

Research Article

Overflow Effect of COVID-19 Pandemic on Stock Market Performance: A Study Based on Growing Economy

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Purpose. The purpose of this study is to evaluate the effect that COVID-19 has on the performance of the stock market in emerging economies. The findings as a whole demonstrate that the stock market does not react significantly. We believe that the outcomes of this study provide knowledge that is useful for decision makers in financial markets and policy all around the globe. **Methods.** Data for 140 companies are obtained from the official websites of the companies listed on the Pakistan Stock Exchange. The Wilcoxon signed-rank test was used to determine whether there was a significant difference before and after the pandemic era. In addition, the ARDL model was chosen because of the variable integration mix (order 0 and 1). **Implications.** Theoretically, it added to the information that was already available about the implications of the COVID-19 pandemic on the performance of stock markets in emerging economies. In a purely practical way, it will help those in charge of making policies come up with plans to deal with things that cannot be predicted. **Results.** The findings of the analysis demonstrate that the COVID-19 pandemic has caused a 52.85% reduction in the volatility of Pakistan's net profit returns. The study shows a statistically insignificant negative association between the COVID-19 pandemic and Pakistan's stock returns. The empirical results of ARDL models provide the first conclusion of the analysis, indicating that the number of long-term connections was greater than short-term connections. **Conclusion.** According to the findings of the research, the pandemic caused by COVID-19 has a bigger impact on the financial performance of enterprises (both positively and negatively). Some companies are able to maintain their place in the market even if the bulk of the firms see their performance suffer during a pandemic. **Originality.** We are the first to use the ARDL model to evaluate the effect of the new COVID-19 pandemic on a stock market in a developing nation.

1. Introduction

There are numerous factors affecting business performance, including firm size and age [1], internal business processes, innovation strategy, management accounting information [2], liquidity position, asset utilisation and leverage position [3], management competence index [4], exchange rate and

inflation rate [5], and COVID-19 [6–8]. Among these elements, the COVID-19 pandemic is the most significant factor affecting the financial performance of businesses worldwide. References [6, 9] explore that the coronavirus illness (COVID-19) has posed a significant threat to both the public and business worlds. COVID-19 began in December 2019 in China, and the entire economic and social worlds are

grappling with this issue [10]. In the year 2020, the World Health Organization officially recognized COVID-19 as a global health emergency [11]. The authors of [6, 11, 12] further stated that COVID-19 had an impact on the average person's life as well as on every business in the world. Business operations ceased and were restricted in compliance with the directives of their respective governments. The experts of the International Monetary Fund indicate that the global gross domestic product will also decrease by 3.2% during the period of 2020 [13]. In short, this pandemic affected the lives of ordinary people as well as the businesses operating around the globe. The business world is also influenced by the financial global crisis before this pandemic in 2007 to 2009 [14]. Mehta's research [15] clearly shows that the financial performance of banking industries falls during the period of an economic crisis. The banks of the UAE were earning two-digit profits before the crisis, but after the crisis, the performance of these banks fell [15]. The results of Mehta [15] show that the profitability measures of return on assets, return on equity, and some other ratios are also decreasing during this global crisis period. The global financial crisis destroyed the business worlds of both the growing economy and the developed economy [16]. Batool and Sahi [16] further stated that the global economy was facing a recession in 2009. Finally, the Organization for Economic Co-operation and Development reported that global trade volume decreased by 13% in 2009 compared to the previous year 2008. Like the global crisis, the COVID-19 pandemic has been harmful to the business world and the financial health of both growing and developed economies is declining [7]. Most governments of developing and developed countries have declared this pandemic period as the economic crisis period [17, 18].

In Pakistan, two main sectors play a vital role in the development of the economy: the service sector and the manufacturing sector [19]. The service sector is a combination of many other sectors, such as education, health, banking, non-profit organizations, and other services [19]. The manufacturing sector includes those firms that process raw materials and convert them into finished goods. The manufacturing sector is a combination of many other industries, such as textiles, food, beverages, tobacco, petroleum, pharmaceuticals, automobiles, fertilisers, chemicals, electronics, leather products, engineering products, tyres, and tubes. The economic development and growth of Pakistan also depend upon the performance of the above-stated sectors. Deitiana and Habibuw [1] describe performance as how companies try to achieve their goals and objectives. The authors further stated that the performance of companies can be measured in three dimensions [1]. These three dimensions are productivity, profitability, and the market value of a company. The Pakistan Stock Exchange's annual report indicates that the KSE100 and KSE30 indices fell in 2019 and 2020. Pakistan's government is also fighting against this pandemic through social distancing and lockdown during the period of COVID-19 [17]. It demonstrates a decline in the companies' financial performance. As a result, organizations must track their financial performance. Before buying or selling a company's stock, an

