Volume: 5, Issue: 12
Page: 52-62
2021

International Journal of
Science and Business
Journal homepage: ijsab.com/ijsb

IJSAB International

Measurement and Comparison of the Financial Soundness of Conventional and Islamic Commercial Banks in Bangladesh using the Altman's Z Score Model

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Abstract

The prime objective of the paper is to measure and compare the financial soundness of conventional and Islamic commercial banks in Bangladesh and to suggest ways to improve the financial status of both categories of banks. Altman's z-Score model is used to measure and predict the financial soundness of selected banks while an independent sample t-test is also used to measure the gap in financial soundness between conventional and Islamic commercial banks. This study uses secondary data and covers ten years study period of 2010-2019. The major finding of the study is that all conventional and Islamic commercial banks are in safe zone during the study period. Only First security Islamic bank ltd. was in the gray zone in 2010 but successfully recovered in the later period. This study also finds that conventional commercial banks are better in terms of financial health than Islamic commercial banks but this difference in financial soundness is not statistically significant.

IJSB
Accepted 18 December 2021
Published 23 December 2021
DOI: 10.5281/zenodo.5800454

Keywords: *Financial soundness, conventional and Islamic commercial banks, Altman Z-score, Independent t-test.*

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1.0 Introduction

The bank is the most vital player in the financial system of Bangladesh. There are four types of banks that run in Bangladesh under the supervision of Bangladesh bank and according to the Bangladesh bank order 1972 and the bank company act 1991. The categories are State-owned commercial banks (SOCBs), Specialized Banks (SDBs), Private Commercial Banks (PCBs), and Foreign Commercial Banks (FCBs). Private commercial banks are two groups, one is conventional private commercial banks another is Islamic Shariah-based banks. There are 6 state-owned commercial banks (SOCBs), 3 specialized Banks (SDBs), 43 private Commercial Banks (PCBs) including 33 conventional commercial banks and 10 Islamic commercial banks, and 9 foreign Commercial Banks (FCBs) (www.bb.org.bd). The study only covers private commercial banks, 5 from conventional commercial banks, and 5 from Islamic commercial banks operating in Bangladesh. The health of the economy is largely dependent on the banking sector. Therefore, it is inevitable to maintain the financial soundness of banks to ensure a sound economic condition of the country. Therefore, it is also important to assess periodically the financial status of the banks in Bangladesh. Several methods are available to predict and evaluate the financial condition of banks. Altman's Z score model is one of the widely used multiple discriminate analysis models to predict the financial status of both manufacturing and non-manufacturing companies. In this study, Altman's Z score model (Emerging market non-manufacturing companies) is used to calculate and predict the financial condition of the banks selected. This study will help different stakeholders like government, investors, shareholders, creditors, clients, regulatory bodies, tax authority and other financial & non-financial institutions, etc.

2.0 Literature review:

According to Verlekar & Kamat (2019), finding accurate strategies to anticipate bankruptcy is critical to avoiding the danger of bank collapse. The goal of their research is to examine and compare the Springate, Zmijewski, and Grover models in order to assess the insolvency of Indian banks. The study shows that the recalibrated Grover model outperforms the original model by changing coefficients of the original models using current data through multiple regression techniques; however, the original model outperforms the recalibrated model in the case of the Springate and Zmijewski model. Erari et al. (2013) used CAEL, Z score, and bank-o-meter to assess the accuracy and precision of the financial ratio analysis model to evaluate Bank Papua's financial performance from 2003 to 2003. The results demonstrate that the CAEL model and Bank-o-Meter both agreed that Bank Papua was healthy from 2003 to 2011, was highly liquid, had sufficient capital, was able to handle liabilities well, had a solid revenue, and had good assets quality, but nevertheless had inefficiencies. In 2007, and 2011, the Z-score methodology drove Bank Papua into the gray zone, and the bank went insolvent due to a lack of liquidity and capital. These findings support previous research that says the Z-Score model is not suited for use in banking, but that using it as a preventive tool in analyzing a bank's financial performance is encouraged, since it may be useful in financial management.
Show the points that correspond to the findings of the preceding three models' analyses, indicating that Bank Papua is profitable.

