Study on Bank Efficiency in Bangladesh: A Panel Data Analysis

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Abstract: **- This research aims to assess the efficiency of commercial banks in Bangladesh using a Z score methodology where Z score (efficiency ratio) is the dependent variable constructed by the proportion of total operating expenses and net operating income of banks. Z score is regressed on some other indices. Panel data estimation technique is used from 2015 to 2017. Two models are constructed in this regard while 6(six) explanatory variables comprise in model-1 and in model-2 an additional independent variable along with previous six variables is added. According to the fashion of panel data estimation, two effect models(fixed effect and random effect) are also estimated. For both models, the random effect is found to be suitable. According to the random effect, three variables have found to be a negative effect, and three variables have observed the positive impact on the Z score in model-1. By the same token in model-2 three indices have a negative, and four indices have a positive effect on the Z score. Remarkably GDP growth rate has found a profoundly positive impact of efficiency ratio in both models.**

Kew Words: **Z score, Panel Data Analysis, Efficiency**

I. INTRODUCTION

Banks are the financial institution mobilizes the deposits of the customer in different productive sector playing a pivotal role in the economy. The dynamic banking sector can face the adverse shocks of the economy and keep the financial system stable which promotes economic growth(Islam & Rana, 2017). On the other hand, bankruptcies may lead to a crisis which has a sluggish effect on the overall economy. Measuring efficiency is essential to evaluate the performance of banks in a country. Bank efficiency has been a central concern for depositors, regulators, customers, and investors. Researchers have used different methods to check bank efficiency over the world. Several studies examine bank stability, bank profitability, bank performance, etc. using different variables. Bank's total income, operating income, operating expense, net profit after tax, total cost, return on asset (ROA), etc. are found as a controlled variable to evaluate the bank stability/ profitability/performance/efficiency in different sophisticated research. Since the financial activities and services of banks increasing, the bank's efficiency determination is essential for the economy. A large amount of deposit, high level of profitability, and quality service of the customer, the higher compatible and safe environment might be expected if the banking system is proficient(Berger, Hunter, & Timme, 1993).

There are several methods to evaluate the bank's efficiency. Scrutiny of the financial index is the most popular for analyzing the bank's efficiency, but these indices can be enormous in number that interprets findings more difficult(Wozniewska, 2008). Data envelopment analysis (DEA) is a non-parametric technique used to estimate the production frontier as a measure of productive efficiency. For a set of the frontier, observations are those for which any other decisions making a unit has not as many or more of each output or as little or less of each input(Berger & Humphrey, 1997). A particular case of the DEA method is Free Disposal Hull (FDH) where the connectors of DEA peaks are comprised in the frontier. DEA and FDH are non-parametric approaches. Now some parametric approaches are discussed. The Stochastic Frontier Approach (SFA) marked a functional form for the cost, production or profit association among variables and permitted random disturbance term. In this method, the firm's inefficiency has been used as a conditional mean of the distribution under a given level the composed error term (Berger & Humphrey, 1997). Considering the estimated inefficiencies as random error Thick Frontier Method (TFA) states a function while inefficiencies are measured by the difference between highest and lowest quartiles of relative values. (Berger & Humphrey, 1997).

Up to September 30, 2018, six state-owned banks, two specialized banks, 32 private domestic banks (excluding Islamic banks) and eight private Islamic banks are operating in Bangladesh (Bangladesh Bank, 2018). In this period the total number of branches stood at 10,159 including Islamic windows, different service center, head office, and foreign bank's branch. The banking sector in Bangladesh has expanded for the years in terms of a higher quantity of institutions, a more substantial amount of financial tools and a more significant amount of resources. Total deposits of all scheduled banks were BDT 1036641.42 crore in January-March, 2018 quarter, in April-June, 2018 quarter it was BDT 822357.99 crore, and it is reached and BDT 1040038.72 crore by September 30, 2018. Scheduled banks investment is increased to BDT 194149.89 crore at the end of the quarter July-September, 2018 and which was BDT 193653.16 crore and BDT189381.59 crore in April-June 2018 and January-March 2018 quarter respectively(Bangladesh Bank, 2018). The total assets of all banks increased by BDT 13059.3 billion in 2017 from BDT 11626.8 billion in 2016(Bank, 2017-2018). Capital adequacy ratio was 9.3% in 2010 and at the end; in June 2018 it becomes 10%. Islamic banks are showing

strength in the banking sector also. In the 2018 fiscal year out of 57 banks, eight full-fledged Islamic banks, and 16 conventional banks were involved in Islamic banking through Islamic banking window. Total deposits of overall Islamic banking reached at BDT 2119.5 (21.08% of total deposit) by December 2017(Bank, 2017-2018).

