Article

Impact of COVID-19 on Financial Performance and Profitability of Banking Sector in Special Reference to Private Commercial Banks: Empirical Evidence from Bangladesh

Md. Abu Issa Gazi [1], **Md. Nahiduzzaman** [2,*], **Iman Harymawan** [3,*], **Abdullah Al Masud** [4] **and Bablu Kumar Dhar** [5]

1   School of Management, Jiujiang University, Jiujiang 332005, China; dr.issa@jju.edu.cn
2   Department of Finance and Banking, Islamic University, Kushtia 7003, Bangladesh
3   Department of Accounting, Faculty of Economic and Business, Universitas Airlangga, Surabaya 60115, Indonesia
4   Department of Management Studies, University of Barishal, Barishal 8254, Bangladesh; masud_ru_bd@yahoo.com
5   Department of International Trade and Economics, Yantai University, Yantai 264005, China; drbablukumardhar@gmail.com
*   Correspondence: info.nahiduzzaman.bd@gmail.com (M.N.); harymawan.iman@feb.unair.ac.id (I.H.)

Abstract: The current crisis caused by the COVID-19 pandemic has hit the global economy hard, causing significant damage to every aspect of the global banking system, and Bangladesh is no exception. For that reason, its performance and profitability have been affected. In this study, we investigate the impact of COVID-19 on the financial performance and profitability of the listed private commercial banks in Bangladesh. We initially compute each bank's financial performance index (FPI) to determine the position according to their financial performance individually before and the current period of COVID-19 by the standardized CAMELS rating system. After assessing the position, the fixed-effect regression model is used to explore the impact of the bank's specific variables and macroeconomic variables along with the banks' variables on the banks' profitability. The banks that performed better during the pre-pandemic period of COVID-19 also performed better during the pandemic period of COVID-19. The performance of AIBL, EBL, and BBL was almost autonomously higher during both periods. In the case of bank profitability, our paper discovered that during the pandemic period of COVID-19, high non-performing loan rates, holding more liquid assets, a high amount of hedging capital, and inappropriate bank size lessened the banks' profitability. In contrast, a low leverage position and inflation rate enhanced the bank's profitability during this period. The outcome of this study will help bank authorities detect the loopholes and take preventive measures that can improve their profitability during a crisis period like COVID-19. The investors and depositors who invest money in banks can precisely decide their portfolios.

Keywords: COVID-19; financial performance index; CAMELS; profitability; macroeconomic variables; regression; panel data

1. Introduction

The bank is very much a familiar term to people, and it is becoming more popular day by day, with excellent prospects. Since the invention of the banking system around 8000 BC, the activities, operation systems, rules and regulations, and product lines of banks have been updated [1]. Meanwhile, operations of the banking system have been severely affected by various global economic crises like the British credit crisis in 1772 [2], the Great Depression between 1929 and 1939 in the United States [3], the Asian crisis in 1997 [4,5], and the financial crisis between 2007 and 2008 [6,7]. The world is currently facing a global crisis, namely, the COVID-19 pandemic. This pandemic has adversely

affected the banking system around the world. At the end of 2019, in December, the first case was identified in Wuhan, China [8]. After the announcement of the first case, the pandemic oppressed the global economy unpleasantly [9] due to continuous lockdowns across the world, restrictions on public movement, the halting of production, slumped demand for goods and services, part or full shutdown of offices and factories, and barriers to international trade. According to the World Bank Report, the growth of the world economy was predicted to be squeezed at 5.2% due to the onset period of the pandemic [10]. In Statista, [11] stated that major economies were forecasted to lose 2.9% of GDP after 2020. In addition, COVID-19 has had a pervading, significant, distressing negative impact in the global financial and economic markets [12]. According to [13], stock market returns have reacted badly due to the preventive measures of COVID-19, specifically social distancing. The banking sector is the major participant to boost and regulate the economy and financial markets. Therefore, this sector is essential to safeguarding the current world crisis. In the case of financial stability and the proper circulation of money, the banking sector plays a significant role. Due to COVID-19, important performance indicators of banks like profitability, capital adequacy, asset quality, management efficiency, earnings ability, liquidity, and sensitivity to risk have been affected around the world [14,15].

In the context of Bangladesh, COVID-19 imposes both macroeconomic and microeconomic shock for the economy and people. The pandemic has negatively affected major macroeconomic factors like the GDP growth rate, inflation rate, exchange rate, and unemployment rate. At the end of 2020, Bangladesh lost a 2.91% GDP growth rate compared with the prospective GDP growth rate at the beginning of 2020 [16,17]. The inflation rate increased from 5.5% to 5.7% during the second quarter of 2020 [18]. Accordingly, this inflation rate crossed almost 6% in 2021 [19,20], and the unemployment level increased from 4.44% to 5.41% by the end of the 2020 from December 2019 [21]. The banking sector of Bangladesh and the banking sector worldwide are primarily associated with macroeconomic variables. The profitability and financial performance of banks perform in terms of changes in the macroeconomic variables of the country [22]. The banking sector of Bangladesh has been poorly affected [23] by the COVID-19 pandemic. Compared to other emerging countries, Bangladesh has a high level of non-performing loans (NPL) [24], and it grew more than 7% in the first quarter of 2021 from the last quarter of 2020 [25]. The liquidity position of banks has also been affected by COVID-19. Bangladesh Bank statistics showed that the banking sector reserved BDT 2.05 trillion in December 2020, which was double the BDT 1.03 trillion in January 2020 [25]. Higher liquidity hampers the profitability position of banks [26]. Employed people have become unemployed because of the unavoidable conditions of COVID-19. Bangladesh Bank statistics show that during this pandemic, 27,237 bankers have been affected by COVID-19 and 143 bankers have died due to this virus [25]. The overall financial health position of banks has been adversely affected by COVID-19. Ref. [23] demonstrated that all listed banks' financial health position has been in a red position during this pandemic era. The central bank of Bangladesh, Bangladesh Bank, predicted poor asset quality due to the higher NPL rate, and impecunious profitability might deteriorate the banking sector's financial performance in Bangladesh in the upcoming days. Therefore, determining the impact of COVID-19 on Bangladesh's banking sector is very important.

Very few studies have been conducted to measure the impact of COVID-19 on the banking sector in Bangladesh. Researchers have explored the effects of COVID-19 on some specific fields of the banking sector, such as the resiliency of commercial banks, liquidity, and financial health position during this onset period of COVID-19. We explore this more in the literature review section. With the extensive literature survey as well as the current needs from the perspective of Bangladesh, we developed this paper to assess the impact of bank-specific variables and macroeconomic variables, as well as particular bank variables, on the profitability of banks and to compute the financial performance position of the listed private commercial banks in Bangladesh during the pandemic period of COVID-19. We considered capital adequacy, asset quality, management efficiency, earning ability, liquidity

position, and sensitivity to risk position of banks during the pre-pandemic period and pandemic period of COVID-19 throughout this research. We believe our findings will help the board of directors of banks and government bodies track the current conditions of the banking sector in Bangladesh and take corrective action to face an economic crisis like COVID-19. Our paper will also be highly supportive to the customers of and investors in banks for making decisions during this time.

Additionally, in recent times, massive focus has been made on sustainability in research works [27]. The financial performance of banks and sustainability issues are largely connected to each other. According to [28], banks have major effects on the sustainability of their performance. For example, non-performing loans hinder the sustainable financial position of banks. Ref. [29] demonstrated that sustainable criteria in the case of lending decisions can diminish the risk position of banks. The ratio of banks like ROE, ROA, and NIMR represents whether the profitability condition or financial position is sufficiently sound in terms of ensuring the sustainability position of the banks. In an application, return on equity and retained earnings affect the sustainable growth rate of banks [30]. Therefore, the outcomes of our paper also must be helpful to ensure the sustainable financial condition of the banking system.

We divide our paper into seven segments. First, we present our study's first and second segments, where the overview, background, and objective are demonstrated. Then, we survey the literature in the third section to look at previous studies in our field and identify the potential research gap. In section four, we show our study's data sources and methodologies. We discuss the main part of the research in the fifth section, where the outcomes of this study are shown. In the sixth and seventh segments, we conclude the research and show the bibliography of the sources used throughout this study, respectively.

2. Literature Review

2.1. Impact of the COVID-19 Pandemic on the World Economy

The World Health Organization (WHO) declared COVID-19 a global pandemic in March 2020 [31,32]. This global pandemic has caused unparalleled ruffles for global economic and human life [33,34]. As a result, the world's global trade suffered much due to the COVID-19 pandemic in 2020, and the growth trend of the world economy expects to remain low compared with the pre-pandemic situation [35]. The International Monetary Fund (IMF) estimated that due to COVID-19, global GDP would lose USD 3.86 trillion in 2020 [36]. According to the World Bank Report, the growth of the world economy was predicted to be squeezed at 5.2% due to the onset period of the pandemic [10]. In Statista, [11] stated that major economies were forecasted to lose 2.9% of GDP after 2020. Consequently, the COVID-19 pandemic affected USD 90 trillion of global economies worldwide [32]. Despite the negative aspects, the global economy is recovering [37].

2.2. Research on the Banking Sector during the COVID-19 Pandemic Period Worldwide

Sufficient studies have been conducted to focus on the impact of COVID-19 on the financial sector, like the impact of COVID-19 on the macroeconomic circumstances of a country [38], on the banking performance stability [39], on bank lending around the world [14], on the stock performance of banks around the world [40], on conventional and Islamic stock performance using market index data and firm-level data [41], and on listed corporate firms' performance [31,42]. The spread of COVID-19 was a shock for the global economy, significantly affecting the economy. Financial sectors like banks are projected to exploit this shock [43].

Ref. [44] examined the systematic risk of banks during the COVID-19 pandemic period. They tried to estimate which factors influenced the systemic risk of banks. They found a highly leveraged large firm with high loans in terms of assets, insufficient capital supply to operate regular business, and network problems that caused a high systemic risk for banks during this period. Accordingly, [45] stated that EU banks' non-performing loans (NPLs) are significant threats to banking risk and profitability during the COVID-19 period.

Furthermore, [46] wanted to determine the cost of the credit risk of Polish commercial banks, comparing pandemic period conditions with the pre-pandemic period implications. They found higher return capital pre-pandemic was more cautious during the COVID-19 period and faced a relatively lower cost of credit risk. Conversely, a low share of impaired loans in the pre-pandemic period faced somewhat faster risk cost growth during the COVID-19 pandemic. Ref. [43] found that adverse effects of COVID-19 in the banking sector were more diaphanous and longer than the other financial institutions. The authors revealed that the larger and public banks suffered from a reduction in stock returns to deal with absorbing the shock of COVID-19 because of its higher liquidity and better ability to cooperate. Ref. [47] investigated a low-income country like Uganda, where the COVID-19 pandemic negatively affected the banking sector's profitability, considering the bank-specific variables with the macroeconomic factors.