investor must keep in mind the company's financial performance [1]. Every company strives to improve its financial performance to attract more investors. Every company does this by disclosing financial information in the form of financial statements to the general audience. The four most important financial statements are the income statement, the balance sheet, the cash flow statement, and the owner's equity statement, all of which show the company's profitability. In order to draw in additional investors, organizations work to overcome these obstacles and boost their financial performance. Each company has a unique way of measuring its financial results. These methods are Cash Value Added Method (CVA) [20], Technique for Order Preference by Similarity to Ideal Solution Method (TOPSIS) [21], Multi-Criteria Decision-Making Method (MCDM) [22], Data Envelopment Analysis Method (DEA) [23], and Financial Ratios Analysis Method (FRA) [24]. Some other studies like the Financial Ratios Analysis Method (FRA) are used to measure the financial performance, and different statistical tests are used to compare this performance before and during COVID-19. The time period for comparing the performance of different companies is from 2015 to 2020. In this time frame, the first three years from 2015 to 2017 will be considered the pre-COVID-19 period, and the last three years from 2018 to 2020 will be considered the post-COVID-19 period.

However, the performance of companies has been fluctuating from 2015 to 2020. Therefore, it is needed to conduct research that examines financial performance and also identifies factors that affect the financial performance of companies. Hence, the aim of this study is to measure the financial performance of the companies before and during COVID-19. We are also examining the differences between ROA, ROE, CR, DR, and ATR before and during COVID-19. The stated study also contributed to the existing body of knowledge in several ways. First, the research examined the factors that affected the financial performance of companies during the global pandemic crisis. Second, the policy makers adjust their strategies to achieve profitability and improve the financial performance of the companies. Third, the top management hedges this macroeconomic issue in improving the overall financial performance of the companies. Finally, other researchers are needed to expand this research area to other countries. In this study, the research measures the financial performance through ROA, ROE, CR, DR, and ATR and compares the results between pre-COVID-19 and during COVID-19.

This study contributes to the knowledge of stock market performance during a pandemic in developing economies. Usually, the COVID-19 pandemic is considered a disabling dynamic that affects the whole society as well as the firms operating in the economy. This study will focus on the companies that operate in the financial sector and some companies that are performing well and have received a number of government incentives or bailout packages. Furthermore, this study will be concentrated on firms from the main board in order to determine the impact of the COVID-19 pandemic on the biggest listed firms in Pakistan. The contribution of this study is twofold: theoretically, it

adds to the existing knowledge about the effects of the COVID-19 pandemic on stock market performance in developing economies. It will help policymakers in developing policies to deal with uncertain situations.

2. Related Literature Review and Hypothesis Development

The worldwide economy and financial markets have been significantly impacted by the COVID-19 epidemic. From the start of the epidemic, the stock market in particular has seen unparalleled volatility and unpredictability. The spillover impact of COVID-19 on the stock market performance of developing economies is the main topic of this research study. We look at research that assesses the pandemic's impact on the stock market and assesses the numerous elements that affect the overflow effect.

2.1. Studies on Overflow Effect of COVID-19 Pandemic on Stock Market Performance. The effects of the COVID-19 epidemic on stock market performance in developing economies have been the subject of several research studies. For instance, Shehzad et al. [25] examined that the pandemic significantly damaged United States' financial stability as well as the stock market. The authors [25] identified financial instability and disequilibrium in United States' financial market. The effects of the epidemic on the stock markets of Latin American economies were the subject of a different research in [26]. The analysis discovered that while the pandemic had a detrimental effect on the stock markets of all growing economies, it was more pronounced in America. The researchers found that this detrimental effect may have been exacerbated by the ongoing lockdown and travel restrictions in different counties. In addition, a study conducted by [27] examined the potential correlation between government-imposed COVID-19 restriction policies and the administration of COVID-19 vaccines. The study discovered that COVID-19 had a strong influence but a negative impact in pandemic era. The COVID-19 pandemic has had a detrimental effect that has been seen strongly on the international crude oil market as well as the global stock markets, according to research by Yu and Xiao [28]. Finally, Li's analysis in the paper [28] shows that COVID-19 has significant effects on the world financial market. The COVID-19 pandemic brings an unprecedented impact on several aspects, such as stock market performance. Measuring business performance is critical because it influences decision making and the direction in which to improve it [29]. It also plays a vital role in the success of the company. Financial performance describes the financial condition of a company based on predefined goals, standards, and procedures of the company. One way to check the financial performance of a company is to check its economic growth [30]. The authors further stated that economic growth is measured through net profit after tax. In the given study, economic growth is considered as a dependent variable and five independent variables are considered: return on assets (ROA), return on equity (ROE), current ratio (CR), debt

ratio (DR), and asset turnover ratio (ATR). The economic earnings have a mutual influence relationship between these variables. Hence, this study examines the impact of the COVID-19 pandemic and also checks whether there is a difference between the pre- and post-pandemic. The investigation is based on the following hypotheses:

H₁: COVID-19 has significant impact on stock market financial performance.

