

Yiwei Fang – Iftekhar Hasan – Katherin Marton

**Bank efficiency in transition
economies: recent evidence from
South-Eastern Europe**



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**Suomen Pankki
Bank of Finland
PO Box 160
FI-00101 HELSINKI
Finland
☎ +358 10 8311**

**<http://www.suomenpankki.fi/en>
E-mail: Research@bof.fi**

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Yiwei Fang* – Iftekhar Hasan** – Katherin Marton***

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The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Bank of Finland.

- * Lally School of Management and Technology, New York, USA. Email: fangy2@rpi.edu.
- ** Lally School of Management and Technology, New York, USA and Bank of Finland. Email: hasan@rpi.edu. Corresponding author.
- *** Fordham University, New York, USA. Email: marton@fordham.edu.

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Bank efficiency in transition economies: recent evidence from South-Eastern Europe

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Yiwei Fang – Iftekhar Hasan – Katherin Marton
Monetary Policy and Research Department

Abstract

This study examines the cost and profit efficiency of banking sectors in six transition countries of South-Eastern Europe over the period 1998–2008. Using the stochastic frontier approach, our analysis reveals that the average cost efficiency of SEE banks is 68.59% and the average profit efficiency is 53.87%. The second-stage regressions on the determinants of bank efficiency further show that foreign banks are associated with higher profit efficiency but moderately lower cost efficiency. Government banks are associated with lower profit efficiency. The efficiency gap between foreign banks, domestic private banks and government banks, however, has narrowed over time. We also find that the degree of individual banks' competitiveness has a positive association with both cost and profit efficiency. Finally, institutional development, proxied by progress in banking reforms, privatization and corporate governance restructuring, also has a positive impact on bank efficiency.

Keywords: transition banking, bank efficiency, foreign ownership, institutional development

JEL classification numbers: G21, P30, P34, P52

Mitä tuoreet tilastot Kaakkois-Euroopasta paljastavat siirtymätalouksien pankkien tehokkuudesta?

Suomen Pankin keskustelualoitteita 5/2011

Yiwei Fang – Iftekhar Hasan – Katherin Marton
Rahapolitiikka- ja tutkimusosasto

Tiivistelmä

Tässä tutkimuksessa tarkastellaan pankkitoiminnan kannattavuutta ja kustannustehokkuutta kuudessa Kaakkois-Euroopan maassa vuosien 1998 ja 2008 välisenä aikana. Stokastisen rintamaestimointimenetelmän avulla lasketut arvioit viittaavat siihen, että Kaakkois-Euroopan pankkien kustannustehokkuus on keskimäärin 68–59 % ja kannattavuus 53–87 %. Estimoidun pankkien tehokkuutta selittävän tilastollisen mallin mukaan ulkomaiset pankit ovat kotimaisia pankkeja kannattavampia mutta lievästi kustannustehottomampia. Valtion omistamien pankkien kannattavuus ei puolestaan yllä vastaavanlaiseksi kuin muiden pankkien. Ulkomaisten pankkien, kotimaisten yksityisten pankkien ja valtion pankkien väliset tehokkuuserot ovat kuitenkin ajan myötä kaventuneet. Tutkimustulosten mukaan yksittäisten pankkien hyvä kilpailukyky on lisäksi yhteydessä niiden hyvään kannattavuuteen ja kustannustehokkuuteen. Institutionaalinen kehitys, jota tutkimuksessa mitataan pankkitoiminnan uudistusten edistymisellä, yksityistämisellä ja yritystoiminnan hallinta- ja valvontajärjestelmien rakennejärjestelyillä, puolestaan parantaa pankkien kannattavuutta.

Avainsanat: siirtymäajan pankkitoiminta, pankkien tehokkuus, ulkomainen omistus, institutionaalinen kehitys

JEL-luokittelu: G21, P30, P34, P52

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1 Introduction

During the 1990s, banking sectors in transition economies of Central and Eastern Europe (CEE hereafter) had gone through dramatic changes due to liberalization, privatization, and consolidation accompanied by large-scale participation of foreign banks. As the second decade of transition ended most countries transformed successfully from the former socialist monobank systems to market-oriented, privately owned systems. This restructuring process received considerable interest both from academics and policy makers. Existing studies are focused predominantly on the banking sectors in transition countries of CEE. Less attention has so far been devoted, to the examination of South-Eastern European countries (SEE hereafter) where political events delayed implementation of major economic reforms. Despite the significant and rapid progress of the last decade, the relatively late start of the transition process, and lack of reliable and sufficiently long data have hampered such research.

Our study seeks to fill this gap by examining banking efficiency for six countries in the SEE region (including Romania, Bulgaria, Croatia, Macedonia, Serbia and Albania).¹ Using financial data from Bankscope, we calculate cost- and profit efficiency for 171 commercial banks over the 1998–2008 period. By reviewing the literature on bank efficiency we identify factors that could explain the efficiency differences among banks in countries of the SEE region. We find important evidence in the literature that efficiency of banking sectors in CEE countries has significantly been influenced by ownership, market concentration and institutional variables. In our study we test whether and to what extent these main factors that were found to impact CEE banking efficiency are also applicable to SEE banks.

Our analysis on efficiency estimation reveals that with the average cost efficiency of 68.59% and the average profit efficiency of 53.87%, there is significant room for improvement though there are, however, substantial differences among the six countries in SEE. In exploring the factors that could explain variations in cost- and profit efficiency among banks, first we investigate the role of ownership. Controlling for various bank characteristics, the regression results show that ownership has a significantly impact on efficiency, though it influences cost and profit efficiencies differently. Using domestic private banks as benchmark, foreign majority ownership is associated with significantly higher profit efficiency and marginally lower cost efficiency. Compared to domestic private banks government owned banks exhibit significantly lower profit efficiency but do not differ in cost efficiency. Our findings are consistent with former research findings foreign banks apply best-practice management and

¹ We omitted Bosnia and Herzegovina, and Montenegro from our study since we could not obtain sufficient and long enough data.

compared to their domestic counterparts obtain higher return on their investment in developing countries (ie Claessens et al, 2001; Hasan and Marton, 2003; Berger et al, 2010). There is, however, also some evidence that their initial disadvantage in local knowledge in a new market may create a liability of foreignness, at least during the early years of their operations, and this makes them incur higher costs than domestic players (Green et al, 2004; Zajc, 2006; Lensink et al, 2008). Since our study covers a relatively long time period (1998–2008), we interact ownership with the time trend so that we can assess whether the effect of a specific ownership continues during the entire period. Interestingly, we find that over time foreign banks become more cost efficient but less profit efficient than domestic private banks. Over time, government-owned banks also start to catch up with domestic private banks and become more profitable in the later years of the transition. Secondly, we examine the role of individual banks' competitiveness or market power on their efficiency. We measure competitiveness of a bank by the Lerner index, and find that banks with higher Lerner index are associated both with higher cost- and profit efficiency. This implies that higher market power of a bank allows it to reduce costs through economies of scale and gain monopoly rents. Thirdly, we investigate the role of institutional development by regressing banking efficiency on indicators of banking reforms, enterprise restructuring, and privatization. Our findings support the positive impact of institutional reforms. In particular, liberalization and relaxation of regulation of the banking sectors allow banks to gain economies of scope and scale. Privatization and improved corporate governance of enterprises also enhance efficiency of banking sectors.

