

OPERATING PERFORMANCE OF THE BANKING INDUSTRY:
AN EMPIRICAL INVESTIGATION
OF THE SOUTH EASTERN EUROPEAN REGION

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Abstract

This paper examines the operating performance of the South Eastern European (SEE) banking industry over the period 1998-2003. To this end, we investigate the empirical relationship between operating expenses and bank, market and country specific characteristics. Operating performance is found to be positively related to loan quality and the asset size or the bank's market share, and negatively related to liquidity, the loan ratio and bank's age.

JEL Classification: D24, G21, L25

Keywords: South Eastern European banking sectors, Operating performance, Personnel expenses, Administrative expenses, Bank structure

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1. Introduction

The operating performance of financial institutions has long been at the center of academic research and has received a substantial amount of attention. This is primarily due to the fact that operating efficiency is of particular interest for both managers, whose aim is to improve the performance of their financial firms, and policy makers, whose task is to assess the effects of market structure on performance and, therefore, to safeguard the stability of the financial system (Berger and Mester, 1997). The majority of the literature concerning bank operating performance has focused on the US banking market (Berger and Humphrey, 1997), and to a lesser extent on the European banking sector (see, for example, Altunbas *et al.*, 2001), while, as far as we are aware, relatively little research has been carried out to investigate the issue of operating performance in the South Eastern European (SEE) banking region.

Banks play a dominant role in the financial system and economy of the SEE region, as capital markets are practically limited to the equity markets and are, in general, quite fragile and underdeveloped. Indeed, in 2003, domestic credit to the private sector was 48.5 per cent of GDP in Croatia, and 25.8 per cent in Bulgaria, while the market value of all shares listed on the stock market was 19.2 per cent and 7.9 per cent respectively (European Bank for Reconstruction and Development [EBRD], 2004). A similar picture emerges for the rest of the SEE countries, Romania being the only exception.¹ As a result, it appears from a first glimpse that banks constitute the backbone of financial markets in the SEE region.

However, despite the dominance of the banking sector, the degree of financial penetration through banking products and services has been lagging behind that of other emerging markets and the European Union (EU), owing to, among other factors, unsound economic policies and structural market inefficiencies, mainly in the previous decade. These factors, in many instances, have resulted in severe financial crises. In particular, the occurrence of banking crises during the nineties coincided with the transition period and was common in most SEE countries.² These were triggered by the bad debts inherited from the past regimes and the inability of financial institutions and other market players to assimilate the rules of a free market economy (European Commission, 2004).

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1. The domestic credit to the private sector and the market value of all shares listed on the stock market in Romania were roughly the same, at about 9.5 per cent in 2003, though the low domestic credit to the private sector signifies the slow pace of development of banking activities rather than the advance of the financial market in general.
 2. Indicatively, we can mention the strong economic shock that hit the FYR of Macedonia economy in the first half of 1999, the hostilities in Serbia & Montenegro during the previous decade, the collapse of the pyramid scheme in Albania in 1997, the crisis in Romania in 1997-98, and the severe economic crisis in Bulgaria in 1996-97 (one of the world's worst banking crises in recent history, when 14 out of the 35 registered commercial banks failed).

The low level of maturity of the financial system also played a detrimental role. In particular, all SEE countries started with low levels of intermediation, given the absence of the framework characterizing market-based economies, the over-cautious behavior of banks, the lack of a sufficient number of clients having the appropriate risk-return profile, and the weak legal framework for creditor protection. As a result, loans to the private sector, on average, stood at about one-eighth of the credit provided by the European Union banking system, where the domestic credit to GDP ratio reached 120 per cent in 2003 (European Central Bank [ECB], 2004).

However, since 2000 a dramatic change has been observed, as economic stability and the adoption of a number of ambitious economic reform programs have started to pay off. Indeed, the transformation of the banking sector in the region has gained momentum as the 'opening up' of SEE countries' financial markets enhanced banking intermediation.³ This was the result of the implementation of a common reform process, including the restructuring, rehabilitation, and privatization of state-owned banks, the liquidation of insolvent institutions, and the improvement of the administrative efficiency and capability of the banking sector.

Moreover, the privatization of the banking sector in the region was enhanced and foreign penetration gradually increased, although at unequal pace among the SEE countries. The asset share of state-owned banks has been reduced significantly in all countries, falling to levels below 5 per cent in Bosnia-Herzegovina, Bulgaria, Croatia, and FYR of Macedonia, indicating that the privatization process has been quite effective (EBRD, 2004). In turn, foreign ownership has been proving beneficial, as it entails a transfer of financial know-how, human capital, sophisticated IT applications, investment resources, and more advanced risk management systems, which could improve banking operating performance and enhance financial intermediation. Recently, a growing number of studies have focused on the effects of foreign penetration on the efficiency of the banking sector of emerging economies. Studies, such as those of Weill (2003), Bonin *et al.* (2005), and Fries and Taci (2005), argue that foreign-owned banks are more cost-efficient than locally-owned ones. In addition, Kraft and Tirtiroglu (1998) and Kraft *et al.* (2002) suggest that new banks in general, and new foreign banks in particular, are the most cost efficient financial institutions in Croatia. Jemrie and Vujeje (2002) undertook a similar analysis, also for Croatia, yielding similar results.

In addition, the establishment and adoption of new prudential regulation and tighter supervision rules, and the improvement of accounting and disclosure standards have also benefited banking intermediation.⁴ Since 1998 significant efforts have

3. However, the credit expansion has so far primarily been directed towards households and to a lesser extent towards the corporate sector (European Commission, 2004).

4. Studies on transition countries have stressed that banking sector reform is a necessary condition for the development and deepening of the sector, while it is also essential to maintain and improve financial stability (European Commission, 2004).

been directed towards improving the legislation related to the banking sector, while there have been continuous amendments of the banking supervision regulatory system aiming at its harmonisation with the EU regulatory regime and the international standards of effective supervision. These laws have increased the attractiveness of the banking industry to foreign investments, strengthened prudential standards and practices in the banks' operations, enhanced corporate governance, and improved efficiency in banking operations and supervision (Mamatzakis *et al.*, 2005).

Indeed, the EBRD index on banking sector reform shows that all SEE countries are classified, on average, around 3.0 in 2003, most of them coming up from much lower levels in 1998 (Table 1). This rating apparently implies that bank solvency and the framework for prudential supervision and regulation have been improving over the years, with the new legislation being a dominant contributor. Efforts are now shifting towards the risks that banks are exposed to and ways to enhance the prudential assessment of risks, both within banks and in terms of supervision of the banking sector.⁵

Table 1. EBRD Index on Banking Sector Reform

Country	1998	2003
Albania	2.0	2.3
Bosnia-Herzegovina	2.3	2.3
Bulgaria	2.7	3.3
Croatia	2.7	3.7
FYR of Macedonia	2.7	2.7
Romania	2.3	2.7
Serbia & Montenegro	1.0	2.3

Note: The EBRD index on banking sector reform provides a ranking of progress for liberalization and institutional reform of the banking sector, on a scale of 1 to 4+. A score of 1 represents little change from a socialist banking system apart from the separation of the central bank and commercial banks, while a score of 4+ represents a level of reform that approximates to the institutional standards and norms of an industrialized market economy.