Wati et al. (2015) employed the X-Score (Zmijewski), Y-Score (Ohlson), and Z-Score (Altman) prediction models to quantify financial performance. Bank prediction models such as the X-Score (Zmijewski), Y-Score (Ohlson), and Z-Score (Altman) are commonly used to assess the financial performance and health of financial institutions. Six listed and three non-listed banks from the Indonesia Stock Exchange were used as samples in this study. Listed firms are thought to have high financial performance, whereas delisted companies are thought to have bad financial performance.

During the research period, only a few listed banks were determined to be in the gray region, and not all listed banks were found to be operating in a solid financial position. Their research also demonstrates that not all delisted banks have bad financial performance. From 2011 to 2018, Prasetyo et al. (2019) assessed the accuracy of a financial distress prediction model in Indonesian Exim banks. The Altman model comparison model, the Springate model, and the Zmijewski model were used to find a substantial difference between the Altman model comparison model, the Springate model, and the Zmijewski model. Their study also discovered that the Altman model outperforms the Springate and Zmijewski models in forecasting the likelihood of financial hardship in Indonesia Eximbank from 2011 to 2018. Using the CAMEL model, Mahmud and Rahman (2020) examined and compared the financial state of conventional and Islamic commercial banks operating in Bangladesh from 2015 to 2019. In this study, 17 conventional private commercial banks (PCBs) and 6 Islamic private commercial banks (PCBs) are considered. The research's conclusion is that throughout the study period, none of the banks were determined to be strong or adequate in terms of financial performance soundness. An independent T-test is utilized to see if there is a significant difference in CAMEL parameters between conventional and Islamic PCBs. In addition, there was no significant difference in the average CAMEL ratings for both forms of banking in Bangladesh, according to this study.

Parvin et al. (2016) used Altman's Z-score and an independent T-test to find that state-owned banks have superior financial health than private commercial banks, and that the difference in financial soundness is statistically significant. In the year 2017-1-2018 in Bangladesh, Rahman et al. (2020) did their study using Altman's Z-score and found that 95 percent of the selected non-bank financial firms were in distress and just 5% were in the safe zone. According to Permata & Purwant (2018), banks listed on the Indonesia Stock Exchange (IDX) from 2012 to 2015 were sound according to the Bank-o-meter model but unsound or in the gray zone according to Altman's Z-score, however the CAMEL model suggests a broad range of soundness. The Altman, Shirata, Springate, Ohlson, Zmijewski, CA Score, Fulmer, and Mckee Genetic Models were reviewed by Rana et al. (2020) for its application in predicting bankruptcy. They focused their research on five steel manufacturing businesses listed on the Dhaka Stock Exchange in Bangladesh. That research was conducted over a five-year period, from 2014 to 2018. The companies under examination were found to be unsound, and the Altman, Shirata, Ohlson, and CA Score models predict that if the current scenario continues, these enterprises will go bankrupt. The Altman, Shirata, Ohlson, Fulmer, and CA score models are also successful in predicting bankruptcy, according to their research.

3.0 Objectives of the Study

i) To measure the financial soundness of selected conventional and Islamic commercial banks in Bangladesh.
ii) To compare the financial soundness of conventional and Islamic commercial banks in Bangladesh through Altman's Z score model.
iii) To suggest ways to improve financial status of both classes of banks.

4.0 Methodology of the Study

4.1. Data and Sample

Due to the similarity of establishment, rules, regulations, and practices, the research solely covers privately held commercial banks. There are 10 banks in the sample size, five of which are conventional commercial banks and five of which are Islamic commercial banks.

This research relies on secondary data. Secondary data is gathered from the audited financial statements of both kinds of banks for the period 2010-2019, including the Income Statement and Balance Sheet, Statement of Changes in Owners' Equity, and Cash-flow Statement. Websites and business publications are among the various data sources considered.

4.2 Techniques to be used

In Bangladesh, the financial soundness of both conventional and Islamic commercial banks is assessed using Altman's Z Score model or the Multiple Discriminant Analysis (MDA) model. To determine if there is a significant difference in financial soundness between conventional and Islamic commercial banks, an independent sample t-test is performed.

