

Karim, Md. Rezaul; Shetu, Samia Afrin; Razia, Sultana

Article

COVID-19, liquidity and financial health: Empirical evidence from South Asian economy

Asian Journal of Economics and Banking (AJEB)

Provided in Cooperation with:

Ho Chi Minh University of Banking (HUB), Ho Chi Minh City

Suggested Citation: Karim, Md. Rezaul; Shetu, Samia Afrin; Razia, Sultana (2021) : COVID-19, liquidity and financial health: Empirical evidence from South Asian economy, Asian Journal of Economics and Banking (AJEB), ISSN 2633-7991, Emerald, Leeds, Vol. 5, Iss. 3, pp. 307-323, <https://doi.org/10.1108/AJEB-03-2021-0033>

This Version is available at:

<https://hdl.handle.net/10419/334060>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

COVID-19, liquidity and financial health: empirical evidence from South Asian economy

COVID-19,
liquidity and
financial health

307

Md. Rezaul Karim

Accounting and Information Systems, University of Dhaka, Dhaka, Bangladesh

Samia Afrin Shetu

Tourism and Hospitality Management, University of Dhaka, Dhaka, Bangladesh, and

Sultana Razia

Accounting and Information Systems, University of Dhaka, Dhaka, Bangladesh

Received 5 March 2021
Revised 24 May 2021
Accepted 11 July 2021

Abstract

Purpose – The pandemic COVID-19 has affected every sector of an economy in every possible way. Banking sector of Bangladesh has been affected by it badly. The purpose of this paper is to find out the impact of COVID-19 on the liquidity and financial health of the listed banks in Bangladesh.

Design/methodology/approach – Liquidity ratios are calculated to measure the liquidity condition of the banks and revised Altman's Z-Score Model for non-manufacturing companies is used to measure the financial health. The ratios are compared before and during the COVID-19 periods to assess the impact.

Findings – The findings of this study indicate a deterioration of liquidity position and financial health of the listed banks after the emergence of this pandemic. Though the banks have poor liquidity ratios and financial health prior to the emergence of this pandemic, they have decreased more in the second quarter of 2020. Most of the banks have poor liquidity ratios and cash position. The listed Islamic Banks have poor financial health than the listed Commercial Banks and all the banks belong to the red zone in all the quarters.

Practical implications – The results of this study will have policy implications for companies and regulators of money market.

Originality/value – This paper is a pioneer initiative in assessing the impact of COVID-19 pandemic on liquidity and financial health based on empirical data.

Keywords COVID-19, Liquidity, Financial health, Z-Score

Paper type Research paper

1. Introduction

Banking sector is not growing with the remarkable growth of GDP; it is facing difficult time due to increasing size of non-performing loans which is a great threat for the economy (Islam, 2019). Many factors are responsible for this adverse situation. Due to poor liquidity management, banks are facing problems of liquidity crisis (Ugoani, 2015). Major liquidity crisis can occur due to coronavirus. People and companies may decide to reserve the money they have for their fear of not generating of new cash further.

When a financial institution lacks cash or easily-convertible-to-cash assets on hand to meet its short-term obligations, then the situation is called liquidity crisis (Chappelow, 2020). The crisis of liquidity can lead to huge loan defaults and even bankruptcies. Liquidity is

© Md. Rezaul Karim, Samia Afrin Shetu and Sultana Razia. Published in *Asian Journal of Economics and Banking*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licenses/by/4.0/legalcode>.

Funding: This paper is an outcome of the project "Covid-19, Supply Chain and Financial Reporting" that is funded by Centennial Research Grant, University of Dhaka, Dhaka, Bangladesh.



Asian Journal of Economics and
Banking
Vol. 5 No. 3, 2021
pp. 307-323
Emerald Publishing Limited
e-ISSN: 2633-7991
p-ISSN: 2615-9821
DOI 10.1108/AJEB-03-2021-0033

important for getting financing and credit, taking good decisions, need of liquidity in case of an emergency.

Some reports are published in the Financial Express, Dhaka Tribune and Dhaka Courier about the Liquidity Crisis of Banking Sector. According to them, when there is a possibility to close business for an extended length of time, paying the existing bills becomes difficult. It is not possible to know how severe it will be or how long it will go on. Financial resources are not available to many small businesses for recovering their condition. Many of them face loss and there is a possibility to create huge loan defaults on loans to lenders, suppliers, workers, and landlords. Several companies are not able to run their business and there is a huge deterioration of their financial health. It can lead to file for bankruptcies and investors may face difficulty. As the listed banks are more regulated, investors and other stakeholder rarely think about their liquidity crisis and poor financial health.

Reasons of Liquidity Crisis in the Banking Sector of Bangladesh: Two reports in 2019 were published about the liquidity crisis of banking sector in the Financial Express named as “*Liquidity crisis: A wake-up call for the banking sector*” and Dhaka courier named as “*Liquidity crisis in the banking sector*”. According to the reports, Non-performing loans (NPLs) are increasing and for this maintaining healthy liquidity position becomes tough for the banks and financial institution (Islam, 2019; Khan, 2019 and Hasan, 2020). NPL creates the shortage of liquidity in the market and according to the data of Bangladesh Bank; the amount of NPL in the first quarter of this year was 18% more than the previous year’s first quarter. Instruction was given to the banks for improving their recovery drives for the loans by the central bank previously, but there is no sign of recovery. Capital flight from Bangladesh is also responsible for the money shortage. *Washington-based consultant Global Financial Integrity (GFI) reported* about the capital flight. In 2015, capital flight from the countries which are developing including Bangladesh was \$600 billion and the share of Bangladesh was \$5.90 billion. The government is not getting the taxes which are due and the country is not getting adequate investments due to the illegal transfer of money.

Aggressive lending practices taken by a few banks are responsible for the current liquidity condition in banking sector. The huge number of banks in such a small economy is competing to grab customers and they are breaching lending guidelines which affects the industry regulation badly. Some banks have been engaged to immoral practices due to the mad race among them and for this reason, the condition of entire banking sector becomes poor. One of the new banks recently faced liquidity crisis which made the regulator to increase attention on the practices of the banks. For these incidents, the regulatory caps on ADR are likely to have been fallen to 80 and 85% from existing 85 and 90% for conventional and Islamic banks. This type of occurrence is more than enough to put the banking system into reputational and liquidity risk.

Actions Taken by the Government to Improve Liquidity Condition at the COVID-19 Crisis: Both the individual and institutional depositors are now withdrawing their deposits from banks for meeting their essential needs during the crisis moment which is created by the novel virus. A report published in Dhaka Tribune named as “*Bailout package: Banks’ liquidity crisis to hinder implementation*”. According to that report, a package of Taka 30,000 crore was announced by Prime Minister as working capital for the industries and service sector organizations which are affected in this situation. Concerned industries and business organizations have to pay 4.5% instead of 9% interest rate on deposit and the rest will be paid by the government as subsidy. Taka 20,000 crore will be given to the small and medium enterprises (SMEs) and cottage industries as working capital under the second package. Here, 5% interest will be provided by the government as subsidy from the total 9% interest. A refinance scheme for meeting the liquidity shortage of scheduled banks should be formed by the central bank. Repurchase agreement (repo) interest rate was reduced from 6% to 5.75% and cash reserve requirement (CRR) of the banks was cut from 5.50% to 5% for boosting liquidity of the banks during this pandemic.