5. In the context of strengthening banking sectors and against the background of previous low trust in the banking sector, the implementation of deposit insurance schemes has been advancing in the region, with full or almost complete implementation in most systems. Deposit insurance can play an important stabilizing role, as it improves confidence and thereby decreases the risks of dramatic changes in funding.

In addition, promising macroeconomic developments, such as the ongoing efforts towards fiscal consolidation, the gradual reduction of interest rates and the accompanying lower risk premiums, the gradual stabilization of exchange rates, the increase of expected lifetime income in the region, and the expansion of demand for money have all positively contributed to the development of financial markets (European Commission, 2004).

The above mentioned developments have made the investigation of operating performance in the SEE banking sectors a more relevant issue now than in earlier times. This paper follows a general-to-specific model approach to examine the main determinants of banks' operating performance, across countries and over time, in the SEE region (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, FYR of Macedonia, Romania and Serbia & Montenegro⁶) over the period 1998-2003. Moreover, we break down operating performance into its components (personnel expenses and administrative expenses), and estimate their interaction with various market and economic characteristics (see also Kwan, 2003).

Thus, the purpose of this paper is threefold; first, to provide evidence of the determinants of operating performance in the banking sector of the SEE region; second, to deal with the underlying aggregation bias by shedding some light on the principal components of operating performance; and third, to exploit data for the SEE region, recently made available, corresponding to an era characterized by substantial structural reform processes during the examined time period.

The rest of the paper is organized as follows. Section 2 describes the data used in the analysis. Section 3 analyzes the empirical model and presents the results, while conclusions are drawn in Section 4.

2. Data Description

Bank level data for seven SEE countries (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, FYR of Macedonia, Romania, and Serbia & Montenegro) are obtained from the Bankscope database and cover the period 1998-2003. The annual balance sheet and income statement figures are comparable across countries and therefore suitable for a panel data study.⁷ Our dataset includes 76 banks in 1998, 98 in 1999, 112 in

6. Serbia & Montenegro was the new name adopted by the former Federal Republic of Yugoslavia on February 4, 2003. We opted to refer to this country by the name "Serbia & Montenegro" for the entire 1998-2003 period for convenience purposes. Please also note that Serbia & Montenegro has since ceased to exist as a single country, by virtue of the result of the Montenegrin independence referendum of May 21, 2006, and has broken up into its constituent parts, namely i. the Republic of Serbia and ii. Montenegro.

7. The data are examined for reporting errors and other inconsistencies. Also, it should be noted that all countries being analyzed are subject to the same survival bias, so the comparisons across countries are valid.

2000, 126 in 2001, 154 in 2002, and 152 in 2003, comprising a large portion of banks both in terms of the number of financial institutions operating in the SEE region, but mainly in terms of importance, based on the balance sheet aggregates.

Table 2 provides some descriptive statistics over the examined period. It becomes apparent that the average bank size in Croatia is the largest among the SEE countries, while the smallest average size is in Bosnia-Herzegovina. Overall, the SEE region is characterized as an emerging banking regime, and thus it is dominated by relatively small financial institutions.

Table 2. Descriptive Statistics (1998-2003)

Country	TA	L/A	LLR/L	E/A	OE/A
Albania	322,845 (466,066)	21.399 (17.339)	13.791 (21.729)	10.512 (7.320)	2.697 (1.328)
Bosnia-Herzegovina	90,760 (107,665)	47.739 (14.634)	10.603 (10.331)	23.230 (16.145)	6.748 (2.977)
Bulgaria	239,211 (310,994)	39.898 (15.783)	8.781 (9.756)	18.670 (13.010)	5.867 (2.514)
Croatia	614,094 (996,930)	52.883 (11.136)	11.307 (8.176)	16.842 (10.648)	4.646 (2.376)
FYR of Macedonia	102,088 (149,754)	39.525 (18.700)	13.385 (8.557)	29.606 (13.485)	6.245 (4.687)
Romania	491,599 (959,103)	36.526 (18.597)	5.250 (8.676)	21.305 (11.628)	8.369 (5.296)
Serbia & Montenegro	168,140 (180,308)	37.696 (18.636)	13.675 (11.803)	22.823 (16.433)	6.757 (4.948)
SEE	329,007 (787,341)	42.538 (17.612)	10.193 (10.442)	20.431 (13.698)	6.129 (3.927)

Note: TA: Total Assets; L/A: Loans / Total Assets; LLR/L: Loan Loss Reserves / Gross Loans; E/A: Equity / Total Assets; OE/A: Operating Expenses / Total Assets. Figures are means (presented in thousands of € for TA and percentages for all other variables) for SEE countries over the period 1998-2003. *Standard deviations are presented in parentheses.* Further descriptive statistics can be provided upon request.

This point is further enhanced by the ratio of loans to total assets, which stands at an average of 42.5 per cent over the period 1998-2003, lower than the average European ratio (50 per cent over the same time period), with only two countries, namely Croatia and Bosnia-Herzegovina, presenting higher than the average ratio. The sluggish credit growth observed in the previous decade can be attributed to inadequate

legal protection for lenders, lack of credit history for most companies, scarcity of adequate risk management techniques, lack of adequate collateral, as well as stricter bank regulation and supervision (ECB, 2004). To these factors one must add the general economic uncertainty, the poor performance of the enterprise sector, and the high real lending rates. However, it seems that, recently, credit growth has been recovering substantially, as economic conditions start improving. Thus, the ratio of loans to total assets stands just above 50 per cent in 2003 compared to 40 per cent in 1998.⁸ Bank credit to households, including consumer credit and mortgage loans, played the most important role in the growth of domestic credit to the private sector across the region. The average loan ratio is the highest in Croatia (53 per cent), and the lowest in Albania (21 per cent). In the case of Albania, banks continue to invest in risk-free or low-risk investments, mainly treasury bills and accounts to non-resident banks. The most significant increase in loans and advances to customers within the structure of assets was recently observed in Serbia & Montenegro; the size of this asset category increased from 32 per cent of total assets in 2001 to 56 per cent in 2003.

Regarding the quality of credit expansion, the average ratio of loan loss reserves to gross loans exceeds 10 per cent. The highest is observed in Albania, while Romania stands at the other end of the spectrum. The poor quality of credit portfolio was inherited from the old regime, where credit risk evaluation was negligible, and the credit policy was used as an instrument by the government to suit the needs of the centrally planned economy (Stubos and Tsikripis, 2004). In recent years, an improvement has been observed, as the loan loss reserves to gross loans ratio fell from 11.9 per cent in 1998 to 7.5 per cent in 2003. However, the share of non-performing loans to the total loan portfolio is still higher than the European average.

