

Efficiency of Banks in Regions at Different Stage of European Integration Process

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Abstract

This paper estimates commercial banks' efficiency in three relatively homogenous groups of countries with different level of economic development and different involvement in the process of European integration. The first group consists of Portugal and Greece, the second group is represented by the Czech Republic, Hungary, Poland and Slovakia and the third group includes Bulgaria and Romania. The paper aims to reveal whether the differences among regions and countries in the stage of European integration and economic situation are visible also in banking efficiency. Thus we test the hypothesis that the higher degree of European economic integration and economic development goes hand in hand with higher banking efficiency. Employing Data Envelopment Analysis on unconsolidated data we evaluate efficiency of banks in a core of their business - financial intermediation - in 2002-2003. Results suggest that differences in banking efficiency exist among analyzed regions and the hierarchy corresponds with the hierarchy of regions and countries in terms of economic development and degree of integration. Thus, low level of financial intermediation efficiency in Central and Eastern European countries may undermine their effort to boost the economic growth and catch-up the forerunning countries. The importance of the efficiency gap is underscored by the fact that only some of the catching-up countries recorded higher growth of efficiency than the forerunners.

Keywords: efficiency, banks, Data Envelopment Analysis, integration

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1. Introduction

Enlargement of the European Union (EU) that took place in May 2004 along with the proposed joining of Balkan countries in near future and gradual implementation of euro in ten new EU-member countries are the principal economic and political phenomena on the European continent. Europe is consequently divided into several groups of countries that differ in the achieved stage of integration and level of economic development. The one tail of the integration path is occupied by countries which belong to the prestigious group of the most developed economies and have also achieved the final stage of integration process - membership in the European Economic Monetary Union (EMU). This group consists of countries such as Germany, France or Italy. On the other side, there are countries standing at the very beginning of their integration to the European structures since the only step made is a declaration of interest to become member of the EU. This group is represented mainly by poor post-Soviet countries such as Ukraine or Moldova. However, many more or less numerous groups of countries with similar economic progress and stage of integration process are positioned somewhere between these two extremes of the development path. Thus, majority of Europe resembles a pursuit competition where each group aims to catch up with the group being ahead as fast as possible.

Financial sector is a backbone of every market economy. An important and in some countries even a dominant role is played by banks.¹ Stable and efficient banking sector is therefore an essential precondition for both to increase the economic level and to secure a smooth course of integration process crowned by the adoption of euro. During several past years, banking have changed significantly due to irreversible processes such as liberalization, globalization, privatization, mergers and acquisition or implementation of modern information technologies. However, the transformation of savings into loans and credits financing consumption and investment of banks' customers can be still considered as a core of banking business and foundation of banks' existence.

The aim of the paper is to estimate and compare efficiency of banking intermediation in eight countries representing three relatively homogenous groups at different stage of the European integration and different economic level during the period 2002-2003. The analysis is supposed to verify or reject the hypothesis that advanced phase of integration and higher economic level is associated with higher efficiency of banking intermediation. Thus, the paper

¹ See Polouček (2004) for more about structure of the financial sector in selected European countries.

should answer the question whether the banking sector fulfills its intermediation function sufficiently to catch-up the forerunners or the low efficiency of intermediation may be an obstacle in the convergence process.

First group under estimation consists of Portugal and Greece - not only long-time members of the EU and countries that have adopted euro as a common currency but also countries with the lowest GDP per capita in the traditional part of the EU (EU-15). The second group is represented by the Czech Republic, Hungary, Poland and Slovakia - Central European countries that became members of the EU in May 2004 and are on the way to adopt euro in 2010 at latest. Their economic level is below the EU-15 average and figures of Greece and Portugal are the most easily attainable. The third group includes Bulgaria and Romania - countries with a clear perspective to join the EU in 2007 and GDP per capita far below the EU. Selection of such countries is backed up by the fact that each group is a moving target for the next group's efforts in the integration and convergence process.

In order for paper purposes to be accomplished, this study proceeds as follows. The second section gives a brief comparison of economies and banking sectors of analyzed countries. Section 3 discusses methodology and its strengths and provides a review of the recent relevant literature evaluating banking efficiency. Section 4 describes the data set and deals with the variable selection. Section 5 presents the findings and discussion and the final section provides conclusions.

2. Economy and banking sector of analyzed countries

This chapter is devoted to the comparison of economies and banking sectors of the analyzed countries. The attention is paid on the actual situation and on the development in 2002-2004. The section 2.1 provides a macroeconomic overview of all economies using the key indicators with a concise commentary. The part 2.2 describes banking sectors included into analysis focusing on size, structure, solvency and profitability as factors with influence on bank efficiency.

2.1 Macroeconomic overview of analyzed countries

The first analyzed group consists of Greece and Portugal as the poorest members of the EU-15. Those countries' GDP per capita comprise approximately 50-60 per cent of the EU-15 average GDP per capita (68-75 per cent in PPS). Economic developments in the two Southern European countries did not follow the same course in 2002-2004, which is evident in the countries' relative position within the EU-15. Whereas the Greek and Portuguese GDP per capita were at almost identical level in 2002, the Greek indicator exceeded the Portuguese one by 17 per cent in 2004. While Greece has emerged as one of the strongest growing economies in the euro area, Portugal's economy is gradually recovering from the recession started in 2002 and extended throughout 2003.

Table 1: Selected economic indicators of Greece and Portugal

| | 2002 | 2003 | 2004 | 2002 | 2003 | 2004 |
|--------------------------------|--------|--------|--------|----------|--------|--------|
| | Greece | | | Portugal | | |
| GDP per capita (EUR th) | 12 920 | 13 890 | 14 910 | 12 400 | 12 460 | 12 760 |
| in % of EU-15 average | 53.52 | 57.04 | 58.65 | 51.36 | 51.17 | 50.31 |
| in % of EU-15 average in PPS | 70.71 | 73.14 | 74.35 | 70.05 | 68.54 | 67.66 |
| growth of real GDP in % | 3.8 | 4.1 | 3.5 | 0.5 | -1.3 | 1.0 |
| growth of CPI in % | 3.7 | 3.5 | 2.8 | 3.5 | 3.3 | 2.3 |
| unemployment in % | 10.0 | 9.3 | 8.5 | 5.0 | 6.3 | 6.3 |
| budget balance in % of GDP | -3.8 | -6.4 | -6.9 | -2.7 | -2.8 | -4.1 |
| current account in % of GDP | -5.8 | -5.2 | -3.2 | -6.7 | -5.1 | -6.5 |
| FDI (inflow, net, EUR mln) | -643 | 545 | 609 | -1 535 | 767 | -292 |
| gross foreign debt in % of GDP | 112.5 | 109.9 | 112.1 | 58.1 | 60.1 | 63.3 |

Note: PPS is Purchasing Power Standards; CPI is Consumer Price Index;
FDI is Foreign Direct Investment

Source: AMECO, Bank of Greece, Bank of Portugal, International Financial Statistics

However, as shown in Table 1, the different development of GDP may be linked with similar symptoms such as internal and external imbalances. Considering Greece, significant nominal and real growth has been accompanied by rising macroeconomic imbalances, both on the domestic and the external side. On the domestic side, the levels of inflation and unemployment reflect not just cyclical factors, but also the structural ones. Moreover, fiscal policy has turned expansionary in spite of the buoyant state of the economy. On the external side, the current account deficit is large. While it is sometimes claimed that imbalances are no major cause for concerns in a catching-up country to the extent that they ultimately serve to enhance the economy's growth potential, this interpretation may not be entirely warranted in the Greek case. Greece suffers mainly from a weak fiscal discipline and rigidities in labor and product markets, which hampers future growth potential. Thus, on unchanged economic

policies, there is a risk of widening both imbalances. For more about current economic situation in Greece see BoG (2003) or Albers *et al.* (2004) among others.

As mentioned above, the imbalances of general budget and current account can be revealed also in Portugal. Since the output growth is rather moderate, the current account deficit stems from strong expansion of domestic demand and imports. Although the factors behind the buoyancy of domestic demand are not very clear, the perception that unemployment developments would be less marked than expected and that the fiscal consolidation would be less intense than initially assumed probably contributed to ease the behavior of households and boosted domestic demand. Thus, it is not realistic to consider that the fiscal consolidation effort should be over. Quite the opposite, this consolidation effort is now more necessary than ever, given that the downturn in the Portuguese economy has been overcome, Tightening of fiscal policy is also required by the fact that Portugal's public debt ratio has been following a consistent upward trend in recent years and surpassed the reference value of 60 per cent set forth in the Maastricht Treaty in 2004. More detailed analysis of the Portuguese economy is provided for instance by EC (2004) or MoFP (2004).

The second group contains countries frequently considered as very similar and differing mainly in area and population. This assertion is warranted by the fact that all countries are members of the EU, NATO or OECD and all of them have constituted and actively participate in the union called Visegrad group. Consequently, these countries are uniformly named as Visegrad countries (V4). Similarity of economic policies of the V4 countries stems, besides other factors, from the effort to fulfill the Maastricht criteria and to join the EMU. Thus, governments of the V4 countries, more or less successfully, try to tighten fiscal policy with the aim to reduce a high deficit of general budget and to not deepen a country's debt burden. With different speed and intensity, the governments also bring forward proposals how to proceed with a reform of pension scheme or health care and social care systems. The relevant macroeconomic indicators of the V4 countries are summarized in Table 2.

