Cross-Cultural Management Journal
Volume XVI, Issue 1 (5) / 2014

Andreea POPOVICI
DragosTURLIUC
Department Finance, Faculty of Economics and Business Administration,
"Alexandru IoanCuza" University
Iasi, Romania

THE EFFECTS OF CROSS-BORDER BANK MERGERS AND ACQUISITIONS ON THE PRODUCTIVITY OF CREDIT INSTITUTIONS

Empirical study

Keywords
M&A
Banking
Performance
Productivity
Efficiency

JEL Classification
G21, G30, G34

Abstract

The purpose of the current research is to study bank mergers and acquisitions (M&A) and to see whether they have implications on the productivity of the target banks, and also for the bidder bank. The aim of this paper is to see if, during 2002-2008 period, three banks from the European banking system, Banca Comerciala Romana from Romania, Slovenská sporiteľňa from Slovakia and Erste Bank Group from Austria improved their productivity due to the fact that all of them were involved in a process of cross-border merger or acquisitions, even if the bank is the purchaser or the target. To reach our goal, we used DEA method, by estimating the productivity achieved by these three banks during the period pre-M&A, post M&A, but we also estimated the productivity for entire period of seven years. Using Malquist DEA method, we show that, on average, the merger or acquisition in which a bank was involved improved the Total Factor Productivity of all analyzed banks.

1. Introduction

The performance of the bank activity constitutes a very important element in the analysis of the financial systems, especially of the developing countries, at the system and which has known in the past years major mutations at the level of the shareholding structure as a result of privatization, of the entry of foreign banks and of the increase of competition determined by the liberalization of the market and the legislative changes**.**

Banks are now looking for new opportunities in foreign markets to replace or supplement decreased growth opportunities. Removing regulatory barriers in the European Union financial services industry will give further impetus to the strengthening cross- border activity.

The result of these operations is the emergence of larger financial companies that offer a wider range of services and operating in multiple markets simultaneously. Acquisitions and mergers in the banking sector have the capacity to ensure efficiency, profitability and synergy, also contributing to increased shareholder value. In some cases, banks with financial problems are the subject of acquisitions or mergers in the banking sector and this type of transaction may result in monopoly or downsizing. Companies all over the world use mergers and acquisitions for growth purposes in recent years.

1. Objectives of the econometric study

In the current research we want to study bank mergers and acquisitions which involved Erste Bank Group since 2005 and to investigate whether these kinds of process have implications on the productivity for the acquired banks, and also for the Erste Bank Group.

Erste Group was founded in 1819 as the first Austrian savings bank. In 1997, Erste Group went public with a strategy to expand its retail business into Central and Eastern Europe (CEE). Since then Erste Group's customer base has grown through numerous acquisitions and organic growth from 600,000 to around 16.6 million. More than 99% of all clients are citizens of the European Union, which gives the countries a stable regulatory framework that supports their economic development. Today Erste Group is one of the largest financial services providers in the Eastern part of EU in terms of clients and total assets. Its core activities, besides the traditional strength in serving private individuals, include advisory services and support for corporate clients in financing, investment and access to international capital markets, public sector funding and interbank market operations.

We have chosen Erste Bank Group for the econometric analysis because today is one of the largest financial services providers in Central and Eastern Europe in terms of customers and total assets. Also in Romania is the main market player, and in 2012 the bank had 667 branches and agencies, with a market share of approximately 20%.

In Romania, as in other countries of Central and Eastern Europe, are operating a variety of financial institutions of different origins, which aim to attract as many customers.

In terms of market share that was Erste Bank in 2012, the financial institution may be considered the favourite financial services provider by the consumers from Romania, BRD-GSG is second on the ranks, with about 6 percentage points away (as it can be seen in chart 1, Appendix 1).

Erste Bank operates in seven countries from Central and Eastern Europe, namely Hungary, Czech Republic, Slovakia, Romania, Croatia, Ukraine and Serbia. To expand on these seven states Erste Bank Group was first forced to enter these markets, engaging in mergers and acquisitions, and after that giving a new name to the created institution, which of

course is built by coursing the name and logo of Erste Bank.