Ref. [48] investigated the capital structure of banks during this period, He found that capital is an essential factor for continuous lending of the banks and reducing the chance of default both during and post COVID-19 [49–51]. In the case of providing emphasis, [52] stated that banks' intellectual capital (IC) positively impacted their profitability. They compared the effect of the intellectual capital (IC) of banks between Pakistan and China on their profitability during the COVID-19 pandemic. Furthermore, [53] explored the banks that adopted advanced IT technology in the pre-pandemic period and performed better during the COVID-19 period. They focused on the technology adopted by banks with a market-adjusted return. Ref. [54] analyzed loan growth, and a strong deposit position did not support the banks' profitability and stability in Central, Eastern, and Northern EU countries during the COVID-19 period. They wanted to show the long-term impact of COVID-19 on banks' profitability and stability. However, good service quality may ensure customer retention during the financial crisis [55–58]. Ref. [14] determined the impact of the COVID-19 outbreak on bank lending worldwide. Previous research mainly considered bank-loan, macroeconomic data, and some COVID-19 cases and deaths to interpret the result and found a negative relationship between bank-lending ability and health crisis—the bigger the health crisis, the lower the lending ability of the banks.

Ref. [59] explored the consequences of the Saudi banking index due to the COVID-19 pandemic. They considered the lockdown data with the COVID-19 cases, interest rates, and oil prices to conduct the research and drew an ANN model. They found that oil prices and new COVID-19 cases positively affected the Saudi banking sector index, whereas the announcement of lockdown and declining interest rates affected it inversely. In this regard, [60] explored the impact of COVID-19 on the Islamic bank indices in GCC countries by using stock exchanges data and Dow Jones Islamic market index data. They explored Islamic banks' ability to fight economic crises like COVID-19. They illustrated that Islamic banks can provide competent services continuously. Additionally, [61] measured the impact of an internal and external factor of corporate governance on banking performance during the COVID-19 period in the Middle Eastern and North African (MENA) region.

2.3. Research on the Banking Sector during the COVID-19 Pandemic Period in Bangladesh

In the context of Bangladesh, the banking sector has been negatively influenced by the COVID-19 pandemic [23]. Ref. [9] tested and forecasted the sustainability and resilience of the commercial banks of Bangladesh during the pandemic period. The authors demonstrated that insufficient capital adequacy, an inadequate liquidity position, and a high rate of non-performing loans (NPL) with lower performance caused more banks' vulnerability by using the TOPSIS and HELLWIG methods. Similarly, [23] found that lower liquidity ratios and an unhealthy financial position before the COVID-19 pandemic worsened the banks' financial position during the COVID-19 period in Bangladesh. They examined the liquidity and financial well-being of commercial banks in Bangladesh during the continuous period. Ref. [62] investigated the impact of COVID-19 on the firms' value, capital adequacy, and income from the interest of the banking sector in Bangladesh by

using a state-designed stress-testing model under different NPL shock circumstances. They found more vulnerability in the case of relatively larger banks during the pandemic period.

We found a lot of research on the impact of COVID-19 on the banking sector around the world. Meanwhile, from the perspective of Bangladesh, [9,23,62] explored the crucial impact of COVID-19 on the banking sector. They provided valuable information regarding the banks' point of view and other stakeholders' points of view. We developed this paper to add some value to the banking research on Bangladesh during this pandemic period. We properly checked the above analysis accordingly and discovered that the impact of COVID-19 on the overall performance of banks is unique. For that reason, we conducted this study to examine the impact of COVID-19 on banks' profitability and computed the financial performance index (FPI) of each bank individually. In the FPI, we used a standardized CAMELS rating system. Furthermore, we covered a more significant number of years in the data sets with more variables and applied a sophisticated methodology to conduct this research. Besides, the financial performance index (FPI) system with the standardized CAMELS rating system was used for the first time in the perspective of Bangladesh as a method of determining the financial position of banks. These all are the main novelties of our paper.

3. Data and Methodology

3.1. Data Sources and Study Sample

We retrieved panel data from the studied banks' financial statements, and these financial statements were collected from the respective bank websites. The macroeconomic variables were collected from the World Bank database. In addition, we collected data from various articles, journals, websites, newspapers, and magazines to generalize this paper. Among the 33 banks listed under the Dhaka Stock Exchange (DSE) [63], in this study, we took a total of 26 private commercial banks (20 conventional private commercial banks and 6 Islamic Sharia-based commercial banks) based on the available financial statements and annual reports. Our study covers the financial years from 2010 to 2021.

3.2. Research Design

In the methodology section, we first divided our study period into two segments, with terms from the year 2010 to 2019 as the pre-pandemic period of COVID-19 and terms from the year 2020 to 2021 as the pandemic period of COVID-19. In the case of regression analysis, we considered the years 2010 to 2019 as pre-pandemic period, and in order to explore the profitability condition of the banks during the COVID-19 period, we incorporated the study years 2020 and 2021 to the 2010 to 2019 data set. We mainly focused on the major changes in regression results during the COVID-19 period compared to the pre-pandemic period. We calculated FPI through the standardized CAMELS model; this is the most popular method of performance measurement of banks. We demonstrate below how the CAMELS model is used to compute banks' financial performance index (FPI) [64,65].

We divided the measurement path into three parts. First, we measured the standard value of each variable (ratio) that was considered in our study in the CAMELS parameters. The formula is as follows:

$$\delta_{ijt} = \frac{\beta_{ijt} - \mu_{jt}}{\sigma_{jt}} \tag{1}$$

Here, μ_{jt} indicates sample mean, σ_{jt} indicates the standard deviation of the CAMELS parameter (j_{th} is the indicator of the sample at time t), and β_{ijt} indicates the individual ratio of each CAMELS parameter for respective banks separately at time t.

Second, we calculated each CAMELS parameter value considering the standardized value of each ratio with the prescribed weights. In this section, we used different types of bank ratios in each parameter.

$$\text{Capital Adequacy (CA}_{it}) = \omega_{1it}\delta_{1it} + \omega_{2it}\delta_{2it} + \omega_{3it}\delta_{3it} \tag{2}$$

$$\text{Asset Quality } (AQ_{it}) = \omega_{1it}\delta_{1it} + \omega_{2it}\delta_{2it} + \omega_{2it}\delta_{2it} + \omega_{4it}\delta_{4it} \tag{3}$$

$$\text{Management Efficiency } (ME_{it}) = \omega_{1it}\delta_{1it} + \omega_{2it}\delta_{2it} + \omega_{2it}\delta_{2it} \tag{4}$$

$$\text{Earning Ability } (EA_{it}) = \omega_{1it}\delta_{1it} + \omega_{2it}\delta_{2it} + \omega_{3it}\delta_{3it} + \omega_{4it}\delta_{4it} \tag{5}$$

$$\text{Liquidity } (LY_{it}) = \omega_{1it}\delta_{1it} + \omega_{2it}\delta_{2it} \tag{6}$$

$$\text{Sensitivity to Risk } (SR_{it}) = \omega_{1it}\delta_{1it} + \omega_{2it}\delta_{2it} \tag{7}$$

Here, δ_{it} indicates the standard value of the CAMELS parameter of the i_{th} bank at time t, and ω_{it} represents the prescribed weight for each ratio at time t for every bank.

Finally, we computed the FPI for the i_{th} bank in the following way:

$$FPI_i = \alpha_{j1}CA_{it} + \alpha_{j2}AQ_{it} + \alpha_{j3}ME_{it} + \alpha_{j4}EA_{it} + \alpha_{j5}LY_{it} + \alpha_{j6}SR_{it} \tag{8}$$

where α_j indicates the prescribed weight for each parameter for the i_{th} bank at time t. CA_{it}, AQ_{it}, ME_{it}, EA_{it}, LY_{it}, and SR_{it} are the CAMELS performance parameters for the i_{th} bank at time t.

3.2.1. Regression Model

Regression analysis is a set of statistical methods used to estimate the relationship between the single dependent variable and one or multiple variables [66]. Accordingly, we used three regression models to explore the effect of bank-specific variables along with macroeconomic variables on banks' profitability during the pre-pandemic period and pandemic period of COVID-19. Table 1 shows the variables used, the definitions of these variables, and the formula for calculating these respective variables. We demonstrated the effect of COVID-19 on the banking sector by considering the years 2010 to 2019 as the pre-pandemic period and during pandemic period; we incorporated the years 2020 and 2021 to the pre-pandemic period data. We wanted to explore the impact of COVID-19 on banks' profitability by focusing on the major changes in the regression outcome compared to the outcome from the pre-pandemic period. For this purpose, we propose the following regression equations as the model of our study:

Table 1. Theoretical framework.

Variable Type			Variable Name	Acronym	Definition and Formula	Expected Relation
Dependent Variables			Return on asset	ROA	Return on asset is a financial performance indicator ratio that indicates how efficiently a profitable firm can generate profit in terms of total assets [67]. According to [68], ROA is the best tool to measure banks' profitability. Formula: ROA = Net Income/Total Assets [69]	Not Applicable
			Return on equity	ROE	Return on equity is defined as the standard of a bank's profitability and is also how effectively a bank can generate profit from equity [70]. It is the ratio of return between a firm's net income and its shareholders' equity [71]. Formula: ROA = Net Income after Tax/Shareholders Equity [22]	Not Applicable
			Net interest margin ratio	NIMR	Net interest margin ratio is a profitability indicator tool that compares the net earning interest from the loan, investment, and lease a firm generates with what it pays to the holders of depositors and savings account holders [72]. Formula: NIMR = Net Interest Income/Average Earning Assets [72]	Not Applicable
Independent Variables	Bank-Specific Variables		Capital adequacy ratio	CAR	Capital adequacy is also called the capital-to-risk-weighted asset ratio, which computes the financial strength of banks considering their assets and capital [73]. Formula: CAR = (Tier 1 Capital + Tier 2 Capital)/Risk Weighted Assets [74]	+/−
			Debt-to-asset ratio	DAR	Debt-to-asset ratio is a type of leverage ratio that expresses the portion of debt both short term and long term compared with the total assets of the firm [75] Formula: DAR = Total Liabilities/Total Assets [75]	+/−
			Debt-to-quity ratio	DER	Debt-to-equity ratio is defined as a financial ratio that represents the proportion of debt in terms of the shareholders' equity that is used to finance the company's assets. According to accounting tools, the debt-to-equity ratio measures the financial structure risk of a company by dividing its total debts by its total equity [76]. Formula: DER = Total Liabilities/Total Shareholders Equity [77]	+/−
			Equity-to-asset ratio	EAR	Equity-to-asset ratio refers to how much a firm's assets are funded by shareholders' equity rather than debt [78]. Formula: EAR = Total Shareholders Equity/Total Assets [22,78]	+/−
			Loan-to-asset ratio	LAR	Loan-to-asset ratio is a financial ratio that represents the portion of the loan amount compared to the total assets of the company. Formula: LAR = Total Loans/Total Assets [79]	+/−
			Liquid-asset-to-total-assets ratio	LATAR	Liquid-asset-to-total-assets ratio expresses how much of a cash asset or cash equal asset is available in terms of total assets of the firm. Formula: LATAR = Liquid Assets/Total Assets [80]	+/−
			Loan-to-deposit ratio	LDR	Loan-to-deposit ratio is a ratio that measures a bank's liquidity position by comparing the loan amount a bank disburses with the deposit amount it receives [81] Formula: ROA = Total Loans/Total Deposits [81]	+/−
			Non-performing loan rate	NPLR	Non-performing loan rate is used as a tool for measuring the credit risk of banks, where a higher ratio indicates a higher chance of losses due to the loan default by the borrowers [82]. Formula: NPLR = Total Non-performing Loans/Total Loans [47]	−
			Bank size	Size	Bank size is the natural logarithm form of a bank's total assets [83]. Formula: Size = {ln(Total Bank Assets)} [65]	+/−
		MV	The GDPGR (+/−), INFR (+/−), and INTR (+/−) stand for gross domestic product growth rate, inflation rate, and real interest rate, respectively, for Bangladesh.			