Financial Health and Its Indicators: Financial health of a company is a term that describes monetary affairs of the company. Good financial health indicates good condition of the company and poor financial health indicates bad condition of the company, and it can lead to bankruptcy. One of the popular methods to measure financial health is Altman Z-Score. Lehman Brothers, Chrysler, General Motors, etc., have applied to the court for the protection of bankruptcy.

Poor financial health that can lead to bankruptcy, affects the stakeholders like creditors, employees, investors, suppliers, consumers and local community negatively. It is an indispensable part of functioning of an enterprise. A firm becomes insolvent when it is unable to fulfill its debt obligations. Financial health of a company depends on both internal and external factors. Internal factor such as inefficient management affects the financial performance, assets and income of the company and that's why income of the company cannot cover up the costs. Inflation, new regulations etc. are the external factors which are responsible for a change in the condition of an economy. Some indicators are considered for understanding whether a firm is going to be bankrupted or not. The indicators are: 1. Facing Loss in Several Periods 2. Having a Doubt in Going Concern 3. Become Unable to Give the Payments 4. Cutting off Shareholder's Dividend 5. Lower Liquidity Ratio, an Indicator of Poor Financial Health 6. Negative Figure of Net Assets.

1.1 Background of the study

There are a lot of studies which are done on the various impacts of COVID-19. Financial health of the companies is an important factor for investment and a lot of studies are based on this. Liquidity of a company is also important for investors, creditors, and other stakeholders; and various types of studies are conducted on liquidity, especially the relationship between liquidity and profitability. Liquidity affects profitability positively and that is why it is very important for a company to have a good liquidity ratio. Some of the studies about liquidity and profitability are shown in the literature review section of this paper as they are closely related and also considered the liquidity ratios.

This study is based on the impact of COVID-19 on the financial health and liquidity crisis of the listed 30 banks in Bangladesh. The banks were facing liquidity crisis and had lower Z-Score. According to the central bank data, the deposits of banks stood at Taka 1,138,632 crore in January, which is only 0.06% up from the previous month, and it was the lowest since February last year. Due to COVID-19, the situation becomes more worsen. It is not only a health crisis for public and a global pandemic; it affected the financial markets and global economy severely. The whole world is facing economic and financial crisis, and it affects the financial institutions and banks badly.

The novelty of this research is that it is based on the impact of COVID-19 pandemic on the financial health and liquidity crisis of the listed 30 banks in Bangladesh. There is a dearth of research which concludes both financial health and liquidity crisis of banks and has considered the COVID-19 situation.

1.2 Objective of the study

The study aims to find out the impact of COVID-19 on the financial health and liquidity of the listed banks in Bangladesh. Listed banks are more regulated and stakeholders rarely think about liquidity crisis and poor financial health of them. In this study, the liquidity ratios and financial health of the listed Commercial Banks are compared before and during the COVID-19 periods ranging from one-quarter to another quarter. The comparison is also extended with the Islamic Banks listed in DSE.

Banks have liquidity crisis and poor financial score prior to COVID-19. The objective is to find out how much the situation changes due to COVID-19, whether the liquidity crisis and financial health which is measured by Z-Score is increasing or not. If the liquidity ratios are more and the Z-Score is more, then it will be beneficial for the stakeholders. The lower

liquidity ratio and lower Z-Score indicates worse position of the company. The report will be useful for the stakeholders and they will be able to take an appropriate decision.

1.3 Methodology

In this study, liquidity crisis is measured through liquidity ratios and financial health is measured by Altman Z-Score for non-manufacturing companies. Cash Ratio, Current Ratio, Operating Cash Flow Ratio, Opening Cash and Cash Equivalents Ratio, Closing Cash and Cash Equivalents Ratio, Credit to Deposit Ratio, Debt to Assets Ratio and Debt to Equity Ratio are calculated to measure the liquidity and solvency condition of the banks. To assess the financial health of the listed banks, revised Altman Z-Score Model for non-manufacturing companies is used. For Liquidity ratios, Descriptive Statistics is used and for measuring financial health, Multiple Discriminant Analysis (MDA) is used. Data of the relevant variables are collected from quarterly reports of the banks through the website of the banks. Quarterly report of first quarter and second quarter of 2020 and second quarter of 2019 are taken for the analysis purpose. Comparison is made between the first and second quarters of 2020. To test the seasonality, comparison is also made between second quarter of 2020 and second quarter of 2019. The results are presented through tables, charts, and graphs.

1.4 Limitations of the study

- (1) Correlation coefficients of Altman Z-Score are same for all the companies in the world. It might be changed in the companies of other countries as the context is different.
- (2) Data is taken from quarterly reports of the banks that mean the study is based on the secondary data. So, the result of the study is as such as the banks provide data in the reports. Nothing can be done if the data given by the banks in their quarterly reports is wrong.
- (3) The liquidity and financial health can also be changed due to other factors but here the impact of COVID-19 is considered only.

2. Literature review

A lot of literatures have been published on the various impacts of COVID-19. But there is a dearth of research which is based on the impact of COVID-19 on the liquidity crisis and financial health of the listed banks in Bangladesh. Liquidity and financial health of a company are related with profitability. Here are some studies that discuss about liquidity crisis due to COVID-19, relationship between liquidity and profitability and also financial health of the companies.

2.1 COVID-19 and liquidity crisis

[De Vito and Gómez \(2020\)](#) investigated the impact of COVID-19 on the liquidity of 14,245 listed firms across 26 countries. Three ratios such as cash burn rate, cash flow from operations to current liabilities and cash flow from operations to total debt are used for the analysis. Firms which have operating flexibility partially is able to use its cash holdings in about two years and current liabilities of the firm are increasing. Among the total sample, 10% firms have the possibility of becoming illiquid within six months. It is suggested that tax deferrals and bridge loans can be helpful to mitigate liquidity risk, and more cost effective is bridge loan and loan guarantees for preventing a huge cash crunch.

[Li et al. \(2020\)](#) observed that banks have faced the largest demand in liquidity ever in March 2020. This study focuses on the liquidity shock faced by the USA banks. Firms draw

huge funds with the advent of COVID-19 crisis for the anticipation of cash flow and financial disruptions. Small banks face smaller increase in the demand of liquidity. Increasing demand of liquidity is concentrated at the largest banks as they serve the largest firms and it becomes the reason of insufficient liquidity faced by the banks. However, the banks have managed it with Federal Reserve and deposits.

2.2 Financial health

[Gerantonis and Christopoulos \(2009\)](#) have tried to show the ability of Altman Z-score model for predicting the failures of companies. All listed firms in the Athens Stock Exchange during the period 2002–2008 are taken for their empirical analysis. They have found out the effectiveness of Z Score Model for identifying the companies which are financially unsound. It is said that this model matches both accounting data and market value. It is also found out that when it comes to the failure cases, this model can predict 54% of the failures at the time of one year before their occurrence.

In the study of [Chowdhury and Barua \(2009\)](#), the bankruptcy risk of DSE (Dhaka Stock Exchange) listed Z category companies is examined. They have found that only 5 companies belong to the risk-free position and 41 companies belong to the distress zone for the inefficient management from the total 53 companies. They have also discussed about the appropriateness of using Z-Score model in the context of Bangladesh.