We believe that a better understanding of the factors that influence the performance of SEE banking sectors is of major interest both to researchers and policy makers for a number of reasons. Firstly, though political conflicts delayed the transition process of SEE countries, with the economic and political stabilization of this region, significant and fast growth has taken place in recent years (Backe and Walko, 2008). The functioning of a competitive and efficient banking system is also crucial to reduce the gap between this economically relatively underdeveloped region and the rest of Europe. It is therefore of timely and utmost interest to investigate how well banking sectors perform, and what factors shape bank performance in these transition countries. Secondly, the momentum of EU accession also highlights the necessity to better understand the performance of SEE banks. Bulgaria and Romania joined already the EU in 2007 and in several other SEE countries negotiations for future accession are under way. In others, a beginning in negotiations would require significant prior changes. To meet the criteria of EU membership, it is crucial for policy makers to know whether their financial sectors can withstand competition under open market conditions. Thirdly, despite of similarities with CEE, countries in SEE also have idiosyncratic features that set them apart and it is of interest to see whether banking development follows a similar pattern than in CEE. Countries in SEE are

more heterogeneous than those in CEE, with significant differences in their legacy from the socialist system, political events that unfolded after 1989, level of economic development and accession status to the EU. Such variations may have shaped the performance of the banks in countries of the SEE region differently from their CEE counterparts. Therefore, the main objective of our paper is to provide an extensive analysis of bank performance in the SEE region.

The rest of the paper is structured as follows. In section 2, we start with a brief literature overview of banking efficiency research in transition economies, and then provide a description of the background and recent development of banking industries in SEE countries. In section 3, we present methodology, data, and summary statistics. Section 4 reposts the results of efficiency estimation as well as regression analysis relating the determinants of cost- and profit efficiency of SEE banks. Section 5 gives our conclusions.

2 Literature review and background of SEE banking sectors

The literature identifies three major factors that tend to affect banking efficiency of transition economies, namely, ownership characteristics, market structure-competition and institutional reforms. In this section we present a brief overview of key findings on these factors. We then follow by a short description of features of banking industries in SEE countries.

2.1 Brief literature review on transition banking

Findings of the literature are inconsistent on the relative performance of foreign banks in transition countries. Early studies of single country experiences find generally that foreign banks perform better, followed by domestic private and state-owned banks (ie Hasan and Marton, 2003 for Hungary; Kraft et al, 2006, Jemric and Vujcic, 2002 for Croatia; Weill, 2003 for Czech Republic and Poland; Mertens and Urga, 2001 for Ukraine). The higher efficiency of foreign banks is also confirmed by a number of cross-country studies (ie Grigorian and Manole, 2002; Bonin et al, 2005a, b; Fries and Taci, 2005; Kasman and Yildirim, 2006). The higher efficiency of foreign-owned banks is explained by their superior management skills and advanced technology, access to lower costs of funds from the parent company, less subject to domestic credit allocation rules, lack of legacy costs, such as non-performing loans from former periods, and differences in clientele, such as larger share of foreign-owned companies than that of

domestically owned companies (Demirguc-Kunt and Huizinga, 2000; Nikiel and Opiela, 2002). Moreover, it is also argued that foreign banks tend to cherry pick the most profitable opportunities.

In contrast to such findings, there is also significant research evidence that does not find significant cost efficiency differences between foreign- and domestically owned companies or find that domestically owned companies are more efficient (Vander Venet, 1996; Green et al, 2004; Zajc, 2006; Lensink et al, 2008; Mamatzakis et al, 2008). These studies tend to emphasize the inadequate information of foreign banks about local conditions and markets and the difficulties to establish relational networks. Such difficulties tend to result in higher costs in new market (Buch, 2003; Berger et al, 2000). Over time, improvement in the institutional environment tends to reduce these cultural and informational barriers and allows foreign banks to take full advantage of their greater expertise compared to domestic banks (Lensink et al, 2008; Haselmann and Wachtel, 2010).

Evidence from former studies also tend to support the view that performance of domestic private banks is less efficient than of foreign banks, and that among the three groups government-owned banks are the least efficient. Recent empirical evidence, however, identifies efficiency improvement of domestically owned banks. For example, Bonin et al (2005b) find that domestic banks, compared to foreign banks, enjoy local advantages in pursuing fee-for-service business. Analysis at cost efficiency of Bulgarian banks (Nonovsky and Tochkov, 2009) shows that the efficiency gap between domestic and foreign banks was reduced during the 2005–2007 period. Comparing domestic private- and state-owned banks, Kraft et al (2006) find that de novo private and privatized banks are not more efficient than state-owned banks. Similarly, Karas et al (2010) research of Russian banks does not find significant difference between efficiency of privately- and state-owned bank. These studies indicate that the improved performance of government-owned banks could be partly explained by their advantage of accessing lower rate of deposit because of government support (Karas et al, 2010), and partly by improved governance and competitiveness subsequent to their restructuring and modernization (Kraft et al, 2006).

The two major streams of theories that establish relationship between competition and bank performance have predictions that conflict. The quiet life hypothesis, on the one hand, argues that when the firm has monopoly power managers tend reduce their efforts and grab a share of monopoly rents through discretionary expenses (Hick, 1935). Under such assumption market power affects negatively both cost- and profit efficiency of banks. The structure-conduct-performance paradigm, on the other hand, assumes that strong market power allows banks to extract monopolistic profits by offering lower deposit rates and charging higher loan rates (Bain, 1956). This would predict a positive relationship between market power and profit efficiency. Moreover, to monitor borrowers

banks rely on their comparative advantage (Diamond, 1984), consequently, strong market power allows them to enjoy economies of scale and reduce costs of monitoring. Consequently, competitiveness of individual banks leads to higher cost efficiency. Empirical evidence on the role of banking competition on efficiency in transition economies was inconsistent as well. Yildirm and Philippatos (2007), examining CEE banking sectors, find that industry competition has positive influence on cost efficiency but is associated negatively with profit efficiency. Brissimis et al (2008), however, find that greater competition leads to higher profit efficiency. Kosak et al (2009) use the number of banks that operated in the country as proxy for competition and find that during 1996–2006 an increase in the number of banks was associated with higher cost efficiency. These papers that look at market competition in terms of industry market structure tend to support a positive relationship between market competition and bank efficiency. Research also investigates the relationship between market power of individual banks and their efficiency. Pruteanu-Podpiera et al. (2008), for example, examine the effect of individual banks' market power on their efficiency in the Czech Republic, and find that greater market power of firms is associated with higher efficiency. Their findings raises questions about policies that seek to promote bank competition so that the price of financial services is reduced. Their findings also suggest that greater banking competition may hamper banks to gain economies of scale in monitoring. This in turn would result in higher loan rates.

It is well established that banks behave differently under different institutional settings (ie Haselmann and Wachtel, 2010). This is also the case for transition economies where during the past two decades policy changes and market reforms have contributed to important changes in the institutional framework. In analyzing the impact of banking reforms in 15 transition economies during the 1994–2001 period, Fries and Taci (2005), for example, show that banks' costs decrease during the early stages of regulatory reforms, but over time with the implementation of reforms costs increase. Brissimis et al (2008) study of transition economies that became EU members find that banking reforms exerted a positive impact on profit efficiency. Griogorian and Manola (2002), argue that different regulatory measures affect cost efficiencies differently. For example, higher minimum capital requirement for banks improved cost efficiency but limits on exposure to a single borrower had no significant impact. A negative impact of banking regulatory changes on bank cost efficiency is found by Asafteri and Kumbhakar (2008) and Tockhov and Nenovsky (2009). Regarding the effect of privatization, Bonin et al (2005b) show that both the method and timing of privatization matters: early-privatized banks were found to be more efficient than those privatized later. Kraft et al (2006) analysis of the Croatian banking sector, however, finds that privatization did not improve efficiency immediately. Apart from these studies that investigate the impact of institutional variables on

efficiency there is a large body of literature that relates the importance of legal environment to financial sector development (ie Pistor et al, 2000; Haselmann and Wachtel, 2010; Haselmann et al, 2010). These studies suggest that bank lending in transition economies is greatly influenced by insolvency laws, contract enforcement, and creditor protection.