Note: MV = macroeconomic variables; parentheses () indicate the expected relationship.

Components of banks that influence their profitability:

$$ROA_{it} = \alpha_i + \beta_1 GDPGR_{it} + \beta_2 INFR_{it} + \beta_3 INTR_{it} + \beta_4 CAR_{it} + \beta_5 DAR_{it} + \beta_6 DER_{it} + \beta_7 EAR_{it} + \beta_8 LAR_{it} + \beta_9 LATAR_{it} + \beta_{10} LDR_{it} + + \beta_{11} NPLR_{it} + \beta_{12} Size_{it} + \varepsilon_{it} \text{---(Model I)}$$

$$ROE_{it} = \alpha_i + \beta_1 GDPGR_{it} + \beta_2 INFR_{it} + \beta_3 INTR_{it} + \beta_4 CAR_{it} + \beta_5 DAR_{it} + \beta_6 DER_{it} + \beta_7 EAR_{it} + \beta_8 LAR_{it} + \beta_9 LATAR_{it} + \beta_{10} LDR_{it} + + \beta_{11} NPLR_{it} + \beta_{12} Size_{it} + \varepsilon_{it} \text{---(Model II)}$$

$$NIMR_{it} = \alpha_i + \beta_1 GDPGR_{it} + \beta_2 INFR_{it} + \beta_3 INTR_{it} + \beta_4 CAR_{it} + \beta_5 DAR_{it} + \beta_6 DER_{it} + \beta_7 EAR_{it} + \beta_8 LAR_{it} + \beta_9 LATAR_{it} + \beta_{10} LDR_{it} + + \beta_{11} NPLR_{it} + \beta_{12} Size_{it} + \varepsilon_{it} \text{---(Model III)}$$

where ROA_{it}, ROE_{it}, and $NIMR_{it}$ indicate the return on asset, return on equity, and net interest margin ratio, respectively, of each bank at time t. Accordingly, CAR_{it} = capital adequacy ratio, DAR_{it} = deposit-to-asset ratio, DER_{it} = debt-to-equity ratio, EAR_{it} = equity-to-asset ratio, LAR_{it} = loan-to-asset ratio, $LATAR_{it}$ = liquid-asset-to-total-asset ratio, LDR_{it} = loan-to-deposit ratio, $NPLR_{it}$ = non-performing loan rate, $Size_{it}$ = bank size, $GDPGR_{it}$ = gross domestic product growth rate, $INFR_{it}$ = inflation rate, and $INTR_{it}$ = real interest rate at time t for each bank; β is the regression coefficient; and α_i is the intercept term. (Note: ROA, ROE, and NIMR are the proxy variables for the banks' profitability).

Most researchers use ROA, ROE, and NIMR as the proxy variables to measure the profitability of banks as well as represent the impact of bank-specific variables, financial indicators of the market, and macroeconomic variables on bank profitability [47,71,84–86].

Panel Data Model Diagnosis

First, we tested the stationarity of data (panel unit root test) by Levin–Lin–Chu (LLC) panel unit root test method to see if a common unit root was present in the variables. Accepting the null hypothesis refers to the existence of a common unit root, whereas acceptance of the alternative hypothesis indicates the absence of a common unit root. The result of this test is shown in Table 2. We saw that every variable of our study received a probability value of less than 0.05, which suggests the null hypothesis was rejected and the alternative hypothesis was accepted. Hence, all the variables were free from a common unit root. Now, it was time to detect the appropriate panel data regression model. There are three kinds of panel data diagnosis regression models: pooled model, fixed-effect model, and random-effect model.

In our study, we used the F-test and Hausman test to identify the best model for our study. First, we conducted an F-test to select a model between pooled and fixed-effect models. The result recommended that (as shown in Table 2) the fixed model be chosen over the pooled model, as the null hypothesis was rejected at a 1% significant level in every case (models I, II, and III). After that, we ran the Hausman test to identify the best model between the fixed-effect model and the random-effect model. The result (Table 2) shows that the null hypothesis was rejected at a 1% significant level in every case (models I, II, and III) as well, so we specified that the fixed-effect model was the best for every case (models I, II, and III) to analyze the panel data of our research.

We performed several tests to ensure our regression model's appropriateness for panel data analysis. First, we tested the Cook's distance [87] of each model and found values of each model below 1, which emphasized the normality of our model. However, the Mahalanobis test values in some cases exceeded the specified value in terms of DOF. As Cook's distance values did not exceed the standard value of 1, these multivariate outliers were not of concern. Second, the normal probability plot and the scatterplot of standardized residuals against the predicted standardized value met the assumptions of normality, linearity, and homoscedasticity residuals. We also used the Durbin–Watson test, consisting of a regression outcome table, which ensured the absence of autocorrelation in our models. Third, our variance inflation factor (VIF) values were below 10 for each model. This indicates that there were no multicollinearity issues.

Table 2. Results of the F-test, Hausman test and panel data unit root test.

		Pre-Pandemic Period (2010–2019)			Considering Pandemic Period (2010–2021)		
		Model I	**Model II**	**Model III**	**Model I**	**Model II**	**Model III**
F-test	F	2.81200	3.45045	8.77661	2.80524	3.33483	8.46283
	p-value	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hausman test	Chi-square	46.17420	51.92613	21.91756	32.69923	49.94804	32.96735
	p-value	0.00000	0.00000	0.00910	0.00010	0.00000	0.00010
Panel Data Unit Root Test (Levin–Lin–Chu)							
Variables		**t statistic**			***p*-value**		
CAR		−6.99126			0.00000		
DAR		−7.43456			0.00000		
DER		−12.2954			0.00000		
EAR		−8.22837			0.00000		
LAR		−10.3526			0.00000		
LATAR		−11.1518			0.00000		
LDR		−8.09988			0.00000		
NIMR		−4.08969			0.00000		
NPLR		−8.61207			0.00000		
ROA		−14.9933			0.00000		
ROE		−12.7831			0.00000		
SIZE		−8.39977			0.00000		
GDPGR		−5.51756			0.00000		
INFR		−36.2907			0.00000		
INTR		−11.1808			0.00000		

4. Analysis and Results

4.1. Descriptive Statistics

Table 3 shows the descriptive statistics of the study. It represents the financial condition of the listed private commercial banks in the pre and pandemic period. We also investigated the macroeconomic conditions of Bangladesh. During the pandemic period, almost all the variables' mean values decreased. We noticed that DER increased from 1229.51% to 1481.94%.

Table 3. Descriptive statistics.

	Pre-Pandemic Period (2010–2019)					Pandemic Period (2020–2021)				
Variables	**N**	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**	**N**	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
ROE	260	−0.0115	0.3882	0.1348	0.0618	52	0.0142	0.1840	0.0914	0.0384
GDPGR	260	0.0557	0.0815	0.0676	0.0079	52	0.0351	0.0690	0.0520	0.0171
INFR	260	0.0544	0.1146	0.0706	0.0185	52	0.0556	0.0565	0.0561	0.0005
INTR	260	0.0307	0.0689	0.0488	0.0111	52	0.0404	0.0475	0.0440	0.0036
CAR	260	0.0631	0.1793	0.1208	0.0169	52	0.1080	0.1728	0.1414	0.0156
DER	260	5.5000	28.2375	12.295	3.6377	52	7.8857	27.2971	14.8194	3.9931
NPLR	260	0.0097	0.1030	0.0451	0.0174	52	0.0217	0.1809	0.0461	0.0292
LDR	260	0.6580	1.1278	0.8838	0.0829	52	0.7350	1.5454	0.9461	0.1269
LATAR	260	0.0159	0.2513	0.1159	0.0390	52	0.0503	0.2286	0.1058	0.0419
ROA	260	−0.0008	0.0321	0.0111	0.0060	52	0.0010	0.0130	0.0063	0.0031
EAR	260	0.0079	0.1543	0.0801	0.0202	52	0.0353	0.1083	0.0672	0.0151
DAR	260	0.0810	0.9090	0.7877	0.0696	52	0.6190	0.8620	0.7484	0.0571
NIMR	260	0.0032	0.0770	0.0252	0.0087	52	0.0031	0.0416	0.0176	0.0084
LAR	260	0.0702	0.8367	0.6948	0.0675	52	0.5585	1.1309	0.7054	0.0898
Bank size	260	10.9182	14.2456	12.167	0.5577	52	12.2878	14.2630	12.8806	0.3699

These results imply that earnings in terms of assets and equity liquid assets in terms of total assets fell during the onset period when banks largely depended on debt, as the DER volume increased and the EAR volume decreased. However, CAR, LDR, LAR, and bank size increased during this period. It was interesting to see that capital adequacy and loan distribution were positive, but default of loan rate was negative during this period, along with showing a higher standard deviation compared to the pre-pandemic period.

Table 4 shows the Pearson correlation of the variables used. It covers the years from 2010 to 2021. This correlation matrix table denotes that there was no multicollinearity problem between our explanatory variables according to the rule of thumb by [88], who stated that multicollinearity problems occur when the correlation between explanatory variables exceeds 0.80. In addition, the results show that there was a positive association between the explanatory variables DAR, LAR, LATAR, LDR, EAR, INFR, and INTR with the dependent variables ROA, ROE, and NIMR. On the other hand, there was a negative relationship between DER, NPLR, and bank size and ROA, ROE, and NIMR. We also noticed that CAR and GDPGR had negative familiarity with ROA and ROE but had positive familiarity with NIMR. Among the relationships, EAR and INFR had a significant positive relationship with the dependent variables ROA, ROE, and NIMR, whereas NPLR and bank size had a significant negative relationship with ROA, ROE, and NIMR.

4.2. Financial Performance Index (FPI)

We calculated the FPI considering each CAMELS parameter, consisting of capital adequacy, asset quality, management efficiency, earning ability, liquidity position, and sensitivity to the risk of banks.