Thus we speak of Erste Bank Hungary in Hungary, Erste Bank Croatia in Croatia, Erste Bank Ukraine in Ukraine, Erste Bank ad Novi Sad in Serbia, Slovenská in Slovakia, Českáspořitelna in Czech Republic and Banca Comerciala Romana in Romania.

2. Literature Review: Determinants of bank mergers and acquisitions

Existing literature when talking about determinant factors of bank mergers and acquisitions is divided into two samples, namely: market reaction on the announcement of a bank in its willingness to engage in a merger or acquisition, as measured by the evolution market price of the shares held by the credit institution and listed on a stock exchange, and quantification of banking productivity in the pre-M&A and post-M&A period, in order to be able to identify with a probability as high as possible the contribution of the bank productivity due to the bank acquisition or merger.

The first factor highlighted, namely performance measured by the market price of shares of a banking group, we wanted to emphasize the following results of the researchers who have studied this aspect of bank mergers and acquisitions.

Isa and Yap (2004) performed a study on market reaction to bank merger announcements in Malaysia for the period 1999-2000. Their findings indicate that there was an overall positive market reaction to the announcement of the merger of banking institutions.

In a related study, Mat-Nor and Mohd-Said (2004) examine the stock market's perception of bank mergers prior to and after Bank Negara Malaysia's announcement of the merger exercise. They found that there were negative cumulative average residuals before the announcement of the merger for domestic banks was made while positive cumulative average residuals were observed after the announcement.

Mahmood and Mohamad (2004) investigated the performance of the domestic banks following the merger exercise. Using data from the period 1997 to 2002, they found that the operating performance of the banks improved following the merger exercise.

However, considering only the efficiency of banks, due to the fact that they were involved in the process of bank mergers and acquisitions we wish to highlight the following studies which helped us fundament our econometric study for this paper.

Before starting to present the conclusions reached by other researchers, we want to emphasize that the DEA method is the preferred method to investigate the impact of mergers and acquisitions in the efficiency of banks, especially if the sample size is small. For this reason, we have chosen the method used in this paper to be Malmquist TPF indices to obtain more approaching reality.

Caves et.al (1982) introduced Malmquist indices for productivity analysis and showed that they correspond to the ratio of two distance functions. The advantages of the Malmquist productivity index are that it is appropriate for production technologies with arbitrary returns to scale, substitution possibilities and biases in productivity change. However, Caves et.al. (1982) noted that the Malmquist cannot be computed without knowledge of the underlying technology.

An attractive feature of the Malmquist productivity index is that it decomposes into sub-components. The first study was by Nishimizu and Page (1982), which attempted to explicitly decompose productivity growth into technical change and change in efficiency. This decomposition was largely ignored until the non-parametric work by Färe et al. (1989). Färe et al. showed that the Malmquist productivity index could be

decomposed into two components - technical efficiency change and technical change.

One of the most widely used methods has been the DEA-like linear programming method suggested by Färe et al. (1994). In this study the DEAP computer program is used to construct Malmquist TFP indexes using DEA-like methods (Coelli et.al (1998)). DEAP is a data envelopment analysis computer program (Coelli (1996). This is the method we intend to use in this paper so we can show how the productivity of the banks after involving in a merger or an acquisition changed.

Katib and Mathews (2000), for example, employed Data Envelopment Analysis (DEA) to estimate the efficiency of 20 Malaysian commercial banks from 1989 to 1995. They found that medium sized banks are more efficient in Malaysia compared to larger banks.

3. Data and Methodology

When dealing with panel data and using DEA as the linear program, Malquist Index is used to measure productivity change and to obtain that, the productivity is divided into technical change and technical efficiency change.

This index helps us to see how the productivity of the production in the current period has changed from the previous period. This index is important because it can help us reach the changes of the productivity which took place among the years we want to include in our analyses.

In this study, it may also indicate that the bank is working efficiently or not, through analysis of the group. Malmquist total factor productivity index requires panel data and presents efficiency changes from year to year, which is essential information for us.

Malmquist index helps in determining total factor productivity and is a technique based on data Envelopment Analysis (DEA). The index measures the change in productivity of a certain value (increase / decrease rate) between two time intervals.

The changes in the value of total factor productivity indexes are calculated separately for each bank and for the three banks covered by the application of panel data for 2002-2008. Temporal development banks productivity and sources are presented in Malmquist index of total factor productivity. To use this method, we have used Deap 2.1 software program.