Altman's Z Score Model or Multiple Discriminant Analysis (MDA) model

The Altman's Z score model is a tool for determining a company's financial health and the likelihood of bankruptcy. It was initially developed in 1968 by Edward Altman, a professor at New York University. Altman's Z score is based on a number of fundamental financial parameters and is a useful tool for credit analysts and investors. Liquidity, profitability, leverage, solvency, and activity are all measured using the model's specified ratios. The Altman's Z score model is a method for determining a company's financial health and bankruptcy risk. It was created in 1968 by New York University professor Edward Altman.
Altman's Z score is a credit analyst and investor assessment tool that is based on many key financial measures. Liquidity, profitability, leverage, solvency, and activity are all measured by the ratios used in the model. This model is generally acknowledged among credit risk analysts and investors, and it has shown to be quite reliable over time. Altman's Z score model was updated multiple times by the author. Altman (1968) introduced a multiple discriminant analysis model to forecast the financial health and bankruptcy status of publicly listed industrial companies in 1968. Z-score value of publicly traded manufacturing companies is calculated as bellows:

Z = 1.2*X1 + 1.4*X2 + 3.3*X3 + 0.6*X4 + 0.999*X5

Source: Altman (1968, pp. 603)
Where:
X1 = Working Capital/Total Assets
X2 = Retained Earnings/Total Assets
X3 = EBIT/Total Assets
X4 = Market Value of Equity/Total Liabilities
X5 = Net Sales/Total Assets
The explanation of the Altman Z-score Model for publicly traded manufacturing companies is as follows:

- Z-score > 3.0 – the company is in the 'Safe' Zone.
- Z-score between 2.7 and 2.99 – The Company is 'Grey' zone. This zone is known as an alert zone where precaution is necessary.
- Z-score between 1.8 and 2.7 – The Company is in the 'distress' zone. There is a good chance that the company will go bankrupt within 02 years.
- Z-score < 1.80 – Chance of financial distress is very high.

For the adaption of private firms, Altman (1983) altered the preceding model.
Altman changed the preceding equation by substituting the ratio of Book value equity/Total liabilities for the variable X4, which was previously computed with the ratio of Market value equity/Book value of total debt.

Z-score for Private Companies:
Z = 0.717X1+0.847X2+3.107X3 + 0.420X4+ 0.998X5
Source: Altman (1983, pp. 122)
Where:
X1 = Working Capital/Total Assets
X2 = Retained Earnings/Total Assets
X3 = EBIT/Total Assets
X4 = Book Value of Equity/Book value of Total Debt.
X5 = Net Sales/Total Assets
The result of the Altman Z-score Model for private companies is interpreted as follows:

- Z-score > 2.9 – The Company is considered in the 'Safe' Zone.
- Z-score between 1.23 to 2.9 – The Company is considered in the 'Grey' Zone.
- Z-score less than 1.23 – The Company is considered in the 'Distress' Zone.

Altman (1995) modified the model so that it can be used for emerging market non-manufacturing companies. Altman excluded variable X5 measured by sales / total assets and also changed the weights of the other four variables. The equation of the modified model is:
Z = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4
Source: Altman, Hartzell and Peck (1995, pp. 3)
Where:
X1 = Working Capital/Total Assets
X2 = Retained Earnings/Total Assets
X3 = EBIT/Total Assets
X4 = Market Value of Equity/Total Liabilities
The result of the Altman Z-score Model for emerging market economy non-manufacturing companies is interpreted as follows:

- Z-score > 2.6 – The Company is considered in the 'Safe' zone.
- Z-score between 1.1 to 2.6 – The Company is considered in the 'Grey' zone.
- Z-score < 1.1 – The Company is considered in the 'Distress' Zone.