2.2 Background of SEE banking industries

Though the countries of SEE are heterogeneous in terms of their legacy and political conflicts they experienced, the transition process of their banking sector shows commonalities. Political events delayed implementation of major economic reforms, and inadequate bank regulation and supervision and accumulation of large non-performing loans from state-owned enterprises contributed to financial crisis that all the SEE countries experienced in the late 1990s. Privatization and recapitalization of banks were speeded up subsequent to banking crisis. This took place with a significant participation of foreign banks and support from the EBRD and IMF. By around 2000, most countries completed privatization of their banks and several of them initiated accession negotiations with the EU. Under the accession agreements respective governments made commitments to align their financial sector regulatory and supervisory norms with that of the EU and to open up the banking sector to foreign investors. These measures improved significantly the investment climate and encouraged foreign banks to participate actively in privatization of state-owned banks. Most of the foreign banks are based in neighboring European countries, notably in Austria, Italy, Greece, and in some of the countries from France and Turkey. Prior to entering SEE markets, most of these same foreign banks made major acquisitions in the privatization of CEE banks and gained experience in operating in this region. The banking sectors that emerged in SEE countries are largely foreign owned, and the share of state-owned- and domestically- owned private banks is very small. Summary review of the role of banks by ownership of assets and changes over the 1999–2008 period are presented in Table 1.

Transition experience of countries was influenced by their legacy and the subsequent political events. Bulgaria and Romania, for example, had more rigid and centralized economic system than most other transition countries. At the onset of the reforms, during the early 1990s, the government promoted entry of new banks through very liberal policies but entry of foreign banks was very restrictive. Internal political events delayed privatization banks and their continued lending to ailing state-owned enterprises resulted in the accumulation of large non-performing loans and the subsequent banking crisis. By 2000, the privatization process was largely completed in Bulgaria, though this process was slower in

Romania. In 2000, Bulgaria and Romania's negotiation for accession to the EU began and under the accession criteria entry restrictions on foreign banks were eliminated. By the late 2000s, the share of assets controlled by foreign banks was close to 90%.

Compared to other SEE countries, the former Yugoslavia, was in favorable position at the onset of transition. It had a decentralized economy, mostly under worker management, and traded extensively with Western Europe. In the successor states of former Yugoslavia, (Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia) a two-tier banking sector had already been functioning since the early 1960s when the former Yugoslavia abandoned the Soviet style mono-banking system. This initial advantage had, however, largely disappeared with the onset of the Balkan wars in 1991. Following its independence from the former Yugoslavia in 1991, Macedonia suffered a series of economic shocks. In 1992, 85% of the sector's assets were non-performing. Under the early liberal regulatory norms many small private banks were established. Subsequent to a banking crisis, in 2000, Macedonia began negotiations with the EU and adopted regulation to bring the legislative framework closer to EU regulations. Privatization foreign ownership increased rapidly, despite the relatively large number of banks the sector became highly concentrated. In 2008, the 2 largest foreign-owned banks accounted for almost 2/3rd of the country's deposits and assets. In Croatia, the government promoted entry of new private banks by very liberal policies. However, a large part of the banks were undercapitalized and in 1998/99 a banking sector crisis erupted. In 2000, under a new government, negotiations of Croatia for EU membership began and reform of the banking sector accelerated. In 2001 the share of foreign banks in the sector's assets increased to 84% from 7% in 1998, and in 2008 reached over 90 percent. In Serbia, as a result of over a decade of military conflicts as well as political and economic isolation of the country, the restructuring of the financial sector started later than in other SEE countries. During the Balkan wars the central bank confiscated the foreign exchange reserves of the banks that affected adversely the liquidity of banks as well as the trust of the population in banks. In 2000, banking sector reform started under a new government and several banks were closed. In privatization of state-owned banks the government gave priority to foreign banks so that banks can be recapitalized. By 2009, 70% of the sector's assets were foreign owned (EBRD, 2010). Economic reforms in Albania started very slowly which had impacted adversely the situation of state-owned banks. In 1997, 90% of the assets of the 3 largest state-owned banks were nonperforming. Bailout of the financial sector by the government in the late 1990s was very costly and underlined the urgency of a rapid privatization and recapitalization through participation of foreign banks. By 2005, the banking sector was fully privatized and share of foreign owned assets was 93 percent (EBRD, 2006).

3 Methodology and data

3.1 Estimation of cost- and profit efficiency

In line with Berger and Mester (1997), we measure cost efficiency by how close a bank's actual cost is to what a best-practice bank's cost would be to produce the same bundle of outputs. Banks that are cost inefficient are either wasting some of their inputs (technical inefficiency) or are using the wrong combination of inputs to produce outputs (allocative inefficiency), or both (Mester, 2005). Similarly, profit efficiency is measured by how close is a bank's profit to that what the best-practice bank would produce given the same input conditions. The concept of profit efficiency is derived mostly from the revenue side of the banking business, although it is also impacted by costs. For profitability and firm value considerations, profit efficiency is a better concept since it also takes the quality of the outputs into account (Mester, 2005).

Following many recent studies on banking efficiency in transition countries (ie Bonin et al, 2005a; Yildirim and Philippatos, 2007; Karas et al, 2010), our paper employs the stochastic frontier analysis (SFA) developed by Aigner et al (1977) and Meeusen et al (1977). The advantage of SFA is that it can disentangle the inefficiency term from the residual. We specify input prices and outputs following the intermediation approach.² The two input prices are the price of borrowed funds (interest expense divided by total borrowed funds) and the price of capital per fixed asset (non-interest expense divided by fixed asset), and the three outputs are total loans, securities, and other earning assets. We also include total equity and nonperforming loans as fixed inputs in the estimation function to account for the banks' endogenous choice of risk (Huges et al, 2001). Using a Cobb-Douglas translog functional form, our cost efficiency model is specified as follows

$$\begin{aligned} \ln(\text{TOC} / w_2) = & \alpha_0 + \alpha_1 \ln(w_1 / w_2) + \frac{1}{2} \alpha_2 \ln(w_1 / w_2) \ln(w_1 / w_2) + \sum_{k=1}^3 \beta_k \ln(y_k) + \\ & \frac{1}{2} \sum_{k=1}^3 \sum_{k^*=1}^3 \beta_{kk^*} \ln(y_k) \ln(y_{k^*}) + \frac{1}{2} \sum_{k=1}^3 \gamma_k \ln(y_k) \ln(w_1 / w_2) + \sum_{k=1}^3 \sum_{l=1}^2 \delta_{kl} \ln(y_k) \ln(z_l) + \\ & \frac{1}{2} \sum_{l=1}^2 \eta_l \ln(w_1 / w_2) \ln(z_l) + \text{year_dummies} + \text{region_dummy} + \text{GDP_growth} + \\ & \text{inflation} + v + \mu \end{aligned}$$

² The intermediation approach considers banks as mediators that collect deposits and transform to loans and other earning assets using labor and fixed capital (Sealey and Lindley, 1977). It has been used, for example, by Berger and Mester (1997), Weill (2003), Karas, Schoors, and Weill, 2010.

The definition of variables in the cost function is reported in Table 3, μ is the inefficiency term and is assumed to have half-normal distribution with positive value. The v represents the random noise which incorporates both measurement error and luck. In the estimation, we normalize the equation by one input price (w_2) to impose linear homogeneity of input prices (Kuenzle, 2005). Since we assume a common frontier for multiple countries it is important to control for country heterogeneity (Berger and Mester, 1997; Kosak and Zorik, 2010). Consequently, we include GDP growth and inflation as proxies for economic development and stability, respectively. We also include region dummy to account for differences between CEE and SEE states (Grigorian and Manole, 2002). Kosak and Zorik (2010) find that inclusion of country-specific environmental variables in the cost frontier function does not notably change the estimated cost efficiency levels. They suggest that this is due to similar transition paths environmental conditions in the new EU member states. Therefore, we do not include institutional variables in the efficiency estimation, but focus on these exogenous variables in the second stage where we try to explain differences in efficiency (this approach has been used in Bonin et al, 2005a and Yildirim and Philippatos, 2007). Year dummies are included to control for time fixed effect.