The study of Xu and Banchuenvijit [30] describes that financial performance means the financial condition of a company based on predefined goals, standards, and procedures of the company. Financial performance can be measured through different ratios [31]. Further, Duncan [31] divided these ratios into five different heads, which included liquidity, activity, profitability, debt, and marketability. In each head, we have calculated different types of ratios to measure the financial performance of the company. The profitability of the company is assessed through return on assets (ROA) [32]. High ROA and low ROA indicate how much a company uses its assets to generate revenue. High ROA shows higher profitability, and low ROA shows that the company is not utilising their assets in the best way [32]. The formula to calculate this ratio is net income of the company divided by total assets.

H₂: there is significant difference of ROA between pre-COVID-19 and during COVID-19 pandemic situation.

Return on equity (ROE) measures how much return that the investor will get on their investment [33]. The essential goal of each business is to increase investor wealth by increasing shareholder wealth. Decreasing ROE shows that the shareholders will get out of such a business and also withdraw their investment from such a business. Increasing ROE means an increase in the wealth of the shareholder. The formula to calculate this ratio is net income of the company divided by total equity.

H₃: there is significant difference of ROE between pre-COVID-19 and during COVID-19 pandemic situation.

Furthermore, the authors stated that any company's liquidity can be measured using various ratios such as current ratio, quick ratio, and acid test ratio. Demiroglu and James [34] stated that the liquidity of a company is important because it affects the interest rate determination. If the liquidity position of a company is less than the financial institutions' charge, and vice versa, the liquidity of a company can be formulated through its current assets divided by its current liabilities. A liquidation of the company ranging from 1.5 to 3 will be deemed healthy.

H₄: there is significant difference of CR between pre-COVID-19 and during COVID-19 pandemic situation.

The debt ratio is a measure of the debt or leverage used by the company with respect to total assets [35]. There is a positive relationship between the debt of the company and its profitability [36]. According to the

Irom et al. [37], there is a significant relationship between debt, total assets, and total equity of the company. The result of Damouri et al.'s study [38] shows that leverage of the company will negatively affect the investment decision of the company. Furthermore, they also argue that a high debt ratio indicates that the firm will invest less in capital assets. The result of this ratio can be calculated by total debt divided by total assets. Therefore, another hypothesis was created to see the difference in debt ratio between the pre-COVID-19 and post-COVID-19 periods.

H_5 : there is significant difference of DR between pre-COVID-19 and during COVID-19 pandemic situation.

The total asset turnover ratio helps in assessing how much a company is using its assets in generating revenue [33]. The higher the results of the total asset turnover ratio, the better the performance of the company. In their study, Irman and Purwati [33] stated that the higher ratio also indicates that the company is managing its assets in the best way. Therefore, measuring asset turnover is important in assessing business performance. Asset turnover can be measured as the average total assets divided by the revenue of the company.

H_6 : there is significant difference of ATR between pre-COVID-19 and during COVID-19 pandemic situation.

3. Materials and Methods

3.1. Study Design. This study is a quantitative type of study because all the values are numeric and collected from the financial statements of the listed companies. A secondary data collection technique was used to collect data from different sources, which included annual reports, related journals, and related articles. The population of the study includes all listed companies on the Pakistan Stock Exchange (PSE) during the period of 2015 to 2020, which included 533 public companies. Arikunto and Suharsimi [39] argue that if the population of the study is a hundred, then the researcher must take all of them. But if the population is over a hundred, then researchers can take around 10% or 20% or 25% or 50% of them. So, the sample was drawn on the basis of Arikunto and Suharsimi's formula [39]. 140 companies were selected. According to the 25%, the companies are $533 \times 25\%$, which is equal to 133.25. These 140 companies are those who have highly contributed to Pakistan's economy.

3.2. Study Model. Figure 1 presents the research model, illustrating the evaluation of a selected company's financial performance pre- and post-COVID-19 using ratio analysis. The figure highlights the comparison between the two periods, emphasizing the presence of a significant difference resulting from the pandemic's impact. Through this model, researchers can assess the company's financial resilience and adaptability to the challenges brought by the global health crisis, providing valuable insights for future decision making.

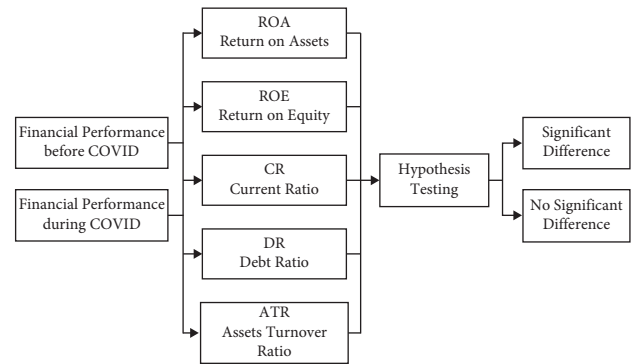


FIGURE 1: Research model.

