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Impact of COVID-19 on NSE Sectoral Indices[1]

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Abstract

The paper examined the level of impact of COVID-19 on different sectors of the Indian economy using NSE sectoral indices under the event study methodology. Multiple events and event windows were considered to examine the sectoral impact of the pandemic on different events and at various stages of the outbreak. Amongst the specific events considered, the lockdown announcement had a significant impact on sectoral indices, whereas the stimulus package announcement had limited impact and the 1st COVID-19 case had no impact on sectoral indices. The impact was intensive in the pre-lockdown period leading to the intensive lockdown, there was not much impact in other phases. The overall impact of the COVID-19 outbreak was significantly negative on Banks, Financial Services, and Realty indices, and positive on Pharma and FMCG indices. The media index showed no significant impact of the pandemic.

JEL Code : G01, G10, G14, G18
Keywords : COVID-19, Sectoral Indices, Sectoral Impact, Event Study, Pandemic Return, NSE, Stock Market, Lockdown, Economy, India

I. Introduction

THE COVID-19 PANDEMIC is unprecedented health and socio-economic crisis that the world is facing. The virus has spread across 213 countries infecting over 2,94,66,633 and killing 9,33,150 people, of which India accounts for 49,30,236 infections and 80,808 deaths and stays in the 2nd place just after the United States (US) (COVID Live Update, 2020). The world economy is severely impacted and is on the verge of a steep recession since the Great Depression (Karan, 2020). Indian stock markets witnessed the lowest returns and the highest volatility (volatility index touching 86.63)

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Notes

1 The study excludes the PSU Bank Index, Private Bank Index, and Financial Services 25/50 Index which have stock that is part of other indices. PSU Bank Index and Private Bank Index have most of the stocks that are also part of the Bank Index. Financial Services 25/50 Index has a stock that is also part of Financial Services.

2 Total Return Index is the index price that is adjusted for the dividend of the constituent stocks.

3 China reported a mysterious pneumonia case to WHO on 31st December 2019. The virus was eventually identified to be infectious. The developments were so dramatic that just in 4 days, on 4th January 2020, the WHO reported the new pneumonia cases in Wuhan. Later, China identified the human-to-human transmission on 14th January 2020 and declared it evidentially on 22nd January 2020. On the next day, 23rd January 2020, China imposed the lockdown on Wuhan and other cities (WHO, 2020). Within 7days, India also reported the first case. Hence, using the event window from 1st January 2020 enables capturing market reaction leading up to the outbreak of COVID-19 in India.

4 A typical length of the event window in the event studies varied from 21 to 121 days, and an estimation window from 100 to 300 days for a daily return event study (Peterson, 1989).

5 The choice of a longer estimation window was to reduce estimation error and improve the accuracy of estimated parameters (MacKinlay, 1997).

6 The estimation window before 30th December 2020 avoids the influence of the event on the estimation parameters.

7 The national-level lockdown was imposed on 24th March 2020. As the announcement was made in the evening, the study considered the next day- 25th March 2020, as the event day.

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Annexure I
Market Model

The estimation parameters were obtained from ordinary least square regression of sectoral indices return (dependent variable) on market return (independent variable).

$$R_{it} = \alpha + \beta R_{mt} + \varepsilon_{it} \quad (1)$$

$$\sigma_{\varepsilon}^{2} = \frac{1}{L_1 - 2} \sum_{t=T_0+1}^{T_1} (R_{it} - E(R_{it}))^2 \quad (2)$$

The R_{it} is the return of sectoral index i at day t during the estimation period, R_{mt} is the return of the broad market index, α and β are the intercept and beta of regression, and ε_{it} is the error term or residual. σ^2_{ε} is the variance of the error term. T_1 is the last day and T_0 is the first day of the estimation window (L_1) (T_1-T_0+1) is the number of days in the estimation period.

$$E(R_{it}) = \hat{\alpha} + \hat{\beta} R_{mt} \quad (3)$$

$$AR_{it} = R_{it} - E(R_{it}) \quad (4)$$

$$\sigma^2(AR_{it}) = \sigma_{\varepsilon}^{2} + \frac{1}{L_1}\left[1 + \frac{R_{mt} - \bar{R}_m}{\sum_{t=1}^{T}(R_{mj} - \bar{R}_m)}\right] \quad (5)$$

The AR_{it} is the abnormal return of sectoral index i at day t, R_{it} is the return of the index i at day t in the event window (L_2) and $\sigma^2(AR_{it})$ is the variance of abnormal return. $\bar{R}_m$ is the average return of the market index in the estimation window, R_{mt} is the return of index on day t of the event window, R_{mj} is the return of index on day j in the estimation window, $\hat{\alpha}$ and $\hat{\beta}$ are the estimated parameters from the regression equation. T_1 is the last day of the event period and T_0 is the first day of the event window (L_2). The second component of $\frac{1}{L_1}\left[1 + \frac{R_{mt} - \bar{R}_m}{\sum_{t=1}^{T}(R_{mj} - \bar{R}_m)}\right]$ is assumed to be zero since the estimation window (L_1) is large enough to avoid the estimation error.

$$CAR(t_1, t_2) = \sum_{t=T_1}^{T_2} AR_{it} \quad (6)$$

$$\sigma_i^2(CAR_t) = L_2 . \sigma^2(AR_{it}) \quad (7)$$

The CAR_{it} is the cumulative abnormal return of sectoral index i for the period (t_1,t_2) and R_{it} is the return of the index i at day t in the event window (L_2), $\sigma^2(CAR_{it})$ is the variance of abnormal return. T_2 is the last day of the event period and T_1 is the first day of the event window (L_2).

The study hypothesizes that the abnormal return/cumulative abnormal return during the event period is zero such that there was no impact of COVID-19 on NSE sectoral indices at any specific event, event window, and during the outbreak period. T-test statistic is used to test the significance of CAR.

Hypothesis H1 : $CAR_t = 0$
Hypothesis H2 : $ARI_t = 0$

$$T_{CAR_{it}} = \frac{CAR_{it}}{\sigma(CAR_{it})}, \quad T_{AR_{it}} = \frac{AR_{it}}{\sigma(AR_{it})}$$