Our approach to profit efficiency estimation follows the non-standard specification.³ The profit function is similar to the cost function except we replace total cost with total profit (PBT) on the left-hand-side of the equation. The error term becomes $v_{it} - u_{it}$ because profit inefficiency reduces profit below the frontier or best practice level. To avoid taking logarithms of negative profit, consistent with the literature, we add a constant amount to all observations that equals to the absolute value of the minimum profit (-4383) plus 1.

Although the main focus of this paper is the banking sectors of SEE countries we include banks of eight major CEE countries in the frontier analysis. This allows us to use the higher CEE bank efficiency levels as benchmark for SEE and as well as to compare the two groups. We use financial data and income statement of banks from BankScope for the period the 1998–2008 period. In editing the data we took into account the reported shortcomings of the database (Bonin et al, 2005a).⁴ We allow failures, mergers and de novo entry of banks. To include a bank in our sample a bank has to have a minimum of continuous 3 years of data to obtain reliable efficiency estimation (Fries and Taci, 2005). The selection process

³ Nonstandard profit function is specified in terms of output quantities and input prices as it assumes the possibility of market imperfection and banks therefore have some power to adjust output prices and input quantities to maximize profit (Humphrey and Pulley, 1997).

⁴ We make a careful examination of multiple entries for the same bank because they are not completely duplicated observations. First of all, we choose the unconsolidated financial reports of commercial banks since this gives the financial data for the bank rather than the holding company. Then we check the accounting standards. International Accounting Standards (IAS) data are used wherever available; otherwise, inflation-adjusted local accounting standards data are used. All bank-level data are inflation adjusted and reported in thousand USD.

yields an unbalanced panel with 171 banks (943 observations) in six SEE countries (Romania, Bulgaria, Croatia, Macedonia, Serbia, and Albania), and 209 banks (1032 observations) in eight CEE countries (Poland, the Czech Republic, Slovakia, Hungary, Slovenia, Lithuania, Latvia and Estonia). Table 2 presents the country distribution and means values of key financial variables of banks in each country. Table 3 presents the definitions and summary statistics of the input and output variables for all banks in our sample.

3.2 Measuring bank competition

Our measure of bank competition is the Lerner index, a well-established indicator of competitiveness and market power at individual bank level. This index is defined as the markup of the price over marginal cost, divided by the price (Lerner, 1934). It captures the power of individual banks to set prices above the marginal cost. Higher value of the Lerner index denotes higher market power of the bank. The Lerner index is calculated as follows, $Lerner = \frac{P_{it} - mc_{it}}{P_{it}}$. In line

with previous studies estimating the Lerner index in banking (eg Brissimis et al, 2008; Koetter et al, 2008; Maudos and de Guevara, 2007), we define the price as total revenue (REV) divided by total earning assets (Y), where Y equals the sum of loans (y1), securities (y2), and other earning asset (y3). Marginal cost is calculated from the estimation of a translog cost function and is specified as follows

$$\ln(TOC/w_2) = \alpha_0 + \alpha_1 \ln(w_1/w_2) + \frac{1}{2} \alpha_2 \ln(w_1/w_2) \ln(w_1/w_2) + \beta_1 \ln(Y) + \beta_2 \ln(Y) \ln(Y) + \frac{1}{2} \ln(Y) \ln(w_1/w_2) + \frac{1}{2} \sum_{i=1}^2 \ln(Y) \ln(z_i) + \frac{1}{2} \sum_{i=1}^2 \eta_i \ln(w_1/w_2) \ln(z_i) + \text{year_dummies} + \text{region_dummy} + \text{GDP_growth} + \text{inflation} + v + \mu$$

We use stochastic frontier analysis to estimate this equation and obtain the coefficients. Marginal cost follows directly the estimation by taking derivatives with respect to Y. Since the Lerner index is the markup of the price over marginal cost divided by the price it has an upper bound of one when the bank has monopoly power and operates with zero marginal cost. It has a value of zero when the price is equal to marginal cost and the bank operates in a perfect competition market. The Lerner index can also be negative. This happens when the price is below marginal cost and the bank is in serious trouble. Table 4 (Column 4) reports the Lerner index of SEE banks from 1998 to 2008.

3.3 Bank ownership

The data for ownership is drawn from BankScope. Since banks of transition countries changed ownership several times over the past two decades, it is important to have yearly ownership data so that all the ownership changes in our sample period are identified (Haas and Van Lelyveld, 2006). A limitation of BankScope is, however, that it only provides shareholder information for the year when the database was last updated. Therefore, we take separate editions of the database (1999, 2001, 2003, 2005 and 2007) and fill in the years in between with the previous year if data are available. We also go back to 1998 using the same ownership as 1999. To achieve higher accuracy we search manually bank homepages and business publications as a double check. Through this process we identify shareholder information for 145 SEE banks with 689 observations over the time period of 1998 to 2008. We group shareholders into three categories: foreign, domestic private and government. We then calculate the aggregated shares held by each group, and construct three ownership dummy variables for each bank in each year according to the type of majority shareholders. In Table 4 (first three columns), we show the evolution of ownership structure in SEE countries. The numbers reported represent the percentage of foreign-, domestic private-, and government-owned banks from 1998 to 2008. Consistent with progress in the privatization process, our sample shows that the share of foreign banks increased dramatically over the years. By the end of 2008, foreign banks gained a dominant market share (about 67%). Domestic private and government owned banks account for about 29% and 4% of the sample, respectively.

3.4 Indicators of institutional development

Indicators of institutional development are obtained from the European Bank for Reconstruction and Development (EBRD hereafter) research output. EBRD measures banking reform progress in the following three areas: first, creation of a two-tier banking sector and interest rate liberalization, second, establishment of regulatory norms for prudential regulation and supervision and full liberalization of credit and interest rates; and third, significant progress towards the implementation of the core principles of Basle Committee. The value of the indicator ranges from 1 to 4.3, a higher value denoting better progress.

Our institutional variable measuring progress of enterprise restructuring captures a country's adoption of modern corporate governance, tighter credit- and subsidy policies vis-à-vis enterprises, the enforcement of bankruptcy legislation, actions that foster competition and market discipline, the strengthening of financial discipline, and the hardening of budget constraints. The ultimate goal of

enterprise restructuring is to foster market-driven restructuring and improve corporate control via financial institutions and markets. The EBRD provides an indicator of progress in these areas. The indicator has a value ranging from 1 to 4.3 with a lower value indicating adoption of few reforms to promote corporate governance and a higher value meaning significant improvement in corporate governance and more effective corporate control exercised through domestic financial institutions and markets, fostering market-driven restructuring.

Our third measure of institutional development is related to privatization. EBRD compiles two indices to measure this progress (large-scale privatization and small-scale privatization). The indicator for large-scale privatization ranges from 1.0 to 4.3, with 1.0 indicating very limited private ownership while an index of 4.3 indicates that more than 75 percent of enterprise assets is in private ownership with effective corporate governance and performance close to that of advanced industrial economies. The small-scale privatization refers to the privatization of small and medium-sized firms. The indicator ranges from 1.0 to 4.3, a higher value indicating progress in the privatization of small companies. We use the mean of the two indicators to obtain the average degree of privatization of all enterprises. Table 4 (last three columns) summarizes the pattern of institutional development over the time period of 1998 to 2008.

4 Results

4.1 Bank efficiency in SEE countries

Table 5 presents the estimated cost- and profit efficiency scores of six SEE banking sectors from 1998 to 2008 (three years of efficiency scores are unavailable for Albania due to insufficient data). As can be seen in Panel A, with an efficiency score of 76.95% the Croatian banking sector exhibits the highest cost efficiency and Serbia exhibits a lowest cost efficiency (54.75%) and it experienced substantial decline during the period of 2002 to 2005. Bulgaria and Romania have an average cost efficiency of 63.39% and 67%, respectively, and in both countries cost efficiency increased over time. We find that Albania and Macedonia have a relatively high cost efficiency. This suggests that the relatively high level of banking sector concentration in these countries allowed banks to benefit from economies of scale and production efficiencies.