II. OBJECTIVES OF THE STUDY

The present investigation aims to examine the effects of different indices on the bank's efficiency in Bangladesh with panel data estimation techniques and mixed models. To determine an appropriate model for an estimate of the bank efficiency is also studied here. Nine(9) commercial banks are selected in this regard.

III. LITERATURE REVIEW

Several empirical analysis of the bank's efficiency exists over the world, and this study refers to some of them:

Altman (1968)found a positive effect of market concentration, bank size, and GDP on bank efficiency whereas competition, liquidity risk has a negative impact. Their study conducted on six emerging Asian countries for the period 2005 to 2012. Their results also exhibit that the Philippines have the highest average efficiency score (0.972) where Bangladesh has 0.863 score in the study period.

Among the different methods DEA approach provide a meaningful insight to locate inefficient branches(Sherman & Gold, 1985). The results suggest that DEA is advantageous to other approaches for developing branch efficiency of bank and found 6 branches are inefficient out of 14 branches. This study also suggests some shortcoming of the DEA method say, DEA cannot specify the cause of inefficiencies and fail to suggest remedial measures.

Berger and Humphrey (1997)investigate bank profitability using different banking and macroeconomic indicators in Bangladesh. Their estimated results suggest that capital strength, loan intensity positively can cost efficiency, and off-balance sheet activities negatively influence the bank profitability.

Grigorian and Manole (2002)were estimate the determinants of commercial bank efficiency of transition countries applying DEA methods. They found foreign ownership along with controlling power; restructuring, and consolidation positively affects the bank's efficiency.

Impact of privatization in banking sectors is determines by (Bonin, Hasan, & Wachtel, 2005) in six transition countries. Income balance sheet and stochastic frontiers are checked for the banks. Their analysis confirmed state-owned banks are less skilled than the foreign bank in the six transition countries. Finally, they showed that efficiency does not increase by voucher privatization and later privatized banks are less competent than newly privatized banks

Wozniewska (2008) checked the efficiency of polish banks ranging from period 2000-2007. Author computed biggest banks efficiency in Poland using the classical index of balance sheet characteristic and DEA method. The estimated result shows that the performance of all commercial banks in Poland is almost similar but not identical. The results produced by both ways are complementary, and DEA is more efficient for calculating bank efficiency.

Rahim, Hassan, and Zakaria (2012) compare the financial durability between conventional and Islamic banks in Malaysia using Z score and non-performing loan(NPL) as the dependent variable. The estimated result revealed that the Herfindahl index has a positive impact on Z score in both Islamic and conventional banks and negative impact on NPL. Loan asset ratio negatively influences the Z score of banks, but in NPL model it has a positive effect on Islamic banks but a negative impact on conventional banks. Real GDP has a positive impact on both model and both types of banks. The entire outcomes show that traditional banks are less stable than Islamic banks in Malaysia.

Abduh, Hasan, and Pananjung (2013)investigate the efficiency and performance of Islamic banks in Bangladesh. They used five Islamic banks from 2006 to 2010 using ratio analysis and DEA method. From ratio analysis, they conclude that Shajalal Islamic Bank limited shows better performance than other Islamic banks. From the consideration of efficiency, First Security Bank is more efficient than others.

Chieng (2013)like to check the socks of the global financial crisis of efficiency along with other factors in Bangladesh from 2000 to 2013. Using DEA method, their results exhibited the highest efficiency during 2001 and lowest during 2010. Bank size, capital adequacy ratio, return on average equality and real interest rate have a significant impact on Bank efficiency.