Despite all difficulties, the V4 countries show a solid growth of the real GDP identifying the highest growth rates in Poland and Slovakia as countries with lower comparison basis. The economic growth is significantly stimulated by a vibrant expansion of exports. One can assume it, taking into account a slow growth of developed European economies, to be an evidence of good competitiveness of exporters from the V4 countries. The ability to confront the international competition is strengthened by the foreign direct

investment (FDI) which boosts the economy, increases productivity and export capacity. However, the reverse side of FDI is gradually coming through in the Czech Republic and Hungary. Previously realized FDI have become profitable and both the reinvested and repatriated profits augment the current account deficit above the generally accepted level of five per cent of GDP. Nevertheless, the economic uniformity of the V4 countries is weakened by some significant discrepancies. For instance, GDP per capita in Poland represented only 60.38 per cent of the Czech GDP per capita in 2004. Likewise, the Slovak inflation in 2004 exceeded the Czech inflation by 270 per cent and the rate of unemployment in Poland was 3.3 times higher than unemployment in Hungary.²

Table 2: Selected economic indicators of Visegrad countries

| | 2002 | 2003 | 2004 | 2002 | 2003 | 2004 |
|--------------------------------|----------------|-------|-------|----------|-------|-------|
| | Czech Republic | | | Hungary | | |
| GDP per capita (EUR th) | 7 685 | 7 795 | 8 438 | 6 783 | 7 227 | 8 051 |
| in % of EU-15 average | 31.84 | 32.01 | 33.19 | 28.10 | 29.68 | 31.67 |
| in % of EU-15 average in PPS | 61.76 | 63.45 | 64.59 | 53.19 | 54.78 | 55.98 |
| growth of real GDP in % | 1.5 | 3.7 | 3.6 | 3.5 | 2.9 | 3.9 |
| growth of CPI in % | 1.8 | 0.1 | 2.8 | 5.3 | 4.7 | 6.8 |
| unemployment in % | 9.2 | 9.9 | 10.3 | 5.8 | 5.9 | 6.0 |
| budget balance in % of GDP | -6.8 | -12.6 | -5.2 | -9.3 | -5.4 | -4.7 |
| current account in % of GDP | -5.6 | -6.2 | -5.9 | -7.1 | -9.0 | -8.9 |
| FDI (inflow, net, EUR mln) | 8 791 | 2 090 | 3 650 | 891 | 2 320 | 2 500 |
| gross foreign debt in % of GDP | 36.4 | 38.4 | 34.2 | 56.6 | 63.5 | 66.8 |
| | Poland | | | Slovakia | | |
| GDP per capita (EUR th) | 5 297 | 4 848 | 5 095 | 4 784 | 5 358 | 6 035 |
| in % of EU-15 average | 21.94 | 19.91 | 20.04 | 19.82 | 22.00 | 23.74 |
| in % of EU-15 average in PPS | 41.47 | 42.91 | 44.85 | 46.98 | 48.62 | 50.04 |
| growth of real GDP in % | 1.4 | 3.8 | 5.5 | 4.4 | 4.2 | 5.2 |
| growth of CPI in % | 1.9 | 0.8 | 3.5 | 3.8 | 8.5 | 7.6 |
| unemployment in % | 20.0 | 20.0 | 19.6 | 17.8 | 15.2 | 14.4 |
| budget balance in % of GDP | -3.6 | -3.9 | -5.4 | -5.7 | -3.7 | -3.7 |
| current account in % of GDP | -2.7 | -2.2 | -2.0 | -8.2 | -0.8 | -3.1 |
| FDI (inflow, net, EUR mln) | 4 371 | 3 360 | 3 300 | 4 069 | 485 | 540 |
| gross foreign debt in % of GDP | 40.7 | 45.2 | 49.1 | 55.7 | 53.7 | 49.6 |

Note: PPS is Purchasing Power Standards; CPI is Consumer Price Index;
FDI is Foreign Direct Investment

Source: AMECO, Bank Austria Creditanstalt

After more than decade of transition, Bulgaria and Romania are countries whose economic level, structure of economy and development of the essential indicators are almost alike. GDP per capita of both countries equals to approximately 37 per cent of the V4 countries average GDP (53 per cent according to PPS). In comparison with Greece and Portugal, GDP per capita of Balkans represents roughly 18 per cent (40 per cent applying PPS). Although both countries have been granted the status of a functioning market economy

² See Gárdó *et al.* (2005) for an overview of essential developments in economies of all Central and Eastern European countries and for a uniform collection of the latest macroeconomic data.

by the European Commission, development of some variables and structure of the economy resemble rather situation of the V4 countries ten years ago.

Countries are struggling with high and raising deficits of the current account which are caused by widening trade deficit pulled by expanding domestic demand and FDI boom associated with imports of capital goods. Strong rises in imports cannot be compensated by even above-average growth of exports. In addition, majority of exports comprises products with low value added and high price elasticity. For example textiles and clothes represent more than 20 per cent of both countries' exports and agricultural products are also very important. Such structure makes exports really sensitive on exchange rate movements. Thus, the actual trend of appreciation of national currencies worsens the competitiveness of such goods on foreign markets and contributes significantly to the deterioration of current account.

On the other hand, many of the key indicators demonstrate a favorable development. A considerable annual growth of GDP is recorded in both countries, price level is stable and the disinflation trend is continuing. Rate of unemployment is decreasing and the state of public finance does not show any sign of budget deficit escalation or elevating of the country's indebtedness. The time remaining to joining the EU has to be efficiently utilized to curb the level of corruption, to improve justice, legal framework and competition policy. See Table 3 for more data on economic situation of Bulgaria and Romania.

Table 3: Selected economic indicators of Bulgaria and Romania

| | 2002 | 2003 | 2004 | 2002 | 2003 | 2004 |
|--------------------------------|----------|-------|-------|---------|-------|-------|
| | Bulgaria | | | Romania | | |
| GDP per capita (EUR th) | 2 108 | 2 257 | 2 527 | 2 219 | 2 317 | 2 598 |
| in % of EU-15 average | 8.73 | 9.27 | 9.94 | 9.19 | 9.52 | 10.22 |
| in % of EU-15 average in PPS | 26.36 | 27.55 | 28.63 | 25.97 | 25.59 | 28.75 |
| growth of real GDP in % | 4.9 | 4.3 | 5.6 | 5.0 | 4.9 | 8.3 |
| growth of CPI in % | 5.8 | 2.3 | 6.2 | 22.5 | 15.3 | 11.9 |
| unemployment in % | 17.4 | 14.3 | 12.7 | 10.2 | 7.6 | 6.8 |
| budget balance in % of GDP | -0.7 | 0.0 | 0.5 | -2.6 | -2.3 | -1.5 |
| current account in % of GDP | -5.3 | -8.4 | -6.8 | -3.4 | -5.7 | -6.0 |
| FDI (inflow, net, EUR mln) | 926 | 1 234 | 1 500 | 1 194 | 1 590 | 3 500 |
| gross foreign debt in % of GDP | 65.4 | 59.8 | 60.8 | 31.2 | 33.2 | 36.1 |

Note: PPS is Purchasing Power Standards; CPI is Consumer Price Index;
 FDI is Foreign Direct Investment
 Source: AMECO, Bank Austria Creditanstalt

2.2 Banking sectors in analyzed countries

Greek and Portuguese banking sectors substantially resemble each other and differ mainly in the degree of financial intermediation since Portugal posts almost twice as high

level as Greece. Activity of both banking sectors increased and solvency and profitability indicators enhanced in 2002-2004. Such developments confirm that Greek sector coped with the downturn in the Athens Stock Exchange in 2000-2002 that led to a slump in banks' capital adequacy and profitability and that the Portuguese banking is resilient in the face of the economic conditions stemmed from the down stage of the business cycle. The number of banks is stable as well as the share of banks with foreign ownership and the banking sector concentration. However, there have been a parallel decrease in the share of foreign capital and increase in the concentration. Both of them occurred in moderate and steady pace in the analyzed period. Concentration rose due to some acquisitions of small local banks by the largest domestic banking groups. Whereas the one fifth of banking capital under foreign control is almost in accordance with the EU-15 average (22.3 per cent), the share of top five banks surpassing two thirds is considerably higher than the EU-15 average of 53 per cent. The other indicators of the banking sector's shape exhibited in Table 4 correspond with the usual values in the EU-15 and the EMU. It is acceptable also for the interest rate spreads in Greece and Portugal that followed a general downward trend coming through the whole euro area.

Table 4: Selected indicators of banking sectors in Greece and Portugal

| | 2002 | 2003 | 2004 | 2002 | 2003 | 2004 |
|---|--------|-------|-------|----------|-------|------|
| | Greece | | | Portugal | | |
| number of banks | 61 | 59 | | 60 | 62 | |
| share of foreign capital in % | 19.5 | 19.0 | 18.1 | 21.2 | 19.3 | 18.5 |
| share of five largest banks in banking sector assets in % | 66.2 | 67.0 | 67.4 | 64.8 | 69.2 | 69.9 |
| total assets in % of GDP | 140.3 | 139.6 | 140.4 | 264.2 | 266.7 | |
| capital adequacy in % | 12.5 | 12.9 | 12.9 | 9.8 | 10.0 | 10.3 |
| NPL in % of total loans | 4.1 | 3.8 | 3.7 | 2.7 | 2.5 | |
| ROE (tier 1 capital) in % | 8.4 | 12.8 | 13.5 | 11.7 | 13.9 | 13.3 |
| interest spread in % | 5.0 | 4.6 | 4.5 | 4.8 | 4.2 | 4.0 |

Note: NPL is Non-Performing Loans; ROE is Return on Equity,
Source: ECB (2004b), Bank of Greece, Banco de Portugal

Restructuring and transformation of the banking systems in the V4 countries have been completed for the very most part. Overriding some minor issues, one may accept this statement also for Bulgaria and Romania. However, the way towards a functioning banking sector has not been easy and all the countries have had to face serious changes and challenges. Since the banking sectors have not been able to absorb such fundamental shifts smoothly, most of the countries in the region suffered banking crises in the course of 1990s affecting economy and society more or less painfully. The crises were caused in majority of cases by a combination of the entire economic system transformation, wild and non-regulated increase of number of small banks funded by domestic capital, lack of banking expertise and high share

of non-performing loans partly inherited from the communist past and partly originated as new. The phase of consolidation that took place afterwards comprised state participation in cleaning banking portfolios from bad loans and raising the capital of state-owned banks, collapses of small and medium-sized banks, mergers and acquisitions, improvement of legal and regulatory framework, and privatization. Although the speed of consolidation and selection of applied measures have varied among countries, banking sectors in all of them can be nowadays characterized as consolidated, universally-based, and under dominant control of strategic foreign investors.³

