

EFFICIENCY, SCALE ECONOMIES AND VALUATION EFFECTS: EVIDENCE FROM BANK MERGERS IN INDIA

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Abstract

This paper examines two important issues related to bank mergers in India. First, we estimate potential economic gains of state owned banks if they undergo consolidation. Scale economies, returns to scale and profit efficiency of state owned banks during 1986 to 2003 are estimated based on stochastic frontier analysis. We find that many Indian banks exhibit potential cost savings from mergers provided they rationalize their branch networks although profit efficiency may not rise immediately. Second we measure the realized impact of bank mergers on shareholders' wealth based on event study analysis. We find that in the case of forced mergers, shareholders of neither the bidder nor the target banks benefited. In the case of voluntary mergers, the bidder banks' shareholders gained more than the target banks' shareholders.

Key words: Mergers, Acquisitions, Efficiency, Scale economies, Stochastic frontier analysis, Event study, abnormal returns, India

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1. Introduction

Mergers and acquisitions have become an important strategy of the global financial services industry during the last fifteen years. Over 10,000 financial firms underwent acquisitions in the major industrialized countries from 1990 to 2001 and the figure was 15,500 worldwide (Amel *et al.*, 2004). The key driving force for this activity is severe competition among firms of the same industry, which puts focus on economies of scale, cost efficiency and profitability. The other motive for mergers is enhancing shareholders' wealth. Many studies (e.g. see the review by Berger and Humphrey, 1994) have evaluated such merger benefits, specific to the banking sectors of the US, UK, Japan and European countries. However, research evidence on mergers in emerging markets is scarce. This paper tries to fill this gap by analyzing mergers in the Indian banking sector.

The paper examines two important issues related to bank mergers in India, viz. an *ex ante* issue in anticipation of mergers and an *ex post* issue of realized mergers. First, we estimate potential scale benefits in Indian banking industry considering all the state owned banks, which constitute more than 70% of the assets of banking industry. The benefits from consolidation are intrinsically related to the existence of scale economies. Thus, expanding the scale of operations through a merger (or takeover) is expected to fetch substantial cost savings. Hence, while examining the potential benefits from consolidation, it becomes imperative to investigate whether state owned banks in India exhibit scale economies. If they do, then there is a case for

cost savings out of consolidation. Accordingly, we examine scale economies of state owned banks using data set for the period 1986 to 2003 by estimating a stochastic cost frontier and computing the Ray scale economies and returns to scale. Our results indicate significant reduction in costs, provided the banks go for rationalisation of their branch networks. The reduction in costs are expected to be significant for smaller banks, rather than for large banks. However, the analysis fails to show any evidence of immediate improvement in profit efficiency. To reap the main benefits of cost reduction through mergers, our study strongly recommends rationalisation of branch networks of the state-owned banks.

The second issue we examine is the impact of mergers on the wealth of shareholders of Indian banks. For this, we conduct event study analysis of forced and voluntary mergers. Mergers are usually market-driven. But in the Indian context, most of the bank mergers are forced mergers with the intervention of regulatory authority, viz. the Reserve Bank of India (RBI). This offers a unique case study, which is not observable in the developed countries. Some emerging markets such as Malaysia have already witnessed forced mergers and some others having state-owned banks are likely to witness forced mergers. Hence, the conclusions drawn from this study would be useful to strengthen the evidence on forced mergers and provide insights to policy makers in effective implementation of merger schemes. To the best of our knowledge, this is the first paper to analyse scale economies in Indian bank mergers, which constitutes a pre-merger analysis and then examine the impact of mergers on shareholders' wealth, which forms a post merger analysis.

The rest of the paper is organized as follows. Section 2 presents a brief review of the Indian banking system and the merger trends. In Section 3, we briefly review the theoretical literature and empirical evidence on bank consolidation. Next in Section 4, we present an econometric exercise wherein we estimate the cost function for Indian state owned banks and compute the economies of scale, returns to scale and profit efficiency. In Section 5, we analyze the impact of mergers on shareholders' wealth by conducting event study analysis. Finally in Section 6, we summarize the entire discussion and conclude the paper.

2. Indian Banking System and Merger Trends

The Indian commercial banking system comprises of state-owned banks (known as public sector banks), private banks as well as branches of foreign banks operating in India. The first two decades of the financial system in post-independent India (1947-69) were fairly liberal, with limited controls on credit and interest rates. However, the main criticism of the banking policy during this period was poor allocation of resources to larger parts of India and that the savings potential of households was not fully exploited. As a consequence, the Government of India acquired the ownership of twenty erstwhile private banks in 1969 and 1980 and exercised control over credit allocation, interest rates and enhanced both primary and secondary reserve ratios. The Government tightened its control over the credit allocation process to ensure adequate credit flow into industrial and agricultural activities in conformity with national level economic plan priorities. In addition to acquisition of control over commercial banks, the Government also promoted certain development banks catering to various segments of industry and agriculture.

The controlled regime of Indian banking has achieved tangible results of increase in per capita deposits and credits and widening of banking services to rural and semi-urban areas with the opening up of branches (Table-I). Large scale economic activity has been brought under the

preview of organised banking system. Since nationalization, the banking system was dominated by public sector banks, which accounted for over 90% of total commercial banking assets, and around 85% of bank branches; the number of private and foreign banks remained stagnant and their branch expansion was restricted. The adverse impact of the controlled regime of banking was on the commercial parameters of banks such as profitability and solvency, which had completely taken a back seat, while social aspects dominated, resulting in an inefficient banking system. The competitive strength of Indian banks in global markets had declined substantially and the primary concern for the policy makers was strengthening of the banking system.

In order to make the banking system profitable, efficient and resilient, the Government initiated the financial liberalisation process in 1992. Financial liberalisation was also an imperative to make Indian banks globally competitive. A comprehensive financial sector reforms package was suggested by a Government-appointed committee. This committee's recommendations include, among others, introduction of prudential accounting and capital adequacy norms, deregulation of interest rates, greater autonomy in day-to-day operations, disinvestment of shares of government owned banks, flexible entry norms for opening up of private sector banks and consolidation of banks through mergers and acquisitions.

Although widely discussed as being among the recent developments, mergers are however not a totally new phenomena in Indian banking. During the period 1961-68, 46 bank mergers took place in India. Many small banks were unable to operate at profitable levels, mainly due to small size and so these were merged with other healthy banks (see Table-II). But mergers have recently gained importance since 2000, when the first market driven merger viz. the acquisition of Times

Bank by HDFC bank took place. In the process of strengthening the financial sector, the RBI has envisaged consolidation of banks through mergers and acquisitions. On introduction of prudential accounting and capital adequacy norms, many small private sector banks have shown the symptoms of sickness such as huge amount of Non Performing Assets (NPAs), decline in capital adequacy ratio substantially below the mandatory level of 8 percent and low profitability. In order to avoid serious runs of these banks and to protect the depositors' interests, the RBI has merged these troubled banks with other healthy public and private sector banks. We refer to these as forced mergers. In the forced mergers, the RBI prepares the merger plans, which are implemented by the acquiring bank. The acquiring bank has limited choice over implementation of the merger scheme. Interestingly, all these bidder banks are listed on the stock exchange and Government of India is typically the major shareholder. Hence, the impact of forced mergers on acquired bank's shareholders' wealth is also a serious concern from the corporate governance point of view. On the other hand, three private sector banks have voluntarily acquired other private banks as per their strategic considerations. These are referred to in this paper as voluntary mergers.

