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The impact of mergers on efficiency of banks in Pakistan

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ABSTRACT
By applying the Stochastic Frontier Analysis (SFA), the study explored the cost and profit efficiency impact of mergers in banking sector of Pakistan during 1998-2006. The intermediation approach is used for definition and determination of input and output variables. It is assumed that cost function followed translog functional form and alternative profit functional form is supposed to be followed by profit function. Following the four years event study approach, both the cost and profit efficiencies are calculated and compared for pre-merger and post-merger period. The study found that in pre-merger period on the average, banks were 93.83% cost efficient, whereas, this figure rose to 94.15% for post merger period. It reflected 0.32% improvement in cost efficiency. The result was significant at 10% level of significance. In case of profit efficiency, the post merger gain was -5%, however, the result was insignificant. The study concluded that there was improvement in cost efficiency due to bank mergers in Pakistan during 1998-2006 however, no such statistically significant evidence was found for profit efficiency.

Introduction

For the last three decades, firms have been intensively using Mergers and Acquisition (M & A) as a strategic tool for corporate restructuring. Initially, this consolidation trend was limited to developed countries especially US and UK however, afterwards developing countries started to follow the same pattern. The growth of the trend can be judged from the fact that in US only the last decade of twentieth century witnessed a three fold increase in the number of Mergers and Acquisitions (M & A) whereas, a five fold increase has been reported in terms of value (Coopland et al, 2005). The number and value of the merger transactions in UK was also exhibiting the same pattern. In 1972, the value of the merger transactions in UK was 2,532 million pounds which rose to 32,600 million pounds in 1995 (Arnold, 1998). Therefore, the research areas of motivation and consequences of mergers have gained significant attention due to this increasing trend of consolidation. The significance of the issue further increases in case of the financial sector mergers because financial sector development plays a significant role in economic growth. The existing literature suggests positive relationship between financial development and economic growth. However, the direct relationship between financial sector development and economic growth requires both factor accumulation and improvement in efficiency. In other words, the efficiency improvement is one of the two critical factors of economic growth. The centrality of financial sector to the development of the economy (Khan & Senhadji, 2000) and public well being compels the antitrust authorities, regulators, researchers and practitioners to develop an in depth understanding of causes and potential consequences of financial sector merger activity. As compared to other aspects of mergers, efficiency gained more attention due to its significance. The merger can enhance efficiency in many ways. For instance, economies of scale resulting from consolidation is one source of efficiency enhancement, synergy is another reason for post merger efficiency improvement and change in input output mix after merger may also result in increase in efficiency.

Efficiency, a relative concept is the transformation of inputs into output for maximum impact. It requires comparison of actual result to some ideal, standard or target outcome for its measurement. Various types of efficiency can be identified from existing literature namely allocative, technical, cost and profit efficiency. Each type of efficiency aims to measure the firm's performance from different perspective and thus reflects different aspects relevant to firm's operations. For instance, a firm is termed as technically efficient if it uses minimum level of inputs for producing a given level of output or if a given level of input is used for producing maximum level of output. An allocative efficiency is said to be achieved by a firm if maximum possible output is produced by combining inputs in best proportion. Moreover, a cost efficient firm produces given level of output at minimum possible cost and a profit efficient firm earns maximum profit with given quantity of inputs and outputs. This study investigates the impact of mergers on cost and profit efficiency of banks in Pakistan.

Existing empirical literature suggests that most of studies on efficiency impact of mergers have focused on developed countries specially US. A great deal of empirical research has to be undertaken in order to investigate the efficiency impact of the mergers in developing countries since this less attention has been paid to explore the efficiency effect of merger in case of developing countries. As far as Pakistan is concerned, banking sector has been studied from many different perspectives. For instance, Akhtar (2002) explored the x-efficiency of banks in Pakistan. Mehmood & Loan (2006) investigated the cost efficiency effect of financial liberalization in banking industry of Pakistan. However, the effect of mergers on efficiency is still the area to be explored. To fill this research gap, this paper investigates the cost and profit efficiency impact of mergers in banking sector of Pakistan by using parametric approach of Stochastic Frontier Analysis (SFA) approach.