[Mizan et al. \(2011\)](#) evaluate the possibility of financial distress of leading pharmaceutical companies in Bangladesh which are listed under DSE and the companies belong to “A” category. Data is taken from the period 2000 to 2009 and Altman Z-score model is used with the trend analysis of some financial variables to measure the financial health of the companies. Only two firms (Square Pharmaceuticals and IBN SINA Pharmaceuticals) have no possibility of being bankrupted in the next two years and other companies have substantial probability of facing financial distress within next two years.

[Mizan and Hossain \(2014\)](#) examine the financial health of cement industry in Bangladesh by taking data from 2006 to 2010 and they have used Z-score model for the empirical analysis. For the evaluation purpose, all listed firms of cement industry are taken in this study. It is revealed that only two firms named Heidelberg Cement and Confidence Cement belong to the Green Zone. The rest three firms are not sound financially. Among the rest three firms, Meghna Cement is in the grey area and the other two belong to the distress zone.

The study of [Ahmed and Alam \(2015\)](#) assess the bankruptcy risk of 15 commercial banks by using Altman Z-Score for their analysis purpose. It is revealed that most of the banks have lower Z-Score such as 1.81 or less than 1.81 and they belong to the distress zone. They also find out that only 7% of the total banks taken as sample are in good financial position in 2009 and only 7% banks from the total sample banks are in healthier financial position. There is gradual deterioration of the banks which are in healthier financial position and there are no banks which belong to the safe zone after 2011.

[Mostofa et al. \(2016\)](#) evaluate the level of insolvency of the banking industry and the likelihood of becoming bankrupted of the banks. 25 conventional and nonconventional banks are taken for the analysis purpose and the results are compared with other similar studies. They have found out that 24% of the banks from the total banks taken as sample belong to the safe zone, 56% of them belong to the grey zone and 20% of them belong to the red zone.

In the study of [Hamid et al. \(2016\)](#), financial health of 15 publicly traded Non-Banking Financial Institutions (NBFIs) in Bangladesh is evaluated. Data is taken from the period 2011 to 2015 and Altman Z-Score Model is applied for the analysis. The findings of the study refers to that most of the NBFIs which are taken as sample in the study are in distress zone. Though some NBFIs are applauded for their performance and contributions to the industrial and economic development of the country, they belong to the red zone. It is recommended in the

study that stakeholders and regulatory authorities should be more cautious for the successful operation of the NBFIs.

2.3 Liquidity and profitability

[Islam and Chowdhury \(2009\)](#) say that the performance of Islamic Bank Bangladesh Ltd was better in liquidity management than the conventional AB Bank Ltd from 2003 to 2006 on both short-term and long-term basis. They also find that profitability ratios like EPS, P/E ratio, ROA and ROE had significant role in determining the level of liquidity.

[Andrew and Osuji \(2013\)](#) observe the efficiency of liquidity management and banking performance in Nigeria. A survey is done by taking a sample of 300 bank employees through the random distribution of questionnaires to employees. It is found that there is a substantial relationship between efficient liquidity management and banking performance, and efficient liquidity management improves the soundness of banks. This study concludes that efficient liquidity management and profitability are positively related.

[Mamatazakis and Bermapi \(2014\)](#) find out the relationship between liquidity risk and bank performance in the G7 and Switzerland in their study. They have taken 97 banks as sample for this study. Role of risk, liquidity and investment banking fees are focused. It is concluded that liquidity risk negatively affects bank performance. They also report that a positive Z-Score affects the banking performance positively and it also refers to the reporting of low default risk. Reforms of regulations can help to increase the performance of the banks.

[Marozva \(2015\)](#) studies the relationship between liquidity risk and performance of South African banks for the period of 1998–2014. In this study, OLS is used to see the relationship between net interest margin (NIM) and liquidity risk. It is revealed in the study that there is a negative relationship between liquidity risk and NIM.

[Begum \(2016\)](#) observes the association between liquidity and profitability in the banking industry of Bangladesh from 1997 to 2014. In this paper, ordinary least square method (OLS) has been applied for examining the impact of liquidity on banks profitability. It is found that the excess liquidity can affect banks' profitability negatively.

In the study of [Hakimi and Zaghdoudi \(2017\)](#), the effect of liquidity risk on bank performance is considered. They have taken 10 Tunisian banks as sample from the period of 1990–2015. They have used regression analysis for their study purpose. The result of the study is that liquidity risk decreases the performance of banks. It is also concluded that international financial crisis and inflation affect the performance of the banks negatively.

[Chowdhury and Zaman \(2018\)](#) analyzed the effects of liquidity risk on the performance of Islamic Banks. They have taken six Islamic Banks as sample for the period of 2012–2016. They have used ROA and ROE for measuring the bank performance, and Loan to deposit ratio, Liquid risky asset to total asset, Capital to total asset ratio as indicators of liquidity. For finding the effect of liquidity on bank performance, correlation and regression analysis are done. This study concluded that there is a significant negative relationship between liquidity indicators and bank performance.

2.4 COVID-19 and stock market return

Although a large number of studies has been conducted on impact of covid-19 on stock market return, no study is yet published on the impact of covid-19 on liquidity and financial position. [Anh and Gan \(2021\)](#) has found adverse impact of COVID-19 on Vietnam stock market. [Insaiddoo et al. \(2021\)](#) have found insignificant negative association between stock return and COVID-19 situation based on the economy of Ghana. However, [Apergis and Apergis \(2020\)](#) have found significant negative impact of COVID-19 on stock returns based on Chinese economy. [Narayan et al. \(2021\)](#) have found heterogeneous effect on health, IT and food sectors. [He et al. \(2020\)](#) have conducted a cross cultural study based on the economy of

China, Japan, Italy, France, South Korea, Spain, Germany, and the USA They have also found negative but short-term impact of the pandemic on stock markets. Xu (2021) has also found the same result from Canada and US perspective.

3. Data analysis and results

3.1 Comparison of cash position in different time interval

The data of cash position in different time interval is shown in Appendix in detail. Here is a graph that shows cash position in the quarters.

Except Islami Bank Bangladesh Ltd., Prime Bank Ltd. and Social Islami Bank Ltd., every listed bank has lower cash in the second quarter of 2020 than the first quarter of 2020. Change in cash position in other quarter is good but in the second quarter of 2020, the cash position has become worse. 10 banks have higher cash in the second quarter of 2020 than the second quarter of 2019. Rests of the banks have lower cash in the second quarter of 2020 than the second quarter of 2019. It is also found that Al-Arafah Islami Bank Ltd. and ICB Islamic Bank Ltd. have more negative cash ratio than the other banks. But among all the listed banks, Dhaka Bank Ltd. has the lowest cash ratio (See Figures 1–5).

3.2 Liquidity and solvency ratios

The study has used a number of liquidity and solvency ratios to assess the liquidity and financial health. The following ratios are measured to find out the liquidity position of the listed banks in Bangladesh (see Table 1).

3.2.1 Interpretation of the results. Table of liquidity and solvency ratios and percentage changes in ratios from Q1 2020 to Q2 2020 and from Q2 2019 to Q2 2020 are shown in Appendix.

- (1) *Cash Ratio*: Cash position of the banks becomes worsen at the second quarter of 2020. Both the Commercial banks and Islamic banks have lower cash ratio in this quarter except few banks. None of the banks has a cash ratio of 1.

Q1 and Q2 2020: Only 7 Banks have higher cash ratio in the second quarter of 2020 compared to the first quarter of 2020. Other banks have negative cash ratio in the second quarter of 2020.