The productivity index value greater than 1 indicates that the total factor productivity increased during the anterior period and current period. Its value less than one says otherwise.

The data used in this study were collected from the annual reports of the three banks anchored in the study, the analyzed period being 2002-2008 interval of time. The data was divided into pre and post M&A periods, before 2005 and after 2005, 2005 being the year when the M&A took place. Finally, the analysis was conducted over a three year pre-M&A period and a three year post-M&A period, but at the same time we performed an analysis for all seven years to get an idea about developments in banking efficiency for the entire period.

With a sample of three banks in 2002-2008, we have 126 records, which are considered sufficient to carry out an analysis of the panel data. We used DEA to examine the following indices of efficiency: the degree of technical efficiency change, technological change degree, the degree of modification of pure efficiency, the degree of scale efficiency change and total factor productivity efficiency.

Up to now, DEA has been applied in different fields ranging from education to banking. The common method for measuring efficiency is to take a ratio of output over input. In DEA, linear programming is used to maximize this ratio. The underlying linear method

assumes that there are *s* inputs and *m* outputs for every decision making unit, DMU (in our case, banks). Therefore, the model for the DMU is as given below:

subject to: v1x1o + v2x2o + … + vmxmo = 1 (1)
u1y1j + … + usysj ≤ v1x1j + … + vmxmj (j = 1, …, n) (2)
v1, v2, …,vm ≥ 0 (4)
u1, u2, …,uş ≥ 0 (5)
where
θ = Objective value (efficiency score)
ui (i+ 1,…, s) + output weights, s= number of inputs
yio (i+1,…, s) = output of DMU
v1 (i=1,…, m) = input weights, . = number of outputs
xo (i+1,…, s) = inputs of DMU
n = number of DMUs
The DMU is efficient if:
i) θ=1 and
ii) there exists one optimal v* or u* in which v* > 0 and u* >0

Bank behaviour can be modelled using two approaches: production and intermediation. Under the production approach, inputs are physical entities such as labour and capital. Number of accounts (which includes both interest income and non-interest income) is a measure of output. The intermediation approach views bank as an intermediary; it collects deposits and purchases funds using labour and capital, and then, uses this fund to make loans to others for profit.

Berger and Humphrey (1997) argue that the intermediation approach might be appropriate for evaluating the entire financial institutions since this approach is inclusive of interest expense. Consequently as the objective of this paper is to evaluate the entire financial institutions, the intermediation approach is adopted in this paper.

The variables used for this study are divided into inputs and outputs, which are:

- ✓ Inputs: total deposits, operating expenses and interest expenses;
- ✓ Outputs: total loans, net interest income and net profit.

Next, we will present data from the study starting with the table no.1 (Appendix B), table no.2 (Appendix C) and table no.3 (Appendix D), in which the outputs and inputs for each bank are analyzed separately, for each of the years included in the analysis.

Analyzing BCR during 2002-2008, as in can be seen in the table no.2, a rise of deposits and credits since 2003, following an upward trend rate of growth, while operating expenses and an increase in interest recorded fluctuations both negative and positive from year to year during the period under review.

For Slovenská sporiteľňa, it is important to emphasize that although the deposits recorded an upward trend in all years involved in the analysis, in the pre-M&A period the loan volume was in decline until2004, then started to grow fast, so it can be seen almost double its loans in 2006 compared to 2005.

Analyzing the Erste Bank Group during 2002-2008 interval of time, it can be seen in table 3 a rise of deposits since 2002 and an increase in credits. Unlike the other two banks included in the analysis, all inputs and outputs of Erste Bank Group escaladed from a year to another year.

4. Empirical findings

The results of the DEA analysis are presented in table no.4 (Appendix E) and they are showing that the average efficiency scores of banks during the pre- and post-M&A periods, and also for the entire period of time. An efficiency score of 1 means that the banks are on the efficiency frontier and thus are technically efficient.

However, when interpreting efficiency scores generated by the DEA analysis, it is important to bear in mind that the scores *do not* capture all aspects of efficiency of the institutions. On average, as banks reported their financial statements, we can observe an improved efficiency due to their implications in a merger or an acquisition.

