The Impact of Covid-19 on the Automobile and Allied Sectors

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Abstract: This paper examines the impact of Covid-19 outbreak on the automobile and allied sector. The role of the automobile sector is significant in the overall economy in India. We have used event study methodology to capture the price impact on account of the Covid-19 outbreak. We found that automobile sector and allied sector have witness the negative impact on the event of the pandemic. We have presented the daily and period wise results to provide clear cut understanding about the impact of Covid-19 outbreak on the automobile and allied sectors. This paper contributes in the extreme event literature and help decision makers to hedge their position during the extreme events.

Keywords: Covid-19, Price Effect, Automobile Sector, India

I. INTRODUCTION

Extreme events are of interest worldwide, given their potential for substantial impacts on social, ecological, economic, and technical systems. However, our concern is to understand the effects of extreme events on the economy of a country. After the economic reform in 1992, the economics of the world are integrated with our economy. Therefore, we are more likely to be impacted by events around the globe. The recent extreme events our nation faces are global recession or financial crisis, demonetization, corporate tax cuts, covid-19, etc., in the last two decades.

Under demonetization, the government of India, on 8th November 2016, enacted a policy to demonetize Rs 500 and Rs 1000 banknotes. The government claimed that demonetization was an effort to stop counterfeiting of the current banknotes allegedly used for funding terrorism and a crackdown on black money in the country. Besides, the Indian government announced a significant out in corporate tax rates, thus bringing down the effective tax rate (including various cases and surcharges) on co-operation from 35% to 25%. Under the new corporate tax policy, a new company set up manufacturing facilities in India starting in October and commenced production before March 2023. The global financial crisis had also impacted our country's economy in 2008. The overall economic activities in our country declined during the crisis. The initial impact on India has muted: GDP growth slowed from 9% in 2007-08 to 7.8% in April to September 2008, still a very high rate but after wall street collapsed in September. Indian growth plummeted to 5.8% and 6.1% in the next three quarters.

The most recent extreme event that our economy is currently facing is the covid-19 outbreak. It is one of the major blows to our economy in every aspect, such as employment, foreign investment, economic growth, and others, because of quarantine measures. The stock market acts as the barometer of the economy. It reflects the current economic situation of a country. According to Efficient Market Hypothesis, markets are of three strongly efficient types, semi strongly efficient and weakly efficient markets. At the same time, in different levels of efficiency, stocks reflect a different level of information. Therefore, any events that affect the overall economy or company can be reflected in the stock prices. In India, we have very low financial literacy, and if we quantify it, then in a population of more than 125 Cr, less than 2% of the population invest in the stock market. There are 21 stock exchanges in India, out of which the National stock exchange (NSE) and Bombay stock exchange (BSE) are two national-level stock exchanges. Most of the Indian stock exchange trading follows the same trading hour, trading mechanism settlement process, etc. At the last count, BSE companies of 6500 listed firms and NSE consist of 2200 listed firms. BSE, which was established in 1875, is the world's 9th largest stock exchange by market capitalization at $ 3.16 trillion as of 31st January 2021 (Monthly report, world federation of exchange). The main index of BSE is SENSEX, which comprises 30 stocks. NSE was incorporated in 1992 as a company and was recognized as a stock exchange in 1993 under the securities contracts (Regulation Act 1995). NSE is the first automated stock exchange in India. NSE was the 10th largest stock exchange globally, with more than the US $ 3 trillion market capitalization as of 31st January 2015. NIFTY is the indices to measure the overall performance of NSE, which compare 50 stock indices. Researchers across the world have studied the impact of various events on the stock market. The majority of the studies have investigated the effects of extreme events in developed economies. India is one of the largest emerging economies in the world (Garten, 1997). Existing papers study the impact of extreme events in the emerging market, but fewer papers are in developed economies. Hence, the finding of the studies in an emerging market cannot be generalized because of the lack of theoretical and empirical saturations. In the same line, fewer studies are investigating the events mentioned above in the context of India. We want to explore the impact of the pandemic on the Indian Automobile sector. We individually investigate the impact of Covid-19 on NSE-listed firms, Auto Index firms, automobile firms, and transportation services.

We will compare the results and recommend which type of firms are more impacted. Our findings suggest that transportation services have experienced the highest negative returns on the outbreak of the pandemic. In addition, NSE-listed firms have experienced the somehow low impact of the outbreak. Automobile firms have experienced negative returns, but the firms in the Auto index have experienced less impact on the outbreak of Covid-19. The plausible reason is that the Auto index firms are significantly larger than the other firms in the automobile sector. Our study will add to extreme events literature, and the research findings of our research will benefit the company, industry, stock market, stock exchanges, and rest others. Finally, the results of our research will equip the market regulators to control panic market reactions, market manipulations, and rest.