Table 5: Selected indicators of banking sectors in Visegrad countries

| | 2002 | 2003 | 2004 | 2002 | 2003 | 2004 |
|---|----------------|-------|-------|----------|------|------|
| | Czech Republic | | | Hungary | | |
| number of banks | 37 | 35 | 35 | 37 | 36 | 36 |
| share of foreign capital in % | 81.9 | 84.9 | 85.1 | 78.3 | 81.9 | 82.0 |
| share of five largest banks in banking sector assets in % | 66.9 | 68.0 | 68.2 | 56.1 | 56.9 | 57.1 |
| total assets in % of GDP | 113.3 | 107.0 | 107.8 | 70.2 | 72.5 | 74.1 |
| capital adequacy in % | 14.3 | 14.5 | 13.2 | 14.0 | 13.7 | 13.8 |
| NPL in % of total loans | 8.1 | 4.9 | 4.3 | 3.5 | 3.5 | 3.7 |
| ROE (tier 1 capital) in % | 27.4 | 23.8 | 22.6 | 19.6 | 21.1 | 25.9 |
| interest spread in % | 2.1 | 2.0 | 2.2 | 2.8 | 2.5 | 2.4 |
| | Poland | | | Slovakia | | |
| number of banks | 62 | 60 | 59 | 20 | 21 | 21 |
| share of foreign capital in % | 67.4 | 67.8 | 67.6 | 85.3 | 88.9 | 89.5 |
| share of five largest banks in banking sector assets in % | 53.4 | 52.3 | 51.6 | 66.9 | 67.5 | 65.8 |
| total assets in % of GDP | 60.4 | 60.0 | 59.9 | 97.4 | 96.2 | 95.7 |
| capital adequacy in % | 13.8 | 13.7 | 15.7 | 21.3 | 21.5 | 20.5 |
| NPL in % of total loans | 21.1 | 22.2 | 18.1 | 11.2 | 9.1 | 7.8 |
| ROE (tier 1 capital) in % | 5.2 | 5.4 | 18.5 | 29.4 | 27.1 | 33.7 |
| interest spread in % | 8.5 | 7.6 | 6.7 | 5.3 | 4.8 | 4.5 |

Note: NPL is Non-Performing Loans; ROE is Return on Equity,

Source: Golajewska and Wyczanski (2002), Bruckbauer *et al.* (2004), Czech National Bank, Hungarian Financial Supervisory Authority, National Bank of Poland, National Bank of Slovakia

Despite the success achieved in recent years, banking sectors in V4 countries, Bulgaria and Romania (CEE-6) are quite modest compared to that in the EU-15 or the euro area. In 2003, the banking sectors in the CEE-6 countries consisted of 225 banks and total assets were about EUR 290 billion⁴. This is equivalent to roughly two per cent of the consolidated balance sheet of all banks in the euro area (Bruckbauer *et al.*, 2004, p. 4). The depth of banking intermediation measured as a share of total banking assets on GDP was at 69.5 per cent in CEE-6 countries in 2003, which means considerably lower than 280 per cent in the EU-15.

³ For more about banking sector transformation in transition countries, see Kulhánek *et al.* (2004), Bonin and Wachtel (2002) or Fries and Taci (2002) among others.

⁴ Both figures do not include institutions from the cooperative sectors.

The low degree of intermediation is pronounced also in Bruckbauer *et al.* (2004, p.5) using total loans as a percentage of GDP. While the indicator's value was 120 per cent in the EU-15 in 2003, the same share did not exceed 25 per cent in CEE-6 countries. Such situation demonstrates that even now, 15 years after the beginning of transition, the CEE-6 banking markets still exhibit vast potential.

Regarding number of banks, no dramatic fluctuations can be seen and such development can be considered as a sign of banking sectors' stability. Due to large scale of privatization of the state-owned banks, all CEE-6 banking sectors are to a great extent controlled by foreign credit institutions originating mainly from the EMU member countries. Increase of the foreign capital importance in the CEE-6 banking sectors has been also facilitated by the fact that there have been few local institutional investors and the desire to import banking know-how via privatization and foreign strategic investors. Thus the share of banks with majority foreign ownership is noticeably higher in this region than in the Greece, Portugal or the euro area as a whole. Concentration of the CEE-6 banking markets is relatively high owing to unique market position of traditional banks persisting from the communist era. However, thanks to successful effort of medium-sized banks (mainly subsidiaries of foreign banks such as Citibank, Raiffeisenbank, HVB or ING) in winning larger market shares, the level of concentration has been stagnating or decreasing in several past years.

Problems associated with non-performing loans have been already solved in all CEE-6 countries, though the share in Poland is still quite non-standard. Large bulks of non-performing loans have been shifted from banks' portfolios to special consolidation institutions harming the government budgets and public finance significantly.⁵ In some countries such as Bulgaria, Romania or Poland, high inflation in the early and middle phase of transformation also helped to alleviate the bad loans problems. Consequently, the capital adequacy in the region raised and actual figures of the ratio are in some cases more than twice as high as required. Similarly, the level of capital adequacy in the CEE-6 countries exceeds the EU-15 average of 12.3 per cent evidencing the substantially higher levels of own funds with respect to the extent of active banking operations. With the improving quality of the credit portfolio, the need for loan loss provisions has been steadily declining and profitability of the banking

⁵ Consolidation of the Czech banking sector is discussed for instance in Hájková *et al.* (2002), the Hungary's consolidation program is analyzed in Szapáry (2001), Balcerowicz and Bratkowski (2001) pay attention on the Polish consolidation and Tkáčová (2001) deals with banking sector stabilization in Slovakia. An in-depth analysis of banking sector transformation in Bulgaria and Romania is provided in Andronova-Vincelete (2001) and Tsantis (1997) respectively.

sectors has been boosting. The last values of ROE ratios recorded in the CEE-6 are notably higher than the average return on equity of 10 per cent in the EU-15. The interest rate spreads vary among the CEE-6 banking sectors due to different level of inflation and interest rates. However, the common trend of narrowing of the difference between lending and deposit rates can be revealed in all CEE-6 countries. The nominal convergence and strong competition on the credit market are the main reasons of that.

Table 6: Selected indicators of banking sectors in Bulgaria and Romania

| | 2002 | 2003 | 2004 | 2002 | 2003 | 2004 |
|---|----------|------|------|---------|------|------|
| | Bulgaria | | | Romania | | |
| number of banks | 35 | 35 | 35 | 39 | 38 | 37 |
| share of foreign capital in % | 77.2 | 91.1 | 92.2 | 64.8 | 65.4 | 69.1 |
| share of five largest banks in banking sector assets in % | 55.2 | 54.6 | 54.1 | 62.8 | 63.0 | 63.1 |
| total assets in % of GDP | 45.0 | 50.2 | 54.8 | 31.6 | 32.6 | 34.2 |
| capital adequacy in % | 25.2 | 22.0 | 22.1 | 25.0 | 18.2 | 19.3 |
| NPL in % of total loans | 5.5 | 4.2 | 4.6 | 2.3 | 8.3 | 7.9 |
| ROE (tier 1 capital) in % | 15.6 | 16.9 | | 18.3 | 15.6 | 16.6 |
| interest spread in % | 7.1 | 6.4 | 5.7 | 16.5 | 14.6 | 13.3 |

Note: NPL is Non-Performing Loans; ROE is Return on Equity,
Source: Bruckbauer *et al.* (2004), Bulgarian National Bank, Bank of Romania

3. Methodology and review of relevant literature

3.1 Meaning and measurement of efficiency

Farrell (1957) in his pioneer paper distinguishes two components of the efficiency of a firm: technical efficiency, which reflects the ability of a firm to obtain maximum output from a given set of inputs, and allocative efficiency, which indicates the ability of a firm to use the inputs in optimal proportions, given their respective prices and the production technology. These two measures can be combined to provide a measure of total economic efficiency, or, when cost instead of production is considered, cost efficiency. The optimal or most efficient production, depending on various circumstances such as the scale of the firm in particular, is called efficient frontier. Errors, lags between the choice of the production plan and its implementation, human inertia, distorted communications and uncertainty cause deviations from the efficient frontier, called X-inefficiency (Leibenstein, 1966). Measuring

X-inefficiency in financial intermediation in eight banking industries is the main subject of this paper.⁶

The two approaches used to assess X-efficiency of an entity, parametric (econometric) and non-parametric (mathematical programming), employ different techniques to envelop a data set with different assumptions for random noise and for the structure of the production technology. In this study we use Data Envelopment Analysis (DEA) as a representative of the non-parametric methods. DEA is a mathematical programming approach for the construction of production frontiers and the measurement of efficiency relative to the constructed frontiers. DEA is based on a concept of efficiency very similar to the microeconomic one; the main difference is that the DEA production frontier is not determined by some specific functional form, but it is generated from the actual data for the evaluated firms. In other words, the DEA frontier is formed as the piecewise linear combination that connects the set of “best-practice observations” in the data set under analysis. As a consequence, the DEA efficiency score for a specific decision making unit (DMU) is not defined by an absolute standard, but it is defined relative to the other DMUs in the specific data set under consideration (Stavárek, 2004a).

A great number of DEA models, specifications and versions can be found in literature. We use the two most frequently applied models: the CCR model - after Charnes, Cooper and Rhodes (1978) and the BCC model - after Banker, Charnes and Cooper (1984). The basic difference between these two models is the treatment of returns to scale. While the latter takes into account the effect of variable returns to scale (VRS), the former restricts DMUs to operate with constant returns to scale (CRS).