Another category is the mergers of Development Financial Institutions (DFIs) with banks. Over a period, several DFIs have been part of the Indian financial system. These were established with an objective of improving allocation efficiency of resources to various segments of the economy. But due to the flexibility provided to banks by the RBI in the deregulated scenario, especially in credit delivery, banks have widened their loan portfolio to project finance, long term loans and other specialised sectoral financing. This made the presence of DFIs redundant. An RBI appointed Working Group (RBI, 1998) suggested that these institutions should explore the

possibility of gainful mergers with different sets of financial entities like banks and DFIs based on commercial considerations. The related merger of ICICI (an erstwhile DFI) with ICICI bank has been considered as a ‘mega merger’ in the Indian context. This increased the size of ICICI bank’s assets from INR 1,97,366 million to INR 10,49,590 million which is almost a five-time increase.¹ We prefer to group these mergers in the category of forced mergers due to the intervention of the regulator in these cases. The public sector banks have not witnessed mergers among themselves. However, on several occasions, policy makers have indicated that the banking sector will be consolidated by merging the public sector banks and have emphasized on a transformation of the banking system “from a regime of large number of small banks to small number of large banks” (Leeladhar, 2005). Hence, public sector banks are the right candidates to analyse potential benefits such as scale economies of mergers. This motivates our analysis of the potential benefits from merger of public sector banks- before we move on to assess the impact of realized mergers involving private banks.

3. Review of Literature

Extant empirical literature on bank mergers can be broadly categorized into two streams. One stream of the literature has looked into *ex ante* issues such as rationale, scope and potential candidates of mergers. The other is related to *ex post* issues such as impact of mergers on shareholder value and bank performance.

Ex ante issues: Laderman (2000) explores potential diversification benefits to be had from banks merging with non-banking financial service firms. Simulated mergers between US banks and non-bank financial service firms show that investment in insurance underwriting and securities

¹ The present exchange rate is INR (Indian Rupees) 42 = \$ 1.

brokerage are optimal for reducing the probability of bankruptcy for bank-holding companies. Wheelock and Wilson (2004) find that expected merger activity in US banking is positively related to management rating. Other factors such as bank size and position of a bank as a lead bank of the holding company also positively influence merger activity. Increase in core deposits and some indicators of asset risk raise the expected number of mergers. The study also finds that regulatory approval process serves as a constraint on merger activity. Supervisory evaluations of bank performance affect mergers. Expected merger activity is negatively related to market concentration and positively related to whether a bank is located in an urban market. Substantial gains from mergers are expected to come from cost savings owing to economies of scale and scope. In a survey of US studies, Berger and Humphrey (1994) concluded that the consensus view of the recent scale economy literature is that the average cost curve has a relatively flat U-shape, with only small banks having the potential for scale efficiency gains and the measured economies are usually relatively small. Studies on scope economies found no evidence of these economies. Based on the literature, Berger and Humphrey conclude that “synergies in joint products in banking are rather small.”

Ex post issues: On the market value effects of mergers, Pilloff and Santomero (1997) conduct a survey of the empirical evidence and report that most studies fail to find a positive relationship between merger activity and gains in either performance or stockholder wealth. But studies by Baradwaj, Fraser and Furtado (1990), Cornett and Tehranian (1992), Hannan and Wolkan (1989), Hawawini and Swary (1990), Neely (1987), and Trifts and Scanlon (1987) report a positive reaction in the stock prices of target banks and a negative reaction in the stock prices of bidding banks to merger announcements. A recent study on mergers of Malaysian banks shows

that, forced mergers have destroyed wealth of acquired banks (Chong Beng-Soon *et al.*, 2006). Berger and Humphrey (1994) reported that most studies that examined pre-merger and post-merger financial ratios found no impact on operating cost and profit ratios. However financial ratios may be misleading indicators of performance because they do not control for product mix or input prices. On the other hand they may also confuse scale and scope efficiency gains with what is known as X-efficiency gains. Recent studies have explicitly employed frontier X-efficiency methods to determine the X-efficiency benefits of bank mergers. Most of the US based studies concluded that there is considerable potential for cost efficiency benefits from bank mergers (since there exists substantial X-inefficiency in the industry), “but the data show that on an average, such benefits were not realized by the US mergers of the 1980s” (Berger and Humphrey, 1994).

In sum, the international evidence does not provide strong evidence on merger benefits in the banking industry. In this paper, we first examine the *ex ante* issue of potential cost benefits from mergers in the context of Indian banking in the next section. Subsequently, we take up the *ex post* issue of the impact of realized mergers on shareholders’ wealth.

4. Scale Economies and Efficiency

Estimation methodology and data

Our analysis of potential scale economies is based on estimation of a bank’s cost function of the following type:

$$C_{it} = f(Y_{it}, W_{it}) + U_{it} \text{ ----- (1)}$$

where C is operating costs, Y is the vector of outputs and W is the vector of input prices. The sub-scripts i and t represent bank and year, respectively.

What constitutes bank output is a matter of intense debate in the banking literature. The issue essentially boils down to the question of whether or not to include deposits as part of bank output. We follow the value-added approach, which has been frequently used in Indian studies (see Kumbhakar and Sarkar, 2003 and Sensarma, 2006). In other words, our output vector consists of three categories of deposits, viz. fixed, saving and current deposits, investments and loans. The inputs in the production technology are considered to be labour and capital. The price of labor (W1) is defined as the ratio of established expenses to total employees. The price of capital (W2) is measured as the ratio of capital expenses to fixed assets. All nominal variables are converted to real by taking them at 1993-94 prices.

In order to estimate the cost function, we assume the following translog form:

$$\ln C_{it} = a + \sum_m a_m \ln Y_{mit} + \sum_j b_j \ln W_{jit} + b_t t + (1/2) \sum_m \sum_l a_{ml} \ln Y_{mit} \ln Y_{lit} + (1/2) \sum_j \sum_k b_{jk} \ln W_{jit} \ln W_{kit} + (1/2) b_{tt} t^2 + \sum_m \sum_j a_{mj} \ln Y_{mit} \ln W_{jit} + \sum_m a_{mt} \ln Y_{mit} + \sum_j b_{jit} \ln Y_{jit} t \text{-----}(2)$$

Next, we impose certain theoretically desirable properties. We apply the usual symmetry restrictions, that follow from Young's theorem, $a_{ml}=a_{lm}$ and $b_{jk}=b_{kj}$. To ensure linear homogeneity in W, the following restrictions are imposed:

$$\sum_j b_j = 1, \sum_j b_{jk} = 0 \quad \forall k, \sum_j a_{mj} = 0 \quad \forall m, \sum_j b_{jt} = 0.$$

Cost and input prices are normalised by the price of capital before taking logarithms to impose linear input price homogeneity. The estimation of the cost function can be done in several ways. While regression method seems to be the most obvious choice, its applicability in banking data has been criticised in the literature. Regression method would implicitly assume that all banks are equally efficient, which is not so in reality (Berger and Humphrey, 1992). To overcome this problem, stochastic frontier analysis is popularly used in the literature to estimate the cost

function. While there are various versions of this methodology, we use the one given by Battese, Coelli and Colby (1989). The error term in the cost equation is assumed to have two parts as follows:

$$C_{it} = f(Y_{it}, W_{it}) + U_{it} + V_{it} \text{-----} (3)$$

The random error is $V_{it} \sim \text{iid } N(0, \sigma_v^2)$, and the inefficiency term is $U_{it} \sim \text{non-negative truncation of independently distributed } N(\mu, \sigma^2)$. Estimation of the parameters and cost function coefficients is done through the maximum likelihood technique. For this purpose, we use the software FRONTIER version 4.1 (Coelli, 1996).

Having estimated the coefficients of the cost function, we compute economies of scale by the Ray Scale Economies (RSCE) measure which is given as, $\varepsilon(Y, W, t) = \sum_m \varepsilon_m(Y, W, t)$ where $\varepsilon_m(Y, W, t)$ is cost elasticity of the m^{th} output. This measure tells us whether, consequent to an equi-proportionate increase in outputs produced, the cost goes up by more than or less than the increase in outputs. If the increase in costs is less (more), then the bank is said to exhibit scale economies (diseconomies). We also compute Returns to scale (RTS), which is given by the inverse of $1 - \varepsilon(Y, W, t)$. Depending on whether the RTS is greater than or less than one, the bank would be characterized by increasing returns to scale (indicating scale economies) or decreasing returns to scale (indicating scale diseconomies).

We make two sets of estimations, one by including branches as output in the cost function, and one excluding branches. The former would give us estimates of scale economies considering an increase in number of branches, along with all other outputs, and the latter would denote the case

of unchanged number of branches (e.g. branch rationalization), but expansion of all other outputs, during consolidation.