Řepková (2014)attemptedto check the efficiencies of Czech commercial banks to applying DEA method for panel data throughout the time 2003 to 2012. Average efficiency has found 70%-78% for constant return to scale and 84%-89% for variable return to scale. Surprisingly efficiency of the group of large banks has found lower efficient than other banks. Large banks had the excess deposit, and their operation was inappropriate which result in the inefficiency.

IV. METHODOLOGY

This study aims to apply an evolved model of Altman's namely the 'Z' score model(Altman, Hartzell, & Peck, 1998). Altman divides the banks into bankrupt and non-bankrupt groups which are mutually exclusive(Altman, 1968). He developed an evaluation using different variables/ratios and the result of the combination of variables known as the Z score(Altman, 1968). The original Altman model took the following form:

$$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$$

Where, X_i = Different ratios or indicators (like assets, income, cost, etc.)

Decision Rules for the model

1) If $Z > 2.99$ then banking industries are financially healthy and efficient to be found.
2) $Z > 1.81$denotes bank is in distress. It is a potential failure and inefficiency.
3) $1.80 < Z < 2.99$is denoted Gray zone or zone of ignorance. A bank should take measures to recovery these situations.

The previous model was used for the manufacturing firm, and the Z score method are updating different times by the different analysts. In 1995 (Altman et al., 1998) and 2013 (Altman, Danovi, & Falini, 2013) applied the following Z score model to check the health of banks in Italy:

$$Z = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$$

X_i =Different ratios or indicators (like assets, income, cost, etc.)

Decision rules are the same as the previous model.

4.1. Model and Data of the Study

In this study efficiency of Banks in Bangladesh is examined by Z-score methodology. The model is as follows:

$Z_{it} = \alpha_0 + \alpha_1 X_{1it} + \alpha_2 X_{2it} + \alpha_3 X_{3it} + \alpha_4 X_{4it} + \alpha_5 X_{5it} + \alpha_6 X_{6it} + \varepsilon_{it}$[i =Cross Section, t = Time]

Where

$Z = Efficiency\ Ratio = \frac{Total\ \ Operating\ \ Expenses\ \ of\ Bank}{Net\ \ Operating\ \ Income\ \ of\ Bank}$

$X_1 = ln\ (Total\ Asset\ of\ Bank)$

$X_2 = \frac{Total\ loan\ of\ Bank}{Toatl\ Asset\ of\ Bank}$

$X_3 = \frac{Total\ Cost\ of\ Bank}{Total\ Income\ of\ Bank}$

$X_4 = Market\ Share\ of\ Bank$

$X_5 = GDP\ growth\ rate$

$X_6 = Return\ on\ Assets\ Ratio$

$\varepsilon_{it} = Random\ Error\ term$

The study is used panel data[1]and at first author will check the panel least square estimation. After that, the Fixed effect and the Random effect is checked. The validity of these two effects is also examined by the Redundant Fixed Effects Test and the Hausman Test respectively. The data is gathered from the bank's annual reports for the period 2015-2017. Econometric software E-views is used to estimate the coefficients.

4.2. Knowledge about Fixed Effects Method and Random Effects Method

i) The Fixed Effects Method: A model with fixed effect characteristics is known as a fixed effect model. The intercept term is assumed to be differing in the model. The fixed effects model for the study-

$$Z_{it} = \alpha_0 + \alpha_1 X_{1it} + \alpha_2 X_{2it} + \alpha_3 X_{3it} + \alpha_4 X_{4it} + \alpha_5 X_{5it} + \alpha_6 X_{6it} + \varepsilon_{it}$$

Here constant slope-coefficient are existed for all the individuals and time, whereas intercept term α_0 is different for different cross-section but fixed in a different time. And the individual heterogeneity is captured by individual intercept term which is also known as the fixed effect.

ii) The Random Effects Method: If the individuals are selected randomly then the individual difference are treated by the random effects. One (1) degrees of freedom is used in the random effects as it estimates the effect in terms of variance. The random effect model in the study as-

$$Z_{it} = (\bar{\gamma}_0 + u_i) + \alpha_1 X_{1it} + \alpha_2 X_{2it} + \alpha_3 X_{3it} + \alpha_4 X_{4it} + \alpha_5 X_{5it} + \alpha_6 X_{6it} + \varepsilon_{it}$$

Where $\bar{\gamma}_0 + u_i = \alpha_0$

$\bar{\gamma}_0$is the fixed part of the α_0 and u_i is the random error term which shows the difference between random individuals from the mean.

