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Effect of COVID-19 on Indian Stock Market

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Abstract

Coronavirus disease popularly known as COVID-19 is a newly introduced disease caused by a virus which is named after the family of Corona viruses. Most common symptom to which is mild to moderate respiratory problems. The effect can be seen all around us. Even stock markets across the world have been affected by it. This study attempts to measure the effect of COVID-19 on the Indian stock market. time series analysis is adopted to understand the effect of COVID-19 on Indian stock market using confirmed recovered and deceased cases of COVID-19, as proxy of COVID-19. This study uses secondary data for time series from 30/01/2020 to 24/04/2020. Finding of the study shows a relationship between COVID-19 confirmed, recovered, and deceased cases and the fluctuations of Indian stock market. The study so conducted has showed, that the sentiments of investors plays a vital role in fall and rise of trading indices and hence the return from the market.

Keywords: Proxy; Time Series; Sentiments; Vital.

Introduction

In early and mid-January 2020, a new kind of virus named COVID-19 erupted from China and on January 30 2020, the World Health Organisation (WHO) declared it a global emergency. This disease had been linked to a virus family WHO openly asserted it a pandemic on 11th March 2020. The mortality rate of COVID-19 patients as collated to other known deadly viruses is quite low, but its rate of infection is comparatively high. Indian government activated to cope up with the situation as early as March 24 2020, by implementing nationwide lockdown. The risk which arises due to outbreak of COVID-19, appears to mould the investors sentiment towards the disease. Investors sentiments influence the stock markets significantly. Investors behave optimistically when the market trends upward and there is less

perceived risk. Accordingly, investors behave pessimistically when market trends downward and when there is more perceived risk. Such pessimistic sentiment of investors prohibits them to invest further. Thus, investors tend to wait until the revival begins. Such situations lead to short-term investor overreaction.

Shu and Chang (2015), studied how financial market behaviour is affected by mood. The study shows, how the prices for equilibrium assets and projected returns is directly affected by the fluctuations in investor mood. Tetlock, P. C. (2007), suggest that media coverage also influence the decisions of investors, the number of withdrawals is directly proportional to the number of articles related to the unexpected events, which means, the higher the number of articles relating to

unexpected events, the greater the number of withdrawals. Although globalization has proved its worth to the world economy but has also linked economies worldwide which in turn, increased the interdependency of global financial markets in recent years. This increase in interdependency among the global stock markets may have an influence over global investors' decision making on asset allocation and on economies as well as economic policies to ensure economic stability. It is quite clear for any financial market analyst around the globe that stock markets continue to move in the same direction in different countries. However, there are some variations in the sense that some stock markets appear more associated with one another than others do. Although globalization has many substantial economic advantages but has some serious disadvantages as well. Like, the role played by globalization during infectious global crisis. In a most dramatic way our planet had been struck by numerous infectious disease such as Nipah Virus, MERS CoV, SARS, Lassa Fever, Avian Flu, Rift, Crimean Congo Haemorrhagic fever, Ebola Virus and the most recently introduced COVID-19.

The expansion of communicable virus not only affects the health and lives of people but also causes a decline in economic growth. Similarly, COVID-19 along with the Lockdown badly affected personal lives. Such external and unanticipated event can cause disruption in economic trends which in turn changes the investors sentiment. Kaplanski and Levy *et al.,* (2015) suggests that, the decisions related to investment can be affected by bad mood and anxiety. A feeling of worry and fear of uncertainty may make an individual more pessimistic about future returns and therefore they tend to take less or no risk. Anxiety creates a pessimistic feeling, which can affect decisions and subsequent returns on assets. This unexpected circumstance created by COVID-19 provides us an opportunity to evaluate the impact of pandemic on the stock market of India due to unforeseen and feared disease. This study focuses on the effect of the confirmed positive cases, deaths and recovery of people due to Covid-19 outbreak on Indian stock market.

Review of Literature

The impact of corona virus disease or "Covid-19" is of paramount importance, especially since the eruption of first case in Wuhan, the straggled metropolis in Hubei province in central China and the Asia's main hub for foreign investment. Researchers believe that the virus that COVID-19 and Severe Acute Respiratory Syndrome "SARS" in 2003 are descendants of the diverse family of Corona viruses but the kind of disease they cause are quite different. A study states that the return on a day of an event is more unassertive than the returns on the non-event days. Many previous studies related to the economic effects of the communicable virus epidemic could be referred to as we talk about the effect of COVID-19 on Indian stock market.

