



An Empirical Analysis of the Efficiency of Conventional and Islamic Banks in Pakistan:

A Data Envelopment Analysis and Tobit Regression Analysis

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Abstract: The present study investigates the comparative efficiency of conventional and Islamic banks in Pakistan using two analytical techniques: Data Envelopment Analysis (DEA) and Tobit Regression. DEA is a non-parametric method that evaluates the efficiency of Decision Making Units (DMUs) by considering multiple inputs and outputs. The study adopts an input-oriented CCR model, utilizing staff numbers, fixed assets, loanable funds, and equity as inputs, and advances and investments as outputs to compare the efficiency of conventional and Islamic banks. The results indicate that conventional banks outperform Islamic banks in terms of profitability, whereas Islamic banks exhibit greater stability with no windfall in profits.

To explore the determinants of efficiency, Tobit Regression is employed. The findings demonstrate that Return on Assets (RoA) and Return on Equity (RoE) have a significant positive association with efficiency, while Size and Diversification are not significant determinants. Moreover, the Dummy variable indicates that conventional banks are more efficient than Islamic banks.

The findings provide useful insights into the determinants of efficiency and suggest that conventional banks outperform Islamic banks in terms of profitability. The study's results may guide policymakers and bank management in enhancing the efficiency of Pakistani banks.

Keywords: Data Envelopment Analysis, Efficiency, Decision Making Units, Tobit Regression, Conventional Banks, Islamic Banks.

I. INTRODUCTION

The financial sector plays a pivotal role in the economic landscape by aggregating deposits and extending credit to individuals, households, businesses, and governments. Its substantial contributions to economic development and the enhancement of living standards include providing essential services like clearing and settlement systems to facilitate trade, directing financial resources from savers to borrowers, and offering risk management products.

The potential risks associated with inefficient banking systems are significant, with the capacity to trigger economic downturns. Consequently, operational efficiency becomes paramount for maintaining competitiveness. Recent statistical analyses underscore the advantageous position of highly efficient banks, emphasizing their cost-effectiveness and competitive edge over counterparts with average or below-average efficiency (Kumar and Gulati, 2010). This study endeavours to assess the efficiency of conventional and Islamic commercial banks in Pakistan utilizing the widely recognized Data Envelopment Analysis (DEA) method.

Technical efficiency, quantified as the ratio of minimum input to actual input, serves as the metric for evaluating banks' effectiveness in resource utilization. The study adopts the input-oriented CCR model developed by Charnes, Cooper, and Rhodes in 1978, a prevalent DEA model renowned in literature. The investigation spans the period between 2004 and 2015.

Beyond measuring technical efficiency, this study employs Tobit analysis to scrutinize the key determinants influencing banks' technical efficiency. Given the distinctive nature of Pakistan's banking sector, encompassing conventional and Islamic banking, the study exclusively concentrates on Pakistani banks.

Conventional banking, synonymous with the traditional system, involves lending with interest earnings. In contrast, Islamic banking adheres to the principles of Islamic law or Shariah, emphasizing Shariah-compliant financial products and services. As of 2015, Pakistan boasted 29 operational banks, including five fully-fledged Islamic banks and numerous conventional banks with established Islamic banking windows. According to the State Bank of Pakistan, the industry's total assets reached PKR 16.2 trillion (USD 154 billion) by December 2015, with conventional banks holding the majority.

This study endeavors to address the following research inquiries:

1. How effective are banks operating in Pakistan?
2. Are conventional banks more efficient than Islamic banks?

These questions gain significance in the aftermath of the global financial crisis of 2007/08, where Islamic banks demonstrated resilience, operating on Sharia principles.

The outcomes of this study bear substantial implications for policymakers, regulators, investors, and stakeholders in Pakistan's banking industry. The findings promise to illuminate the strengths and weaknesses of both conventional and Islamic banks, offering insights for enhancing overall efficiency.

