



# Assessing the impact of the global financial crisis on the profit efficiency of Indian banks



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## ABSTRACT

With the objective to assess the impact of the global financial crisis on bank efficiency in India, the study focuses on the evolution of profit efficiency before, during and after the crisis. For evaluating and comparing the risk-adjusted alternative profit efficiency of different ownership groups in the Indian banking industry, the study employs a DEA-based meta profit frontier framework that accounts for technological heterogeneity across groups. The results highlight that profit efficiency of banks declined mildly during the global financial crisis, but then recovered quickly after the crisis. However, the global financial crisis had a differentiated impact across ownership groups. New private banks observed largest drag in the profit efficiency during the crisis years. The analysis of technology gap ratio provides that foreign banks employed best-practice production technology, and were observed to be the technology leaders of the Indian banking industry. Overall, we found no long-lasting adverse effect of the global financial crisis on the profit efficiency of the Indian banking sector due to the adoption of accommodative macro policies aiming at injecting sufficient liquidity in the system.

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## 1. Introduction

From the experience of different episodes of financial crisis in recent decades and particularly from the global financial crisis of 2007–09, it has been well established that a sound and well-regulated financial system, of which the banking system is a most crucial part, is a sine qua non for macroeconomic stability and sustainable economic growth. In fact, the presence of a crisis in the banking system in terms of its insolvency has the potential to push the economy into a slump, in what is the most extreme form of credit-driven macroeconomic cycle (Caprio and Honohan, 2002). It has been noted that the banking crises of the recent decades have been inextricably linked with macroeconomic crises. Further, these crises are observed to be costly, either in direct cash costs to bank creditors or to the governments who have bailed them out, or both, and indirectly in the associated spillover effects on economic activity including that caused by reduced access to credit (Caprio and Honohan, 2010).

According to the Report on Currency and Finance for the year 2010 by the Reserve Bank of India (RBI) (India's central bank), the recent global financial crisis that has caused great turmoil in the banking systems of developed economies has not affected the Indian banking

system much. This is because of the prudent regulatory and supervisory framework, strong macroeconomic fundamentals, limited exposure of Indian banks to riskier assets and derivatives, and the relatively low presence of foreign banks in India. On the other hand, Ghosh and Chandrasekhar (2009) noted that the liquidity trap characteristics prevailed in the Indian banking industry during the crisis years. This was because from demand side most credit-worthy potential borrowers were unwilling to borrow because of the prevailing uncertainties and expectations of slowdown, and from supply side banks suddenly became more risk-averse. Meanwhile, all other enterprises, including those which desperately required working capital just to stay afloat, found it increasingly difficult to access bank credit even as they faced more stringent demand conditions. Eichengreen and Gupta (2013) observed that from mid-2008, there was a sharp increase in interbank borrowing rates and the flight of deposits from private banks to public sector banks was predominantly towards the State Bank of India (SBI), India's largest commercial bank. Reallocation of deposits towards the SBI due to the government's implicit guarantee of its liabilities destabilised other banks and increased the inefficiency of financial system since other banks were forced to hold more capital and maintain more liquidity to reassure depositors.

Against this background, two significant moot questions arise: i) "Did Indian banking sector remain insulated from the contagion effects of global financial crisis?", and ii) "Did the impact of global financial crisis remain uniform across all the ownership groups?". The

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present study seeks to explore the answers to these questions. In particular, the main objective of this study is to analyse the impact of global financial crisis on the profit efficiency of Indian banks by examining the behaviour of profit efficiency before, during and after the crisis. In the bank efficiency literature, a measure of profit efficiency has been unquestionably considered as the most appropriate measure of bank performance since it considers both revenue and cost sides of production process (Berger and Mester, 1997). Our secondary objective is to see whether the impact of crisis has distributed uniformly across different ownership types by focusing on the inter-temporal variations in profit efficiency across the public, private and foreign banks' segments of the Indian banking industry. Further, we intend to analyse the developments in technology gap ratios (*TGRs*) to ascertain whether there exists significant technological spillovers in the Indian banking industry. We believe that the research findings of the present study would not only inform the policy makers about the size of the impact of the crisis on the Indian banking sector, but also guide them to take precise and targeted policy instruments for safeguarding financial stability from any potential crisis.

In order to perform this research, we made use of the meta profit frontier framework. This framework serves as a potent tool for comparing and estimating the risk-adjusted alternative profit efficiency and technology gap ratios for bank groups operating under different technologies. In this framework, we follow a two-step procedure. In the first step, a non-parametric profit frontier of each ownership group is estimated to obtain the risk-adjusted alternative profit efficiency scores of all banks within the group. In the second step, we estimate the meta profit frontier (which envelops the group-specific frontiers and represents available potential technology in the industry) to obtain the technology gap ratios (*TGRs*) between the metafrontier and the group frontiers for each bank. Estimating the *TGRs* can help decision-makers by identifying performance improvement programmes (O'Donnell et al., 2008). In the present study, we extend the DEA-based metafrontier framework of O'Donnell et al. (2008) in the context of profit efficiency, which explicitly accounts for technological heterogeneity in the banking industry. The prominent bank efficiency studies that made use of metafrontier framework include Bos and Schmiedel (2007); Huang et al. (2011); Huang and Fu (2013); Casu et al. (2013) and Chiu et al. (2013). However, the focus of aforementioned studies is either on technical efficiency or cost efficiency without incorporating the effects of risk-bearing behaviour on bank performance.