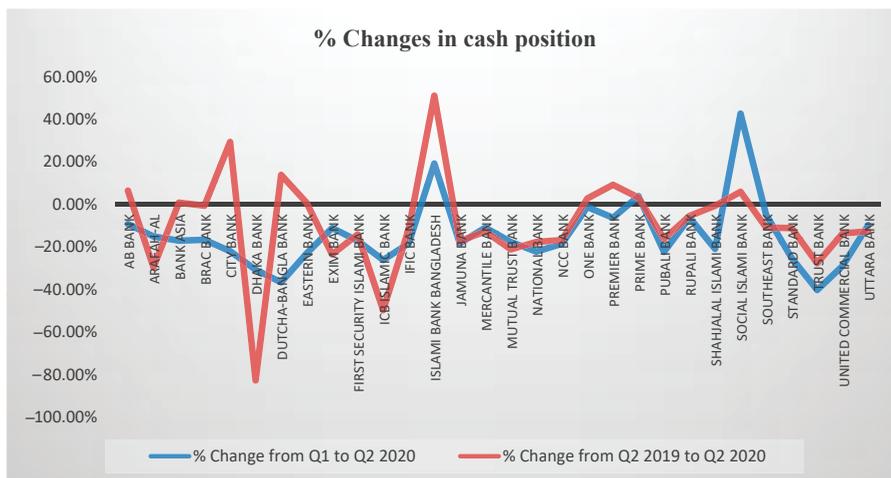


Figure 1.
Percentage Change in
Cash Position at
different time interval

Figure 2.
Percentage Change in
Cash Ratio in different
time interval

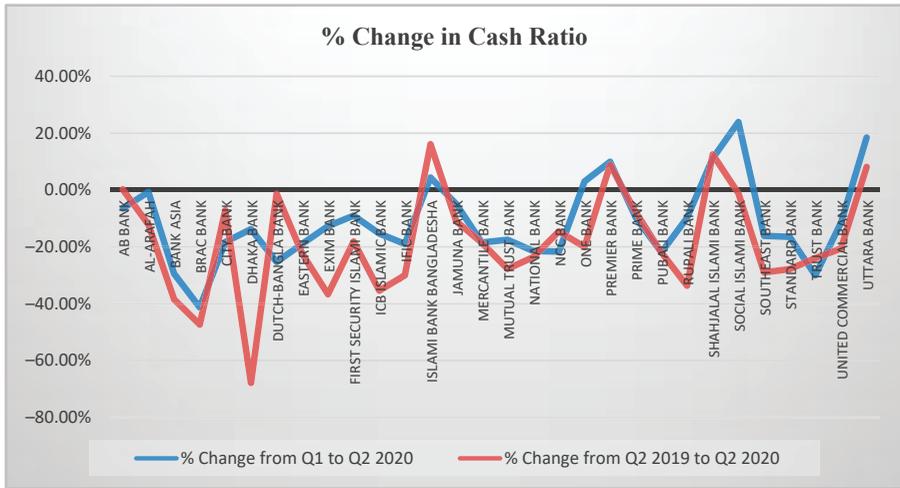
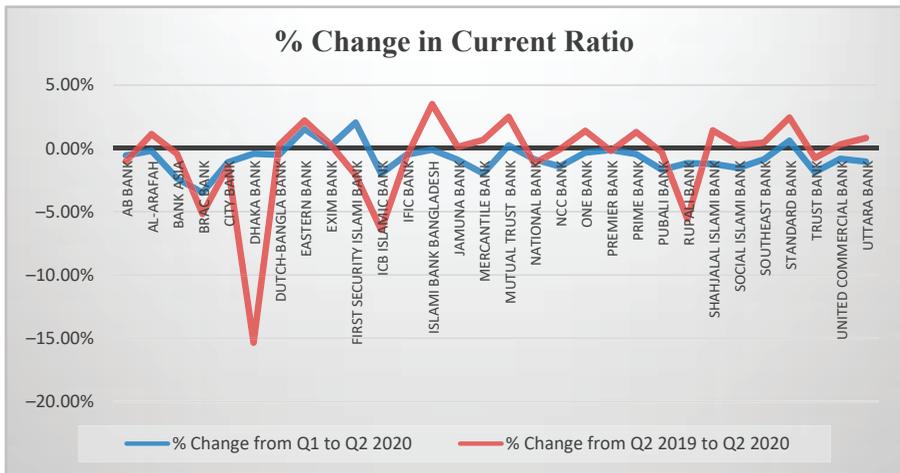


Figure 3.
Percentage Change in
Current Ratio different
time interval



Q2 2020 and 2019: Only 4 banks have higher cash ratio in the second quarter of 2020 than the second quarter of 2019. Rest of the banks have lower cash ratio in the second quarter of 2020.

(2) *Current Ratio:* All the banks including commercial banks and Islamic banks have current ratio above 1 except ICB Islamic Bank Ltd. It has lower current ratio. But no bank has a current ratio of 1.5 or more than 1.5 which is good for the liquidity. The current ratio is also lower in second quarter of 2020.

Q1 and Q2 2020: Only 5 Banks have higher current ratio in the second quarter of 2020 than the first quarter of 2020. Rest of the banks have lower current ratio in the second quarter of 2020.

Q2 2020 and 2019: 17 banks have higher current ratio in the second quarter of 2020 than the second quarter of 2019.

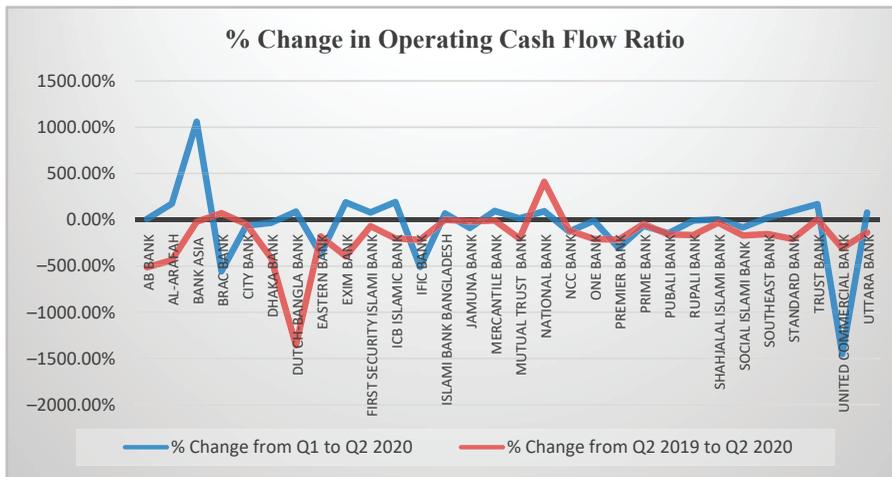


Figure 4.
Percentage Change in
Operating Cash Flow
Ratios in different time
interval

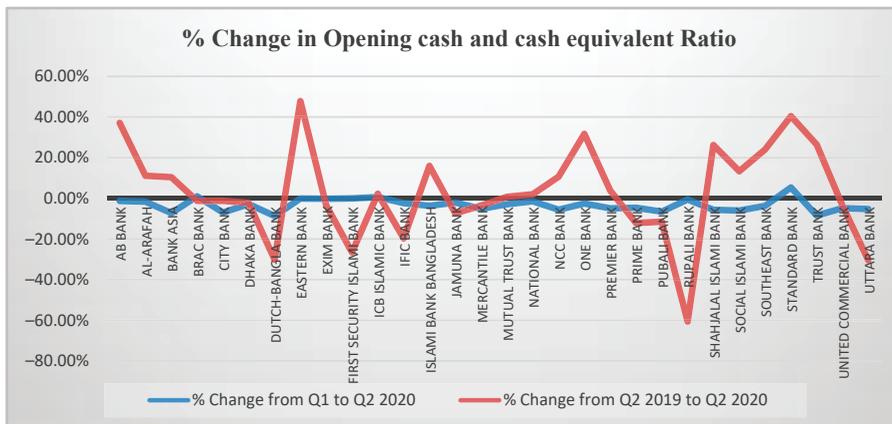


Figure 5.
Opening Cash and
Cash Equivalents
Ratio's changes in
different time interval

(3) *Operating Cash Flow Ratio:* This ratio is below 1 for all banks and most of the banks have negative operating cash flow ratio. Banks do not have adequate operating cash flow to meet the short-term obligations. In the second quarter of 2020, this ratio becomes lower than the first quarter of 2020.

