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Original Research

COVID-19 and Stock Return: Empirical Evidence from Developing Economy

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Abstract

This paper has tried to assess the impact of COVID-19 on stock return in different sectors listed under Dhaka Stock Exchange in Bangladesh during the period from 08 March 2020 to 15 September 2020. To measure the impact of COVID-19 on stock return, daily change in number of confirmed cases and deaths have been used as independent variables and DSE stock return has been taken as variable of interest. Data were collected from Bangladesh Government's official portal, DSE archive and annual reports of listed firms. Sample is selected using two stage sampling method which is a probabilistic model. To test the validity of the used model, Pearson's correlations analysis, Breusch and Pagan's heteroscedasticity test, White's homoscedasticity test and Hausman's fixed random tests are conducted. After testing the validity, fixed effect method of panel data regression model has been used to test the two hypotheses. The result reveals that most of the sectors responded negatively to the growth in COVID-19 confirmed cases. It is also observed that selected sectors reacted more proactively to the growth in number of deaths as compared to the growth in number of confirmed cases. Where banking and textile sectors are the most sufferers to the growth of both confirmed cases and deaths, pharmaceuticals & chemicals industry proved out to be the gainers. The findings will have policy implications for the regulators as well as for the investors to design the optimum portfolio of investment. The study will add new dimensions to the existing literature.

Keywords: COVID-19, Stock Market, Stock Return, Developing Economy.

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Introduction

From the ancient times contagious diseases have always been proved to be a great threat to humanity, especially those diseases about which a little is known. The worldwide spread of a new disease is described as pandemic by the WHO and this fatal disease is named Coronavirus disease 2019 (COVID-19) which is a vascular and respiratory disease caused by Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2). Although in such a disturbed time, the greatest concern is to avail every possible measure to save human lives, there also prevails a great concern to save the economy and preserve the well-being. Going back to the last century, it is noted that the economy observed a huge loss by the outbreak of Spanish flu (1918- 1919). Based on the statistics of Johns Hopkins University, the global death-to-case ratio of COVID-19 is 2.5% (1,287,051/52,304,064) as of 12 November 2020 (Worldometers, 2020).

Though the economic data from the early 20th century are hardly available, there is evidence that the impact of business closures led to unemployment, and survived businesses have suffered irrecoverable losses which the economy is already experiencing due to COVID-19. The impact of recent fatal disease can easily be drawn comparing with the pandemic from the past. During 2003 Severe Acute Respiratory Syndrome (SARS), which lasted less than a year, businesses faced enormous revenue plunge. So, it is clearly visible that pandemic like COVID-19 is predicted to put a significant impact on the global economy, especially causing degradation of the financial markets. It has already been evident that from 24 February 2020 to 28 February 2020 global stock markets reported their largest one-week declines, since the financial crisis of 2008.

Background of the Study

The first Novel Coronavirus (COVID-19) case was identified by WHO in Wuhan China on 31st December 2019). It was declared as a pandemic by WHO on 11 March 2020 because of the worldwide coronavirus outbreak causing significant economic effects. The sudden spread of coronavirus largely affects the financial instruments' market around the whole world. According to Baker et al. (2020), no other contagious disease in the very past has influenced the securities exchange as powerfully as COVID-19. The studies of Ding, Levine, Lin & Xie (2020) and Alfaro, Chari, Greenland & Schott (2020) revealed that COVID-19 related market values losses rise with capital intensity and leverage.

Bangladesh is a country which is densely populated and so the pandemic risk is also high. IEDCR confirmed the first case of COVID-19 in Bangladesh on 8 March 2020. The two capital markets in Bangladesh also suffered adverse impacts caused by this pandemic. The benchmark index DSEX of DSE dropped to 3,603 on 18th March from 4,453 points which is lowest from past seven years. On 19 March 2020, with a view to stopping the natural fall of stock prices, a historic "floor price" was set for all the stocks in the stock market. Moreover, during nationwide lockdown against

coronavirus, the country's two capital markets have been kept shut from 25 March 2020 to 30 May 2020 suspending all sorts of trading, settlement, and official activities.

Therefore, this situation led to the need for study for assessing the effect of this pandemic on the stock market. There are studies published recently emphasized the foreign economy focusing on the market to measure the impact of COVID-19. But no published paper identified the sector-wise influence of COVID-19 on stock return. It is also noted that there is no such study in Bangladesh on this topic. So, this becomes a topic of great interest which will also identify the industry-wise winner and loser from DSE in Bangladesh.

Research Questions and Objectives

Table 1 has highlighted the objectives and questions for this research. With respect to the past empirical studies on the Impact of COVID-19 on Different Sectors of DSE in Bangladesh, the following objectives and questions are developed:

Table 1: Research Objectives and Questions

Research Objectives	Research Questions
General: To identify the impact of COVID-19 on different sectors of DSE in Bangladesh.	General: Is there any impact of COVID-19 on different sectors of DSE in Bangladesh?
Specific: 1. To identify the impact of COVID-19 pandemic confirmed cases on the selected sectors' stock returns. 2. To identify impact of COVID-19 pandemic deaths on the selected sectors' stock	Specific: 1. Will there be any impact of COVID-19 pandemic confirmed cases on the selected sectors' stock returns? 2. Will there be any impact of COVID-19 pandemic deaths on the selected sectors' stock returns?

Literature Review

The impact of the COVID-19 pandemic on the economy is potentially significant. It draws more attention when its origin is China which is regarded as a key center of foreign investment in the whole Asia. In 2019, the disease began to have a dominating effect throughout the regional economies. According to Dewatripont (2020) and Lee & McKibbin (2004), the effect of this deadly disease on human society around the globe is striking, not only because of quick spread of the disease across countries, but also because of any economic shock in one country highly affects others due to globalization and financial integration.

Previous works based on epidemics mainly focused on economic effects or medical costs associated with disease because of disease related mortality and morbidity. For instance, the study of Siu & Wong (2004) and Chou et al. (2003) on Hong Kong, China, and Taiwan concluded findings of the economic effects of SARS. In 2005

around the hurricane Katrina, Gangopadhyay et al. (2010) tested individual share price behavior along with stock market reaction. The stock market reaction was explored by Becchetti and Ciciretti (2011) during the worldwide financial crisis from 2007 to 2009 whereas Kowalewski and Śpiewanowski (2020) analyzed the stock market's reaction to mine disasters. The havoc created by COVID-19 provides with a unique opportunity to measure the impact of this unexpected contagious disease on the economies of affected nations. The pandemic not only involved a notable change in investors' risk level but also it led the economists observe that societal responses to health risks seem to be very extreme and inconsistent. At present, it is important to give light on the fact that the individual's responses to COVID-19 outbreak were not solely observed in the healthcare market but also in the capital market. There are several existing studies that explore the link between COVID-19 and stock returns. In his study of Chen et al. (2007) concluded that the tourism industry suffered the most serious loss in terms of decline in stock price during COVID- 19 period. Additionally, Ali et al. (2010) confirmed that the over-response of the investors on COVID-19 outbreak led to dramatic fall in stock prices in the stock market. Throughout the crisis periods the stock prices are observed to be more fluctuating than those in non-crisis periods in the trading days. According to Baker et al. (2020) no previous contagious disease outbreak, including the Spanish Flu, has affected the stock market as strongly as COVID-19.

In the 21st century, previous studies analyzed the association between different epidemics and stock performance. The work of Liu et al.(2020) and Jiang et al.(2017) asserted that the volatility in the stock exchanges caused by individual investors' disappointment on future incomes due to epidemics have caused significant losses to stock markets i.e., Nippani and Washer (2004) found negative impacts of the SARS on Vietnam's and China's stock markets. The studies of Chen et al. (2009) and Chen et al. (2007) explored the impact of SARS on Taiwan stock market which revealed a negative association between the outbreak and returns on stocks of wholesalers & retail, hotel businesses, and travelling & tourism sectors whereas biotechnology industries reveals a significantly positive relationship with stock returns in Taiwan during the SARS epidemic. The link between the influenza virus H7N9 outbreak and China's stock performance was assessed by Jiang et al. (2017 showing that increase in daily number of cases significantly and negatively impacted stock prices in the overall market as well as relevant sectors in China. The outbreak of Ebola virus also significantly influenced the returns of smaller firms than the bigger firms whose operations were located in West Africa and the USA. This study concludes that the food and beverage, healthcare supplies, biotechnology, and pharmaceutical sectors positively responded to the epidemic whereas other industries were significantly negatively related to the Ebola outbreak.