Under restriction that each DMU’s efficiency is judged against its individual criteria (individual weighting system), efficiency of a target DMU₀ can be obtained as a solution to the following problem.

$$\max_{u,v} h_0(u, v) = \frac{\sum_{r=1}^s u_r y_{r_0}}{\sum_{i=1}^m v_i x_{i_0}} \quad (1)$$

subject to

⁶ For an in-depth description of the concept of efficiency and differences between efficiency, productivity and profitability see Stavárek and Polouček (2004).

$$\frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1, j = 1, 2, \dots, j_0, \dots, n \quad (2)$$

$$u_r \geq 0, \quad r = 1, 2, \dots, s \quad (3)$$

$$v_i \geq 0, \quad i = 1, 2, \dots, m, \quad (4)$$

where h_0 is the technical efficiency of DMU₀ to be estimated, u_r and v_i are weights to be optimized, y_{rj} is the observed amount of output of the r^{th} type for the j^{th} DMU, x_{ij} is the observed amount of input of the i^{th} type for the j^{th} DMU, r indicates the s different outputs, i denotes the m different inputs, and j indicates the n different DMUs.

The weights u_r and v_i in the objective function are chosen to maximize the value of the DMU's efficiency ratio subject to the less than unity constraints. These constraints ensure that the optimal weights for DMU₀ in the objective function does not imply an efficiency score greater than unity, either for itself or for any of the other DMUs.

Above DEA problem is a fractional linear program in which the numerator has to be maximized and the denominator minimized simultaneously, i.e. the problem has an infinite number of solutions. To solve the model it is first necessary to convert it into linear form by following a transformation developed by Charnes and Cooper (1962) for fractional programming. It allows the introduction of a constant

$$\sum_{i=1}^m v_i x_{i_0} = 1 \quad (5)$$

meaning the sum of all inputs is set to equal one. The obtained linear programming problem that is equivalent to the linear fractional programming problem (1 - 4) for DMU₀ can be written as:

$$\max_u z_0 = \sum_{r=1}^s u_r y_{r_0} \quad (6)$$

$$\sum_{r=1}^s u_r y_{rj} - \sum_{i=1}^m v_i x_{ij} \leq 0, j = 1, 2, \dots, n \quad (7)$$

$$\sum_{i=1}^m v_i x_{i_0} = 1 \quad (8)$$

$$u_r \geq 0, \quad r = 1, 2, \dots, s \quad (9)$$

$$v_i \geq 0, \quad i = 1, 2, \dots, m, \quad (10)$$

The CRS assumption is only appropriate when all DMUs are operating at an optimal scale. Imperfect competition, constraints on finance, leverage concerns, certain prudential

requirements, etc. may cause a DMU not to operate at optimal scale. The fact that banks face non-constant returns to scale has been documented empirically by, among others, McAllister and McManus (1993), and Wheelock and Wilson (1999). To overcome this problem a DEA model with variable returns to scale has been developed. In this model the variables of technical efficiencies are measured which are confounded to scale efficiencies. The convexity constrain is added to the standard CCR model:

$$\sum_{j=1}^n \lambda_j = 1 \quad (11)$$

The input-oriented VRS for the DMU₀, firstly introduced in Banker *et al.* (1984), can be consequently written as:

$$\min_{\lambda} z_0 = \Theta_0 \quad (12)$$

$$\sum_{j=1}^n \lambda_j y_{r_j} \geq y_{r_0}, r = 1, 2, \dots, s \quad (13)$$

$$\Theta_0 x_{i_0} - \sum_{j=1}^n \lambda_j x_{i_j} \geq 0, i = 1, 2, \dots, n \quad (14)$$

$$\sum_{j=1}^n \lambda_j = 1 \quad (15)$$

$$\lambda_j \geq 0, \quad j = 1, 2, \dots, n \quad (16)$$

where the technical efficiency of DMU₀ is denoted by Θ_0 , and λ_j indicates weight of the j^{th} DMU. Moreover, $\lambda = (\lambda_1, \lambda_2, \dots, \lambda_n)$, $\lambda \geq 0$, is the vector of weights obtained by individual DMUs. Thus, it is a n-dimensional vector of the model's variables. Whereas the DMU with technical efficiency $\Theta_j < 1$ is considered as inefficient, the efficiency $\Theta_j = 1$ shows the efficient DMU placed on the efficiency frontier. The BCC model eliminates the scale part of efficiency from the analysis and therefore the CCR efficiency score for each DMU will not exceed the BCC efficiency score, which is intuitively clear since the BCC model analyses each DMU locally, i.e. compared to the subset of DMUs that operate in the same region of returns to scale, rather than globally. Thus, the BCC efficiency scores are also called pure technical efficiency scores.

3.2 Review of relevant literature on banking efficiency

Efficiency and financial performance of banks and other financial institutions are very frequently discussed topics in economic literature. Sherman and Gold (1985) were one of the first researchers to use the nonparametric approach to evaluate and compare the performances of banks. Berger and Humphrey (1997) surveyed 130 studies that apply frontier efficiency analyses to financial institutions in 21 countries. They report that the majority of these studies are confined to the U.S. banking sector, and call for the need to do further research in this area outside the United States. Since then, more than 60 empirical studies on banking efficiency have been published and their scope has expanded to more countries including transition ones. However, the rapid development of banking sectors and integration process make the previous studies out-of-date very quickly. Therefore, there is a permanent need for further cross-country analysis of banking efficiency.

The further text provides a brief review of empirical literature estimating efficiency of banks in the countries included in the present paper. Majority of cited studies do not only estimate the efficiency of bank but also address some issues such as influence of foreign ownership, privatization or concentration on the efficiency. Many papers investigate determinants of bank efficiency distinguishing the internal and environmental variables. In this review, however, the emphasis is mainly put on the results of efficiency estimation and the rest of findings are considered as irrelevant for the present paper.

The first comprehensive study on Greek banks efficiency was Christopoulos *et al.* (2002) covering period 1993-1998. The empirical results show that larger banks were less efficient than smaller ones. Also, it is found that economic performance, bank loans and investments were positive related to the cost efficiency of the Greek commercial banking sector. Cost efficiency in Greek banking was evaluated also in Kamberoglou *et al.* (2004) extending the time period on 1993-1999. The obtained results indicated that mean efficiency did not exceed 60 per cent and some evidence was provided that bank size, type of ownership and risk behavior may explain differences in measured efficiency scores. Efficiency of Portuguese banks was estimated in Canhoto and Dermine (2000). The banking efficiency was evaluated for the period 1990-1995 applying DEA. The results demonstrate an improvement in efficiency mostly driven by technological change. Considering CRS, the average efficiency increased from 59 per cent in 1990 to 84 per cent in 1995. A rise from 73 per cent to 93 per cent was detected allowing VRS.

Portuguese banks comprised data sets in several cross-country studies, too. For instance Lozano-Vivas *et al.* (2001) used 1993 data of 10 European banking industries. Their estimation of efficiency employing DEA led to results that Portuguese banks had a mean efficiency 15.99 per cent in standard input-output model and 79.87 when national environmental variables incorporated. The average efficiency score of the whole sample was 28.23 per cent and 62.14 per cent, respectively. Carbo *et al.* (2002) applied stochastic frontier approach (SFA) on a large sample of European savings banks between 1989 and 1996. Portugal's saving banks were classified as the second worst in Europe (just ahead of Finnish banks) while their mean efficiency over the period was 70.8 per cent and the average of all national sectors was 78.2 per cent. Nevertheless, the enhancement from 65.1 per cent in 1989 to 72.5 per cent in 1996 was revealed in Portugal. Weill (2004) analyzed the relationship between competition and efficiency in banking on a sample of 12 EU-member countries, including Greece and Portugal, during the period 1994-1999. The most striking result is the improvement in efficiency for all countries, whilst the most significant movement of 22.77 percentage points appeared in Greece catapulting the country from the absolute bottom (efficiency of 50.98 per cent) to the middle part of the overall standings (efficiency of 73.75 per cent). The Portuguese banking industry also recorded a noticeable progress of 20.62 points departing from 54.61 per cent in 1994 and achieving the level of 75.23 per cent in 1999.

Moving the attention on banking in the CEE-6 countries, the most extensively analyzed banking sector is the Polish one. Besides cross-country studies, there are also three papers concentrating only on the country's market. Pawlowska (2003) applied DEA in examination of the impact of mergers and acquisitions (M&A) on efficiency of banks in Poland in the period 1997-2001. A generally increasing level of efficiency is reported and the improvement of efficiency of banks involved in the M&A process is noticed. Moreover, the size was found as important in explaining efficiency since majority of efficient banks were very large and large banks. Although the efficiency of the Poland's bank industry was also investigated using DEA in Havrylchuk (2004), the results indicate that bank efficiency did not improve during 1998 and 2000. Nevertheless, foreign banks were found to be more efficient than their domestically owned counterparts. On the contrary, Nikiel and Opiela (2002) employed a parametric approach and explored the possibility that customer type, rather than foreign ownership and size, explains efficiency. They found that foreign banks servicing foreign and business customers are more cost-efficient and less profit-efficient than other

banks in Poland. The Czech banking sector was solely investigated in Taci and Zampieri (1998) using the distribution-free approach, one of the parametric methods. The conclusion is that private banks have a higher mean efficiency score, supporting rapid privatization. Hasan and Marton (2003) used the SFA to estimate profit and cost efficiency of Hungarian banks during the period 1993-1998. They found an improvement of both types of efficiency. While the cost efficiency increased from 62.08 per cent to 77.61 per cent, the profit efficiency raised from 57.69 per cent to 73.94 per cent. To our knowledge there is no other empirical work focusing on bank efficiency in solely one of the CEE-6 countries. Therefore, the literature survey continues with summary of cross-country studies.