II. LITERATURE REVIEW

Any kind of information is reflected in the stock prices in capital market. The information may be normal or abnormal. The abnormal means extreme events. Information affects the investors sentiments which is reflected in the stock prices. The event study method is a method which help in investigating the effect of information on the stock prices. The event study method is proposed by the Fama et al. (1969). It is very widely used method to understand the market efficiency of any market. The application of event study has grown in recent time. There is vast literature which study the extreme events and its impact of the different capital markets. The extreme events can be terrorist attacks, natural disasters, epidemic, and financial crises. Kalra et al. (1993) examine the effect of the Soviet Chernobyl disaster on the stock prices. Nikkinen et al. (2008) examine the effect of the 9/11 terrorist attack on the global market and provide evidence that market declined and recovered quickly. Al-Rjoub (2011) and Al Rjoub and Azzam (2012) investigate different extreme events. They have examined the impact of Iraq war, great recession of 2008. In addition, they have examined the Mexican tequila crisis of 1194. Further, they have also studied the 9/11 terrorist attack and global financial crisis 2005. The authors have studied the above-mentioned extreme event for the Jordan Stock Exchange. They provide the evidence that each of the extreme events have impact on the stock prices as these events affect the investors behaviours.

Righi and Ceretta (2011) investigate the European debt crisis of 2010. The crisis has impact on the different European market such as German, French, and British markets and rest others. The stock prices of these markets become volatile during the crisis. Schwert (2011) investigate the financial crisis in US and its impact on the stock prices. Rengasamy (2012) investigates the repercussion of Eurozone sovereign policy announcement. The author has studied the impact of above-mentioned announcement and stock prices of BRICS nations. Lanfear et al. (2018) examines the impact of hurricanes on the stock prices in US. They conclude that consumer growth has been impacted by the hurricanes in US. Yin et al. (2020) investigates the impact of China-US trade wars. The authors have conducted the research on the Chinese stock market. They conclude

that is has negative impact on the stock prices of the firms listed in the Chinese stock markets. There are several studies that studies the impact of extreme events on the individual industries. Kaplanski and Levy (2010) studies the effect of aviation accidents. They conclude that aviation industries stock prices are more prone to the accident news and negative price reaction can be found. Ragin and Halek (2016) investigates the impact of disasters on the insurance sector. They have taken 43 largest disasters for their study. They have concluded that insurance sector along with insurance brokers have seen negative price reaction on the happening of the disasters. Al Rjoub (2009) studied the impact of different financial meltdown on the different global capital markets. There is existence of the vast literature of the impact of the extreme events on the stock prices. There is presence of the studies impact of the health emergencies on the stock prices. The majority of the studies focus on the influenza and SARS pandemics Goh and Law (2002) conclude that the Asian financial crisis had negative impact on the stock prices of the tourism sector. In addition, they have concluded the same for the Hong Kong avian influenza outbreak. Mctier et al. (2011) investigates the impact of flu outbreak on the US stock prices. They concluded that with increase in the spread rate the activities reduce in the US markets. Chen et al. (2007) investigates the influence of the SARS virus on hotel industry. They have studied the impact on the Taiwan stock exchange. They concluded that stock prices of hotel industry have declined on the outbreak of SARS. Chen, Jang, and Kim (2007) examine the longer-term impact of SARS. They have taken China and other four Asian market as their scope of study. They concluded that SARS has significant impact on the integration of these markets. As a whole, there is no study which majorly focus on impact of the extreme events on the automobile and its allied sector. According to Iyke (2020a), Covid-19 pandemic have huge negative impact on the market across the globe. Mei-Ping et al. (2018) examined the SARS outbreak role in increasing the volatility in Asian economies. Narayan and Phan (2020) examines the impact of outbreak of COVID-19 on different capital markets. Pandey and Kumari (2020) have studied the impact of Covid- 19 outbreak on the 43 nations and their responses. Kumar et al. (2021) examines the impact of the current pandemic on the different sectors in India. There is a gap in the existing literature which we are bridging through our work.

III. DATA & METHODOLOGY

A. Data

The outbreak of Covid -19 started in China in late 2019. The epicenter for the spread was Wuhan in China. In India, the pandemic started in early march 2020, which triggered the government to take strict precautionary measures. Therefore, we have taken the announcement of lockdown as an event date for our paper.