The negative impacts of COVID-19 pandemic outbreaks on stock markets have been documented in various studies worldwide. Trang & Gan(2020) used panel-data regression model to analyze the influence of COVID-19 on stock return and confirmed that daily COVID-19 confirmed cases has an adverse impact on stock returns in Vietnam. Liu et al. (2020) and He et al. (2020) analyzed the influence of COVID-19 pandemic on stock markets of multiple countries and found a negative effect of this pandemic on stock returns which also indicates a spreading effect among Asian,

European and American nations. The study of Al-Awadhi et al. (2020) on the stock market of China showed that both each confirmed cases of COVID-19 and deaths due to COVID-19 negatively affected stock returns of all firms. In line with the study of Al-Awadhi et al. (2020), Ashraf (2020) examined the impact of the COVID-19 on stock market performance in 64 nations and found adverse relationships between increasing numbers of COVID-19 cases and stock returns. Alfaro et al. (2020) also observed negative impact of this deadly disease on the stock market returns in the USA. Zhang et al. (2020) in his study concludes the negative influence of this contagious disease on the stock markets of the ten countries having the highest figure of confirmed cases in March 2020 including Japan, Korea and Singapore stock markets which reveals that China's stock market witnessed the maximum standard deviations in February but minimum in March. The governments worldwide have been influenced to impose bans and restrictions to reduce market crash risk, curtail volatility and protect the stability of markets owing to the severe impact of COVID-19 on stock markets (Kodres, 2020). However, the outcomes of the COVID-19 pandemic on stocks varied among different industries and sectors. Schoenfeld (2020) investigated on stock markets due to this pandemic to identify the worst affected industries which included the garment, gas and petroleum, automobile, transportation, machinery, travel, leisure and hospitality industries. The financial sectors including banks and other financial institutions was strongly influenced by the outbreak of COVID-19, because these sectors experienced a notable increase in non-performing loans owing to income losses of borrowers' and withdrawals by a substantial number of depositors over a shorter period of time which calls for a dire need to measure the impact of this pandemic in specific sectors. The review of previous literature sheds light to the fact that no study is found assessing the sector-wise gainer and sufferer based on the stock returns due to the outbreak of COVID-19 pandemic.

Proposed Conceptual Framework

To confirm the impact of COVID-19 on different sectors of the stock market, evidence from prior empirical studies has been sought. Based on prior empirical research related with this topic following characteristics of COVID-19 and Stock Market is applied in this study: (1) COVID-19 Confirmed Cases and (2) COVID-19 Deaths are considered as independent variables. Stock Return of the firms is taken as proxy variable for measuring profitability and is considered as dependent variable in this study. There are four more variables included in this study i.e. (1) Dhaka Stock Exchange Broad Index, (2) Market to Book Ratio, (3) Market Capitalization, and (4) Market Value of Outstanding Stocks that may control the impact of COVID-19 on the stock return of different sectors of Dhaka Stock Exchange named as control variables.

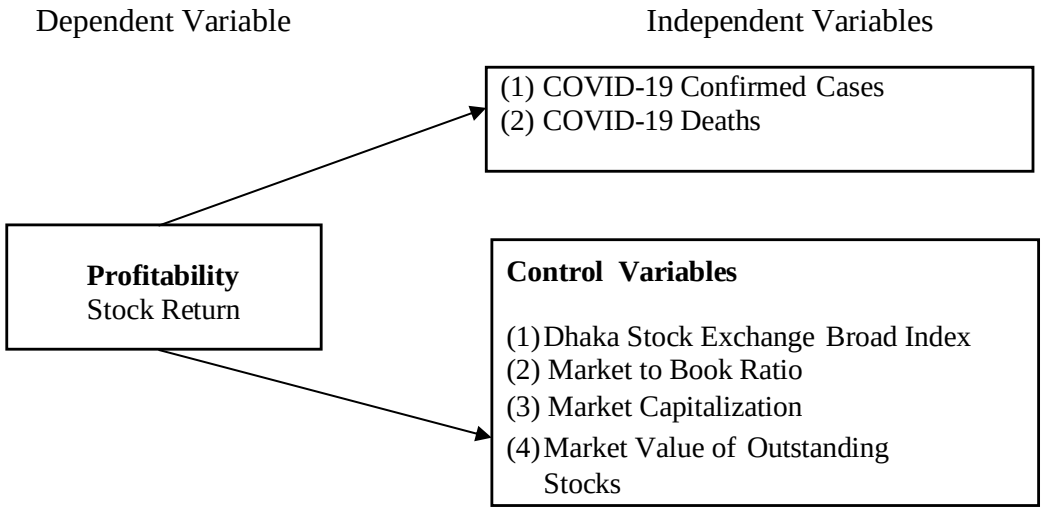

Figure 1: Research Model

Development of Hypothesis

With respect to the past empirical studies on the Impact of COVID-19 on Different Sectors of DSE in Bangladesh, the following hypotheses are developed:

H01: There is no impact of COVID-19 pandemic confirmed cases on the selected sectors' stock return.

H11: There is a significant impact of COVID-19 pandemic confirmed cases on the selected sectors' stock returns.

H02**:** There is no impact of COVID-19 pandemic deaths on the selected sectors' stock returns.

H12: There is a significant impact of COVID-19 pandemic deaths on the selected sectors' stock returns.

Research Methodology

Research Design

Quantitative research design has been used in this research. As this study is based on secondary data, firm specific data are collected from the annual reports of respective firms, market related data from the data archives of Dhaka Stock Exchange and COVID-19 related information from Bangladesh Government Portal. To identify the impact of COVID-19 on different sectors of DSE panel data regression model has been used which means data taken for various observations like stock return of firms, market capitalization, market index, COVID-19 confirmed cases and COVID-19 deaths on a daily basis and also through a series of time period from 8th March 2020 to 15th September 2020 covering only the trading days of DSE. However, considering growing concerns of pandemic in Bangladesh, the government considered suspension of trading

in stock exchanges from 26th March to 4th April. Later it extended the closing till 30th May as the government extended its shutdown to reduce the spread of COVID-19. So, the data for 26th March to 30th May can't be included here.

Study Area, Population, Sample and Sampling Procedures

The likelihood that a given data set comes from a normal distribution is determined by normal distribution. Ghasemi and Zahediasl (2012) conclude that, the distribution of data can be ignored if samples are comprised of hundreds of observations. In accordance with the central limit theorem, the sampling distribution tends to be normal in those samples which are greater than 30 or 40 regardless of the shape of the data. Similar result of Breusch and Pagan's test for heteroscedasticity and White's test for homoscedasticity proves the normal distribution of data used for this research.

Among the two stock exchanges of Bangladesh, this mainly study focuses on DSE. Hence, the study area for this study is all the firms listed under Dhaka Stock Exchange except those firms listed in the debenture and Treasury bond sector. In this study, the two stock markets of Bangladesh can be considered as the population. The sample size was selected using the two-stage sampling method which is a probabilistic model as there is an equal chance or possibility of each company listed under Dhaka Stock Exchange to be selected. In the primary stage from the two stock exchanges, DSE was selected. In the final stage, among the 22 sectors of DSE 16 sectors including 351 firms were selected as sample based on the availability of required variables used in this study which comprises 41.64% (351/843) of total population.