The DEA analysis reveals that conventional banks surpass Islamic banks in terms of profitability, while Islamic banks exhibit greater stability with no windfall in profits. Tobit regression findings indicate that Return on Assets (RoA) and Return on Equity (RoE) are positively and significantly associated with efficiency, whereas Size and Diversification lack significant determinants. The inclusion of a Dummy variable suggests that conventional banks demonstrate superior efficiency compared to Islamic banks. In conclusion, while conventional banking maintains dominance in Pakistan's industry, Islamic banking emerges as a crucial and expanding segment. The government's promotion of Islamic banking, coupled with increased consumer awareness of Islamic financial products, foreshadows continued growth in Pakistan's Islamic banking sector.

Literature Review:

To evaluate the banking industry's performance, a comprehensive examination of previous research and initiatives spanning different periods becomes imperative. Numerous studies have probed into banking sector efficiency, employing diverse methods. The prevalent approaches include three Parametric Approaches: Stochastic Frontier Approach (SFA), Thick Frontier Approach (TFA), and Distribution-Free Approach (DFA), and two nonparametric approaches: Data Envelopment Analysis (DEA) and Free Disposal Hull (FDH).

Abbas, Hammad, Elshahat, and Azid (2015) utilized Data Envelopment Analysis (DEA) and the Malmquist index to assess the efficiency of Islamic and conventional banks in Pakistan from 2005 to 2009. The study disclosed higher productivity growth in Islamic banks from 2005 to 2006, although their subsequent growth rate lagged behind conventional banks. The Malmquist Total Factor Productivity (TFP) index identified the technological change index as a significant contributor to the decline in productivity in Islamic banks, which also grappled with scale inefficiency, resulting in comparatively higher economies of scale.

Ahmed and Ahmed (2015) employed DEA to evaluate the technical efficiency of Islamic and conventional banks in Pakistan for the period 2007-2011. Input variables included the amount of deposits, loans and advances, and total assets, while output variables comprised income from investments, interest income, and total income. The study ascertained that both types of banks demonstrated relative efficiency, with Islamic banks exhibiting superior technical efficiency compared to conventional banks.

Khattak et al. (2016) conducted a comparative analysis of the efficiency of Islamic and conventional banks in Pakistan using the DEA approach. The study's findings indicated that conventional banks demonstrated higher technical efficiency, while Islamic banks exhibited superior scale efficiency.

Niazi and Zaman (2016) delved into the efficiency of Islamic and conventional banks in Pakistan for the period 2009-2013, employing DEA. Their study incorporated input variables such as deposits, loans, and investments, with output variables including operating expenses, gross profit, and net profit. The results revealed that Islamic banks surpassed conventional banks in terms of technical efficiency, scale efficiency, and cost efficiency.

Ahmad, Hussain, and Saqib (2017) investigated the efficiency of Islamic and conventional banks in Pakistan for the period 2010-2015 through DEA. Their study included input variables such as deposits, loans, and investments, while output variables comprised interest income, non-interest income, and operating expenses. The outcomes indicated that both types of banks demonstrated relative efficiency, with Islamic banks outperforming conventional banks in terms of technical efficiency.

Abbas and Zulfiqar (2015) explored the financial performance of Islamic and conventional banks in Pakistan, analyzing a sample of 10 banks. Their study found that conventional banks exhibited better profitability, while Islamic banks demonstrated a stronger liquidity position.

Rehman et al. (2014) conducted a study on the financial performance of Islamic and conventional banks in Pakistan, using a sample of 12 banks. The findings revealed that conventional banks excelled in terms of profitability and asset quality, while Islamic banks displayed a superior capital adequacy ratio.

Naeem and Saifullah (2018) focused on the efficiency of Islamic and conventional banks in Pakistan for the period 2012-2016, employing DEA. Their study incorporated input variables such as deposits, advances, and investments, and output variables consisting of operating income, non-operating income, and total income. The results indicated that Islamic banks outperformed conventional banks in terms of technical efficiency and pure technical efficiency, while conventional banks demonstrated higher scale efficiency.