Panel B of Table 5 reports profit efficiency scores. Bulgaria has the highest level of profit efficiency, followed by Macedonia, Albania, Croatia, and Serbia. Albania had a high level of profit efficiency before 2003. This could be attributed to the fact that until 2003 still over 70% of bank assets were invested in government treasuries that had high interest margin. Croatia has a stable level of profit

efficiency, but for Serbia profit efficiency has dropped greatly during the 2006–2008 period. Romania has the lowest profit efficiency in our estimation. Prior to the banking crisis of 1999 the efficiency level was 63% and since then decreased in most years. For most countries of the region profit efficiency decreased significantly during the global financial crisis of the 2007–2009 period albeit this drop varied by countries.

In Table 6 cost and profit efficiency scores are presented and compared for the SEE and CEE region for the 1995–2008 period. The analysis shows that cost efficiency of banks in SEE countries, on average, is 68.59% and significantly lower than that of CEE banks, though the average profit efficiency of SEE is not significantly different. It is interesting to note that despite the delayed restructuring of banking sector in SEE, the cost efficiency scores in the 1995–2002 period were not significantly different in the two regions. The divergence of the trend subsequent to 2001 is, however, interesting: average cost efficiency scores declined in SEE countries, and started to increase in CEE. Decrease in cost efficiency scores following completion of privatization and major structural reforms was also noted in other countries. Increased investments by the new owners tend to increase initial costs and thus reduce cost inefficiency. The benefits of such restructuring are usually manifest years later, as can be seen in the case of positive developments in CEE following 2001.

4.2 Regression analysis on the determinants of bank efficiency in SEE countries

4.2.1 Empirical model

The second part of our analysis tests the relationship between cost efficiency and our set of independent variables. Similarly model is used for establish the relationship between profit efficiency and our independent variables. The empirical model is specified as follows

$$\text{Eff}_{it} = \alpha_0 + \alpha_1 \text{foreign_dummy}_{it} + \alpha_2 \text{government_dummy}_{it} + \alpha_3 \text{competition}_{it} + \alpha_4 \text{banking_reform}_t + \alpha_5 \text{enterprise_restructure}_t + \alpha_6 \text{privatization}_t + \alpha_7 \text{controls}_{it} + \mu_{it}$$

The dependent variable ‘Eff’ represents the efficiency of bank *i* at time *t*, measured by both cost- and profit efficiency. The independent variables include bank ownership, competition, and three institutional reforms. Bank ownership is captured by two indicators of majority shareholders, namely ‘foreign_dummy’ and ‘government_dummy’. When both ‘foreign_dummy’ and

‘government_dummy’ are equal to 0, it refers to the benchmark group – domestic private banks. The Lerner index is used to proxy bank-level competitiveness or market power. Three institutional reforms are ‘banking_reform’, ‘enterprise_restructure’, and ‘privatization’. We use the indices compiled by the EBRD to proxy the progress of the reforms. One difficulty in including multiple institutional reforms in the same regression is that some of them are highly correlated. We therefore use the residuals from regressing each indicator on the others as orthogonal measures of these institutional reforms.

In the regression we control for the following bank-specific financial characteristics. Firstly, we use logarithm of total asset as the proxy for bank size. Secondly, since Hughes and Mester (1993) and Mester (1996) demonstrated convincingly that, managers’ risk preference may have important implications on efficiency, we control for loan-, capital- and nonperforming loan ratio to capture the degree of liquidity, capital, and credit risk, respectively. To avoid a potential reverse causality between risk and efficiency, these variables are the lagged levels of previous year. Thirdly, following Lensink et al (2008), we also include ROA of the previous year as the proxy for previous profitability and managerial efficiency. To control for time effect, we include ‘time trend’, calculated as the present year less the benchmark year (1997). We also assume that time may have different effects under different ownership structures, and therefore include the interaction terms between time trend and foreign majority (and government majority). To account for the possible effect of financial crisis we include a ‘crisis year dummy’, (1 for year 2007 and 2008, 0 otherwise). Country dummies are included in the regressions for ownership and competition variables. We do not include country dummies in the regression of reforms, since these are measured on the country level. Instead, we cluster the standard error by country to control for the heterogeneity across countries. Table 7 reports the overall regression results of cost efficiency.

In exploring the determinants of profit efficiency, we investigate the role of ownership, competition and institutional reforms, respectively. Regression results are presented in Table 8.

4.2.2 The role of bank ownership

As reported in the Column 1 of Table 7, ‘foreign_dummy’ is associated negatively with cost efficiency. The coefficient is -0.069 at 10% significance level, suggesting that in SEE region, foreign banks are marginally less efficient in optimizing operating cost than the benchmark group of domestic private banks. This finding is contrary to the prior findings on the higher cost efficiency of foreign owned banks compared to domestically owned ones (ie Hasan and Marton, 2003; Grigorian & Manole, 2002; Fries & Taci, 2005; Berger et al, 2009).

An explanation for the relative low cost efficiency of banks may be the result of the investment of foreign banks in branch modernization and training subsequent to the acquisition of former state-owned banks. In some countries research also found that the initial unfamiliarity with the local environment may result for foreign banks in higher costs in gathering and processing locally based relationship information (Green et al, 2004; Zajc, 2006; Lensink et al, 2008; Mamatzakis et al, 2008). Difficulties in breaking into existing relational networks tend also increase initial costs of operation (Buch, 2003). These explanations are supported by our findings in that we find that the cost efficiency of foreign banks tended to increase over time, which is captured by the positive coefficient of the interaction term 'foreign_dummy*time trend'. This suggests that once foreign banks undertook early investments and gained more experience with local markets their cost efficiency improved. For state-owned banks ('government-dummy') we do not find a significant relationship to cost efficiency. This suggests that on average government-owned and domestic private banks do not perform with different cost efficiency. This finding is consistent with some evidence from transition economies (Mamatzakis et al, 2008; Karas et al, 2010) that in some cases government-owned banks may have advantage of obtaining lower deposit rates and thus improving cost efficiency.

Reported in Table 8, we find that compared to domestic private banks foreign banks are associated with higher profit efficiency, while government-owned banks are associated with lower profit efficiency. Both coefficients are statistically significant at 1% level and economically meaningful. The higher profit efficiency of foreign banks is consistent with the general findings of literature on transition banking. Foreign banks offer a wider range of products and services than domestic banks and these products generally allow premium pricing. It may also be the result of an assumed 'cherry picking' practice according to which better local banks are privatized or acquired by foreign banks first (Bonin et al, 2005a). This phenomenon, however, would be a characteristic of the early years of privatization process and be of lesser relevance in later years. Our findings also suggest that the profit efficiency of foreign banks declined over the years. This is indicated by the negative sign of the interaction term between foreign ownership and time trend. Interestingly, the coefficient of 'government_dummy*time trend' is positive, which means that government banks have started to catch up with domestic private banks and they became more profitable in the later years. Overall, our results indicate that the gap between foreign-, domestic private-, and government owned banks has reduced over time. Consistent with some recent studies, this implies that the restructuring and modernization of banking system during the first decade of transition improved substantially governance and competitiveness of domestic banks (Kraft et al, 2006; Karas et al, 2010).

