Socio-Economic Planning Sciences 43 (2009) 240–252

Contents lists available at ScienceDirect

Socio-Economic Planning Sciences

journal homepage: www.elsevier.com/locate/seps

Measuring the impact of restructuring and country-specific factors on the efficiency of post-crisis East Asian banking systems: Integrating DEA with SFA

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ARTICLE INFO

Article history:
Available online 3 January 2009

JEL Classification:
G21
G28
G32

Keywords:
Bank restructuring
Environmental factors
Bank efficiency
DEA
SFA

ABSTRACT

This paper investigates the relationship between post-crisis bank restructuring, country-specific conditions and bank efficiency in Asian countries from 1997 to 2001 using an approach that integrates data envelopment analysis and stochastic frontier analysis. We focus on restructuring measures related to bank ownership. The results indicate that although domestic mergers produce more efficient banks, overall, restructuring does not lead to more efficient banking systems. Banking system inefficiencies are mostly attributed to country-specific conditions, particularly, high interest rates, concentrated markets and economic development.

1. Introduction

This paper examines the relationship between post-crisis bank restructuring and relative bank technical efficiency in East Asian developing countries from 1997 to 2001. Particularly, we investigate: (i) whether restructuring enhances efficiency of banks; and (ii) to what extent the country-specific conditions affect bank efficiency during restructuring. Bank efficiency is measured using the slacks-based measure (SBM) of efficiency, which is a relatively new model of data envelopment analysis [1]. The focus on bank restructuring used in this study includes measures related to bank ownership, namely, mergers, allowing for foreign bank entries, and state intervention.

A study of bank efficiency during post-crisis restructuring is significant for a number of reasons. First, during the 1990s the East Asian economies were recognized as the most successful in financial integration, attracted capital flows from other free-markets, and provided the preferred model for emulation by other developing countries [2]. However, the disruption in financial systems in 1997 caused repercussions in many other financial markets around the world [3]. This implies that stability of the East Asian economies is important to the world economy. Financial stability of the region is also important in its own right because the current projections for economic growth indicate that Asia's share of the world gross domestic product (GDP) could climb to around 40% by 2020–25 [4].

Second, bank *inefficiency* has often been claimed as a major cause of banking crises in developing countries. After the East Asian crisis in 1997, most of the bank regulators in crisis-affected countries adopted several measures to enhance their banking systems, including encouraging or even forcing distressed banks to merge as a way to

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doi:10.1016/j.seps.2008.12.002

reduce failure risk and inefficiency. Yet, the effectiveness of different policies at the individual bank level following a crisis is rarely explored for these countries (an exception is [5]). Allowing for full foreign ownership of commercial banks was used as a means to attract foreign investors and their technologies to reduce operating costs [6]. Although these conventional restructuring measures are expected to improve efficiency in a banking system, research usually indicates no such improvement from mergers [7–9]. For example, mixed results have been found regarding the relationship between foreign bank entries and bank efficiency [10,11].

Third, the current study sheds light on the relationship among bank mergers, foreign bank entries, state intervention, and bank efficiency in developing country. For instance, research based on industrialized countries usually indicates no improvement from bank mergers. However, little empirical research exists on developing countries. Hence, the positive association between bank mergers and efficiency in the current study strengthens the assumption of efficiency gains from bank mergers in developing countries. The negative association between foreign bank entry and bank efficiency brings a new observation to bank literature in developing countries.

Finally, the current study also contributes to investigation of environmental influences on efficiency estimates. In cross-country bank efficiency literature, research that accounts for the influence of environmental factors is limited to studies based on Europe (e.g., [12,13]). Our results highlight the importance of country-specific conditions that play a significant role in bank efficiency measurement in developing countries.

The paper is organized as follows. In Section 2, we provide a review of bank efficiency in Asian countries around the 1997 banking crisis. Section 3 discusses bank restructuring measures implemented following the Asian banking crisis. Section 4 outlines data and the multiple-stage analysis used to account for environmental effects. Section 5 presents an analysis of the results, and Section 6 concludes.

2. Bank efficiency in Asian countries around the banking crisis of 1997

To date, only a few studies have investigated banks' efficiency around a banking crisis in Asian countries although there is a claim that bank inefficiency is a cause of banking crisis. Kwan [14], who uses multiple regression, examines the banking industry's per unit operating costs in seven East Asian economies, namely, Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, and Thailand, from 1992 to 1999. Prior to the 1997 crisis period, the author finds that bank operating costs among these Asian countries were declining from 1992 to 1997, indicating that banks, on average, were improving their operating performance over time.

Laeven [15], however, argues that, on average, the increase in calculated efficiency before the East Asian banking crisis in 1997 was due to excessive risk-taking instead of a true increase in efficiency. This is because these countries experienced extremely high loan growths, but *ex-post* it was known that a substantial part of those loans were nonperforming, and, therefore, risky. The author also indicates that foreign-owned banks took little risk relative to other banks in the East Asian region, and family-owned banks were among the most risky banks.

Karim [16], who used the stochastic frontier analysis (SFA) to assess efficiency of banking industries in four South East Asian countries prior to the crisis in 1997, provides different results from the aforementioned studies. The author indicates that cost efficiencies in South East Asian banks tend to decline over the year preceding the crisis, and suggests that the problem of bank failures may have been related to inefficiency.

Turning to the post-crisis period, Kwan [17] notes that Asian banks were incurring additional costs in dealing with their problem loans while output was simultaneously declining after the 1997 Asian banking crisis. Moreover, the proportion of labor costs to total costs is found to decline significantly between 1997 and 1999. This suggests that banks were adjusting their labor input upon falling demand but were less flexible in reducing physical capital input.

Unfortunately, the aforementioned studies do not reveal a clear relationship between banking crisis and bank efficiency in Asian developing countries. In addition, they do not consider the effect on bank efficiency of measures implemented during and after the crisis period. An exception is Williams and Nguyen [5], who recently investigated the relationship between bank performance and bank governance for South East Asian countries from 1990 to 2003. Unlike our current study, Williams and Nguyen adopted only the stochastic frontier approach. They suggest that state-owned banks were underperforming compared to privately owned banks, whereas no conclusion was drawn on foreign acquisitions. Since post-crisis restructuring may affect bank efficiency, the next section discusses common measures.

3. Bank restructuring measures following the Asian banking crisis of 1997

The goal of bank restructuring is to restore a sound banking system that can provide efficient banking services to the economy on a sustainable basis [18]. A comprehensive review of restructuring programs adopted in Asia can be found in [19]. The focus of this paper is on the forms of ownership and individual bank efficiency; therefore, this section discusses only the measures used in bank restructuring that relate to changes of bank ownership.

3.1. Mergers among domestic banks

Asian governments intensified their efforts to promote mergers in the aftermath of the Asian banking crisis. Mergers were encouraged by some form of 'moral suasion', a suggestion that the authorities would view it favorably if a large bank were to take over a troubled small bank [20]. Temporary exemptions were granted from prudential requirements. We also note that takeovers that are likely to be delayed or blocked due to concerns about market concentration in normal times are more likely to be approved during a crisis.