In calculating the Z" Score for emerging countries, Altman (1995) proposed the addition of constant of +3.25 with the model of emerging market economy non-manufacturing companies to standardize the score. Thus, the z score model of emerging market companies (banks) takes the following form:

Z = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4+ 3.25

Where
X1 Working capital / total asset
X2 Retained earnings / total assets
X3 EBIT / total assets
X4 Market value of equity / total liabilities

5.0 Data Analysis and Interpretation
Multiple Discriminant Analysis (MDA) or Z-Score:

Table No. 1	MDA of Dutch Bangla Bank Ltd									
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
X1	-0.026	0.010	0.015	0.064	0.053	0.053	0.054	0.038	0.040	0.047
X2	0.009	0.014	0.017	0.019	0.016	0.017	0.020	0.018	0.027	0.027
X3	0.041	0.039	0.033	0.025	0.025	0.026	0.021	0.018	0.025	0.029
X4	0.489	0.283	0.158	0.121	0.106	0.098	0.094	0.106	0.089	0.098
Constant	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Z-score	3.90	3.92	3.79	4.02	3.93	3.93	3.90	3.79	3.86	3.94
Status	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

The table No. 1 shows the Z-score of Dutch Bangla Bank ltd over the period of 2010 to 2019. The z scores of the bank in the above-mentioned period were always above 2.60, which indicate the bank was in safe zone in terms of financial condition over the study period.

Table No. 2 MDA of Bank Asia Ltd

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
X1	-0.036	0.031	-0.049	0.062	0.037	0.047	0.025	0.027	0.035	0.030
X2	0.012	0.011	0.005	0.005	0.008	0.010	0.006	0.006	0.006	0.006
X3	0.040	0.034	0.036	0.033	0.032	0.027	0.023	0.023	0.026	0.026
X4	0.026	0.191	0.106	0.107	0.077	0.067	0.067	0.085	0.069	0.064
Constant	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Z-score	3.35	3.92	3.30	4.01	3.81	3.84	3.66	3.69	3.75	3.71
Status	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

The table No. 2 shows the z-score of Bank Asia Ltd. for the period 2010 to 2019. All the z scores over the period for this bank are above 2.60 that mean the bank has been able to maintain a safe financial status over the study period. The z-score for the bank are 3.35, 3.92, 3.30, 4.01, 3.81,3.84, 3.66, 3.69,3.75 and 3.71 for the period 2010 to 2019 respectively.

Table No. 3 MDA of Southeast Bank Ltd

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
X1	-0.041	0.078	-0.094	-0.092	0.034	-0.129	-0.115	0.072	-0.052	-0.031
X2	0.016	0.009	0.007	0.010	0.011	0.011	0.011	0.008	0.007	0.008
X3	0.051	0.038	0.029	0.030	0.035	0.031	0.029	0.027	0.026	0.021
X4	0.359	0.152	0.102	0.079	0.084	0.070	0.065	0.065	0.047	0.039
Constant	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Z-score	3.75	4.21	2.95	2.97	3.84	2.72	2.79	4.00	3.16	3.26

The table No. 3 shows the z scores the Southeast Bank Ltd. for the period 2010 to 2019. The z scores over the period are 3.75, 4.21, 2.95, 2.97, 3.84, 2.72, 2.79, 4.00, 3.16 and 3.26 respectively. The z scores of Southeast Bank over the period shows that the bank was safe in financial condition as all score were above 2.60.

Table No. 4 MDA of Prime Bank Ltd

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
X1	0.048	0.011	0.012	0.062	0.083	0.036	0.060	0.002	0.011	0.085
X2	0.018	0.014	0.009	0.005	0.007	0.007	0.007	0.004	0.006	0.007
X3	0.040	0.037	0.036	0.031	0.024	0.022	0.021	0.019	0.019	0.022
X4	0.397	0.192	0.160	0.121	0.088	0.077	0.074	0.110	0.075	0.069
Constant	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Z-score	4.31	3.82	3.77	4.00	4.07	3.74	3.89	3.52	3.55	4.05

The table No. 4 shows the z-scores of Prime Bank Ltd. for the period 2010 to 2019. The Z-Score over the period is 4.31, 3.82, 3.77, 4.00, 4.07, 3.74, 3.89, 3.52, 3.55, and 4.05 respectively. All the z scores over the study period are higher than 2.60 that indicate the safe financial status of the bank.

