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Productivity growth and biased technological change: Credit banks in Japan

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ABSTRACT

This paper investigates the productivity change of Japanese credit banks with a Malmquist index and the input technological bias during 2000–2006. Our results indicate that the traditional growth accounting method, which assumes Hicks neutral technological change, is not appropriate for analyzing changes in productivity. Our analysis unambiguously shows that management of *Shinkin* banks has to be improved. These must be based on the improvement of technical efficiency and/or technological change, emulating the procedures of the best-practice banks, i.e., those banks with Malmquist productivity scores higher than one and simultaneously with technical efficiency and technological change higher than one.

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1. Introduction

Banks efficiency and performance are important indicators that may identify actual or potential problems at individual banks and in the sector as a whole (Molyneux and Williams, 2005). Such information is also valuable in order to compare competitiveness and efficiency of banking systems. If there is significant inefficiency in the sector, in general, and in different groups of banks, in particular,

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there may be room for structural changes, increased competition, mergers and acquisitions (Berger and Mester, 1997).

The standard models estimate efficiency *via* parametric techniques and non-parametric methods. In our study, we apply Data Envelopment Analysis (DEA) and the Malmquist productivity index as in Alam (2001). The advantage of using non-parametric frontier techniques is that they impose no *a priori* functional form on technology, nor any restrictive assumptions regarding input remuneration. Furthermore, the frontier nature of these techniques allows any productive inefficiency to be captured and offers a “benchmarking” perspective. The DEA method has been widely used to estimate the reciprocal of the Shephard (1970) input distance function. The reciprocal of this distance function serves as a measure of Farrell (1957) input efficiency and equals the proportional contraction in all inputs that can be feasibly accomplished by given output, if a decision-making unit (DMU) adopts best-practice methods.

The objective of our study is the following. We link input efficiency indexes across time in order to estimate the Malmquist productivity index. This index estimates the change in resource use over time that is attributable to efficiency change and due to technological change. Furthermore, we use the approach of Färe and Grosskopf (1996) and decompose technological change into an index of output biased technological change, an index of input biased technological change, and an index of the magnitude of technological change. The introduction of the Malmquist index with biased technological change in banking is a novelty in this context.

Current research studies on productivity change have applied the Malmquist index but without considering biased technology, see, for example, Guzmán and Reverte (2008), Casu et al. (2004), Sturm and Williams (2004). Studies focusing on savings banks and cooperative banks include, for example, Grifell-Tatjé and Lovell (1997), Carbo et al. (2002), Williams (2001), Kumbhakar et al. (2001). However, we apply the innovative frontier models on the segment of financial institutions – credit banks (*Shinkin* banks) in Japan. Our methodological concept contributes to research studies on *Shinkin* banks presented by Satake and Tsutsui (2002), Hosono et al. (2006), Fukuyama and Weber (2008, 2009). The study has clear implications for the definition of productivity strategies, taking into account the previously managerial practices identified in the study at unit levels.

The remainder of this paper is organised as follows. Section 2 presents the contextual setting of credit banks in Japan. Section 3 presents the literature survey. Section 4 presents the data and the detailed methodological concept of our model. Section 5 discusses the results. Section 6 concludes.

2. The role and place of credit banks in Japan

Stock price and land bubbles in the late 1980s and the following stock market crash in the 1990s caused significant disruptions in the Japanese banking sector and the domestic economy. The business activities of financial institutions were brought to an almost complete standstill due to lack of capital caused by extremely large volumes of non-performing loans (Ohashi and Singh, 2004). The banking crisis catalysed systemic changes within the Japanese banking system. The government launched a blanket guarantee for bank deposits in order to restore the confidence in the system and prevent systemic crisis. The radical consolidation and capitalization of the Japanese financial system took place at the beginning of unprecedented global technological progress, product innovation, integration of financial markets and the expansion of domestic and across border banks activities through mergers and acquisitions. These developments have presumably contributed to improve banks efficiency and performance in the Japanese banking sector (Fukuyama, 1996).

The Japanese banking sector is segmented into three levels³: (i) city banks and trust banks, (ii) regional banks and second regional banks, (iii) *Shinkin* banks (credit banks (CBs)) and *Shinyo Kumiai* (credit cooperatives (CCs)). The first two groups are traditional commercial banks. The third group includes mutual (cooperative) financial institutions.

³ This paper does not consider long-term credit banks because they were generally positioned as half-government and half-private financial institutions.

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