For the purpose of estimating scale economies, we collect data on all 27 Public Sector Banks (PSBs) over the period 1986-2003, collated from various issues of *Financial Analysis of Banks* and *Performance Highlights of Banks* published by the Indian Banks' Association. The 27 PSBs comprise of the largest bank in India, viz. the State Bank of India (SBI), its 7 associates (small banks owned by the SBI) and 19 other nationalized banks. Based on this data, we estimate the cost function and compute scale economies and returns to scale for each bank in each year. The results are discussed below.

Scale economies, Cost gains Vs Revenue gains: Analysis of results

Values of RSCE and RTS are computed for each PSB in each year. We present below the mean values over the years in Table III and the values for individual banks in the last year of our data set in Table IV. When branches are included in the output vector, the values of RSCE is greater than one and those of RTS are less than one for all years. This indicates that expansion of bank size accompanied with an increase in the number of branches, would not lead to cost savings. On the other hand, the corresponding values when branches are excluded are less than one in the case of RSCE and greater than one in the case of RTS. This indicates that if banks increase their size while maintaining their present number of branches, then there could be cost savings. In other words, in case PSBs go for size expansion, it should be done without increasing the number of branches. This finding was earlier observed by Srivastava (2000) who concluded that the number of branches are too high and “many of these branches are under-utilized, unable to generate large volume of deposits or loans” (Srivastava, 2000).

Thus, rationalisation of branches is going to be a key factor in consolidation of PSBs. If merger of banks is not followed by closure of redundant branches, then there will not be any cost savings from mergers. This result is in line with international evidence. Numerous studies that did not consider size enhancement accompanied by branch expansion, concluded that banks exhibit scale economies in USA (Berger and Humphrey, 1994), Japan (Tadesse, 2006), Taiwan (Huang and Wang, 2004), Argentina (Guala, 2002) etc. However Berger and Humphrey (1994) criticize this approach and suggest allowing for branch expansion in the cost-function specification. When we do that, our results show that size expansion will not lead to cost gains.

We now move to some bank-specific results. Table IV presents RSCE and RTS for individual banks for the last year in our sample, viz. 2003. Several interesting observations follow. If we consider the results with branches held constant, then most of the banks exhibit increasing returns to scale. Thus, there is a scope of increasing the size of these banks, provided the number of branches is kept constant. The cost savings from such an exercise are expected to be substantial, especially for the small banks. Most banks that exhibit low RSCE or high RTS are the smaller banks. In fact, the SBI associate banks appear to have the maximum cost saving potential, especially State Bank of Saurashtra, State Bank of Patiala, State Bank of Mysore, State Bank of Indore and State Bank of Travancore. This indicates that SBI's control over these banks stopped their organic growth which could have yielded them cost savings. Thus, there is a strong case for allowing these banks to grow, either by relaxing SBI's control over their growth, or by allowing them to merge among themselves or with other banks. This result is true even when we consider branch expansion, in which case these banks would have the least cost dis-savings out of an increase in size. Other banks which have the potential for size expansion are Corporation Bank, Canara Bank, Oriental Bank of Commerce (OBC), Punjab & Sind Bank, Bank of India

(BOI), Andhra Bank and Vijaya Bank. Most of these, (except for BOI and OBC) are relatively smaller banks. In fact, OBC was the government's choice of acquirer to merge the failed Global Trust Bank, a private bank. Our cost results seem to vindicate the government's choice in this regard.

On the other hand, most of the banks that exhibit decreasing returns to scale were the big banks, viz. SBI, Punjab National Bank (PNB), Central Bank of India, United Bank of India, Dena Bank, Indian Bank and Allahabad Bank. These banks are operating beyond their optimal scale, which would minimise their average costs. Ray (2004) also recommends breaking up of SBI and PNB into smaller units. Thus, there is a case for rationalizing the size of the above mentioned banks and identifying them as non-candidates for mergers, based on the cost criteria.²

In order to ascertain the cost performance of a bank in a year, we can estimate a measure of cost efficiency based on the stochastic frontier. Cost efficiency measures the cost performance of a banking firm, relative to the best-practice (least-cost) bank that produces the same output under the same exogenous conditions. After estimating the stochastic cost frontier, the cost efficiency for bank *i* at time *t* is measured as the ratio between the minimum cost (C_{\min}) necessary to produce that bank's output and the actual cost (C_{it}):

$$COSTEFF_{it} = \frac{C_{\min}}{C_{it}} \text{-----} (4)$$

After computing the cost efficiency estimates, we conduct two specific inquiries. First, did banks gain from mergers in terms of cost efficiency? Second, are big banks more cost efficient than small banks? To answer the first question, we chose not to do a statistical analysis because of the very few cases of mergers during the period considered by us, relative to the sample size.

² Regressing RTS on size (taken as log of assets), we found a negative and statistically significant relationship between the two variables.

However, we looked at some specific cases of mergers, such as the spate of mergers in 1990 involving Allahabad Bank, Indian Overseas Bank (IOB), Indian Bank and BOI. In case of Allahabad Bank and IOB, cost efficiency fluctuated in every year around the merger, thereby not revealing any clear trend (see Table V). Similarly, cost efficiency did not exhibit any clear trend in the mergers involving of Bank of Baroda (BOB), Union Bank of India and OBC. In the case of BOI and Indian Bank, cost efficiency declined in the years after the mergers. Thus, the evidence in this regard is inconclusive.

However, costs are only one side of the story. While traditional academic research on banking focused on costs, recent interest has shifted to revenues (Berger and Mester, 2003). The rationale is that banks may indulge in costly practices with the purpose of making up for it through revenue gains. In the context of mergers, diversification of the loan portfolio may bring in additional revenues that would compensate for the cost dis-savings. Studies have shown that banks underwent an improvement in profit efficiency (estimated based on stochastic frontiers) subsequent to mergers (Akhavain, Berger and Humphrey, 1997). In order to examine this possibility in the case of Indian banks, we estimated profit efficiency of PSBs for the period 1986-2003. The reason why profit efficiency is studied rather than simple financial ratios of profit performance is that financial ratios may give misleading indicators of performance, as they fail to control for product mix or input prices (Berger and Humphrey, 1994).

Profit efficiency measures how close a bank is to attaining the maximum possible profit that a best-practice bank on the frontier earns, for given levels of input and output prices (quantities) and other exogenous conditions. The literature provides two different specifications for the profit maximization concept; viz. 'standard' (Humphrey and Pulley, 1997) and 'alternative' profit (Berger and Mester, 1997) functions. The standard (text book type) profit function assumes that

banks maximize their profits by choosing the output quantities, while output and input prices are given. Alternative profit function assumes that banks can have some power in determining output prices and therefore, they maximize profits choosing the output prices, while output quantities and input prices are given. Thus, standard profit function is specified as a function of input and output prices, whereas alternative profit function is specified as a function of input prices and output quantities. Sensarma (2005) provides a discussion on why alternative profit is a more appropriate concept for Indian banking. Accordingly, we adopt alternative profit function rather than standard profit to study profit efficiency of Indian PSBs.

The alternative profit specification employs the same set of exogenous variables as the cost function, with the only difference that profit replaces cost as the dependant variable in the frontier regression. Therefore, the alternative profit frontier is given by (subsuming cross-section and time subscripts):

$$P = g(y, w) + V - U \text{ ----- (5)}$$

Where P is the profit of the firm and the other variables are as explained before (all variables are in logarithms). Profit efficiency is measured by the ratio between the actual profit of a bank and the maximum possible profit that is achievable by the most efficient bank.

$$PROFEFF_{it} = \frac{P_{it}}{P_{max}} \text{ ----- (6)}$$

In other words, if profit efficiency score of a bank is say 90 percent, then it means that the bank is losing about 10 percent of its potential profits to X-inefficiency or managerial failure by choosing sub-optimal input quantities and outputs prices. Once again, we follow the Battese, Coelli and Colby (1989) methodology for estimating the profit frontier and subsequently computing profit efficiency.