Table 5 represents the banks' financial performance index (FPI) during the COVID-19 pandemic period and the pre-pandemic period. This table is segmented into two sections, where the first section (2010 to 2019) is the pre-pandemic period of COVID-19 and the second section (2020) is the pandemic period of COVID-19. We looked among the 26 listed private commercial banks. Eastern Bank Ltd. (EBL) was the best performer and Brac Bank Ltd. (BBL), Al-Arafah Islami Bank Ltd. (AIBL), City Bank Ltd. (CBL), National Credit and Commerce Bank Limited (NCCBL) came in second, third, fourth, and fifth position, respectively, during the pre-pandemic period of COVID-19. From the bottom, AB Bank Ltd.'s (ABL) performance was the lowest among the studied banks. IFIC Bank Ltd. (IFICBL), First Security Islami Bank Ltd. (FSIBL), and Pubali Bank Ltd. (Pubali BL) got 23rd, 24th, and 25th place, respectively, during this period. It was surprising to see that Islamic Sharia-based commercial banks' performance was relatively lower compared with the conventional banks. In many studies, the authors found that Islamic Sharia-based banks perform less efficiently than conventional banks [66,89]. Ref. [66] demonstrated that higher operating costs could be the cause for the tenuous performance of Islamic Sharia-based banks, whereas [89] stated that due to management inefficiency, Islamic Sharia-based banks could not perform like conventional banks even though they have enough capital. Ref. [90] concluded that conventional banks are better in the case of management efficiency. However, in the case of liquidity and capital adequacy, Islamic Sharia-based banks are better. Moving into the second section, we noticed that during the COVID-19 pandemic period, there were a lot of changes due to the ongoing crisis. In this period, only AB Bank Ltd.'s (ABL) and Prime Bank Ltd.'s (Prime BL) positions were unchanged, whereas the rest of the 24 banks' performance positions were affected due to COVID-19 both positively and negatively. We saw that among these banks, One Bank Ltd.'s (OBL), EXIM Bank Ltd.'s (EXIMBL), National Credit and Commerce Bank Limited's (NCCBL) performance positions were more vulnerable because their positions decreased more than those of the other banks. However, Pubali Bank Ltd. (Pubali BL), Jomuna Bank Ltd. (JBL), Dutch Bangla Bank Ltd. (DBBL), and United Commercial Bank Ltd. (UCBL) increased their financial performance position during the COVID-19 pandemic period more than the other banks. During this period, AIBL, EBL, BBL, DBBL, and CBL secured 1st (+1), 2nd (−1), 3rd (−1), 4th (+7), and 5th (−1) place, respectively, and IBBL, OBL, SOCIALBL, IFICBL, and ABL came in 22nd (−2), 23rd (−16), 24th (−2), 25th (−2), and 26th (0), respectively. Ref. [9] found that EBL and DBBL were more resilient banks during the pandemic period, and OBL was a less resilient bank in terms of managing the shock of COVID-19. We noticed that during the COVID-19 pandemic period, Islamic Sharia-based commercial banks' performance was lower than that of conventional banks in the pre-pandemic period of COVID-19. SIBL, EXIMBL, FSIBL, SBL, IBBL, and Social BL came in 14th, 16th, 19th, 20th, 22nd, and 24th positions, respectively. That should be a concern for Islamic Sharia-based commercial banks' authority.

Table 4. Correlation coefficients (2010–2021).

Variables	CAR	DAR	DER	EAR	LAR	LATAR	LDR	NIMR	NPLR	ROA	ROE	Size	GDPGR	INFR	INTR
CAR	1														
DAR	−0.347 **	1													
DER	0.018	0.242 **	1												
EAR	−0.042	−0.082	−0.893 **	1											
LAR	−0.033	0.432 **	0.293 **	−0.100	1										
LATAR	0.147 **	0.051	0.071	0.002	0.025	1									
LDR	0.285 **	−0.434 **	0.073	−0.012	0.615 **	0.005	1								
NIMR	−0.020	0.084	−0.191 **	0.262 **	0.169 **	0.486 **	0.112 *	1							
NPLR	0.001	−0.149 **	0.044	−0.110	−0.071	−0.142 *	0.027	−0.216 **	1						
ROA	−0.213 **	0.065	−0.531 **	0.599 **	0.023	0.096	−0.008	0.404 **	−0.424 **	1					
ROE	−0.231 **	0.121 *	−0.208 **	0.220 **	0.026	0.108	−0.055	0.393 **	−0.456 **	0.888 **	1				
Size	0.443 **	−0.275 **	0.383 **	−0.432 **	0.047	−0.036	0.261 **	−0.172 **	0.173 **	−0.563 **	−0.478 **	1			
GDPGR	0.012	−0.031	0.080	−0.116 *	0.096	−0.018	0.107	0.112 *	0.186 **	−0.159 **	−0.138 *	0.136 *	1		
INFR	−0.400 **	0.201 **	−0.350 **	0.413 **	−0.056	0.034	−0.219 **	0.225 **	−0.372 **	0.602 **	0.515 **	−0.636 **	−0.215 **	1	
INTR	−0.140 *	0.093	−0.224 **	0.224 **	−0.339 **	0.063	−0.399 **	0.098	−0.050	0.133 *	0.076	−0.299 **	−0.174 **	0.324 **	1

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

Table 5. Financial performance index (FPI).

Banks	Pre-Pandemic Period												Pandemic Period		Change
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Composite Index	Rank	2020	Rank	
ABL	0.385	−0.433	0.003	−0.322	−0.268	−0.154	−0.619	−1.01	−1.459	−1.373	−5.251	26	−1.214	26	0
BAL	−0.086	0.356	−0.091	−0.239	0.115	0.223	−0.278	0.317	0.393	0.228	0.938	8	0.303	7	+1
BBL	−0.147	−0.177	−0.485	0.048	0.388	0.208	0.953	1.175	1.352	1.171	4.486	2	0.694	3	−1
CBL	−0.067	0.144	−0.133	−0.333	0.479	0.695	0.681	0.807	0.373	0.342	2.987	4	0.551	5	−1
DBL	−0.066	0.350	−0.406	0.424	0.251	−0.119	0.072	−0.198	−0.194	0.118	0.233	12	0.171	8	+4
DBBL	−0.346	−0.188	0.126	−0.049	−0.026	0.379	−0.316	0.015	0.419	0.322	0.337	11	0.556	4	+7
EBL	0.811	0.735	1.002	0.759	0.616	0.700	1.043	0.765	0.729	0.821	7.979	1	0.712	2	−1
IFICBL	−0.227	−0.759	−0.222	−0.217	−0.239	−0.715	−0.561	−0.067	−0.222	0.039	−3.189	23	−0.798	25	−2
JBL	−0.288	0.077	−0.496	−0.146	−0.081	−0.010	0.111	0.216	0.251	0.300	−0.067	15	0.462	6	+9
MBL	−0.115	−0.080	−0.246	0.335	−0.041	−0.127	0.296	0.438	0.327	0.096	0.884	10	−0.031	13	−3
MTBL	−0.089	−0.762	−0.782	−0.485	−0.147	0.451	0.224	0.252	−0.174	−0.428	−1.940	21	−0.348	21	0
NCCBL	0.431	0.325	0.108	0.071	0.075	0.040	0.177	0.051	0.052	0.241	1.572	5	0.127	11	−6
OBL	0.247	0.118	0.030	0.277	0.577	0.138	0.170	0.046	−0.233	−0.349	1.022	7	−0.446	23	−16
PBL	0.060	−0.549	−0.161	−0.327	−0.393	−0.503	0.072	0.306	0.396	0.392	−0.708	18	0.109	12	+6
Prime BL	0.406	0.468	0.522	−0.153	−0.205	−0.414	−0.235	−0.001	0.302	0.219	0.909	9	0.159	9	0
Pubali BL	0.045	0.063	−0.202	−0.412	−0.225	−0.483	−0.962	−1.239	−0.590	−0.903	−4.908	25	−0.191	15	+10
SEBL	0.098	−0.108	−0.027	0.322	0.571	0.139	−0.074	−0.501	−0.126	−0.197	0.098	14	−0.208	17	−3
TBL	−0.252	−0.360	−0.346	−0.629	0.069	−0.039	0.273	0.005	−0.168	−0.088	−1.534	19	−0.263	18	+1
UCBL	−0.802	0.115	−0.139	0.259	0.172	0.282	−0.433	−0.146	−0.126	0.170	−0.646	17	0.128	10	+7
AIBL	0.761	0.720	0.493	0.648	0.276	0.360	0.532	0.234	0.169	0.137	4.330	3	1.284	1	+2
EXIMBL	0.587	0.269	0.304	0.371	0.190	0.033	0.073	0.015	−0.177	−0.140	1.526	6	−0.193	16	−10
FSIBL	−0.653	−0.544	−0.343	−0.438	−0.435	−0.604	−0.358	−0.271	−0.309	−0.269	−4.224	24	−0.318	19	+5
IBBL	−0.179	0.048	0.233	0.097	−0.283	−0.559	−0.346	−0.228	−0.217	−0.269	−1.702	20	−0.373	22	−2
SBL	0.114	0.313	0.418	0.030	−0.060	0.199	−0.398	−0.227	−0.375	−0.170	−0.157	16	−0.329	20	−4
SIBL	0.328	0.005	0.601	0.143	−0.350	−0.255	−0.100	−0.150	−0.096	0.017	0.143	13	−0.060	14	−1
Social BL	−0.951	−0.148	0.245	−0.032	−1.025	0.144	0.006	−0.601	−0.301	−0.423	−3.086	22	−0.485	24	−2

Note: AIBL, EXIMBL, FSIBL, IBBL, SBL, SIBL, and Social BL are Islamic Sharia-based (non-conventional) private listed commercial banks under the Dhaka Stock Exchange (DSE).

4.3. Regression Result Interpretation

4.3.1. Empirical Result on Banks' Profitability Measured by ROA

Table 6 shows the empirical results of banks' profitability measured by ROA. We apply model I at two different periods of time. The first period was the pre-pandemic period of COVID-19, where model I(a) and model I(b) are located. In the second period, we incorporated the pandemic period of COVID-19 into the pre-pandemic period, where model I(c) and model I(d) are located. In models I(a) and I(c), we included only the bank-specific variables. In models I(b) and I(d), we added macroeconomic variables along with the banks' particular variables to see the impact of bank-specific variables and macroeconomic variables along with bank-specific variables on the banks' profitability separately.

Table 6. Relationship of ROA to bank-specific and macroeconomic variables.

Variables	Pre-Pandemic (2010–2029)		Including Pandemic Period (2010–2021)	
	Model I(a)	Model I(b)	Model I(c)	Model I(d)
	Coefficient	Coefficient	Coefficient	Coefficient
CAR	−0.04136 (0.04520) **	−0.02058 (0.32810)	−0.03766 (0.03020) **	−0.03667 (0.03470) **
DAR	−0.03983 (0.14770)	−0.03898 (0.15080)	−0.02111 (0.37610)	−0.01235 (0.60980)
DER	0.00023 (0.37590)	0.00031 (0.22000)	0.00021 (0.32960)	0.00013 (0.53230)
EAR	0.14441 (0.00030) ***	0.14336 (0.00020) ***	0.12991 (0.00020) ***	0.11964 (0.00050) ***
LAR	0.03566 (0.23870)	0.04521 (0.13070)	0.01760 (0.49740)	0.01058 (0.69000)
LATAR	−0.00922 (0.34290)	0.00215 (0.82990)	−0.01431 (0.07580) *	−0.01013 (0.06860) *
LDR	−0.00945 (0.68970)	−0.01060 (0.64520)	−0.00231 (0.90590)	0.00171 (0.93070)
NPLR	−0.13309 (0.00000) ***	−0.11518 (0.00000) ***	−0.09465 (0.00000) ***	−0.08228 (0.00000) ***
BANK SIZE	−0.00432 (0.00000) ***	−0.00004 (0.97650)	−0.00486 (0.00000) ***	−0.00350 (0.00090) ***
GDPGR		−0.26640 (0.00000) ***		−0.00816 (0.65600)
INFR		0.04510 (0.03380) **		0.04950 (0.01340) **
INTR		−0.03848 (0.17810)		−0.02974 (0.21430)
C	0.07626 (0.00270) ***	0.02911 (0.30640)	0.07414 (0.00080) ***	0.05109 (0.03370) **
Observations	260	260	312	312
Adj R2	0.64566	0.66974	0.63648	0.64239
F value	14.88074 (0.00000) ***	15.19549 (0.00000) ***	17.01559 (0.00000) ***	16.09870 (0.00000) ***
Durbin–Watson	1.54004	1.61015	1.35257	1.47730

Note: *** shows 1% level of significance, ** shows 5% level of significance, and * shows 10% level of significance.