21

The scope of our study is firms listed at the National stock exchange (NSE). There are more than 1900 stocks are listed in the NSE. We have removed the companies whose data are unavailable and inconsistent throughout the study period.At last, we remained with 1333 firms that are listed in the NSE. The data were gathered from January 2019 to March 2020 in daily frequency. We have used the Nifty 50 Index to estimate the market returns. The data we need for our research is secondary data. Therefore, we gather data for our paper from the following sources:

NSE website - We obtain data regarding prices about firms and data of the index in daily frequency.

Various websites – All event dates will be gathered from the different websites available to us.

We have run the three event studies to explore the impact of Covid-19 in the Indian auto sector and allied sector. In addition, we compare the impact of covid-19 on the Indian Auto sector with the rest market. We have 67 firms in the automobile sector and 26 firms in transportation services. We have proxied the auto sector index with Nifty Auto Index's help, which has 15 firms as its underlying.

B. Methodology

Our primary agenda is to explore the impact of Covid-19 in the Indian auto sector and allied sector. In addition, we compare the impact of covid-19 on the Indian Auto sector with the rest market. The period of the study will be from 2019 to 2020. The basic ideas behind taking this time frame are to capture the impact of lockdown on the Indian auto sector and market as a whole. The sample size will be entire NSE-listed firms.

The methodology we will use is the Event Study Methodology. We will use the event study methodology outlined by Brown and Warner (1980). For this, we have to finalize the event date, event window, estimation period. The event date is the date at which the information about the event gets available to the public. The estimation period we will take is 200 days. The event window will comprise the event day, ten days prior to event day, and ten days after the event day.

The following are the steps for calculating the abnormal return.

Estimate normal market return:

$ER_{it} = \alpha + \beta R_{mt}$

R_{mt} is the return of the Nifty 50 index on trading day t.

Estimate abnormal return:

$$AR_{it} = R_{it} - ER_{it}$$

The following formula calculates the actual return:

$$R_{it} = \ln (P_{it}/P_{it-1})$$

Estimate the cumulative abnormal return (CAR):

$$CAR_{(-10, +10)} = \sum_{i=-10}^{10} AR_{it}$$

Estimate the cumulative average abnormal return (CAAR):

$$CAAR_p = \sum_{i=1}^{p} AAR_{it}$$

Estimate the average abnormal return (CAAR):

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it}$$

IV. FINDINGS

Table 1 presents abnormal returns on the outbreak of Covid-19 on NSE-listed firms. The abnormal return in this table is in daily frequency. The NSE-listed firm has experienced the highest 3.92 % negative returns on the 4th day after the announcement of lockdown in India. The negative returns have also been observed on event day, 1st and 3rd day after the announcement. After the 5th day market started to recover from extreme panic selling situations. The results are significant in different event windows. We have used a parametric test to check whether the results given by the event study are robust or not.

Table 3 presents abnormal returns on the outbreak of Covid-19 on firms listed in the Auto Index. The abnormal return in this table is in daily frequency. The firms listed in Auto Index have experienced the highest 4.86 % negative returns on the 1st day after the announcement of lockdown in India. The negative returns have also been observed on event day, 1st and 3rd day after the announcement. After the 12th day market started to recover from extreme panic selling situations. The results are significant in different event windows. We have used a parametric test to check whether the results given by the event study are robust or not.

Table 5 presents abnormal returns on the outbreak of Covid-19 on automobile firms. The abnormal return in this table is in daily frequency. The automobile firms have experienced the highest 5.35 % negative returns on the 4th day after the announcement of lockdown in India. The negative returns have also been observed on event day, 1st and 3rd day after the announcement. After the 6th day market started to recover from extreme panic selling situations. The results are significant in different event windows. We have used a parametric test to check whether the results given by the event study are robust or not.

Table 7 presents abnormal returns on the outbreak of Covid-19 on transportation services firms. The abnormal return in this table is in daily frequency. The transportation services related firm have experience the highest 5.48 % negative returns on the 4th day after the announcement of lockdown in India. The negative returns have also been observed on event day, 1st and 3rd day after the announcement. After the 5th market started to recover from extreme panic selling situations. The results are significant in different event windows. We have used a parametric test to check whether the results given by the event study are robust or not.