After computing the profit efficiency estimates, we conduct two specific inquiries. First, did banks gain from mergers in terms of profit efficiency? Second, are big banks more profit efficient than small banks? To answer the first question, we looked at some specific cases of mergers, such as the spate of mergers in 1990 involving Allahabad Bank, IOB, Indian Bank and BOI. In case of Allahabad Bank, profit efficiency declined in the next year and then fluctuated in every subsequent year thereby not revealing any clear trend. In the latter three cases, profit efficiency went up in the next year, but this increase was not sustained in the subsequent years (see Table VI). On the other hand, profit efficiency actually declined in the next year and picked up subsequently for the mergers involving Bank of Baroda and Union Bank of India in 2000. Another case is of OBC, which acquired two banks in 1998 and there seems to have been no impact on its profit efficiency. Thus, the evidence in this regard is inconclusive. Our findings do not support the expectation that profit performance of banks would go up subsequent to mergers. This hypothesis seems to be borne out for the Indian case when we analyzed the relationship between size and profit performance of PSBs, taking profit efficiency as our indicator of profit performance.

Moving on to the relationship between size and profit efficiency, once again we do not find a clear relationship. For the year 2003, banks with high profit efficiency are not necessarily the large banks (see Table VI). In fact, small banks like some of the SBI Associates have high profit efficiency. Similarly, many big banks have poor profit performance in terms of profit efficiency.³

The lessons from the above empirical analyses are as follows. PSBs are not expected to have cost gains from mergers, unless the exercise is accompanied by branch rationalization. The cost gains

³ We did not find any statistically significant relationship between profit efficiency and size using regression technique.

from mergers are expected to be most for small banks and the least for large banks. Finally, there is no conclusive evidence to suggest that mergers would bring any immediate improvement in profit performance. The implication of these results is that while the need for consolidation is not motivated by cost or revenue benefits, it would rather depend on other factors. Even in such a case, banks have to carefully implement the merger exercise, for example, by closing down redundant branches) in order to reap the merger benefits and to improve the bottom line.

5. Bank Mergers and Market Valuation of Equity

As mentioned before, Indian banking sector has witnessed two types of mergers. In the first type i.e. forced mergers initiated by the RBI, the main objective has been to protect the interests of depositors of weak banks. When a bank has shown symptoms of sickness such as huge NPAs, substantial erosion of net worth due that decline of capital adequacy ratio, RBI has intervened and merged the weak bank with a strong bank (Table VII). The second type of mergers is voluntary mergers with the motivation of market dynamics such as increasing size, diversification of portfolio, and exposure to new geographical markets. In all these cases, the acquirer banks have gained the advantage of branch network and customer clientele of the acquired banks. In this section, we analyze the impact of forced and voluntary mergers on shareholders' wealth.

There have been eighteen cases of bank mergers during the period 1993 to 2006. Out of these, three were voluntary mergers. These were merger/ amalgamation of a private sector bank with another private sector bank purely driven by business considerations. We categorize the remaining fifteen cases were forced mergers. Among these fifteen, two cases involved convergence of DFIs into commercial banks. The objective here was to follow a universal bank model, which would offer a wide range of financial services. In the first case, ICICI Limited (a

private sector DFI) has been merged with its subsidiary banking unit ICICI Bank Limited and the merged entity emerged as the largest private sector bank and as the second largest bank in India. In the second case, the Government decided to transform the public sector DFI, Industrial Development Bank of India (IDBI) into a commercial bank by having it acquire its subsidiary, viz. IDBI Bank Limited, which was a private sector bank. After the merger a new public sector commercial bank was formed. At the time of the mergers both the DFIs ICICI Limited and IDBI were in poor financial health, with huge NPAs and low profitability. Restructuring was essential and inevitable; hence there were regulatory interventions in the mergers involving these two institutions. We categorize these two mergers under forced mergers for the purpose of event study analysis. The remaining thirteen forced mergers were mergers of weak banks with existing public and private sector banks. Almost all the target banks in this category were small private sector banks, suffering with problems of capital adequacy, high NPAs and low profitability. We analyzed six such cases of forced mergers in the event study analysis. In the remaining cases, either the target and bidder banks were both unlisted, or the size of the target bank was substantially less than that of the bidder bank. Hence, these cases would carry little significance for our analysis of mergers.

Event Study Analysis

The event study methodology used in our analysis has been widely used in the literature in a variety of contexts (Mackinlay, 1997). To ensure that any information leakage is being captured, we allow the identified merger period (event window) to include four days before and four days after the merger (event). A similar window period was adopted by Chong Beng-Soon *et al.* (2006). We collected daily adjusted closing prices of stocks and the market index (Sensex) from *CMIE Prowess*, which is a comprehensive financial database of Indian companies.

We estimate Abnormal returns (AR), that indicate the *additional* impact on stock returns due to an event over and above normal market movements as follows:

$$AR_{it} = R_{it} - [\alpha_i + \beta R_{mt}] \quad (7)$$

where, R_{it} is the daily return on firm 'i' on day 't' and R_{mt} is the return on the bench mark index, α and β are OLS regression parameters that are estimated using the market model, over the previous period of 150 days. We estimate abnormal returns for both bidder and target banks and then test the significance of abnormal returns based on the Standard Errors (SE), as suggested by Mackinlay (1997):

$$SE(AR_{it}) = \frac{\sum_{i=1}^n (R_{it} - \alpha - \beta R_{mt})^2}{n - 2}$$

In addition to the above, we also computed t-statistic for each day in the event window by estimating the SE suggested by Dodd and Warner (1983):

$$SE(AR_{it}) = \left[S^2 \left(1 + \frac{1}{n} + \frac{(R_{mt}x - \bar{R}_{mt})^2}{\sum_{t=1}^n (R_{mt}y - \bar{R}_{mt})} \right) \right]^2$$

where, S^2 is the variance of the market-model residuals, n is the number of days in the estimation period, $R_{mt}x$ is the return on market index on t day of event window period, $R_{mt}y$ is the return on market index on t day of estimation period and \bar{R}_{mt} is the mean return on market index of estimation period.

Analysis of Results

In four out of the six forced mergers that we examined, the shareholders of bidder banks appeared to have lost their market value of equity (Table VIII and Figure 1). However in the case

of acquisition of ICICI Limited by ICICI bank, since it signaled the emergence of the largest private bank, ICICI Bank's shareholders' expectations went up with significant increase in abnormal returns. This is consistent with the findings of Anand and Singh (2008), who analyzed five merger cases in Indian banking.⁴ Similarly, the acquisition of United Western Bank by IDBI had given a positive signal with abnormal gains to the bidder banks' shareholders, but the gains were statistically significant only on the third and fourth days following the merger announcement. In all other cases, the bidder banks' shareholders appear to have lost wealth upon merger with the weak banks. Especially in the case of acquisition of Global Trust Bank (GTB) by the Oriental Bank of Commerce, the bidder bank's shareholder's wealth declined from 8.34 percent to 16.77 percent in the window period following the merger announcement. Forced mergers have not helped even the target banks (Figure 2). The GTB shareholders appear to have deeply discounted the merger. As the GTB episode was a serious crisis of bank failure, the merger had provided confidence to depositors but the merger announcement does not appear to have provided any relief to shareholders. In the case of Nedungadi Bank, the shareholders have gained significantly on the second day of the merger announcement but thereafter, no abnormal returns were found. United Bank shareholders seem to have marginally gained on announcement of merger with IDBI bank, but the abnormal returns were not statistically significant.

Thus in all the cases of forced mergers, the shareholders of neither the bidder bank nor the target bank seem to have gained upon announcement of the merger. Further, the shareholders of bidder banks have lost their wealth when the merger announcement is perceived as a negative signal. Our results suggest that the regulator needs to rethink its policy of reviving weak banks through mergers. The RBI believes that merger of weak banks with strong banks is essential for

⁴ Out of the five cases that they examined, Anand and Singh (2008) did not make any distinction between forced and voluntary mergers.

restructuring of the banking system and is a desirable step in consolidating the financial sector. However, in most of the forced merger cases, the target banks were identified for acquiring the weak bank almost after the collapse of the latter. At that stage, the acquirer bank, under instructions from the RBI, was left without any other option. Instead of this procedure, the RBI should activate the Prompt Corrective Action system (PCA) and identify the weak banks on the basis of certain symptoms. This would help the bidder banks to choose target banks, based on strategic considerations, which is likely to benefit all the stakeholders.