Evaluating model I(a), we saw that EAR significantly and positively affected the ROA; this is consistent with the literature [71,91,92]. this implies that a less leveraged financial position enhances the banks' return on assets. On the other hand, CAR, NPLR, and bank size significantly affected the ROA. This means decreases in non-performing loans in terms of the total loans could increase the banks' return on assets, and holding capital to hedge the risk exposure would diminish the banks' profitability. Ref. [93] found a significant negative effect of bank size on bank performance. In the perspective of Bangladesh, [84] reported a significant negative relationship of bank size with the profitability of banks.

Accordingly, [94] demonstrated a significant negative relationship of bank size and NPLR with bank ROA. The negative impact of NPLR on ROA is similarly consistent with [71]. We also noticed that statistically, there was an insignificant negative relationship between DAR, LATAR, and LDR with the ROA and an insignificant positive relationship between DER and LAR with bank ROA. These findings imply that banks with more debt, sanctioning more loans, and holding liquid assets do not significantly affect the banks' return in terms of assets.

In Model I(b), we integrated macroeconomic variables with bank-specific variables and found that GDP growth rate significantly and negatively affected the ROA of the banks. In contrast, the inflation rate positively and significantly affected the ROA of the banks. Ref. [95] also found that inflation rate has a significant positive effect on bank profitability. The significant negative effect of GDPGR on bank profitability means that during the study period, the producers, business investors, corporate firms, and government production house who borrowed money from the bank may have had enough internal funds or depended on other sources than the banks, making them less reliant on banks and leading to the negative effect of GDPGR on the banks' ROA [65]. Our result is in agreement with [96]. This author found a significant negative relationship of GDPGR with bank profitability. In this model, the significant positive impact of inflation on the banks' return on assets refers to the fact that the banks can manage the inflation rate expected to enhance their profitability [95]. The coefficient value of real interest rate demonstrated that real interest rate insignificantly and negatively affects banks' return on equity. This means that an increase or decrease in real interest rate could not significantly affect the bank's ROA. When we included macroeconomic variables with the bank's specific variables, there were three changes among the bank's specific variables. In this case, there was an insignificant positive impact of LATAR on the ROA of banks and an insignificant negative impact of CAR and bank size on the banks' return on assets.

When we incorporated the pandemic period of COVID-19 into the pre-pandemic period of COVID-19, we found that LATAR significantly and negatively affected the banks' return on equity. The results are shown in model I(c). Ref. [97] also reported that liquidity position affected banks' profitability during the crisis. This implies that holding liquid assets decreased banks' return on equity. The other remaining variables behaved in the same way as in the pre-pandemic period. Model I(d) shows that when we integrate the COVID-19 period into the pre-pandemic period considering macroeconomic variables in bank profitability, we also saw that CAR affected banks' ROA negatively and significantly. Furthermore, we noticed that in model I(d), GDPGR impacted banks' ROA negatively and insignificantly, whereas GDPGR significantly affects banks' profitability in the pre-pandemic period. This means that banking profitability was not largely sensitive to the GDPGR during the pandemic period. Bank size negatively affected bank ROA at a 1% significance level when we added macroeconomic variables as determinants of the bank's profitability during both periods.

Besides, the adjusted R^2 value of model I(a) 0.64566, model I(b) 0.66974, model I(c) 0.63648, and model I(d) 0.64239 implied that our studied explanatory variables perfectly fit with the dependent variable ROA. From the Durbin–Watson test, we found that there was no autocorrelation present in these models based on the rule of thumb by [98] who denoted that a Durbin–Watson test value between 1 and 3 is not of the concern for autocorrelation. The regression tables 6, 7 and 8, where our specified models are represented, show that the Durbin–Watson test values were between 1 and 3. Therefore, the overall appropriateness of the models appeared to be very good.

4.3.2. Empirical Result on Bank Profitability Measured by ROE

Table 7 shows the relationship between explanatory variables and the dependent variable ROE as determinants of bank profitability. Like Table 6, here we applied model II in the same way. Model II(a) and model II(b) represent the pre-pandemic period of COVID-19, and in model II(c) and model II(d) we included the pandemic period data set to

the pre-pandemic period data set. Based on the relationship between model II(a) and ROE, we found that CAR, LATAR, NPLR, and bank size negatively and significantly affected the banks' return on equity. In contrast, DER and LAR affected it insignificantly and positively, and DAR and EAR had an insignificantly negative impact on the ROE. Refs. [95,99] reported that liquidity risk and funding risk had a significant negative relationship with the banks' profitability. Except for EAR and LATAR, the same result is shown in Table 6, where ROA represents the banks' profitability. Therefore, we strongly agree with the notion that during the pre-pandemic period, the profitability of listed commercial banks in Bangladesh was significantly and negatively sensitive to capital adequacy, non-performing loan rate, and bank size. However, debt in terms of equity and loan sanction did not significantly affect the banks' profitability.

Table 7. Relationship of ROE to bank-specific and macroeconomic variables.

Variables	Pre-Pandemic (2010–2019)		Including Pandemic Period (2010–2021)	
	Model II(a)	Model II(b)	Model II(c)	Model II(d)
	Coefficient	Coefficient	Coefficient	Coefficient
CAR	−0.49167 (0.04960) **	−0.21609 (0.39540)	−0.45035 (0.03390) **	−0.44429 (0.03730) **
DAR	−0.37676 (0.25840)	−0.38893 (0.23520)	−0.23336 (0.42330)	−0.15555 (0.60090)
DER	0.00026 (0.93600)	0.00141 (0.64830)	−0.00004 (0.98900)	−0.00072 (0.78420)
EAR	−0.01675 (0.97190)	−0.01633 (0.97150)	−0.21240 (0.60760)	−0.31726 (0.44850)
LAR	0.34541 (0.34650)	0.48660 (0.17810)	0.20350 (0.52090)	0.14355 (0.65960)
LATAR	−0.21673 (0.06690) *	−0.08248 (0.49560)	−0.21692 (0.02790) **	−0.17719 (0.08170) *
LDR	−0.08527 (0.76650)	−0.11365 (0.68280)	−0.03892 (0.87050)	−0.00521 (0.98280)
NPLR	−1.56293 (0.00000) ***	−1.36701 (0.00000) ***	−1.13315 (0.00000) ***	−1.01292 (0.00000) ***
BANK SIZE	−0.04861 (0.00010) ***	0.00301 (0.86220)	−0.05819 (0.00000) ***	−0.04553 (0.00040) ***
GDPGR		−3.44917 (0.00000) ***		−0.12537 (0.57770)
INFR		0.46931 (0.06720) *		0.45624 (0.06290) *
INTR		−0.48756 (0.15810)		−0.29041 (0.32330)
C	1.01291 (0.00100) ***	0.47336 (0.16910)	1.06709 (0.00010) ***	0.86046 (0.00370) ***
Observations	260	260	312	312
Adj R2	0.49556	0.53322	0.47707	0.48004
F value	8.48360 (0.00000) ***	8.99627 (0.00000) ***	9.34498 (0.00000) ***	8.76007 (0.00000) ***
Durbin–Watson	1.55566	1.60130	1.39907	1.49020

Note: *** shows 1% level of significance, ** shows 5% level of significance, and * shows 10% level of significance.

Model II(b) shows the impact of macroeconomic variables and the bank-specific variables on the banks' ROE. It shows that GDPGR impacted the return on equity of banks significantly and negatively. However, the inflation rate substantially affected the banks' ROE. We found the same result in Table 6, with the insignificant negative impact of real interest rate on bank profitability. This result implies that the profitability of the listed commercial banks in Bangladesh was strongly sensitive to the GDP growth rate (negatively) and inflation rate (positively) during the pre-pandemic situation. Other variables in model II(b), except for CAR and bank size, were indifferent from model II(a). It is surprising to see

that when we considered macroeconomic variables as a bank's profitability determinants, we found that CAR insignificantly and negatively affected the bank profitability during the pre-pandemic period. When we incorporated the pandemic period of COVID-19 into the pre-pandemic period we acquired different results from the pre-pandemic period. Model II(c) shows that LATAR had a negative relationship with ROE at the 5% significant level, whereas this variable negatively affected the ROE at the pre-pandemic period at the 10% significant level. This high significance level means that during the COVID-19 period holding liquid assets dampened the profitability of the banks more severely than during the pre-pandemic period. We found the same results with model I in Table 6. In addition, model II(c) disclosed that DER affected the ROE negatively and insignificantly during the pandemic, although it affected the banks' ROE positively before the COVID-19 period. Model II(d) specifies that CAR, LATAR, and NPLR had significant negative impacts on the banks' return on equity. In contrast, only NPLR had a significant negative relationship with the banks' return on equity in the pre-pandemic period considering macroeconomic variables. It expresses that the banks earned less profit during the pandemic due to holding liquid assets and hedge funds to combat the uncertain risk of COVID-19. Model II(d) also shows that during the pandemic period, the banks' GDPGR did not significantly affect the return on equity as in the pre-pandemic period. However, the inflation rate played a role in the same way in both periods. Moreover, it is to be noted that the non-performing loan rate in terms of total loans in models I and II in both periods affected the banks' profitability negatively and significantly. This outcome refers to the profitability of private commercial banks in Bangladesh being affected considerably by management inefficiency. Besides, according to the adjusted R^2 values, all models' explanatory variables fit with the dependent variables. The Durbin–Watson test [98] statistical results show no autocorrelation problem in the above discussed models.

4.3.3. Empirical Results on Bank Profitability Measured by NIMR

Table 8 shows the empirical results of the effect of bank-specific variables and macroeconomic variables along with the particular bank variables separately on bank profitability measured by NIMR, where model III(a) and model III(b) played a role as the pre-pandemic period models and model III(c) and model III(d) represent the incorporated results shown in Tables 6 and 7.

Model III(a) shows that CAR and LDR positively and significantly affected the net interest margin regarding earning assets, whereas NPLR negatively and significantly affected NIMR. The results also indicate that DAR, DER, EAR, LATAR, and LDR had an insignificant positive relationship with the banks' NIMR. On the other hand, LAR and bank size had an insignificant negative relationship with NIMR. Shifting to model III(b), where macroeconomic variables were considered, we noticed that in the case of the bank-specific variables, except for LDR, all variables impacted NIMR in the same way as model III(a). Ref. [71] reported that bank size had an insignificant negative effect on NIMR and that there was a significant positive relationship between CAR and NIMR. Here, we also noticed that the real interest rate affected the banks' NIMR positively and significantly. This implies that an increase in real interest enhances banks' net interest income regarding earning assets. However, an increase in real interest rates hampers banks' borrowers, but the banks make more money from issuing loans by implementing higher interest rates. In model III(c), we incorporated the COVID-19 pandemic period into the pre-pandemic period. We saw that, in the case of only the bank-specific variables, bank size significantly and negatively affected NIMR, like the profitability measured by ROA and ROE. Apart from this, DER impacted the NIMR negatively at the 5% significant level, but LATAR had a significant positive effect on NIMR. The significant negative effect of DER on NIMR shows that a high leverage position weakened the banks' profitability position during the pandemic period. We also found that CAR did not affect NIMR significantly, like the pre-pandemic period. Moving to model III(d), we noticed that LATAR and GDPGR significantly and positively impacted banks' NIMR during the pandemic period, and we saw an insignificant

impact during the pre-pandemic period. Model III(d)'s results also show that bank size impacted NIMR significantly and negatively, but impacted NIMR insignificantly during the pre-pandemic period. During the COVID-19 period, GDPGR growth rate enhanced the banks' NIMR, although non-performing loan rates and insufficient bank size decreased the NIMR during the pandemic period. We observed no significant effect of GDPGR on the banks' ROA and ROE in Tables 6 and 7, respectively, during the pandemic period, but we noticed here that GDPGR affected the banks' net interest earning in terms of earning assets positively at a 1% level of significance during this period.

