

THE COST EFFICIENCY ANALYSIS OF COMMERCIAL BANKS IN PAKISTAN: BASED ON FREE DISTRIBUTION APPROACH

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Abstract

The study primarily aims at analyzing cost inefficiency of 15 Pakistani commercial banks during 1990 to 2006. The cost structure of banks has been defined under intermediation approach. For results estimation, free distribution approach has been used. The study mainly finds that cost inefficiency varies across the banking industry. If ranked, a foreign private bank is found as the best practice bank or a cost frontier. The relative cost inefficiencies of other banks fall within the range of 97.13 percent (a foreign bank) to 59.23 percent (a private bank). The average cost inefficiency of top 5 best practice banks is 97.2 percent, while it is 66.28 percent for 5 least efficient banks. As a group, the efficiency of foreign banks is 100 percent, followed by 90.48 percent for private domestic banks, 71.18 percent for nationalized commercial banks, and 63.76 percent for privatized banks. The average efficiency level of all commercial banks is found to be 82.22 percent which indicate that there is enough room for improvements in their banking operations.

As regards the contributory factors of cost inefficiency, these are non-performing loans which contributed largely to the cost inefficiency of banks, followed by financial prices, advances, and investment. However, the technological up gradation plays a positive role in lowering cost the inefficiency of banks. Banks corrective measures with regards to improvements in HR management, skillful decision making regarding choice of asset

portfolios, strategies for controlling of NPLs, etc. would also be helpful in lowering of cost inefficiencies of banks.

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I Introduction

The financial landscape of Pakistan witnessed significant changes when the Government decided to nationalize domestic banks in mid 1970s. Not only the ownership structure of banks changed but also the political as well as bureaucratic interference in the functioning of nationalized banks enhanced significantly. The government launched subsidized credit schemes for specific sectors. A system of credit ceiling was introduced and banks were given quantitative limits for credit expansion during a fiscal year¹. Restrictions were imposed on the entry of banks in the private sector and opening of branches by foreign banks. The system of credit ceilings remained a powerful instrument of credit management and distribution up to the early 90s, when it was replaced with a system of credit-deposit ratio. As a corollary of the above policy changes, the efficiency of banks affected severely. By the end of 1980s, the banking sector in Pakistan had become hardly conducive for meeting the growing financial needs of the country. According to Hardy (2003), the state-owned structure of banks, initiation of government sponsored schemes for specific sectors, high domestic borrowing by the government, and an administratively controlled yield structure, caused financial repression in Pakistan.

To reduce the adverse implications of the resultant financial repression, a comprehensive reform program was initiated in Pakistan in early 1990s, which has far reaching implications for performance of banking industry in the country. The first round of reforms has already been implemented while the implementation of the second round of the reforms is still going on. Both, the government and the central bank, have claimed positive outcomes of the said reform program². However,

¹ Pakistan's fiscal year starts from July 1st and ends on 30th June.

² Financial Sector Assessment reports of State Bank of Pakistan

it is worthwhile to mention here that despite claims of successes of the banking sector reforms on different fronts, the efficacy of banks is criticized on different accounts. Such criticism is an area of real concern for policy makers in the central bank. Since the poor performance of banks has significant negative implications for the overall economy, the issue concerning the impact of reforms on banks performance requires immediate attention.

A bank may pursue many goals. While profit efficiency is naturally its ultimate goal, the cost efficiency is an important means of reaching long-run profit efficiency. Since the efficiency of the banking industry influences the cost of financial intermediation and overall stability of financial markets, an improvement in bank performance indicates a better allocation of financial resources, and therefore an increase in investment that favors growth. The main objective of the current study is to analyze the cost efficiency of commercial banks in Pakistan over the period 1990 to 2006. Measuring the efficiency of financial institutions has received considerable attention in recent time. However, the paucity of empirical research in this key area seems perplexing, particularly when it is recognized that policymakers need accurate assessments about the effects of their decisions on the institutions they supervise.

The rest of the study is organized as follows: Section II is about an overview of the banks in Pakistan, Section III reviews the relevant literature on the subject issue, Section IV discusses data and methodological issues, and Section V evaluates the cost efficiency of selected banks. Section VII pertains to concluding remarks. References and Appendices are given at the end.