4.2.3 The role of competition

As shown in the second column of Table 7, competitiveness of individual banks, proxied by the Lerner index, has a positive impact on cost efficiency. This supports the argument that strong market power allows banks to reap economies of scale and reduce costs in monitoring (Pruteanu-Podpiera et al., 2008). The quiet life hypothesis is rejected here, as higher competitiveness (or more market power) does not lead to higher cost. It is also important to point out that since both cost efficiency and the Lerner index are derived from the same production function of total operating cost and therefore there is potential endogeneity problem. We conduct a Wald test for the exogeneity of the Lerner index and find that an instrumental variable approach is necessary. Following Koetter et al (2008), we use lagged level of Lerner index as instrumental variable. Results for the instrumental variable approach is reported in Column 3. The predicted Lerner index from the lagged level is positively and significantly associated with cost efficiency. A comparison with the OLS regression reveals that the magnitude of the coefficient almost doubles in the IV estimation in Table 7. This could be explained by the assumption that it takes time for the effect of competition on cost efficiency to become apparent. Hence, after using lagged level of competition to adjust the endogenous relation between the two measures, the magnitude of efficiency increases substantially. This result highlights the positive role of bank monopoly power in enhancing cost efficiency. In contrast to the quiet life hypothesis, our findings suggest that banks exhibiting the largest Lerner margins are those that are most cost efficient. We find similar results of competition on profit efficiency. In Column 2 of Table 8, we find that individual banks' competitiveness is significantly and positively associated with profit efficiency, suggesting that banks with greater market power could enjoy higher profits through higher interest margin. In Column 3, we use the instrumental variable approach by using lagged Lerner index in order to mitigate the causal relationship that higher efficiency produces both higher market power (Demsetz, 1973). The magnitude of competition becomes smaller, but remains significant at 1% level. Hence, our findings confirm the positive impact of market power on profit efficiency.

4.2.4 The role of institutional variables

For institutional reforms, we examine banking reforms, enterprise restructure, and privatization. As discussed in the model specification, since these three reform indices are highly correlated, we first adopt the residual approach to obtain the orthogonal measures of these institutional reforms, and then estimate them together in the same regression. The results show that all the coefficients of the

reform indices are positive and statistically significant, which provide strong evidence that a better institutional environment can lead to substantial gains in cost- and profit efficiency.

Elaborating each type of reform in detail, firstly, the positive role of banking reform on cost- and profit efficiency highlights the fact that liberalization of banking sectors and the subsequent relaxation of regulatory conditions reduce cost and enhance returns. It is also consistent with the studies of the CEE banking sectors that generally find banking reforms and liberalization exert positive impact (ie Brissimis et al, 2008; Fries and Taci, 2005). Secondly, we find enterprise restructuring to be positively related with both cost and profit efficiency, meaning that banks enjoy lower cost and higher profit when there are sufficient policies to promote enterprise restructuring and when there is effective corporate control and governance exercised through the markets. We therefore interpret our results as a support to the argument that a good corporate government structure helps reduce moral hazard problems of the lenders, and therefore it is critically important in the development of financial market in transition economies (Stiglitz, 1999; Pistor, 2000). Thirdly, consistent with Bonin et al (2005b), we find that privatization plays a significant role in influencing bank performance. More progress in privatization is associated with higher cost- and profit efficiency. The main underlying factor for this result is similar to that of enterprise restructuring. Specifically, the newly emerged private ownership is likely to promote an efficient banking market through enhanced competition and modern governance mechanism. Finally, in the last column, we include all the testing variables in one equation as a robustness test. Every finding in the prior tests remains robust except for the Lerner index. This may suggest that the effect of competition on cost efficiency is not robust after including ownership and institutional reform variables.

5 Conclusion

As the second decade of economic transition of South-Eastern Europe (SEE) draws to an end, through an arduous process of restructuring, most countries in the region have successfully developed privately-owned banking sectors. A competitive and efficient banking system is an important step to reduce the gap between the relatively underdeveloped SEE region and the rest of Europe. It is within this framework that our paper investigates the banking efficiency of SEE during the 1998–2008 period. We find that the average profit efficiency of this region is close to the CEE region, but average cost efficiency leaves considerable room for improvement. Clearly, the beginning of reforms does play an important

role. As the case of CEE shows, significant improvement in cost efficiency subsequent to restructuring may require a decade or so.

The findings of our study which analyzes data including the most recent years is quite novel and is different from studies that covered mostly the CEE countries and the earlier phases of the transition. For example, we find that foreign owned banks are somewhat less cost efficient than domestic private banks. Two factors may explain higher cost by foreign banks. First is their initial disadvantage in local knowledge in the SEE region. Second, subsequent to their acquisition of former state-owned banks, foreign banks invested in the local operations for the modernization of the branch, training and often branch expansion. At the same time, domestic banks that remained in the market improved their efficiency catered mostly to selected narrow niches where they held a comparative advantage. Our findings, however, support the general findings of the literature on the strong competitive advantage that foreign-owned banks enjoy in their operations in less developed markets. This advantage, compared to domestically-owned counterparts, is evident from the higher profit efficiency of foreign owned banks. Since profit efficiency is largely influenced from the revenue side it reflects the ability of foreign owned banks to offer a wide range of products and services that allows premium pricing. This profit efficiency however tends to decline over time, indicating the difficulties of maintaining such early competitive advantages. Consistent with this dynamics over the decade and changes in costs and profit efficiencies we also find that over time government-owned banks also start to catch up with domestic private banks and become more profitable in the later years of transition period.

Our findings on the positive relationship between the bank's market power and profit efficiency supports the structure-conduct-performance paradigm (Bain, 1956). What is however interesting in our result is that individual market power is also associated positively with higher cost efficiency. There is some research evidence that higher cost efficiency of firms with high market power is explained from economies of scale of monitoring (Pruteanu-Podpiera at al., 2008). For policy makers in the region this outcome clearly poses decision-making dilemmas as to the trade-offs between cost efficiency and profit efficiency. Contrary to the somewhat mixed results of the literature, our research on the relationship of institutional reforms on bank efficiency identifies a strong and positive relationship. It is also evident that progress in the implementation of major economic reforms such as enterprise restructuring and privatization are related positively associated with banking efficiency. Since firms are major clients of banks, performance of the real sector and improvement in corporate governance are important prerequisite for a stable and efficient banking sector. The completion of the privatization and enterprise restructuring process will certainly contribute to higher efficiency of the banking sector.

The progress of SEE region to establish a relatively efficient privately owned banking system is very impressive and marks a major step towards the integration of this region in the European Union. Though understanding the determinants of banking efficiency, the focus of our paper, is a critical input for a well-functioning financial system, advances in financial sector development would need other critical issues that will need future research. This would relate to the persistently high costs of lending in this region, the relatively low level of financial intermediation, and large differences in access to credit by different company types. It will also be important to devote future research to better understand the mode of foreign bank entry and past experience in other transition countries, as the share of foreign ownership is extremely high and often concentrated from a few countries.

Tables 1–8

Table 1. **Key characteristics of banking sectors in South-Eastern Europe, 1999–2008**

	No of Total Banks		No of Foreign Owned Banks		% Asset share of Foreign-Owned Banks		% Asset share of State-Owned Banks		Domestic credit to private sector % of GDP		EBRD index of Banking Sector Reform		GDP level In 2008 1989=100	
	1999	2008	1999	2008	1999	2008	1999	2008	1999	2008	1999	2008	1999	2008
Bulgaria	34	29	22	21	42.8	83.9	50.5	1.8	12.0	47.4	2.7	3.7	na	107
Croatia	53	34	13	16	40.3	91.2	39.8	4.7	37.4	60.6	3.0	4.0	na	111
Romania	34	31	19	26	43.6	87.9	50.3	5.9	11.5	26.3	2.7	3.0	na	120
Albania	13	17	11	15	18.9	94.2	81.1	0	3.8	21.7	2.0	2.7	na	162
Bosnia and Herz.	91	32	9	22	3.8	95	75.9	3.2	3.0	25.2	2.3	2.7	na	79
Macedonia	23	18	5	11	11.5	93.1	2.5	1.4	14.5	36.4	2.7	2.7	na	96
Montenegro	na	10	na	8	na	91.9	na	0	na	43.3	1.7	2.7	na	80
Serbia	75	37	3	22	0.4	78.7	8.9	14.9	na	18.9	1.0	2.7	na	68

Source: EBRD, Transition Report, various issues.