Following assumptions are followed by u_i

i) Zero mean value of $u_i, E(u_i) = 0$

ii) Variance of u_i are same, $var(u_i) = \sigma^2$

iii) Two error terms are uncorrelated, that is, $cov(u_i, u_j) = 0$. [Where $i \neq j$]

According to methodology author first operate the panel least square estimation and then use Redundant Fixed Effects Test to check the heterogeneity within the model. If the null hypothesis (H_0 = Panel estimation is suitable) rejected, then we have to conduct another test named the Hausman Test. This test is used to detect the appropriate model from the random effect model and the fixed effect model. Where hypothesizes are:

H_0: Random effect model is suitable

H_1: Fixed effect model is suitable

4.3. Regression Outcomes

[1]specifies to samples of the identical cross-section units accomplished at different points in time.

Table-1 reports the estimate of panel least square, fixed effect, and random effect model:

Table-01: Estimated Result for Model 1			
Variable(s)	Panel Least Square Estimation	Fixed Effect Model	Random Effect Model
C	*8.763071* *(2.278918)* *[0.0338]*	*0.564128* *(0.0822710* *[0.9358]*	*4.574105* *(1.025681)* *[0.3173]*
X_1	*-0.805276* *(-2.056150)* *[0.0531]*	*-0.261472* *(0.7293)* *[-0.354232]*	*-0.477653* *(-1.021304)* *[0.3193]*
X_2	*-5.870514* *(-4.847740)* *[0.0001]*	*-0.825987* *(0.4858)* *[-0.719222]*	*-2.670921* *(0.0108)* *[-2.810106]*
X_3	*0.257868* *(2.796974)* *[0.0111]*	*0.714462* *(0.0002)* *[5.139663]*	*0.345263* *(3.675854)* *[0.0015]*
X_4	*16.19959* *(2.235161)* *[0.0370]*	*-10.54096* *(0.6269)* *[-0.498808]*	*7.171654* *(8.724378)* *[0.4208]*
X_5	*0.0016* *(3.656296)* *[80.59720]*	*55.44012* *(2.340717)* *[0.0373]*	*53.62793* *(2.931840)* *[0.0082]*
X_6	*-13.29575* *(-1.502597)* *[0.1486]*	*-15.54061* *(-2.379523)* *[0.0348]*	*-17.50526* *(0.0101)* *[-2.843020]*
() indicates t value, [] indicates p value			

In panel least square estimation total asset of the bank (X_1), loan asset ratio (X_2), cost-income ratio (X_3), and market share of bank (X_4) are found significant, and the estimated values are found $-0.8052, -5.8705, 0.2578, 16.1995$ respectively. On the other hand GDP growth rate (X_5) and return on asset ratio (X_6) are found to be insignificant.

X_1, X_2, X_4 and X_6 variables have a negative impact on the dependent variable, but these variables have to be found insignificantwhile the cost-income ratio(X_3) and GDP growth rate(X_5) positively motivate the Z score in fixed- effect model and they are also significant at 5% level of significance. The coefficient of GDP growth rate indicates that, one unit change in GDP growth rate is leading to the change in Z score by 55 units. In random-effects modelX_1, X_2 and X_6 variables have negative coefficient and X_3, X_4 and X_5 have a positive impact on Z score where $X_3$and X_5 are significant at 5% level of significance. The estimated factor of cost-income ratio(X_3) and GDP growth rate(X_5) are found 0.3452 and 53.6279 respectively in the random effect model.

Now the author turns to check the acceptability of different regression.

First, Redundant Fixed Effects Tests is used to examine the suitability of panel estimation. Where the hypothesizes are

Null Hypothesis, H_0: Panel estimation is suitable

Alternative Hypothesis, H_1: Panel estimation is not adequate

Table-02 shows the important result of Redundant Fixed Effects Test.

