



## Efficiency and productivity growth in the banking industry of Central and Eastern Europe <sup>☆</sup>

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### ABSTRACT

We employ the directional technology distance function and provide estimates of bank efficiency and productivity change across Central and Eastern European (CEE) countries and across banks with different ownership status for the period 1998–2003. Our results demonstrate the strong links of competition and concentration with bank efficiency. They also show that productivity for the whole region initially declined but has improved more recently with further progress on institutional and structural reforms. Input-biased technical change has been consistently positive throughout the entire period suggesting that the reforms have induced favorable changes in relative input prices and input mix. However we find evidence of diverging trends in productivity growth patterns across banking industries and that foreign banks outperform domestic private and state-owned banks both in terms of efficiency and productivity gains. Overall, we find that productivity change in CEE is driven by technological change rather than efficiency change.

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### 1. Introduction

During the last 15 years the financial systems in the Central and Eastern European countries have undergone wide-ranging changes that have radically transformed their banking sectors. The creation of viable, sound and efficient banking institutions, able to support economic growth, has been fundamental to the transition to a market economy. Significant efforts were directed towards improving banking supervision and legislation in compliance with the EU regulatory system and the international standards of bank supervision. The new framework increased the attractiveness of the banking system to foreign investment, strengthened prudent standards and practices, enhanced corporate governance and the effectiveness of supervision.

This paper investigates the effects of the financial reforms on the efficiency and productivity performance of the banking industries in 10 CEE countries, Croatia, Czech Republic, Estonia, Hungary,

Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia, over the period 1998–2003. The investigation of bank efficiency is of vital importance from both a microeconomic and a macroeconomic point of view (see Berger and Mester, 1997). From the micro perspective, the issue of banking efficiency is crucial given the enhancement of competition due to the increasing presence of foreign banks in the CEE region and the improvement in the institutional, regulatory and supervisory framework. From the macro perspective, the efficiency of the banking industry influences the cost of financial intermediation and the overall stability of the financial system, as banks constitute the spinal cord of financial markets in the CEE economies (Rossi et al., 2005). Indeed, an improvement of banking performance indicates a better allocation of financial resources, and therefore an increase of investment that favors growth.

Considerable interest on bank productivity studies has also emerged as a result of rapid changes in the structure of the financial services industry and advances in financial and nonfinancial technologies (Berger and Mester, 2003). Assessment of the productivity record of the banking sector is of particular interest from a policy perspective, as an increase in bank productivity is expected to lead to better bank performance, lower prices and improved service quality, as well as an enhancement of resource allocation and

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productivity in the broader economy. Productivity growth also contributes to greater safety and soundness of the banking system provided these gains are channelled towards strengthening capital buffers that absorb risk (Casu et al., 2004). Moreover, an analysis of productivity differences across countries may help identify potential successes or failures of policy initiatives.

Most banking studies have estimated productivity change by employing either non-parametric or parametric techniques rather than using index number methods (see the literature reviews in Berger and Humphrey, 1997; Berger and Mester, 2003). Several studies have computed the Malmquist total factor productivity index by employing non-parametric Data Envelopment Analysis (DEA) techniques to estimate Shephard (1970) type distance functions (see for example, Grifell-Tatje and Lovell, 1997; Chaffai et al., 2001). Parametric estimation of distance functions has become more prevalent in recent years (see for example, Fuentes et al., 2001; Cuesta and Orea, 2002). A comparison of non-parametric and parametric approaches for measuring productivity change in banking is given in Casu et al. (2004).

Research on cross-country efficiency performance comparisons in transition countries has intensified recently. Particular attention has been given to the analysis of the effect of ownership on performance in light of the increasing presence of foreign investors in the financial systems of transition economies. Thus, several studies have examined cost and/or profit efficiency of banks, especially in CEE countries, focusing primarily on the performance differences between foreign and domestic financial institutions (see, for example, Grigorian and Manole, 2002; Bonin et al., 2005; Fries and Taci, 2005; Rossi et al., 2005; Yildirim and Philippatos, 2007a).