3.3. Data Treatment. First, to examine the existence of a long-term relationship between economic growth and ROA, ROE, CR, DR, and ATR, we employ the bound testing approach to co-integration. Second, the autoregressive distributed lag (ARDL) testing procedure is used to establish the long-run impact. Then, descriptive statistics were used for the analysis of the data. Data normality was tested through the Kolmogorov–Smirnov and Shapiro–Wilk tests, and hypothesis testing was tested through the Wilcoxon signed-rank test.

4. Results and Findings

4.1. Descriptive Analysis. Table 1 shows the descriptive statistics of the collected data, which include minimum value, maximum value, mean, and standard deviation for all variables of firms listed on the Pakistan Stock Exchange before and during COVID-19. Based on Table 1, the mean value of ROA is 0.0554 before COVID-19 and 0.0410 during COVID-19. This means that the firm performance of listed firms decreases during the period of a pandemic situation. On the basis of the results, we can say that the COVID-19 pandemic situation is harmful for the listed companies on the Pakistan Stock Exchange. The mean value of ROE was 0.1808 before COVID-19 and 0.0573 during COVID-19. This means that the firm has decreased its equity in the period of a pandemic situation. This decrease also shows that the pandemic situation has positively impacted the company's financial performance. The same way, if we see the current ratios of such a firm, they have also decreased from 2.0268 to 1.8932. But the value of the total debt of the firm increased during COVID-19. Table 1 shows that firms had -0.0043 before COVID-19 and 0.2984 during COVID-19. Last, the asset turnover ratio before COVID-19 was 0.0602, and during COVID-19, it decreased from 0.0602 to 0.0433. This means that the company is not utilising their assets during a pandemic situation due to lockdown. The overall results of the descriptive analysis in Table 1 show that there was a decrease in each of the ratios during COVID-19 as compared to before COVID-19.

4.2. Normality Test. Table 2 shows the results of the Kolmogorov–Smirnov and Shapiro–Wilk normality tests. The overall findings indicate that the distribution of the variable

TABLE 1: Data descriptive statistics results for all variables before and during COVID-19.

	<i>N</i>	Minimum	Maximum	Mean	Std. Deviation
ROA before COVID-19	140	-1.54	0.56	0.0554	0.17639
ROA during COVID-19	140	-0.37	1.01	0.0410	0.13191
ROE before COVID-19	140	-0.66	1.32	0.1808	0.25036
ROE during COVID-19	140	-6.00	2.45	0.0573	0.63827
CR before COVID-19	140	0.06	16.07	2.0268	2.08144
CR during COVID-19	140	0.10	24.63	1.8932	2.75227
DR before COVID-19	140	-37.22	1.64	-0.0043	3.18886
DR during COVID-19	140	-0.30	16.66	0.2984	1.58328
ATR before COVID-19	140	-1.48	0.52	0.0602	0.17237
ATR during COVID-19	140	-0.37	1.03	0.0433	0.13486
Valid <i>N</i> (listwise)	140				

TABLE 2: Normality test (Kolmogorov–Smirnov and Shapiro–Wilk).

	Kolmogorov–Smirnov ^a			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ROA before COVID-19	0.224	140	0.000	0.601	140	0.000
ROA during COVID-19	0.164	140	0.000	0.745	140	0.000
ROE before COVID-19	0.157	140	0.000	0.820	140	0.000
ROE during COVID-19	0.302	140	0.000	0.437	140	0.000
CR before COVID-19	0.240	140	0.000	0.628	140	0.000
CR during COVID-19	0.277	140	0.000	0.431	140	0.000
DR before COVID-19	0.465	140	0.000	0.116	140	0.000
DR during COVID-19	0.378	140	0.000	0.186	140	0.000
ATR before COVID-19	0.211	140	0.000	0.629	140	0.000
ART during COVID-19	0.159	140	0.000	0.752	140	0.000

^aLilliefors significance correction.

is not in accordance with a normal distribution, as its value falls below the predetermined significance level of 0.05. The results of each observation shown in Table 2 are less than the significant value of 0.05. Therefore, we cannot test the collected data using a parametric test. Hence, a non-parametric (Wilcoxon signed-rank test) test was used to test the set hypothesis stated above.

4.3. Unit Root Analysis. Prior to discussing various econometric estimation methods such as panel OLS, ARDL, and other econometric tests, it is essential to assess the stationarity of the variables using different panel unit root tests. There are different tests of unit root available such as ADF (Augmented. Dickey-Fuller), PP (Phillips-Perron), Levin in and Chu and IPS unit root tests. Unit root tests are employed to assess the stationarity of a given dataset [40]. The accurate estimation of a data set necessitates the presence of a consistent mean and variance that remains independent over time. Moreover, this condition leads to the classification of the data set as stationary.