II Brief Overview of the Banking Industry in Pakistan

Commercial banks in Pakistan have been playing a very significant role for the development of the country. With the nationalization of domestic banks in mid 1970s, the role of public sector banks dominated in the areas of banking and finance. By the end of 1980s, almost all assets of the banking industry were

held by the public sector banks. Their key indicators reveal that they dominated in the banking sector in terms of asset holdings, deposits mobilization, extension of advances, and paid-up capital, number of employees, etc. To enhance the role of private sector, the process of financial liberalization and deregulation of banks started in the early 1990s which paved the way for opening up of banks by the private sector. The privatization of nationalized banks also started and which is still continue. In fact, the central bank implemented a complete set of reform agenda for enhancing the performance of banks operating in Pakistan.

For analysis purposes, 15 commercial banks³ have been selected. They have a long history of operations in Pakistan and have been affected mainly by the reforms program. The asset share of these banks in total assets of commercial banks stood 93 percent in 1990, which has reduced to 74 percent in 2006 mainly due to an increase in competitive environment (*Table I*). Further, the concentration of public sector banks has also reduced due to their privatization and the role of private banks has increased, as they offer relatively attractive bank products with better customer services.

The SBP's measures about strengthening of soundness of banks, especially the implementation of BASEL framework, led to the rise in paid-up capital of selected commercial banks. Further, the removal of restrictions for opening of private banks by the SBP caused a mushroom growth of financially weak banks, which could inflict the financial stability in case of any exogenous shock. In this backdrop, the SBP encouraged merger/acquisition of banks which in turn resulted into strengthening of paid-up capital of commercial banks. The non-performing loans (NPLs), although still high, showed a

³ National Bank of Pakistan, First Women Bank Limited, Bank of Punjab, Muslim Commercial Bank Limited, United Bank Limited, Allied Bank Limited, Habib Bank Limited, Bank Al-Falah Limited, Metropolitan Bank Limited, Askari Commercial Bank Limited, Citi Bank, Standard Chartered, ABN Amro Bank, AGN Zurich Bank (data available up to 2005), and AlBaraka Islamic Bank.

declining trend over the period of analysis which is a very encouraging development from banks' soundness point of view.

III. Review of Literature

The methods for evaluating frontier efficiency basically break into parametric and nonparametric methods. The former category is represented by the Data envelopment analysis and the free disposable hull. The latter comprises the stochastic frontier approach (SFA) in cross-section or panel data framework, cross-section or panel data Thick Frontier Approach, and panel data techniques of the Random effects model (REM) and the Distribution free approach (DFA). For a comprehensive survey and detail description of these methods, see Berger and Humphrey (1997). One of such methods is based on the econometric techniques and involves the estimation of an economic function (e.g., production or cost) and the derivation of efficiency scores from either the residuals or dummy variables. The fixed effect models use dummy variables while random effect model derive such efficiency using residuals.

Similarly, the second approach is based on linear programming in which an objective function envelops the observed data; efficiency scores are derived by measuring how far an observation lies from the "envelope" or frontier. Each approach has its own advantages and disadvantages. The parametric approach of efficiency measurement allows for noise in the measurement of inefficiency; however, it also possesses some problems like making assumptions about the form of the economic function being estimated and the distribution of efficiency. The non-parametric approach has an advantage over parametric approach as it does not use functional or distributional forms; however, this approach suffers from the drawback that all deviations from the frontier are attributed to inefficiency with no allowance made for error. Among the two approaches, the current study uses parametric approach for the efficiency measurements. The same methodology has also been chosen by Hardi (20003), and Ansari (2005) for efficiency estimates of Pakistani banks.

Within the parametric approach, the study broadly chooses stochastic frontier approach. Since the study uses longitudinal data (also called panel data), some of distributional assumptions in the stochastic frontier approach can be relaxed and this approach can be termed as distribution free approach. Within distribution free framework, the study employ Fixed Effect Model with the panel data which enables to estimate the standard models of fixed and random effects without setting prior assumptions about the distribution of inefficiency terms, provided these efficiency remain constant over time period [Schmidt and Sickles (1984)].