Banking efficiency in the V4 countries during 1999 and 2003 are analyzed in Stavárek (2004b) and Stavárek (2005). Although the two studies employ different estimation techniques - SFA and DEA respectively - the findings were found to be very consistent. Overall, the results suggest that the Czech banking sector is the most efficient followed by the Hungarian with a marginal gap. For instance Stavárek (2005) reports the average efficiency of the V4 region in 2003 to be 79.99 per cent, efficiency in the Czech Republic 88.01 per cent, in Hungary 84.31 per cent, in Poland 78.58 per cent, and in Slovakia 67.69 per cent using BCC model. The Slovakia's banking sector was recognized as the less efficient one. Although there has been an improvement in level of efficiency in all countries since 1999, its intensity is not considered as sufficient. Regarding to chronology, the first comprehensive cross-country study on banking efficiency in CEE countries was Grigorian and Manole (2002). The data set consisted of banks from 17 countries and the period under estimation was 1995-1998. Using DEA, the Czech and Slovenian banking sectors were identified as the most efficient followed by Bulgaria, Hungary, Poland and Slovakia. Romanian banks obtained the lowest average efficiency among CEE-6 countries. The efficiency scores in 1998 varied from 51.1 per cent (Romania) to 79.9 per cent (Czech Republic).

Yildirim a Philippatos (2002) examined the cost and profit efficiency of banking sectors in 12 transition countries of the region in 1993-2000 by alternative parametric approaches. The mean efficiency of all banks and all years was 70 per cent in the case of cost efficiency and 55.3 per cent regarding profit efficiency. Whereas all CEE-6 countries except Slovakia had cost efficiency slightly above the regional average with marginal difference, the profit efficiency scores had a wider range and were lower than regional average in Hungary, Poland and Romania. Bulgaria was not included in the analysis. Fries and Taci (2005) estimated cost efficiency of banks in 15 post-communist European countries during the period

1994-2001 using SFA and two alternative models - with and without country-level factors. The average bank efficiency levels estimated by the two models varied from 47 per cent in the Czech Republic to 85 per cent in Estonia and from 42 per cent in Bulgaria and the Czech Republic to 78 per cent in Kazakhstan, respectively. Slovak banking sector prove to be the most efficient banking sector among the CEE-6 countries.⁷ Using data from 1996 to 2000, Bonin *et al.* (2005) investigated the effects of ownership, especially by a strategic foreign owner, on bank efficiency for 11 transition countries. They found that foreign-owned banks are more cost-efficient than other banks and that they also provide better service, in particular if they have a strategic foreign owner. Estimations of the efficiency level in analyzed countries are not provided in the paper.

Only two studies created a mixed estimation set consisted of transition as well as developed European banking sectors. Stavárek and Polouček (2004) analyzed banks from V4 countries along with banks from Belgium and Finland in 2000 and 2001. They applied four models differing in the assumption of returns to scale and inputs-outputs specification and came to a general conclusion that banks from Finland and Belgium are more efficient than banks from V4 countries. The gap varied from roughly four percentage points in the Czech Republic to more than 12 points in Slovakia. Weill (2003) measured cost efficiency on sample of banks from 11 Western European and six Eastern European countries with the SFA in two years 1996 and 2000. The cross-country analysis showed in fact that Western countries had efficiency scores medians ranging from 61.48 per cent for Portugal to 75.63 per cent for the United Kingdom, while the medians for Eastern countries ranged from 45.09 per cent for Slovakia to 73.24 per cent for the Czech Republic. Among Western countries, Greece and Portugal had the least efficient banking sectors. Among Eastern countries, it appeared that Czech banks were as cost efficient as the most efficient EU banks, while Hungarian banks dominated the banks of the least efficient EU banks, namely Greek and Portuguese banks. Otherwise, the banks originating from the four, other Eastern countries (Latvia, Poland, Slovakia, and Slovenia) clearly underperformed the banks of EU countries.

This study differs from the two mentioned above in three ways. First, to evaluate the level of bank efficiency the most up-to-date available data are employed and the analyzed period is expanded to the year preceding the EU enlargement. Second, the investigation concentrates on banking intermediation instead of cost efficiency or production process since

⁷ Such conclusions are in conflict with a privilege position of the Czech banking sector and generally low efficiency of Slovak banks endorsed by the results of the aforementioned studies.

we consider transformation of deposits to credits and loans as the primary function of banks. Third, we strictly distinguish three groups of countries according to achieved degree of European integration and economic level to realize whether the differences in bank efficiency correspond with such segmentation.

4. Data and selection of variables

The analysis is based on data of banks representing more than 90 per cent of the total banking assets in all countries. Since the sample period was selected on 2002 and 2003, i.e. years covering the final stage of transformation free of instability, the arguments concerning the reliability of data and indicators may be considered as groundless. While describing the data, it is necessary to note that composition of the dataset changed slightly over the period analyzed because one Czech bank ended its operation in 2003 and data on several banks from other V4 countries are not available for both years. Therefore, the sample contains 103 banks in 2002 and 102 banks in 2003.⁸ All data were extracted from the banks' official end-of-year unconsolidated balance sheets and financial statements based on international accounting standards. All data reported in local currencies were converted into EUR as a reference currency using official exchange rates.⁹ We analyzed only commercial banks (some of them originally performed as savings banks) that are operating as independent legal entities. All foreign branches, building societies, mortgage banks, specialized banks or credit unions were excluded from the estimation set.

In the banking literature, there is a considerable disagreement on the perception of the banking activities' principle and on the explicit definition and measurement of banks' inputs and outputs. A fundamental difficulty arises in the treatment of bank deposits. Long-lasting debate in the literature surrounds the input-output status of deposits. Traditionally, deposits are regarded as the main ingredients for loan production and the acquisition of other earning assets. On the other hand, high value-added deposit products, like integrated savings and checking accounts, investment trusts and foreign currency deposit accounts tend to highlight

⁸ In particular, the dataset consists of nine Greek banks, 10 Portuguese banks, 15 Czech Banks, 12 Hungarian banks, 21 Polish banks, 12 Slovak banks, 12 Bulgarian banks, and 12 Romanian banks in 2002 and of nine Greek banks, 10 Portuguese banks, 12 Czech banks, 14 Hungarian banks, 21 Polish banks, 12 Slovak banks, 12 Bulgarian banks, and 12 Romanian banks in 2003.

⁹ To convert values from local currencies we may use either the official exchange rate or the purchasing power parity rate as computed by the OECD. According to Berg *et al.* (1993) the two approaches seem to yield very similar results.

the output characteristics of deposits. Indeed, high value-added deposit services are an important source of commissions and fee revenue for specialized commercial banks such as trust and private banks. In the context of these specialized institutions, one cannot afford to ignore the output nature of deposits. Extending this argument further, one might contend that the classification of deposits should therefore depend on the structure and characteristics of banks in the representative sample and viewed in the regulatory context of the country in question. For example, since the magnitude of high value-added deposits is relatively small compared to time and savings deposits in CEE-6 countries, there may be more reason to regard deposits as inputs in these circumstances.

Three main approaches have been developed to define the input-output relationship in financial institution behavior in the literature. Firstly, the production approach (Sherman and Gold, 1985) views financial institutions as producers of deposit and loan accounts, defining output as the number of such accounts or transactions. This method usually defines inputs as the number of employees and capital expenditures on fixed assets. Second, the intermediation approach (Sealey and Lindley, 1977) stems directly from the traditional role of financial institutions as intermediaries that convert financial assets from surplus units into deficit units. Operating and interest costs are usually the major inputs, whereas interest income, total loans, total deposits and non-interest income form the principal outputs. Third, the asset approach recognizes the primary role of financial institutions as creators of loans. In essence, this stream of thought is a variant of the intermediation approach, but instead defines outputs as the stock of loan and investment assets (Favero and Papi, 1995).

Intermediation approach seems to have dominated empirical research in this area and also we adopt for the definition of inputs and outputs the original approach proposed by Sealey and Lindley (1977) with a small modification. It assumes that the bank collects deposits to transform them, using labor and capital, in loans. We determined the appropriate number of inputs and outputs with a respect on the dataset size and consequently employed three inputs (labor, capital, and deposits), and two outputs (loans and net interest income).¹⁰ We measure labor by the total personnel costs (PC) covering wages and all associated expenses, capital by the net book value of fixed assets (FA), and deposits by the sum of demand and time deposits from customers, interbank deposits and sources obtained by bonds

¹⁰ Under the non-parametric approach which will be implemented in our empirical analysis, increasing the number of variables reduces the number of technically inefficient observations. Therefore, in order to minimize this possible drawback of the methodology, we restricted our choice of variables to a three-input, two-output model.

issued (TD). Loans are measured by the net value of loans to customers and other financial institutions (TL) and net interest income as the difference between interest incomes and interest expenses (NII).

The main modification of the traditional intermediation approach is the absence of investment (financial) assets on the side of outputs. Such part of banks' assets is excluded because the majority of banks' investments in CEE-6 countries are allocated in treasury bills and government bonds and we do not perceive it as a pure intermediation that finances customers' investment and consumption needs. The second modification is motivated to accent not only volume of the intermediation process but also its quality and profitability. Thus, the NII is added on the output side of the model. See Table 7 for a descriptive statistics of all inputs and outputs calculated for the whole sample of banks.