Data Collection Method

Secondary data has been used in this study. The data for this study has been collected from two different sources. Stock market related information such as daily closing prices of the stock, market capitalization, and market index have been obtained from the DSE data archives. On the other hand, firm specific data has been collected from the published annual reports of respective firms. Data related with COVID-19 cases has been obtained from the official portal of Government of Bangladesh regarding COVID-19. The data from 8th March 2020 to 15th September 2020 has been obtained on a daily basis from these sources.

Variables and Measurement

In this study, Stock Return is the dependent variable for measuring stock market impact. COVID-19 Confirmed Cases and COVID-19 Deaths are used as independent variables. Besides, there are a number of control variables such as DSEX Index, Market to Book Ratio, Market Capitalization and Market Value of Outstanding Stocks which controls the impact of COVID-19 on different sectors of DSE. The measurements of all the variables considered under this study can be shown as below:

Table 2: Measurements of Variables

Variables	Description	Measurement
Profitability Measure		
SR	Stock Return	Measured by using this formula: (Today's Closing Price-Yesterday's closing price)/ Yesterday's closing price*100
COVID-19 Measures		
DCC	COVID-19 Confirmed Cases	Measured by the number of marginal number of Daily Confirmed Cases of COVID-19
DCD	COVID-19 Deaths	Measured by number of marginal numbers of Daily Deaths caused by COVID-19.
Measures of Control Variables		
DSEXC	Dhaka Stock Exchange Broad Index	Measured by daily change in Dhaka Stock Exchange Broad Index
MB	Market to book ratio	Measured as market value of outstanding stock divided by book value of outstanding stock
LOGMKTC	LOG Market Capitalization	Measured by the natural logarithm of market capitalization
LOGMV	LOG Market Value	Measured by the natural logarithm of market value of outstanding stocks.

Data Analysis Techniques

Descriptive Analysis

Large amount of collected raw data is not easily understandable, so it needs descriptive analysis. According to Zikmund (2003), data can be transformed in an understandable form through rearrangement and manipulation and this technique can be called descriptive analysis. In this analysis large volume of data will be simplified and presented in a simple manner. As stated by Williams (2007), other purposes to conduct descriptive analysis include the representation of data in an objective manner to explore the relationships between situations. Numerical methods such as mean, median, variance, standard deviation, minimum and maximum limit can be applied to give an optimum picture about the collected data which will be more reliable and accurate. (Kent, 2007). Graphical methods can also be used by including histogram, pie chart, and bar chart etc. in the organization of data (Hair, Money and Page, 2007).

In this study, statistical computer software STATA will be used to interpret, analyze and summarize the data collected from two different sources to assess the impact of COVID-19 on different sectors of Dhaka Stock Exchange.

Multiple Linear Regression Analysis

In this research, multiple linear regression analysis will be adopted because more than two variables are considered to explore the relationship between COVID-19 and stock market. This analysis is used as it can examine the correlation among multiple variables including numerous independent and dependent variables. A regression model will be created in order to predict specific research outcomes. Normality, absence of extreme values and linearity are the assumptions of using Multiple Linear Regression analysis in this study.

Therefore, the following basic model can be developed:

$$SR = \beta 0 + \beta 1DCC + \beta 2DCD + \beta 3DSEXC + \beta 4MB + \beta 5LOGMKTC + \beta 6LOGMV + \varepsilon$$

Pearson Correlation Coefficient

This analysis detects the range of linear relationship among tested dependent and independent variables. The result of this analysis detects the degree of correlation between the two variables corresponding to each other. The value of correlation coefficient ranges from -1 to +1. There may be three types of correlation: positive, negative and zero. When one variable changes with respect to the other in the same way at a same time, the variables are said to be positively correlated. This means if one variable increases other will also increase and vice-versa. A negative correlation means if one variable changes the other will change in a reversed way at a definite point of time. If one variable increases other will decrease and vice-versa. When there is no linear relationship between two variables, it means there is zero correlation between them. The following table shows the rule of thumb for Pearson Correlation Coefficient.

Table 3: Rule of thumb for Pearson Correlation Coefficient

Range of Coefficient	Degree of Correlation
± 0.91 to ± 1.00	Very Strong
± 0.71 to ± 0.90	High
± 0.41 to ± 0.70	Moderate
± 0.20 to ± 0.40	Small but definite relationship
± 0.00 to ± 0.20	Slight, almost negligible

*Source: Hair, J., Money, A., Samouel, P., and Page, M. (2007)

In line with the above table, it is found that coefficient ranging from 0.91 to 1.00 is considered very strong, coefficient ranging from 0.71to 0.90 is considered to be strong, coefficient ranging from 0.41 to 0.70 is considered to have moderate relationship, coefficient ranging from 0.20 to 0.40 has small but definite relationship and coefficient below .20 is considered to have a relationship which is almost negligible. If the correlation level is very high, it may give rise to multicollinearity problem which will affect the overall result and can be solved by taking additional observations. Therefore, the coefficient value less than .90 is considered to prevent the issue of multicollinearity (Hair, Black, Babin, Anderson and Tatham, 2006).

Data Analysis, Result, and Discussion

Descriptive Analysis

The following table shows the central tendency measures such as mean, standard deviation, variance, maximum limit and minimum limit of the variables used as COVID-19 measure and two market related control variables.

Table 4: Central Tendency Measurements of COVID-19 & market related variables

Variables	Descriptive Statistics					
	Mean	Variance	Standard Deviation	Median	Maximum	Minimum
DCC	19.7816	233615.6151	483.3380	0.0000	2545.0000	-1339.0000
DCD	0.4943	87.4971	9.3540	0.0000	40.0000	-26.0000
DSEXC	0.2164	3.3580	1.8325	0.1225	10.2946	-6.5150
LOGMKTC	6.5177	0.0010	0.0324	6.5002	6.5868	6.4585

The above table has been drawn including eighty seven days' data of COVID-19 measures i.e., marginal daily confirmed cases of COVID-19 (DCC) and marginal daily deaths caused by COVID-19 (DCD) & market related variables i.e., daily change in DSEX index (DSEXC) and natural logarithm of market capitalization (LOGMKTC) from a period of 8th March, 2020 to 15th September, 2020. It should also be noted that data from 26th March 2020 to 30th May 2020 are excluded due to the lockdown closure of DSE. Marginal change in daily confirmed cases and marginal change in daily deaths are two independent variables while the average of daily change in DSEX (DSEXC) index and the natural logarithm of market capitalization amount are taken as market related control variables for this study.

Change in daily confirmed cases shows an average of 19.7816 ranging from -1339 persons to 2545 persons which means that the maximum decrease in daily confirmed cases was only 1339 whereas maximum increase is 2545. While a variance of 233615.6151 implies the deviation of daily values from its mean value. This huge variance also means the dramatic spread of COVID- 19 within a period of eighty-seven days. Looking at the marginal daily deaths which ranges from -26 to 40 with a mean value of .4943 implies that daily deaths decreased only by 26 people while it increased by 40 people daily. It is notable that the variance of marginal deaths is only 87.4971 comparing to marginal confirmed cases.

The average of daily change in DSEX (DSEXC) index is .2164 percent whereas the standard deviation is 1.8325 meaning the daily data isn't very much deviated from the mean value. Here, the maximum daily change is 10.2946 percent while the minimum is -6.5150 percent implying that during this period of 87 days DSEX index increased by 10.2946 and decreased by 6.5150 percent which is its maximum daily

change. On the other hand, the natural logarithm of market capitalization amount results in a mean value of 6.5177 and variance is only 0.0010 which means daily data isn't very much deviated from the average. The median, maximum and minimum value, which is 6.5002, 6.5868, and 6.4585 respectively signifies that there isn't a notable change in daily market capitalization amount.

After discussing the central tendency of COVID-19 measure and two market related control variables, the following table shows the central tendency measures of the firm specific dependent variable and control variables.