Despite significance of the subject area, we find dearth of literature on cost efficiency measurement of Pakistan's banking sector. However there are few studies by Qayyum (2007), Ansari (2006), Iimi, (2004), Hardy.

Despite significance of the subject area, we find dearth of literature on cost efficiency measurement of Pakistan's banking sector. However there are few studies by Qayyum (2007), Ansari (2006), Iimi, (2004), Hardy (2003), Burki & Niazi (2003), Arby (2003), Iimi (2002), Rizvi (2001), Shahid (2001), and Hardy & Patti (2001), which analyze the impact of reforms on Pakistani banking industry.

IV. Methodology and Data

There is a continuous debate on the issue that what constitute the outputs and inputs of a banking firm. In this study, the intermediation approach has been employed which is most commonly used in the conventional bank cost function literature⁴. As regards the production approach, it is mainly criticized as it excludes interest costs and overemphasizes the role of staff costs and rental costs while defining inputs. Thus, the approach seems to neglect the banking sector's traditional role which is about the distributor of funds. Owing to these reasons, the intermediation approach dominates in empirical research work concerning the subject area.

⁴ The current study has benefitted from the methodology used by Ansari (2006).

Under intermediation approach, the cost structure of a bank is classified as followed a function of vector of output (earning assets), vector of input prices, random error, and level of inefficiency:

$$C = f(Y, W) + u + v \quad \text{————— (1)}$$

Where C stands for total cost, Y indicates vector of outputs, W indicates vector of input prices, v denotes random error, and u indicates level of inefficiency of banks.

While estimating the cost inefficiencies, generally researchers are confronted with the problem of isolating inefficiency term from random errors in the model. To overcome this issue, the current study uses fixed effect model which enables a bank specific constant to capture the inefficiency elements associated with that specific bank. The following econometric equation represents the broader form of the model:

$$C_{it} = \hat{\alpha} + \hat{\alpha} X_{it} + u_{it} + v_{it} \quad \text{————— (2)}$$

here I denotes number of banks ranging from 1, 2, 3, ——— N, t is the time period for years 1, 2, 3, ——— T, C denotes total cost to asset ratio of the bank at time t, v represents random errors associated with the bank at time t, and u indicates inefficiency level of the bank at time t. Similarly, X denotes the vector of exogenous variables. The error and efficiency terms have the following assumptions:

- (i) The v term is uncorrelated with the regressor X such as $\text{corr}(XV) = 0$;
- (ii) The inefficiency level of best practice banks is assumed zero at any point of time;
- (iii) u's are assumed to follow identically independent distribution (iid), with mean u and variance S_u^2 ; and
- (iv) $\text{Corr} = (v, u)$.

While using fixed model, it is assumed that the differences in intercepts are driven by distinct level of

inefficiencies associated with each bank. The impact of exogenous variables on cost structure is also assumed similar for all the banks. This assumption is justifiable as all the banks are operating under the same macroeconomic conditions, prudential regulations of the regulator, fiscal restrictions, and external effects. Therefore, the general format of the model specified in Equation (2) can be modified as:

$$C_{it} = (\hat{a} + u_{it}) + \hat{a} X_{it} + v_{it} \quad \text{————— (2a)}$$

Therefore, equation (2a) can be rewritten as,

$$C_{it} = \hat{a}_{it} + \hat{a} X_{it} + v_{it} \quad \text{————— (2b)}$$

It is worthwhile to note here that as a result of the differences in the inefficiencies of each bank, the constant term \hat{a}_{it} would be different for all the banks. However, the Wald test can be used to know the statistical significance of the empirical estimates of these differences.