Table 7: Descriptive statistics of inputs and outputs (in EUR)

| | TD | PC | FA | TL | NII |
|--------------------|---------------|------------|--------------|---------------|--------------|
| | 2002 | | | | |
| mean | 4 206 814.78 | 65 516.25 | 110 579.35 | 3 467 741.65 | 140 272.01 |
| median | 849 366.00 | 15 222.96 | 21 311.19 | 620 492.89 | 31 068.53 |
| standard deviation | 8 777 227.91 | 119 905.60 | 189 594.52 | 7 656 795.76 | 243 722.81 |
| min | 8 989.76 | 254.86 | 875.49 | 13 515.63 | 265.26 |
| max | 55 733 000.00 | 786 496.00 | 1 132 094.00 | 49 520 081.00 | 1 326 748.00 |
| | 2003 | | | | |
| mean | 4 610 382.78 | 71 327.11 | 103 613.71 | 3 755 986.95 | 145 873.00 |
| median | 1 124 156.41 | 20 957.05 | 27 377.66 | 1 075 295.11 | 46 750.42 |
| standard deviation | 9 525 763.75 | 126 043.15 | 178 252.36 | 8 008 702.64 | 242 509.94 |
| min | 18 904.08 | 894.01 | 1 116.59 | 23 937.19 | 1 764.60 |
| max | 62 904 000.00 | 864 032.00 | 1 129 018.00 | 53 579 445.00 | 1 466 011.00 |

Source: Author's calculation

5. Empirical results

Following the methodology described, we evaluated the efficiency of all banks in the estimation set and calculated DEA efficiency scores obtained by running separate programs for the CCR model and for the BCC model. We used the EMS software, version 1.3.0, by Holger Scheel for the DEA scores calculation. To avoid any input or output being totally ignored in determining the efficiency the constraints specified in equations (9) and (10) were modified to the weights are equal to or greater than 0.001. The specification of the BCC model was modified analogically. We pooled the cross-country data and used them to define a common best-practice efficiency frontier. This allowed us to focus on determining the relative differences in performances across banking industries. The same approach was previously

followed by Berg *et al.* (1993), Pastor *et al.* (1997), Casu and Molyneux (2000), Grigorian and Manole (2002) or Stavárek (2004). Table 8 reports elementary statistics of efficiency scores obtained relative to the whole sample considering CRS and VRS respectively.

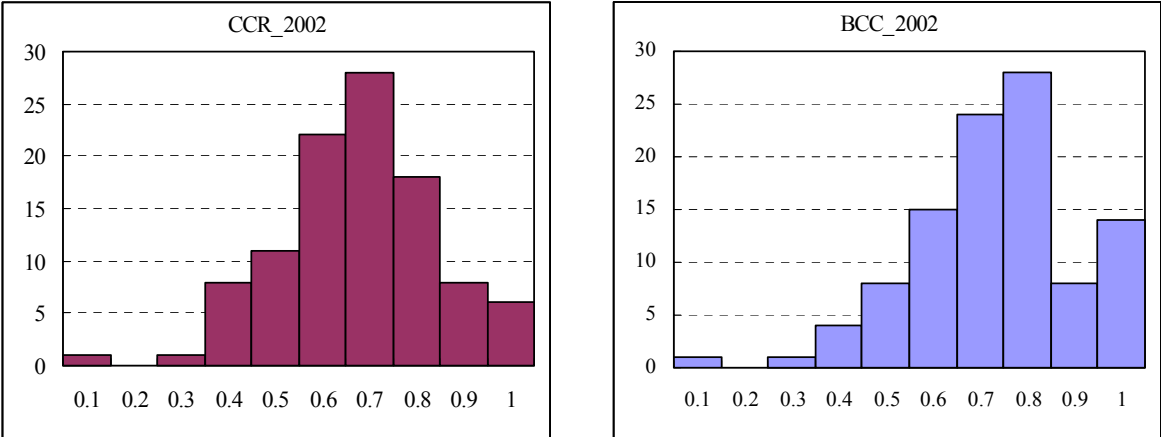
Table 8: Descriptive statistics of efficiency scores

| | CCR model | | BCC model | |
|-----------------------|-----------|----------|-----------|----------|
| | 2002 | 2003 | 2002 | 2003 |
| no. of DMUs | 103 | 102 | 103 | 102 |
| no. of efficient DMUs | 3 | 3 | 5 | 9 |
| mean | 62.62 % | 67.26 % | 68.14 % | 78.13 % |
| median | 62.81 % | 67.49 % | 68.32 % | 77.80 % |
| standard deviation | 16.07 % | 13.19 % | 17.44 % | 15.85 % |
| min | 7.94 % | 33.99 % | 8.25 % | 40.24 % |
| max | 100.00 % | 100.00 % | 100.00 % | 100.00 % |

Source: Author’s calculation

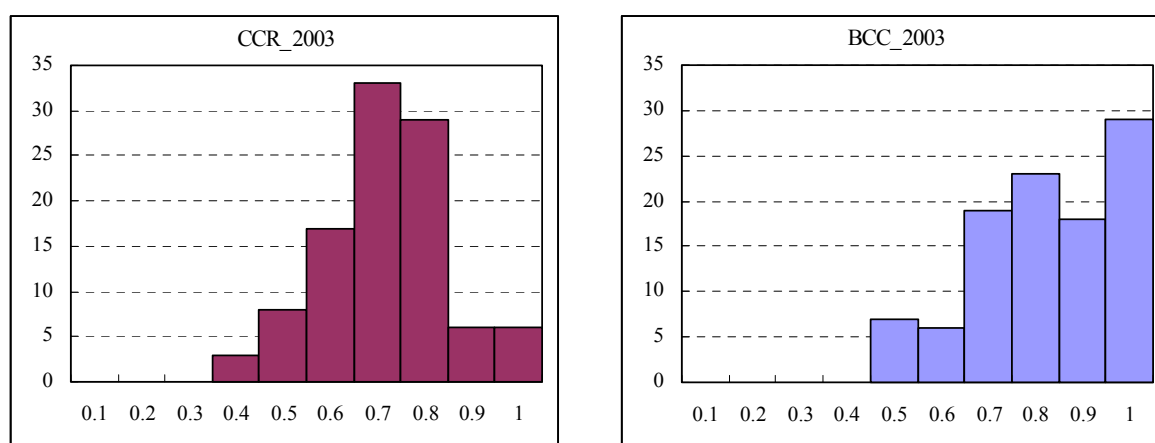
One can point out that BCC efficiency scores are considerably higher than ones of CCR and also that the efficiency frontier using BCC model consisted of more DMUs than the CCR frontier. It is possible to detect an improvement of average efficiency between 2002 and 2003. The average efficiency scores seem to be in general accordance with results of above surveyed studies. Since the development of efficiency may be examined in changes of frequency distribution, Figures 1-4 illustrate the frequency distribution of efficiency scores over the period of analysis and models used.

Figures 1-2: Frequency distribution of efficiency scores in 2002



Source: Author’s calculation

Figures 3-4: Frequency distribution of efficiency scores in 2003



Source: Author's calculation

The improvement of efficiency can be identified in a shift of the cluster comprising the most DMUs from 0.50-0.70 to 0.60-0.80 in the CCR model and from 0.60-0.80 to 0.80-1.00 in the BCC model. Number of DMUs whose efficiency came under the interval 0.00-0.40 was also reduced significantly in 2003.¹¹ Also in comparison with findings of Berger and Humphrey (1997) the figures show signs of average performance. They surveyed, as mentioned earlier, 130 studies (122 of which were focused on depository financial institutions), applying frontier efficiency analysis (using parametric as well as non-parametric methods) to financial institutions in 21 countries. They drew to the conclusion that the mean value of average efficiencies was 0.79, with a standard deviation of 0.13, and a range of 0.31 to 0.97. Considering only 69 applications of non-parametric techniques, the mean average efficiency was 0.72, with a standard deviation of 0.17. Results of the present study are not poles apart.

To observe differences in average efficiency among three analyzed groups the mean efficiency scores of traditional EU-member countries, new EU-member countries and candidate countries were calculated and they are reported in Table 9. Considering CRS, the differences are rather small and banks from the third group even over-performed banks from other two groups in 2003. However, the CRS assumption may be only accepted if banks operate at optimal size. Since imperfect competition, financial constrains, banking regulation and supervision, concentration, market structure and other factors exist in the real environment the size of banks cannot be ideal. Some empirical evidence on insufficient validity of the CRS assumption can be found in McAlister and McManus (1993) or Wheelock

¹¹ As the scale inefficiency is included in the CCR efficiency scores, their frequency distributions show more features of normality than distribution of the BCC efficiency scores.

a Wilson (1999). Consequently, the efficiency estimation allowing VRS should provide more robust results.

Table 9: Average efficiency in the groups of countries

| | CCR model | | BCC model | |
|--|-----------|---------|-----------|---------|
| | 2002 | 2003 | 2002 | 2003 |
| whole sample | 62.62 % | 67.26 % | 68.14 % | 78.13 % |
| 1 st group (GRE, POR) | 66.81 % | 69.48 % | 78.24 % | 88.54 % |
| 2 nd group (CZE, HUN, POL, SVK) | 61.65 % | 65.61 % | 66.17 % | 77.03 % |
| 3 rd group (BUL, ROM) | 61.75 % | 69.54 % | 65.08 % | 72.62 % |

Source: Author's calculation

Only one group consisting of the long-time EU-member countries exceeded the average efficiency of the whole sample. The gap between the first group and the rest of the estimation set was significant in both years. The V4 countries obtained the average efficiency of approximately 12 percentage points lower than the first group. Mean efficiency scores of the EU-candidate countries were even lower and the gap between them and the first group reached 13.16 percentage points in 2002 and 15.92 points in 2003. All analyzed regions showed an increase in average efficiency, whilst the fastest growth of 16.41 per cent was recorded in the V4 countries. The annual growth of the first group was 13.16 per cent and the growth of efficiency in the candidate countries was 11.59 per cent. Our results support the existence of an efficiency gap between three analyzed groups with the dominance of banks from Greece and Portugal. Because the growth of efficiency was slowest in the Balkans their relative position worsened and the third group lags behind instead of catching-up the forerunners. On the other hand, the V4 countries speeded up the convergence process in the field of banking intermediation and came near the first group. Summarizing all findings, standings of the groups according to average efficiency absolutely copies the hierarchy in terms of economic development and achieved stage of integration.