Table 5: Sector-wise Central Tendency Measurements of Firm Specific Variables

Variables	Sectors	Descriptive Statistics					
		Mean	Variance	Standard Deviation	Median	Maximum	Minimum
SR	Bank	0.2064	7.0711	2.6592	0.0000	35.9375	-18.5190
	Cement	0.1645	10.1451	3.1851	0.0000	23.8342	-10.0000
	Engineering	-0.2194	10.4661	3.2351	0.0000	10.0000	-26.4368
	Financial	0.4470	11.5425	3.3974	0.0000	30.0000	-17.0268
	Food & Allied	0.4356	14.8444	3.8528	0.0000	26.7947	-9.9650
	Fuel & Power	0.2154	7.4676	2.7327	0.0000	21.5606	-10.0000
	Insurance	0.4699	16.3993	4.0496	0.0000	50.0000	-10.0000
	IT & Services	0.2534	9.2435	3.0403	0.0000	24.0143	-10.0000
	Mutual Fund	0.1275	9.2817	3.0466	0.0000	25.0000	-10.0000
	Pharmaceuticals	0.2963	12.1760	3.4894	0.0000	27.9070	-10.0000
	Tannery	0.0336	10.0653	3.1726	0.0000	25.8621	-9.9925
	Textile	0.2610	13.5767	3.6847	0.0000	31.0096	-10.0000
	Miscellaneous	0.3988	14.7363	3.8388	0.0000	28.9753	-10.0000
MB	Bank	0.8116	1.1638	1.0788	0.5995	7.1308	-0.2528
	Cement	1.5719	0.5070	0.7120	1.2876	3.1527	0.4153
	Engineering	3.9851	90.7727	9.5275	1.1208	54.4084	-9.5923
	Financial	0.8528	0.3037	0.5511	0.7663	2.9274	-0.0712
	Food & Allied	-0.3917	77.0497	8.7778	1.0800	8.1518	-4.0779
	Fuel & Power	1.7358	4.4772	2.1160	1.2176	10.0183	-2.0911
	Insurance	2.0524	7.2357	2.6899	1.2720	20.9678	0.1214
	IT & Services	1.9742	6.3479	2.5195	1.3269	12.4229	-2.5616
	Mutual Fund	0.6062	0.0354	0.1882	0.6164	1.6300	0.2921
	Pharmaceuticals	3.5499	42.8759	6.5480	1.4142	40.1245	-4.3176
	Tannery	2.9632	5.5524	2.3563	2.0749	9.5171	0.8340
	Textile	1.0409	2.1580	1.4690	0.5625	8.9582	-2.8216
	Miscellaneous	3.3996	46.1824	6.7958	0.8686	51.0332	0.1650
LOGMV	Bank	10.1383	0.0628	0.2507	10.1481	10.7767	9.2540
	Cement	9.6952	0.3212	0.5665	9.8098	10.7220	8.5343

The above sector-wise central tendency measures have also been calculated considering eighty seven days' daily stock return (SR), market to book ratio (MB) and the natural logarithm of market value of shares outstanding (LOGMV) of the sampled firms.

Analyzing the sector-wise stock return, similar average return is seen in case of Banks, Fuel & Power, IT, Services & Real Estate, Telecommunication & Travel, Pharmaceuticals & Chemicals and Textile sector whereas the mean return of Financial Institution, Food & Allied, Insurance and Miscellaneous sector seemed to be similar . The mean return of cement, mutual fund and tannery industries was also found to be less comparing with others. The negative average stock return of -.2194 percent belonging to engineering sector implies that this sector seems to be in great loss.

The standard deviation of return is almost same for all the sectors which mean that the deviation of daily return from the mean value is almost similar for all the industries. It has also been noted that the insurance sector yielded the highest maximum return of 50 percent while the engineering sector yielded the lowest one i.e., 10 percent. The lowest minimum return is -9.96 percent which belongs to Food & Allied industry and the highest minimum return which is -26.43 percent belongs to engineering sector.

The market to book ratio of some sectors is found to be negative signifying the negative equity of some firms of their respective sectors. Both maximum and minimum market to book ratio is found from the engineering sector implying that some firms are still doing better in that sector while some are creating downfall in the overall industries' stock return. The natural logarithm of all the sectors are found to be almost similar which may either be a result of having similar number of outstanding shares or market price.

Pearson Correlation Analysis

The following tables have been created to test the strength of relationship between two variables according to the rule of thumb. The level of association of one variable with another will also help test the issue of multicollinearity. The relationship between variables calculated here at a significance level of 0.05.

Table 6: Pearson Correlations for Banking Sector

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	-0.1438*	1.0000					
DCD	-0.1460* 0.0000	0.3060* 0.0000	1.0000				
DSEXC	0.5625* 0.0000	-0.0638* 0.0011	-0.029 0.1292	1.0000			

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
MB	-0.0013 0.9470	-0.0042 0.8283	-0.002 0.8949	0.0103 0.5987	1.0000		
LOGMKTC	0.1248* 0.0000	-0.0810* 0.0000	-0.029 0.1289	0.1986* 0.0000	0.0440* 0.0247	1.0000	
LOGMV	0.0250 0.2010	-0.0108 0.5812	-0.006 0.7520	0.0253 0.1968	0.0897* 0.0000	0.1222* 0.0000	1.0000

* Significant at 0.05 level of significance (2-tailed)

Table 6 shows a significantly negative relationship between stock return and COVID-19 measures i.e., stock return decreases by 14.38 percent and 14.60 percent with an increase in number of daily confirmed cases and daily deaths, respectively. On the other hand, a significantly positive association is seen between marginal daily confirmed cases and marginal daily deaths. But the degree of correlation between dependent and independent variables is found to be almost negligible whereas a small correlation (.3060) is found between independent variables i.e., DCC & DCD.

Table 7: Pearson Correlations for Cement Sector

	SR	DCC	DCD	DSEXC	MB	LOGMKTC	LOG MV
SR	1.0000						
DCC	-0.0979*	1.0000					
DCD	-0.0622 0.1253	0.3060* 0.0000	1.0000				
DSEXC	0.7155* 0.0000	-0.0638 0.1157	-0.0297 0.4643	1.0000			
MB	-0.0003 0.9947	-0.0112 0.7833	-0.0047 0.9079	0.0317 0.4355	1.0000		
LOGMKTC	0.1217* 0.0026	-0.0780 0.0544	-0.0351 0.3876	0.1859* 0.0000	0.1257* 0.0019	1.0000	
LOGMV	-0.0217 0.5932	-0.0043 0.9155	-0.0014 0.9717	0.0117 0.7723	0.6422* 0.0000	0.0485 0.2320	1.0000

* Significant at 0.05 level of significance (2-tailed)

From the above table of correlations, it can be noted that there is a significantly negative correlation between stock return and marginal daily confirmed cases, that is, stock return decreases by 9.79 percent with an increase in number of daily confirmed cases. The correlation between stock return and marginal daily deaths is also found to be negative but insignificant. The correlation between marginal daily confirmed cases and marginal daily deaths is significantly positive which means if number of daily confirmed

cases increases, daily deaths also increase by 30.60 percent. The degree of correlations between dependent and independent variables and between independent variables is similar than that of the banking industry.

Table 8: Pearson Correlations for Engineering Sector

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	0.0795* 0.0000	1.0000					
DCD	0.0300 0.0805	0.3060* 0.0000	1.0000				
DSEXC	-0.7241* 0.0000	-0.0638* 0.0002	-0.0297 0.0836	1.0000			
MB	-0.0162 0.3454	-0.0035 0.8404	-0.0009 0.9560	0.0072 0.6745	1.0000		
LOGMKTC	-0.1405* 0.0000	-0.0780* 0.0000	-0.0351* 0.0411	0.1859* 0.0000	0.0415* 0.0157	1.0000	
LOGMV	-0.0145 0.3973	-0.0090 0.5988	-0.0023 0.8929	0.0221 0.1983	-0.0569* 0.0009	0.0968* 0.0000	1.0000

* Significant at 0.05 level of significance (2-tailed)

From table 8, it is observed that there is a significantly positive correlation between stock return and daily change in confirmed cases which means with an increase in number of daily confirmed cases, stock return increases by 7.95 percent. The correlation between stock return and marginal daily deaths is also found to be positive but insignificant. A slight degree of correlation is found between dependent and independent variables which is almost negligible.