Q1 and Q2 2020: 14 banks have lower operating cash flow ratio in the second quarter of 2020 than the first quarter of 2020. Rest of the banks have higher operating cash flow ratio in the second quarter of 2020.

Q2 2020 and 2019: Only 6 banks have higher operating cash flow ratio in the second quarter of 2020 than the second quarter of 2019. Rest 24 banks have lower operating cash flow ratio in the second quarter of 2020.

(4) *Opening Cash and Cash Equivalents Ratio:* No bank has the good opening cash and cash equivalents ratio. The ratio is below 1 for every bank. Banks do not have adequate cash and cash equivalents at the opening of the quarters to meet the short-term obligations.

List of the ratios	Formula	Interpretation
Cash ratio	$(\text{Cash} + \text{cash Equivalents}) / \text{Current liabilities}$	Value more than 1 means there is more cash than the short-term obligations. Value less than 1 means cash which is available, is not sufficient for meeting the short-term obligations
Current ratio	$\text{Current assets} / \text{Current liabilities}$	Value less than 1 gives indication of potential liquidity problems. Value of 1.5–2 gives indication of good financial growth in terms of liquidity
Operating cash flow ratio	$\text{Cash flow from operations} / \text{Current liabilities}$	Value less than 1 indicates that the company generates less cash from operations than is needed to pay the short-term obligations. Value more than 1 indicates availability of more cash from operations to meet the short-term obligations
Opening cash and cash equivalents ratio	$\text{Opening cash and cash equivalents} / \text{Current liabilities}$	Value more than 1 means there is availability of more opening cash and cash equivalents in the period than the short-term obligations. Value less than 1 means opening cash and cash equivalents available in the period is not sufficient for meeting the short-term obligations
Closing cash and cash equivalents ratio	$\text{Closing cash and cash equivalents} / \text{Current liabilities}$	Value more than 1 means there is availability of more closing cash and cash equivalents in the period than the short-term obligations. Value less than 1 means closing cash and cash equivalents available in the period is not sufficient for meeting the short-term obligations
Credit to deposit ratio	$\text{Loan} / \text{Deposits}$	Ideal value is 80%–90%. Too high ratio indicates the unavailability of liquidity of banks to cover any unanticipated fund requirements. Too low ratio indicates the bank has not enough earning
Debt to assets ratio	$(\text{Short-term Debt} + \text{long-term Debt}) / \text{Total assets}$	Value more than 1 indicates the company has more liabilities than its assets and riskier for investment. Ratio of less than 1 refers that the company owns more assets than its liabilities and less risky for investment
Debt to equity ratio	$(\text{Short-term Debt} + \text{long-term Debt}) / \text{Shareholders equity}$	Higher ratio indicates that the company is getting more financing through borrowing and there is a high risk of insolvency. Lower ratio indicates that the company gets its maximum financing through shareholders' equity

Table 1.
List of liquidity and solvency ratios

Q1 and Q2 2020: Only 4 banks have higher opening cash and cash equivalents ratio in the second quarter of 2020 than the first quarter of 2020. Rest 26 banks have lower opening cash and cash equivalents ratio in the second quarter of 2020.

Q2 2020 and 2019: 15 banks have higher opening cash and cash equivalents ratio in the second quarter of 2020 than the second quarter of 2019.

- (5) *Closing Cash and Cash Equivalents Ratio:* Banks do not have sufficient cash and cash equivalents at the end of the quarters to meet the short-term obligations. No bank has the good closing cash and cash equivalents ratio. The ratio is below 1 for every bank (see [Figures 6–10](#)).

Q1 and Q2 2020: 6 Banks have higher cash ratio in the second quarter of 2020 compared to the first quarter of 2020. The Other 24 banks have lower cash ratio in the second quarter of 2020.

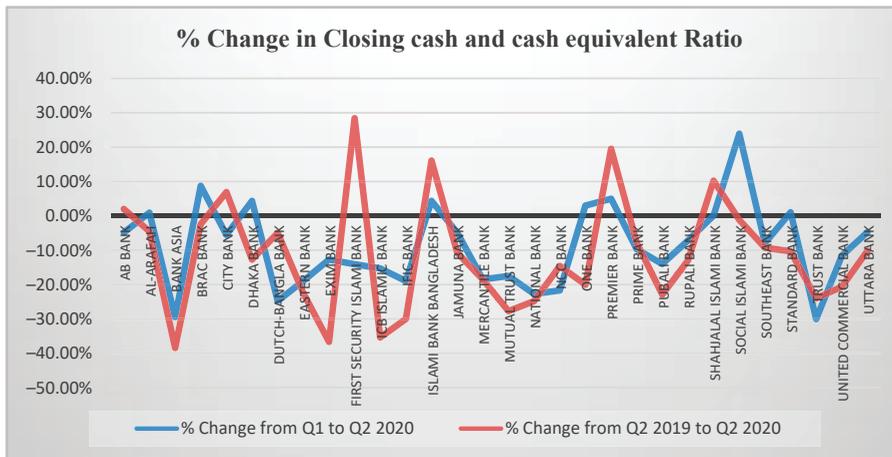


Figure 6.
Closing Cash and Cash
Equivalents Ratio's
changes in different
time interval

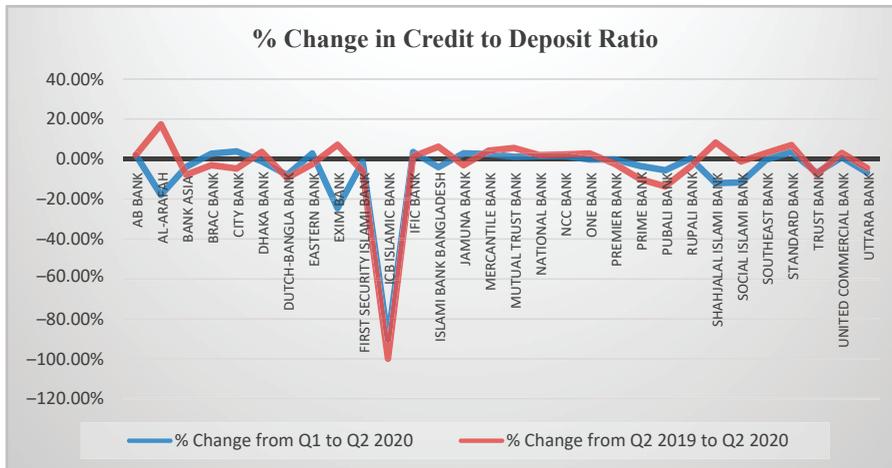


Figure 7.
Percentage Change in
Credit to Deposit Ratio
in different time
interval

Q2 2020 and 2019: Only 3 banks have higher cash ratio in the second quarter of 2020 than the second quarter of 2019. Rest 27 banks have lower cash ratio in the second quarter of 2020 than the second quarter of 2019.