Economic impact of contagious virus:

Existing research papers focuses on ailment-related medical costs or effect arising on economy caused by morbidity and mortality rate due to disease. Wang *et al.* (2013) conducts a study to investigate the effect of infectious disease on the performance of stocks in Taiwan's Bio-technology stocks. Major Taiwan's statutory infectious diseases included "ENTEROVIRUS-71, DENGUE FEVER, SARS and H1N1" and proposed that company shares in Taiwan's bio-technological industry have significant abnormal returns due to contagious virus. On the other hand, a study conducted by Siu and Wong in 2003, addressed the spread of Hong-Kong SARS epidemic of 2002, proposed that the number of serious negative effects were observed on the consumer side, with the short term severely influenced by local consumption and the export of tourism related services and services related to air travel. However, the economy did not face any supply shock as the manufacturing based in the Pearl River Delta remains unaffected and the supplies continued to be exported through Hong-Kong normally. Ichev and Marinc (2014) researched whether the geographical proximity of information circulated by the eruption of Ebola, accompanied by widespread media coverage, has affected asset price of USA. The outcome of the study indicates that the impact on the prices of stock is generally negative, however

local media reporting also had a notable effect on local trading, and the effect is more pronounced in smaller and more volatile stocks and less stable industries.

Impacts on performances of Stock Market:

Seeing the effect on the stock markets, Nippani & Washer (2004), observed the effect of SARS on Canada, Singapore, the particular region of Hong-Kong, China, Indonesia, Philippines, Thailand and Vietnam and derived the conclusion that SARS affected only the stock markets of Vietnam and China. Chen, Jang & Kim (2007) checked the impact of SARS outbreak on the efficiency of the Taiwanese Hotel stocks. Using an event study approach, they found that during the SARS outbreak period, seven publicly traded hotel companies experienced steep declines in income and stock prices. The stocks of Taiwanese Hotel showed significant negative cumulative mean abnormal returns, indicating the significant impact of SARS outbreak on the performance in hotel stock. Wang, Yang & Chen (2013) conducted the study to investigate, how infectious disease can affect the performance of biotechnology stocks. The empirical results indicate that there is significant abnormal return on company shares in Taiwan's biotechnology industry due to infectious epidemics. Karlsson, Nilsson & Pichler (2014) studied about the impact of the 1918 Spanish flu epidemic on economic performance in Sweden. They find strong evidence for the pandemic, which is having a positive impact on poorhouse rates in the medium term, and also strong evidence of an immediate and lasting negative effect on capital returns. However, there is no evidence whatsoever that earnings were affected by the pandemic. Macciocchi *et al.,* (2016) studied the short-term economic impact of Zika virus outbreak on Argentina, Brazil and Mexico, and their result showed that, with the exception and the result shows that the market indices of the three Latin American and Caribbean countries with the exception of Brazil did not show large negative returns the day after each shock. The study also shows that the average return was -0.90% but on different occasions and in different countries it ranges from 0.90 percent to -4.87 percent. Bai (2014) studied the cross-border sentiments to investigate

different aspects of investor sentiment impact by differentiating the scope of influence of the sentiments. He found that the sentiment especially developed and emerging, EU stock market regional sentiments have significant impact on sample market excess returns and volatility.

Relationship between Stock Market and Disease:

Stock prices change every day by market forces. By this, we mean that share prices change because of supply and demand, if more people want to buy it than sell it the prices then the price moves up and vice-versa. The demand and supply in this market entirely depends on the investors will. At the time of crisis or epidemic as the investor start turning pessimist about the share price the more likely will be the fall of share price. Chen, Jang & Kim (2007) checked the impact of SARS outbreak on the efficiency of the Taiwanese Hotel stocks and they had found the significant impact of SARS outbreak on the performance in hotel stock. Fiuzat *et al.,* (2010) sought to examine the relation between US economic decrease in 2008 and cardio vascular events as measured by local acute myocardial infractions, the result show that the adjusted and unadjusted analyses of the patients in Duke Databank for cardiovascular disease indicates a significant co-relation between the period, when stock market decreases and increment in acute myocardial infraction cases. Al-Awadhi *et al.,* (2020) recently conducted a study to investigate whether contagious infectious diseases affect stock market outcomes. The findings indicate that both the daily growth in total confirmed cases and in total cases of death caused by COVID-19 have significant negative effect on the stock market returns. Another recent study conducted by Baker *et al.,* (2020) on the unprecedented stock market reaction to COVID-19 pandemic using text-based method concludes that the news related to COVID-19 developments is overwhelmingly the dominant driver of large daily US stock market moves since February 24, 2020.

Time Series Analysis:

Time series is a sequence of observations recorded at regular time interval. Time Series

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Analyses has a great significance in understanding various aspects about the inherent nature of series so that, one could be better informed to predict meaningful and accurate forecast. Any time series may split into following components Base level + trend + Seasonality + Error. A trend is observed when there is an increasing or decreasing slope observed in the Time Series. On the other hand, seasonality is observed when there is a distinct repeated pattern observed between regular intervals due to seasonal factors.

