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IMPACT OF FINANCIAL CRISIS ON BANKING EFFICIENCY: EVIDENCE FROM ROMANIA

Case study

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JEL Classification
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Abstract

In this paper, we use a non-parametric approach to examine the efficiency of banks from Romania, during a ten-year period, from 2003 to 2012. We limit our sample to this period in order to observe the dynamics of efficiency before and after the financial crisis. We develop an empirical model that involves estimating bank efficiency. In order to measure the efficiency growth of the banking industry, we calculate Malmquist index using a non-parametric linear programming approach.Our results suggest that during the first period under study (2003-2008), the banks from Romania have been more efficient, mainly because of the integration in to European Union. In the second period (2009-2012), financial crisis took its toll on banking efficiency even though banks have attempted to reduce personnel costs.

Introduction

Romania is part of the emerging and developing countries group according to the International Monetary Fund. Due to reforms in 2000 (decade) and the accession to the European Union in 2007, the country enjoyed a favourable economic environment. Until 2009, the country had one of the highest growth rates in the European Union (*http://www.imf.org/external/pubs/ft/weo/2009/02/weodata/groups.htm#eu*).

Romania has been hit hard by the global financial crisis of 2007 2008, GDP declined by 6.6% in 2009. In addition, GDP reduced by 1.6% in 2010. From 2011, GDP came in positive territory, with a 3% and 3.1% growth in 2011, respectively 2012 (*http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/countries/RO-7e?display=graph*).

In this research, we want to know the impact of global financial crisis on banking efficiency. For this, we built a nonparametric model (Data Envelopment Analysis) and we used the Malmquist index. We postulated that the global financial crisis affected the banking efficiency, and therefore we will distinguish two periods, one with a higher efficiency until 2008 and a period with a lower efficiency after 2008 until 2012.

Literature review

Scholars are studying extensively banking efficiency in recent years. Some papers focus on North America, other on countries of Europe or Asia. Andries&Capraru investigates "the impact of European integration process on the cost efficiency of EU27 banking markets over period 2003-2009" (Andries&Capraru, 2012) and the "competition in banking systems in the EU27 as a whole for the period 2004-2010, but also for old members` banking systems compared with new members` banking systems and for banking systems form countries member of euro zone compares with banking systems from countries non-member of euro zone" (Andries&Capraru, 2013).

Other authors are focused on banking regulation and supervision (Barth et al., 2013; Chortareas et al., 2012), first researches "whether bank regulation, supervision and monitoring enhance or impede bank operating efficiency, based on an un-balanced panel analysis of 4050 banks observations in 72 countries over the period 1999–2007" (Barth et al., 2013). The latter investigates "the dynamics between key regulatory and supervisory policies and various aspects of commercial bank efficiency and performance for a sample of 22 EU countries over 2000–2008" (Chortareas et al., 2012) by employing the Data Envelopment Analysis. Hasan, Koetter and Wedow, (2009) test "whether regional growth in 11 European countries depends on financial development and suggest that the use of cost and profit efficiency estimates as quality measures of financial institutions." What is different about this paper is the use of the relative ability of banks to intermediate funds as a measure for quality of financial institutions.

Two papers focus on the differences between the two states and between local and foreign banks (Tiko&Jureviciene, 2014; Havrylchyk, 2006). The first "aims to make cross country analysis in banking sector" (Tiko&Jureviciene, 2014) by employing non-parametric frontier technique Data Envelopment Analysis and the latter "investigates the efficiency of the Polish banking industry between 1997 and 2001" (Havrylchyk, 2006) by using also Data Envelopment Analysis.

Three papers are focused on different parts of Europe: Central and Eastern Europe (Koutsomanoli-Filippaki, Margaritis&Staikouras, 2009), South Eastern Europe (Staikouras, Mamatzakis&Koutsomanoli-Filippaki, 2008) and the new EU states (Koutsomanoli-Filippaki,