- (6) *Credit to Deposit Ratio:* Among the listed commercial banks in DSE, EXIM Bank Ltd. and Uttara Bank Ltd. and all the listed Islamic Banks in DSE have poor credit to deposit ratio.

Q1 and Q2 2020: 53% banks that mean 16 banks have lower credit to deposit ratio in the second quarter of 2020 than the first quarter of 2020.

Q2 2020 and 2019: 16 banks have higher credit to deposit ratio in the second quarter of 2020 than the second quarter of 2019.

- (7) *Debt to Assets Ratio:* All the banks have this ratio of almost 1 except Brac Bank Ltd. ICB Islamic Bank Ltd. has this ratio of 2 or 1 in different time interval. This ratio is not changed much at the second quarter of 2020.

Figure 8.
Percentage Change in
Debt to Assets Ratio in
different time interval

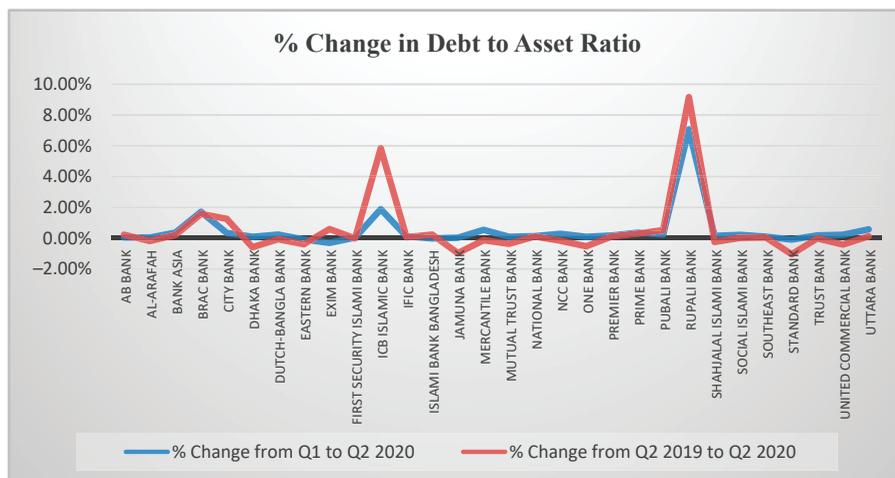
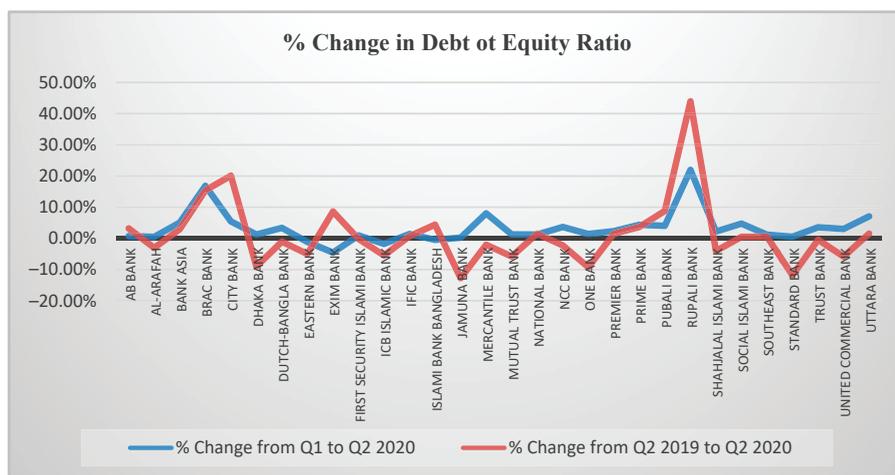


Figure 9.
Percentage Change in
Debt-to-Equity Ratio in
different time interval



Q1 and Q2 2020: Only 4 banks have lower debt to assets ratio in the second quarter of 2020 than the first quarter of 2020. Rest 26 banks have higher debt to assets ratio in the second quarter of 2020 than the first quarter of 2020.

Q2 2020 and 2019: 15 banks have lower debt to assets ratio in the second quarter of 2020 than the second quarter of 2019.

- (8) *Debt to Equity Ratio:* Most of the banks have debt to equity ratio of more than 10. Only Brac Bank Ltd., National Bank Ltd. and ICB Islamic Bank Ltd. have less than 10 in this ratio. ICB Islamic Bank Ltd. has negative figure in this ratio. This ratio is not changed much at the second quarter of 2020.

Q1 and Q2 2020: Only 4 banks have lower debt to equity ratio in the second quarter of 2020 than the first quarter of 2020. Rest 26 banks have higher debt to equity ratio in the second quarter of 2020 than the first quarter of 2020.

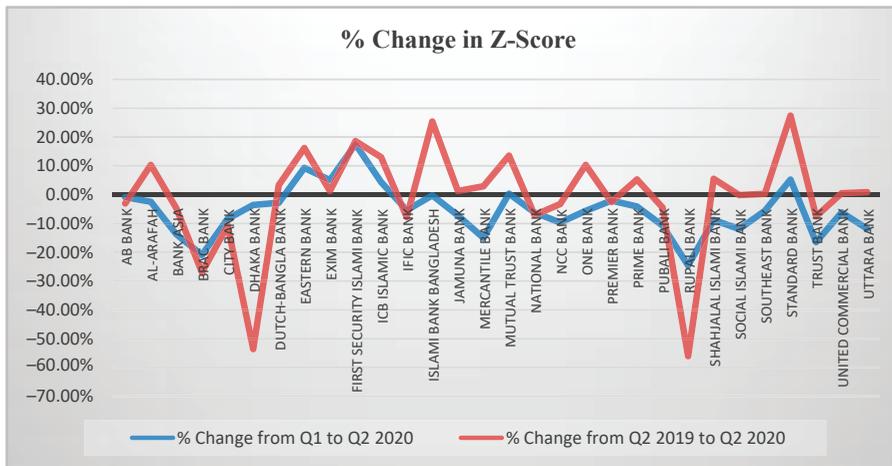


Figure 10.
Percentage change in
Z-score at different
time interval

Q2 2020 and 2019: 16 banks have lower debt to equity ratio in the second quarter of 2020 than the second quarter of 2019. All the ratios are affected in the second quarter of 2020 except debt to equity and debt to assets ratio.

3.3 Altman Z-Score for non-manufacturing company

Altman (1968) has developed a model for bankruptcy prediction and it is known as Z-Score Model. It is a multiple discriminant analysis model which is preferred as a statistical technique to measure the financial health and it is for manufacturing companies. In 1983, the model is revised for non-manufacturing companies (Altman, 1983). The revised model is given below:

$$Z = 6.56A + 3.26B + 6.72C + 1.05D$$

Where.

A = Net Working Capital/Total Assets

B = Retained Earnings/Total Assets

C = EBIT/Total Assets

D = Book Value of Equity/Total Liabilities

3.3.1 Cut-off points. Z-Score<1.23, considered as distress zone which means the possibility of being bankrupted is very high. It is the Red Zone.