Table 8. Relationship of NIMR to bank-specific and macroeconomic variables.

Variables	Pre-Pandemic (2010–2019)		Including Pandemic Period (2010–2021)	
	Model III(a)	Model III(b)	Model III(c)	Model III(d)
	Coefficient	Coefficient	Coefficient	Coefficient
CAR	0.07143 (0.02270) **	0.06893 (0.03620) **	0.01778 (0.63540)	0.00726 (0.84120)
DAR	0.06525 (0.11780)	0.04524 (0.28390)	0.01073 (0.83540)	−0.00883 (0.86170)
DER	0.00013 (0.74670)	0.00026 (0.51780)	−0.00100 (0.03150) **	−0.00064 (0.15570)
EAR	0.08684 (0.14420)	0.09366 (0.11340)	−0.03183 (0.66420)	0.01802 (0.80050)
LAR	−0.04618 (0.31390)	−0.02142 (0.64500)	0.00579 (0.91790)	−0.00578 (0.91720)
LATAR	0.01539 (0.29670)	0.02026 (0.19450)	0.05213 (0.00300) ***	0.04175 (0.01640) **
LDR	0.06014 (0.09480) *	0.05260 (0.14320)	0.00985 (0.21590)	0.01809 (0.66060)
NPLR	−0.07218 (0.00680) ***	−0.07984 (0.00520) ***	−0.04340 (0.09780) *	−0.08019 (0.00310) ***
BANK SIZE	−0.00220 (0.15370)	−0.00197 (0.37860)	−0.00560 (0.00270) ***	−0.00805 (0.00030) ***
GDPGR		−0.08755 (0.38010)		0.18145 (0.00000) ***
INFR		−0.03042 (0.35590)		−0.06593 (0.11460)
INTR		0.07595 (0.08830) *		0.07533 (0.13330)
C	−0.03626 (0.34240)	−0.03148 (0.47720)	0.10651 (0.02480) **	0.11807 (0.01920) **
Observations	260	260	312	312
Adj R2	0.61896	0.62511	0.60106	0.63301
F value	13.37415 (0.00000) ***	12.67194 (0.00000) ***	14.78107 (0.00000) ***	15.49815 (0.00000) ***
Durbin–Watson	1.71712	1.73996	1.37978	1.45197

Note: *** shows 1% level of significance, ** shows 5% level of significance, and * shows 10% level of significance.

In addition, the adjusted R^2 value of model III(a) 0.61896, model III(b) 0.62511, model III(c) 0.60106, and model III(d) 0.63301 indicates that there was a good fit between the explanatory variables with dependent variable NIMR. In addition, the Durbin–Watson test statistic of model III(a) at 1.71712, model III(b) at 1.73996, model III(c) at 1.37978, and model III(d) at 1.45197 shows that the autocorrelation problem was absent among the models, according to the rule of thumb by [98].

4.4. Hypothesis Test Result

Ref. [100] used the hypothesis technique to measure the significant dissimilarities and commonalities of bank-specific variables at various perspectives. Furthermore, [101] used hypothesis analysis to measure the impact of various bank-specific factors on the

profitability of the banks. Table 9 shows the results of hypothesis analysis. We used an independent sample T-test to detect whether any significant difference happened during the pandemic period of COVID-19 compared to the pre-pandemic period statistically. This test helped to support our regression outcomes, as we found that there were some bank-specific variables that significantly and negatively and significantly and positively affected the profitability (measured by ROA, ROE, and NIMR) of the banks. We compared the pandemic period of COVID-19 data set (2020–2021) with the pre-pandemic period data set (2010–2019). Ref. [102] also compared mobile banking financial performance between the pre-pandemic period and pandemic period by hypothesis testing.

Table 9. Hypothesis test statistic results.

Variables	t Statistic	*p* Value	Interpretation
CAR	−8.11961	0.00000 ***	H_0 rejected
DAR	3.82777	0.00016 ***	H_0 rejected
DER	−4.49289	0.00001 ***	H_0 rejected
EAR	5.28674	0.00002 ***	H_0 rejected
LDR	−3.39807	0.00121 ***	H_0 rejected
LAR	−0.96942	0.33309	Failed to reject H_0
LATAR	1.68931	0.04217 **	H_0 rejected
NIMR	6.80330	0.00000 ***	H_0 rejected
NPLR	−0.31796	0.75073	Failed to reject H_0
ROA	5.74611	0.00000 ***	H_0 rejected
ROE	6.85213	0.00000 ***	H_0 rejected
Bank Size	−11.53250	0.00000 ***	H_0 rejected

Note: $\alpha = 0.05$, *** shows 1% level of significance, ** shows 5% level of significance.

We did not violate the normality assumptions of the independent sample T test and represented the t statistic and p-value according to the equal variance assumption rule. According to Levene's test for the equality of variances assumption, if the significance level is greater than 0.05, researchers consider that equal variance is assumed; if not, they consider that equal variance is not assumed. Our results represent a significant difference between the pre-pandemic period and pandemic period of COVID-19 in the case of CAR, DAR, DER, EAR, LDR, LATAR, NIMR, ROA, ROE, and bank size at a 1% probability value. In contrast, LAR and NPLR did not face significant differences during this COVID-19 period. We considered ROA, ROE, and NIMR proxy variables to detect the profitability position of the banks, and the results show that they were significantly impacted by COVID-19 pandemic situation. Furthermore, our hypothesis study proves the significant negative impact of CAR and LATAR on banks' profitability during the COVID-19 pandemic period, which was revealed in the regression results. Thus, we can conclude that the profitability of the listed private commercial banks in Bangladesh has been significantly affected by the COVID-19 pandemic.

5. Conclusions

The impact of COVID-19 on the world economy is unforgettable, and undoubtedly it will be treated as a historic event in the future. By inducing continuous lockdown around the globe, restrictions on public movement, halting of production, slumping demand for goods and services, and international trade barriers, it has slowed global economic growth. It has hindered the performance of every financial sector, with the banking sector being the most significant one. The liquidity, financial health position, and resiliency of the banks in Bangladesh were estimated during the pandemic period of COVID-19, but no research had yet been conducted to measure the impact of COVID-19 on the banks' profitability. Therefore, the major objective of this paper was to explore the impact of COVID-19 on the profitability of listed private commercial banks in Bangladesh and to compute the financial performance index of the studied banks.

This paper used panel data set from the year 2010 to the year 2021 of listed private commercial banks in Bangladesh, where the years 2010–2019 were considered the pre-pandemic period of COVID-19, and the years 2020–2021 were considered the pandemic period of COVID-19. Initially, we used the CAMELS rating system to estimate the financial performance index (FPI) of the sampled banks individually both in the pre-pandemic situation and pandemic situation according to the specified weights. To estimate the FPI, we considered the capital adequacy position, asset quality, management efficiency, earning ability, liquidity position, and sensitivity to the risk of each bank. During the pandemic period of COVID-19, AIBL, EBL, and BBL were the top three performing banks among the studied banks; they were also the top three performers in the pre-pandemic situation. Although the top-performing banks were shown to be doing well, as in the pre-pandemic period, the banks that were in a lower position during the pre-pandemic period performed worse during the pandemic period. Exceptionally, Pubali BL, JBL, DBBL, and UCBL performed better during this ongoing crisis period than during the pre-crisis period. In contrast, OBL and EXIMBL performed worse during this catastrophic situation than in the pre-pandemic period.

We also focused on the banks' profitability during these periods to see how the bank-specific variables and macroeconomic variables, along with the particular bank variables, affected the banks' profitability. We took ROA, ROE, and NIMR as dependent variables and CAR, DAR, DER, EAR, LAR, LATAR, LDR, NPLR, size, GDPGR, INFR, and INTR as independent variables, with GDPGR, INFR, and INTR as the macroeconomic variables. We found that NPLR and bank size significantly and negatively affected the ROA, ROE, and NIMR of the listed private commercial banks in Bangladesh during the pre-pandemic period as well as when we incorporated the COVID-19 period into the pre-pandemic period. In contrast, CAR only affected the banks' ROA and ROE in the same ways, and LDR only dampened ROA significantly during the COVID-19 period. We also found a significant positive association of EAR and INFR with ROA in the pre-pandemic period and pandemic period of COVID-19. The incorporated results show that LATAR affected the banks' ROA and ROE significantly and negatively during the pandemic period, but there was an insignificant association with ROA and ROE during the pre-pandemic period. It is also to be noted that GDPGR affected the bank's ROA and ROE negatively and considerably during the pre-pandemic period. During the pandemic period, it affected the banks' ROA and ROE negatively but insignificantly; however, GDPGR significantly enhanced the banks' NIMR. Although INFR had no significant positive association with NIMR during both periods, it improved the banks' ROA and ROE during the same two periods. During pre-pandemic period, INTR rate affected the banks' NIMR positively and significantly, whereas our study did not find any significant alignment of INTR with the other two proxy variables of ROA and ROE.

In a country like Bangladesh, it is essential to formulate and implement relevant rules and guidelines, improve and extend service areas, ensure good quality of service, and not the least, ensure the appropriate maintenance of banks in any situation. The banking sector of Bangladesh is experiencing a crisis. We found that high non-performing loan rates, holding more liquid assets, high amounts of hedging capital, and inappropriate bank size lessened the profitability of the listed private commercial banks during this period. Thus, the banking sector of Bangladesh should be conscious about diversifying assets, holding liquid capital at the right time, and sanctioning and managing loans properly. Besides, our study recommends that a low leverage position enhances banks' profitability, so banks should collect required funds through equity shares. We suggest that future research test the impact of COVID-19 in the state-owned and foreign commercial banks of Bangladesh using a large number of data sets.