The average ratio of equity to total assets, though varying significantly across countries, stands at around 20 per cent, almost double the average European ratio. The reasons behind this low financial leverage in the region are the ongoing restructuring process of state-owned financial institutions, the relatively low credit expansion, and banks' compensation for poor access to other sources of funds. This average ratio is the lowest in Albania, slightly exceeding 10 per cent, whereas the highest is registered in the FYR of Macedonia, standing at around 30 per cent. Indeed, the relatively high capital adequacy ratio implies that banks have significant room for credit expansion without impairing capital positions.

8. These descriptive statistics on a year to year basis for the SEE countries can be provided by the authors upon request.

9. Administrative expenses include various types of bank expenses associated with bank operations, such as the adoption of new information technology, depreciation, legal fees, marketing expenses, and non-recurring costs related to bank restructuring.

Table 2 also presents the ratio of operating expenses to total assets. Operating expenses consist of personnel expenses, i.e. salaries and other employee benefits, including transfers to pension reserves, and administrative expenses.⁹ The underlying doctrine in the literature of operating expenses argues that the lower these costs are as a percentage of assets, the more efficient a financial institution is. On average, this ratio stood at 6.1 per cent in the SEE region over the period 1998-2003, much higher than that observed in the EU (ECB, 2004). Romania presents the highest ratio (8.4 per cent), while Albania shows the lowest (2.7 per cent). However, it appears that this ratio declines over time in all SEE countries, except for the FYR of Macedonia and Serbia & Montenegro, where it increases slightly from 7.2 and 6.4 per cent respectively in 1998 to 7.5 and 6.6 per cent respectively in 2003, owing mainly to the opening of new branches and an increase in the number of bank employees. Generally, an improvement in banking operation in the SEE region has taken place as the ratio of operating expenses to total assets clearly exhibits a downward trend over the period 1998-2003.

3. Empirical Analysis

The current study follows Kwan (2003) who relied on accounting measures to compare the operating performance of credit institutions operating in seven Asian countries, after controlling for bank-specific characteristics and the output mix of firms. As the author argues, accounting ratios are highly correlated with efficiency (see also Berger and Mester, 1997; Peristiani, 1997). Moreover, one should be aware that a comparison, in terms of operating performance, across heterogeneous credit institutions is meaningful subject to the assumption that banks have equal access to the same production technology.¹⁰

This paper seeks primarily to examine the relationship between operating expenses and various bank and market characteristics, but also investigates whether the former vary systematically across SEE countries and over time, using information derived from the principal components of operating expenses. To this end, the following regression model is estimated:

$$\begin{aligned} \ln(OE/A)_{it} = & \alpha + \beta_1 \ln(L/A)_{it} + \beta_2 \ln(LLR/L)_{it} + \beta_3 \ln(C/A)_{it} + \\ & \beta_4 \ln(E/A)_{it} + \beta_5 \ln(D/F)_{it} + \beta_6 \ln(AGE)_{it} + \beta_7 \ln(TA)_{it} + \\ & \gamma_1 \ln(EBRD)_{it} + \gamma_2 \ln(HHI)_{it} + \gamma_3 \ln(SB)_{it} + \gamma_4 \ln(CPS)_{it} + \\ & \gamma_5 \ln(INFL)_{it} + \gamma_6 \ln(GDP)_{it} + \delta D_{it} + \theta \ln T_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

10. This explains why cross-study comparisons often reveal substantial differences even for the same countries or bank categories, pointing out a key weakness in measuring performance (Berger and Mester, 1997).

where i denotes the credit institution and t the examined time period, while ε captures the disturbance term.

The dependent variable is measured as total operating expenses divided by total assets to form a per unit cost measure (OE). An alternative definition relates efficiency to internal productivity measures, such as bank output to the number of employees. Although this definition could be accurate, it is not appropriate for cross-country comparisons, since this index would not necessarily be comparable for banks across borders. In addition, indicators of population per employee or branch might be somewhat misleading as measures of quality and banking efficiency. There might, for example, have been a tendency to close branches and thus cut the number of branch employees, while at the same time the number of central administration or back office employees may not have been cut and, in some cases, their number may have actually increased. Also, staff figures may vary according to labor mobility, contract flexibility, and employee qualifications; overstaffing and inefficiency may be either alleviated or compounded by the structural composition of bank employees (Davis and Salo, 1998).

On the side of the explanatory variables, seven bank-specific variables are included. These are the ratio of loans to total assets (L/A), the ratio of loan loss reserves to gross loans (LLR/L), the ratio of cash and due from banks to total assets (C/A), the ratio of equity to total assets (E/A), the ratio of bank deposits to customer and short-term funding (D/F), a variable capturing bank's age (AGE), and total assets to count for size effects (TA) (or alternatively a bank's market share to capture market power).

The loan loss reserves ratio is used as a proxy for the loan portfolio quality. A number of hypotheses link the amount of problem loans and operating performance in the banking industry. According to Berger and DeYoung (1997) the 'bad management' hypothesis assumes that loan quality is endogenous in the quality of bank management, indicating that managers who are poor at dealing with day-to-day operations are also poor at managing the bank's loan portfolio. Under this hypothesis, we expect a positive coefficient, since an inefficient bank with high operating expenses would also have a higher ratio of problem loans. The positive relationship between problem loans and operating expenses can also be explained by the 'bad luck' hypothesis, implying that an exogenous increase in non-performing loans may force even the most cost efficient banks to purchase additional inputs necessary to administer these problematic credits, Berger and DeYoung, (1997). On the other hand, under the 'skimping' hypothesis there is a trade-off between short-term operating expenses and future loan performance problems, as banks that devote fewer resources to credit underwriting and loan monitoring may appear to be more cost efficient in the short-run (Berger and DeYoung (1997)), because fewer operating expenses can support the same quantity of loans and other outputs. Under this hypothesis, we expect a negative

coefficient for the loan loss reserve ratio, since banks which spend more resources on loan screening would have fewer problem loans at the expense of higher operating expenses (Mester, 1996).

The ratio of cash and due from banks to total assets controls for bank liquidity. The higher the ratio is, as the nominator constitutes the first line of defence in case of liquidity problems, the larger the stored liquidity of the financial institution. However, liquid assets could also raise operating expenses as these assets require additional transportation, storage, protection, and labor costs. Thus, the cash ratio is expected to have a positive coefficient.