Table No. 5	Z-Score or MDA of Conventional Banks											
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Mean	Status
DBBL	3.901	3.922	3.790	4.025	3.930	3.932	3.904	3.793	3.861	3.942	3.90	Safe
Brac	4.875	3.346	3.046	3.296	3.460	3.596	3.797	4.048	4.039	3.994	3.75	Safe
Bank Asia	3.350	3.921	3.297	4.007	3.813	3.840	3.659	3.692	3.747	3.710	3.70	Safe
Southeast	3.752	4.208	2.955	2.967	3.836	2.722	2.794	3.996	3.156	3.258	3.36	Safe
Prime	4.307	3.821	3.765	4.005	4.069	3.739	3.886	3.522	3.549	4.048	3.87	Safe
Sample Average	4.037	3.843	3.371	3.660	3.822	3.566	3.608	3.810	3.671	3.790	3.718	Safe

The table No. 5 shows the sample average z scores of conventional banks. The sample average z-scores over study period are 4.037, 3.843, 3.371, 3.660, 3.822, 3.566, 3.608, 3.810, 3.671, and 3.790 respectively. The overall sample average of conventional banks in Bangladesh of this study is 3.718.The sample average z scores show that none of the z score is below 2.60, which confirms safe financial condition of selected banks over the study period.

Table No. 6	MDA of IBBL									
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
X1	0.045	0.048	0.087	0.015	0.043	0.060	0.057	0.054	0.049	0.048
X2	0.008	0.008	0.007	0.005	0.004	0.004	0.002	0.002	0.002	0.001
X3	0.029	0.033	0.032	0.026	0.024	0.020	0.018	0.019	0.020	0.019
X4	0.196	0.151	0.121	0.100	0.062	0.066	0.064	0.064	0.041	0.028
Constant	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Z-score	3.97	3.97	4.19	3.64	3.77	3.86	3.82	3.80	3.76	3.73
Status	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

The table No. 6 shows the Z-Scores the Islami Bank Bangladesh Ltd. for the period 2010 to 2019. The z scores over the period are 3.97, 3.97, 4.19, 3.64, 3.77, 3.86, 3.82, 3.80, 3.76, and 3.73 respectively. The z scores of Islami Bank Bangladesh Ltd. over the period shows that the bank was safe in financial condition as all the scores were above 2.60.

Table No. 7	MDA of EXIM									
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
X1	-0.121	-0.096	-0.105	-0.102	-0.140	-0.118	-0.118	-0.125	-0.101	-0.090
X2	0.019	0.017	0.015	0.012	0.009	0.008	0.006	0.004	0.004	0.006
X3	0.052	0.030	0.032	0.025	0.026	0.024	0.020	0.018	0.019	0.016
X4	0.412	0.222	0.145	0.085	0.068	0.051	0.062	0.079	0.049	0.035
Constant	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Z-score	3.31	3.11	2.97	2.88	2.61	2.72	2.70	2.65	2.78	2.82
Status	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

The table No. 7 shows the z scores the Exim Bank Ltd. for the period 2010 to 2019. The z scores over the period are 3.31, 3.11, 2.97, 2.88, 2.61, 2.72, 2.70, 2.65, 2.78 and 2.82 respectively. These z-scores clearly show a declining trend in financial status. However, the Z-scores of EXIM Bank Ltd. over the period shows that the bank was safe in financial condition as all the scores were above 2.60.

Table No. 8 MDA of FSIBL

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
X1	-0.224	0.511	0.527	0.042	0.022	0.024	0.035	0.027	0.013	0.009
X2	0.006	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002
X3	0.019	0.017	0.015	0.013	0.011	0.010	0.012	0.014	0.015	0.014
X4	0.206	0.103	0.056	0.040	0.034	0.024	0.032	0.033	0.024	0.020
Constant	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Z-score	2.14	6.84	6.88	3.66	3.52	3.51	3.61	3.57	3.47	3.43
Status	Gray	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

The table No. 8 shows the z scores the First Security Islami Bank Ltd. for the period 2010 to 2019. The z scores of this bank over the period are 2.14, 6.84, 6.88, 3.66, 3.52, 3.51, 3.61, 3.57, 3.47 and 3.43 respectively. This z score of 2010 was 2.14 that mean that the bank was grey zone but successfully recovered in later period. However, the z scores of First Security Islami Bank Ltd. over the period shows that except 2010 the bank was safe in financial condition as all the scores were above 2.60.