We also computed average efficiency of all banking industries to provide more comprehensive results and to investigate whether the relative positions of banking sectors correspond with the standing of the respective group. Taking into account results of BCC model in 2003, the leading position of the traditional EU-members group was verified by the Portuguese banking sector as the most efficient followed by the Greek one. Likewise, the second position of the V4 countries was confirmed by the results of Czech, Hungarian and Polish banking sectors classified as third, fourth and fifth most efficient industries. It is worth to note that Czech banks were almost as efficient as Greek banks in 2003 and even more efficient in 2002. One may also observe the gap of roughly three percentage points distancing

the Hungary's banking sector from the Greek one as rather marginal. Mean efficiency of Poland's banks tallies with the V4 average. Whereas Czech and Hungarian banks brought the efficiency closer to the EU-15 members, the Slovak banking sector was found to be the less efficient and the gap was substantial even in comparison with Bulgarian and Romanian banks. Similarly with the Czech Republic achieving almost the same level of efficiency as the worse banking sector from the leading group, Romania's efficiency was somewhat even as the efficiency of Polish banks.

To analyze catching-up process from the national perspective we have to look into pace of the efficiency growth. Although the Slovak banking sector obtained the lowest average efficiency it showed the fastest growth reaching 32.2 per cent in 2003. Another country that surpassed the growth rate of all countries from the target group was Hungary recording annual growth of 18.44 per cent while Greece recorded growth of 17.74 per cent and efficiency of the Portuguese banks increased by 9.32 per cent in 2003. Catching-up in other countries was not fully accomplished because growth rates in the Czech Republic and Poland (10.75 per cent and 14.18 per cent respectively) exceeded only growth in Portugal. Likewise, Bulgaria and Romania registered growth rates of 11.72 per cent and 11.44 per cent, which allowed the countries to catch-up the Czech Republic only while the rest of the V4 countries receded extensively.

Table 10: Average efficiency in banking sectors

| | CCR model | | BCC model | |
|----------------|-----------|---------|-----------|---------|
| | 2002 | 2003 | 2002 | 2003 |
| Greece | 62.49 % | 66.70 % | 73.14 % | 86.29 % |
| Portugal | 70.70 % | 71.99 % | 82.83 % | 90.55 % |
| Czech Republic | 72.88 % | 71.79 % | 77.37 % | 85.69 % |
| Hungary | 66.12 % | 68.57 % | 70.73 % | 83.77 % |
| Poland | 59.75 % | 63.49 % | 65.81 % | 75.14 % |
| Slovakia | 46.46 % | 59.69 % | 48.26 % | 63.80 % |
| Bulgaria | 61.18 % | 68.33 % | 63.49 % | 70.93 % |
| Romania | 62.33 % | 70.74 % | 66.67 % | 74.30 % |

Source: Author's calculation

To explain generally lower level of efficiency in CEE-6 banking sectors we may use either key indicators of the banking industries presented and discussed in the second section or some incidental outcomes of the efficiency estimation. We apply both approaches whilst some important facts about lending policy in Slovakia, Bulgaria, Romania and Poland are elaborated firstly and weaknesses of banks detected in efficiency estimation secondly.

Although the financial intermediation in Slovakia measured as total banking assets to GDP stood at almost 96 per cent and is thus relatively high compared to other CEE-6

countries, the loans to private sector as a percentage of GDP reached only 30 per cent and has been continuously falling till 2002. It is due to the fact that formerly state-owned banks that dominate banking market in all areas are still struggling to come to terms with the rough and tumble events of recent years, which is reflected in a very cautious lending policy. On the other hand, there has always been a growth of deposits resulting in stable ratio of private sector deposits on GDP that has been fluctuating around 60 per cent till 2002. The main reasons for that are very strong banking tradition and relatively low rates of inflation during the transition years that have not eroded value of financial assets. Such an overhang of deposits with respect to lending activity added a further element to the intermediation inefficiency issue. Nevertheless, 2003 appeared to be a turning point for the Slovak banking sector recalling the aforementioned sharp raise in efficiency.

Low efficiency in the Balkans stems from the banks' very cautious approach to lending, which is not surprising given the difficulties in reinforcing creditor rights, uncertainties in obtaining information and hesitant reforms in the corporate sector. In addition, banks are still struggling to digest the shock from the recent banking crises. Low-risk businesses such as foreign exchange and interbank transaction or purchase of government bonds are preferred, which leads to a crowding out of the private sector, especially small and medium enterprises. Moreover, banks are left far more prone to unexpected exchange rate fluctuations. Credit institutions' exceptionally circumspect approach to extending credit is also reflected by the maturity structure of the loan portfolio since half of the total loans disbursed to the private sector are short-term, that is with maturity of less than one year. The risk aversion towards lending that adversely affects the efficiency is also underscored by the high capital adequacy in Bulgarian and Romanian banking sectors that exceeds the limit as well as common standards substantially.

The unfavorable business climate in Poland (see Table 2 for the registered economic recession), which affects banks both via weaker demand for banking services and indirectly via the borrower's ability to service a loan, not only led to a deterioration in profitability indicators over the years 2002-2003; the level of financial intermediation (total bank assets to GDP) has been also declining since 2002.¹² Due to the slump in demand for loans resulting from a weaker economic environment, lending activity has recently been sluggish. Domestic currency lending has stagnated due to the banks' conservative lending policy, which has kept

¹² The comparatively low level of financial intermediation is emphasized by the low penetration of banking services. Only 65 per cent of Poles over the age of 18 have a bank account, and only 53 per cent of all account holders use bank cards.

interest rates on zloty-denominated loans relatively high and prompted the banks to increase their purchase of low-risk government bonds. By contrast, low interest rates on loans denominated in foreign currency triggered a rise in foreign exchange loans. The share of NPL in total loans, which was already rather high in Poland, raised from its historical low of 10.5 per cent in 1997 to 22.2 per cent in 2003, thus surpassing the figure recorded for 1995. Such developments limit the banking efficiency in Poland to growth more substantially.

One of the important advantages of DEA that attracts analysts and managers is its ability to identify the potential improvement for inefficient DMUs. For the inefficient DMUs, DEA compares the DMU with a convex combination of DMUs located on the frontier and enables the analyst to indicate the sources and the level of inefficiency for each of its inputs and outputs. The indicated targets, which are shown to the inefficient DMUs as models, are their actual peer units, therefore the results are more likely to be accepted by the managers of these DMUs. One of the possible approaches to identify exactly the causes of inefficiency is the analysis of weights assigned to inputs and outputs. The lower the weight assigned the greater effort to minimize impact of the respective input or output on the efficiency score. Thus, inputs and outputs with the lowest weights can be labeled as sources of the DMU's inefficiency. Because the input oriented model is applied in this study we restrict our attention on the inputs of banking intermediation. To conserve the space separate discussions on each bank's weaknesses are substituted by a summary on national basis.¹³ Identification of the sources of inefficiency may help remove some obstacles on the way to catch-up more efficient countries in the banking intermediation.

Estimation of the Portuguese banks' efficiency yielded results that are far from any kind of generalization. The causes of inefficiency differ among banks and nearly no unifying element can be found. Although such diversification of weaknesses on the input side is obvious also in Greece, one may consider personal costs in the Greek banking industry as high with respect to the output capacity since half of the Greek banks obtained the lowest possible weight of the personal costs input. On the other hand, the CEE-6 banking sectors are more uniform in recognizing the inefficiency sources. Fixed assets proved to be the most significant factor pushing the efficiency down in four banking sectors (Czech Republic, Slovakia, Bulgaria and Romania). However, the negative impact of FA reduced in 2003

¹³ Results of estimation including names of banks analyzed and their efficiency scores, weights or data may be provided by the author upon request.

compared to 2002 when FA was the primary cause of inefficiency also in Poland.¹⁴ Banks in the CEE-6 countries dispose of property, mainly in the form of real estates, which is excessive with respect to the market size and is not able to generate sufficient output. Besides the FA, banking efficiency was influenced negatively by the personal costs. This input was found as the main factor aggravating efficiency in Hungary and Poland. Such a result conforms to the relatively lower concentration of the Hungarian and Polish markets documented in Table 5. Since there are more banks serving the whole market more employees have to be employed. Consequently, due to limited market shares the employees' output potential is not fully replenished. Moreover, majority of Romanian banks were negatively affected by the PC, too. In contrast to FA, extend of the PC negative impact did not shrink.¹⁵

We are aware of the fact that averaging without any respect to the size of banks causes loss of information, and therefore, we implemented in our analysis a size-adjusted average efficiency (SEA) calculated as:

$$SEA = \sum_{j=1}^n w_j \Theta_j \quad (17)$$

where SEA is the size-adjusted average efficiency, w_j is the weight computed as a share of j^{th} DMU's assets on total assets of all estimated DMUs from particular country, Θ_j is the observed efficiency for the j^{th} DMU, and j indicates the different n DMUs. Results of the SEA calculation for all banking sectors are portrayed in Table 11.

Table 11: Average size-adjusted efficiency in national banking sectors

| | CCR model | | BCC model | |
|----------------|-----------|---------|-----------|---------|
| | 2002 | 2003 | 2002 | 2003 |
| Greece | 61.56 % | 65.39 % | 77.14 % | 88.45 % |
| Portugal | 68.98 % | 68.25 % | 92.54 % | 91.58 % |
| Czech Republic | 68.27 % | 64.53 % | 79.61 % | 85.11 % |
| Hungary | 63.22 % | 64.06 % | 70.68 % | 82.79 % |
| Poland | 55.37 % | 58.12 % | 67.29 % | 75.92 % |
| Slovakia | 40.65 % | 46.46 % | 43.90 % | 55.48 % |
| Bulgaria | 60.39 % | 67.05 % | 64.04 % | 72.41 % |
| Romania | 46.54 % | 55.72 % | 55.56 % | 67.72 % |

Source: Author's calculation

¹⁴ Whereas ten Czech banks obtained a minimal weight of 0.001 for the fixed input in 2002 and two more institutions got the weight lower than 0.05, in 2003 the minimal weight was assigned to four banks and four other banks obtained a weight lower than 0.05. In Poland the number of banks with the minimal weight dropped from 17 in 2002 to eight in 2003. Similar development was recorded in Slovakia where seven banks obtained the lowest possible weight in 2003 instead of 10 in 2002. Situation in Bulgaria and Romania remained unchanged as nine banking institutions were assigned by the minimal weight in both countries and both years.