Akmal and Saleem (2008) utilized a two-stage DEA approach to measure the efficiency of thirty commercial banks in Pakistan from 1996 to 2005. Their study incorporated Tobit regression to investigate the impact of macroeconomic and internal bank factors on efficiency. The findings highlighted the greater efficiency of foreign banks compared to national privatized banks, with an overall increasing efficiency trend since 2000.

Khan (2014) applied the DEA technique to assess the performance of commercial banks in Pakistan from 2006 to 2010. The study considered two inputs (interest expenses and non-interest expenses) and two outputs (interest income and non-interest income). The analysis indicated an overall decline in average efficiency, suggesting potential issues with the inefficient use of inputs or management practices.

In conclusion, multiple studies employing various approaches such as DEA, SFA, TFA, and DFA have assessed the efficiency of Islamic and conventional banks in Pakistan. While findings vary, the general trend suggests that both types of banks exhibit relative efficiency, with some studies favouring Islamic banks in terms of technical efficiency and others favouring conventional banks.

Research Gaps:

Despite the wealth of studies, two significant research gaps persist. Firstly, there is a dearth of research on the stability of Islamic banking practices in Pakistan during financial crises, particularly the 2007/08 crisis. Understanding how Islamic banks weathered such crises provides valuable insights for policymakers and industry practitioners.

Secondly, the determinants of efficiency in Islamic and conventional banks in Pakistan remain understudied, despite the crucial importance of this information. Identifying and comprehending these determinants are essential for informing strategic decisions

and policies within the banking sector. Closing these research gaps would contribute substantially to the existing body of knowledge in Islamic and conventional banking efficiency in Pakistan.

Methodological Framework

3.1. CCR-DEA Model:

Data Envelopment Analysis (DEA) serves as a nonparametric tool for multifactor productivity analysis, particularly in evaluating the relative efficiencies of decision-making units (DMUs), such as banks (Ahmad, 2014). As a non-parametric method, DEA employs linear programming to gauge the efficiency levels of comparable DMUs, considering multiple inputs and outputs (Othman et al., 2016). The origins of this efficiency measurement approach can be traced back to Farrell's 1957 introduction, rooted in the fundamental theory of production involving a single input and single output.

$$E = \frac{\text{Output}}{\text{Input}} \quad \dots (1)$$

For scenarios involving multiple inputs generating single or multiple outputs, the original equation is expanded to account for the measurement of multiple inputs and outputs. Charnes, Cooper, and Rhodes (1978) further extended this concept, modifying the original equation as follows:

$$E = \frac{\text{Weighted sum of output}}{\text{Weighted sum of input}} \quad \dots (2)$$

Sherman and Zhu (2006) note that the fundamental CCR model by CCR assumes a constant return to scale (CRS). The overall productivity of a bank, according to this model, hinges on four efficiency classification components, as illustrated in Figure 1:

1. **Technical Efficiency:** This component measures a bank's capability to produce actual outputs with fewer inputs, signifying higher efficiency.
2. **Scale Efficiency:** Referring to the optimal activity volume level, scale efficiency determines inefficiencies that may arise if goods or services are produced above or below the optimal level.
3. **Price Efficiency:** Banks can enhance efficiency by procuring inputs at lower costs without compromising quality.
4. **Allocative Efficiency:** This component measures the optimal mix of various inputs for producing products or services. For instance, banks may incorporate Internet banking for capital-labour trade-offs to improve overall efficiency.