Table No. 9 MDA of SIBL

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
X1	0.035	0.046	0.082	0.045	0.041	0.027	0.024	0.018	0.016	0.015
X2	0.008	0.008	0.008	0.007	0.008	0.008	0.007	0.003	0.003	0.003
X3	0.030	0.033	0.031	0.023	0.026	0.027	0.025	0.022	0.020	0.018
X4	0.310	0.224	0.118	0.081	0.068	0.061	0.064	0.068	0.043	0.038
Constant	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Z-score	4.03	4.03	4.15	3.81	3.79	3.70	3.66	3.60	3.54	3.52
Status	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

The table No. 9 shows the z scores the Social Islami Bank Ltd. for the period 2010 to 2019. The z scores of this bank over the period are 4.03, 4.03, 4.15, 3.81, 3.79, 3.70, 3.66, 3.60, 3.54 and 3.52 respectively. The table also shows a declining trend of z-score over the period. However, the z scores of Social Islami Bank Ltd. over the period shows that the bank was safe in financial condition as all the scores were above 2.60.

Table No. 10 MDA of SJIBL

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
X1	0.016	0.019	0.038	0.030	0.050	0.061	0.015	0.014	0.018	0.030
X2	0.020	0.011	0.008	0.007	0.006	0.007	0.007	0.004	0.003	0.004
X3	0.045	0.028	0.033	0.021	0.018	0.017	0.018	0.016	0.019	0.022
X4	0.377	0.146	0.129	0.101	0.073	0.079	0.071	0.131	0.102	0.088
Constant	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Z-score	4.12	3.75	3.88	3.72	3.80	3.87	3.56	3.60	3.62	3.70
Status	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

The table No. 10 shows the z scores the Shah Jalal Islami Bank Ltd. for the period 2010 to 2019. The z scores of this bank over the period are 4.12, 3.75, 3.88, 3.72, 3.80, 3.87, 3.56, 3.60, 3.62 and 3.70 respectively. The table shows a declining trend in z-scores over the period. The z scores of Shah Jalal Islami Bank Ltd. over the period shows that the bank was safe in financial condition as all the scores were above 2.60.

Table No. 11	Z-Score or MDA of Islamic Banks											
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Mean	Status
IBBL	3.974	3.972	4.188	3.642	3.769	3.861	3.820	3.802	3.759	3.728	3.85	Safe
EXIM	3.306	3.110	2.974	2.883	2.607	2.718	2.696	2.647	2.776	2.819	2.85	Safe
FSIBL	2.145	6.841	6.879	3.663	3.515	3.506	3.607	3.566	3.466	3.426	4.06	Safe
SIBL	4.031	4.032	4.152	3.807	3.791	3.697	3.662	3.597	3.543	3.522	3.78	Safe
SJIBL	4.116	3.751	3.885	3.717	3.800	3.872	3.564	3.597	3.615	3.700	3.76	Safe
Sample Average	3.514	4.341	4.415	3.542	3.497	3.531	3.470	3.442	3.432	3.439	3.662	Safe

The table No. 11 shows the sample average z scores of Islamic banks. The sample average z-scores of Islamic banks over the study period are 3.514, 4.341, 4.415, 3.542, 3.497, 3.531, 3.470, 3.442, 3.432, and 3.439 respectively. The overall sample average of Islamic banks in Bangladesh according to Z-score of this study is 3.662. The sample average z scores Islamic banks show that none of the scores is below 2.60, which confirms safe financial condition of selected Islamic banks over the study period.