This paper fills a gap in the literature by departing from the traditional analysis of efficiency and productivity performance. We use directional technology distance functions, a generalization of the widely used partially oriented Shephard (1970) distance functions, to model multiple output technology in the CEE banking sector. For our purposes directional distance functions are extremely useful tools because of their aggregation properties in addition to being natural performance or efficiency measures themselves (see Färe et al., 2007). They entail an extremely flexible description of technology without restricting banks to optimize in a single (i.e., input or output) direction as is the case with the Shephard distance functions. Following Chambers et al. (1998) we parameterize the directional distance function via a quadratic function specified in the form of a stochastic frontier model.<sup>1</sup> We use the directional distance function, to measure efficiency and estimate productivity using the Luenberger productivity indicator.<sup>2</sup> The additive structure of the Luenberger indicator facilitates the aggregation of individual bank efficiency and productivity to the industry level (see Färe and Primont, 2003).<sup>3</sup> By decomposing productivity growth into technological change (both neutral and biased) and efficiency change, we can directly identify the distinct contributions of innovation and learning and diffusion to productivity performance. These tools are

particularly useful for analyzing the performance of the banking system during a transitional phase.<sup>4</sup>

We use this methodology to address a number of questions regarding banking efficiency and productivity in CEE countries and to discuss their policy implications. Are bank choices of inputs and outputs consistent with technical efficiency? Are there any performance differences across CEE countries? Has the process of consolidation improved efficiency? How has productivity evolved over time for the whole region and across banking markets? How much productivity growth is attributed to efficiency change or technological change? Does ownership structure matter for productivity growth?

The rest of the paper is organized as follows. Section 2 presents a brief history of the reforms implemented in the CEE countries. Section 3 describes the methodology, while Section 4 provides the description of the data. Section 5 discusses the empirical results, while conclusions are drawn in Section 6.

## 2. The CEE banking systems

Most transition economies have followed similar processes to transform their banking sectors. They introduced a two-tiered banking system; they abolished sectoral restrictions on specialized banks, restructured and privatized state-owned banks, liberalized interest rates, allowed the entry of new private banks including foreign banking institutions, and established a new legal and supervisory banking framework. The reform of the financial sectors in the CEE region was a task fraught with difficulties. During the initial phase of the transition period, most countries adopted a fairly liberal licensing policy, which facilitated the emergence of a large number of new banks that often engaged in unsound business practices that were supported by shortcomings in the legal framework and the supervisory system. Moreover, the state-owned banks, which came from the old mono-bank system, suffered from an inherited burden of bad loans. Their problems were exacerbated by a lack of adequate banking skills with an insufficient management ability to assess credit risk. Coupled with the adversities of a recessionary environment, all CEE countries experienced one or more banking crises in the initial transition phase.<sup>5</sup> This led to a sharp reduction in the number of banking institutions as shown in Table 1.

In the process of overcoming these crises and restructuring their banking systems, the CEE countries initiated large scale privatization programs in the mid-1990s that substantially diminished state ownership. The main motive behind the privatization of state-owned banks was the desire to enhance competition and efficiency in the banking sector by increasing foreign and private domestic participation. Prudential banking laws and securities laws were enacted to bring them in line with Bank for International Settlements guidelines and EU directives. In addition, to enable arms-length lending relationships between credit institutions and their borrowers and to foster depositors' confidence, an overhaul of the legal framework, including commercial codes and bank-

<sup>1</sup> Färe and Lundberg (2005) show that within the class of transformed quadratic functions, the quadratic function is the only flexible functional form that satisfies the translation property.

<sup>2</sup> The Luenberger indicator is constructed using differences of directional distance functions. This is, to our knowledge, the first study to use parametric forms of the Luenberger indicator and its components. Balk et al. (2008) show how the Luenberger indicator is related to the more familiar Malmquist productivity index which is derived from ratios of Shephard distance functions. A distinguishing feature of the Luenberger indicator is its dual relationship to profit which allows to identify the profit function if the directional distance function is known and vice versa, thus providing a useful performance companion when profitability is the overall goal.

<sup>3</sup> This is contrary to other approaches used in the literature which are based on aggregator functions that are in ratio form and require the use of value share weighting techniques to transform individual ratios into industry performance measures.

<sup>4</sup> Park and Weber (2006) provide estimates of efficiency and productivity change for Korean banks using directional distance functions. However, they use a non-parametric deterministic approach (DEA) to construct the technological frontier. In addition, they do not provide estimates of biased technological change.

<sup>5</sup> For example, there was a crisis in Croatia in 1996, when 5 banks accounting for about 50% of banking system loans were deemed insolvent; Estonia in 1992–1995, when insolvent banks accounted for 41% of banking assets; Latvia between 1994 and 1999, a total of 25 banks had their licenses revoked, merged with another bank or ceased operations; of the 25 banks in Lithuania in 1995, 12 small banks liquidated, 3 state-owned banks were deemed insolvent and 3 private banks which accounted for 29% of banking sector deposits failed; Poland in 1991 where 7 out of 9 treasury owned banks with 90% share of the total credit market and the cooperative banking sector experienced solvency problems.

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