The Impact of Covid-19 on the Automobile and Allied Sectors

Table 1. presents daily cumulative abnormal returns and average abnormal returns for NSE listed firms on the happening of the Covid-19

Days	AAR	t-stats	P-value	CAAR	t-stats	P-value
-20	-0.0051	-5.5282	0	-0.0051	-1.2063	0.1927
-19	0.0026	2.8073	0.0078	-0.0025	-0.6084	0.3315
-18	0.0077	8.3789	0	0.0052	1.298	0.1718
-17	0.0028	3.0276	0.0041	0.008	2.0472	0.0491
-16	-0.0026	-2.863	0.0066	0.0054	1.4122	0.1472
-15	-0.0005	-0.5402	0.3448	0.0049	1.3206	0.1668
-14	-0.0055	-5.9426	0	-0.0006	-0.1705	0.3932
-13	-0.0077	-8.3307	0	-0.0083	-2.4029	0.0222
-12	-0.0044	-4.7505	0	-0.0127	-3.8112	0.0003
-11	-0.0088	-9.5325	0	-0.0215	-6.7186	0
-10	-0.0153	-16.5625	0	-0.0368	-12.0111	0
-9	0.0009	1.0194	0.2373	-0.0358	-12.275	0
-8	-0.0075	-8.1256	0	-0.0433	-15.6476	0
-7	-0.0052	-5.6199	0	-0.0485	-18.5837	0
-6	-0.0021	-2.2262	0.0335	-0.0506	-20.7082	0
-5	-0.0156	-16.8664	0	-0.0661	-29.2531	0
-4	-0.0243	-26.297	0	-0.0904	-43.8055	0
-3	0.018	19.4957	0	-0.0724	-39.2282	0
-2	0.005	5.4559	0	-0.0674	-42.1468	0
-1	-0.0019	-2.1085	0.0432	-0.0693	-53.1101	0
0	-0.0168	-18.1542	0	-0.0861	-93.2632	0
1	-0.0286	-30.9387	0	-0.1147	-87.824	0
2	0.0142	15.4268	0	-0.1004	-62.8013	0
3	-0.0326	-35.3516	0	-0.133	-72.0633	0
4	-0.0392	-42.4849	0	-0.1723	-83.4553	0
5	0.0011	1.2302	0.1872	-0.1711	-75.6817	0
6	0.004	4.2857	0	-0.1672	-68.4477	0
7	0.0259	28.0814	0	-0.1413	-54.0987	0
8	-0.0035	-3.8098	0.0003	-0.1448	-52.2747	0
9	0.0398	43.106	0	-0.105	-35.9608	0
10	0.022	23.7893	0	-0.083	-27.1146	0
11	-0.0299	-32.3622	0	-0.1129	-35.3024	0
12	0.0273	29.5243	0	-0.0856	-25.7289	0
13	0.0071	7.6883	0	-0.0785	-22.7382	0
14	0.0184	19.9345	0	-0.0601	-16.286	0
15	0.0258	27.9324	0	-0.0344	-9.3029	0
16	0.0178	19.2757	0	-0.0166	-4.3501	0
17	0.0037	4.0268	0.0001	-0.0128	-3.2784	0.0018
18	0.0179	19.398	0	0.0051	1.2593	0.1805
19	0.0012	1.2699	0.1781	0.0062	1.5113	0.1273
20	-0.0144	-15.6033	0	-0.0082	-1.93	0.062

Table 2. presents period wise cumulative abnormal returns and average abnormal returns for NSE listed firms on the happening of the Covid-19

Windows	AAR	t-stats	P-value	CAAR	t-stats	P-value
(-20, -15)	0.0008	0.8804	0.2708	0.0049	2.1565	0.039
(-15, -10)	-0.007	-7.6098	0	-0.0421	-18.6402	0
(-10, -5)	-0.0074	-8.0635	0	-0.0447	-19.7515	0

(-5, -1)	-0.0038	-4.064	0.0001	-0.0188	-9.0875	0
(-3, -1)	0.007	7.6144	0	0.0211	13.1885	0
(-1,0)	-0.0094	-10.1314	0	-0.0187	-14.3279	0
(-1, +1)	-0.0158	-17.0671	0	-0.0473	-29.5612	0
(0, +1)	-0.0227	-24.5465	0	-0.0453	-34.7139	0
(+1,3)	-0.0157	-16.9545	0	-0.047	-29.366	0
(+1, +5)	-0.017	-18.4237	0	-0.085	-41.1965	0
(+5, +10)	0.0149	16.1138	0	0.0893	39.4706	0
(+10, +15)	0.0118	12.7511	0	0.0706	31.2337	0
(+15, +20)	0.0087	9.3833	0	0.052	22.9842	0