Stationary and Non-Stationary Time Series:

Stationarity is a property of a time series. Stationary series is the series, where the value of the series is not a function of time. It means that the statistical property of the series like variance, mean and autocorrelation are constant over time. Whereas, the Non-Stationary series, where statistical property of the series like variance, mean and autocorrelation are not constant over time.

Autocorrelation is the correlation between the series with its previous value. A Non-stationary series has to be made stationary before forecasting because forecasting a stationary series is relatively easy and the forecasting is more reliable. The most common method of making a series stationary is by differencing the series. Differencing the series is nothing but subtracting the next value by the current value in the series i.e., $Y = Y(t) - Y(t-1)$.

Research Methodology

Data:

This study uses secondary data for the time-series from 30/01/2020 to 24/04/2020. Information was collected through two online sources - National Stock Exchange and World Health Organizations' official site.

Research Design:

Since the explanatory variables can be helpful in predicting dependent variable. The variable is statistically tested and the probability sampling is done in order to explain the cause and effect of the variables through structured and pre-planned design. Therefore, descriptive design is the best suited to show the cause and effect.

Statistical tool and Technique:

In order to achieve the objective, the series is to be made stationary because forecasting a stationary series is relatively easy and the forecast are more reliable. Therefore, in order to make the series stationary Augmented Dickey Fuller test (ADF test) is performed. Apart from ADF test, Ordinary Least Square method is used to predict values of a continuous response variable using one or more explanatory variable(s). It also identifies the strength of the relationship between variables.

Results & Discussion

In this paper, we examine the effect of the unexpected outbreak of the COVID-19 on Indian Stock Market. To achieve the objective, data is collected from two reliable online sources WHO www.who.int and NSE www1.nseindia.com/. The data so collected is analyzed by putting it into two different tests i.e., Augmented Dickey Fuller test (ADF test) and Ordinary Least Square Method (OLS method). The variables on which the tests are conducted are CumRec, Cum Deceased and DGR_CC (Recovered, Deceased and Confirmed cases of COVID-19 in India).

Augmented Dickey Fuller Test:

Before testing for the significance of the variables, the variables are needed to be tested for linearity so that unit roots can be determined and removed to make series stationary. This can be achieved through Augmented Dickey Fuller test; it is found that all the variables stationarity tested for which p-values of the independent and dependent variables are less than 5%, which confirms the linearity of the series except for the variable CumRec, which is more than 5% that confirms the presence of unit root in the series. To make the series stationary, differencing is performed once, which that solves the problem as p-value becomes less than 5%. Results have been incorporated in *Table 1*.

Ordinary Least Square Model:

Since the variable's series are stationary, hence we apply OLS model to check the significance of the variables. From the study of the OLS model, using observation of samples

on dependent variable i.e., Stock Market Return (SMR). It is found that the variables Cum Deceased is having a p-value of 0.0118, which means it is highly significant. Whereas, that of the variable DGR_CC has p-value of 0.0019, which means it is less significant than Cum deceased and variable d_CumRec is least significant with p-value of 0.0013. Further, the significance of dependent variable "SMR" is also determined by its p-value, which is 0.0287, which is the fifth lag value, which means that there is an effect for the data of past five days. The p-value of the dependent variable (0.0287) is less than the significance level, which provides enough evidence for rejecting the null hypothesis for the entire population. SMR also has a coefficient value of -0.425973, which means that there is a negative relation between "SMR" and "CumRec, DGR_CC and d_CumRec" (see *Table 2*).

Equation for the OLS model:

SMR= - 0.000881881- 0.00831016*DGR_CC + 0.000279326* d_CumRec+ 0.000634251*d_CumRec (5) + 0.000673351*d_CumRec (6) – 0.00055129*Cum Deceased + 0.000535573*Cum Deceased (1) +0.000979537*Cum Deceased (2) – 0.00153685*Cum Deceased (3) – 0.425973*SMR (5).

Table 1: Results of ADF test

Variables	Level of Variable		First difference of variable	
	Test with Constant	With Constant and Trend	Test with Constant	With Constant and Trend
DGR_CC	7.506e-008	5.89e-007	-	-
CumRec	0.7672	0.5331	2.05e-007	1.181e-006
CumDeceased	9.856e-005	0.001665	-	-
SMR	5.622e-009	4.67e-008	-	-

Table 2: Model 1: OLS, using observations 2020-02-10:2020-04-17 (T = 50)