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Rest of the paper proceeds as follows: section II provides some overview of banking sector of Pakistan, section III presents the relevant literature on efficiency impact of mergers. Section IV discusses the data and methodology of the paper. Section V discusses the results and section VI concludes the paper.

An overview of the banking sector of Pakistan

In case of Pakistan, banking sector has been the most inefficient sector of the economy since independence (Iimi, 2002). In 1947, Habib bank was the only bank functioning in the country which obviously was insufficient to meet the growing financing needs of newly set up state. In 1948, Government of Pakistan established central bank named State Bank of Pakistan (SBP) with variety of objectives to be achieved. Within 23 years, the number of banks working in the country grew to five. The liquidity condition of these banks was not so good due to major portion of the credit and investment to be concentrated in government sector. The situation became worst in 1970s when six out of fourteen banks in the country were facing severe financial problem. The severity of the problem forced the government of Pakistan to nationalize all private banks functioning in the country at that time. The nationalization failed due to embedded political interest behind the whole program. The condition was not good even in the beginning of 1990 when more than 90% of the total assets were owned by public sector financial institutions (SBP, 2003). Non-performing loans were accumulating because of continuous interference on government's part. In late 1990s, govt. introduced reforms in financial sector. After the introduction of these reforms, financial institutions started consolidation in order to meet regulatory requirement imposed by SBP. Small banks, which were unlikely to meet the regulatory requirements, found mergers and acquisitions a tool for exit from banking industry. It was the year 2002 when first bank merger took place in Pakistan. With the passage of time this trend got momentum and is still continued.

Relevent literature review

Efficiency impact of merger has been a topic of considerable discussion in empirical research, however, the evidence regarding the efficiency impact of mergers in literature is mixed. In case of US, consolidation became relatively less difficult due to relaxation in antitrust laws during 1980s. Resultantly, the mergers in both financial and non-financial sectors got momentum which developed a remarkable interest in investigating the efficiency impact of financial sector mergers from different angles. Rhodes (1993) suggests that, in late 1980s, efficiency impact became the focal point in literature on mergers.

A number of studies reported improvement in efficiency due to mergers. Al-Sharkas et al. (2008) used the techniques of Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA) to investigate the impact of mergers on cost and profit efficiency of the US banking sector. Their findings suggest the evidence of improvement in both types of efficiencies following the mergers. Berger and Humphrey (1992) analyzed the efficiency effect of mergers by taking 57 bank mergers. They used the performance measures of X-efficiency rank and total efficiency rank. The study concluded that efficiency gains may be created when a more efficient bank takes over the less efficient bank, otherwise there will be no improvement in the efficiency after the merger.

Huizinga et al (2001) concluded that 1994-98 European bank mergers showed positive impact on cost efficiency, whereas improvement in profit efficiency was only marginal. The study used Stochastic Frontier Analysis and sample of 52 horizontal bank mergers to reach the conclusion. Vannet (2002) investigated efficiency impact of 62 cross border M&As in EU, Norway and Switzerland executed between 1990 and 2001. They found positive efficiency impact of these cross border mergers and acquisition in European banking sector. Wen (2002) documented significant improvement in technical and allocative efficiency and insignificant cost efficiency improvement after bank mergers in Taiwan using DEA. Worthington (2001) studied the difference between pre- and post-merger efficiency of the non-financial banking institutions. Using the discrete choice regression model, the results showed that there was improvement in efficiency of Australian credit unions after the merger in the period 1993-95. Carlos et al (2006) reported improvement in efficiency from mergers of 30 Columbian banks merged during 1990-2005. Gourlay et al (2006) found efficiency gains from bank mergers in India by using Data envelopment Analysis. Sufian &Fadzlan (2004) utilized the non-parametric frontier approach of Data Envelopment Analysis (DEA) to analyze the technical and scale efficiency of domestic incorporated Malaysian commercial banks during 1998 to 2003. Their results showed improvement in efficiency in post merger period. Cornett and Tehranian (1992) studied 30 large US bank mergers to analyze the gains from merger activity. By using different ratios, they found overall benefits from mergers.