Turning to the cases of voluntary mergers, we find that in two out of the three voluntary merger cases, the gains to target banks' shareholders are higher than that of bidder banks (Table IX). Both the target and bidder banks' shareholders benefited upon announcement of the mergers. Thus, the stock markets welcomed mergers which would lead to enhanced growth prospects for the merged entity and therefore shareholders of both banks benefited out of such mergers (Figure 3 and 4). Our analysis reveals that in the case of acquisition of Times Bank by HDFC bank, both banks' shareholders viewed it as a positive signal. A similar result was obtained by Anand and Singh (2008). At the time of the merger, Times Bank was suffering from low profitability and high NPAs; hence, the acquisition by HDFC bank provided relief to both shareholders and depositors of the bank. Similarly, HDFC bank gained out of the retail portfolio of Times Bank and subsequently emerged as the largest private sector bank in India in 1999. ICICI Bank increased its size by acquiring BOM and reached the position of a large size bank among the private sector banks way back in 2000. Our analysis shows that upon the announcement of this merger, there was a significant rise in abnormal returns, leading to increase in value for shareholders of BOM. But the shareholders of ICICI bank did not achieve any gains. This is not surprising, because shareholders of a troubled bank stand to gain from a merger with a strong

bank, whereas the same may not be good news from the perspective of the strong acquiring bank. In the case of amalgamation of Bank of Punjab with Centurion Bank, the amalgamation was an inevitable restructuring for both the banks, as both intended to grow but experienced dismal performance. Both the banks came forward to build a growth-oriented bank on the basis of each other's strengths. Centurion Bank was active in western part of India, whereas Bank of Punjab was active in northern part of the country. The combined entity's deposits have shown a growth of 20 percent, its advances increased by 41.7 percent and the ROA increased to 0.89 percent⁵. However, an event study analysis of stock returns revealed that neither of the banks' shareholders considered the merger as a positive event and the announcement led to deterioration in shareholders' wealth. It appears that shareholders of both the banks would have preferred a merger with a stronger bank and the news of amalgamation with another troubled bank may not have been welcomed by the stock markets.

In sum, results from the event study analysis suggest that in case of voluntary bank mergers between a weak and a strong bank, shareholders of the weak bank benefit and those of the strong bank lose. However, if both banks are weak (strong) then the merger leads to a fall (rise) in shareholder value.

6. Conclusion

This paper undertakes an *ex ante* analysis of bank mergers in India by examining potential costs savings from consolidation in public sector banking. Next, we undertake an *ex post* analysis by studying the impact of realized mergers on shareholders' wealth. In the *ex ante* analysis, we estimate scale economies and returns to scale which suggest that public sector banks are unlikely to achieve cost gains from mergers unless the process is accompanied by branch rationalization.

⁵ The Annual Report 2005-06 of the Bank

Further, based on these results as well as estimates of cost efficiency, we conclude that cost gains may be forthcoming only for the smaller banks and not for bigger banks. Results from profit efficiency estimation suggest that mergers are unlikely to bring in immediate improvement in profit performance. Thus, mergers would not necessarily be associated with cost or revenue benefits; rather if mergers do take place because of other factors, banks have to carefully implement the merger exercise (e.g. by closing down redundant branches) in order to achieve economic gains.

Our *ex post* analysis of shareholders' wealth suggests that while forced bank mergers may be protecting the interests of depositors, shareholders of both bidder and target banks do not perceive any benefits from the merger. Our event study results show that both bidder and target banks' market value of equity have been eroded upon the announcement of mergers. However, in the case of voluntary mergers, the results are mixed. Merger between two strong banks was welcomed by the stock markets whereas, merger of two weak banks have not benefited either bank's shareholders.

The above results provide important policy implications. The failure of forced mergers to reward shareholders suggests that the RBI should activate the mechanism of Prompt Corrective Action which would help in identifying a sick bank. Moreover, the timing of the merger may be advanced to avoid a total collapse of the weak bank. This will also help the bidder banks in formulating appropriate strategies, which may mitigate the dilution in market value of equity consequent upon merger. To ensure the availability of financial services to all segments of the population, the RBI needs to approve voluntary mergers conditional upon the disadvantaged segments being unaffected by the process and approval should be linked to specific plans offered by the acquirers to mitigate the extent of financial exclusion.

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Table I: Banking Sector in India				
Indicators	June	March	March	March
	1969	1993	2003	2005
Number of Commercial Banks	89	276	292	289
Public Sector Banks	27	27	27	27
Private Sector Banks	21	34	30	29
Regional Rural Banks	0	196	196	196
Foreign Banks	25	15	35	33
Non-Scheduled Commercial Banks	16	4	4	4
Number of Bank Offices in India	8262	61169	68500	70373
(a) Rural	1833	35389	32283	30790
(b) Semi-Urban	3342	11465	15135	15325
(c) Urban	1584	8562	11566	12419
(d) Metropolitan	1503	5753	9516	11839
Population per Office (in thousands)	64	14	16	16
Per capita Deposits of Scheduled Commercial Banks	88	3111	12253	16281
Per capita Credit of Scheduled Commercial Banks	68	1752	7275	10752
Deposits of Scheduled Commercial Banks as Percentage of GNP	15.5	50.4	58.8	60.2

(Source: Various Issues of Statistical Tables Relating to Banks in India, Reserve Bank of India)

Table II: Bank Mergers in India	
Period	Number of Mergers
Pre-nationalization of banks (1961-1968)	46
Nationalization period (1969-1992)	13
Post-reform period (1993-2006)	18*
Total number of mergers	77

** Includes merger of two development financial institutions
 (Source: Various publications of Reserve Bank of India)*

Table III: Mean values of Scale Economies and Returns to Scale

This table presents Ray Scale Economies (RSCE) and Returns to Scale (RTS) computed from the estimated stochastic cost frontier for all public sector banks. Bank level estimates indicate that branches are allowed to expand during the estimation and branch level estimates indicate that number of branches is kept unchanged.

Year	Branches as output		Branches excluded	
	RSCE	RTS	RSCE	RTS
1986	1.0345	0.9669	0.8129	1.3055
1987	1.0338	0.9677	0.8380	1.2048
1988	1.0339	0.9677	0.8460	1.1974
1989	1.0281	0.9731	0.8362	1.2083
1990	1.0268	0.9743	0.8426	1.1992
1991	1.0254	0.9757	0.8474	1.1915
1992	1.0335	0.9679	0.8466	1.1930
1993	1.0433	0.9598	0.8400	1.2105
1994	1.0459	0.9567	0.8688	1.1643
1995	1.0497	0.9534	0.8864	1.1417
1996	1.0574	0.9466	0.8798	1.1495
1997	1.0582	0.9457	0.8929	1.1313
1998	1.0593	0.9446	0.8999	1.1220
1999	1.0599	0.9441	0.9059	1.1151
2000	1.0584	0.9454	0.9145	1.1045
2001	1.0659	0.9390	0.9211	1.0965
2002	1.0556	0.9479	0.9236	1.0933
2003	1.0564	0.9470	0.9410	1.0724

Table IV: Bank wise Scale Economies and Returns to scale in 2003

This table presents the same measures as in Table III but at the individual bank level for the year 2003 so as to provide a recent snap-shot picture.

