Chapter 62

Analyzing the Efficiency of European Banks: A DEA-Based Risk and Profitability Approach

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ABSTRACT

Basic financial and profitability ratios such as net interest margin, return on assets, and return on equity alone do not measure bank performances effectively as they lack the risks associated. Since the success of banks in managing performance is expected to be largely dependent on the correct pricing and management of risks, a proper measurement of efficiency should include the effects of risks. The purpose of this study is to benchmark risk profiles of European commercial banks and performance indicators during the 2006-2009. The research is implemented based on four models by Data Envelopment Analysis with data of 697 banks from 37 countries. The results suggest that there is an extensive inter- and intra-country risk efficiency of banks. Profitability increase is not always directly proportional to risk increase, and the financial crisis substantially decreased the risk efficiency of banks, especially in 2008 in developed economies.

INTRODUCTION

Conventionally, a set of ratios, net interest margin (NIM), return on average asset (ROAA), return on average equity (ROAE) or cost to income, have been used to analyze the performances of banks. But the recent global crisis has proved that these parameters are not enough to judge the robustness of financial agents and performance should be associated with risk more than ever. All the paradigms have been reevaluated to integrate risk monitoring and control mechanisms into pruden-
tial regulations, to adopt a stronger regulatory and supervisory framework, to ensure more resistant financial institutions and to attain more rational and effective measures.

All international organizations agree that there is a need for more restricted and regulated financial systems and that risks should be considered more than ever before in the supervising of financial bodies. The basic financial and profitability ratios NIM, ROAA and especially ROAE have been criticized for being insufficient to effectively measure the performance of banks since they lack the risks (credit risk, interest rate risk, foreign exchange risk, liquidity risk, operational risk and leverage) associated with them. Therefore, a proper measurement of bank efficiency should include the effects of risks on measured profitability ratios as well. Risk efficiency indicates whether the profitability ratios of banks are reasonable compared to their risk levels. This relation demonstrates the efficiency of banks in converting their risks to profitability and performance indicators.

With this study we aim to investigate the relationship between the risk levels of European commercial banks and their profitability indicators by using DEA. In this specific area of efficiency, there is a very limited literature and thus the risk efficiency of banks has yet to be analyzed. To our knowledge, this is the first study to extensively associate risk parameters with profitability indicators by using DEA. In utilizing DEA, some proper proxies for the abovementioned risks are used as inputs and profitability ratios are employed as outputs. The study also enables us to compare risk efficiency of different banking sectors throughout wide range of economic and geographical region. The models will be run on the data of 697 from 37 member countries of the European Banking Federation (EBF). The data covers the period 2006-2009 to ensure that any changes in performance during the global financial crisis would be captured as well. The results will enable us to analyze the risk efficiencies of banks in terms of the following: the country within which they are located, the absence or presence of unions, their regions, local development levels, ownership, size, and whether or not they are exchange listed.

The approach used in this paper is based on a DEA (Data Envelopment Analysis) where inputs are risks and outputs are profitability. In the first of four different models, it is assumed that NIM is affected by interest rate risk, liquidity risk and credit risk, and accordingly their effects on efficiency are analyzed via the NIM Model. The second model, or ROAA Model, includes operational risk as a supplement to the abovementioned financial risks. Then third model, or ROAE model, is analyzed in terms of how it adds leverage to the risks included in the other models. Lastly, the final model, referred to as ALL, measures how successful a bank is in maintaining its risks at some specific levels in order to maximize all of its outputs simultaneously.

The rest of the paper proceeds as follows. In section 2, an overview of the European Banking System is presented. Efficiency studies in the banking sector, together with approaches about specifying inputs and outputs, are summarized in section 3. Section 4 provides models, methodology, variables and data. We then present our empirical results and analysis in the next section, with conclusions provided in the final section.

AN OVERVIEW OF THE EUROPEAN BANKING SYSTEM

The European banking sector has undergone continuous changes as a result of a numerous factors since the instatement of the First Banking Directive of the European Community in 1977. Developments related with European Union have been the core factor in shaping these changes. One of the initial steps was The First Banking Directive towards a single European banking sector and its purpose was to harmonize banking laws and eliminate barriers between members. The Directive on Consolidated Supervision (1983) was a further