Some studies concluded that mergers caused no improvement in efficiency. Rhodes (1986) examined 413 mergers during the period of 1968-78 (even years only) in US. By using multiple regression and probit analysis, they found no increase in the efficiency of merged banks as compared to the nonmerged banks. Srinivan and Wall (1992) witnessed no improvement in post merger efficiency for merger transactions completed during 1982-86. Peristiani (1997) used the data of 1980s merger transactions to analyze the X-efficiency and scale-efficiency impact of mergers. Using the DFA approach Peristiani came to the conclusion that 1980s merger transactions were not in favor of participating banks in terms of X-efficiency. But in the case of scale efficiency there was moderate increase. Sufian et al (2007) used joint estimation of non-parametric, parametric and ratio analysis to investigate the efficiency impact of bank mergers in Singapore. Their findings showed no efficiency gains from Singaporean bank mergers. Gjirja (2003) employed panel based Stochastic Frontier Analysis to analyze the saving bank mergers in Sweden and found no evidence for efficiency gain after mergers. Rhodes (1993) summarized thirty-nine US studies on efficiency, profitability and stockholder wealth impact of mergers during 1980 to 1993 and provided little evidence to the hypothesis that bank mergers result in improvement in performance.

In Pakistan, there are many studies regarding the efficiency of banking and non-banking sectors of the economy. Mehmood & Loan (2006) analyzed the impact of financial liberalization on cost efficiency of Pakistani banks during 1994-2000. By using Stochastic Frontier Approach, they found a U-shaped efficiency trend over the said time period and foreign banks to be more efficient than domestic private bank. Their findings showed no significant relationship between bank size and efficiency. Akhtar (2002) investigated the X-efficiency of 40 Pakistani commercial

banks during the period of financial liberlization through data envelopment analysis. Qayyum & Khan (2007) investigated the X-efficiency, scale economies and technological progress of 29 commercial banks in Pakistan. They used Deterministic Frontier Approach (DFA) and found that domestic banks were less efficient than foreign banks during 2000-2005. They also found that scale economies were higher for small banks.

The existing literature reveals that although there are many studies on efficiency analysis of different sectors in Pakistan, little has been explored regarding efficiency impact of mergers in financial sector of Pakistan. Therefore, there is a dire need for exploring the efficiency impact of mergers in financial sector of Pakistan.

Data & Methodology

In order to investigate the cost and profit efficiency impact of mergers in banking sector of Pakistan, if any, data is collected from published annual reports of all merged banks listed at Karachi Stock Exchange (KSE) during 1999-2004. Although various approaches like ratio analysis, Data Envelopment Analysis (DEA), Stochastic Frontier Approach (SFA), Deterministic Frontier Approach (DFA), Thick Frontier Approach (TFA) etc., have been used for the estimation of cost and profit efficiency of financial institutions, the present study uses Stochastic Frontier Analysis (SFA) due to two reasons. Firstly, it introduces a disturbance term representing statistical noise, measurement error and exogenous shocks beyond the control of organization, which would otherwise be attributed to inefficiency. Secondly, it provides a basis for the conduct of statistical tests on the results.

Cost efficiency measures the extent to which the cost of a firm (bank in our case) varies from that of best practice bank producing same level of output and under same conditions. Following Aigner (1977), the present study defines the cost function of the bank in following manner:

$$C_b = C(y_i, p_{k,} €_b) \quad (1)$$

"Where C_b is the total operating cost of a particular bank, y_i is the vector of output quantities, p_k is the input prices and $€_b$ is the error term."