Table-02: Redundant Fixed Effects Test for Model-1			
Effects Test	Statistic	Degrees of Freedom	P-value
Cross-section F	12.928079	(8,12)	0.0001
Cross-section Chi-square	61.120201	8	0.0000

According to the result of the cross-section chi-square statistic, the null hypothesis is rejected at all level, i.e., panel least square estimation is not suitable and biased due to the presence of heterogeneity. Now author will check which effect is appropriate. For this purpose, the Hausman Test is conducted. Table-03 expresses the results of the Hausman Test to detect a suitable model from Random effect and fixed effect model. Where the hypothesizes are as below:

H_0: Random effect model is suitable

H_1: Fixed effect model is suitable

Table-03: Hausman Test for Model-1			
Test Summary	Chi-Sq. Statistic	Degrees of Freedom	P-value
Cross-section random	0.000000	6	1.0000

The estimated p-value for the chi-square statistic is 1.0000 which is indicated that null is not rejected at any level. That is the random effect is suitable, alternatively fixed effect is not a suitable model in this study.

Now the second model is considered where the dependent variable is the same, and a new independent variable is added along with the previous variables, as:

$$Z_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \vartheta_{it}$$

Where X_1 to X_6 be represent the same variables as Model-1 and $X_7$is represent equity asset ratio.

All tests and hypothesizes are calculated in Model-2 by the same procedures of Model-1. The regression technique regarding fixed effects model and random effects model the same as the previous Model-1 and intercept coefficient for the random effect are as follows:

$\beta_0 = \bar{\delta}_0 + \tau_i$where, $\bar{\delta}_0$ is the fixed part of the β_0 and τ_i is the random error term. The estimated results of Model-2 are reported in Table-4:

Table-4: Estimated Result for Model-2			
Variable(s)	Panel Least Square Estimation	Fixed Effect Model	Random Effect Model
C	*8.741955* *(2.220806)* *[0.0387]*	*-3.186874* *(-0.540684)* *[0.5995]*	*1.331166* *(0.306605)* *[0.7625]*
X_1	*-0.831375* *(-2.027265)* *[0.0569]*	*-0.015844* *(-0.025489)* *[0.9801]*	*-0.402113* *(-0.896020)* *[0.3815]*
X_2	*-5.912636* *(-4.740258)* *[0.0001]*	*-0.847393* *(-0.887120)* *[0.3940]*	*-1.742637* *(-2.063389)* *[0.0530]*
X_3	*0.278930* *(2.375804)* *[0.0282]*	*0.734305* *(6.336525)* *[0.0001]*	*0.533469* *(5.627131)* *[0.0000]*
X_4	*16.67861* *(2.198497)* *[0.0405]*	*-15.74281* *-0.889577* *0.3927*	5.034717 (0.576571) [0.5710]
X_5	*84.33935* *(3.275294)* *[0.0040]*	*61.39535* *(3.094431)* *[0.0102]*	66.83079 (3.867876) [0.0010]
X_6	*-15.55010* *(-1.324095)* *[0.2012]*	*-26.66611* *(-3.809189)* *[0.0029]*	-29.45117 (-4.423213) [0.0003]
X_7	*1.237808* *(0.301531)* *[0.7663]*	*8.095619* *(2.519377)* *[0.0285]*	8.926575 (3.040839) [0.0067]
() indicates t value, [] indicates p value			

The panel Least Square Estimation result, reveal that $X_2, X_3, X_4$and X_5 variables are significant at 5% level and X_1 variable is significant at 10% level. X_6andX_7 variables are insignificant which imply ROA and Equity Asset ratio do not influence the efficiency of the banks. However total asset and loan asset ratio has a negative impact on Z score in panel least square estimation. The estimated results of the fixed effect model are showed that $X_3, X_5, X_6$and X_7 are significant and others are insignificant.

Table-05 shows the Redundant Fixed Effects Test, and according to p-value the null hypothesis is rejected, and panel estimation is not suitable.

Table-5: Redundant Fixed Effects Test for Model-2			
Effects Test	Statistic	Degrees of Freedom	P-value
Cross-section F	19.382972	(8,11)	0.0000
Cross-section Chi-square	73.290869	8	0.0000

The Hausman test results are reported in Table-06 which represent that the null hypothesis cannot be rejected and we can conclude that appropriate effect is random effect for Model-2. Therefore for both model suitable model is the random effect model.