Table 9: Pearson Correlations for Financial Institution Sector

	SR	DCC	DCD	DSEXC	MB	LOGMKTC	LOG MV
SR	1.0000						
DCC	-0.0553* 0.0134	1.0000					
DCD	-0.0755* 0.0007	0.3060* 0.0000	1.0000				
DSEXC	0.5108* 0.0000	-0.0638* 0.0043	-0.0297 0.1841	1.0000			
MB	-0.0153 0.4927	-0.0143 0.5223	-0.0050 0.8224	0.0299 0.1812	1.0000		
LOGMKTC	0.1795* 0.0000	-0.0780* 0.0005	-0.0351 0.1168	0.1859* 0.0000	0.1687* 0.0000	1.0000	
LOGMV	-0.0210 0.3486	-0.0076 0.7345	-0.0027 0.9055	0.0151 0.4994	0.6884* 0.0000	0.0935* 0.0000	1.0000

* Significant at 0.05 level of significance (2-tailed)

Table 9 shows a significantly negative relationship between stock return and COVID-19 measures i.e., stock return decreases by 5.53 percent and 7.55 percent with an increase in number of daily confirmed cases and daily deaths respectively. And the degree of correlation between stock return and the two COVID-19 measures taken as independent variable is almost negligible as like the above three industries.

Table 10: Pearson Correlations for Food & Allied Sector

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	-0.0404 0.1205	1.0000					
DCD	-0.0575* 0.0271	0.3060* 0.0000	1.0000				
DSEXC	0.5928* 0.000	-0.0638* 0.0141	-0.0297 0.2536	1.0000			
MB	0.0100 0.7004	-0.0001 0.9974	0.0001 0.9973	-0.0004 0.9876	1.0000		
LOGMKTC	0.1262* 0.000	-0.0780* 0.0027	-0.0351 0.1776	0.1859* 0.0000	-0.0039 0.8812	1.0000	
LOGMV	-0.0321 0.2170	-0.0080 0.7575	-0.0037 0.8874	0.0166 0.5234	0.2216* 0.0000	0.0888* 0.0006	1.0000

* Significant at 0.05 level of significance (2-tailed)

From the above table of correlations it can be noted that there is a negative correlation between stock return and marginal daily confirmed cases which is not significant. Conversely, the correlation between stock return and marginal daily deaths is also found to be negative but significant, that is, stock return decreases by 5.75 percent with an increase in number of daily deaths. The degree of correlation between dependent and independent variables is also negligible here.

Table 11: Pearson Correlations for Fuel & Power Sector

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	-0.0781* 0.0020	1.0000					
DCD	-0.0420 0.0966	0.3060* 0.0000	1.0000				
DSEXC	0.7157* 0.0000	-0.0638* 0.0116	-0.0297 0.2401	1.0000			

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
MB	0.0076 0.7623	-0.0046 0.8564	-0.0017 0.9449	0.0124 0.6242	1.0000		
LOGMKTC	0.1176* 0.0000	-0.0780* 0.0020	-0.0351 0.1654	0.1859* 0.0000	0.0554* 0.0284	1.0000	
LOGMV	0.0040 0.8735	-0.0051 0.8409	-0.0022 0.9302	0.0128 0.6121	0.0024 0.9259	0.0548* 0.0303	1.0000

* Significant at 0.05 level of significance (2-tailed)

Table 11 shows that there is a significantly negative correlation between stock return and marginal daily confirmed cases, that is, stock return decreases by 7.81 percent with an increase in number of daily confirmed cases. The correlation between stock return and marginal daily deaths is also found to be negative but insignificant. The correlation between marginal daily confirmed cases and marginal daily deaths is significantly positive which means if number of daily confirmed cases increases, daily deaths also increase by 30.60 percent. The degree of correlations between dependent and independent variables and between independent variables is similar than that of the other industries described above.

Table 12: Pearson Correlations for Insurance Sector

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	-0.0059 0.7086	1.0000					
DCD	-0.0303 0.0548	0.3060* 0.0000	1.0000				
DSEXC	0.5594* 0.0000	-0.0641* 0.0000	-0.0300 0.0570	1.0000			
MB	-0.0155 0.3249	-0.0009 0.9567	-0.0007 0.9628	0.0047 0.7681	1.0000		
LOGMKTC	0.0721* 0.0000	-0.0781* 0.0000	-0.0348* 0 .0273	0.1855* 0.0000	0.0086 0.5853	1.0000	
LOGMV	0.0093 0.5537	-0.0131 0.4080	-0.0067 0.6713	0.0367* 0.0199	0.8155* 0.0000	0.1407* 0.0000	1.0000

* Significant at 0.05 level of significance (2-tailed)

The above table shows an insignificantly negative relationship between stock return and COVID- 19 measures. On the other hand, a significantly positive association is seen between marginal daily confirmed cases and marginal daily deaths. But the degree

of correlation between dependent and independent variables is found to be almost negligible. The correlation between marginal daily confirmed cases and marginal daily deaths is significantly positive which means if number of daily confirmed cases increases, daily deaths also increase by 30.60 percent.

Table 13: Pearson Correlations for IT, Services & Real Estate, Telecom and Travel & Leisure Sectors

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	-0.0802* 0.0006	1.0000					
DCD	-0.0515* 0.0276	0.3060* 0.0000	1.0000				
DSEXC	0.6417* 0.0000	-0.0638* 0.0064	-0.0297 0.2044	1.0000			
MB	0.0324 0.1667	-0.0074 0.7506	-0.0023 0.9222	0.0157 0.5023	1.0000		
LOGMKTC	0.1342* 0.0000	-0.0795* 0.0007	-0.0323 0.1673	0.1924* 0.0000	0.0814* 0.0005	1.0000	
LOGMV	0.0094 0.6887	-0.0059 0.7999	-0.0022 0.9244	0.0138 0.5549	0.6822* 0.0000	0.0621* 0.0000	1.0000

* Significant at 0.05 level of significance (2-tailed)

After the analysis of table 13 it is seen that there is a significantly negative relationship between stock return and COVID-19 measures i.e., stock return decreases by 8.02 percent and 5.15 percent with an increase in number of daily confirmed cases and daily deaths respectively. On the other hand, a significantly positive association is seen between marginal daily confirmed cases and marginal daily deaths. But the degree of correlation between dependent and independent variables is found to be almost negligible whereas a small correlation (.3060) is found between independent variables i.e., DCC & DCD.

Table 14: Pearson Correlations for Mutual Fund Sector

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	-0.0408 0.0208	1.0000					
DCD	-0.0458* 0.0094	0.3060* 0.0000	1.0000				

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
DSEXC	0.5936* 0.0000	-0.0638* 0.0003	-0.0297 0.0920	1.0000			
MB	0.0659* 0.0002	-0.0193 0.2736	-0.0118 0.5040	0.0453* 0.0102	1.0000		
LOGMKTC	0.0842* 0.0000	-0.0780* 0.0000	-0.0351* 0.0466	0.1859* 0.0000	0.2319* 0.0000	1.0000	
LOGMV	0.0237 0.1781	-010105 0.5509	-0.0062 0.7232	0.0253 0.1511	-0.4092* 0.0000	0.1296* 0.0000	1.0000

* Significant at 0.05 level of significance (2-tailed)

From the above table of correlations, it can be noted that there is a negative correlation between stock return and marginal daily confirmed cases which is not significant. Conversely, the correlation between stock return and marginal daily deaths is also found to be negative but significant, that is, stock return decreases by 4.58 percent with an increase in number of daily deaths. The degree of correlation between dependent and independent variables is also negligible here.