The ratio of equity to total assets captures the bank's risk preferences and the bank management quality. This ratio reflects the degree to which shareholders have their own capital at risk, and hence may reflect their incentives to monitor management and assure that the institution operates efficiently. Under the 'moral hazard' hypothesis, the higher this ratio is, the more efficient the institution is likely to be (Eisenbeis *et al.*, 1999). Thus, given that a high degree of capitalization is a clear indication of risk aversion in the operation of the banks in favor of quality management, a high equity ratio benefits the operating performance of the credit institutions. Thus, a negative coefficient is expected for the equity ratio. However, apart from the risk, a bank's capital level directly affects operating expenses by providing an alternative to deposits as a funding source for loans. Since raising equity typically involves higher expenses than raising deposits, the coefficient of the equity ratio is expected, in this case, to be positive. Overall, the sign of the coefficient of the equity ratio is ambiguous.

The ratios of loans to total assets and bank deposits to customer and short-term funding are included to control for the output and funding mix of each financial institution. As far as the ratio of loans to assets is concerned, since operating expenses related to originating, maintaining and monitoring loans might be much higher than those needed for trading and available for sale securities, banks with a greater proportion of loans in their balance sheet are expected to present higher costs. Also, the coefficient of the ratio of bank deposits to customer and short term funding is expected to take negative values, as, in general, those funding sources are less costly than retail deposits.

A bank's age might also be related to performance, since bank production procedure might follow the 'learning by doing' hypothesis (Mester, 1996). This would imply that the coefficient variable is negative. On the other hand, at some stage, efficient management might become less prominent and opt, instead, for a less proactive style, leading to a decrease in efficiency (Esho, 2001). If, indeed, the latter effect dominates, the age variable should display a positive coefficient.

Moreover, in terms of market characteristics, we include the EBRD index of banking sector reform (*EBRD*) to account for differences in the financial environment

where credit institutions operate. To this end, we also incorporate the Herfindahl index (*HHI*) (or alternatively the 3-firm concentration ratio) to capture the degree of concentration in the SEE banking markets, the asset share of state-owned banks (*SB*) and the ratio of domestic credit to the private sector as a percentage of GDP (*CPS*).

Apart from the aforementioned bank and market specific characteristics, we also include two variables that reflect the general macroeconomic conditions existing in each SEE country; these are the inflation rate (*INFL*) and the GDP per capita (*GDP*). GDP measures the level of productivity in the economy; in particular, rising productivity would raise the demand for bank products. The increased demand for bank products would bring some additional expenses in evaluating and maintaining the additional amount of loans.¹¹ Also, inflation would negatively affect operational performance as inflationary periods would exert pressures on the demand for bank products.

After controlling for bank, market and macro specific variables, country specific dummy variables (*D*) are introduced to identify potential differences in operating performance across countries. These dummies are expected to capture differences in the labor productivity in particular, but also input inefficiencies in general (Kwan, 2003).¹² Finally, we use a time trend (*T*) to capture any systematic change in operating expenses over time. The privatization of credit institutions in the SEE countries, the entry of foreign banks, as well as the adoption of new prudential regulation and tighter supervision rules are expected to lead to lower production costs over time.

Table 3 provides information on the degree of correlation between the variables used in the model. The bank-specific variables are not significantly correlated with the market or macro determinants, though there seems to be a strong correlation between the credit to the private sector and the GDP per capita and the EBRD index (positive), as well as between the credit to the private sector and the variable capturing the asset share of state-owned banks (negative).

11. We are thankful to the anonymous referee who stressed the importance of these control variables.

12. For identification purpose, the dummy variable for Croatia is excluded so that the estimated coefficients measure the production operating performance of the remaining SEE countries relative to Croatia.

Table 3. Correlation Matrix

	L/A	LLR/L	C/A	E/A	D/F	AGE	TA	EBRD	HHI	SB	CPS	INFL	GDP
L/A	1.00												
LLR/L	-0.04	1.00											
C/A	-0.03	0.01	1.00										
E/A	0.15	0.05	0.13	1.00									
D/F	0.17	-0.12	-0.01	0.14	1.00								
AGE	0.07	0.24	0.01	-0.17	-0.29	1.00							
TA	-0.08	0.01	-0.19	-0.62	-0.17	0.41	1.00						
EBRD	0.24	-0.08	-0.22	-0.08	-0.04	0.11	0.14	1.00					
HHI	-0.30	0.00	-0.22	-0.01	-0.01	0.00	0.03	-0.08	1.00				
SB	-0.27	-0.07	-0.07	0.00	0.12	-0.20	0.02	-0.49	0.12	1.00			
CPS	0.43	0.13	-0.18	-0.08	-0.09	0.30	0.13	0.63	-0.31	-0.60	1.00		
INFL	-0.08	-0.19	-0.04	0.06	0.12	-0.07	0.06	-0.33	-0.07	0.39	-0.12	1.00	
GDP	0.31	0.02	-0.26	-0.13	-0.12	0.27	0.22	0.59	0.00	-0.43	0.83	-0.05	1.00

Note: L/A: Loans / Total Assets; LLR/L: Loan Loss Reserves / Gross Loans; C/A: Cash / Total Assets; E/A: Equity / Total Assets; D/F: Bank Deposits / Customer and Short Term Funding; AGE: Bank's Age; TA: Total Assets; EBRD: EBRD index on banking sector reform; HHI: Herfindahl Index; SB: share of state-owned banks; CPS: credit to the private sector; INFL: inflation rate; GDP: GDP per capita.

3.1. Operating expenses

Table 4 presents the regression results of Equation (1) with operating expenses as the dependent variable. The models are estimated using the ordinary least square (OLS) approach within a panel, where robust standard errors to correct for heteroscedasticity are calculated.¹³ The models fit the data reasonably well, with *R*-square ranging from 52 per cent to 58 per cent. Moreover, the results are very robust to all alternative specifications, while almost all variables retain their sign and level of significance across different specification models.

13. We follow White's (1980) heteroscedasticity consistent covariance matrix estimator, which provides correct estimates of the coefficient covariances in the presence of heteroscedasticity of unknown form. The White covariance matrix is given by the form:

$$\Sigma = \frac{1}{n} \left(\frac{1}{n} X'X \right)^{-1} \left(\frac{1}{n} \sum_{i=1}^n e_i^2 x_i x_i' \right) \left(\frac{1}{n} X'X \right)^{-1} = n(X'X)^{-1} S_0 (X'X)^{-1}$$

The estimate of the asymptotic covariance matrix allows inferences based on the results of the least squares without actually specifying the type of heteroscedasticity.