The scores before M&A is 1.097 and after M&A is 1.121, respectively, whereas the score obtained for the entire period was 1.1, which is higher than the score obtained during the pre-M&A period. Practical, this means that on average, the M&A does not seem to enhance the productive efficiency of the banks. Given such findings, unsurprisingly enough, banks still continue to consolidate in order to benefit from the economic efficiency of consolidation for example the synergy effect.

It should be noted that the DEA model focuses only on the productive or technical efficiency rather than economic efficiency and hence the interpretation of the scores should be confined to just the productive efficiency of the institutions.

When technical efficiency, the degree of change in pure efficiency and the degree of change scale efficiency equals 1, we can say that there were no changes from the previous year included in the analysis. While in the pre-M&A period there was a 9.7% increase in total factor productivity efficiency due to increase by 9.7% of technical efficiency, in the post-M&A period there has been an increase in total factor productivity efficiency of 12.1 %, while for the whole analyzed period the growth was with 10%.

In table no.5 (Appendix F)we presented the average effective annual efficiency obtained for each bank separately for the three analyzed periods of time.

If the efficiency obtained for the three banks showed an increase in overall efficiency, an independent analysis shows that BCR had an upward trend in efficiency, while Erste Bank and Slovenská had a growth rate lower during the post–M&A period, but still there was an increase in efficiency, the index is higher than 1, that shows that there has been a increase during the post M&A period as against the pre-M&A period of time. This is mainly due to the fact that BCR was analyzed during a good growth rate of outputs and inputs analyzed, which helped her to have a positive efficiency unlike Slovenská and Erste Group.

Should be noted that DEA model focuses only on its technical productive efficiency rather than economic efficiency and, therefore, the interpretation of the scores should be confined to the productive efficiency of credit institutions.

We can conclude that the M&A increased productive efficiency of the analyzed banks. Given these findings, as expected, banks continue to strengthen their global position to benefit from economic efficiency due to acquisitions or mergers.

Regarding the average period, we conclude that total factor productivity grew in the case of the analyzed banks with about 2.5%, which was due to the improvements in technology.

5. Conclusions

Currently, the banking system in Central and Eastern Europe is dominated by a large number of banks that self internationally and have entered these markets through the acquisition of local banks.

It is therefore important to specify the preference of investors in financial markets in Central and Eastern Europe, where there are a large number of bank branches coming from the rest of Europe, countries that are under the terms of strengthening the banking and attractive in terms of customers and potential they have.

If global foreign banks reduced their expansion during the global crisis in Central and Eastern Europe was an increase of capital of foreign banks due to cross-border mergers and acquisitions. The crisis has shown that banks can bulk expansion, mainly due to the niches that they have found in the countries of Central and Eastern Europe, thus playing a stabilizing role in the region clearly.

An example of this is Erste Bank, an Austrian bank, who made purchases of banks in Hungary, Ukraine, Romania and Croatia, in order to reach more customers, to improve bank performance, but also to become a global bank.

Taking the case of this bank, we wanted to study the impact of mergers and acquisitions on bank efficiency, where he owned subsidiaries of Erste Group in Romania and Slovakia since 2005.

The scores before and after the M&A were 1.097 and 1.121, and the score obtained for the entire period was 1.1, which is higher than that of pre –M&A period .

Through this study, we concluded that an acquisition is more important in terms of reasons relating to maximize value because any bank aim is to growth, both in size and value of the profit that they can obtain.

The findings in this paper are similar to the finding of Katib and Mathews (2000), in which they concluded that there can be an improve of the efficiency after a M&A, but are not similar to the conclusions of Rasidah et.al (2008), because they show that that on average, the merger does not seem to enhance the productive efficiency of the analyzed banks.

We think one reason for which the financial institutions engage in acquisitions or mergers may be also to increase their efficiency so that shareholders be driven longer investments in the future.

Acquisitions and mergers have the impact of banking market concentration, and thus believe that they should be driven by European and national regulations. Relevant regulations should be common way to define the same penetration and thus help not only large banking groups, but also the European single market, and why not, especially consumers of banking products and services, which should have significant benefits as a result of financial integration in Europe.

