A STUDY OF THE BANKS' EFFICIENCY IN CRISIS: EMPIRICAL EVIDENCE FROM EASTERN EUROPE, BALKANS AND TURKEY

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OPEN ACCESS

How to cite this paper: Lemonakis, C., Garefalakis, A., Georgios, X., & Haritaki, H. (2018). A study of the banks' efficiency in crisis: Empirical evidence from Eastern Europe, Balkans and Turkey. *Journal of Governance & Regulation, 7(3),* 8-12. http://doi.org/10.22495/jgr_v7_i3_p1

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ISSN Print: 2220-9352
ISSN Online: 2306-6784

Received: 12.04.2018
Accepted: 22.07.2018

JEL Classification: M4, G3,G2
DOI: 10.22495/jgr_v7_i3_p1

Abstract

This study focuses on the efficiency measures of banking institutions from sixteen Eastern European countries, the Balkans and Turkey. Authors use a two-step approach to study the efficiency of banks at the regional level during the critical period 2007-2011. First, the study examines whether banks are actively operating differently at a regional level during the under-review period to focus on the development of the crisis. Secondly, authors use the performance measure (Technical Efficiency -TM) that was obtained from the analysis using basic banking accounting characteristics such as capital ratios, assets quality, leverage, liquidity, and operations financial ratio as independent variables. Authors also use Global Governance Indicators to describe the ability of the respective governments to formulate effectively and properly policies related to Political Stability and the Rule of Law.
Their results suggest that bank accountant and managers of all regions should focus upon profit efficiency, proper capitalization, in order to increase their banks' profitability. In all regions, there is a need for a benchmark in lowering Banks' operating expenses, in order for them to become more efficient. Finally, credit expansion in Eastern Europe and Balkans countries needs to be under a cautious umbrella in order banks should take the momentum for reaching their more efficient operational levels.

Keywords: Banks, Technical Efficiency, DEA Analysis, Financial Crisis, Accounting Characteristics.

1. INTRODUCTION

The euro area financial crisis that broke from the end of 2007 to mid-2008 has raised a number of issues related to the efficiency and security of the banking system. The creation of an efficient and stable financial system is a sovereign issue of any reform effort and the transition from a centralized economy to a market economy, especially in the countries of Eastern Europe and the Balkans. Also, due to increased competition, banking systems are looking for larger market shares in emerging countries such as Turkey. For this reason, analyzing the profitability of Turkish banks is a matter for the financial analysts' agenda, as it plays a key role in the efficiency of the Turkish financial system.

In the case of the developing countries, we focus on searching for the impact of banks' reforms, of privatization of state banks, and of entering of foreign banks in external markets as a tendency of credit expansion and reallocation of their credit risk undertaken overall in a sense also of increasing their efficiency levels (Bauer et al., 1993; Berger & Humphrey, 1997; Yildirim & Philippatos, 2007; Asaftei & Kumbhakar, 2008; Guzman & Reverte, 2008).

Berger and Mester (2003) outlined the increasing number of studies relative to the analysis of performance and efficiency of banking institutions as a result of the transformations in the financial services sector and the unprecedented changeover in financial and non-financial technologies.

Barbara Casu and Philip Molyneux (2003) studied the productive efficiency of the European banking system, using the Decision Envelopment Analysis (DEA). They conclude that there has been a small improvement in banking efficiency levels, although there is little evidence to suggest that there was an adequate level of banking convergence.

Casu et al. (2004) pointed out that the increase in Banks' productivity contributes to a subsequent increase in the validity and the stability of the banking system, provided that the achieved banking accounting profits are channeled toward increasing equity and provisions that allow banking institutions to better managing of credit risk.

European Central Bank (2010) surveyed the inter-temporal relationships among bank efficiency, capital and risk for the European commercial banking industry. It was found that banks that lag in their efficiency levels are more likely to face a subdued bank capital level.

Murat and Kurtaran (2013) measure the relative efficiency of 13 commercial banks in Turkey for the year of 2011 with an integrated approach including Analytic Hierarchy Process (AHP) and Data Envelopment Analysis (DEA). They used two variables as inputs of the models (i.e. personnel expenditures and a number of branches) and four accounting and finance variables as outputs of the models (i.e.: deposits-national currency, deposits-foreign currency and precious metal, cash loans, and non-cash loans) in terms of production approach. They found that foreign-owned commercial banks have the lower efficiency scores among both state-owned and private-owned commercial banks. Inefficient banks should especially improve their non-cash loans and should focus on their annual personal expenditure. This is a clear statement of minimizing administrative costs, in order for the banking institutions to become more efficient.

