Convergence of total factor productivity among banks: Hong Kong's experience

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A B S T R A C T

Are the less productive banks catching up to the more productive ones and, if so, how quickly and by what means? The objective of this study is to answer these questions by looking for convergence in total factor productivity (TFP) among banks in Hong Kong. Past research has identified two major factors governing productivity in the banking sector–scale economies and X-efficiency. If the gains from scale economies decline with firm size and the only difference between banks lies in their initial size, the initially smaller banks should eventually catch up to the initially larger ones because the former tends to grow more rapidly. However, the findings from this study do not support this hypothesis of "absolute convergence." Indeed, the findings show strong evidence for "conditional convergence," which means that the steady-state TFP to which a bank is converging is conditional on the bank's own level of X-efficiency. Conditional convergence implies that initial differences in X-efficiency among banks can, between them, create permanent differences in TFP.

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1. Introduction

Comparison of productivity performance across financial institutions is central to many of the questions concerning factors leading to productivity growth: are less productive financial institutions catching up to the more productive ones, and if so, how quickly and by what means? Groups as disparate as financial economists and business leaders have expressed profound interest in the answer to the question whether the currently best-performing institutions can maintain their roles as productivity leaders in the future. With special reference to the Hong Kong banking industry, this study examines the convergence of productivity among commercial banks.

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Studies in the past literature have identified two major factors governing productivity in the banking sector–scale economies and X-efficiency. Scale economies can arise from an improved division of labor and specialization in larger banks. In addition, the risk diversification effect of a larger loan portfolio provides a bank-specific reason for increasing returns to scale. On the other hand, X-efficiency refers to all technical and allocative efficiencies of individual banks, which are related to managerial ability to control costs or maximize revenues. Findings from past research suggest that X-efficiency differences across banks are large and dominate scale economies (see Berger, Hunter, & Timme, 1993).

Most early research before 1990s has found little evidence for economies of scale beyond a relatively modest overall size (see Berger, Hanweck, & Humphrey, 1987, and a survey by Humphrey, 1990). For instance, Hunter and Timme (1995) find that such economies cease or even become negative at the scale of very large banks. Similarly, Lang and Welzel (1996) find that all German banks enjoy growth of total factor productivity, which is higher for the smaller banks. Recent evidence from the 1990s, however, suggests that economies of scale increase with bank size (e.g., Berger & Mester, 1997; Hughes & Mester, 1998; Hughes, Landg, Mester, & Moon, 1996). Stiroh (2000) provides an explanation for this phenomenon: the optimal size and unexploited scale economies have increased from 1991 to 1994 due to deregulation, technological change, and financial innovation. After 1994, however, banks moved closer to the new optimal size and left less potential gains from unrealized scale economies. If the gains from scale economies decline with bank size and there exists a common optimal size that maximizes this gain, then banks will continue to expand in order to fully exploit the gains from scale economies until the optimal size is reached in the steady state. In Hong Kong, for instance, the total assets of locally incorporated licensed banks have increased by 158% in 1993–2002. While Noulas, Miller, and Ray (1990) found that economies of scale for large US banks into the range of $3 to $6 billion in assets, the average assets of locally incorporated licensed banks in Hong Kong was about $6 billion. Moreover, if scale economies are the major source of productivity growth, the absolute convergence in size driven by economies of scale should also imply absolute convergence in productivity among banks. As a consequence, all banks should end up with the same size and productivity level in the steady state. This is the so-called "absolute convergence" hypothesis. Mergers and acquisition are possible ways to speed up this absolute convergence in size and productivity.

However, results from past studies suggest that even within the output range where scale economies do exist their measured extent is small, of the order of 5% or less (Berger & Humphrey, 1992), and that banks typically display high (and variable) levels of X-efficiency (Berger & Humphrey, 1991; Drake & Weyman-Jones, 1992; Miller & Noulas, 1996). Therefore, X-efficiency is likely to be large enough to dominate scale effects. Since the factors determining X-efficiencies are bank-specific, productivity growth resulting from X-efficiency implies that banks may converge to different levels of steady-state productivity. This is the so-called "conditional convergence" hypothesis. Fung (2006) found strong evidence for conditional convergence in productivity among bank holding companies (BHCs) in the US, which suggests that the steady-state productivity to which a BHC is converging is conditional on the BHC's own level of X-efficiency. The objective of this study is to investigate whether such convergence in productivity exists in the Hong Kong banking industry.

The remainder of this article is organized as follows. The empirical formulation is specified in Section 2. Sections 3 and 4 then describe the data on which the study is based and present the results of the estimation, respectively. Conclusions are drawn in Section 5, the final section.

2. Empirical formulation

To model the bank production function, this study employs the intermediation approach (Sealey & Lindley, 1997) wherein banks intermediate financial services, collect purchased funds and use labor and capital to transform these funds into loans and other assets. We use a Cobb–Douglas production function where output is produced with fixed assets, liquid assets and variable input. A production function is therefore specified as follows:

$$Y_{i,t} = A_{i,t} K_{i,t}^{\alpha} D_{i,t}^{\gamma} L_{i,t}^{\beta} \tag{1}$$

where, $Y_{i,t}$ is the output, $K_{i,t}$ is the fixed assets, $D_{i,t}$ is the liquid assets, $L_{i,t}$ is the variable input, and $A_{i,t}$ is the total factor productivity of firm i at time t. $Y_{i,t}$ in Eq. (1) has two alternative definitions: $Y1_{i,t}$ and $Y2_{i,t}$. While