Table 4. Regression Estimates of Operating Expenses

Dependent variable	Alternative specifications					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
L/A	0.191*** (4.16)	0.211*** (4.85)	0.211*** (4.80)	0.202*** (4.73)	0.201*** (4.89)	0.191*** (4.16)
LLR/L	0.101*** (4.68)	0.103*** (5.17)	0.103*** (5.17)	0.108*** (5.30)	0.108*** (5.59)	0.101*** (4.68)
C/A	0.161*** (5.80)	0.150*** (5.76)	0.149*** (5.67)	0.153*** (5.76)	0.153*** (5.98)	0.161*** (5.80)
E/A	0.082* (1.79)	0.069 (1.63)	0.074* (1.79)	0.052 (1.22)	0.052 (1.24)	0.082* (1.79)
D/F	-0.033** (-2.26)	-0.034** (-2.39)	-0.034** (-2.40)	-0.033** (-2.35)	-0.035** (-2.48)	-0.033** (-2.26)
AGE	0.081** (2.59)	0.069** (2.49)	0.068** (2.52)	0.074*** (2.75)	0.070*** (2.77)	0.081*** (2.59)
TA	-0.131*** (-7.07)	-0.134*** (-7.34)	-0.130*** (-7.37)	-0.138*** (-7.51)	-0.138*** (-7.74)	-0.131*** (-7.07)
MSH						
EBRD	0.505 (0.67)				0.738** (3.20)	0.505 (0.67)
HHI	-0.179 (-0.64)			-0.402* (-1.86)		-0.179 (-0.64)
SB	0.032 (1.07)					0.032 (1.07)
CPS	0.049 (0.27)					0.049 (0.27)
INFL	-0.046 (-1.20)					-0.046 (-1.20)
GDP	-0.338 (-0.89)					-0.338 (-0.89)
AL	-0.251 (-0.51)	-0.178 (-1.11)	0.120 (0.72)	0.218 (0.80)	0.100 (0.54)	-0.251 (-0.51)
BH	-0.306 (-0.58)	0.100 (1.30)	0.421*** (5.16)	-0.113 (-0.80)	0.363*** (3.30)	-0.292 (-1.36)
BUL	-0.014 (-0.04)	0.366*** (6.75)	0.513*** (8.82)	0.183* (1.66)	0.433*** (7.24)	
FYROM	-0.212 (-0.55)	-0.138 (-1.42)	0.222** (2.04)	0.051 (0.38)	0.023 (0.21)	-0.212 (-0.55)
ROM	0.741** (2.43)	0.830*** (12.45)	0.902*** (13.03)	0.944*** (10.31)	1.006*** (11.07)	0.741** (2.43)
SB	0.083 (0.09)	0.171 (1.29)	0.419*** (3.06)	0.026 (0.16)	0.731*** (3.48)	0.083 (0.09)
T	-0.103 (-0.62)	-0.100** (-2.42)	-0.179*** (-4.23)	-0.216*** (-2.88)	-0.198*** (-3.97)	-0.103 (-0.62)
Con	5.078 (1.20)	1.627*** (4.86)	0.100 (0.44)	4.887*** (2.77)	0.976** (2.39)	5.078 (1.2)
Currency board						-0.014 (-0.04)
R-squared	0.5818	0.5267	0.5238	0.5357	0.5439	0.5818
White test	chi2(158)=254.54	chi2(98)=182.76	chi2(98)=178.33	chi2(114)=192.72	chi2(112)=203.70	chi2(158)=254.54
No of obs	368	415	415	415	415	368

Note: t-statistics are computed using robust (heteroscedasticity consistent) standard errors. t-statistics are presented in parentheses. ***, **, * indicate significance at the 1 per cent, 5 per cent and 10 per cent levels respectively. The estimation method is OLS within panel.

The coefficient of the loans to total assets ratio is positive and statistically significant, indicating that the operating expenses associated with credit origination and loan monitoring are quite substantial. The coefficient of the loan loss reserves ratio is always positive and statistically significant, consistent with the 'bad management' or the 'bad luck' hypothesis. This observation is consistent with the vast majority of the literature (see, for example, Altunbas *et al.*, 2000). The liquidity ratio is also positive and statistically significant across all models, suggesting that although liquid assets reduce a bank's liquidity risk, these assets involve additional operating expenses (see also Altunbas *et al.*, 2000 and Kwan, 2003).

The coefficient of the equity to assets ratio, though always positive, is not statistically significant in all specifications, which indicates that raising equity involves higher operating expenses than raising deposits. This finding may arise from the high capital ratios observed in the SEE banking systems, largely as the result of the restructuring plans implemented by the governments in these countries to manage insolvency problems. This process of restructuring comes at a cost in terms of operating performance, a typical characteristic for emerging financial markets. We expect the efficiency loss due to the restructuring process to fall, as markets mature.

The deposit mix variable presents the expected negative sign and is statistically significant. An interesting finding is that the coefficient of the age variable is positive and statistically significant in all specifications, in contrast to the 'learning by doing' hypothesis, as identified by Mester (1996), DeYoung and Hasan (1998), and Kraft and Tirtiroglu (1998). This finding may be attributed to a striking characteristic of the SEE banking systems; 'older' banks in this region are mostly newly privatized state-owned credit institutions that have inherited significant cost inefficiencies from the old regime, where market oriented practices were not present and cost efficiency had not been a priority issue for government authorities.

Moreover, the size variable is reported with a negative sign and is statistically significant in all models, which is not surprising given the small size of financial institutions that dominate the SEE banking regime. This finding suggests that banks could gain substantial benefits by exploiting further economies of scale in order to improve their operational performance (see also Allen and Rai, 1996). In addition, when bank's market share (in terms of total assets) is used, its coefficient is also negative and statistically significant (see Model 3).

Regarding the market and macro determinants, these are all statistically insignificant,¹⁴ the only exception being the EBRD index on banking sector reform, which is positive (see Model 5). The positive coefficient of this variable could signal

14. We run several alternative specifications (not presented in the paper) and the significance of the market and macro variables does not change. Results can be provided upon request by the authors.

that the liberalization and institutional reform of the banking sector is a long and intensive process that involves additional operating expenses for credit institutions, at least in the short run, before this process is fully completed. Any benefits from that reform are expected in the medium or long term. The Herfindahl index is also statistically significant at the 10 per cent level of significance, albeit only in one specification (see Model 4), but is, surprisingly, negative. This result supports the finding of a negatively signed size (and market share) variable, arguing that exploiting further economies of scale could improve operating performance.

Surprisingly, although one would expect that the GDP per capita would assert a positive effect on banks' operating expenses, in the current study its coefficient is statistically insignificant. A possible interpretation could be based on the lagging level of financial integration in these countries compared to their EU counterparts; the latter implies that the possible demand effects that are observed in the EU banking systems, stemming from higher GDP per capita, are limited in the transition economies. Also, by the same token, the inflation variable is found to be statistically insignificant too.

As far as the country dummies are concerned, Romania has a positive and statistically significant coefficient in all specifications, indicating that per unit operating expenses in that country are higher than in Croatia. Similarly, the coefficient of Bulgaria is mostly positive and statistically significant, while Serbia & Montenegro presents a positive coefficient in all specifications, though that coefficient is not always significant. On the other hand, no consistent picture emerges for Albania, Bosnia-Herzegovina and the FYR of Macedonia, since their coefficients change sign and level of significance according to the specification. Overall, our results indicate that there are substantial differences in the cost structure of banks across SEE countries over the examined period. The coefficient of the time trend is negative and statistically significant in most cases, indicating that, on average, operating expenses among the SEE countries followed a downward path from 1998 to 2003; the latter verifies the efforts undertaken to direct the banking sector towards a more efficient structure.