2. METHODOLOGY AND SAMPLE

Data Envelopment Analysis (DEA) method's foundations were placed by Charnes et al. (1978), later Banker et al. (1984) who developed it further. Various DEA models have been developed; the best known of all is the model of Charnes, Couper and Rhodes (1978) known as the CCR model, and its expansion by Banker, Charnes and Cooper (1984) called the BCC model. These models are separated depending on orientation, to input-oriented models (for a given level of output to minimize inputs) and output-oriented models (for a given level of inputs to maximize outputs) and on economies of scale to constant returns of scale (CRS model) and variables returns of scale (VRS model).

Assuming firstly that the main role of banking institutions is to transfer funds between depositors and borrowers at the lower cost (i.e. under assets – liability management discussion) and secondly that interest is an input (expense), which is consistent with that input objective (Hughes et al., 2000); we use the DEA analysis variable constant to scale (VRS) input-oriented model in order to answer the research question. Finally, MAXDEA Computer Software used, Version 6.0, by Cheng Gang, is used to solve the linear programming problem.

The Table 1 show the accounting inputs variables of the model are: personnel expenses, interest expenses and other operating expenses and the output variables are set as the following: net loans, total securities (e.g. include equity investments by the banks) and other earning assets (e.g. include physical and premises that are used in revenue generation like safekeeping transactions).

Table 1. Inputs and outputs of the model

Such that	***Min θ***
– Where θ is the efficiency score;	$\sum_{j=1}^{n} \lambda_j x_{i.j} \leq \theta x_{i.0}$
– x_{ij} and y_{ij} are the amount of the i input consumed and the amount of the r_{th} output generated by the j_{th} bank, respectively;	$\sum_{j=1}^{n} \lambda_j y_{r.j} \leq y_{r.0}$
– The index n refers to the number of bank observations: 1) m equals to the three inputs; 2) s refers to the three outputs.	$\sum_{j=1}^{n} \lambda_j = 1$ r =1, … ,s i= 1, … , m j = 0, … ,n $\lambda_{j \geq 0}$

A panel data approach was used to track possible technical changes or shifts in the frontier utilizing DEA, and to include only surviving banks. Consequently, the sample consists of two hundred thirteen (213) Commercial Banks from three (3) geographical regions, i.e. Region 1: Eastern Europe, Region 2: Balkans and Region 3: Turkey. Financial data used are derived from the BankScope -Bureau van Dijk's database, and macro data derived through the World Bank. The period 2007 to 2011 is chosen because of the effect of the exogenous shocks (i.e. contagion of the European financial crisis) to the regions' banking institutions. More specifically, if too short a period is chosen, inefficiency might not average out. If too long a period is chosen, the bank's efficiency score becomes less meaningful due to possible changes in management and other relative events. In that sense, we finally pick up a sampling period of 5 years (Paul, S., et al. 2012; Dimitras et al., 2013; Garefalakis et al., 2016; Lemonakis et al., 2016)

To search for factors that might explain differences in efficiency levels, one should be focused on a number of accounting and finance control variables such as i. financial ratios of Banks' capital structure, ii. Assets quality, iii. Leverage, iv. liquidity and v. macro variables from World Bank, mainly for taking the best comparability of the results between the aforementioned regions in order to capture potential differences, also, in a political or a geographical level. It is introduced, firstly, the ratio of equity to total assets to capture the quality of bank management and risk preferences, expecting a negative coefficient as well capitalized banks reflect both higher management quality and higher aversion to risk-taking. These banks should be more cost efficient in producing banking outputs. Secondly, in the study, it is also included the ratio of Loan Loss Provisions to Net Interest Revenue as a proxy of output quality. The literature provides mixed results on the expected sign of the coefficient of this variable, either in positive or negative polarity. Also, a Governance Indicators (i.e. External Factors) is considered in our analysis. This includes the

capacity of the regional governments to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them(Garefalakis et al., 2017; Garefalakis et al., 2015a)

The coefficient can be negative, in case that banking institutions spend more resources on credit underwriting and loan monitoring, and consequently effect is to have fewer bad loans at the expense of higher operating costs (Mester, 1996) and can have a positive effect in case that banks have high ratios of loan loss provisions to net loans, indicating poor loan quality; this has a direct effect on higher banking operating costs related to credit risk and loan loss management (Berger et al., 1997).

In order to examine the internal and external factors that affect the banks' profitability of the three (3) regions the following model has been developed (see Table 2).

