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The impact of macroeconomic and regulatory factors on bank efficiency: A non-parametric analysis of Hong Kong's banking system

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Abstract

This paper assesses the relative technical efficiency of institutions operating in a market that has been significantly affected by environmental and market factors in recent years, the Hong Kong banking system. These environmental factors are specifically incorporated into the efficiency analysis using the innovative slacks-based, second stage Tobit regression approach advocated by Fried et al. [Fried, H.O., Schmidt, S.S., Yaisawarng, S., 1999. Incorporating the operating environment into a nonparametric measure of technical efficiency. Journal of Productivity Analysis 12, 249–267]. A further innovation is that we also employ Tone's [Tone, K., 2001. A slacks-based measure of efficiency in data envelopment analysis. European Journal of Operational Research 130, 498–509] slacks-based model (SBM) to conduct the data envelopment analysis (DEA), in addition to the more traditional approach attributable to Banker, Charnes and Cooper (BCC) [Banker, R.D., Charnes, A., Cooper, W.W., 1984. Some models for estimating technical and scale efficiencies in data envelopment analysis. Management Science 30, 1078–1092].

The results indicate: high levels of technical inefficiency for many institutions; considerable variations in efficiency levels and trends across size groups and banking sectors; and also

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differential impacts of environmental factors on different size groups and financial sectors. Surprisingly, the accession of Hong Kong to the People's Republic of China, episodes of financial deregulation, and the 1997/1998 South East Asian crisis do not seem to have had a significant independent impact on relative efficiency. However, the results suggest that the impact of the last-mentioned may have come via the adverse developments in the macroeconomy and in the housing market.

JEL classification: C23; C52; G21

Keywords: Data envelopment analysis; Slacks adjustment; Hong Kong banks; Efficiency; Regulation and environmental variables

1. Introduction

The concept of efficiency in banking has been considered widely in the literature, utilising both non-parametric and parametric techniques (Hall, 2001). However, there has been an on-going debate over whether the estimated efficiency scores ('scale efficiencies' or '*X*-efficiencies') are biased, not only due to the techniques utilised to estimate them, but also due to endogenous and/or exogenous factors affecting the bank sample. With respect to the former, for example, McAllister and McManus (1993) argue that the minimum efficient scale (MES) for banks can change as the total asset size of the banks in the sample increases, due to possible differences in the asset portfolios between the smaller and larger banks. With respect to the latter, it has long been recognised that external/environmental factors can have a significant impact on relative efficiency scores.

There have recently been advances made, however, in respect of how researchers incorporate the potential impact of environmental, economic and regulatory factors on bank efficiencies (see, for example, parametric studies by Akhigbe and McNulty (2003), Berger and Mester (2003), Chaffai et al. (2001) and Dietsch and Lozano-Vivas (2000), and non-parametric studies by Lozano-Vivas et al. (2002)). In the former set of studies, the external variables (which are added as control variables to the functional form equation) are assumed to have a direct effect on the production/cost structure. Hence, each bank is assumed to face a different production/cost frontier. In the latter set of non-parametric studies, the external factor variables are typically introduced as non-discretionary inputs and/or outputs, having a direct effect on the efficient production frontier.

A drawback of this particular non-parametric approach, however, is that there is no standard statistical test to determine whether the researcher has utilised the correct set of non-controllable inputs or outputs. In this paper, therefore, we utilise an innovative non-parametric approach to examine the impact of external/environmental factors on an evolving banking market. Specifically, this is undertaken using an approach that allows a second statistical stage of analysis of the effects of external factors to be determined. These impacts are then incorporated into a revised non-parametric efficiency analysis. We maintain that any analysis of specific financial