By using Equation (2a), the separate intercepts for individual banks can be estimated, assuming that the best practice bank is 100 percent efficient, having minimum intercept in magnitude such that $\hat{a}_{min} = \hat{a}_1 + u_1 = \hat{a}_1 + 0 = \hat{a}_1$. Since the estimated model is expressed in log form, the relative inefficiencies of the remaining individual banks, \hat{a}_i , can be derived using their respective estimated intercepts such as $\hat{u}_i = \hat{a}_i - \hat{a}_{min}$. As per Schmidt and Sickles (1984), the estimated intercepts u_i are asymptotically consistent. The expression of efficiency can be computed by the following expression:

$$E_i = (C_{min} - C_i) = \text{Exp}(-u_i) = \text{Exp}(\hat{a} - \hat{a}_{min}) \quad \text{———— (2c)}$$

The proxies of inputs/outputs of banks are consistent with the definition of the intermediation approach. Further, the study uses unbalanced micro panel data of 16 banks which includes state owned, privatized, private and foreign banks (including one foreign Islamic bank). Using the data of the sample banks, the model for estimation of results can be expressed as:

$$TC = \hat{a}_i + \hat{a}_1 Y_1 + \hat{a}_{kj} Y_k Y_j + \hat{e} W_L + \hat{e} W_r W_s + \hat{a}_{mn} Y_n W_m + NPAR + TY_i + TW_j + e \quad \text{———— (3)}$$

As regards to the unknown coefficients, they would be estimated using the following symmetry restriction:

$$\hat{a}_{ij} = \hat{a}_{ji}, \quad \hat{e}_{ij} = \hat{e}_{ji}, \quad \hat{a}_{mn} = \hat{a}_{nm}$$

In order to normalize the effects of differences in banks size, all variables are expressed in ratio form. The variables used in the model are given as under:

TC= Total cost (administrative cost plus interest expenses) to total asset ratio

Y = Adv= Ratio of advances to total assets

Y¹= Inv=Ratio of total investment to total assets

NPAR= percentage ratio of NPLs to assets

W = Pf=Price of financial capital calculated as the ratio of total interest expenses to total deposits and financial borrowing

W = Sal=Price of labor input, calculated as the ratio of administrative expenses to total number of employees.

i = 1, 21,15.

It may be noted that all of the above variables are expressed in logarithmic form except for non-performing loans to asset ratio and the dummy variable used for time. As the data for the salary of the banks employees are not available, the study uses administrative expenses as proxy for the salary of the bank employees.

The study uses both the input and output variables keeping in view the intermediation approach. Total expenses to total assets ratio is used as the dependent variable. The independent variables include: percentage of advances to assets, percentage of investment to assets, annual administrative expenses per employee (for labor price) and interest expenses per million of borrowed funds (price of financial capital). Moreover, the model incorporates percentage of non-performing loans (NPLs) to total asset ratio and time dummy is also used as an independent variable. Time variable quantifies the impact of

technological progress upon cost. The translog cost function, although incorporates fixed effect model, is assumed to follow all the fundamental assumptions of the “distribution free” approach. Equation (3) is the specific version of Equation (2) which has been transformed into translog cost function, mainly to estimate the relative cost inefficiency of the individual banks. However, the relative inefficiencies measures have been estimated from values of intercepts for each bank.

V. Results Interpretation

The empirical results of the model are given in **Table 2** which indicate that advances, financial price, non-performing loans, time dummy, all intercepts are statistically significant at 99 percent level of confidence. The value of R^2 is 0.93 and adjusted R^2 is 0.92, which exhibits that about 90 percent of the variations in the cost structure of the selected commercial banks is explained by the exogenous variables. The value of F-statistic also indicates that the model explains significantly the cost structure of the commercial banks operating in Pakistan. Based on values of these parameters, it can be inferred that despite having similar exogenous determinants, the commercial banks have different efficiency levels.

As regards cost inefficiency of banks, it emerges from Table 3 that a foreign private bank is estimated to be the best practice bank or cost frontier, while the relative inefficiency of other banks fall within the range of 97.13 percent (foreign bank) to 59.23 percent (a privatized bank). By 59.23 percent relative inefficiency of privatized bank we mean that the bank could have saved 40.77 percent costs in producing the current level of earning assets by eliminating the element of the cost inefficiency. Ansari (2006) finds that all banks significantly differ in the relative cost efficiency, which varies between 87 percent and 49 percent. Similarly, according to Limi (2002), the differential in technical efficiencies of Pakistani banks ranges from 51.9% to 79.5%, which suggests the differences between the banks which undergo internal restructuring and those which failed to do so. However, these results differ from those of the study by Rizvi (2001), which finds that inefficiency in the overall banking system of Pakistan

is more or less stagnant. Nevertheless, the efficiency composition within the industry has changed, as local banks, especially nationalized banks, except one, have improved their performance.