Table 3. presents daily cumulative abnormal returns and average abnormal returns for Nifty Auto Index firms on the happening of the Covid-19

Days	AAR	t-stats	P-value	CAAR	t-stats	P-value
-20	-0.0041	-0.6865	0.3152	-0.0041	-0.1498	0.3945
-19	-0.0091	-1.5173	0.1262	-0.0132	-0.4928	0.3533
-18	0.0088	1.4759	0.1343	-0.0044	-0.167	0.3934
-17	0.0028	0.4646	0.3581	-0.0016	-0.0621	0.3982
-16	-0.0069	-1.1484	0.2063	-0.0084	-0.3424	0.3762
-15	-0.0057	-0.9507	0.2539	-0.0141	-0.5906	0.3351
-14	0.0016	0.2611	0.3856	-0.0126	-0.5426	0.3443
-13	-0.0032	-0.5303	0.3466	-0.0157	-0.7034	0.3115
-12	0.0056	0.9379	0.257	-0.0101	-0.4698	0.3573
-11	-0.0008	-0.1317	0.3955	-0.0109	-0.527	0.3472
-10	-0.0035	-0.5825	0.3367	-0.0144	-0.726	0.3065
-9	-0.0004	-0.0607	0.3982	-0.0148	-0.7807	0.2942
-8	0.0184	3.0818	0.0035	0.0037	0.2044	0.3907
-7	0.0285	4.7577	0	0.0321	1.8988	0.0658
-6	-0.0104	-1.7339	0.0887	0.0218	1.3746	0.1551
-5	0.0376	6.2797	0	0.0593	4.0484	0.0001
-4	-0.0178	-2.977	0.0047	0.0415	3.1035	0.0032
-3	0.0414	6.9178	0	0.0829	6.9287	0
-2	0.0196	3.2716	0.0019	0.1025	9.8894	0
-1	0.0227	3.7935	0.0003	0.1252	14.7944	0
0	-0.036	-6.0157	0	0.0892	14.9068	0
1	-0.0486	-8.1249	0	0.0406	4.7955	0
2	0.0333	5.5657	0	0.0739	7.1289	0
3	-0.0306	-5.1196	0	0.0433	3.614	0.0006
4	-0.0448	-7.4875	0	-0.0016	-0.116	0.3963
5	-0.0104	-1.7354	0.0885	-0.0119	-0.8144	0.2863
6	-0.0135	-2.2546	0.0314	-0.0254	-1.6062	0.1098
7	0.0061	1.0206	0.237	-0.0193	-1.1416	0.2079
8	-0.0323	-5.3898	0	-0.0516	-2.8729	0.0064
9	0.0312	5.214	0	-0.0204	-1.0766	0.2235

10	-0.003	-0.5062	0.351	-0.0234	-1.1792	0.1991
11	-0.0391	-6.5374	0	-0.0625	-3.0162	0.0042
12	0.0328	5.4862	0	-0.0297	-1.3762	0.1547
13	0.0204	3.4159	0.0012	-0.0093	-0.4132	0.3663
14	-0.0103	-1.7143	0.0918	-0.0195	-0.8151	0.2862
15	0.0062	1.034	0.2337	-0.0133	-0.5566	0.3417
16	-0.0015	-0.2552	0.3862	-0.0149	-0.6019	0.3328
17	0.0145	2.4186	0.0214	-0.0004	-0.0149	0.3989
18	0.0026	0.4289	0.3639	0.0022	0.0839	0.3975
19	-0.014	-2.3317	0.0263	-0.0118	-0.4396	0.3622
20	-0.0081	-1.3515	0.1601	-0.0199	-0.7239	0.307

Table 4. presents period wise cumulative abnormal returns and average abnormal returns for Nifty Auto Index firms on the happening of the Covid-19