Table 3 consists of the results of the LLC test, and the unit root test is applied on variables separately. All variables are stationary at a level, so the order of integration is $I(0)$ and we can suggest that there is no issue of a unit root. But one variable EG is stationary at first difference. Moreover, some variables are significant at 2%, and the remaining are significant at 5% or 10% level of significance.

Table 4 presents the results of the IPS (Im, Pesaran, and Shin) test, and the unit root test is applied on variables separately. All variables are stationary at a level, so the order of integration is $I(0)$ and we can suggest that there is no issue of a unit root. But one variable EG is stationary at first difference. So, these results suggest that ARDL model is an accurate method of estimation because variables are stationary at level.

4.4. Bound Test. Table 5 shows the bound test results. We are using this test to check whether the co-integration between the short run and long run between the variables exists or not. Therefore, looking at the probability values and the F-statistics, the variables may move together in the long run. Ascertain if there actually exists a long-run relationship and, thereafter, calculate the ARDL of the long-run impact. It can be seen from Figures 2 and 3 that the plots of CUSUM and CUSUMSQ statistics are well within critical bounds, implying that all the coefficients in the error correction model are stable.

4.5. ARDL Result of Co-Integration. Co-integration test is used to determine if there is a long-term association between variables. Co-integration was introduced by Nobel laureates Robert Engle and Clive Granger in 1987. Co-integration, unlike correlation, does not assess the long-term movement of two or more data variables. If the F-statistics value is

TABLE 3: Levin, Lin, and Chu unit root test.

Variable	Level		First difference		Order of integration
	Intercept	Trend and intercept	Intercept	Trend and intercept	
ROA	-3.30*	-3.44**	-7.26*	-7.18**	I (0)
ROE	-0.45	-1.93**	-5.57*	-5.63	I (0)
CR	-3.43*	-3.35**	-5.16*	-5.11*	I (0)
DR	-2.57	-2.93**	-4.09*	-4.03	I (0)
ATR	-2.95**	-3.38***	-3.54*	-3.50**	I (0)
EG	-0.22*	-0.17*	-6.08***	-6.01***	I (1)

H0: indicates the stationary dataset that is the null hypothesis (absence of unit root). Critical values are 10%, 5%, and 2%, and values of LM less than critical values indicate the acceptance of H0 (null hypothesis). This is again the case that the dataset has no unit root. *Significant at 10% level of significance. **Significant at 5% level of significance. ***Significant at 1% level of significance.

TABLE 4: IPS unit root test.

Variable	Level		First difference		Order of integration
	Intercept	Trend and intercept	intercept	Trend and intercept	
ROA	-3.32*	-3.34*	-8.24*	-8.06*	I (0)
ROE	-0.35	-1.93**	-5.58*	-5.69*	I (0)
CR	-2.17**	-2.23**	-10.08*	-5.11*	I (0)
DR	-2.11	-2.73**	-4.09*	-4.03	I (0)
ATR	-3.21**	-3.67**	-3.74*	-3.60**	I (0)
EG	-0.32*	-0.29*	-7.01***	-6.09***	I (1)

H0: indicates the stationary dataset that is the null hypothesis (absence of unit root). Critical values are 10%, 5%, and 2%, and values of LM less than critical values indicate the acceptance of H0 (null hypothesis). This is again the case that the dataset has no unit root. *Significant at 10% level of significance. **Significant at 5% level of significance. ***Significant at 1% level of significance.

TABLE 5: Bound test results.

Test statistics	Value	k
F-statistics	98.409	5
<i>Critical value bounds</i>		
Significance	I (0)	I (1)
10%	2.4	3.14
5%	2.43	3.02
2.5%	2.76	3.67
1%	3.36	4.83

below 3, it indicates that there is no co-integration, but F-statistics values over 3 indicate co-relation. Further, the researchers followed the study model of Bhagata and Bolton [41] which suggested a linear association between EG and firm performance. Equation (1) indicates that firm performance in terms of economic growth and other variables of the study.

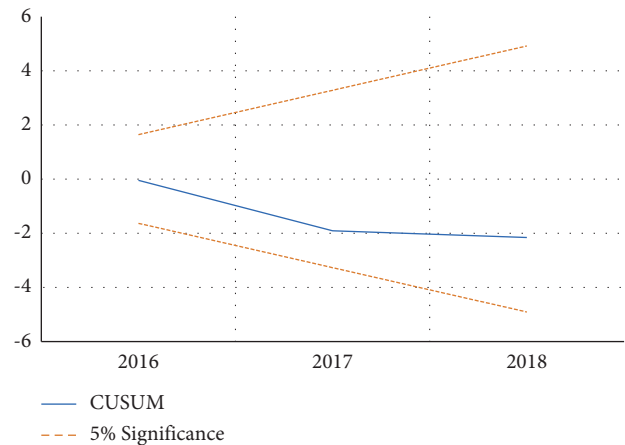


FIGURE 2: Plot of cumulative sum of recursive residuals.