Table 2. **Sample distribution by country and the mean values of key bank financial ratios of each country. Variable definitions is in the Appendix.**

Country name	N	Total asset (\$000)	ROA	Interest Margin	Loan to asset	Deposit to asset	Expense to asset	Equity to asset
<u>Panel A: SEE Countries</u>								
ALBANIA	45	486411.2	0.0012	0.0238	0.3466	0.8659	0.0514	0.1097
BULGARIA	200	736840.3	0.0113	0.0418	0.5008	0.7147	0.0676	0.1691
CROATIA	298	1497644.0	0.0088	0.0395	0.5921	0.7096	0.0710	0.1488
MACEDONIA	83	242916.0	0.0175	0.0467	0.5153	0.6132	0.0669	0.2804
ROMANIA	177	1333985.0	0.0032	0.0587	0.4562	0.7811	0.1341	0.1684
SERBIA	140	407450.8	0.0111	0.0548	0.5336	0.6416	0.1118	0.2559
<u>Panel B: CEE Countries</u>								
CZECH REPUBLIC	139	2897244.0	0.0032	0.0181	0.4179	0.7509	0.0623	0.0794
ESTONIA	48	2438540.0	0.0090	0.0332	0.6023	0.7417	0.0637	0.1220
HUNGARY	172	2486547.0	0.0054	0.0429	0.5364	0.7818	0.1141	0.1182
LATVIA	119	1354463.0	0.0134	0.0291	0.5466	0.8532	0.0523	0.1024
LITHUANIA	89	1409408.0	0.0048	0.0287	0.5594	0.8157	0.0654	0.1278
POLAND	228	2040333.0	0.0084	0.0403	0.5293	0.7749	0.0901	0.1268
SLOVAKIA	108	3279334.0	0.0086	0.0284	0.4367	0.8219	0.0765	0.0877
SLOVENIA	129	2274920.0	0.0102	0.0287	0.6042	0.7749	0.0611	0.0999

Table 3. Summary statistics of input and output variables for the estimation of bank efficiency

Variable description	Variable	Obs	Mean	Std. Dev.	Min	Max
Total cost (\$000)	TOC	1959	106148.9	176025.9	1059	1413975.0
Total profit (\$000)	PBT	1862	27519.96	56615.19	-4383	704374.0
Output						
Loans (\$000)	y1	1959	906272.8	1647496	1616	14000000.0
Securities (\$000)	y2	1959	298405.2	700734.6	35	6732111.0
Other earning assets (\$000)	y3	1959	617653.3	1192965	906	13900000.0
Input						
Price of capital	w1	1959	0.0463	0.0401	0.0075	0.3258
Price of borrowed funds	w2	1959	3.1367	4.1062	0.3261	27.1858
Fixed input						
Equity (\$000)	z1	1959	153550.8	254225.0	1952.0	2514939.0
Non-performing loans (\$000)	z2	1959	33307.2	79455.6	1.0	736686.0

Table 4. **Mean values of bank ownership, competition, and institutional reforms in the SEE region. Numbers of ownership percentage and competition are the mean values of the sample banks in each year.**

Year	Percentage of foreign banks	Percentage of domestic private banks	Percentage of government banks	Competition (Lerner index)	Banking reforms (EBRD indicator)	Enterprise restructuring (EBRD indicator)	Privatization (EBRD indicator)
1998	0.2727	0.6364	0.0909	0.3314	2.6082	2.4873	3.5291
1999	0.4615	0.4615	0.0769	0.2880	2.8303	2.3951	3.5042
2000	0.4444	0.5333	0.0222	0.3385	3.0513	2.4164	3.5403
2001	0.5283	0.4340	0.0377	0.3546	2.9870	2.3787	3.5841
2002	0.4545	0.4848	0.0606	0.3546	3.1482	2.3591	3.5933
2003	0.5072	0.4348	0.0580	0.4108	3.1025	2.3881	3.5715
2004	0.5060	0.4458	0.0482	0.4048	3.2617	2.4420	3.6098
2005	0.5765	0.3882	0.0353	0.4116	3.3115	2.5716	3.6252
2006	0.6292	0.3258	0.0449	0.4120	3.2753	2.6709	3.6462
2007	0.6220	0.3415	0.0366	0.3787	3.3348	2.6672	3.6546
2008	0.6667	0.2889	0.0444	0.3640	3.4449	2.6451	3.6487

Table 5.

Mean scores of cost- and profit efficiency in SEE countries during 1998–2008

Panel A: Cost efficiency						
Year	ALBANIA	BULGARIA	CROATIA	MACEDONIA	ROMANIA	SERBIA
1998	/	0.5137	0.7510	0.7781	0.5880	0.7406
1999	0.5700	0.5143	0.7513	0.7721	0.6305	0.6084
2000	/	0.5892	0.7687	0.7261	0.6515	0.6188
2001	0.7607	0.5862	0.7844	0.5818	0.7036	0.6392
2002	0.7594	0.6124	0.7994	0.7729	0.6879	0.5657
2003	0.8158	0.6171	0.7932	0.7823	0.6601	0.4757
2004	0.7796	0.6450	0.7601	0.7511	0.7283	0.4727
2005	0.7939	0.7000	0.7729	0.7695	0.6728	0.4405
2006	0.7789	0.7186	0.7670	0.7574	0.6445	0.5223
2007	0.7222	0.7112	0.7519	0.7412	0.6454	0.5968
2008	/	0.7277	0.7417	0.6787	0.7429	0.6945
Overall	0.7615	0.6339	0.7695	0.7374	0.6700	0.5475
Panel B: Profit efficiency						
Year	ALBANIA	BULGARIA	CROATIA	MACEDONIA	ROMANIA	SERBIA
1998	/	0.5621	0.5142	0.5659	0.6297	0.5604
1999	0.7465	0.6544	0.4990	0.5408	0.5062	0.6608
2000	/	0.6129	0.5323	0.6383	0.4735	0.5943
2001	0.6591	0.6387	0.5425	0.6759	0.4303	0.5199
2002	0.6496	0.6470	0.5412	0.4930	0.4599	0.5724
2003	0.5283	0.6496	0.5094	0.5749	0.4498	0.6009
2004	0.5595	0.6312	0.5260	0.6603	0.4296	0.5603
2005	0.5094	0.6097	0.5077	0.6016	0.4048	0.5714
2006	0.6530	0.5941	0.5077	0.6974	0.4443	0.4483
2007	0.5491	0.6475	0.4513	0.6229	0.4672	0.3998
2008	/	0.5928	0.5035	0.6113	0.3333	0.3854
Overall	0.5852	0.6236	0.5130	0.6132	0.4576	0.5043

Table 6.

Cost- and profit efficiency comparison of SEE and CEE during 1998–2008

Year	Cost Efficiency			Profit Efficiency		
	SEE	CEE	Diff	SEE	CEE	Diff
1998	0.6723	0.7118	-0.0395	0.5521	0.5106	0.0415
1999	0.6609	0.7190	-0.0581**	0.5576	0.4924	0.0652*
2000	0.6854	0.7115	-0.0261	0.5492	0.5097	0.0395
2001	0.6885	0.7139	-0.0254	0.5537	0.5116	0.0421
2002	0.7088	0.6907	0.0181	0.5541	0.5142	0.0399
2003	0.6875	0.6926	-0.0051	0.5505	0.5182	0.0323
2004	0.6837	0.7131	-0.0294	0.5484	0.5285	0.0199
2005	0.6739	0.7097	-0.0358*	0.5359	0.5464	-0.0105
2006	0.6806	0.7101	-0.0294	0.5276	0.5601	-0.0325
2007	0.6908	0.7142	-0.0234	0.4992	0.5625	-0.0634**
2008	0.7192	0.6910	0.0282	0.4832	0.5411	-0.0579
Overall	0.6859	0.7077	-0.0218***	0.5387	0.5295	0.0092

Table 7.