Table 2. Internal and external factors that affect the banking institution

$Z_{i,t} = b_{oi,t} + b_{mi,t}Y_{mi,t} + b_{dj,t}Y_{dj,t} + \varepsilon$	(1)
Where:	
i: refers to an individual bank *t:* refers to the year *j:* refers to the country in which bank i operates; $Z_{i,t}$*:* the dependent variable that refers to the return on average assets (ROAA) and is the observation of a bank i in a particular year t	Y_m*:* represents the internal factors/determinants of a banking institution; Y_d*:* represents the external factors/determinants (macro data) of a banking institution; ε*:* is an error term

3. RESULTS

The following table (see Table 3) shows the results for DEA methodology with regions included in the study average scores. It is clear enough that 41, 5 and 3 observations exhibit constant returns to scale for our model in Eastern Europe, Balkans and Turkey respectively. Also, 224, 198 and 24 observations exhibit increasing returns to scale in Eastern Europe, Balkans and Turkey respectively, whereas we have 305, 172 and 93 observations with decreasing returns to scale, and the model specification is able to discriminate between efficient and inefficient banks as only 12.28%, 6.67% and 8.33% are characterized as efficient banking institutions in Eastern Europe, Balkans and Turkey respectively.

For the increasing returns group to reach the level of the efficient group, scale efficiency has to be improved by 39.30%, 52.80% and 20.00% in Eastern Europe, Balkans and Turkey respectively. With the group exhibiting decreasing returns, the level of scale efficiency has to be improved by around 53.51%, 45.87% and 77.50%. The results also indicate that, during the crisis period, banks generally enjoy increasing returns in the Balkans Banks at 57.78%, in Eastern Europe at 43.27% and in Turkey at 18.06%.

Table 3. Regions mean scores (2007-2011)

Regions-mean values	*Technical Efficiency Score(CRS)*	*Pure Technical Efficiency Score(VRS)*	*Scale Efficiency Score*	*Constant returns (% percentage of the sample)*	*Increasing returns*	*Decreasing returns*
Eastern Europe	0.4713	0.5525	0.55	41 (12.28%)	224	305
Balkans	0.4419	0.5166	0.52	5(6.67%)	198	172
Turkey	0.3215	0.5253	0.53	3 (8.33%)	24	93

Using a Spearman rank test, we proceed to a comparison between the efficiency scores computed; the Model shows that negative correlation does exist (i.e. -0,28), with statistical significance at 1% level. It means that as the code of the region (i.e. 1: Eastern Europe, 2: the Balkan States and 3: Turkey) increases, then Technical Efficiency decreases. In other words, efficiency in Eastern Europe's Banking Institutions is the highest in the sample banks.

In Table 4, using multiple comparisons in Turkey HSD Test and in Least Significant Difference (LSD) test we find those regions' comparisons in Technical Efficiency-TE (CRS) that show high significance (i.e. at 1% significance level):

Table 4. Spearman's rho correlation test for Technical Efficiency (TE)

		Region	*Technical Efficiency score CRS*
Spearman's rho	Correlation Coefficient	1,000	-,280**
	Sig. (2-tailed)	-	,000
	N	213	213
Technical Efficiency Score CRS	Correlation Coefficient	-.280	1,000
	Sig. (2-tailed)	,000	
	N	213	213

*Note: **, correlation is significant at the 0.01 level (2-tailed).*

Where it comes that Technical Efficiency (TE) between the banking institutions of the examing regions are as follows: TE Region 1 > TE Region 2 > TE Region 3.

Where,

– TE Region 1 represents the Technical Efficiency of banking institutions in Eastern Europe's,
– TE Region 2 represents the Technical Efficiency of banking institutions in Balkan countries and
– TE Region 3 represents the Technical Efficiency of banking institutions in Turkey.

The results of regression (see Table 2) suggest that banks with higher Technical Efficiency tend to be more efficient, especially in Eastern Europe and

Turkey (e.g. statistically significant at 1%). All Banks in 3 regions show the positive relationship of variables Eq/TA ratio to ROAA, due to the lack of capital buffers, reflecting also higher banking risk undertaking to provide new loans in respective countries (see Table 5). European financial crisis has made its presence in all regions' banking institutions. Banks' need more capital buffers to become efficient. Furthermore, variables such as Net Interest Margin % is positively relative to efficient, because banks with higher interest margins tend to be more efficient, in all regions (statistically significant at 1%).