References

1. World Bank. The History of Banks. 2021. Available online: https://www.worldbank.org.ro/about-banks-history (accessed on 10 February 2022).
2. Sheridan, R.B. The British Credit Crisis of 1772 and The American Colonies. *J. Econ. Hist.* **1960**, *20*, 161–186. Available online: http://www.jstor.org/stable/2114853 (accessed on 25 April 2022). [CrossRef]
3. Cootner, P.H. Review of *A Monetary History of the United States 1867-1960*, by M. Friedman & A. J. Schwartz. *Hist. Theory* **1966**, *5*, 100–108. [CrossRef]
4. King, M.R. Who Triggered the Asian Financial Crisis? *Rev. Int. Political Econ.* **2001**, *8*, 438–466. Available online: http://www.jstor.org/stable/4177393 (accessed on 17 May 2022). [CrossRef]
5. Zhuang, J.; Dowling, J. Causes of the 1997 Asian Financial Crisis: What Can an Early Warning System Model Tell Us? 2002. Available online: http://hdl.handle.net/11540/2065 (accessed on 25 April 2022).
6. Aisen, A.; Franken, M. *Bank Credit During the 2008 Financial Crisis: A Cross-Country Comparison*; IMF Working Papers; International Monetary Fund: Washington, DC, USA, 2010; Volume 10. [CrossRef]
7. Williams, M. *Uncontrolled Risk*; McGraw-Hill Education: New York, NY, USA, 2010; ISBN 978-0-07-163829-6.
8. Page, J.; Hinshaw, D.; McKay, B. In Hunt for COVID-19 Origin, Patient Zero Points to Second Wuhan Market. *Wall Str. J.* **2021**. Available online: https://www.wsj.com/articles/in-hunt-for-covid-19-origin-patient-zero-points-to-second-wuhan-market-11614335404 (accessed on 10 February 2022).
9. Ghosh, R.; Saima, F.N. Resilience of commercial banks of Bangladesh to the shocks caused by COVID-19 pandemic: An application of MCDM-based approaches. *Asian J. Account. Res.* **2021**, *6*, 281–295. [CrossRef]
10. Insaidoo, M.; Arthur, L.; Amoako, S.; Andoh, F.K. Stock market performance and COVID-19 pandemic: Evidence from a developing economy. *J. Chin. Econ. Foreign Trade Stud.* **2021**, *14*, 60–73. [CrossRef]
11. Szmigiera, M. Impact of the Coronavirus Pandemic on the Global Economy—Statistics & Facts. 2022. Available online: https://www.statista.com/topics/6139/covid-19-impact-on-the-global-economy/#topicHeader__wrapper (accessed on 26 April 2022).
12. Chinazzi, M.; Davis, J.T.; Ajelli, M.; Gioannini, C.; Litvinova, M.; Merler, S.; Piontti, A.P.y.; Rossi, L.; Sun, K.; Viboud, C.; et al. The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak. *Science* **2020**, *368*, 395–400. [CrossRef]
13. Ashraf, B.N. Economic impact of government interventions during the COVID-19 pandemic: International evidence from financial markets. *J. Behav. Exp. Financ.* **2020**, *27*, 100371. [CrossRef]
14. Çolak, G.; Öztekin, Ö. The impact of COVID-19 pandemic on bank lending around the world. *J. Bank. Financ.* **2021**, *133*, 106207. [CrossRef]
15. Kozak, S. The Impact of COVID-19 on Bank Equity and Performance:The Case of Central Eastern South European Countries. *Sustainability* **2021**, *13*, 11036. [CrossRef]
16. Azad, G.K. *Economic and Financial Stability Implications of COVID-19: Bangladesh Bank and Government's Policy Responses*; Department of Communications and Publications, Bangladesh Bank: Dhaka, Bangladesh, 2021; Available online: https://www.bb.org.bd//pub/special//covid19_26092021.pdf (accessed on 14 February 2022).
17. Gazi, M.A.I.; Rahaman, M.A.; Hossain, G.M.A.; Ali, M.J.; Mamoon, Z.R. An Empirical Study of Determinants of Customer Satisfaction of Banking Sector: Evidence from Bangladesh. *J. Asian Financ. Econ. Bus.* **2021**, *8*, 497–503. [CrossRef]
18. Shafiqullah; Rahman, T. Impact of COVID-19 on Major Macroeconomic Variables of Bangladesh: An ARIMA Model. *JnU J. Econ.* **2021**, *3*, 61–76.
19. Correspondent, S. Bangladesh Inflation Crosses 6% in December, the Highest Level in 2021. Retrieved from bdnews24.com. 2022. Available online: https://bdnews24.com/economy/2022/01/07/bangladesh-inflation-crosses-6-in-december-the-highest-level-in-2021#:~{}:text=Although%20the%20average%20rate%20was,of%20a%20pandemic%2Dinduced%20slump (accessed on 15 February 2022).

20. Statistics, B.B. Bangladesh Inflation Rate. Retrieved from Trading Economics, Bangladesh Bureau of Statistics. 2022. Available online: https://tradingeconomics.com/bangladesh/inflation-cpi (accessed on 15 February 2022).

21. Bank, T.W. Unemployment, Total (% of Total Labor Force) (Modeled ILO Estimate)—Bangladesh. Retrieved from International Labour Organization, ILOSTAT Database. 2022. Available online: https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS (accessed on 26 February 2022).

22. Gazi, M.I.; Alam, M.S.; Hossain, G.A.; Islam, S.N.; Rahman, M.K.; Nahiduzzaman, M.; Hossain, A.I. Determinants of Profitability in Banking Sector: Empirical Evidence from Bangladesh. *Univers. J. Account. Financ.* **2021**, *9*, 1377–1386. [CrossRef]

23. Karim, R.; Shetu, S.A.; Razia, S. COVID-19, liquidity and financial health: Empirical evidence from South Asian economy. *Asian J. Econ. Bank.* **2021**, *5*, 307–323. [CrossRef]

24. Dey, B.K. *Managing Nonperforming Loans in Bangladesh*; Asian Development Bank: Mandaluyong, Philippines, 2019. [CrossRef]

25. Paul, T.C. *COVID-19 Impact in Banking Industry*; Mercantile Bank Limited: Dhaka, Bangladesh, 2021. Available online: https://mblbd.com/assets/corporate/senior/COVID-19-Impact-in-Banking-Industry.pdf (accessed on 26 February 2022).

26. Reddy, S.K. Relative performance of commercial banks in India using CAMEL approach. *Int. J. Multidiscip. Res.* **2012**, *2*, 38–58.

27. Subbaredy, K.; Reddy, M.K.K. Sustainable Growth Rate and Firm Performance. In Proceedings of the National Conference on Marketing and Sustainable Development, Rajampet, India, 13–14 October 2017; pp. 647–652.

28. Moufty, S.; Clark, E.; Al-Najjar, B. The different dimensions of sustainability and bank performance: Evidence from the EU and the USA. *J. Int. Account. Audit. Tax.* **2021**, *43*, 100381. [CrossRef]

29. Weber, O.; Scholz, R.W.; Michalik, G. Incorporating sustainability criteria into credit risk management. *Bus. Strategy Environ.* **2010**, *19*, 39–50. [CrossRef]

30. Altahtamouni, F.; Alfayhani, A.; Qazaq, A.; Alkhalifah, A.; Masfer, H.; Almutawa, R.; Alyousef, S. Sustainable Growth Rate and ROE Analysis: An Applied Study on Saudi Banks Using the PRAT Model. *Economies* **2022**, *10*, 70. [CrossRef]

31. Golubeva, O. Firms' performance during the COVID-19 outbreak: International evidence from 13 countries. *Corp. Gov.* **2021**, *21*, 1011–1027. [CrossRef]

32. Jackson, J.K.; Weiss, M.A.; Schwarzenberg, A.B.; Nelson, R.M.; Sutter, K.M.; Sutherland, M.D. *Global Economic Effects of COVID-19*; Congressional Research Service: Washington, DC, USA, 2021.

33. Padhan, R.; Prabheesh, K.P. The economics of COVID-19 pandemic: A survey. *Econ. Anal. Policy* **2021**, *70*, 220–237. [CrossRef]

34. Wahyuhadi, J.; Efendi, F.; Al Farabi, M.J.; Harymawan, I.; Ariana, A.D.; Arifin, H.; Adnani, Q.E.S.; Levkovich, I. Association of stigma with mental health and quality of life among Indonesian COVID-19 survivors. *PLoS ONE* **2022**, *17*, e0264218. [CrossRef] [PubMed]

35. Arriola, C.; Kowalski, P.; Kowalski, P.; Tongreen, F.V. International Trade during the COVID-19 Pandemic: Big Shifts and Uncertainty. Organisation for Economic Co-Operation and Development. 2022. Available online: https://www.oecd.org/coronavirus/policy-responses/international-trade-during-the-covid-19-pandemic-big-shifts-and-uncertainty-d1131663/ (accessed on 11 March 2022).

36. International Monetary Fund. World Economic Outlook, October 2020: A Long and Difficult Ascent. Retrieved from International Monetary Fund. 2020. Available online: https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020 (accessed on 26 February 2022).

37. The World Bank. The Global Economy: On Track for Strong but Uneven Growth as COVID-19 Still Weighs. 2021. Available online: https://www.worldbank.org/en/news/feature/2021/06/08/the-global-economy-on-track-for-strong-but-uneven-growth-as-covid-19-still-weighs (accessed on 26 February 2022).

38. Abasimel, N.A.; Fufa, H.W. The Horrors of COVID-19 and the Recent Macroeconomy in Ethiopia. *J. Knowl. Econ.* **2021**, *13*, 305–320. [CrossRef]

39. Elnahass, M.; Trinh, V.Q.; Li, T. Global banking stability in the shadow of COVID-19 outbreak. *J. Int. Financ. Mark. Inst. Money* **2021**, *72*, 101322. [CrossRef]

40. Claeys, G. The European Central Bank in the COVID-19 Crisis: Whatever It Takes, within Its Mandate. 2020. Available online: https://www.ecb.europa.eu/mopo/intro/objective/html/index.en.html (accessed on 24 February 2022).

41. Shear, F.; Ashraf, B.N. The performance of Islamic versus conventional stocks during the COVID-19 shock: Evidence from firm-level data. *Res. Int. Bus. Financ.* **2022**, *60*, 101622. [CrossRef] [PubMed]

42. Shen, H.; Fu, M.; Pan, H.; Yu, Z.; Chen, Y. The Impact of the COVID-19 Pandemic on Firm Performance. *Emerg. Mark. Financ. Trade* **2020**, *56*, 2213–2230. [CrossRef]

43. Demirgüç-Kunt, A.; Pedraza, A.; Ruiz-Ortega, C. Banking sector performance during the COVID-19 crisis. *J. Bank. Financ.* **2021**, *133*, 106305. [CrossRef] [PubMed]

44. Duan, Y.; el Ghoul, S.; Guedhami, O.; Li, H.; Li, X. Bank systemic risk around COVID-19: A cross-country analysis. *J. Bank. Financ.* **2021**, *133*, 106299. [CrossRef]

45. Apergis, N. Convergence in non-performing loans across EU banks: The role of COVID-19. *Cogent Econ. Financ.* **2022**, *10*, 2024952. [CrossRef]

46. Korzeb, Z.; Niedziółka, P. Determinants of Differentiation of Cost of Risk (CoR) among Polish Banks during COVID-19 Pandemic. *J. Risk Financ. Manag.* **2021**, *14*, 110. [CrossRef]

47. Katusiime, L. COVID 19 and Bank Profitability in Low Income Countries: The Case of Uganda. *J. Risk Financ. Manag.* **2021**, *14*, 588. [CrossRef]

48. Mohammad, K.U. How bank capital structure decision-making change in recessions: COVID-19 evidence from Pakistan. *Asian J. Econ. Bank.* **2021**, forthcoming. [CrossRef]

49. Berger, A.N.; Bouwman, C.H.S. How does capital affect bank performance during financial crises? *J. Financ. Econ.* **2013**, *109*, 146–176. [CrossRef]

50. Carlson, M.; Shan, H.; Warusawitharana, M. Capital ratios and bank lending: A matched bank approach. *J. Financ. Intermediation* **2013**, *22*, 663–687. [CrossRef]

51. Doku, J.N.; Kpekpena, F.A.; Boateng, P.Y. Capital Structure and Bank Performance: Empirical Evidence from Ghana. *Afr. Dev. Rev.* **2019**, *31*, 15–27. [CrossRef]

52. Xu, J.; Haris, M.; Irfan, M. The Impact of Intellectual Capital on Bank Profitability during COVID-19: A Comparison with China and Pakistan. *Complexity* **2022**, *2022*, 2112519. [CrossRef]