Table-06: HausmanTest for Model-2			
Test Summary	Chi-Sq. Statistic	Degrees of Freedom	P-value
Cross-section random	0.000000	7	1.0000

In Model-2 according to the random effect loan asset ratio (X_2), cost-income ratio (X_3), GDP growth rate (X_5) , return on asset ratio(X_6), and equity asset ratio(X_7) variables are significant at 5% level while total asset of bank(X_1)and market share of bank(X_4) are found to be insignificant. Loan-asset ratio and return on asset have a negative influence on efficiency ratio; their estimated coefficients are found to be -1.7426 and -29.4511 respectively. Cost-income ratio, GDP growth rate, equity asset ratio have a positive impact on efficiency ratio, and their coefficients are calculated $0.5334, 66.8307, 8.9265$ respectively.

V. CONCLUSION

The main aim of this study is to check the effect and validity of different indices on bank efficiency using panel data estimation technique and choose the best effect model. Two models and panel data for the period 2015-2017 have been used in this regard. In the first model, six indices are used as explanatory variables and in the second model along with the previous six an additional variable is included to check the efficiency. In both model some variables are found a negative impact on Z score and another have found positive, some variables are significant and some other found insignificant. Using Redundant fixed effect test and Hausman test random effect model is found suitable to analyses the efficiency of banks in Bangladesh in the study period. The remarkable findings of this study are that the GDP growth rate has a big positive and significant impact on efficiency.

REFERENCES

[1] Abduh, M., Hasan, S., & Pananjung, A. (2013). Efficiency and performance of Islamic Banks in Bangladesh. *Journal of Islamic Banking and Finance, 30*(2), 94-106.

[2] Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The journal of finance, 23*(4), 589-609.

[3] Altman, E. I., Danovi, A., & Falini, A. (2013). Z-Score Models' application to Italian companies subject to extraordinary administration. *Journal of Applied Finance (Formerly Financial Practice and Education), 23*(1).

[4] Altman, E. I., Hartzell, J., & Peck, M. (1998). Emerging market corporate bonds—A scoring system *Emerging market capital flows* (pp. 391-400): Springer.

[5] Bank, B. (2017-2018). Annual Report (Vol. chapter 5).

[6] Berger, A. N., & Humphrey, D. B. (1997). Efficiency of financial institutions: International survey and directions for future research. *European journal of operational research, 98*(2), 175-212.

[7] Berger, A. N., Hunter, W. C., & Timme, S. G. (1993). The efficiency of financial institutions: A review and preview of research past, present and future. *Journal of Banking & Finance, 17*(2-3), 221-249.

[8] Bonin, J. P., Hasan, I., & Wachtel, P. (2005). Privatization matters: Bank efficiency in transition countries. *Journal of Banking & Finance, 29*(8-9), 2155-2178.

[9] Chieng, J. (2013). *Verifying the Validity of Altman's Z" Score as a Predictor of Bank Failures in the Case of the Eurozone.* Dublin, National College of Ireland.

[10] Grigorian, D. A., & Manole, V. (2002). *Determinants of commercial bank performance in transition: An application of data envelopment analysis*: The World Bank.

[11] Islam, M. A., & Rana, R. H. (2017). Determinants of bank profitability for the selected private commercial banks in Bangladesh: a panel data analysis. *Banks and Bank Systems, 12*(3), 179-192.

[12] Rahim, S. R. M., Hassan, N. M., & Zakaria, R. H. (2012). *Islamic Vs. Conventional Bank Stability:'A Case Study Of Malaysia'.* Paper presented at the Presented Paper at 7th Malaysian National Economic Conference (PERKEM VII).

[13] Řepková, I. (2014). Efficiency of the Czech banking sector employing the DEA window analysis approach. *Procedia Economics and Finance, 12*, 587-596.

[14] Sherman, H. D., & Gold, F. (1985). Bank branch operating efficiency: Evaluation with data envelopment analysis. *Journal of Banking & Finance, 9*(2), 297-315.

[15] Wozniewska, G. (2008). METHODS OF MEASURING THE EFFICIENCY OF COMMERCIAL BANKS: AN EXAMPLE OF POLISH BANKS. *Ekonomika/Economics, 84*.