Z-Score between 1.23 and 2.9 belongs to Grey Zone that means there is a possibility for the company of being bankrupted within next two years.

Z-Score>2.9, belongs to the Green Zone which means the possibility of being bankrupted is very low.

3.4 Comparison of Z-Score in different time interval

Detail calculation of Z-Score and percentage change in Z-score is shown in Appendix. Here is a table with the Z-Score of second quarter of 2020 and a graph to show the percentage change in quarters.

Table 2 shows that except AB bank, all the banks are lying in the red zone which is very alarming for the banking sector as well as for the whole economy of Bangladesh. If the

Table 2.
Z-Score of the banks

Name of the banks	Z-Score of Q2 2020	Zone
AB bank Ltd	1.3027	Gray zone
Al-Arafah Islami bank Ltd	0.7172	Red zone
Bank Asia Ltd	0.9899	Red zone
BRAC bank Ltd	0.9608	Red zone
City bank Ltd	0.9264	Red zone
Dhaka bank Ltd	0.9631	Red zone
Dutch-Bangla bank Ltd	0.8749	Red zone
Eastern bank Ltd	0.9149	Red zone
EXIM bank Ltd	0.8763	Red zone
First Security Islami bank Ltd	0.7653	Red zone
ICB Islamic bank Ltd	-10.6917	Red zone
IFIC bank Ltd	0.9136	Red zone
Islami bank Bangladesh Ltd	0.9180	Red zone
Jamuna bank Ld	0.9580	Red zone
Mercantile bank Ltd	0.8602	Red zone
Mutual Trust bank Ltd	0.9762	Red zone
National bank Ltd	1.2148	Red zone
NCC bank Ltd	1.0278	Red zone
One bank Ltd	0.7464	Red zone
Premier bank Ltd	0.7644	Red zone
Prime bank Ltd	0.9980	Red zone
Pubali bank Ltd	0.8699	Red zone
Rupali bank Ltd	0.2672	Red zone
Shahjalal Islami bank Ltd	0.9452	Red zone
Social Islami bank Ltd	0.6901	Red zone
Southeast bank Ltd	1.1362	Red zone
Standard bank Ltd	0.7328	Red zone
Trust bank Ltd	0.6536	Red zone
United commercial bank Ltd	0.8627	Red zone
Uttara bank Ltd	0.8370	Red zone

banking sector of Bangladesh collapses, all the progress of the country will be stopped down as this the dominating industry of the country. So, necessary actions should be taken by the banks and regulator Bangladesh bank as soon as possible.

Q1 and Q2 2020: Most of the banks have lower Z-Score in the second quarter. 77% banks that mean 23 banks have lower Z-Score in Q2 2020 than Q1 2020.

Q2 2020 and Q2 2019: 13 banks among the 30 banks have lower Z-Score in Q2 2020 than Q2 2019. Rest 17 banks have higher Z-Score in the second quarter of 2019.

3.5 Comparison of Z-Score between commercial banks and Islamic Banks

Islamic Banks have lower Z-Score than the commercial banks. ICB Islamic bank Ltd. has negative Z-Score. In Q2 2020, most of the banks have lower Z-score than the Q1 2020. Though commercial banks have higher Z-Score than the Islamic Banks, they belong to the Red Zone.

AB Bank Ltd., Dhaka Bank Ltd. (Q2 2019), National Bank Ltd. (except Q2 2020) belong to the Grey Zone. Rest of the banks belongs to the Red Zone. All the Islamic Banks belong to the Red Zone and ICB Islamic Bank Ltd. is the only bank which has negative Z-Score.

4. Conclusion and recommendations

4.1 Conclusion

Banking sector was not going well before the emergence of COVID-19. The sector had lower liquidity ratios and poor financial health. Increase of non-performing loans, capital

flight from Bangladesh, aggressive lending practices are responsible for current liquidity condition in the banking sector and profitability and financial health are also affected by this. Liquidity is important as it can affect the most important goal of a business which is profitability. At the second quarter of 2020, all the liquidity ratios and financial health of the listed banks are affected badly and the situation has become worse than before. Emergence of this pandemic affects not only the banking sector; every sector has to face the challenges that are made for this pandemic. The listed banks had lower cash ratio, current ratio, operating cash flow ratio, opening cash and cash equivalents, closing cash and cash equivalents prior to the emergence of this pandemic. These ratios become lower than before in the second quarter of 2020. Only debt to assets and debt to equity ratios are not changed much at this quarter. All the listed banks belonged to the red zone in the first quarter and second quarter of 2019. They have the lower Z-Score in the first and second quarter of 2020. But at the second quarter of 2020, the financial health of the listed banks becomes poorer than before and the possibility of becoming insolvent is increased. It is clearly seen that the emergence of this pandemic makes the liquidity condition and financial health of the listed banks worsen than before. Among the listed Islamic Banks, First Security Islami Bank Ltd., ICB Islamic Bank Ltd. and Social Islami Bank Ltd. have poor liquidity ratio than the other listed Islamic Banks. AB Bank Ltd., EXIM Bank Ltd., IFIC Bank Ltd., Mercantile Bank Ltd., Mutual Trust Bank Ltd. and National Bank Ltd. have the poor liquidity ratio than the other listed Commercial Banks. Premier Bank Ltd., Rupali Bank Ltd., Standard Bank Ltd., Trust Bank Ltd. have lower Z-Score compared to the other listed Commercial Banks. All the listed Islamic Banks have lower Z-Score and ICB Islamic Bank Ltd. has negative Z-Score. Though all the listed banks in DSE belong to the red zone, listed Commercial Banks have generally higher Z-Score than the listed Islamic Banks. It can be said that there is a negative impact of COVID-19 on the liquidity crisis and financial health of the listed banks in Bangladesh. This paper can contribute the interesting field of economy and business.

4.2 Recommendations

- (1) Long-term debt should be used more for financing than short-term debt. This will help to increase non-current liabilities and decrease current liabilities. The reduction of current liabilities will lead to the increase of liquidity ratios.
- (2) Banks must find out what are their unproductive assets and then they have to get rid of these assets. Cash balances will be increased, and the liquidity ratios will be increased too.
- (3) Corruption and illegal money outflow from the country can be reduced if the regulatory authority, agencies that enforce law, business associations, tax authority and banks take efforts. Thus, both liquidity and financial health will be improved.
- (4) Forecasting cash flow is an effective tool which helps to manage the cash and decide the level of cash. This will help to manage cash effectively and thus the liquidity ratios and financial health will be improved.
- (5) Proper monitoring by regulatory authority and government can be helpful to improve the financial health and liquidity ratios of the company. Assistance from government and Bangladesh Bank will make the banks able to recover the current crisis.
- (6) Corporate efficiency and managerial efficiency are necessary for making profit and running out any kind of business successfully. They help to improve the liquidity ratios and financial health.

- (7) To overcome the effects of this pandemic and recover the loss is a challenge for every sector. Managements of the banks must accept the challenge and should try to recover the losses as soon as possible.
- (8) Knowledgeable experts can help at the time of financial difficulty and challenging circumstances by providing their valuable advice. Their advice can help a company to overcome the losses and survive by taking necessary steps.