The results of the current out study are consistent with the efficiency estimates of the study by Ansari (2006) carried for Pakistani banks only. Similarly, Berger et al. (1993) finds that the X-inefficiency for the U.S. depository institutions is around 20 percent of costs, while Allen and Rai (1996) report that the average cost inefficiency for the European countries is around 15 percent of the cost.

The efficiency estimates reveal that the average relative efficiency of the top 5 best practice banks is around 97.21 percent while those of 5 least efficient banks is around 66.28 percent. The group-wise efficiency of banks is also consistent with the overall efficiency estimates as foreign banks are found more efficient, followed by private banks, nationalized commercial banks and privatized banks.

As a group, the efficiency of foreign banks is 100 percent, followed by 90.48 percent for private domestic banks, 71.18 percent for nationalized commercial banks, and 63.76 percent for those of privatized banks (Table 4). The relative high cost inefficiency of privatized banks is most probably due to these banks having remained under state-owned structure during most of the period of analysis. Apparently, the partial privatization of some of the banks is the key reason for their high cost inefficiency amongst the groups of banks. Ansari (2006) also finds that most of the public sector banks fall in the least efficient group, while majority of foreign banks and some private commercial banks fall in the best efficient group. The overall average cost efficiency of commercial banks in Pakistan is 82.22 percent, which depicts that there exists enough room for reduction in their costs by controlling the factors causing inefficiencies in their operations.

The regression results of Table 2 indicate that 1 percent increase in advances enhance the costs of banks by 0.25 percent, mainly due to inefficient banking operations. However, with the adoption of credit discipline, the quality of bank advances could

increase which is likely to help reduce their cost inefficiency. As regards the story of investment portfolios, its role in enhancing the cost inefficiency of the banks appears to be relatively smaller. Since the investment portfolio of the banks mainly consists of their investment in government securities, there is a lesser likelihood of default in such type of securities.

The commercial banks' inefficiency also increases due to increase in their total expenses which are borne by the banks on the maintenance and renovation of premises, buildings, etc. owned by them. The banks need to reduce their unnecessary expenses on the renovation of premises, particularly to attract customers in the wake of competitive environment. As regard the story of administrative expenses of the banks, it appears to have impacted inversely on their cost inefficiency. One reason could be that the banks have recently adopted various strategies for cost saving, which appears to have put a positive impact on banks' operations in Pakistan.

As regard the impact of non-performing loans (NPLs), it also appears to have contributed significantly in enhancing the cost inefficiency of the banks. Limi (2002) also finds that non-performing loans (NPLs) have significantly enhanced the degree of the cost inefficiency of the banking industry in Pakistan. The results of the study by Ansari (2006) also reveal that NPLs have generated negative implications for the efficiency level of the banks. Based on foregoing, it can be recommended that the banks need to pay more attention to the adoption of the best banking practices, mainly to reduce the magnitude of their NPLs, as it contributes significantly in enhancing their cost inefficiency. In this regard, the central bank should also enhance its supervisory role besides strengthening its monitoring framework, largely to bring down the magnitude of bad loans. Especially, the adoption of high collateral standards through improved feasibility analysis of projects, and more cautious attitude for risky portfolios may help the banks in reducing their cost inefficiency level.

One aspect of modern banking is its greater reliance on the IT technology. As per expectations, the technological changes which have taken place in the new banking operations

are likely to reduce the banks cost inefficiency through low intermediation costs.

VI Concluding Remarks

The study aimed at analyzing the efficiency of commercial banks over the period 1990 to 2006. For analysis purposes, the study broadly chose stochastic frontier approach. Within this framework, it developed a Fixed Effect Model with the panel data which enabled us to estimate fixed and random effects without setting prior assumptions about the distribution of inefficiency terms. As regards the cost structure of a bank, it was defined under intermediation approach, which follows a function of vector of output (earning assets), vector of input prices, random error, and level of inefficiency. The study used unbalanced micro panel data of 15 banks which included nationalized, privatized, private, and foreign banks (including one foreign Islamic bank).