References

[1] Berger, A.N., and Humphrey, D.B. (1997) Efficiency of Financial Institutions: International Survey and Directions for Future Research. *European, Journal of Operational Research* 98, pp. 175-212

[2] Caves, R. et.al (1982) "The Economic Theory of Index Numbers and the Measurement of Input, Output and Productivity," Econometrica, 50:1393-1414,

[3] *CEE Banking Sector Report, available at http://www.rbinternational.com, June 2013*

[4] Coelli, T. et.al (1998) An Introduction to Efficiency and Productivity Analysis. Boston., Kluwer Academic Publishers

[5] Coelli, T., A (1996) Guide to DEAP, Version 2.1: A Data Envelopment Analysis (Computer) Program, working paper, 96/08. Center for Efficiency and Productivity Analysis, University of New England

[6] Färe, R. et.al (1989) Productivity Development in Swedish Hospitals: A Malmquist Output Index Approach, Department of Economics Discussion Paper 89-3 Southern Illinois University, Carbondale

[7] Färe, R. et.al (1994) Productivity Growth, Technical Progress, and Efficiency Change in Industrialized Countries. American Economic Review, no 84, p. 66-83

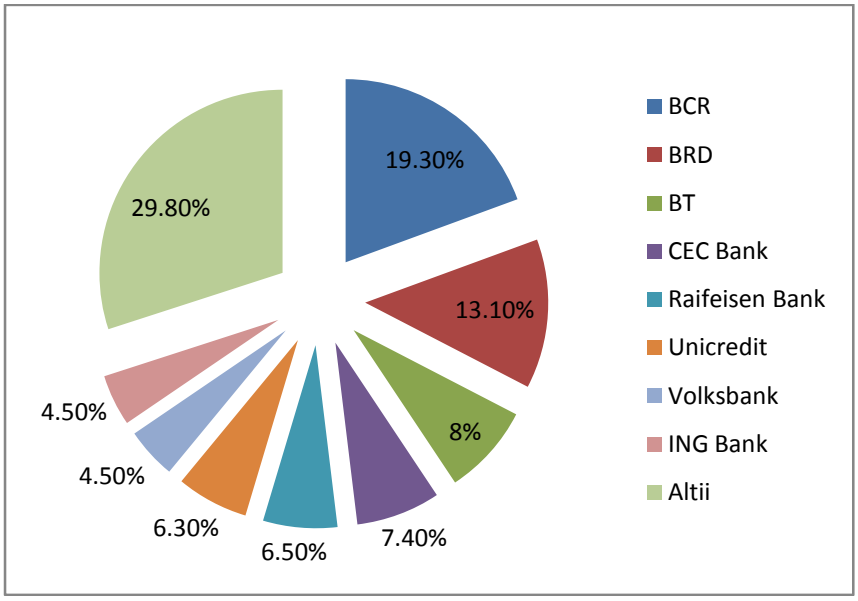
[8] Isa, M. and Yap, C. M. (2004) Market Reaction to Merger Announcement: The Case of Consolidation of the Banking Sector in Malaysia. *Malaysian Journal of Economic Studies* 41, pp 39-69

[9] Katib, M. Nasser and Mathews, K. (2000) A Non Parametric Approach to Efficiency Measurement in the Malaysian Banking Sector. *The SingaporeEconomic Review* 44, pp. 89-114
[10] Mahmood, W. M. and Mohamad, R. (2004) Does Operating on Performance Really Improve Following Financial Institutions Merger: A case of Malaysian Banks, Proceedings of *MFA 6th Annual Symposium*
[11] Mat-Nor, F. and Mohd-Said, R. (2004) Efficiency and Financial Performance Changes of Malaysian Banking Institutions in Merger and Acquisition. *Proceedings of MFA 6th Annual Symposium*
[12] Nishimizu M and Page, J.M (1982) "Total Factor Productivity Growth, Technological Progress and Technical Efficiency Change: Dimensions of Productivity Change in Yugoslavia, 1965-78." Economic Journal 92: 920-936
[13] RasidahMohd Said et.al (2008) The Efficiency Effects of Mergers andAcquisitions in Malaysian Banking Institutions, Asian Journal of Business and Accounting, 1(1), 47-66
[14] The financial statements of BancaComercialaRomana, during 2002-2008, available at http://www.bcr.ro/ro/investitori/rapoarte-financiare#X31353337323136
[15] The financial statements of Erste Group Bank, during 2002-2008 available at http://www.erstegroup.com/en/
[16] The financial statements of Slovenskásporiteľňa during 2002-2008, available at http://www.slsp.sk/en/all-about-banks/financial-indicators/annual-report-of-slovenska-sporitelna