References

- Ahmed, T. and Alam, S. (2015), "Prediction of financial distress in banking companies of Bangladesh and A need for regulation by FRC", *The Cost and Management*, Vol. 43 No. 6, pp. 13-19.
- Altman, E.I. (1983), "WHY businesses fail", *Journal of Business Strategy*, Vol. 3 No. 4, pp. 15-21, doi: [10.1108/eb038985](https://doi.org/10.1108/eb038985).
- Altman, E.I. (1968), "Financial ratios, discriminant analysis and the prediction of corporate bankruptcy", *The Journal of Finance*, Vol. 23 No. 4, pp. 589-609, doi: [10.2307/2978933](https://doi.org/10.2307/2978933).
- Andrew, O.A. and Osuji, C.C. (2013), "The efficacy of liquidity management and banking performance in Nigeria", *International Review of Management and Business Research*, Vol. 2 No. 1, pp. 223-233.
- Anh, D.L.T. and Gan, C. (2021), "The impact of the COVID-19 lockdown on stock market performance: evidence from Vietnam", *Journal of Economic Studies*, Vol. 48 No. 4, pp. 836-851, doi: [10.1108/JES-06-2020-0312](https://doi.org/10.1108/JES-06-2020-0312).
- Apergis, N. and Apergis, E. (2020), "The role of Covid-19 for Chinese stock returns: evidence from a GARCHX model", *Asia-Pacific Journal of Accounting and Economics*, Vol. ahead of print No. ahead of print, doi: [10.1080/16081625.2020.1816185](https://doi.org/10.1080/16081625.2020.1816185).
- Begum, N. (2016), *Nexus between Bank's Liquidity and Profitability in Bangladesh: An Empirical Overview*, BB Working paper, NO-1612.
- Chappelow J. (2020), "Liquidity crisis", *Investopedia*, 6 December, available at: <https://www.investopedia.com/terms/l/liquidity-crisis.asp> (accessed 5 February 2021).
- Chowdhury, A. and Barua, S. (2009), "Rationalities of Z-category shares in Dhaka stock Exchange: are they in financial distress risk?", *BRAC University Journal*, Vol. 1 No. 1, pp. 45-58.
- Chowdhury, M.M. and Zaman, S. (2018), "Effect of liquidity risk on performance of Islamic banks in Bangladesh", *IOSR Journal of Economics and Finance (IOSR-JEF)*, Vol. 9 No. 4, pp. 01-09.
- De Vito, A. and Gómez, J. (2020), "Estimating the COVID-19 cash crunch: global evidence and policy", *Journal of Accounting and Public Policy*, Vol. 39 No. 2, p. 106741.
- Gerantonis, N., Vergos, K. and Christopoulos, A.G. (2009), "Can altman Z-score models predict business failures in Greece?", *Research Journal of International Studies*, Vol. 12, pp. 21-28.
- Hakimi, A. and Zaghoudi, K. (2017), "Liquidity risk and bank performance: an empirical test for Tunisian banks", *Business and Economic Research*, Vol. 7 No. 1, pp. 46-58.
- Hamid, T., Akter, F. and Rab, N.B. (2016), "Prediction of financial distress of Non-Bank financial institutions of Bangladesh using Altman's Z score model", *International Journal of Business and Management*, Vol. 11 No. 12, pp. 261-270.
- Hasan, M. (2020), *Bailout Package: Banks' Liquidity Crisis to Hinder Implementation*, DhakaTribune, 06 April, available at: <https://www.dhakatribune.com/business/banks/2020/04/06/bailout-package-banks-liquidity-crisis-to-hinder-implementation> (accessed 15 November 2020).
- He, Q., Liu, J., Wang, S. and Yu, J. (2020), "The impact of COVID-19 on stock markets", *Economic and Political Studies*, Vol. 8 No. 3, pp. 275-288, doi: [10.1080/20954816.2020.1757570](https://doi.org/10.1080/20954816.2020.1757570).
- Insaiddo, M., Arthur, L., Amoako, S. and Andoh, F.K. (2021), "Stock market performance and COVID-19 pandemic: evidence from a developing economy", *Journal of Chinese Economic and Foreign Trade Studies*, Vol. 14 No. 1, pp. 60-73, doi: [10.1108/JCEFTS-08-2020-0055](https://doi.org/10.1108/JCEFTS-08-2020-0055).

- Islam, A.S.M.S. (2019), *Liquidity Crisis: A Wake-Up Call for the Banking Sector*, The Financial Express, 17 June, available at: <https://thefinancialexpress.com.bd/views/reviews/liquidity-crisis-a-wake-up-call-for-the-banking-sector-1560785211> (accessed 17 November 2020).
- Islam, M.M. and Chowdhury, H.A. (2009), "A comparative study of liquidity management of an Islamic bank and a conventional bank: the evidence from Bangladesh", *Journal of Islamic Economics, Banking and Finance*, Vol. 5 No. 1, pp. 89-108.
- Khan, M. (2019), *Liquidity Crisis in the Banking Sector*, dhakacourier, 02 August, available at: <http://www.dhakacourier.com.bd/news/Reportage/liquidity-crisis-in-the-banking-sector/1580> (accessed 15 November 2020).
- Li, L., Strahan, P.E. and Zhang, S. (2020), "Banks as lenders of first resort: evidence from the COVID-19 crisis", *The Review of Corporate Finance Studies*, Vol. 9 No. 3, pp. 472-500.
- Mamatzakis, E. and Bermpei, T. (2014), "What drives bank performance? The role of Risk, Liquidity and fees prior to and during the performance", *International Review of Financial Analysis*, Vol. 35, pp. 102-117.
- Marozva, G. (2015), "Liquidity and bank performance of South African banks", *International Journal of Economics and Business Research*, Vol. 14 No. 3, pp. 453-462.
- Mizan, A.N.K. and Hossain, M.M. (2014), "Financial soundness of cement industry of Bangladesh: an empirical investigation using Z-score", *American Journal of Trade Policy*, Vol. 1 No. 1, pp. 1622-1633.
- Mizan, A.N.K., Amin, M.R. and Rahman, T. (2011), "Bankruptcy prediction by using the altman Z-score model: an investigation of the pharmaceutical industry in Bangladesh", *Bank Parikrama*, Vol. 36 Nos 2-4, pp. 33-56.
- Mostofa, M., Rezina, S. and Hasan, M. (2016), "Predicting the financial distress in the banking industry of Bangladesh: a case study on private commercial banks", *Dhaka International Business and Social Science Research Conference*, pp. 214-227.
- Narayan, P.K., Gong, Q. and Ahmed, H.J.A. (2021), "Is there a pattern in how COVID-19 has affected Australia's stock returns?", *Applied Economics Letters*, Vol. ahead of print No. ahead of print, doi: [10.1080/13504851.2020.1861190](https://doi.org/10.1080/13504851.2020.1861190).
- Ugoani, J. (2015), "Poor bank liquidity risk management and bank failures: Nigerian perspective proceedings in finance and risk series", *14th FRAP Conference, from 22nd to 24th Sept. 2014 at the University of Oxford, UK*, Vol. 14, pp. 659-678, doi: [10.2139/ssrn.2562341](https://ssrn.com/abstract=2562341), available at: <https://ssrn.com/abstract=2562341>.
- Xu, L. (2021), "Stock return and the COVID-19 pandemic: evidence from Canada and the US", *Finance Research Letters*, Vol. 38, doi: [10.1016/j.frl.2020.101872](https://doi.org/10.1016/j.frl.2020.101872).

Appendix

The Appendix files are available online for this article.

Corresponding author

Md. Rezaul Karim can be contacted at: reza.ais@du.ac.bd

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgrouppublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com