Also, one may take into account the effect of restrictions imposed from a currency board (*CB*) arrangement in the SEE economies. Thus, in the empirical analysis, we incorporate a dummy variable to capture the existence of currency boards in these countries.^{15, 16} The existence of the currency board arrangement does not appear to have any effect on banks' operating performance (see Model 6). This result comes as no surprise, as all countries in the region, except Bulgaria and Bosnia-Herzegovina, are under managed float exchange rate arrangements pegged to the euro over the examined time period.

15. Bosnia-Herzegovina and Bulgaria are the only SEE countries that have a currency board arrangement.

16. We are thankful to the anonymous referee for mentioning the potential significance of the currency board in the comparison of operating performance in the SEE banking sectors.

3.2. Personnel expenses and physical capital expenses

As part of a sensitivity analysis we break operating performance down into its components and proceed with the following regressions:

$$\begin{aligned} \ln(P E / A)_{it} = & \alpha + \beta_1 \ln(L / A)_{it} + \beta_2 \ln(LLR / L)_{it} + \beta_3 \ln(C / A)_{it} + \\ & \beta_4 \ln(E / A)_{it} + \beta_5 \ln(D / F)_{it} + \beta_6 \ln(AGE)_{it} + \beta_7 \ln(TA)_{it} + \\ & \gamma_1 \ln(EBRD)_{it} + \gamma_2 \ln(HHI)_{it} + \gamma_3 \ln(SB)_{it} + \gamma_4 \ln(CPS)_{it} + \\ & \gamma_5 \ln(INFL)_{it} + \gamma_6 \ln(GDP)_{it} + \delta D_{it} + \theta \ln T_{it} + \varepsilon_{it} \end{aligned} \quad (2)$$

and:

$$\begin{aligned} \ln(AE / A)_{it} = & \alpha + \beta_1 \ln(L / A)_{it} + \beta_2 \ln(LLR / L)_{it} + \beta_3 \ln(C / A)_{it} + \\ & \beta_4 \ln(E / A)_{it} + \beta_5 \ln(D / F)_{it} + \beta_6 \ln(AGE)_{it} + \beta_7 \ln(TA)_{it} + \\ & \gamma_1 \ln(EBRD)_{it} + \gamma_2 \ln(HHI)_{it} + \gamma_3 \ln(SB)_{it} + \gamma_4 \ln(CPS)_{it} + \\ & \gamma_5 \ln(INFL)_{it} + \gamma_6 \ln(GDP)_{it} + \delta D_{it} + \theta \ln T_{it} + \varepsilon_{it} \end{aligned} \quad (3)$$

where PE / A and AE / A stand for the ratio of personnel expenses and administrative expenses respectively to total assets, while the definition of all other variables remains the same as previously described.

Owing to data unavailability for these cost components, some banks from each country are excluded from the initial sample, while for Bosnia-Herzegovina all banks are excluded, since data for personnel expenses are not available at all. The new sample consists of 33 banks in 1998, 50 in 1999, 59 in 2000, 62 in 2001, 86 in 2002, and 83 in 2003.

Table 5 presents some descriptive statistics for the new sample. The emerging characteristics for the SEE banking sectors are that administrative expenses constitute the largest portion of total operating expenses, and that there has been an overall improvement in staff expenses and administrative expenses in all countries. Indeed, personnel expenses stand, on average, at 2.4 per cent of total assets, compared with 3.3 per cent for the administrative costs. Interestingly, personnel expenses fall from 2.8 per cent of total assets in 1998 to 2.2 per cent in 2003, while physical capital expenses remain relatively unchanged. This is mainly due to the developments in information technology applied to the SEE banking sectors. Information technology has been associated to date with higher expenses, as banks invest heavily in order to keep up with leading edge practices in data warehousing, risk management, and capital allocation, *inter alia*. The figures for personnel expenses are much higher than those observed at the EU banking regime, where the average ratio of staff costs stands at 0.9 per cent of assets in 2003 (Organization for Economic Cooperation and Development [OECD], 2003). At the country level, the average bank in Albania presents the lowest ratio of personnel expenses to total assets among the SEE countries, while Romania stands at the other end. Moreover, Albania and Romania have the lowest and highest average administrative expenses ratio respectively.

Table 5. Descriptive Statistics for Operating Expenses' Components (1998-2003)

Country	OE/A	PE/A	AE/A
Albania	2.697 (1.328)	0.984 (0.394)	1.713 (0.997)
Bulgaria	5.012 (1.535)	1.815 (0.615)	3.197 (1.054)
Croatia	4.396 (2.236)	2.058 (0.971)	2.339 (1.521)
FYR of Macedonia	6.141 (4.920)	2.069 (0.755)	4.072 (4.451)
Romania	8.291 (5.197)	3.469 (2.044)	4.822 (3.672)
Serbia & Montenegro	7.548 (5.195)	3.269 (2.648)	4.279 (2.552)
SEE	5.705 (4.139)	2.370 (1.528)	3.335 (3.024)

Note: OE/A: Operating Expenses / Total Assets; PE/A: Personnel Expenses / Total Assets; AE/A: Administrative Expenses / Total Assets. Figures are means (expressed in percentages for all variables) for SEE countries over the period 1998-2003. *Standard deviations are presented in parentheses.* Further descriptive statistics can be provided upon request.

Tables 6 and 7 present the regression results, with personnel expenses and administrative expenses as the dependent variable respectively.

Table 6 shows that the coefficient of the loan loss reserves ratio is always positive and statistically significant, indicating that dealing with a higher ratio of problem loans invokes additional personnel expenses. The liquidity ratio is also positive and statistically significant in all specifications, consistent with the fact that liquid assets require more labor costs to cover additional protection and transportation needs. The ratio of equity to total assets is positive and statistically significant, as well as the ratio of loans to total assets (at 10 per cent level of significance), in line with the general notion that originating, maintaining and monitoring loans involves substantial human resources. For the remaining variables, only the size and the age variables are statistically significant, the former presenting a negative sign and the latter a positive one. The positive sign of the age variable suggests that 'older', mostly formerly state-owned, banks incur, on average, higher personnel expenses, probably because of overstaffing inherited from the old regime, necessitating further intensification of reform efforts in the direction of labor market liberalization. Finally, neither the bank deposits ratio nor any of the macroeconomic variables are significant.

