

Estimating the technical and scale efficiency of Greek commercial banks: The impact of credit risk, off-balance sheet activities, and international operations

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Abstract

This paper uses data envelopment analysis (DEA) to investigate the efficiency of the Greek commercial banking industry over the period 2000–2004. Our results indicate that the inclusion of loan loss provisions as an input increases the efficiency scores, but off-balance sheet items do not have a significant impact. The differences between the efficiency scores obtained through the profit-oriented and the intermediation approaches are in general small. Banks that have expanded their operations abroad appear to be more technical efficient than those operating only at a national level. Higher capitalization, loan activity, and market power increase the efficiency of banks. The number of branches has a positive and significant impact on efficiency, but the number of ATMs does not. The results are mixed with respect to variables indicating whether the banks are operating abroad through subsidiaries or branches.

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1. Introduction

The Greek banking sector has undergone major restructuring in recent years. Important structural, policy and environmental changes that are frequently highlighted by both academics and

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practitioners are the establishment of the single EU market, the introduction of the euro, the internationalization of competition, interest rate liberalization, deregulation, and the recent wave of mergers and acquisitions.

The Greek banking sector has also experienced considerable improvements in terms of communication and computing technology, as banks have expanded and modernized their distribution networks, which apart from the traditional branches and ATMs, now include alternative distribution channels such as internet banking. As the Annual Report of the [Bank of Greece \(2004\)](#) highlights, Greek banks have also taken major steps in recent years towards upgrading their credit risk measurement and management systems, by introducing credit scoring and probability default models. Furthermore, they have expanded their product/service portfolio to include activities such as insurance, brokerage and asset management, and at the same time increased their off-balance sheet operations and non-interest income.

Finally, the increased trend towards globalization that focused on the wider market of the Balkans (e.g. Albania, Bulgaria, FYROM,¹ Romania, Serbia) has added to the previously limited international activities of Greek banks in Cyprus and USA. The performance of the subsidiaries operating abroad is expected to have an impact on the performance of parent banks and consequently on future decisions for further internationalization attempts.

The purpose of the present study is to employ data envelopment analysis (DEA) and re-investigate the efficiency of the Greek banking sector, while considering several of the issues discussed above. We therefore differentiate our paper from previous ones that focus on the Greek banking industry² and add insights in several respects, discussed below.

First of all, we examine for the first time the impact of credit risk on the efficiency of Greek banks by including loan loss provisions as an additional input as in [Charnes et al. \(1990\)](#), [Drake \(2001\)](#), [Drake and Hall \(2003\)](#), and [Drake et al. \(2006\)](#) among others. As [Mester \(1996\)](#) points out “*Unless quality and risk are controlled for, one might easily miscalculate a bank’s level of inefficiency; e.g. banks scrimping on credit evaluations or producing excessively risky loans might be labelled as efficient when compared to banks spending resources to ensure their loans are of higher quality*” (p. 1026). We estimate the efficiency of banks with and without this input to adjust for different credit risk levels and examine its impact on efficiency.

Second, unlike previous studies in the Greek banking sector, we consider off-balance sheet activities during the estimation of efficiency scores. Several recent studies that examine the efficiency of banks, with DEA or stochastic frontier techniques, acknowledge the increased involvement of banks in non-traditional activities and include either non-interest (i.e. fee) income (e.g. [Lang and Welzel, 1998](#); [Drake, 2001](#); [Tortosa-Ausina, 2003](#)) or off-balance sheet items (e.g. [Altunbas et al., 2001](#); [Altunbas and Chakravarty, 2001](#); [Isik and Hassan, 2003a,b](#); [Bos and Colari, 2005](#); [Rao, 2005](#)) as an additional output. However, despite their increased importance for Greek banks, such activities have not been considered in the past. Again, we estimate the efficiency of the banks in our sample with and without off-balance sheet activities to observe whether it will have an impact on efficiency.

Third, we compare the results obtained from the intermediation approach that has been followed in most recent studies of banks’ efficiency with a profit-oriented approach that was recently proposed by [Drake et al. \(2006\)](#) in the context of DEA, and is in line with the approach of [Berger](#)

¹ Former Yugoslav Republic Of Macedonia.

² Previous studies that focus on the efficiency of the Greek banking sector are: [Karafolas and Mantakas \(1996\)](#), [Noulas \(1997\)](#), [Christopoulos and Tsionas \(2001\)](#), [Christopoulos et al. \(2002\)](#), [Tsionas et al. \(2003\)](#), [Halkos and Salamouris \(2004\)](#), [Apergis and Rezitits \(2004\)](#) and [Rezitits \(2006\)](#). These studies are discussed in more detail in the next section.

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