The error term can be further decomposed into two parts and that is:

$$€_b = \mu_b + e_b \quad (2)$$

μ_b includes all the endogenous factors, whereas e_b represents all the factors which are exogenous for the bank. μ_b is the source of inefficiency. e_b is assumed to be iid with average value zero whereas it is assumed that inefficiency term is normally distributed N (o, σ_u^2).

The study follows Berger and DeYoung (2002) in defining cost efficiency in the following way:

$$CostEFF_b = C_{b\,min} / C_b \quad (3)$$

Where $C_{b\,min}$ represents minimum cost across all the banks.

The study uses translog cost function for estimation of cost of the particular bank and can be expressed in following way:

$$lnC_b = \alpha_0 + \beta_1 ln\, y_1 + \frac{1}{2}\beta_{11} lny_1^2 + \sum_k^3 \gamma_k \ln p_k + \frac{1}{2}\sum_l^3\sum_m^3 \gamma_{lm}\, lnp_l p_m + \sum_k^3 \rho_{1k} \ln y_1\, lnp_k + \epsilon_b \quad (4)$$

Where $\ln$ is the natural logarithm, C_b represents the total cost of the bank, y shows the output of the bank and p is the price of input used by the bank and $€_b$ represents composite error term.

The present study uses alternative profit function while estimating the profit efficiency of the bank which is as follows:

$$\ln(\pi + a)_b = f(y_i, p_k) + \ln \mu_{\pi b} + \ln e_{\pi b} \quad (5)$$

The following functional form is used to specify how profit of the bank is related to its single output and multiple inputs.

$$\ln(\pi + a)_b = \alpha_0 + \beta_1 ln\, y_1 + \frac{1}{2}\beta_{11} lny_1^2 + \sum_k^3 \gamma_k \ln p_k + \frac{1}{2}\sum_l^3\sum_m^3 \gamma_{lm}\, lnp_l p_m + \sum_k^3 \rho_{1k} \ln y_1\, lnp_k + \epsilon_b \quad (6)$$

Where π is the net income of the bank and α is the constant added to make profit of all the banks positive. It is evident from above function that both the translog cost function and alternative profit function have same independent variables.

The list of mergers in banking and leasing sector is obtained from KSE website. An event study approach is used to explore any change in cost and profit efficiency of the merged entities. First of all, in the pre-merger period, merging entries are combined in order to make comparison with merged entities on equal basis. The cost and profit efficiencies of merging banks listed at KSE, merged in Pakistan during period of 1999-2004, are calculated for two years before merger and two years after merger. The study employs intermediation approach for defining inputs and output, which is intensively used in existing efficiency literature. Following Isik & Hassan (2002) dependent variable, inputs and outputs are defined in Table 1.The study uses single output and three input model to investigate cost and profit efficiency of the bank. There were 17 completed bank merger transactions during the study period, out of which 7 were horizontal mergers and remaining 10 were vertical and the present article covers all of the mergers.

Results and analysis

Descriptive Statistics

By employing the methodology explained in previous section, cost and profit efficiency in both pre-merger and post-merger period is estimated for all the banks merged during 1998 to 2006. A software program Frontier 4.1 independently developed by Coelli (1996), is used to estimate the cost and profit efficiencies for both pre-merger and post-merger periods. Then both pre and post merger cost and profit efficiencies are compared to explore the impact of mergers on efficiency of the bank merged during the study period. Descriptive statistics for dependent variable, inputs and output is given in Table 2.

Table 2 shows that the banks merged during study period on average incurred total cost of Rs. 4756.07 million for providing intermediary services to customers. Cost is taken as dependent variable in estimation procedure of cost efficiency. The profit earned by an average bank is Rs. 814.80 million. The price of the labor, capital and funds paid by an average bank is Rs.1,550,944, Rs.0.1482, Rs.1.4162 respectively. On the average, banks merged during 1998-2006 invested Rs. 51758.59 millions in different investment opportunities. The figures of standard deviation in the table show that there is a great variability in all the variables presented in table 2.