Table 15: Pearson Correlations for Pharmaceuticals & Chemicals Sector

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	0.0097 0.6074	1.0000					
DCD	0.0324 0.0870	0.3060* 0.0000	1.0000				
DSEXC	0.6625* 0.0000	-0.0638* 0.0008	-0.0297 0.1171	1.0000			
MB	-0.0053 0.7795	-0.0032 0.8670	-0.0009 0.9637	0.0091 0.6323	1.0000		
LOGMKTC	0.0884* 0.0000	-0.0780* 0.0000	-0.0351 0.0643	0.1859* 0.0000	0.0412* 0.0296	1.0000	
LOGMV	0.0018 0.9262	-0.0054 0.7744	-0.0021 0.9127	0.0158 0.4059	0.2060* 0.0000	0.0639* 0.0007	1.0000

* Significant at 0.05 level of significance (2-tailed)

Table 15 shows an insignificantly positive correlation between stock return and COVID-19 measures. The degree of correlation between dependent and independent variables is almost negligible. The correlation between marginal daily confirmed cases

and marginal daily deaths is significantly positive which means if number of daily confirmed cases increases, daily deaths also increase by 30.60 percent.

Table 16: Pearson Correlations for Tannery Industries

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	-0.0271 0.5366	1.0000					
DCD	-0.0201 0.6462	0.3060* 0.0000	1.0000				
DSEXC	0.7395* 0.0000	-0.0638 0.1454	-0.0297 0.4983	1.0000			
MB	0.0286 0.5148	-0.0043 0.9217	-0.0005 0.9911	0.0153 0.72777	1.0000		
LOGMKTC	0.1086* 0.0130	-0.0780 0.0750	-0.0351 0.4239	0.1859* 0.0000	0.0607 0.1665	1.0000	
LOGMV	0.0020 0.9640	-0.0034 0.9391	-0.0011 0.9807	0.0154 0.7253	-0.4009* 0.0000	0.0485 0.2683	1.0000

* Significant at 0.05 level of significance (2-tailed)

Table 16 shows an insignificantly negative relationship between stock return and COVID-19 measures. On the other hand, a significantly positive association is seen between marginal daily confirmed cases and marginal daily deaths. But the degree of correlation between dependent and independent variables is found to be almost negligible. The correlation between marginal daily confirmed cases and marginal daily deaths is significantly positive which means if number of daily confirmed cases increases, daily deaths also increase by 30.60 percent.

Table 17: Pearson Correlations for Textile Sector

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	-0.0931* 0.0000	1.0000					
DCD	-0.0703* 0.0000	0.3060* 0.0000	1.0000				
DSEXC	0.6739* 0.0000	-0.0638* 0.0000	-0.0297* 0.0381	1.0000			

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
MB	-0.0023 0.8721	-0.0055 0.7018	-0.0018 0.9010	0.0119 0.4047	1.0000		
LOGMKTC	0.1370* 0.0000	-0.0780* 0.0000	-0.0351* 0.0144	0.1859* 0.0000	0.0604* 0.0000	1.0000	
LOGMV	-0.0163 0.2558	-0.0110 0.8012	-0.0036 0.8012	0.0231 0.1075	0.2145* 0.0000	0.1160* 0.0000	1.0000

* Significant at 0.05 level of significance (2-tailed)

Table 17 shows a significantly negative relationship between stock return and COVID-19 measures i.e., stock return decreases by 14.38 percent and 14.60 percent with an increase in number of daily confirmed cases and daily deaths respectively. On the other hand, a significantly positive association is seen between marginal daily confirmed cases and marginal daily deaths. But the degree of correlation between dependent and independent variables is found to be almost negligible whereas a small correlation (.3060) is found between independent variables i.e., DCC & DCD.

Table 18: Pearson Correlations for Miscellaneous Sector

	SR	DCC	DCD	DSEXC	MB	LOG MKTC	LOG MV
SR	1.0000						
DCC	-0.0322 0.2788	1.0000					
DCD	-0.0522 0.0794	0.3060* 0.0000	1.0000				
DSEXC	0.6812* 0.0000	-0.0638* 0.0319	-0.0297 0.3182	1.0000			
MB	0.0612* 0.0396	-0.0109 0.7143	-0.0058 0.8460	0.0158 0.5966	1.0000		
LOGMKTC	0.1311* 0.0000	-0.0780* 0.0087	-0.0351 0.2386	0.1859* 0.0000	0.1365* 0.0000	1.0000	
LOGMV	-0.0220 0.4595	-0.0091 0.7598	-0.0038 0.8984	0.0188 0.5267	-0.1672* 0.0000	0.0993* 0.0008	1.0000

* Significant at 0.05 level of significance (2-tailed)

The above table shows an insignificantly negative relationship between stock return and COVID- 19 measures. On the other hand, a significantly positive association is seen between marginal daily confirmed cases and marginal daily deaths. But the degree of correlation between dependent and independent variables is found to be almost negligible. The correlation between marginal daily confirmed cases and marginal daily

deaths is significantly positive which means if number of daily confirmed cases increases, daily deaths also increase by 30.60 percent.

From the sector-wise analysis of Pearson correlations, it is clear that independent variables have correlation less than 0.9 which proves that there is no existence of multicollinearity. The results above are satisfying the assumption of Multiple Linear Regression analysis and allowing standard analysis of regression coefficients. The fulfillment of this assumption is as well strengthened by the results in Multiple Linear Regression test in the next part.

Multiple Linear Regression Analysis

Multiple Linear Regression Analyses has been carried out using Fixed Effect Model after testing its validity using Hausman's fixed random effect. For the ease of analysis, results of two industries are arranged together in the same table.

Table 19: Multiple Regression Results (Banks and Financial Institutions Sector)

SR	Banks			Financial Institutions		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	-67.2762	-2.8000	0.0090	-45.2792	-2.4500	0.0230
DCC	-0.0004	-3.8800	0.0010*	0.0000	0.2100	0.8330
DCD	-0.0287	-6.5900	0.0000*	-0.0218	-5.5700	0.0000*
DSEXC	0.7994	16.9100	0.0000*	0.9261	8.1500	0.0000*
MB	1.6338	2.1200	0.0430*	-0.0467	-0.0500	0.9570
LOGMKTC	-20.5131	-7.4700	0.0000*	-15.4808	-4.4100	0.0000*
LOGMV	19.6981	6.0700	0.0000*	15.6612	8.1700	0.0000*
No. of observations	2610			2001		
R2	0.3386			0.2738		
Adjusted R2	0.3370			0.2716		
F value	222.0700			38.7100		
F significance	0.0000			0.0000		
Breusch and Pagan	0.0000			0.0000		
White	0.0000			0.0000		

*Significant at 0.05 level of significance (2-tailed)

In the banking sector, stock return has a significantly negative relationship with daily confirmed cases and daily deaths. In case of financial institutions, it is noted

that there is no relationship between daily confirmed cases and return on stocks but a significantly negative impact of daily deaths on stock return.

Table 20: Multiple Regression Results (Cement and Engineering Sector)

SR	Cement			Engineering		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	-58.6983	-1.8200	0.1180	45.4336	2.3900	0.0220
DCC	-0.0003	-1.5200	0.1800	0.0002	3.3800	0.0020*
DCD	-0.0100	-1.6100	0.1580	0.0004	0.1200	0.9050
DSEXC	1.2232	17.8800	0.0000*	-1.2603	-25.1100	0.0000*
MB	0.8981	1.1800	0.2820	0.0620	1.1300	0.2660
LOGMKTC	-18.7135	-6.3300	0.0010*	15.9662	5.4000	0.0000*
LOGMV	18.4795	7.1400	0.0000*	-15.9693	-4.2900	0.0000*
No. of observations	609			3393		
R^2	0.5165			0.5255		
Adjusted R^2	0.5117			0.5247		
F value	32.1900			146.1900		
F significance	0.0000			0.0000		
Breusch and Pagan	0.0000			0.0000		
White	0.0000			0.0000		

* Significant at 0.05 level of significance (2-tailed)

In cement industry, it is seen that there is an insignificant negative relationship between stock return and COVID-19 variables. In engineering sector, a positive association between the dependent and independent variables are observed.