$$EG_{(t)j} = ROA_{(t)j} \beta + ROE_{(t)j} \beta + CR_{(t)j} \beta + DR_{(t)j} \beta + ATR_{(t)j} \beta + X_{(t)j} + \mu, \tag{1}$$

where $EG_{(t)}$ is firm economic growth performance for firm j at time t , $CG_{(t)j}$ is corporate governance measure for firm j at time t , β is the coefficient of all variables measures, X is the vector of some control variables such as firm size and capital structure, and μ represents the error terms. Further, j denotes firms while t is for time. where; $EG_{(t)j}$ is economic growth to measure the financial performance; $ROA_{(t)j}$ is

return on assets ratio to measure the economic growth; $ROE_{(t)j}$ is return on equity ratio to measure the economic growth; $CR_{(t)j}$ is return on equity ratio to measure the economic growth; $DR_{(t)j}$ is return on equity ratio to measure the economic growth; $ATR_{(t)j}$ is return on equity ratio to measure the economic growth. The result of co-integration of all variables is as follows.

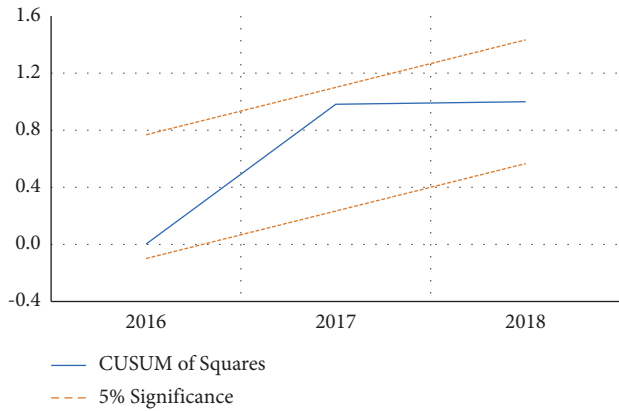


FIGURE 3: Plot of cumulative sum of squares of recursive residuals (CUSUMSQ).

TABLE 6: The ARDL result of co-integration.

Variables	AIC lags	F-statistics	Results
EG	2	3.5768	Co-integration
ROA	2	3.5511	Co-integration
ROE	2	10.01171	Co-integration
CR	2	2.9669	No co-integration
DR	2	1.1760	No co-integration
ATR	2	3.76987	Co-integration

Table 6 represents the result of co-integration of all variable in long term. Co-integration is a statistical concept that indicates the long-term relationship between two or more variables. In this context, economic growth has been found to be co-integrated with return on assets, return on equity, and assets turnover ratio, suggesting that these variables move together in the long run. However, the two variables, current ratio and debt ratio, have been identified as those that do not have a co-integration relationship with economic growth. This means that these variables may be independent of economic growth and should be carefully monitored as they may have a different impact on the overall financial health of the organization. Understanding co-integration between variables is crucial for effective financial management and decision making.

The autoregressive distributed lag (ARDL) bound test was applied to estimate the impact of a pandemic on the economic growth of companies. Economic growth is affected during a pandemic. The study employs the autoregressive distributed lag (ARDL) approach; it was introduced originally in [42] and redeveloped as the ARDL bound testing approach in [42, 43]. The ARDL approach is distinguished from other co-integration approaches such as those in [44, 45]. It can be used if the variables are integrated at order one ($I(1)$), order zero ($I(0)$), or a combination of both. The ARDL results of the co-integration model are as follows.

4.6. *ARDL Analysis.* Due to the mix of stationary and non-stationary variables, the ARDL model was adopted in this research. Through this model, it was feasible to study the

TABLE 7: Long-run and short-run ARDL analysis.

Variables	Coefficients	T-statistics	P value
<i>Long-run coefficients</i>			
ROA	5.6612	2.6708	0.0111**
ROE	-0.3928	-2.4387	0.0195**
CR	1.0965	5.1136	0.0010**
DR	-0.2583	-2.7471	0.0087**
ATR	0.6976	2.8807	0.0076**
C	-25.6866	-4.0475	0.0002**
<i>Short-run coefficients</i>			
ROA	0.1093	0.7597	0.4531
ROE	0.7467	0.2596	0.7968
CR	1.5042	14.5829	0.0010**
DR	-0.0428	-1.0263	0.3126
ATR	0.8722	10.2850	0.0010**
ROA	0.6987	4.7692	0.0010**
C	-0.0034	1.8765	0.0500**

**sign indicate the significance value.

relationships that were established in the long and short term. It should be noted in Table 7 that a number of long-term relationships exist between variables rather than short-term ones. In the long run, the COVID-19 pandemic affects economic growth as well as other variables.