Table 6. Regression Estimates of Personnel Expenses

Dependent variable	Alternative specifications				
	Model 1	Model 2	Model 3	Model 4	Model 5
PE/A					
L/A	0.072* (1.79)	0.075** (1.96)	0.077** (1.97)	0.073* (1.91)	0.071* (1.87)
LLR/L	0.104*** (3.37)	0.104*** (3.54)	0.104*** (3.53)	0.106*** (3.48)	0.104*** (3.46)
C/A	0.137*** (4.48)	0.132*** (4.52)	0.131*** (4.49)	0.134*** (4.50)	0.132*** (4.47)
E/A	0.218*** (3.22)	0.222*** (3.39)	0.234*** (3.59)	0.218*** (3.27)	0.219*** (3.31)
D/F	-0.010 (-0.51)	-0.011 (-0.56)	-0.011 (-0.55)	-0.011 (-0.54)	-0.011 (-0.57)
AGE	0.181*** (4.83)	0.181*** (5.12)	0.179*** (5.05)	0.180*** (4.95)	0.180*** (5.00)
TA	-0.092*** (-4.20)	-0.092*** (-4.25)		-0.093*** (-4.28)	-0.092*** (-4.25)
MSH			-0.084*** (-3.97)		
EBRD	-0.296 (-0.37)				-0.518 (-0.96)
HHI	-0.216 (-0.54)			-0.260 (-0.78)	
SB	0.054 (1.00)				
CPS	0.159 (0.77)				
INFL	-0.057 (-1.08)				
GDP	-0.383 (-0.98)				
AL	-0.666 (-1.09)	-0.435*** (-3.71)	-0.237* (-1.89)	-0.179 (-0.52)	-0.655** (-2.56)
BUL	-0.306 (-0.69)	0.099 (0.85)	0.187 (1.51)	-0.041 (-0.19)	0.062 (0.50)
FYROM	-0.457 (-1.05)	-0.299*** (-3.21)	-0.065 (-0.55)	-0.181 (-1.02)	-0.406*** (-3.03)
ROM	0.551* (1.78)	0.719*** (9.26)	0.763*** (9.28)	0.785*** (7.13)	0.599*** (3.94)
SM		0.058 (0.37)	0.205 (1.22)	-0.133 (-0.44)	-0.171 (-0.59)
T	-0.017 (-0.09)	-0.118** (-2.43)	-0.167*** (-3.33)	-0.183* (-1.80)	-0.054 (-0.69)
Constant	4.747 (0.98)	0.154 (0.36)	-0.925*** (-3.45)	2.213 (0.83)	0.730 (0.94)
R-squared	0.5943	0.5900	0.5863	0.5911	0.5916
White test	Chi2(136)=190.66	chi2(82)=143.21	chi2(82)=143.30	chi2(96)=162.91	chi2(95)=151.26
No of obs	272	277	277	277	277

Note: t-statistics are computed using robust (heteroscedasticity consistent) standard errors. t-statistics are presented in parentheses. ***, **, * indicate significance at the 1 per cent, 5 per cent, and 10 per cent levels respectively. The estimation method is OLS within panel.

Table 7. Regression Estimates of Physical Capital Expenses

Dependent variable	Alternative specifications				
	Model 1	Model 2	Model 3	Model 4	Model 5
AE/A					
L/A	0.227** (2.50)	0.223*** (2.99)	0.224*** (2.97)	0.220*** (2.93)	0.231*** (3.03)
LLR/L	0.090** (2.59)	0.086** (2.49)	0.087** (2.55)	0.087** (2.53)	0.086** (2.49)
C/A	0.197*** (4.98)	0.184*** (4.77)	0.183*** (4.74)	0.187*** (4.80)	0.184*** (4.82)
E/A	0.084 (1.13)	0.083 (1.19)	0.079 (1.13)	0.077 (1.09)	0.089 (1.26)
D/F	-0.026 (-1.25)	-0.033* (-1.67)	-0.033 (-1.64)	-0.033 (-1.63)	-0.033 (-1.62)
AGE	0.019 (0.37)	0.013 (0.26)	0.015 (0.29)	0.011 (0.22)	0.016 (0.32)
TA	-0.114*** (-4.41)	-0.112*** (-4.38)		-0.113*** (-4.41)	-0.112*** (-4.37)
MSH			-0.115*** (-4.45)		
EBRD	1.746 (1.34)				1.012 (1.29)
HHI	-1.296* (1.80)			-0.324 (-0.64)	
SB	-0.016 (-0.23)				
CPS	0.127 (0.39)				
INFL	-0.140 (-1.34)				
GDP	-0.822 (-1.22)				
AL	0.999 (1.00)	-0.152 (-0.40)	0.109 (0.28)	0.168 (0.29)	0.279 (0.59)
BUL	-0.846 (-0.97)	0.495*** (4.54)	0.627*** (5.48)	0.320 (1.11)	0.568*** (4.56)
FYROM	0.104 (0.15)	-0.027 (-0.19)	0.289* (1.84)	0.120 (0.49)	0.184 (0.77)
ROM	1.200** (2.29)	0.827*** (7.08)	0.896*** (7.53)	0.910*** (5.32)	1.061*** (4.79)
SM		0.214 (0.64)	0.424 (1.26)	-0.024 (-0.05)	0.660 (1.42)
T	-0.382 (-1.18)	-0.010 (-0.14)	-0.077 (-1.04)	-0.091 (-0.60)	-0.135 (-1.10)
Constant	15.543* (1.66)	0.648 (1.16)	-0.621 (-1.39)	3.220 (0.79)	-0.477 (-0.44)
<i>R-squared</i>	0.4500	0.4277	0.4290	0.4288	0.4315
<i>White test</i>	chi2(136)=196.64	chi2(82)=160.38	chi2(82)=156.43	chi2(96)=164.94	chi2(95)=170.47
<i>no of obs</i>	272	277	277	277	277

Note: t-statistics are computed using robust (heteroscedasticity consistent) standard errors. t-statistics are presented in parentheses. ***, **, * indicate significance at the 1 per cent, 5 per cent, and 10 per cent levels respectively. The estimation method is OLS within panel.

Table 7 broadly reveals a similar picture. The loan loss reserves ratio is significantly positive, and this is also the case for the loans to total assets ratio. As expected, the ratio of cash and due from banks to total assets has a positive sign and is statistically significant in all specifications, indicating that these assets require additional transportation, storage and protection costs. Moreover, the size variable is significantly negative, as larger banks are able to manage their physical capital expenses more efficiently than smaller ones. A similar picture emerges when we use bank's market share instead of total assets to capture the market power of the firm. Contrary to the results referring to personnel expenses, the coefficients of the equity to assets ratio and the age variable are positive but statistically insignificant in all specifications. Finally, regarding the variables that control for differences in the market and macro environment among the SEE countries, these are all statistically insignificant in all specifications.

4. Conclusion

The restructuring process that started in the mid nineties in the SEE banking sector has intensified during the last five years. Substantial steps towards the rehabilitation of state-owned banks, the write-offs of non-performing loans, and the enforcement of new prudential regulation and tighter supervision have taken place. In addition, the escalating competition arising from the entry of foreign banks has enhanced the focus on operating performance. These developments have brought the issue of operating performance in the SEE banking sector to the forefront.