Table 21: Multiple Regression Results (Food & Allied and Fuel & Power Sector)

SR	Food & Allied			Fuel & Power		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	15.9333	1.1400	0.2710	14.6616	0.4600	0.6510
DCC	0.0001	1.4300	0.1720	-0.0002	-1.3700	0.1880
DCD	-0.0176	-2.1700	0.0450*	-0.0036	-0.9800	0.3400
DSEXC	1.2394	17.1200	0.0000*	1.0584	10.8500	0.0000*
MB	-0.0256	-0.2200	0.8290	1.4050	2.1600	0.0460*

SR	Food & Allied			Fuel & Power		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
LOGMKTC	-11.5252	-4.4000	0.0000*	-14.5993	-8.1800	0.0000*
LOGMV	6.5344	5.2800	0.0000*	7.8047	2.3300	0.0330*
No. of observations	1479			1566		
R^2	0.3556			0.5138		
Adjusted R^2	0.3530			0.5119		
F value	76.7300			48.1300		
F significance	0.0000			0.0000		
Breusch and Pagan	0.0000			0.0000		
White	0.0000			0.0000		

* Significant at 0.05 level of significance (2-tailed)

In food & allied sector, it is noted that there is a negligible and insignificant relationship between daily confirmed cases and return on stocks but a significantly negative impact of daily deaths on stock return. With the regression result of fuel & power industry a coefficient of 14.6616 is found which implies that stock return will be 14.66 percent even if all the independent variables are constant or zero. It is seen that there is an insignificant negative relationship between stock return and COVID-19 variables.

Table 22: Multiple Regression Results (Insurance and Mutual Fund Sector)

SR	Insurance			Mutual Fund		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	62.6243	6.0000	0.0000	-161.2624	-3.5400	0.0010
DCC	0.0003	2.6500	0.0110*	0.0000	0.3500	0.7260
DCD	-0.0105	-2.0100	0.0500*	-0.0088	-2.6400	0.0120*
DSEXC	1.2312	22.3100	0.0000*	0.9908	16.0500	0.0000*
MB	0.0086	3.9500	0.0000*	-6.6169	-2.5700	0.0140*
LOGMKTC	-22.5086	-10.2000	0.0000*	-26.6610	-8.8100	0.0000*
LOGMV	9.1978	6.2500	0.0000*	38.2557	6.6400	0.0000*
No. of observations	4018			3219		
R^2	0.3159			0.3575		
Adjusted R^2	0.3148			0.3563		
F value	109.4400			87.6700		
F significance	0.0000			0.0000		
Breusch and Pagan	0.0000			0.0000		
White	0.0000			0.0000		

* Significant at 0.05 level of significance (2-tailed)

In insurance sector, both the independent variables i.e., DCC & DCD have a significant impact on stock return. However, there is no impact of daily confirmed cases on the stock return of mutual funds while there is a significantly negative association between stock return and DCD. Stock return decreases by .88percent for each death caused by COVID-19.

Table 23: Multiple Regression Results (Textile and Tannery Sector)

SR	Textile			Tannery		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	-15.2083	-1.3200	0.1930	-187.7575	-4.4700	0.0070
DCC	-0.0003	-3.4700	0.0010*	0.0001	0.5500	0.6070
DCD	-0.0158	-4.1700	0.0000*	-0.0024	-0.3100	0.7680
DSEXC	1.3416	27.5300	0.0000*	1.2521	7.3700	0.0010*
MB	0.1069	0.5000	0.6170	-0.0891	-0.3700	0.7270
LOGMKTC	-16.6847	-9.4600	0.0000*	-17.6501	-6.1500	0.0020*
LOGMV	13.6130	6.6900	0.0000*	32.4575	6.1900	0.0020*
No. of observations	4872			522		
R^2	0.4593			0.5485		
Adjusted R^2	0.4586			0.5432		
F value	192.7200			117.1700		
F significance	0.0000			0.0000		
Breusch and Pagan	0.0000			0.0000		
White	0.0000			0.0000		

* Significant at 0.05 level of significance (2-tailed)

The stock return of textile industry has a significantly negative relationship with daily confirmed cases and daily deaths. On the other hand, there is no significant impact of COVID-19 on the stock return of tannery industry.

Table 24: Multiple Regression result of Pharmaceuticals & Chemicals and IT, Services, Telecommunication, Travel & Leisure Sector

SR	Pharmaceuticals & Chemicals			IT, Services, Telecommunication, Travel & Leisure		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	19.2378	0.9200	0.3670	-43.9254	-1.4100	0.1730
DCC	0.0003	2.7000	0.0110*	-0.0002	-2.4400	0.0240*
DCD	0.0145	2.4300	0.0210*	-0.0074	-1.6300	0.1200

SR	Pharmaceuticals & Chemicals			IT, Services, Telecommunication, Travel & Leisure		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
DSEXC	1.2670	15.6900	0.0000*	1.0461	11.2600	0.0000*
MB	0.2384	1.2000	0.2380	-0.1819	-0.7500	0.4590
LOGMKTC	-15.8436	-6.8800	0.0000*	-16.1961	-6.7500	0.0000*
LOGMV	8.6037	2.7500	0.0100*	15.8215	4.6200	0.0000*
No. of observations	2784			1827		
R^2	0.4442			0.4147		
Adjusted R^2	0.4430			0.4128		
F value	46.4900			37.8300		
F significance	0.0000			0.0000		
Breusch and Pagan	0.0000			0.0000		
White	0.0000			0.0000		

Significant at 0.05 level of significance (2-tailed)

In Pharmaceuticals and chemical industry, stock return is significantly positively associated with Covid 19 confirmed cases and death. The indicates that pharmaceuticals sector is the gainer as medicines sales has increased significantly due to the pandemic. It is also seen that the stock return of textile industry has a significantly positive relationship with daily confirmed cases and daily deaths. In case of IT sector, it is seen that the stock return has a significantly negative relationship with daily confirmed cases but an insignificant association with daily deaths.

Table 25: Multiple Regression Result (Miscellaneous Sector)

SR	Miscellaneous		
	Coefficient	t-value	p-value
Constant	0.3995	0.0200	0.9840
DCC	0.0002	1.0700	0.2850
DCD	-0.0160	-2.0300	0.0420*
DSEXC	1.4272	18.0800	0.0000*
MB	0.0258	1.0300	0.3010
LOGMKTC	0.1672	0.0600	0.9560
LOGMV	-0.1595	-1.3900	0.1650
No. of observations	1131		
R^2	0.4147		
Adjusted R^2	0.4128		

F value	67.5600
F significance	0.0000
Breusch and Pagan	0.0000
White	0.0000

* Significant at 0.05 level of significance (2-tailed)

From the above result obtained from the analysis of miscellaneous sector it is also noted that there is no significant impact of daily confirmed cases on the stock return of mutual funds while there is a significantly negative association between stock return and DCD.

Test for the Regression Model

Table 26: Variance Inflationary Factor (VIF) Test for Multicollinearity

Variables	Variance Inflationary Factor(VIF)												
	Bank	Cement	Engineer.	Fin. Inst.	Food & Allied	Fuel & Power	Insurance	IT & Services	Mutual Fund	Pharma. & Chem.	Tannery	Textile	Misc.
DCC	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
DCD	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
DSEXC	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
MB	1.01	1.73	1.01	1.94	1.05	1.00	3.09	1.88	1.33	1.05	1.20	1.05	1.05
LOG MKTC	1.06	1.06	1.05	1.07	1.05	1.05	1.10	1.05	1.17	1.05	1.05	1.06	1.08
LOG MV	1.02	1.71	1.01	1.90	1.06	1.00	3.15	1.87	1.28	1.05	1.20	1.06	1.05
MEAN VIF	**1.06**	**1.29**	**1.05**	##	**1.07**	**1.05**	**1.77**	**1.34**	**1.17**	**1.07**	**1.12**	**1.07**	**1.07**

This Variance Inflationary Factor (VIF) test detects the severity of multicollinearity in regression analysis. It provides a result which measures the increase in variance of an estimated regression coefficient due to collinearity. According to the Rule of Thumb if VIF is more than 10 it can be an issue of concern. The above result shows all values less than 10, so there is no problem of collinearity and this method is appropriate.