Dependent variable: SMR, HAC standard errors, bandwidth 2 (Bartlett kernel)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	−0.000881810	0.000995387	−0.8859	0.3853	
DGR_CC	−0.00831016	0.00235424	−3.530	0.0019	***
DGR_CC_1	−0.00205125	0.00207053	−0.9907	0.3326	
DGR_CC_2	0.000994638	0.00283658	0.3506	0.7292	
DGR_CC_3	0.00119950	0.00394131	0.3043	0.7637	
DGR_CC_4	0.00417761	0.00223986	1.865	0.0756	*
DGR_CC_5	0.00119396	0.00143546	0.8318	0.4145	
DGR_CC_6	−0.00242111	0.00263776	−0.9179	0.3686	
d_CumRec	0.000279326	7.55390e-05	3.698	0.0013	***
d_CumRec_1	5.74279e-05	0.000101016	0.5685	0.5754	
d_CumRec_2	−0.000115405	9.84433e-05	−1.172	0.2536	
d_CumRec_3	0.000233325	0.000179313	1.301	0.2066	
d_CumRec_4	0.000329035	0.000171940	1.914	0.0688	*
d_CumRec_5	0.000634251	0.000191314	3.315	0.0031	***
d_CumRec_6	0.000673351	0.000171424	3.928	0.0007	***
CumDeceased	−0.000551296	0.000200888	−2.744	0.0118	**
CumDeceased_1	0.000535573	0.000244936	2.187	0.0397	**
CumDeceased_2	0.000979537	0.000280723	3.489	0.0021	***
CumDeceased_3	−0.00153685	0.000354052	−4.341	0.0003	***
CumDeceased_4	−0.000812400	0.000406294	−2.000	0.0580	*
CumDeceased_5	−0.000994047	0.000560280	−1.774	0.0899	*
CumDeceased_6	0.000680583	0.000666763	1.021	0.3185	

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SMR_1	0.178123	0.214248	0.8314	0.4147	
SMR_2	−0.198700	0.144574	−1.374	0.1832	
SMR_3	−0.0786308	0.118115	−0.6657	0.5125	
SMR_4	0.286542	0.156718	1.828	0.0811	*
SMR_5	−0.425973	0.181965	−2.341	0.0287	**
SMR_6	−0.118457	0.126441	−0.9369	0.3590	

Mean dependent var	−0.001168	S.D. dependent var	0.007037
Sum squared resid	0.001029	S.E. of regression	0.006839
R-squared	0.575913	Adjusted R-squared	0.055442
F(27, 22)	270.8151	P-value(F)	3.15e-22
Log-likelihood	198.8342	Akaike criterion	−341.6683
Schwarz criterion	−288.1317	Hannan-Quinn	−321.2813
Rho	−0.012009	Durbin-Watson	2.011480

Conclusion

The dependent variable Stock Market Return (SMR) has the negative coefficient value, which means that, SMR is negatively related to CumRec, DGR_CC and d_CumRec. By negatively related it means to say that the dependent variable is inversely proportional to independent variables. which indicates that the model suggests that the variables during COVID-19 outbreak Cases recovered (CumRec), Cases deceased (Cum Deceased) and confirmed cases (DGR_CC) no of growing confirmed cases of COVID-19 positive effects the Stock market return. As the coefficient value of Stock market return got from OLS testing is negative, it means that Stock market return inversely proportional to CumRec, DGR_CC and Cum Deceased. It also means that the SMR. We know that Stock market functions on demand and supply. The result obtains through this regression clearly shows that the sentiments of investors during pandemic greatly affect the stock market return. As per the results of the study, increasing number of deaths due to SARS Cov-2 in India has the most significant effect on the Stock Market Return. The Indian government have to impose a lockdown in the country on immediate effect from 24th march 2020, which was further increased observing the effect of the virus. Due to which many companies' shutdown their productions and services for the period. Which effected the stock market returns further and the sentiments of the investors becomes pessimistic towards the return due to decrease in interest rates. However, there are some sectors which still holds hopes for many investors but investors still hold the pessimistic sentiment towards the market. Due to these events the risk in the market increased many folds and investors started short covering i.e., they started trading more because of the high market fluctuations. It shows that the, market is more volatile and will remain volatile for uncertain period of time because of the unavailability of measures for controlling the pandemic. The cases of pandemic are rapidly increasing in India, which makes the market further more volatile. This increase in volatility of the market leads to the drop in stock prices and with the dripping of the market price, investors will start withdrawing money from the sources they invested. A drop in price of the stock increases the underlying company's financial leverage and the volatility of the stock increases as the result to this increase in the firms' risk. The more the investors started withdrawing and stops investing the more it causes the stock prices to drop, if that continues to persist then the stock prices drops to zero, due to which the investor will lose all his or her money, which brings the crisis in the market, which is not helpful for the economy of the country.

Future Scope of the Study:

- The outbreak of COVID-19 is an ongoing process, and no one is still sure what future holds for the study.
- Stock market is uncertain.

Conflict of Interests

The authors declare that they have no conflict of interest.

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