Appendices

Appendix A

Chart 1: Market share of financial institutions in Romania in 2012



Source: CEE Banking Sector Report, http://www.rbinternational.com, June 2013

Appendix B

Table 1: Inputs and outputs for BCR in 2002-2008 (millions Euro)

	2002	2003	2004	2005	2006	2007	2008
Input							
Total deposits	4299.905	3504.257	4595.604	5319.598	6944.833	9064.745	9025.226
operating expenses	309.7855	258.2912	280.4376	356.3294	414.3507	526.2518	521.3946
interest expenses	459.6188	230.5132	281.2619	307.8608	388.2148	558.9857	783.1216
Output							
total loans	1769.924	1969.175	2619.045	56.93327	84.33508	9927.094	11653.54
net interest income	824.8846	147.6753	156.9668	680.8881	844.1521	1173.096	1851.466
net profit	118.9938	68.22907	160.2557	167.762	172.2971	265.9299	529.9557

Source: processed after the financial statements of BCR, available at http://www.bcr.ro/ro/investitori/rapoarte-financiare#X31353337323136

Appendix C

Table 2: *Inputs and outputs for* Slovenská sporiteľňa *in 2002-2008 (millions Euro)*

	2002	2003	2004	2005	2006	2007	2008
Input							
Total deposits	4233.449	4152.334	4394.859	4616.3	5712.789	6807.882	8513.076
operating expenses	149.9067	157.1561	158.5567	168.662	187.408	225.7888	262.449
interest expenses	185.9436	121.4158	115.2592	105.534	155.584	183.1056	221.892
Output							
total loans	2428.518	1977.911	1571.486	2520.12	5402.736	5650.255	8374.938
net interest income	345.7161	310.6008	310.7129	308.204	392.4688	495.0896	601.953
net profit	29.889	65.8171	78.4626	92.872	105.128	123.3432	141.339

Source: processed after the financial statements of Slovenskásporiteľňa, available at http://www.slsp.sk/en/all-about-banks/financial-indicators/annual-report-of-slovenska-sporitelna/

Appendix D

Table 3: *Inputs and outputs for* Erste Bank Group *in 2002-2008 (millions Euro)*

	2002	2003	2004	2005	2006	2007	2008
Input							
Total deposits	87733	90543	96764	106703	128537	135281	143977
operating expenses	2431	2460.7	2592.9	2676	2945	3642	4001
interest expenses	3236	2622	2571	3014	3928	5743	7052
Output							
total loans	79927	80906	88235	97276	113722	128892	140529
net interest income	5699	5209	5232	5809	7089	9665	11944
net profit	513	537.4	787.3	914	932	1174	859

Source: processed after the financial statements of Erste Group Bank, available at http://www.erstegroup.com/en/#

Appendix E

Table 4: Average efficiency obtained during 2002-20087 for all the analyzed banks

	Pre M&A period	Post M&A period	Entire period
Technical efficiency change	1	1	1
Technological change	1.097	1.121	1.1
Pure technical efficiency change	1	1	1
Scale efficiency change	1	1	1
Total factor productivity	1.097	1.121	1.1

Source: output DEAP 2.1

Appendix F

Table 5: Average effective annual efficiency during 2002-2008

	Pre M&A period			Post M&A period			Entire period		
	BCR	Slovenská sporiteľňa	Erste Group	BCR	Slovenská sporiteľňa	Erste Group	BCR	Slovenská sporiteľňa	Erste Group
Technical efficiency change	1	1	1	1	1	1	1	1	1
Technological change	1.010	1.222	1.069	1.348	1.032	1.013	1.10	1.146	1.034
Pure technical efficiency change	1	1	1	1	1	1	1	1	1
Scale efficiency change	1	1	1	1	1	1	1	1	1
Total factor productivity	1.010	1.162	1.069	1.348	1.032	1.013	1.10	1.146	1.034

Source: output DEAP2.1