Testing for Heteroscedasticity and Homoscedasticity

Both of the results of Breusch and Pagan's test for heteroscedasticity and White's test for homoscedasticity provide evidence to reject the null hypotheses. This means that both the tests create Chi square test value of 0.0000 which is less than the p-value of 0.05. So, there prevails heteroscedasticity problem in the model which has been solved by running robust standard error function in STATA.

Findings, Implications and Conclusion

Discussions of Major Findings

The havoc created by COVID-19 provides with a great opportunity to measure the impact of this unexpected contagious disease on the economies of affected nations. This study is conducted to find out whether there is any impact of COVID-19 pandemic on the stock return of DSE. In this regard daily stock return of individual firms is taken as dependent variable and daily change in COVID-19 affected and daily change in deaths caused by COVID-19 are taken as independent variables. Two hypotheses are tested based on Multiple Linear Regression Analysis' result to find the impact of this pandemic on stock return of individual sectors. The regression output of Bank, Insurance, Pharmaceuticals & Chemicals And Textile Sector provide evidence in support of rejecting both of the null hypotheses (H_{01} & H_{02}) which means there is a significant impact of both the variables of COVID-19 on the stock return of these sectors. It is found that COVID-19 has a significantly positive impact on the stock return of Pharmaceuticals & Chemicals Industry whereas it's negative for the banking and textile sector which is in line with the research of Goodell's (2020) highlighting the negative influence of COVID-19 on the financial sector. COVID-19 confirmed cases positively influenced the return of Insurance Sector which is in contrast with the study of Trang & Gan (2020) whereas deaths influenced the return of Insurance Sector negatively. In case of Cement, Fuel & Power and Tannery Industries data provided evidence not to reject the null hypotheses (H_{01} & H_{02}) which implies the insignificant impact of COVID-19. Analyzing the data of Engineering, IT, Service, Telecommunication and Travel & Leisure Sector it is found that stock return of these sectors are significantly related with confirmed cases of this pandemic and insignificantly related with deaths due to this pandemic which provides clear evidence to reject the null hypothesis (H_{01}) and accept the alternative hypothesis (H_{12}). On the other hand, the result of Financial Institution, Food & Allied, and Mutual Fund & Miscellaneous Sector provides the reverse decision which indicates decision in support of not rejecting the null hypothesis (H_{01}) and not rejecting the alternative hypothesis (H_{12}). These findings couldn't be specifically linked with any past studies as there is no single research based on sector-wise impact of COVID-19. But there are studies showing the impact of COVID-19 on the overall market which observed both negative and positive impact of COVID- 19 on the market. The study of Kotishwar (2020), Trang and Gan (2020), Topcu and Gulal (2020) & Ashraf (2020) observed negative relationship of stock return with the COVID-19 pandemic while the study of Ahmed (2020) observed the opposite.

Major findings of this study can be listed as under:

- There is a significant impact of COVID-19 Confirmed Cases on the stock return of Bank, Insurance, Pharmaceuticals & Chemicals, Textile, Engineering, IT, Services, Telecommunication and Travel & Leisure Sectors.

- COVID-19 Confirmed Cases do not have any impact on the stock return of Cement, Fuel & Power, Tannery, Financial Institution, Food & Allied, Mutual Fund and Miscellaneous Sectors.

- The stock return of Banks, Insurance, Pharmaceuticals & Chemicals, Textile, Financial Institution, Food & Allied, Mutual Fund and Miscellaneous Sectors is influenced by each deaths caused by COVID-19.

- There is no impact of daily deaths due to COVID-19 on the stock return of Cement, Fuel & Power, Tannery, Engineering, IT, Services, Telecommunication and Travel & Leisure Sectors.

- Banking and Textile Industries come out to be great sufferers due to this pandemic as their returns are found to be negatively influenced by both COVID-19 Confirmed Cases and Deaths.

- While other industries are faced with decline in stock price resulting in negative returns, Pharmaceuticals & Chemicals Industry is observed to be gainer during this pandemic outbreak as its return is positively impacted by both COVID-19 Confirmed Cases and Deaths.

- It is also observed that insurance sector is also positively influenced by the COVID-19 confirmed cases.

Implications of Study

This thesis will contribute to the existing literature by identifying the impact of COVID-19 on different sectors of the stock market. It will also be beneficial to the companies of Bangladesh to modify their firm structure and enable them to focus on the factors that influence overall performance of the companies for a better performance achievement.

In addition to the firm itself, the interested parties who want to make investment decision to invest in different sector will also be able to understand the current structure and status of the sector. Besides it will suggest the investors' to choose the stocks of those firms that demonstrate long-term good corporate governance and performance and diversify their investment portfolios across both financial and non-financial sectors in order to avoid the significant impacts of future unexpected events and outbreaks like COVID-19 on their financial assets.

Future researcher will also be beneficial from this study by getting knowledge about this area of study and can easily improve the study by adopting some additional variables and improved analytical procedures. The outcomes of this study also provide with a basis for measuring trends in global stock markets after the alleviation of the situation worldwide.

Limitations of the Study

In this study only two independent variables for measuring COVID-19 outcome and only one dependent variable for measuring profitability are considered. There are some other characteristics that are not included in this study. Therefore, additional independent and dependent variables should be included to provide more meaningful

findings. This study is limited within DSE only whereas the sample size could be extended by taking other stock markets from home and abroad as well and data of only eighty-seven days have been considered which could be extended for a more reliable result. Thus, it may contain sampling and non-sampling errors. If this study was performed minimum one year after the outbreak of pandemic, it could conclude more accurate result. Finally, secondary data are used for this study which is assumed to be true and reliable but there may be some manipulation which may affect the final result. These limitations are mainly due to the time frame to perform this study is constrained which is only 97 days and unavailability of required data. A complete study is very difficult to perform within this limited time span.

Conclusion

This study is conducted to find out the impact of COVID-19 on the stock returns of individual industries under DSE. In this regard, data from 351 listed firms under DSE was collected and arranged industry-wise. Two hypotheses are built for decision-making purpose. Both descriptive and inferential analysis is performed to analyze the data. Panel data regression model has been used to sector-wise analyze the eighty seven days' data of all firms. In order to detect the validity of the used model several tests like Pearson correlations analysis, Breusch and Pagan's heteroscedasticity test, White's homoscedasticity test and Hausman's fixed random tests are conducted. Some sectors provided evidence in support of the null hypotheses while some provided evidence against the null hypotheses. The findings of this study observes that banks and textiles sectors suffered most due to this pandemic which may be caused due to rise in substandard loans and sudden withdrawal of deposits in the banking sector and shut down in production and export due to lockdown in the textile sector. Conversely, the pharmaceuticals & chemicals sector proved out to be the sole gainer due to the increasing demand of their products. It should also be noted that the impact of this pandemic didn't turn out to be as great as expected. This study will help the investors in long term investment decision-making. There arose of limitations to the way of conducting this research which have already been mentioned. There is a further need to improve this study by incorporating other COVID-19 related variables along with other economy related variables such as economic growth, interest rate and inflation rate the at a cross-country level. Hence, a complete knowledge about the pandemic-related variables must be ascertained which affects the performance of a stock market. Therefore, governments should take proactive actions in curbing the outbreak of viruses to help stock markets overcome such crisis and recover sustainably with a view to enhancing investors' confidence.

Authors' Contributions

The corresponding author has contributed in the research design, data analysis and abstract part and the second author has contributed in data collection and write up of the introduction and literature review part.

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