The Key findings of the study are given as under:

- a) The cost inefficiency of an individual bank varies across the industry. The ranking of banks in terms of the cost efficiency reveals that a foreign private bank is found to be the best practice bank and estimated as a cost frontier. The relative efficiencies of other banks fall within the range of 97.13 percent (foreign bank) to 59.23 percent (a privatized bank).
- b) The average relative efficiency of the top 5 best practice banks is estimated to be 97.21 percent while it is 66.28 percent for the 5 least efficient banks.
- c) The average efficiency level of all commercial banks is found to be 82.22percent which indicate that there is enough room to improve their operational efficiency. The finding of the study is also consistent with efficiency estimates of the study conducted by Ansari (2005), despite having differences of coverage of banks and time period.

- d) As regards group-wise cost inefficiency estimates, foreign banks are found to be more efficient, followed by private banks, nationalized commercial banks, and privatized banks. As a group, the efficiency of the foreign banks is 100 percent, followed by 90.48 percent for the private domestic banks, 71.18 percent for the nationalized commercial banks, and 63.76 percent for the privatized banks. The cost inefficiency of the privatized banks happens to be relatively high as they operated under a state-owned structure during most of the period of analysis.
- e) With regard to the contributory factors of the cost inefficiency of the banks, it is the non-performing loans (NPLs) which contributed largely to enhance the cost inefficiency of the banks, followed by the financial prices, and the loan portfolio of the banks. However, the technological up gradation appears to have reduced their cost inefficiency.
- f) Overall, the banks ownership structure appears to be extremely important in reducing their cost inefficiency besides making them more competitive and cost efficient. Based on the foregoing, we can infer that there exists enough scope for banks to reduce their cost inefficiency through appropriate measures aimed at improving their HR management, skillful decisions with regard to asset portfolios, technological up-gradation and reduction in NPLs.

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APPENDIX

Table 1
Profile of Major Commercial Banks¹
(Percentage Share in Total)

(In Percent)

	1990	1992	1997	2000	2002	2004	2006
Assets	93	88	78	81	75	74	74
Deposits	94	89	79	83	81	78	79
Advances	93	88	77	80	70	72	75
Paid up Capital	82	65	44	70	30	72	77
Administrative Costs	95	91	89	83	72	74	71
NPLs	95	96	94	90	64	62	62
Number of Employees	98	97	92	91	73	83	82

Source: Authors' calculation using data of balance sheet of banks.

Table 2: Regression Estimates of the Model

Source	SS	df	MS			
Model	45.28	30.00	1.51	Number of obs = 261		
Residual	3.17	230.00	0.01	F(30, 230) = 109.42		
Total	48.45	260.00	0.19	Prob > F = 0.0000		
				R-squared = 0.9345		
				Adj R-squared = 0.9260		
				Root MSE = .11745		
Lc	Coefficients	Std. Err.	t-stat	P> t	[95% Conf.	Interval]
adv	0.25	0.14	1.81	0.07	-0.022	0.529
adv2	0.01	0.02	0.36	0.72	-0.027	0.039
inv	0.06	0.09	0.70	0.48	-0.114	0.240
inv3	0.01	0.01	0.72	0.47	-0.012	0.025
fp	1.49	0.13	11.68	0.00	1.238	1.740
sal	-0.17	0.06	-2.71	0.01	-0.289	-0.046
fp2	0.13	0.02	7.84	0.00	0.095	0.158
sal2	-0.01	0.01	-1.19	0.24	-0.032	0.008
salfp	-0.09	0.02	-5.57	0.00	-0.122	-0.058
advinv	0.07	0.05	1.58	0.12	-0.018	0.166
advsal	0.01	0.04	0.35	0.73	-0.058	0.083
advfp	0.04	0.04	0.95	0.34	-0.042	0.121
invsal	-0.01	0.02	-0.30	0.76	-0.038	0.028
invsal	-0.01	0.02	-0.30	0.76	-0.038	0.028
npar	0.96	0.23	4.14	0.00	0.503	1.416
NB*_Bank_1	0.13	0.05	2.92	0.00	0.043	0.223
NB*_Bank_2	0.27	0.06	4.57	0.00	0.152	0.382
NB*_Bank_3	0.18	0.05	3.78	0.00	0.088	0.279
PVT*_Bank_4	0.42	0.05	8.65	0.00	0.321	0.510
PVT*_Bank_5	0.23	0.05	4.28	0.00	0.122	0.331
PVT*_Bank_6	0.27	0.05	5.80	0.00	0.178	0.362
PVT*_Bank_7	0.35	0.06	6.26	0.00	0.238	0.456
PB*_Bank_8	-0.08	0.05	-1.65	0.10	-0.173	0.151
FB*_Bank_9	-0.08	0.05	-1.64	0.10	-0.170	0.015
FB*_Bank_10	-0.11	0.04	-2.51	0.01	-0.193	-0.023
FB*_Bank_11	-0.03	0.05	-0.49	0.63	-0.134	0.081
FB*_Bank_12	0.06	0.05	1.21	0.23	-0.038	0.162
FB*_Bank_13	-0.06	0.04	-1.32	0.19	-0.147	0.029
PB*_Bank_14	-0.08	0.05	-1.58	0.12	-0.170	0.019
PB*_Bank_15	0.04	0.04	0.97	0.33	-0.043	0.127
_cons	0.74	0.27	2.71	0.01	0.201	1.274