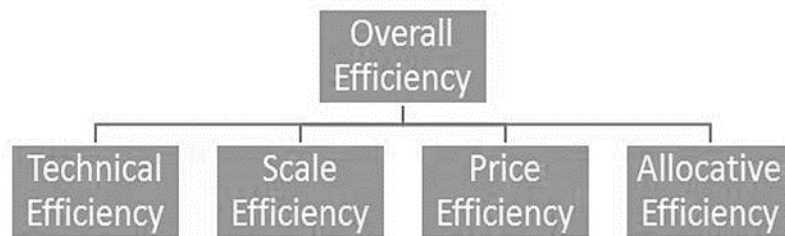


Figure 1: Components of Efficiency Classification

3.2 Model specification:

To compute efficiency scores for individual banks operating in Pakistan during 2004-2015, we used the input oriented CCR model. This model provides an overall technical efficiency score which highlights the ability of the bank to reduce the inputs by retaining the same level of output.

The input oriented CCR model is formulized as follows:

Notation

x = input

y = output

n = number of banks

m = number of inputs

s = number of outputs

$j = 1, 2, 3 \dots r$

$i = 1, 2, 3 \dots m$

$r = 1, 2, 3 \dots s$

The technical efficiency of the k^{th} bank can be obtained by solving the following linear programming problem.

$$TE_k = \text{minimize } \theta_k$$

Subject to:

$$\text{Input Constraints: } \sum_{j=1}^n \delta_j x_{ij} \leq \theta_k x_{ik} \quad i = 1, 2, 3 \dots m \quad \dots (3)$$

$$\text{Output Constraints: } \sum_{j=1}^n \delta_j y_{rj} \geq y_{rk} \quad r = 1, 2, 3 \dots s \quad \dots (4)$$

$$\delta_j \geq 0$$

The input-oriented CCR model offers a method to assess the technical efficiency of a DMU, denoted as "k," compared to other DMUs. This evaluation is based on the ability of the DMU to utilize its inputs efficiently to generate outputs, while considering the performance of all other DMUs in the sample. The resulting optimal value of θ_k , known as the technical efficiency score (TE_k), ranges from 0 to 1, where a TE_k of 1 indicates that the DMU is fully efficient. For example, a TE_k of 0.8 implies that the k^{th} bank can lower its input usage by 20% while maintaining the same level of output, indicating a 20% level of technical inefficiency.

3.3 Tobit regression:

The Tobit Model, developed by James Tobin in 1958, is an econometric model used to estimate the relationship between independent variables and a dependent variable that is subject to censoring. The term "Tobit" combines "Tobin" and "Probit,"

resulting in "Tob-it" or Tobin's Probit model. The Tobit Model is commonly referred to as a censored regression model and can be employed to estimate models with a censored dependent variable that may have upper, lower, or both limits in the model.

ESTIMATION

Consider the following model:

$$Y_i = \beta_0 + \sum_{j=1}^k \beta_j X_{ij} + U_i \quad \dots (5)$$

$$\text{Where, } Y_i = \begin{cases} C_u : \text{if } Y_i = C_u \\ Y_i^* : \text{if } C_L < Y_i < C_u \\ C_L : \text{if } Y_i = C_L \end{cases} \quad \dots (6)$$

The above model is a censored model because the dependent variable has upper and lower limits, i.e., it is censored from above as well as from below.

Afterward, the likelihood function is maximized in order to find the values for the coefficients and variance of the explanatory variables based on the observed values of the explanatory variables and the DEA scores:

$$L = \left(\frac{1}{\sigma\sqrt{2\pi}}\right)^{n_1} e^{-\frac{1}{2\sigma^2} \sum_{i=1}^{n_1} (C_L - \beta_0 - \sum_{j=1}^k \beta_j X_{ij})^2} \cdot \left(\frac{1}{\sigma\sqrt{2\pi}}\right)^{n_2} e^{-\frac{1}{2\sigma^2} \sum_{i=1}^{n_2} (Y_i - \beta_0 - \sum_{j=1}^k \beta_j X_{ij})^2} \cdot \left(\frac{1}{\sigma\sqrt{2\pi}}\right)^{n_3} e^{-\frac{1}{2\sigma^2} \sum_{i=1}^{n_3} (C_u - \beta_0 - \sum_{j=1}^k \beta_j X_{ij})^2} \quad \dots (7)$$

Where n_1 = number of items with the value of lower limit.

n_2 = number of items with the value between C_L and C_u .

n_3 = number of items with the value of upper limit.