This paper seeks to contribute to the analysis of operating performance of the banking industry for the SEE region, an area rarely investigated, over the period 1998-2003. To this end, we construct operating performance measures using accounting data. We find that operating expenses have decreased in all SEE banking sectors over the examined period, except for the FYR of Macedonia and Serbia & Montenegro, a clear sign that banks, on average, are improving their operating performance over time. Following a general-to-specific approach, we find, however, that operating expenses, and their components, namely personnel expenses and administrative expenses, are still at very high levels compared with those of the banks' European counterparts, reflecting the smaller size of the average bank, and the heavy burden of staff.

We further investigate the relationship between operating performance and various bank, market and macro specific characteristics. Operating performance is positively related to loan quality and the asset size or the bank's market share, and negatively related to liquidity, the loan ratio and the bank's age. The negative relationship between operating performance and banks' age suggests that 'older', and mostly newly privatized, state-owned banks have inherited significant cost inefficiencies from the old regime, and therefore, there is a need to intensify reform efforts to improve op-

erating performance. Most market and macro variables seem to be insignificant, the only exception being the EBRD index and the Herfindahl index, the latter only in one specification. Further analysis for the cost components confirms these results and shows that systematic differences in bank operating performance across the SEE countries exist.

Currently, it is widely believed that the profitability of banks in the examined countries is high, stemming mainly from the high intermediation spread. Looking forward, the large net interest margins are unlikely to last, as both competition among banks and economic consolidation efforts prior to the accession to the EU intensifies.¹⁷ As spreads decline, banks will need, among other measures, to address operating performance. This paper identifies as the main areas of cost cutting the rationalization of branch networks, the reduction of personnel expenses, and the application of strict cost control measures.

References

- Allen, L. and A. Rai (1996), 'Operational Efficiency in Banking: An International Comparison', *Journal of Banking and Finance*, 20: 655-672.
- Altunbas, Y., M., Gardner, E., Molyneux, P., and Moore, B., 2001, 'Efficiency in European banking', *European Economic Review*, 45 (10): 1931-1955.
- Altunbas, Y., M. Liu, P. Molyneux and R. Seth (2000), 'Efficiency and Risk in Japanese Banking', *Journal of Banking and Finance*, 24: 1605-1628.
- Berger, A. and R. DeYoung (1997), 'Problem Loans and Cost Efficiency in Commercial Banking', *Journal of Banking and Finance*, 21: 849-870.
- Berger, A. and D. Humphrey (1997), 'Efficiency of financial institutions: International survey and direction of future research', *European Journal of Operational Research*, 98: 175-212.
- Berger, A. and L. Mester (1997), 'Inside the Black Box: What Explains Differences in the Efficiencies of Financial Institutions?', Federal Reserve Bank of Philadelphia, Research Department, Working Paper, No. 97-1.
- Bonin, J., I. Hassan and P. Wachtel (2005), 'Bank Performance, Efficiency and Ownership in Transition Countries', *Journal of Banking and Finance*, 29: 31-53.
- Davis, P. and S. Salo (1998), 'Excess Capacity in EU and US Banking Sectors – Conceptual, Measurements and Policy Issues', LSE Financial Markets Group, Special Paper, No. 105.
- DeYoung R. and I. Hasan (1998), 'The Performance of de novo Commercial Banks: A Profit Efficiency Approach', *Journal of Banking and Finance*, 22: 565-587.
- Eisenbeis R., G. Ferrier and S. Kwan (1999), 'The Informativeness of Stochastic Frontier and Programming Frontier Efficiency Scores: Cost Efficiency and Other Measures of Bank Holding Company Performance', Federal Reserve Bank of Atlanta, Working Paper, No. 99-23.

17. Romania and Bulgaria acceded to the European Union, January 1, 2007. Accession negotiations with Croatia opened on October 3, 2005. The Former Yugoslav Republic of Macedonia is also an official candidate, since the decision of the European Council on December 17, 2005, albeit awaiting the opening of accession negotiations. All other Western Balkan countries (Albania, Bosnia-Herzegovina, Montenegro and Serbia) are so-called 'potential candidate countries'.

- Esho, N. (2001), 'The Determinants of Cost Efficiency in Cooperative Financial Institutions: Australian Evidence', *Journal of Banking and Finance*, 25: 941-964.
- European Bank for Reconstruction and Development (2004) Transition Report 2004: Infrastructure, EBRD.
- European Central Bank (2004), 'Report on EU banking structure', ECB, November.
- European Commission (2004), 'The Western Balkans in transition', Directorate General for Economic and Financial Affairs, Enlargement Papers, No 23.
- Fries, S. and A. Taci (2005), 'Cost Efficiency of Banks in Transition: Evidence from 289 Banks in 15 Post-communist Countries', *Journal of Banking and Finance*, 29: 55-81.
- Jemrie, I. and B. Vujeie (2002), 'Efficiency of Banks in Croatia: A DEA Approach', Croatian National Bank, Working Paper, No. 7.
- Kraft, E. and D. Tirtiroglu (1998), 'Bank Efficiency in Croatia: A Stochastic Frontier Approach', *Journal of Comparative Economics*, 26: 282-300.
- Kraft, E., R. Hofler and J. Payne (2002), 'Privatization, Foreign Bank Entry and Bank Efficiency in Croatia: A Fourier-flexible Frontier Cost Function Analysis', Croatian National Bank, mimeo.
- Kwan, S. (2003), 'Operating Performance of Banks Among Asian Economies: An International and Time Series Comparison', *Journal of Banking and Finance*, 27: 471-489.
- Mamatzakis, E., C. Staikouras and N. Koutsomanoli-Filippaki (2005), 'Competition and Concentration in the Banking Sector of the South Eastern European Region', *Emerging Markets Review*, 6: 192-209.
- Mester, L. (1996), 'A Study of Bank Efficiency Taking into Account Risk-Preferences', *Journal of Banking and Finance*, 20: 1025-1045.
- Organisation for Economic Cooperation and Development (2004), 'Bank Profitability 2003', OECD.
- Peristiani S. (1997), 'Do Mergers Improve the X-efficiency and Scale Efficiency of US banks?', *Journal of Money, Credit and Banking*, 29: 326-337.
- Stubos, G. and I. Tsikripis (2004), 'Banking Sector Developments in South-Eastern Europe', *Global Development Network Southeast Europe*, Working Paper, No. 4.4.
- Weill, L. (2003), 'Banking Efficiency in Transition Economies: The Role of Foreign Ownership', *The Economics of Transition*, 11: 569-592.
- White, H. (1980), 'A Heteroskedasticity-consistent Covariance Matrix and a Direct Test for Heteroskedasticity', *Econometrica*, 48: 817-838.