Bank	Branches as output		Branches excluded	
	RSCE	RTS	RSCE	RTS
Sate Bank of India	1.0680	0.9364	1.1582	0.8634
State Bank of Hyderabad	1.0459	0.9561	0.8886	1.1253
State Bank of Patiala	1.0270	0.9737	0.8927	1.1203
State Bank of Travancore	1.0348	0.9664	0.8474	1.1800
State Bank of Bikaner & Jaipur	1.0517	0.9508	0.9650	1.0362
State Bank of Mysore	1.0318	0.9692	0.8382	1.1930
State Bank of Saurashtra	1.0230	0.9775	0.7880	1.2691
State Bank of Indore	1.0337	0.9674	0.8086	1.2367
Bank Of Baroda	1.0583	0.9449	1.0001	0.9999
Punjab National Bank	1.0700	0.9346	1.1204	0.8926
Bank of India	1.0457	0.9563	0.9555	1.0466
Canara Bank	1.0365	0.9647	0.9949	1.0051
Central Bank of India	1.0975	0.9112	1.0726	0.9323
Union Bank of India	1.0755	0.9298	0.9885	1.0117
Indian Bank	1.0853	0.9214	0.9444	1.0589
Indian Overseas Bank	1.0609	0.9426	0.9457	1.0574
Syndicate Bank	1.0700	0.9345	0.9879	1.0122
UCO Bank	1.0738	0.9313	0.9588	1.0430
Allahabad Bank	1.0813	0.9248	1.0183	0.9820
United Bank of India	1.0931	0.9148	1.0354	0.9658
Oriental Bank of Commerce	1.0258	0.9748	0.8661	1.1546
Corporation Bank	1.0362	0.9651	0.8142	1.2281
Vijaya Bank	1.0641	0.9398	0.8793	1.1373
Dena Bank	1.0892	0.9181	0.9585	1.0433
Bank of Maharashtra	1.0481	0.9541	0.9100	1.0989
Andhra Bank	1.0523	0.9503	0.8743	1.1438
Punjab & Sind Bank	1.0443	0.9575	0.8957	1.1165

Table V: Mergers and Profit efficiency

This table presents cost efficiency and profit efficiency of some banks involved in mergers, based on the estimated stochastic cost and profit frontiers for all public sector banks. The numbers indicate relative performance of each bank in terms of the costs saved or profits obtained in a year as a percentage of that achieved by the banks comprising the frontier. The asterisks indicate the year of merger.

BANK	Year	Cost Efficiency	Profit Efficiency
Allahabad Bank	1989	97.96	73.86
Allahabad Bank	1990*	97.18	96.97
Allahabad Bank	1991	97.89	92.98
Allahabad Bank	1992	96.89	95.44
Allahabad Bank	1993	97.83	93.13
Bank of India	1989	94.80	82.64
Bank of India	1990*	96.00	91.60
Bank of India	1991	94.69	95.54
Bank of India	1992	93.32	95.10
Bank of India	1993	90.15	76.28
Indian Bank	1989	95.20	77.21
Indian Bank	1990*	96.04	91.57
Indian Bank	1991	95.65	93.01
Indian Bank	1992	95.43	92.95
Indian Bank	1993	94.12	82.92
Indian Overseas Bank	1989	89.93	89.03
Indian Overseas Bank	1990*	93.56	86.01
Indian Overseas Bank	1991	92.90	92.92
Indian Overseas Bank	1992	92.96	94.65
Indian Overseas Bank	1993	89.91	44.99
Bank Of Baroda	1999	95.73	93.65
Bank Of Baroda	2000*	95.04	96.63
Bank Of Baroda	2001	93.83	78.44
Bank Of Baroda	2002	96.93	81.97
Bank Of Baroda	2003	95.64	88.20
Union Bank	1999	96.64	94.75
Union Bank	2000*	96.21	93.75
Union Bank	2001	96.57	80.15
Union Bank	2002	96.93	90.75
Union Bank	2003	96.35	97.51
Oriental Bank of Commerce	1997	91.09	96.31
Oriental Bank of Commerce	1998*	91.72	97.24
Oriental Bank of Commerce	1999	89.44	96.26
Oriental Bank of Commerce	2000	87.81	95.20
Oriental Bank of Commerce	2001	90.33	73.99

Table VI: Bank wise Cost and Profit efficiency in 2003

This table presents the same measures as in Table V but at the individual bank level for the year 2003 so as to provide a recent snap-shot picture.		
Bank	Cost Efficiency	Profit Efficiency
Sate Bank of India	97.03	91.15
State Bank of Hyderabad	92.52	92.62
State Bank of Patiala	95.89	94.68
State Bank of Travancore	90.52	95.91
State Bank of Bikaner & Jaipur	82.52	84.95
State Bank of Mysore	92.72	89.14
State Bank of Saurashtra	87.80	97.14
State Bank of Indore	94.94	87.61
Bank Of Baroda	95.64	88.20
Punjab National Bank	92.84	75.96
Bank of India	91.71	97.69
Canara Bank	91.14	93.72
Central Bank	95.74	75.62
Union Bank	96.35	97.51
Indian Bank	83.78	96.45
Indian Overseas Bank	92.18	81.64
Syndicate Bank	88.63	77.67
UCO Bank	90.23	94.74
Allahabad Bank	93.50	89.81
United Bank of India	86.75	96.97
Oriental Bank of Commerce	96.62	85.29
Corporation Bank	86.24	92.59
Vijaya Bank	95.10	70.28
Dena Bank	96.71	82.97
Bank of Maharashtra	96.36	91.12
Andhra Bank	96.90	87.28
Punjab & Sind Bank	93.97	76.60

Table VII: Bank Mergers in the post-reform period

Merger year	Target bank	Acquirer (or bidders)	Motive
1993	New Bank of India	Punjab National Bank	Restructuring of weak bank-forced merger
1994	Bank of Karad Ltd	Bank of India	Restructuring of weak bank-forced merger
1995	Kashinath Seth Bank	State Bank of India	Restructuring of weak bank-forced merger
1996	Punjab Co-op Bank Ltd	Oriental Bank of Commerce	Restructuring of weak bank-forced merger
1997	Bari Doab Bank Ltd	Oriental Bank of Commerce	Restructuring of weak bank-forced merger
1999	Bareilly Corp Bank Ltd	Bank of Baroda	Restructuring of weak bank-forced merger
1999	Sikkim Bank Ltd	Union Bank of India	Restructuring of weak bank-forced merger
2000	Times Bank Ltd	HDFC Bank Ltd	Expansion of size-voluntary merger
2001	Bank of Madura	ICICI Bank	Expansion of size-voluntary merger
2002	ICICI Limited	ICICI Bank	Universal banking objective (merger of financial institution with bank)
2002	Benaras State Bank Ltd	Bank of Baroda	Restructuring of weak bank-forced merger
2003	Nedungadi Bank Ltd	Punjab National Bank	Restructuring of weak bank-forced merger
2004	IDBI Bank Limited	Industrial Development Bank of India	Universal banking objective, merger of bank with another bank(erstwhile FI)
2004	South Gujarat Local Area Bank	Bank of Baroda	Restructuring of weak bank-forced merger
2004	Global Trust Bank Ltd	Oriental Bank of Commerce	Restructuring of weak bank-forced merger
2005	Centurion Bank	Bank of Punjab	Expansion of size-voluntary merger
2006	Ganesh Bank of Kurandwad	Federal Bank	Restructuring of weak bank-forced merger
2006	United Western Bank	Industrial Development Bank of India	Restructuring of weak bank-forced merger
2006	Lord Krishna Bank	Centurion Bank of Punjab	Expansion of size-voluntary merger

Table VIII : Abnormal Returns of Forced Mergers

This table depicts the abnormal returns of banks during the window period (-4,4) and the first line below the abnormal returns indicates t values based on Mackinlay (1997) corresponding to abnormal returns. The Second line below the abnormal returns indicates t-values based on Dodd and Warner (1983) corresponding to abnormal returns. t-value greater than 1.96 indicates significance at 5% level and greater than 2.58 indicates significance at 1% level