Above equation can also be written as:

$$L = \left(\frac{1}{\sigma\sqrt{2\pi}}\right)^{n_1} e^{-\frac{1}{2\sigma^2} \sum_{i=1}^{n_1} (C_L - \beta_0 - \sum_{j=1}^k \beta_j X_{ij})^2} + \sum_{i=1}^{n_2} (Y_i - \beta_0 - \sum_{j=1}^k \beta_j X_{ij})^2 + \sum_{i=1}^{n_3} (C_u - \beta_0 - \sum_{j=1}^k \beta_j X_{ij})^2$$

Taking Log,

$$\begin{aligned} \log L = & \frac{-n}{2} \log \sigma^2 + n \log \frac{1}{\sqrt{2\pi}} - \frac{1}{2\sigma^2} \sum_{i=1}^{n_1} (C_L - \hat{\beta}_0 - \sum_{j=1}^k \hat{\beta}_j X_{ij})^2 + \sum_{i=1}^{n_2} (Y_i - \hat{\beta}_0 - \sum_{j=1}^k \hat{\beta}_j X_{ij})^2 \\ & + \sum_{i=1}^{n_3} (C_u - \hat{\beta}_0 - \sum_{j=1}^k \hat{\beta}_j X_{ij})^2 \quad \dots (8) \end{aligned}$$

Maximizing this log-likelihood function with respect to σ^2 , $\hat{\beta}_0$ and $\hat{\beta}_j$, we will get the maximum likelihood estimates of population parameters using the Tobit Model.

The extended equations used in this study including the DEA scores as the dependent variables are:

$$TE_{it} = \alpha + \beta_1 RoA_{it} + \beta_2 RoE_{it} + \beta_3 Size + \beta_4 Divers_{it} + \beta_5 Dummy + \varepsilon_{it} \quad \dots (9)$$

$i = 1, 2, 3 \dots n; t = 1, 2, 3 \dots T$

Where **TE_{it}** (Technical Efficiency), also known as global efficiency measures, the ability of banks to produce actual outputs with fewer inputs, or fewer resources indicates higher efficiency (Othman et al. 2016),

ROA_{it} (return on assets) gives an idea as to how efficient management is in using its assets to generate profit. The expected sign between ROA and TE is positive since more efficient banks generate higher returns (Jackson n.d.). ROA is measured as the ratio of 'operating profits before tax' to 'total assets'.

ROE_{it} (return on equity) is the amount of net income returned as a percentage of the shareholder's equity, in another word, ROE, reveals how much profit a bank generates with the money shareholders have invested, there exists a positive relationship between ROE and TE, the higher the ROE will show more of the TE. **Size** is the logarithm of total assets, larger banks could pay less for their inputs than their counterparts, and that there could be increasing returns to scale through the allocation of fixed cost (Garza-Garcia n.d.). **Dives_{it}** is the diversification indicator which is the provision of product and services by the financial institutions defined as:

$$1 - HHI = 1 - \left[\left(\frac{NON}{NETOP} \right)^2 + \left(\frac{NET}{NETOP} \right)^2 \right] \quad \dots (10)$$

where $NETOP = NON + NET$; NON is non-interest income; NET is net-interest income; and $NETOP$ is bank net operating revenue (Othman et al. 2016).

And Dummy variable is reflecting 0 if the bank is conventional and 1 if its Islamic.

3.4 Data Sources and Choice of Variables:

The literature on banking presents a significant level of inconsistency regarding the conceptualization of banking activities and principles, as well as the explicit definition and measurement of inputs and outputs in the banking sector. This divergence of opinions and approaches among scholars highlights the complexity of the banking industry and underscores the need for a unified conceptual framework for evaluating banking performance.