Mamatzakis&Staikouras, 2009). For the first paper, authors employ "the directional technology distance function and provide estimates of bank efficiency and productivity change across Central and Eastern European (CEE) countries and across banks with different ownership status for the period 1998–2003" (Koutsomanoli-Filippaki, Margaritis&Staikouras, 2009). The second paper analyzes "cost efficiency in the banking sector of six South Eastern European countries over the period 1998–2003" (Staikouras, Mamatzakis&Koutsomanoli-Filippaki, 2008). The latter "opts for the stochastic frontier methodology to investigate the impact of structural reforms on profit efficiency in the banking industry of four new European Union Member States over the period 1999–2003" (Koutsomanoli-Filippaki, Mamatzakis&Staikouras, 2009).
Other studies are focused on different aspect of efficiency in Europe: technical and allocative efficiency (Brissimis, Delis &Tsionas, 2010), integration and efficiency convergence (Casu&Girardone, 2010), efficiency and risk (Fiordelisi, Marques-Ibanez &Molyneux, 2011), efficiency and stock performance (Liadaki&Gaganis, 2010) and convergence in banking efficiency (Weill, 2009). The first paper specifies "an empirical framework for estimating both technical and allocative efficiency using the translog cost-share system, thus providing a solution to the issue known in the literature as the Greene problem" (Brissimis, Delis &Tsionas, 2010). The second evaluates "the recent dynamic of bank cost efficiency by means of data envelopment analysis (DEA)" (Casu&Girardone, 2010). The third "assess the inter-temporal relationship between bank efficiency, capital and risk in a sample of European commercial banks employing several definitions of efficiency, risk and capital and using the Granger-causality methodology in a panel data framework" (Fiordelisi, Marques-Ibanez &Molyneux, 2011). The forth "examine whether the stock performance of EU listed banks is related to their efficiency" (Liadaki&Gaganis, 2010). The fifth "aims to check whether financial integration has taken place on the EU banking markets, by investigating the convergence in banking efficiency for European countries between 1994 and 2005" (Weill, 2009).
Many scholars have studied banking efficiency in recent years through various methods. Through this research, we aim to highlight the impact of the crisis on the efficiency of banks in Romania by using DEA and Malmquist index.

Methodology

In order to calculate the banking efficiency in Romania we use Data Envelopment Analysis (DEA).). "One of the advantages of DEA is that it works well with small samples, as the one used in our research. Other advantages of this technique are that it does not require any assumptions to be made about the distribution of inefficiency and it does not require a particular functional form on the data in determining the most efficient banks. DEA has drawbacks, it assumes data to be free of measurement error and it is sensitive to outliers" (Popovici, 2013, p. 785).
Coelli et al. (2005) also point out that: "having few observations and many inputs and/or outputs will result in many firms appearing on the DEA frontier; treating inputs/outputs as homogenous commodities when they are heterogeneous may bias the results; not accounting for differences in the environment may give misleading results; standard DEA does not control for multi-period optimization or risk managerial decision making."
We selected the following options for our model. First, an input-oriented DEA approach because, in crisis, banks are interested to minimize costs. Second, Variable Returns-to-Scale (VRS) and Constant Returns-to-Scale (CRS) because we use the options Malmquist index and the results are the same, whichever options

we choose. Third, Malmquist index to measure productivity change and to decompose it into technical change and technical efficiency change.

Data and variables used

All the data we use in this paper is taken from the Bureau van DijkBankscope database. We selected banks with data for at least ten years (2003-2012). The banks that do not have information for at least 10 years were excluded from the research. The sample consists of nine banks. Scholars have not reached a consensus regarding the inputs and outputs used in efficiency analysis (Berger & Humphrey, 1997). We use the intermediation approach because is particularly appropriate for banks where most activities consist of turning large deposits and funds purchased from other financial institutions into loans or financing and investments (Favero&Papi, 1995). For inputs, we use total customers deposits and deposits from banks, and for outputs loans to customers and loans to banks (Sanjeev, 2006).

Empirical results

In (table 1) we see the technical efficiency change (Effch), pure technological efficiency change (Pech) and scale efficiency change (Sech). The hypothesis, the financial crisis had a major impact on banking efficiency and we expect a decrease after effects begin to be felt by banks, is verified as we can observe in (Table 1). From the 7^{th} year, 2009, efficiency is reduced on all three calculated components. Our research has some weaknesses. First, because we wanted to do a research for a ten years' time, five years before the crisis and five years after, we removed major banks from assets standpoint. Second, the application used, DEAP, does not allow working with unbalanced panel data. Therefore was necessary to reduce the sample.

Conclusion

The global financial crisis and recession has strongly affected the global financial system. Some banks went bankrupt; the government provided financial support for others banks with financial difficulties.

The research hypothesis, financial crisis has influenced banking efficiency, is verified (Table 1). Before crisis, banking efficiency was at a high level, but since 2009, when the crisis effects were visible in Romania, banking efficiency decreased significantly.

In further research, we will use another application to eliminate the disadvantages listed above and be able to work with missing values and unbalanced panel data. Another research direction may be cost efficiency to demonstrate how have been affected by the financial crisis and the recession.

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Appendices

Table No. 1.
Malmquist Index Summary of Annual Means

Year	Effch	Pech	Sech
2	1.008	0.971	1.038
3	0.854	1.111	0.768
4	1.300	1.050	1.238
5	0.586	0.592	0.990
6	2.193	1.938	1.132
7	0.640	0.749	0.854
8	1.389	1.297	1.071
9	0.982	1.024	0.959
10	0.862	0.914	0.943
Mean	1.009	1.019	0.990

Source: Output DEAP 2.1