Table 3 and table 4 presents the Cost and profit efficiency estimates for merged banks during 1998-2006 respectively. In table 3, a minor difference can be observed in cost efficiencies of different merged banks. In time period t-2 (two years prior to merger transaction) Crescent Commercial Bank is appeared to

be least cost efficient (0.912) and Faysal Bank is the most cost efficient (0.957). Further inquiry into annual reports of both the companies reveals that Crescent Commercial Bank pays higher price of funds as compare to Faysal Bank. The former can improve its cost efficiency by decreasing price of the funds. As far as the ranking of merged banks on the basis of cost efficiency in year t-1 (one year before merger) is concerned both the banks maintained their positions. However, the Crescent Commercial Bank experienced a slight improvement (0.922) and Faysal Bank observed a slight decrease in cost efficiency in said period. In year t+1 (one year after merger), again Faysal Bank is the most cost efficient bank and IFIC is the least cost efficient. In year t+2, IFIC remained the least cost efficient bank whereas Standard Chartered Bank became the most efficient bank. In this period, IFIC Bank employed more expensive funds and capital in comparison to Standard Chartered Bank for rendering the inter mediatory services. Table 3 also reveals that in pre-merger period on the average banks are 93.83 % cost efficient, which implies that the bank can produce 6.17% more output while incurring same level of cost. However, in the post merger period, the average bank shows a little improvement (0.32%) in cost efficiency. The difference is statistically significant at 10% level of significance. There may be two reasons for this little increase in post-merger cost efficiency. Firstly, the merging banks are already cost efficient to a great extent and there is a little room available for improvement. It means before merger the banks were making full use of resources and little was left for improvement through merger. Secondly, efficiency enhancement may not be the motivation behind consolidation in banking sector of Pakistan as it is often cited at the time of applying for mergers rather the mergers in banking sector of Pakistan are regulation driven.

Table 4 highlights that in year t-2 (two years before merger) IFIC Bank is the most profit efficient bank (0.999) while Mashreq bank is the least profit efficient bank (0.213). In year t-1 (one year before merger) IFIC is the most profit efficient bank and Allied Bank is the least efficient bank. The profit efficiency figures in year t+1 (one year after merger) give very interesting results. Allied Bank merged with two different financial institutions in two different years. Among those two transactions one transaction between Ibrahim Leasing Limited and Allied Bank was completed in 2005 and other between Allied Bank and First Allied Bank Modaraba was completed in 2006. One year after first merger (that is 2006 and the year when second merger took place) the profit efficiency was not good and the survivor was least profit efficient. However, two years after first merger (which is the first year after second merger) the profit efficiency improved to a great extent and Allied Bank became most profit efficient in this year and in next year also. Since all the banks were highly cost efficient in both pre and post merger period, those with highest profit efficiency also performed well on revenue side while banks with lowest profit efficiency did not performed well in this area. On the whole table 4 shows that post-merger profit efficiency of merged banks decreased by 5% however, the result was statistically insignificant at 10%.

Conclusion

During last three decades, the remarkable changes in regulatory environment of financial institutions forced many financial firms towards Mergers and Acquisitions as a strategic tool for corporate restructuring. The value of the merger transaction was so high that in US only it was reported to be 5% of the GDP during 1995. The present study explored the efficiency impact of mergers in banking sector of Pakistan by using Stochastic Frontier Analysis (SFA) during 1998-2006. The inputs and outputs were defined in line with intermediation approach. Cost and profit efficiency before and after the merger were calculated and compared to investigate any efficiency gain after merger. The study found statistically significant cost efficiency improvement of 0.3 % in the post merger period. The increase in efficiency was negligible because the pre-merger efficiency may be too high to have substantial improvement in cost efficiency. The results were consistent with Al-Sharkas et al (2008) which found similar results for bank mergers in US. The post-merger profit efficiency decreased by 5% however, the result was statistically insignificant.