	-4	-3	-2	-1	0	1	2	3	4
Bid Banks									
ICICI Bank acquired ICICI	2.15%	6.37%	6.45%	3.54%	8.45%	0.13%	-4.98%	1.50%	1.19%
	<i>0.57</i>	<i>1.70</i>	<i>1.72</i>	<i>0.94</i>	<i>2.25</i>	<i>0.03</i>	<i>-1.33</i>	<i>0.40</i>	<i>0.32</i>
	0.52	1.76	1.63	0.94	2.25	0.00	-1.24	0.42	0.26
	-	-	-	-	-	-	-	-	-
Oriental Bank of Commerce	0.50%	-0.59%	1.63%	-0.16%	-6.46%	-1.88%	-2.23%	-2.95%	-1.38%
	<i>0.18</i>	<i>-0.21</i>	<i>-0.58</i>	<i>-0.06</i>	<i>-2.30</i>	<i>-0.67</i>	<i>-0.79</i>	<i>-1.05</i>	<i>-0.49</i>
	0.18	-0.21	-0.58	-0.06	-2.29	-0.67	-0.79	-1.05	-0.49
	-	-	-	-	-	-	-	-	-
Federal Bank	1.03%	3.44%	1.80%	0.36%	-0.30%	-0.61%	-0.88%	-0.32%	2.37%
	<i>-0.48</i>	<i>1.59</i>	<i>-0.83</i>	<i>0.17</i>	<i>-0.14</i>	<i>-0.28</i>	<i>-0.41</i>	<i>-0.15</i>	<i>1.10</i>
	-0.47	1.58	-0.83	0.17	-0.14	-0.28	-0.41	-0.15	1.09
	-	-	-	-	-	-	-	-	-
PNB	0.38%	-0.55%	1.33%	-2.05%	-0.17%	0.08%	-2.25%	-0.90%	-1.59%
	<i>0.18</i>	<i>-0.25</i>	<i>-0.61</i>	<i>-0.94</i>	<i>-0.08</i>	<i>0.04</i>	<i>-1.04</i>	<i>-0.41</i>	<i>-0.73</i>
	0.18	-0.25	-0.61	-0.94	-0.08	0.04	-1.03	-0.41	-0.73
	-	-	-	-	-	-	-	-	-
IDBI acquired IDBI Bank	2.22%	4.98%	1.68%	-3.62%	-3.69%	-1.72%	0.38%	1.42%	-2.69%
	<i>0.40</i>	<i>0.89</i>	<i>-0.30</i>	<i>-0.64</i>	<i>-0.66</i>	<i>-0.31</i>	<i>0.07</i>	<i>0.25</i>	<i>-0.48</i>
	0.51	1.14	-0.38	-0.83	-0.84	-0.39	0.09	0.33	-0.62
	-	-	-	-	-	-	-	-	-
IDBI acquired United Western Bank	2.60%	-1.17%	5.90%	3.84%	-2.95%	0.09%	2.16%	8.56%	4.26%
	<i>1.03</i>	<i>-0.46</i>	<i>2.33</i>	<i>1.51</i>	<i>-1.16</i>	<i>0.03</i>	<i>0.85</i>	<i>3.38</i>	<i>1.68</i>
	1.02	-0.46	2.32	1.51	-1.16	0.03	0.85	3.36	1.68
	-	-	-	-	-	-	-	-	-
Target Banks									
	-	-	-	-	-	-	-	-	-
ICICI Limited	0.54%	5.78%	8.74%	4.95%	-9.20%	2.26%	-3.09%	1.47%	-0.98%
	<i>-0.18</i>	<i>1.87</i>	<i>2.83</i>	<i>1.60</i>	<i>-2.98</i>	<i>0.73</i>	<i>-1.00</i>	<i>0.48</i>	<i>-0.32</i>
	-0.17	1.87	2.82	1.60	-2.97	0.73	-1.00	0.48	-0.32
	-	-	-	-	-	-	-	-	-
Nedugundi Bank	4.83%	11.04%	0.88%	0.49%	-1.09%	3.43%	14.79%	22.67%	22.56%
	<i>-1.24</i>	<i>-2.82</i>	<i>0.22</i>	<i>0.13</i>	<i>-0.28</i>	<i>0.88</i>	<i>3.78</i>	<i>-5.79</i>	<i>-5.77</i>
	-0.05	-0.11	0.01	0.00	-0.01	0.03	0.15	-0.23	-0.22
	-	-	-	-	-	-	-	-	-
IDBI Bank	1.54%	-3.37%	1.08%	-5.08%	0.07%	0.75%	1.58%	-2.25%	-0.44%
	<i>0.52</i>	<i>-1.13</i>	<i>-0.36</i>	<i>-1.70</i>	<i>0.02</i>	<i>0.25</i>	<i>0.53</i>	<i>-0.76</i>	<i>-0.15</i>
	0.51	1.14	-0.38	-0.83	-0.84	-0.39	0.09	0.33	-0.62
	-	-	-	-	-	-	-	-	-
Global Trust Bank	3.19%	1.91%	0.64%	23.07%	112.79%	32.26%	-1.35%	1.95%	12.05%
	<i>-0.67</i>	<i>0.40</i>	<i>-0.13</i>	<i>-4.81</i>	<i>-23.51</i>	<i>-6.72</i>	<i>-0.28</i>	<i>0.41</i>	<i>2.51</i>
	-0.67	0.47	-0.16	-5.68	-27.76	-7.95	-0.33	0.48	2.97
	-	-	-	-	-	-	-	-	-
United Western Bank	3.11%	0.82%	1.00%	0.08%	2.69%	0.46%	-0.05%	0.39%	0.14%
	<i>0.72</i>	<i>0.19</i>	<i>-0.23</i>	<i>0.02</i>	<i>0.63</i>	<i>0.11</i>	<i>-0.01</i>	<i>0.09</i>	<i>0.03</i>
	1.06	0.28	-0.34	0.03	0.92	0.16	-0.02	0.13	0.05

Table IX : Abnormal Returns of Voluntary Mergers

This table depicts the abnormal returns of banks during the window period (-4, 4) and the first line below the abnormal returns indicates t values based on Mackinlay (1997) corresponding to abnormal returns. The Second line below the abnormal returns indicates t-values based on Dodd and Warner (1983) corresponding to abnormal returns. t-value greater than 1.96 indicates significance at 5% level and greater than 2.58 indicates significance at 1% level

	-4	-3	-2	-1	0	1	2	3	4
Bid Banks									
HDFC Bank	0.02%	3.14%	4.21%	-1.08%	8.34%	8.89%	7.97%	5.33%	6.17%
	<i>0.01</i>	<i>1.23</i>	<i>-1.65</i>	<i>-0.42</i>	<i>3.27</i>	<i>3.49</i>	<i>3.13</i>	<i>2.09</i>	<i>2.42</i>
	0.28	47.62	-63.88	-16.37	126.60	134.53	121.23	80.99	93.39
ICICI Bank acquired Bank of Madura	-	-	-	-	-	-	-	-	-
	0.02%	3.22%	0.84%	11.40%	-3.28%	3.08%	0.95%	0.49%	1.60%
	<i>0.00</i>	<i>0.83</i>	<i>0.22</i>	<i>2.93</i>	<i>-0.84</i>	<i>-0.79</i>	<i>-0.24</i>	<i>-0.13</i>	<i>0.41</i>
	0.00	0.82	0.21	2.63	-0.84	-0.78	-0.24	-0.12	0.41
Centurion Bank	-	-	-	-	-	-	-	-	-
	0.85%	0.26%	0.84%	0.92%	-6.48%	2.24%	1.67%	0.15%	1.06%
	<i>-0.27</i>	<i>-0.08</i>	<i>0.27</i>	<i>0.29</i>	<i>-2.06</i>	<i>-0.71</i>	<i>0.53</i>	<i>-0.05</i>	<i>0.34</i>
	-0.27	-0.08	0.26	0.29	-2.04	-0.71	0.53	-0.05	0.34
Target Banks									
Times Bank	-	-	-	-	-	-	-	-	-
	1.41%	1.16%	0.89%	-3.43%	21.09%	1.18%	1.42%	9.14%	0.11%
	<i>-0.44</i>	<i>0.36</i>	<i>0.28</i>	<i>-1.07</i>	<i>6.59</i>	<i>-0.37</i>	<i>-0.44</i>	<i>2.86</i>	<i>-0.03</i>
	-0.43	0.35	0.27	-1.04	6.36	-0.35	-0.42	2.76	-0.03
Bank of Madura	7.97%	7.79%	7.74%	7.76%	7.91%	7.88%	7.90%	8.02%	8.05%
	1.98	1.93	1.92	1.92	1.96	1.95	1.96	1.99	1.99
	1.96	1.92	1.91	1.92	1.95	1.95	1.95	1.97	1.98
Bank of Punjab	-	-	-	-	-	-	-	-	-
	0.67%	7.01%	0.00%	-0.40%	-8.85%	0.00%	1.39%	0.15%	1.50%
	<i>-0.18</i>	<i>1.87</i>	<i>0.00</i>	<i>-0.11</i>	<i>-2.36</i>	<i>0.00</i>	<i>-0.37</i>	<i>0.04</i>	<i>0.40</i>
	-0.18	1.86	0.00	-0.11	-2.35	0.00	-0.37	0.04	0.40