It has been well acknowledged in the bank efficiency literature that a well-defined measure of risk-taking should explicitly be incorporated into any model aiming at appraising the relative efficiency of banks. Among the various suggestions on the measures of risk-taking activity, one of the commonly used risk control variable in the literature is equity capital. Commenting on the inclusion of equity capital as a risk variable, Berger and Mester (1997) stated: "A bank's insolvency risk depends on its financial capital available to absorb portfolio losses, as well as on the portfolio risk themselves. Insolvency risk affects bank costs and profits via risk premium the bank has to pay for uninsured debt, and through the intensity of risk management activities the bank undertakes. For this reason, the financial capital of the bank should be considered when studying efficiency" (p. 909). Keeping in view that bank attitudes to holding equity have responded quickly to changes in the financial climate, Johnes et al. (2014) advocated the appropriateness of equity capital as a proxy variable for risk in a bank efficiency study in which the study period encompasses the years of financial crisis. The equity capital has been widely used as a control for risk in previous studies, including those by Maudos et al. (2002), Färe et al. (2004) and Koutsomanoli-Filippaki et al. (2012). The broad conclusion of aforementioned studies is that neglecting equity capital into the performance appraisal model induces a bias in efficiency estimates. Therefore, we incorporate the equity capital directly into the DEA programme as a quasi-fixed input with the objective to estimate the risk-adjusted

alternative profit efficiency of Indian banks. To the best of our knowledge, none of the previous studies has made an attempt to calculate risk-adjusted alternative profit efficiency scores for individual banks using the metafrontier framework in which efficiency scores are calculated relative to own group's frontier and metafrontier (industry's best-practice frontier) along with technology gap ratios (*TGRs*).

The present study makes several significant contributions to the extant literature. First, to the best of our knowledge, this is the first study which assesses the impact of global financial crisis on the profit efficiency of Indian banks using the bank-wise data for the period of 2003/04 to 2012/13. It is significant to note here that the focus of most recent studies on Indian banks by Fujii et al. (2014) and Tzeremes (2015) is limited on technical efficiency of banks in the production process, which has been considered as very narrow concept relative to profit efficiency in appraising the bank performance. Second, as noted above, in the present study, we incorporate the equity capital directly into the DEA model as a quasi-fixed input with the objective to estimate the risk-adjusted alternative profit efficiency of Indian banks. None of the previous studies has made an attempt to calculate risk-adjusted alternative profit efficiency scores for individual banks. Third, our study employs a DEA-based meta profit frontier framework, which perhaps has not been used in the literature on bank efficiency in India. The potential benefits of using this framework are: i) it takes care of issue of heterogeneous technologies across ownership groups in evaluating and comparing the efficiency estimates; ii) it allows researchers to assess *TGRs* for banks from different ownership groups with respect to the common metafrontier (Huang et al., 2015). Finally, this study contributes to the literature by providing a detailed analysis of sources of profit inefficiency of banks across ownership groups. Such analysis perhaps has not been attempted in the literature on bank efficiency in India. In particular, we decomposed the profit inefficiency into two distinct components: i) relative inefficiency (*RIE*) indicating the profit losses due to suboptimal choice of input-output mix, and ii) profit gap inefficiency (*PGIE*) representing the inefficiency that caused by purely technical factors and originates from the technology gap between the group-specific frontier and metafrontier. Since profit efficiency scores of different ownership groups are evaluated relative to same metafrontier, these scores and the resultant inefficiency estimates are comparable and able to provide insightful information, or more specifically, whether inefficiency is due to suboptimal choice of input-output mix or caused by not adopting potential technology available to the banking industry.

In Indian context, the use of meta profit frontier framework is justifiable because there appears a clear heterogeneity across banks belonging to different ownership groups in terms of production technology and operating environment. Even a level playing field has been created by the RBI for public, private and foreign banks, but these banks differ from each other in terms of objective function,<sup>1</sup> operating model, geographical coverage,<sup>2</sup> resource endowment,<sup>3</sup> risk taking appetite,<sup>4</sup>

<sup>1</sup> In India, the public sector banks pursue not only profit maximisation, but are also concerned with social justice in the allocation of credit (Bhaumik and Piesse, 2008). On the other hand, private and foreign banks focus solely on profit maximisation.

<sup>2</sup> At present, foreign banks like Citibank, Standard Chartered and HSBC operate as branches, mainly in bigger cities. At end-March 2013, metropolitan cities had accounted for 245 of the then existing 321 branches of foreign banks in India. On the other side, public sector banks have strong presence in the urban, rural and semi-urban areas.

<sup>3</sup> As at end-March 2011, almost three-fourths of the total assets of the banking sector belonged to public sector banks followed by new private banks (about 15 percent). Old private sector banks had the lowest share (around 4 percent) followed by foreign banks (around 7 percent) (Reserve Bank of India, 2011).

<sup>4</sup> Jaiswal (2010) found that public sector banks have a low-risk appetite relative to their counterparts since these banks have the lowest ratio of off-balance sheet exposure to total assets ratio at 61 percent, compared to 251 percent for private sector banks and 2803 percent for foreign banks.

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