¹⁵ Eight of twelve Hungarian banks obtained the minimal weight for the personal costs input in 2002. This number decreased slightly to seven in 2003. In Poland, 16 banks suffered by higher PC than necessary in both years as 13 of them obtained the lowest possible weight and weight of three other banks did not exceed 0.05.

The SEA indicator may be used to investigate whether size of a bank matters in explaining differences in the achieved efficiency. To proceed this kind of analysis we have to compare SAE with a “simple” average efficiency. If the difference is positive the larger banks over-perform the smaller banks a vice versa. The higher is the absolute value of the difference the more significant is the gap in efficiency between large and small banks. See Table 12 for differences calculated for all banking sectors.

Table 12: Differences between SAE and average efficiency (in percentage points)

| | CCR model | | BCC model | |
|----------------|-----------|--------|-----------|-------|
| | 2002 | 2003 | 2002 | 2003 |
| Greece | -0.93 | -1.31 | 4.00 | 2.15 |
| Portugal | -1.72 | -3.74 | 9.71 | 1.02 |
| Czech Republic | -4.61 | -7.26 | 2.25 | -0.58 |
| Hungary | -2.90 | -4.51 | -0.05 | -0.98 |
| Poland | -4.38 | -5.37 | 1.48 | 0.78 |
| Slovakia | -5.81 | -13.23 | -4.36 | -8.32 |
| Bulgaria | -0.78 | -1.28 | 0.55 | 1.48 |
| Romania | -15.79 | -15.03 | -11.11 | -6.58 |

Source: Author’s calculation

The results indicate that the larger banks were generally more efficient using the BCC model. It is quite a common finding for many other studies that smaller banks dominate the frontier in the CCR model, while in the BCC model, frontier banks are on average much larger (e.g. Berg et al. (1993) or Vujcic and Jemric (2002) came to the same conclusion). Nevertheless, it must be stressed that dominance of larger banks in the BCC model enervated during the analyzed period in almost all countries. The only exceptions are Bulgaria and Romania. In Romania, although larger banks improved efficiency more considerably than smaller banks, the difference between SAE and “simple” average efficiency was still negative in 2003 suggesting better performance of smaller banks. Continuing in investigation of the BCC model in 2003, one can point out that differences in five countries did not exceed 1.5 percentage point and therefore the size does not account for variances in efficiency among banks.

As it is apparent from Table 10, the results obtained show differences between efficiencies allowing VRS and efficiencies based on CRS. Recall that the CCR efficiency score is a product of technical and scale efficiency, and BCC measures purely technical efficiency; thus, the ratio of the efficiency scores

$$S_j = \frac{\Theta_{j,CCR}}{\Theta_{j,BCC}} \tag{18}$$

yields a measure of the relative scale efficiency of bank j . If $S_j = 1$, this means that bank n is operating at the most efficient scale size. If it is less than one, this means there is scale inefficiency for bank j . Thus, $(1-S_j)$ represents the relative scale inefficiency of a bank. The units that are CCR-efficient will also be scale-efficient, since scale was already factored in the CCR model. Thus, the two are equal. The units that are BCC-efficient, but inefficient in the CCR model, have a scale inefficiency. Since they were technically efficient, all of the inefficiencies picked up by CCR are due to scale. However this ratio does not indicate whether the banks with scale inefficiency are too small or too big. To detect not only the extend of scale inefficiency but also its direction we modified the ratio and replaced the CRS efficiency by non-decreasing returns to scale (NDRS) efficiency and VRS efficiency by the non-increasing returns to scale (NIRS) efficiency score. Formally it can be written as:

$$S_j = \frac{\Theta_{j,NDRS}}{\Theta_{j,NIRS}} \quad (19)$$

Consequently, the scale inefficiency higher than zero predicates about too big bank and inefficiency lower than zero identifies too small banks from the point of view of the input orientated DEA model. Average scale inefficiencies of all banking sectors are presented in Table 13. Moreover, the table shows average size-adjusted scale inefficiency (SASI) taking into account the size of the bank and its market power in the country's banking sector. This indicator can shed some light on the issue whether size of a bank is related to the scale inefficiency. SASI is calculated analogically with the equation (17) and may be formally written as:

$$SASI = \sum_{j=1}^n w_j SI_j \quad (20)$$

where $SASI$ is the size-adjusted average efficiency, w_j is the weight computed as a share of j^{th} DMU's assets on total assets of all estimated DMUs from particular country, SI_j is the observed scale inefficiency for the j^{th} DMU calculated as $1-S_j$, and j indicates the different n DMUs. If the SASI is higher than the average scale inefficiency the larger banks suffer from the scale inefficiency more than smaller banks a vice versa.

Table 13: Scale inefficiency in national banking sectors

| | 2002 | | 2003 | |
|----------------|--------------------|---------|--------------------|---------|
| | scale inefficiency | SASI | scale inefficiency | SASI |
| Greece | 13.87 % | 19.95 % | 22.05 % | 26.05 % |
| Portugal | 13.50 % | 25.16 % | 20.38 % | 25.48 % |
| Czech Republic | 5.17 % | 14.32 % | 15.58 % | 24.24 % |
| Hungary | 6.07 % | 10.87 % | 17.24 % | 22.81 % |
| Poland | 8.70 % | 17.74 % | 14.64 % | 23.56 % |
| Slovakia | 3.39 % | 7.57 % | 6.07 % | 16.99 % |
| Bulgaria | 2.85 % | 5.40 % | 2.86 % | 6.90 % |
| Romania | 7.26 % | 16.52 % | 4.72 % | 17.27 % |

Source: Author's calculation

Presented results on scale inefficiency clearly show three common findings for the whole sample. First, all scale inefficiencies are positive suggesting the banks are too big with respect to their real output production. Second, the higher is the average efficiency considering VRS the higher is the scale inefficiency in the banking sector. Third, the scale inefficiency increased in almost all banking sectors over the analyzed period. High scale inefficiency in Greece and Portugal stems from the fact that banks in these countries maintain extensive nets of bank branches compared to number of branches in the CEE-6 countries.¹⁶ This traditional structure, common in EU-15 (50 bank branches per 100,000 inhabitants), is very efficient in collecting deposits (input of banking intermediation) but not so in disbursing loans (output of banking intermediation). Thus, a better utilization of existing size or its consolidation may contribute to decline of scale inefficiency. On the contrary, banks in Romania and Bulgaria operate at almost optimal size and their efficiency gap is therefore primarily caused by technical inefficiency frequently assigned to the shortage of managerial skills. The SASI figures unambiguously show that the problem of inadequate size refers especially to large banks. It is also absolutely evident that this issue gains strength in the CEE-6 countries where the difference between SASI and the average scale inefficiency surpassed ten percentage points in many cases.

¹⁶ In 2003, there were 3,300 branches in Greece, 5,440 branches in Portugal, 1,670 branches in the Czech Republic, 985 branches in Hungary, 2,971 branches in Poland, 1,029 branches in Slovakia, 652 branches in Bulgaria, and 2,795 branches in Romania. The difference between the Western and Eastern zone become even more evident if the ratio of bank braches' number on 100,000 inhabitants is calculated.

6. Conclusion

This study aimed to estimate and compare efficiency of banking intermediation in eight countries representing three relatively homogenous groups of countries at different stage of the European integration and different economic level during the period 2002-2003. We also analyzed linkage between efficiency and size of a bank by calculating size-adjusted efficiency and the issue of optimal bank's size was investigated by incorporating the scale inefficiency into the paper.

The results of efficiency estimation suggest that there exists an efficiency gap for banks in the CEE-6 countries in comparison to banks from Greece and Portugal representing the least developed EU-15 countries. The hierarchy of groups in terms of banking efficiency absolutely concurs with that in terms of economic development and achieved stage of European integration. We registered a substantial improvement of efficiency in the V4 region boosting the convergence process and placing the average efficiency in the V4 countries near the efficiency in Greece and Portugal. However, a favorable performance of the whole region is weakened by a high range of the country's efficiency means. In particular, whereas the Czech banking sector's average efficiency almost equals to the efficiency in Greece, the Slovak banking sector was evaluated as the least efficient of all countries. Improvement of the average efficiency in the third group consisted of Bulgaria and Romania did not allow reducing of the efficiency gap and their relative position worsened. One can interpret such a finding that low efficiency of banking intermediation constitutes a serious problem for a smooth functioning of the banking sector and may hamper economic growth in the Balkans.

Another crucial problem in the CEE-6 countries is the noticeably high scale inefficiency of large banks. These banks are too big with respect to their real output production and the way towards higher efficiency does not lead through establishment of new braches and engagement of new employees. Such a conclusion is extremely important in the context of generally lower number of bank braches and consequently lower direct accessibility of banking services in the CEE-6 countries if compared with EU-15. Therefore, large banks may either consolidate the input base or make a progress in its utilization. Closing of branches is highly improbable because medium-sized banks have started expansion to the retail market recently and large banks are not likely to loose their market shares. Consolidation can neither be done by a wave of mergers. Nearly all large banks in the CEE-6 countries are owned by strategic foreign investors and it is absolutely out of question to

proceed a merger of daughter banks without the same process involving the parent institutions. Thus, the adequate approach to improve efficiency is the better utilization of existing inputs in financial intermediation. A complex menu of banking products and services of the highest quality is the only possibility to attract well-renowned and long-established companies and manufacturers which are the most credible and demanded bank customers. Since this market segment is extremely competitive, the credit institutions should extend their lending activities particularly in the sector of households and small and medium enterprises.

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