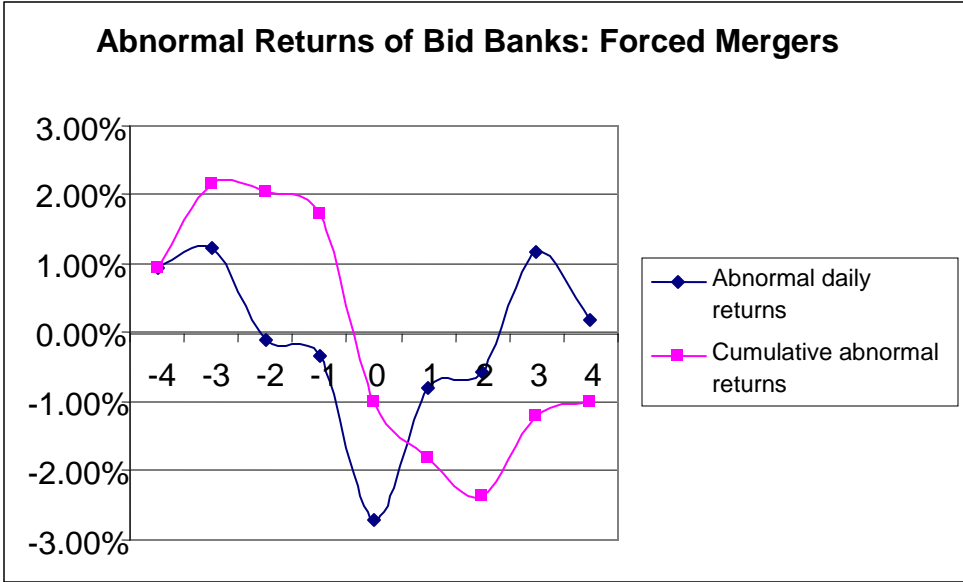


Figure 1: Abnormal Return of Bid Banks: Forced Mergers

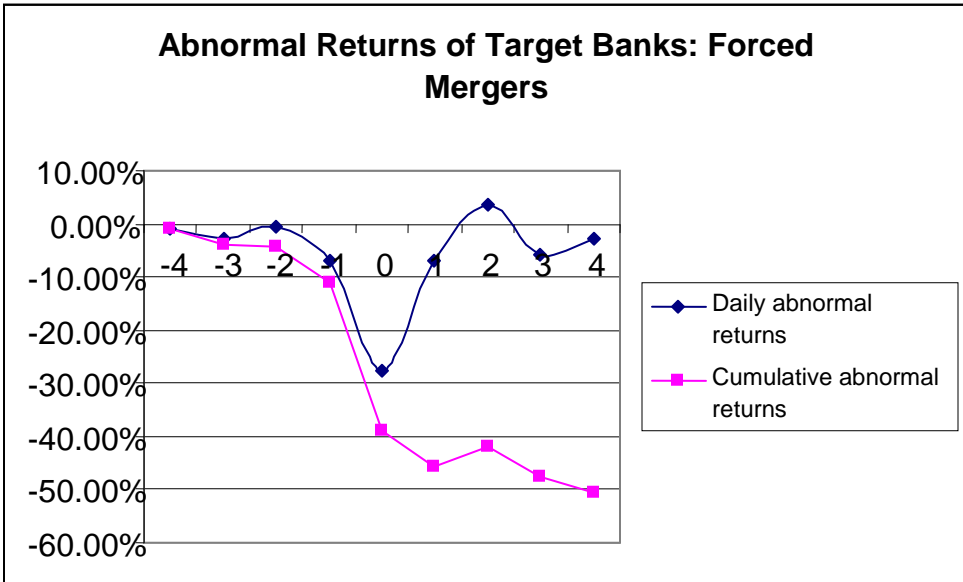


Figure 2: Abnormal Return of Target Banks: Forced Mergers

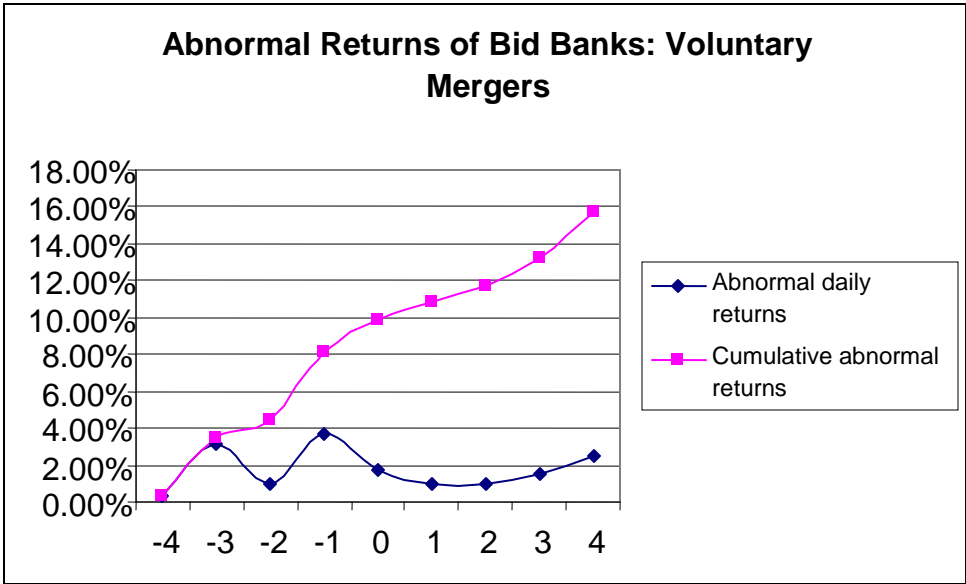


Figure 3: Abnormal Return of Bid Banks: Voluntary Mergers

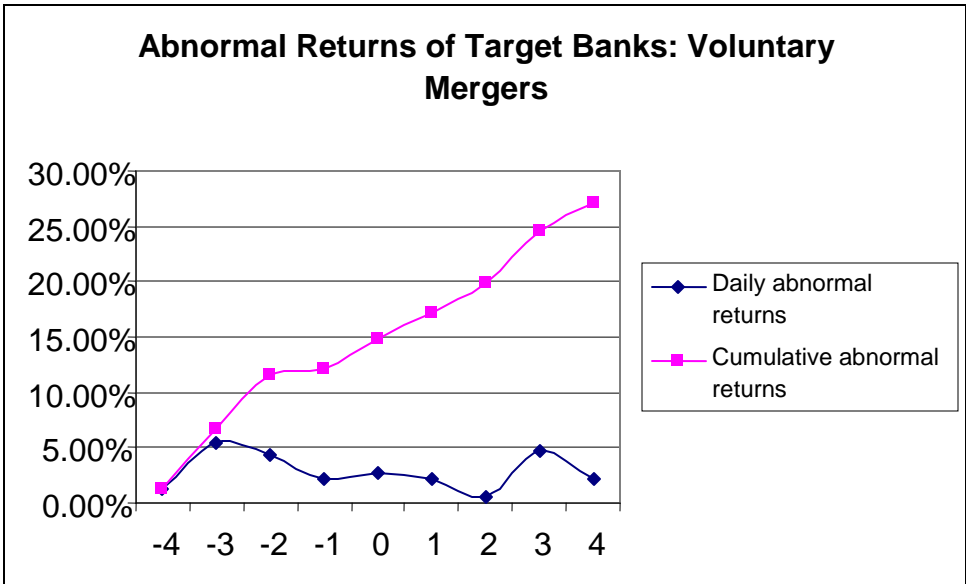


Figure 4: Abnormal Return of Bid Banks: Forced Mergers