One of the primary challenges in banking research pertains to the treatment of bank deposits. A long-lasting debate in the literature surrounds the input-output status of deposits (Garza-Garcia n.d.). There are many approaches which are dealing with this problem, the production and intermediation approaches are the best-known ones and the most used in the quantification of bank efficiency (Hauner and Peiris n.d.).

Intermediation approach refers to when banks function as financial intermediaries where financial assets are transferred from surplus units to deficit units. Following this approach, four inputs (staff numbers, deposits, interest expense, and non-interest expense) and three outputs (net loans, net interest income, and non-interest income) have been commonly used (Adrienne and Kevin n.d.). In the

production-type approach, also called value added or service provision approach, banks are considered as deposit and loan producers and it is assumed that banks use inputs such as capital and labor to produce a number of deposits and loans. This approach focuses only on operating cost and completely ignores interest expenses. (Stavárek 1934)

Berger and Humphrey conducted a study and concluded that the production perspective is more suitable for determining the efficiency of bank branches, while the intermediation perspective is more appropriate for assessing the efficiency of entire banks. Similarly, a review of DEA-related literature revealed that deposits are primarily treated as inputs, thus prioritizing the intermediation approach.

In our study on evaluating efficiency using DEA models, we collected data from secondary sources, specifically the annual Banking Statistics of Pakistan released through the State Bank of Pakistan's official website. To adjust for inflation, we deflated our price series variables using the CPI index from the State Bank of Pakistan's Handbook of Statistics.

We then selected the following input and output variables for our efficiency model.

Table 1: Input-Output Model

Inputs	Outputs
1. Employees	1. Advances
2. Fixed asset	
3. Loanable fund	2. Investment
4. Equity	

The efficiency scores obtained from this model capture the banks' ability to generate advances and investments using employees, fixed assets, loanable funds, and equity shares as inputs.

4. Empirical results:

4.1. Findings from DEA Analysis

Applying the aforementioned methodology, we proceeded to assess the efficiency score of each bank. Efficiency, in this context, denotes the bank's capacity to generate output with optimal use of input resources. To put it succinctly, efficiency is characterized by operational excellence in the process of resource allocation and utilization.

Table 2: Efficiency of the banking industry in Pakistan

Year	No. of Banks	Mean	S.D.	Min	Max	No. of efficient bank	% of efficient banks
2004	23	0.949	0.127	0.508	1	16	69.6
2005	24	0.944	0.127	0.455	1	14	58.3
2006	26	0.897	0.147	0.5	1	12	46.2
2007	31	0.945	0.115	0.402	1	17	54.8
2008	30	0.902	0.098	0.725	1	11	36.7
2009	31	0.889	0.128	0.608	1	9	29.0
2010	30	0.761	0.196	197	1	5	16.7
2011	33	0.484	0.242	0.136	1	4	12.1
2012	32	0.937	0.113	0.408	1	14	43.8
2013	32	0.916	0.172	0.082	1	15	46.9
2014	33	0.743	0.181	0.062	1	3	9.1
2015	32	0.813	0.218	0.052	1	10	31.3
Grand Mean		0.848					
Growth Rate		2.019					
Source: Author's estimation							

The table shows the results of the efficiency scores of Pakistani banks from 2004 to 2015. The mean efficiency score for the entire study period is 0.848, indicating that, on average, 15.2% more inputs are used than required, which indicates a significant waste of input resources. However, it is noteworthy that the trend in technical efficiency demonstrates an average growth rate of 2.01% per annum, suggesting that the efficiency of the Pakistani banking system is improving over time. Therefore, it can be concluded that while there is room for improvement, the overall efficiency of the banking system in Pakistan is increasing.