53. Dadoukis, A.; Fiaschetti, M.; Fusi, G. IT adoption and bank performance during the COVID-19 pandemic. *Econ. Lett.* **2021**, *204*, 109904. [CrossRef]

54. Miklaszewska, E.; Kil, K.; Idzik, M. How the COVID-19 pandemic affects bank risks and returns: Evidence from eu members in central, eastern, and northern europe. *Risks* **2021**, *9*, 180. [CrossRef]

55. Lin, A.J.; Chang, H.Y.; Huang, S.W.; Tzeng, G.H. Improving Service Quality of Wealth Management Bank for High-Net-Worth Customers During COVID-19: A Fuzzy-DEMATEL Approach. *Int. J. Fuzzy Syst.* **2021**, *23*, 2449–2466. [CrossRef]

56. Ting, H.-I. Factors Affecting Wealth Management Services: From Investors' and Advisors' Perspectives. *J. Wealth Manag.* **2017**, *20*, 17–29. [CrossRef]

57. Ang, S.-K. A Qualitative Study on the Challenges of Private Banking in Asia. *J. Wealth Manag.* **2010**, *12*, 68–77. [CrossRef]

58. Wu, C.-R.; Lin, C.-T.; Tsai, P.-H. Evaluating Business Performance of Wealth Management Banks. *Eur. J. Oper. Res.* **2010**, *207*, 971–979. [CrossRef]

59. Assous, H.F.; Al-Najjar, D. Consequences of COVID-19 on banking sector index: Artificial neural network model. *Int. J. Financ. Stud.* **2021**, *9*, 67. [CrossRef]

60. Ul Rehman, S.; Ali Almonifi, Y.S.; Gulzar, R. Impact of the COVID-19 Pandemic on Islamic Bank Indices of the Gcc Countries. *Int. J. Islamic Bank. Financ. Res.* **2021**, *7*, 1–17. [CrossRef]

61. El-Chaarani, H.; Abraham, R.; Skaf, Y. The Impact of Corporate Governance on the Financial Performance of the Banking Sector in the MENA (Middle Eastern and North African) Region: An Immunity Test of Banks for COVID-19. *J. Risk Financ. Manag.* **2022**, *15*, 82. [CrossRef]

62. Barua, B.; Barua, S. COVID-19 implications for banks: Evidence from an emerging economy. *SN Bus. Econ.* **2021**, *1*, 19. [CrossRef]

63. Dhaka Stock Exchange (DSE). List of Companies Selected Industry: Bank. 2022. Available online: https://www.dsebd.org/companylistbyindustry.php?industryno=11 (accessed on 2 January 2022).

64. Teker, S.; Teker, D.; Kent, O. Measuring Commercial Banks' Performances in Turkey: A Proposed Model. *J. Appl. Financ. Bank.* **2011**, *1*, 97–112.

65. Rashid, A.; Jabeen, S. Analyzing performance determinants: Conventional versus Islamic Banks in Pakistan. *Borsa Istanb. Rev.* **2016**, *16*, 92–107. [CrossRef]

66. Corporate Finance Institute (CFI). Regression Analysis. 2022. Available online: https://corporatefinanceinstitute.com/resources/knowledge/finance/regression-analysis/ (accessed on 2 February 2022).

67. Hargrave, M. Return on Assets (ROA). Retrieved from Investopedia. 2022. Available online: https://www.investopedia.com/terms/r/returnonassets.asp (accessed on 18 February 2022).

68. Hassan, M.K.; Bashir, A.-H. *Determinants of Islamic Banking Profitability*; Edinburgh University Press: Edinburgh, Scotland, 2005. [CrossRef]

69. Corporate Finance Institute (CFI). Return on Assets & ROA Formula. 2022. Available online: https://corporatefinanceinstitute.com/resources/knowledge/finance/return-on-assets-roa-formula/ (accessed on 18 February 2022).

70. Fernando, J. Return on Equity (ROE). Retrieved from Investopedia. 2021. Available online: https://www.investopedia.com/terms/r/returnonequity.asp (accessed on 18 February 2022).

71. Rahman, M.; Hamid, M.; Khan, M. Determinants of Bank Profitability: Empirical Evidence from Bangladesh. *Int. J. Bus. Manag.* **2015**, *10*, 135–149. [CrossRef]

72. Bloomenthal, A. Net Interest Margin. Retrieved from Investopedia. 2021. Available online: https://www.investopedia.com/terms/n/netinterestmargin.asp (accessed on 19 February 2022).

73. Beers, B. What Does a High Capital Adequacy Ratio Indicate? Retrieved from Investopedia. 2021. Available online: https://www.investopedia.com/ask/answers/040115/what-does-it-mean-when-company-has-high-capital-adequacy-ratio.asp#:~{}:text=The%20capital%20adequacy%20ratio%20(CAR)%20is%20a%20measure%20of%20how,at%20risk%20for%20becoming%20insolvent (accessed on 19 February 2022).

74. Thakur, M. Capital Adequacy Ratio. Retrieved from Wall Street Mojo. 2022. Available online: https://www.wallstreetmojo.com/capital-adequacy-ratio/ (accessed on 19 February 2022).

75. Master Class Article. Debt-To-Assets Ratio: How to Calculate Debt-To-Assets Ratio. 2022. Available online: https://www.masterclass.com/articles/debt-to-asset-ratio-explained#:~{}:text=It%20is%20calculated%20using%20the,has%20more%20debt%20than%20assets (accessed on 20 February 2022).

76. Accounting Tools. Debt to Equity Ratio. 2022. Available online: https://www.accountingtools.com/articles/debt-to-equity-ratio (accessed on 20 February 2022).

77. Thakur, M. Debt to Equity Ratio Formula. Retrieved from EDUCBA. 2022. Available online: https://www.educba.com/debt-to-equity-ratio-formula/ (accessed on 20 February 2022).

78. Hayes, A. Shareholder Equity Ratio. Retrieved from Investopedia. 2021. Available online: https://www.investopedia.com/terms/s/shareholderequityratio.asp (accessed on 23 February 2022).

79. Rahman, M.Z.; Islam, M.S. Use of CAMEL Rating Framework: A Comparative Performance Evaluation of Selected Bangladeshi Private Commercial Banks. *Int. J. Econ. Financ.* **2018**, *10*, 120–128. [CrossRef]

80. Rauf, A.A. Towards Increasing the Financial Performance: An Application of CAMEL Model in Banking Sector in the Context of Sri Lanka. *Res. J. Financ. Account.* **2016**, *7*, 66–71.

81. Murphy, C. Loan-to-Deposit Ratio (LDR). Retrieved from Investopedia. 2020. Available online: https://www.investopedia.com/terms/l/loan-to-deposit-ratio.asp#:~{}:text=a%20bank\T1\textquoterights%20LDR.-,What%20Is%20an%20Ideal%20LDR%3F,for%20expected%20or%20unexpected%20contingencies (accessed on 23 February 2022).

82. Zhang, J.; Jiang, C.; Qu, B.; Wang, P. Market concentration, risk-taking, and bank performance: Evidence from emerging economies. *Int. Rev. Financ. Anal.* **2013**, *30*, 149–157. [CrossRef]

83. Laeven, M.L.; Ratnovski, M.L.; Tong, M.H. *Bank Size and Systemic Risk*; International Monetary Fund: Washington, DC, USA, 2014. [CrossRef]

84. Sufian, F.; Habibullah, M.S. Determinants of bank profitability in a developing economy: Empirical evidence from Bangladesh. *J. Bus. Econ. Manag.* **2009**, *10*, 207–217. [CrossRef]

85. Titko, J.; Skvarciany, V.; Jurevičienė, D. Drivers of bank profitability: Case of Latvia and Lithuania. *Intellect. Econ.* **2015**, *9*, 120–129. [CrossRef]

86. Kumar, V.; Acharya, S.; Ho, L.T.H. Does Monetary Policy Influence the Profitability of Banks in New Zealand? *Int. J. Financ. Stud.* **2020**, *8*, 35. [CrossRef]

87. Cook, R.D. Detection of Influential Observation in Linear Regression. *Technometrics* **1977**, *19*, 15–18. [CrossRef]

88. Kennedy, P. *A Guide to Econometrics*, 6th ed.; Wiley-Blackwell: Hoboken, NJ, USA, 2008.

89. Merchant, I.P. Empirical Study of Islamic Banks Versus Conventional Banks of GCC. *Glob. J. Manag. Bus. Res.* **2012**, *12*, 32–42.

90. Jaffar, M.; Manarvi, I. Performance comparison of Islamic and Conventional banks in Pakistan. *Glob. J. Manag. Bus. Res.* **2011**, *11*, 60–66.

91. Kohlscheen, E.; Murcia, A.; Contreras, J. *Determinants of Bank Profitability in Emerging Markets*. BIS Working Paper No. 686. 2018. Available online: https://ssrn.com/abstract=3098196 (accessed on 15 February 2022).

92. Samad, A. Determinants Bank Profitability: Empirical Evidence from Bangladesh Commercial Banks. *Int. J. Financ. Res.* **2015**, *6*, 173–179. [CrossRef]

93. Akhtar, M.; Ali, K. Factors Influencing the Profitability of Islamic Banks of Pakistan. *Int. Res. J. Financ. Econ.* **2011**, *66*, 125–132.

94. Matin, K.A. Determinants of Bank Profitability. In Proceedings of the Biennial Conference on Economics and Ethics, Dhaka, Bangladesh, 27–29 April 2017. Available online: https://bea-bd.org/site/images/pdf/new17/72.pdf (accessed on 15 February 2022).

95. Hasanov, F.; Bayramli, N.; Al-Musehel, N. Bank-Specific and Macroeconomic Determinants of Bank Profitability: Evidence from an Oil-Dependent Economy. *Int. J. Financ. Stud.* **2018**, *6*, 78. [CrossRef]

96. Nuriyeva, Z. Factors Affecting the Profitability of Azerbaijan Banking System. Master's Dissertation, Eastern Mediterranean University, Gazimağusa, North Cyprus, Turkey, July 2014. Available online: http://i-rep.emu.edu.tr:8080/xmlui/bitstream/handle/11129/1616/NuriyevaZulfiyye.pdf?sequence=1 (accessed on 14 February 2022).

97. Adelopo, I.; Lloydking, R.; Tauringana, V. Determinants of bank profitability before, during, and after the financial crisis. *Int. J. Manag. Financ.* **2018**, *14*, 378–398. [CrossRef]

98. Andy Field. *Discovering Statistics Using SPSS*, 3rd ed.; SAGE Publications Ltd.: Thousand Oaks, CA, USA, 2009.

99. Ali, M.; Puah, C.H. The internal determinants of bank profitability and stability. *Manag. Res. Rev.* **2019**, *42*, 49–67. [CrossRef]

100. Almazari, A.A. Impact of Internal Factors on Bank Profitability: Comparative Study between Saudi Arabia and Jordan. *J. Appl. Financ. Bank.* **2014**, *4*, 125–140.

101. Gemar, P.; Gemar, G.; Guzman-Parra, V. Modeling the sustainability of bank profitability using partial least squares. *Sustainability* **2019**, *11*, 4950. [CrossRef]

102. Amin, R.; Nahiduzzaman. Performance Analysis of Mobile Banking During the COVID-19 Pandemic Period Comparing with the Pre-pandemic Period of COVID-19: An Empirical Study on Bangladesh. *GATR Account. Financ. Rev.* **2021**, *6*, 54–68. [CrossRef]