4.7. *Non-Linear ARDL Analysis.* We applied the “NARDL” in [46] to implement the estimation procedures for the non-linear relationship between the variables over the two periods. The results of estimation are shown in Table 8. The results in this paper suggest that COVID-19 has a negative impact on the return of stock market. As a result, most of the ratios decrease downward. The results can be contrasted with a recent study by Bashir [47], which investigated how oil prices and oil price volatility affect real stock market returns.

4.8. *NARDL Wald Test.* The result of Wald test shown in Table 9 (also called the Wald chi-squared test) is used to find out whether the explanatory variables in a model are significant or non-significant. The overall results show that DR and ROA are two variables that have significant value.

4.9. *Wilcoxon Signed-Rank Test.* Tables 10 and 11 show the results of the Wilcoxon signed-rank test and test statistics. The overall results show that 89 listed companies decreased their ROA because they were on negative rank, and 51 listed companies increased their ROA because they were all on positive rank. If we look at the ROE, we see that 103 listed companies decreased because they have a negative rank at the N value of 103 and 37 listed companies increased because they have an N value of 37. Based on the current ratio, 84 companies decrease in said ratio and 56 companies increase in said ratio. Further, in total debt ratio, 95 listed companies were decreasing their debt ratio because they were on negative rank and 45 listed companies were increasing their debt ratio because they were on positive rank. In the asset

TABLE 8: Long-run and short-run non-linear ARDL analysis.

Variables	Coefficients	T-statistics	P value
<i>Long-run coefficients</i>			
ROAt	3.76976	3.9098	0.0013
ROEt	0.38762	2.1409	0.0023
CRt	0.68762	4.7687	0.0010
DRt	-0.1798	-2.7897	0.0018
ATRt	0.09789	5.7692	0.0010
C	-10.9868	-3.8798	0.0012
<i>Short-run coefficients</i>			
ΔROAt	0.0989	1.9864	0.0060
ΔROEt	0.0180	2.5906	0.0045
ΔCRt	1.0099	7.4629	0.0010
ΔDRt	-0.1498	-1.9017	0.0142
ΔATRt	0.0914	4.9890	0.0010
C	-0.0080	2.9001	0.0005

TABLE 9: NARDL Wald test.

Exogenous	Short-run		Long-run	
	F-stat.	Prob.	F-stat.	Prob.
DR	3.45	0.153	0.786	0.478
ROA	3.90	0.167	3.091	0.005

TABLE 10: Wilcoxon signed-rank test results.

		N	Mean rank	Sum of ranks
ROA during COVID-19-ROA before COVID-19	Negative ranks	89 ^a	77.48	6896.00
	Positive ranks	51 ^b	58.31	2974.00
	Ties	0 ^c		
	Total	140		
ROE during COVID-19-ROE before COVID-19	Negative ranks	103 ^d	72.67	7485.00
	Positive ranks	37 ^e	64.46	2385.00
	Ties	0 ^f		
	Total	140		
CR during COVID-19-CR before COVID-19	Negative ranks	84 ^g	79.31	6662.00
	Positive ranks	56 ^h	57.29	3208.00
	Ties	0 ⁱ		
	Total	140		
DR during COVID-19-DR before COVID-19	Negative ranks	95 ^j	77.20	7334.00
	Positive ranks	45 ^k	56.36	2536.00
	Ties	0 ^l		
	Total	140		
ART during COVID-19-ATR before COVID-19	Negative ranks	91 ^m	76.77	6986.00
	Positive ranks	49 ⁿ	58.86	2884.00
	Ties	0 ^o		
	Total	140		

^aROA during COVID-19 < ROA before COVID-19. ^bROA during COVID-19 > ROA before COVID-19. ^cROA during COVID-19 = ROA before COVID-19. ^dROE during COVID-19 < ROE before COVID-19. ^eROE during COVID-19 > ROE before COVID-19. ^fROE during COVID-19 = ROE before COVID-19. ^gCR during COVID-19 < CR before COVID-19. ^hCR during COVID-19 > CR before COVID-19. ⁱCR during COVID-19 = CR before COVID-19. ^jDR during COVID-19 < DR before COVID-19. ^kDR during COVID-19 > DR before COVID-19. ^lDR during COVID-19 = DR before COVID-19. ^mART during COVID-19 < ATR before COVID-19. ⁿART during COVID-19 > ATR before COVID-19. ^oART during COVID-19 = ATR before COVID-19.

turnover ratio, 91 companies are ranked negatively, while 49 are ranked positively. The overall results of the Wilcoxon signed-rank test show that there is a change between the values before and during the COVID-19 shown in Table 3.

5. Discussion

The COVID-19 pandemic had a significant impact on developing country stock market performance. Furthermore,

TABLE 11: Test statistics.