Table 5. Multiple comparisons Turkey HSD test LSD test

Dependent Variable		*(I) region*	*(J) region*	*Sig.*
Technical Efficiency Score CRS	Tukey HSD	1	2	,025
			3	,000
		2	1	,025
			3	,008
		3	1	,000
			2	,008
	LSD test (Least Significance Difference test)	1	2	,009
			3	,000
		2	1	,009
			3	,003
		3	1	,000
			2	,003

In contrast, capital reserves for bad loans absorb efficiency levels in Eastern Europe's Banks and all regions (at 1% significance level) and banks with lower operating expenses tend to become more efficient, in all regions (statistically significant at 1%). The Cost Income Ratio can be used as benchmarking only when banks' managers reviewing their banks' operational efficiency. Ghosh et al. (2003) and Hess & Francis (2004), observe that there is an inverse relationship between the cost income ratio and the bank's profitability. Banks of Eastern Europe and Balkans countries show a negative correlation of this ratio to ROAA, at 1% significance level. The higher this ratio becomes it indicates that banks are loaned up and their liquidity is low. The higher the ratio, the riskier a banking institution may become, facing a tendency of higher default events. In other words, increasing banks' net loans in Eastern Europe and Balkans countries tend to reduce their efficiency levels. In Turkish commercial banks, there is also a negative correlation of this ratio to ROAA, but not in a significant level.

Banks in all examining regions show a negative correlation of this ratio to ROAA at 1% significance level. Increasing loan loss provisions tend to reduce net income and earnings per share, to lowering efficiency levels and banking institutions in the Balkan states show a negative correlation of this ratio to ROAA, at 1% significance level. Impaired Loans are considered to be the best measure of non-performing loans. Increasing impaired loans tend to increase "bad loans" provisions, with a direct effect on lowering banks' efficiency levels. Banking institutions in all examining regions show a negative correlation of Tier 1[1] capital to ROAA (at 1% significance level), except Banking institutions in Eastern Europe that show also negative significance but at 5% significance level. Increasing Risk-Adjusted Assets due to Basel's II and III accords tend to reduce Tier I ratio. This is a real burden for the banking institutions that are obliged to retain appropriate amounts of buffers to sustain their viability. In order for a Bank to hold capital so as to provide protection against unexpected losses, it tends to become less efficient in terms of ROAA.

In terms of Governance Indicators, we can place emphasis on a core statement which shows that countries' political instability directly reflects to lowering banks' efficiency as it is shown in regression results for the Balkans states (significance level at 1%). Political and social turmoil provide also banks inefficiency. Confidence in the marketplace and in society as a whole in particular as well as in other aspects of "political indicators" such as in the quality of contract enforcement, property rights, and proper government authority (Rule of Law) flourishes banks' efficiency in all regions (significance level at 1%). Voice and Accountability, i.e.: freedom of expression, of association, free media, etc., provides a positive effect to efficiency in banking institutions of Eastern Europe and Turkey. This is an absolutely rational effect of banking institutions' stability as an effect of countries' political and social stability (Sariannidis et al., 2009; Garefalakis et al., 2015, Benhayoun, N. et al., 2016).

4. CONCLUSION

This study uses both DEA efficiency scores, financial and loan quality ratios, with governance indicators and econometric model in examining the factors that contribute to a bank's efficiency and profitability. The findings imply specific trends between the banks in Eastern Europe's, Balkan countries and Turkey.

The financial crisis has affected in all regions' banks in terms of capital inefficiency and loans portfolios quality and secondly, the Technical Efficiency (TE) obtained through proposed DEA model, specified in traditional banking activities shows better results in Eastern Europe's Banks' to their counterparts in the Balkan States and in Turkey. Nevertheless, loans portfolios in Eastern Europe's and Balkan countries seem to be riskier than that of Turkish Banks, in terms of credit risk, due to the European Unions' contagion crisis effect.

Our results suggest that bank managers of all regions should focus on policies of increasing profit efficiency, providing proper banks' capitalization, in order to increase their profitability. In all regions, there is a need for a benchmark in lowering Banks' operating expenses, in order for the specific banks to become more efficient. Credit expansion in Eastern Europe and Balkans countries needs to be

[1] Tier 1 capital ratio is a basic criterion of a bank's financial strength from a regulator's point of view. It consists of common stock and disclosed reserves (or retained earnings), when at the same time may include non-redeemable preferred stock.

done with extreme cautiousness in order for banks to gain more efficient levels in terms of profits and competitiveness.

Also, the overall perspective of respective regions' banking operations is to support the full convergence of those economies to EU living standards, both in the Central and Eastern Europe (CEE) and Turkey moving towards the EU member states candidates' and in the pre-accession countries. The corresponding banking institutions play a crucial role in supporting economic development in these territories, by addressing new investments in infrastructure, through medium and long-term financing. This endeavor would provide a positive contribution to the full integration of the region into the Western European networks and in the increase of cohesion in respective countries through more solid banking institutions.

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