The effect of the mergers on market is two fold. In the first place, due to increase in market power the firm may exploit customers by increasing prices. In this situation, consolidation posits cost to the customers. Secondly, in case of efficiency gain the benefit may be passed on to public. Our study showed a negligible increase in cost efficiency in post merger period in banking sector of Pakistan. The policy makers and antitrust authorities should consider this result while formulating policy or giving approval for any merger application in banking sector of Pakistan. The cost benefit analysis is the appropriate approach in this regard. The study suggests that since there is little increase in post merger cost efficient and slightly insignificant decrease in profit efficiency, those merger applications should not be approved which result in substantial increase in market power of the survivor otherwise survivors may use that increase in market power for exploitation of the customers.

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Table 1 Descriptive Statistics for Inputs and Outputs of Banks Merged During 1998-2006 in Pakistan

Variable	Mean	Standard Deviation	Maximum	Minimum
Dependent Variable				
Cost (In million Rs.)	4756.07	6054.80	27379.06	1117.44
Profit (In million Rs.)	814.80	1,777.05	8460.35	-10.56
Inputs (In Pak Rs.)				
Price of Labor	1,550,944	3,048,677	17,995,024	118,904
Price of Capital	0.1482	0.1873	0.9428	0.01088
Price of Funds	1.4162	4.3635	26.222	0.01398
Output				
Investments (In million Rs.)	51758.59	86287.38	311,396.31	144.16

Table 3 Pre-merger and Post-merger Cost efficiency of Banks merged during 1998-2006 in Pakistan

Sr.#	Institution's Name	Pre-merger		Post-merger	
		t-2	t-1	t+1	t+2
1	Trust Investment Bank	0.939	0.942	0.942	0.941
2	Atlas Inv. Bank	0.942	0.934	0.940	0.944
3	Faysal Bank	0.957	0.956	0.948	0.947
4	IFIC Bank	0.945	0.945	0.931	0.931
5	KASB Bank	0.936	0.937	0.940	0.936
6	Mashreq Bank	0.940	0.942	0.941	0.941
7	Crescent Commercial Bank Ltd	0.912	0.922	0.942	0.939
8	Allied bank	0.935	0.936	0.944	0.946
9	JS Bank	0.942	0.945	0.937	0.941
10	Standard Chartered	0.940	0.924	0.944	0.960
11	Atlas Bank	0.934	0.934	0.936	0.936
12	Allied bank	0.945	0.935	0.946	0.945
	Pre-merger Mean	0.9383			
	Post-merger Mean	0.9415			
	Difference (t-statistic)	0.0032 (1.95*)			

Note: *Statistically significant at the 0.1 level.

Table Error! No text of specified style in document. **Pre-merger and Post-merger Profit efficiency of Banks merged during 1998-2006 in Pakistan**

Sr.#	Institution's Name	Pre-merger		Post-merger	
		t-2	t-1	t+1	t+2
1	Trust Investment Bank	0.924	0.875	0.870	0.866
2	Atlas Inv. Bank	0.895	0.709	0.793	0.906
3	Faysal Bank	0.680	0.679	0.978	0.999
4	IFIC Bank	0.999	0.999	0.513	0.401
5	KASB Bank	0.421	0.407	0.574	0.423
6	Mashreq Bank	0.213	0.599	0.641	0.641
7	Crescent Commercial Bank Ltd	0.710	0.710	0.710	0.506
8	Allied bank	0.352	0.362	0.292	0.999
9	JS Bank	0.768	0.825	0.325	0.369
10	Standard Chartered	0.739	0.926	0.787	0.292
11	Atlas Bank	0.472	0.472	0.330	0.026
12	Allied bank	0.668	0.880	0.999	0.815
	Pre-merger Mean	0.678			
	Post-merger Mean	0.627			
	Difference (t-statistic)	-0.050 (0.70)			