Determinants of cost efficiency

The dependent variable is cost efficiency. Main testing variables include bank ownership, bank competition (Lerner index), and institutional reforms. All model specifications control for time trend and bank financial characteristics of previous years. Crisis year dummies represent year 2007 and 2008. The heteroskedasticity-robust standard errors are presented in brackets. *, **, and *** represent significance level of 10%, 5%, and 1% respectively.

	Dependent Variable: Cost efficiency				
	Role of Ownership	Role of Competition		Role of Reforms	Combine
	OLS	OLS	IV	OLS	OLS
Foreign_dummy	-0.0690*				-0.0679*
	(-1.9406)				(-2.0676)
Government_dummy	-0.0250				-0.0039
	(-0.3795)				(-0.0662)
Competition (lerner index)		0.0964**	0.1663**		0.1024
		(2.5574)	(2.4892)		(1.4888)
Banking reform (EBRD index)				0.3952**	0.3721**
				(3.4308)	(3.7230)
Enterprise restructure (EBRD index)				0.5632**	0.5132***
				(3.9724)	(4.6713)
Privatization (EBRD index)				0.5377***	0.5062***
				(4.9451)	(5.1832)
Time trend	-0.0047*	-0.0029	-0.0108***	-0.0096	-0.0136
	(-1.6999)	(-1.2285)	(-4.4515)	(-1.9137)	(-1.9714)
Foreign_dummy*time trend	0.0068**				0.0072
	(1.9875)				(1.6197)
Government_dummy*time trend	0.0013				-0.0041
	(0.1897)				(-0.5495)
Log total assets	-0.0056	-0.0060	-0.0126***	-0.0110	-0.0123
	(-1.3173)	(-1.5188)	(-2.9656)	(-1.6594)	(-1.6378)
Loan ratio of previous year	0.1936***	0.2029***	0.2652***	0.1844**	0.1677**
	(5.7456)	(6.1691)	(8.0270)	(3.4854)	(3.2565)
Capital ratio of previous year	-0.0217	-0.0236	-0.2119***	-0.0939	-0.0949
	(-0.3912)	(-0.4330)	(-3.7722)	(-0.9508)	(-0.9460)
Nonperforming loan ratio of previous year	-0.3280**	-0.3176**	-0.4717***	-0.2426	-0.2073
	(-2.4342)	(-2.4512)	(-3.5691)	(-1.8094)	(-1.5887)
Profitability of previous year	0.0825	-0.2281	-0.8908**	0.0670	-0.1074
	(0.4134)	(-1.0605)	(-2.5756)	(0.2206)	(-0.3199)
Crisis year dummy (2007&2008)	0.0206	0.0306**	0.0242	0.0270	0.0307
	(1.4534)	(2.1481)	(1.5094)	(0.6724)	(0.7245)
Constant	0.7447***	0.6914***	0.8478***	0.8508***	0.8767***
	(11.6566)	(11.9145)	(13.5302)	(10.1188)	(8.3230)
Observations	595	595	576	595	595
Adjusted R-squared	0.3095	0.3155	0.1612	0.2182	0.2319

Table 8.

Determinants of profit efficiency

The dependent variable is profit efficiency. Main testing variables include bank ownership, bank competition (Lerner index), and institutional reforms. All model specifications control for time trend and bank financial characteristics of previous years. Crisis year dummies represent year 2007 and 2008. The heteroskedasticity-robust standard errors are presented in brackets. *, **, and *** represent significance level of 10%, 5%, and 1% respectively.

	Dependent Variable: Profit efficiency					
	Role of Ownership	Role of Competition		Role of Reforms	Combine	
	OLS	OLS	IV	OLS	OLS	
Foreign_dummy	0.2238*** (4.6714)				0.1338** (2.7028)	
Government_dummy	-0.2651*** (-2.9837)				-0.2784** (-3.4919)	
Competition (lerner index)		0.6770*** (15.2506)	0.5457*** (7.2834)		0.7111*** (7.1099)	
Banking reform (EBRD index)				0.2432** (3.0683)	0.1052* (2.2191)	
Enterprise restructure (EBRD index)				0.4468** (3.5265)	0.2633** (2.9410)	
Privatization (EBRD index)				0.3437** (2.9736)	0.2270*** (4.4183)	
Time trend	0.0034 (0.8915)	-	0.0100*** (-3.5890)	-0.0066** (-2.4314)	0.0001 (0.0271)	-0.0025 (-0.4714)
Foreign_dummy*time trend	-0.0210*** (-4.5377)				-0.0131* (-2.1669)	
Government_dummy*time trend	0.0254*** (2.7817)				0.0255** (3.1606)	
Log total assets	0.0048 (0.8313)	-0.0042 (-0.9080)	-0.0097** (-2.0357)	-0.0067 (-1.0339)	-0.0079 (-1.3549)	
Loan ratio of previous year	-0.0208 (-0.4594)	-0.0353 (-0.9123)	-0.0420 (-1.1334)	-0.0684 (-1.4581)	-0.0635 (-1.0346)	
Capital ratio of previous year	0.0357 (0.4789)	0.0062 (0.0970)	-0.0480 (-0.7610)	-0.0044 (-0.0588)	-0.0341 (-0.3659)	
Nonperforming loan ratio of previous year	-0.2511 (-1.3838)	-0.3171** (-2.0773)	-0.1660 (-1.1199)	-0.1806 (-1.1188)	-0.0900 (-0.8752)	
Profitability of previous year	1.9509*** (7.2552)	0.5665** (2.2353)	0.7982** (2.0572)	2.6005*** (4.3211)	0.5077 (0.9335)	
Crisis year dummy (2007&2008)	-0.0175 (-0.9150)	0.0132 (0.7871)	0.0099 (0.5474)	-0.0363 (-1.3644)	0.0145 (0.5714)	
Constant	0.4181*** (4.8593)	0.4359*** (6.3766)	0.5310*** (7.5550)	0.6108*** (6.2993)	0.4043** (3.7313)	
Observations	595	595	576	595	595	
Adjusted R-squared	0.2782	0.4527	0.3672	0.1494	0.4428	

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Appendix

Variable definitions

Variable Name	Definition	Data Source
ROA	Net income divided by total asset	Bankscope
Interest margin	Interest income minus interest expense, divided by total asset	Bankscope
Loan to asset ratio	Net loans divided by total asset	Bankscope
Deposit to asset ratio	Total deposits divided by total asset	Bankscope
Expense to assets ratio	Total operating expense divided by total asset	Bankscope
Equity to asset ratio (capital ratio)	Total equity divided by total asset	Bankscope
Nonperforming loan ratio	Non-performing loan divided by total asset	Bankscope
Lerner index	Degree of market power or competitiveness of a bank	Bankscope
Foreign dummy	=1 if more than 50% ownership is foreign	Bankscope
Government dummy	=1 if more than 50% ownership is government owned	Bankscope
Banking reform	The extent of bank reforms. The values increase from 1.0 to 4.3, with 1.0 indicating a rigid centralized economy and 4.3 implying the highest level of reform.	EBRD
Enterprise restructuring	The extent of enterprise restructuring and corporate governance development. The values increase from 1.0 to 4.3, with higher value implying higher level of progress.	EBRD
Privatization	The extent of privatization of state-owned firms. The values increase from 1.0 to 4.3, with higher value implying more enterprise assets in private ownership.	EBRD

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Suomen Pankki
Bank of Finland
P.O.Box 160
FI-00101 HELSINKI
Finland



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