Note: Regression estimates are computed using Stata Econometric Software.

* indicates dummies used for individual banks.

Table 3
Efficiency Scores of Banks in Pakistan

Bank	Coefficients	Std. Err.	t-stat	P> t	[95% Conf. Interval]	Efficiency (in %)
FB_Bank_10	-0.108	0.043	-2.51	0.01	-0.193 -0.023	100.00
PB_Bank_8	-0.079	0.048	-1.65	0.10	-0.173 0.151	97.13
FB_Bank_9	-0.077	0.047	-1.64	0.10	-0.170 0.015	96.93
PB_Bank_14	-0.076	0.048	-1.58	0.12	-0.170 0.019	96.78
FB_Bank_13	-0.059	0.045	-1.32	0.19	-0.147 0.029	95.20
FB_Bank_11	-0.027	0.055	-0.49	0.63	-0.134 0.081	92.15
PB_Bank_15	0.042	0.043	0.97	0.33	-0.043 0.127	86.04
FB_Bank_12	0.062	0.051	1.21	0.23	-0.038 0.162	84.36
NB_Bank_1	0.133	0.046	2.92	0.00	0.043 0.223	78.54
NB_Bank_3	0.183	0.049	3.78	0.00	0.088 0.279	74.69
PVT_Bank_5	0.227	0.053	4.28	0.00	0.122 0.331	71.54
NB_Bank_2	0.267	0.058	4.57	0.00	0.152 0.382	68.69
PVT_Bank_6	0.270	0.047	5.80	0.00	0.178 0.362	68.51
PVT_Bank_7	0.347	0.055	6.26	0.00	0.238 0.456	63.44
PVT_Bank_4	0.415	0.048	8.65	0.00	0.321 0.510	59.23

Note:

FB denotes Foreign Bank operating in Pakistan.

PB denotes Private Domestic Bank operating in Pakistan

NB denotes Nationalized Commercial Bank operating in

Pakistan

PVT denotes Privatized Bank operating in Pakistan.

Efficiency
100.00
90.48
71.18
63.76

Table 4
Banks Efficiency Across the Type of Group

Groups	Coefficients	Std. Err.	t	P> t	[95% Conf. Interval]	Efficiency
FB_Bank	0.73	0.31	2.44	0.02	0.15	100.00
PB_Bank	0.83	0.32	2.72	0.01	0.24	90.48
NCB_Bank	1.07	0.33	3.41	0.00	0.47	71.18
PVT_Bank	1.18	0.32	3.82	0.00	0.59	63.76

Note: Banks have divided into the following four Groups:

FB: The group of foreign banks operating in Pakistan.

PB: The group of private banks operating in Pakistan.

NCB: The group of nationalized commercial banks operating in Pakistan.

PVT: The group of privatized banks operating in Pakistan.