econometric estimations, but we believe that the econometric results will be affected by the short period of time of analysis (we focused only on the crisis analysis, because the Geek banks were affected only during this specific period). Neural networks works with short data series observations, despite econometric forecast that need a longer period of observations.

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