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Productivity changes in pre-crisis Western European banks: Does scale effect really matter?

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ABSTRACT

Insofar as the completion of the Single Market for Financial Services, it has presented new challenges for European Banking industries. In this study, we use a recently developed generalized metafrontier Malmquist productivity index (gMMPI) to provide insights on productivity growth. We extend the gMMPI to broaden the index's capacity by decomposing various sources of productivity change in the metafrontier context. The sample contains commercial banks from 12 Western European countries prior to the recent financial crisis. A key advantage of our extension is that it introduces the role of scale effects. The empirical results show that an average bank's productivity growth arises mainly from technical changes and scale effects. Moreover, smaller and larger banks grow faster than medium ones. In addition, conservative banks tend to grow faster. These findings suggest that a more competitive and integrated financial market induced by financial deregulation is indeed able to improve banks' productivity.

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1. Introduction

Western European banking industries have experienced fundamental changes in their regulatory and competitive environments ever since the completion of the Single Market for Financial Services

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in 1993. This regulation largely reduces or eliminates trade and entry barriers to the financial markets in the European Union (EU). Goldberg and Johnson (1990) find a positive relation between economic integration and the entry of foreign banks into developed countries. Subsequently, EU banks are facing an increasingly competitive environment not only from domestic markets, but also from abroad. Bank managers must adopt the best technologies and attempt to diversify their financial products in order to earn profits. Under this trend of international economic integration, the efficiencies and productivity changes of EU banks play pivotal roles in the keen race for survival. These ideas are the initial motivation for this study, where we investigate the productivity growth in Western European banking industries.

Many previous studies have carried out international comparisons between banks. These studies estimate a common frontier for banks of different countries by pooling all observations together. This approach implicitly assumes that banks from different countries have access to the same technology. This assumption appears to be strong, as each country has its own cultural traditions, resource endowments, and political and legal systems. These characteristics affect the behavior and willingness of banks to undertake new innovations. Different regulatory environments, for example, lead to either universal banking countries or separated banking countries. Universal banking countries permit commercial banks to engage in nontraditional activities such as investment, trading, real estate, and insurance, while separated banking countries do not. Barth, Caprio, and Levine (2004) describe some of the background information on regulatory and supervisory differences.

An alternative approach to these studies is to obtain individual production frontiers for each country to measure the country-specific technical efficiency scores. This method avoids making the assumption that all of the countries under consideration share the same technology. However, the efficiency scores are not comparable due to the fact that they are evaluated against different country-specific frontiers, rather than a common frontier. This dilemma motivated Battese, Rao, and O'Donnell (2004) and O'Donnell, Rao, and Battese (2008) to propose a metafrontier production function estimated in two steps that makes a comparison of the technical efficiency of banks in different countries possible.

As far as the specific context of the banking industry productivity are concerned, the Malmquist productivity index is the most commonly used measure of productivity change (Chortareas, Garza-García, & Girardone, 2011). Since the conventional Malmquist productivity index (MPI) is defined in the context of a single group production frontier, it is necessary to extend the MPI to the framework of a metafrontier production function. To this end, Rao (2006) defines a metafrontier and discusses how to derive the metafrontier Malmquist productivity index (MMPI). Rao implicitly assumes a constant return to scale (CRS) technology that excludes the existence of the scale effect. The MMPI can be used to compare the changes in technical efficiency, technology, and metatechnology ratio (TGR) among various countries. Although Rao's MMPI measure is innovative, it requires more elaboration to gain further insights into its sources and to get rid of the presumption of the CRS.

Recently, Chen and Yang (2011) have introduced the effect of scale efficiency change into the MMPI formula and the resulting index is called the generalized MMPI (gMMPI). Following this vein, our study uses three steps to decompose productivity change into a variety of sources under the framework of the metafrontier in an attempt to render more information. First, following Orea's (2002) development of a parametric approach that decomposes a generalized MPI while accounting for scale economies, we establish a measure of gMMPI in the context of a metadistance function. Second, Rao (2006) provides a catch-up item that is split into two terms: catch-up in technology (CUT) and potential technological change (PTC). These two terms give a better description of the relative adjustment speed of the technology undertaken by a country to that of the potential metafrontier. Third, recent empirical works, such as Chaffai, Dietsch, and Lozano-Vivas (2001), Cavallo and Rossi (2002), and Chronopoulos, Girardone, and Nankervis (2011), recommend that controlling for environmental variables is crucial for assessing efficiency scores and productivity changes. We use an output-oriented country-specific distance function that allows for multiple inputs and multiple outputs to estimate the technical efficiency of each bank. Our function comprises environmental variables like the function proposed by Battese and Coelli (1995). In this manner, the variance of the one-sided error term, representing the technical inefficiency of a bank, is heteroscedastic as pointed out by Kumbhakar and Lovell (2000). By doing so, we can examine the importance of various elements underlying the gMMPI and legitimately compare the productivity changes among different countries. This new approach gives insight into the

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