Table No. 12 Z-Score or MDA of Conventional and Islamic Banks

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Mean	Status
DBBL	3.901	3.922	3.790	4.025	3.930	3.932	3.904	3.793	3.861	3.942	3.90	Safe
Brac	4.875	3.346	3.046	3.296	3.460	3.596	3.797	4.048	4.039	3.994	3.75	Safe
Bank Asia	3.350	3.921	3.297	4.007	3.813	3.840	3.659	3.692	3.747	3.710	3.70	Safe
Southeast	3.752	4.208	2.955	2.967	3.836	2.722	2.794	3.996	3.156	3.258	3.36	Safe
Prime	4.307	3.821	3.765	4.005	4.069	3.739	3.886	3.522	3.549	4.048	3.87	Safe
IBBL	3.974	3.972	4.188	3.642	3.769	3.861	3.820	3.802	3.759	3.728	3.85	Safe
EXIM	3.306	3.110	2.974	2.883	2.607	2.718	2.696	2.647	2.776	2.819	2.85	Safe
FSIBL	2.145	6.841	6.879	3.663	3.515	3.506	3.607	3.566	3.466	3.426	4.06	Safe
SIBL	4.031	4.032	4.152	3.807	3.791	3.697	3.662	3.597	3.543	3.522	3.78	Safe
SJIBL	4.116	3.751	3.885	3.717	3.800	3.872	3.564	3.597	3.615	3.700	3.76	Safe
Sample Average	3.776	4.092	3.893	3.601	3.659	3.548	3.539	3.626	3.551	3.615	3.690	Safe

This table shows the sample average z scores of both conventional banks as well as Islamic banks. The sample average z scores for both conventional and Islamic banks for 2010 to 2019 are 3.776, 4.092, 3.893, 3.601, 3.659, 3.548, 3.539, 3.626, 3.551, and 3.615 respectively. The overall sample average according to Z-score of this study is 3.690. These sample average scores of the selected banks show that overall financial condition for all banks combined is safe as all the scores are above 2.60.

Comparison between conventional banks and Islamic banks according Altman z-score model given bellow:
This study developed the following hypothesis:
Ho: There is no difference in financial status between conventional and Islamic banks according to Altman Model.

Table No. 13		**Group Statistics**			
Bank_Type		N	Mean	Std. Deviation	Std. Error Mean
Z_Score	Conventional Banks	50	3.717757	.4027080	.0569515
	Islamic Banks	50	3.662350	.8004649	.1132028

The mean Z-score of Conventional and Islamic banks are 3.717757 and 3.662350 with standard deviation 0.4027080 and 0.8004649 respectively. This means both types of banks are financially safe according to Altman Z-score in terms of financial performance but conventional banks under the study are comparatively better than Islamic banks in financial soundness.

Table No. 14 **Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Z_Score	Equal variances assumed	1.926	.168	.437	98	.663	.0554077	.1267216	-.196067	.3068825
	Equal variances not assumed			.437	72.311	.663	.0554077	.1267216	-.197188	.3080039

Independent Sample Test shows that the p-value of Levene's Test for equality of variance is higher than 5% (.437>.05). So null hypothesis of equality of variance cannot be rejected. The p-value of the t-test for equality of means is higher than 5% (.663>.05). Therefore, we cannot reject the null hypothesis of no significant difference financial soundness between conventional banks and Islamic banks according to Altman model. Therefore, this study found that financial soundness of conventional bank is not significantly better than that of Islamic banks.

6.0 Findings, Recommendations and Conclusion:

The findings of Altman's Z score research demonstrate that all traditional banks studied from 2010 to 2019 had z scores more than 2.6, indicating that they are secure. During the research period, all Islamic banks were safe, with the exception of First Security Islamic Bank ltd., which was in the gray zone in 2010 but later became safe. The mean z score of conventional banks is higher than that of Islamic banks, according to an independent sample t test of Altman Z scores. This suggests that conventional banks' financial soundness is superior to that of Islamic banks. However, according to the Altman z score model, the difference in financial soundness is not statistically significant. The z scores of Islamic banks have been dropping during the research period. As a result, Islamic banks should place a greater emphasis on working capital management. It should also increase the efficiency of its earnings by investing in high-return initiatives and profitable businesses.

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Cite this article:

Shohel Rana & A.S.M. Kamruzzaman (2021). Measurement and Comparison of the Financial Soundness of Conventional and Islamic Commercial Banks in Bangladesh using the Altman's Z Score Model. *International Journal of Science and Business*, *5*(12), 52-62. doi: https://doi.org/ 10.5281/zenodo.5800454
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