The study presents a comparison of the efficiency performance of two types of banking systems, namely, conventional and Islamic banking, in Pakistan. Table 2 presents the individual efficiency scores for both types of banks from the year 2004 to 2015. The comparison of the average efficiency scores reveals that Pakistani banks are performing better in terms of conventional banking compared to Islamic banking practices. The mean efficiency score for conventional banking is 0.855, whereas for Islamic banking, it is 0.795. This difference indicates that the wastage of resources under Islamic banking is greater than that of conventional banking. Furthermore, the comparison of growth rates reveals that conventional banking is growing at a better rate of around 2%, while Islamic banking's efficiency is growing at a rate of 1.83% per annum. This finding indicates that the conventional banking system is more efficient in utilizing resources than the Islamic banking system in Pakistan.

Table 3: Individual Efficiency (Conventional and Islamic Banks)

Conventional Banks					Islamic Banks			
Year	No. of Banks	Mean	S.D	No. of efficient bank	No. of Banks	Mean	S.D	No. of efficient bank
2004	22	0.951	0.129	16	1	0.899	0	0
2005	23	0.942	0.129	13	1	1	0	1
2006	24	0.912	0.137	12	2	0.717	0.196	0
2007	27	0.938	0.122	14	4	0.995	0.004	3
2008	26	0.911	0.093	10	4	0.84	0.123	1
2009	26	0.925	0.094	9	5	0.702	0.13	0
2010	25	0.761	0.196	5	5	0.635	0.143	0
2011	28	0.492	0.259	4	5	0.443	0.119	0
2012	27	0.946	0.118	13	5	0.888	0.068	1
2013	27	0.916	0.186	15	5	0.918	0.059	0
2014	28	0.751	0.192	4	5	0.7	0.111	0
2015	27	0.814	0.227	8	5	0.808	0.182	2
Grand Mean		0.855				0.795		
Growth Rate		2.001				1.833		
Source: Author's estimation								

Overall, the study suggests that the conventional banking system is more efficient in Pakistan, and there is a need to improve the efficiency of the Islamic banking system to reduce the wastage of resources.

4.2. Results of Tobit Analysis

In order to identify the determinants of efficiency, Tobit regression model is evaluated. The following table summarizes the results of these models.

Table 4: Estimation results: Tobit model (n=348)

Variables	Coef.	t value	p> ItI
Size	.013	1.08	.280
RoA	-.024	-3.18	.002***
RoE	.004	3.14	.002***
Divers.	-.061	-1.20	.233
Dummy	-.087	-1.83	.068*
Cons	.725	3.10	.002***
Sigma	.276		
Pseudo R2	0.1159		
Log Likelihood	-127.0644		
Notes: *, **, *** represent significance at 10, 5, and 1% confidence intervals.			
Source: Author's estimation			

Table 4 presents the results of a Tobit regression model used to identify the determinants of efficiency. The dependent variable is the DEA score. The coefficient of each variable indicates the direction and strength of its association with efficiency. The results indicate that RoA and RoE are positively and significantly associated with efficiency, while Size and Diversification are not significant determinants. The Dummy variable suggests that conventional banks are more efficient than Islamic banks.

5. Summary and Conclusion

The given text presents the results of a study that aims to assess the efficiency of Pakistani banks from 2004 to 2015, using a methodology that measures the bank's capacity to generate output with optimal use of input resources. The study found that, on average, 15.2% more inputs were used than required, indicating a significant wastage of input resources. However, the trend in technical efficiency shows an average growth rate of 2.01% per annum, suggesting that the efficiency of the Pakistani banking system is improving over time.

The study also compared the efficiency performance of two types of banking systems in Pakistan: conventional and Islamic banking. The results showed that Pakistani banks are more efficient in terms of conventional banking than Islamic banking practices, with conventional banking growing at a rate of 2% per annum, while Islamic banking growing at a rate of 1.83% per annum. The study suggests that there is a need to improve the efficiency of the Islamic banking system to reduce the wastage of resources.

Furthermore, the study conducted a Tobit analysis to identify the determinants of efficiency. The analysis found that bank size, age, capital adequacy, and loan-to-deposit ratio have a significant impact on bank efficiency.

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