	ROA during COVID-19-ROA before COVID-19	ROE during COVID-19-ROE before COVID-19	CR during COVID-19-CR before COVID-19	DR during COVID-19-DR before COVID-19	ART during COVID-19-ATR before COVID-19
Z	-4.079 ^b 0.000	-5.304 ^b 0.000	-3.592 ^b 0.000	-4.990 ^b 0.000	-4.266 ^b 0.000

Asymp. sig. (2-tailed)

^bBased on positive ranks.

COVID-19 had a detrimental impact on the financial market and crude oil prices in the United States. Several variables influence the negative consequences on developing economies, including spread of the virus, continuous lockdown, social distancing, and strict government policies. In this study, the research focused on the impact of the COVID-19 pandemic on the financial system. Consequently, the COVID-19 outbreaks have significant impacts on various industries, including tourism, textile, energy, banking, and food and beverages. The findings suggest that the pandemic has had a significant negative impact on stock market performance, with the severity of the impact varying between countries. Government policies aimed at controlling the pandemic and supporting the economy can have a significant impact on stock market performance. Overall, this topic is of great significance for investors, policymakers, and researchers as they navigate the economic impacts of the pandemic and develop strategies to mitigate its impact on the stock market.

COVID-19 has great impact on the business world on globe in the period of pandemic. Therefore, the need for this study arises to measure the link between the pandemic and stock market performance [48]. The overall analysis shows that COVID-19 has greater influence on the economic growth of the developing economy. As a result, the economic growth of the country decreases, and it also causes decrease in other ratios of the selected companies. This finding is also consistent with the research conducted by [49–51], which also indicate a mixed influence of the pandemic on the stock performance of different sectors [52]. The paper featured an examination of the link between COVID-19 and the economic growth or financial performance of the stock market in both linear ARDL and non-linear NARDL frameworks, as suggested by Shin et al. [46]. The findings and results of models suggest that stock market has downward movements [53]. The impact of COVID-19 on the developing economy was examined in this study. The 2nd hypothesis is that the ROA (return on assets) was confirmed on the basis of the results of the study. Most industries are decreasing their ROA during the period of this pandemic, but a few industries, like engineering, technology, communication, and textiles, are increasing their return on assets. The main reason behind this increase in ROA during this pandemic is that the industries are running and the restrictions set by the government have not affected these industries. The result of this study is in line with the study that found that the ROA decreased during the period of COVID-19. Meanwhile, the next hypothesis about the ROE and the CR is confirmed because there is a difference between the values of ROE and CR before and during COVID-19. The overall analysis and the results are aligned with the previous study of Yu and Xiao [28] that showed that there is a difference between the values of ROE and CR before and after the decline in oil production. The last two hypotheses are about the leverage (DR and ATR) of the company. This is also accepted because DR and ATR decreased during the period of COVID-19. The statistical results of DR and ATR show that financial performance varies before and during COVID-19. However, the

results of this research are consistent with the study conducted by [7], which similarly examined nine sectors in the Indonesian economy. The study's findings assist policymakers in formulating policies in the event of a COVID-19 pandemic as well as investors in making investment decisions. This research is also beneficial to the government, as the government can grant tax benefits to these enterprises that qualify for tax incentives under COVID-19. Additionally, the study's overall conclusion suggests that while the majority of businesses are reducing their performance, some are not. Companies in the food and personal care product, pharmaceuticals, technology, and communication industries continue to perform well despite the COVID-19 pandemic situation, as these companies do not shut down. Government policies (closure, social isolation, etc.) have little effect on such industries. Further, the study has some limitations, like the government's bailout package in the COVID-19 pandemic. In March and April 2020, the government gave bailout packages to the construction industry, which improved the financial performance of this sector. However, the majority of sectors are declining in performance because of the sudden shock of the pandemic. Another reason for the declining performance of companies is the growing economy of the country. Additionally, on April 4, 2020, the Securities and Exchange Commission of Pakistan (SECP) gave instructions to NBFCs, non-bank finance companies, and NBMFCs, non-bank microfinance companies, to grant an extension of one year for their borrowers in repayment of their lending amount. This also improves the performance of NBFCs and NBMFCs.

6. Conclusion

Our overall study and results can be concluded with two findings. First, the COVID-19 pandemic has significant negative effects on stock markets, i.e., decreasing returns and increasing volatility. Second, it will also decrease the overall productivity of the developing economy. As a result, there is a decline in the performance indicators ROA, ROE, CR, DR, and ATR. The results show that, in the long run, the COVID-19 pandemic has a positive impact on economic growth. The study was limited by a lack of financial and economic data for the recent years of 2015 and 2020. The main focus of this study is to investigate the financial performance before and after COVID-19 for the above said period. Another limitation of the study is that we have considered only COVID-19's effect on organization's performance. But other factors like inflation, interest rate, and government bailout packages are also affecting the organization's performance. However, further research should be conducted by considering the said factors with different time frames.

Data Availability

Publicly available datasets were analysed in this study. Most of the data were collected from <https://financials.psx.com.pk/> as well as the official websites of the selected companies.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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