Windows	AAR	t-stats	P-value	CAAR	t-stats	P-value
(-20, -15)	-0.0024	-0.3937	0.3692	-0.0141	-0.9645	0.2506
(-15, -10)	-0.001	-0.166	0.3935	-0.006	-0.4067	0.3673
(-10, -5)	0.0117	1.957	0.0588	0.0703	4.7937	0
(-5, -1)	0.0207	3.4571	0.001	0.1034	7.7303	0
(-3, -1)	0.0279	4.661	0	0.0837	8.073	0
(-1,0)	-0.0066	-1.1111	0.2152	-0.0133	-1.5713	0.1161
(-1, +1)	-0.0206	-3.449	0.001	-0.0619	-5.9739	0
(0, +1)	-0.0423	-7.0703	0	-0.0846	-9.9989	0
(+1,3)	-0.0153	-2.5596	0.0151	-0.046	-4.4333	0
(+1, +5)	-0.0202	-3.3803	0.0013	-0.1011	-7.5587	0
(+5, +10)	-0.0036	-0.6086	0.3315	-0.0219	-1.4907	0.1313
(+10, +15)	0.0012	0.1964	0.3913	0.0071	0.481	0.3554
(+15, +20)	-0.0001	-0.0095	0.3989	-0.0003	-0.0232	0.3988

Table 5. presents daily cumulative abnormal returns and average abnormal returns for automobile firms on the happening of the Covid-19

Days	AAR	t-stats	P-value	CAAR	t-stats	P-value
-20	-0.0033	-0.8757	0.2719	-0.0033	-0.1911	0.3917
-19	-0.0084	-2.2386	0.0326	-0.0116	-0.6964	0.313
-18	0.0026	0.7034	0.3115	-0.009	-0.5531	0.3424
-17	0.0029	0.7722	0.2961	-0.0061	-0.3862	0.3703
-16	-0.004	-1.0586	0.2278	-0.0101	-0.6542	0.3221
-15	-0.0054	-1.4524	0.1389	-0.0155	-1.0374	0.2329
-14	-0.0088	-2.3517	0.0251	-0.0243	-1.6787	0.0975
-13	-0.0004	-0.1059	0.3967	-0.0247	-1.7659	0.0839
-12	-0.0045	-1.203	0.1935	-0.0292	-2.1662	0.0382
-11	-0.0137	-3.6567	0.0005	-0.0428	-3.3102	0.0017
-10	-0.016	-4.2731	0	-0.0588	-4.7458	0
-9	0.0003	0.0845	0.3975	-0.0585	-4.9507	0
-8	0.0076	2.0467	0.0491	-0.0508	-4.5363	0
-7	0.008	2.1501	0.0395	-0.0428	-4.0513	0.0001
-6	-0.0036	-0.9559	0.2526	-0.0464	-4.6923	0
-5	0.0011	0.2866	0.3829	-0.0453	-4.9513	0
-4	-0.0389	-10.4286	0	-0.0842	-10.0877	0

-3	0.0373	9.9958	0	-0.0469	-6.2804	0
-2	0.0125	3.3479	0.0015	-0.0344	-5.3191	0
-1	0.005	1.3437	0.1618	-0.0294	-5.5645	0
0	-0.019	-5.0776	0	-0.0483	-12.947	0
1	-0.0369	-9.8725	0	-0.0852	-16.1358	0
2	0.0399	10.6867	0	-0.0453	-7.0048	0
3	-0.0424	-11.3606	0	-0.0877	-11.7467	0
4	-0.0535	-14.3345	0	-0.1413	-16.9171	0
5	-0.0094	-2.5134	0.0169	-0.1507	-16.4693	0
6	0.0018	0.4891	0.354	-0.1488	-15.0627	0
7	0.0255	6.8201	0	-0.1234	-11.6786	0
8	-0.022	-5.8809	0	-0.1453	-12.971	0
9	0.0459	12.3012	0	-0.0994	-8.4154	0
10	0.0195	5.2153	0	-0.0799	-6.4513	0
11	-0.0532	-14.2427	0	-0.1331	-10.2881	0
12	0.0329	8.8163	0	-0.1002	-7.4393	0
13	0.0179	4.7893	0	-0.0823	-5.8887	0
14	0.0161	4.2986	0	-0.0662	-4.4337	0
15	0.0394	10.545	0	-0.0269	-1.7975	0.0793
16	0.0209	5.5947	0	-0.006	-0.3869	0.3702
17	0.0251	6.7331	0	0.0192	1.211	0.1916
18	0.0166	4.4338	0	0.0357	2.1959	0.0358
19	-0.0097	-2.5875	0.014	0.0261	1.5617	0.1178
20	-0.0238	-6.3622	0	0.0023	0.1357	0.3953

Table 6. presents period wise cumulative abnormal returns and average abnormal returns for automobile firms on the happening of the Covid-19

Windows	AAR	t-stats	P-value	CAAR	t-stats	P-value
(-20, -15)	-0.0026	-0.6916	0.3141	-0.0155	-1.6941	0.095
(-15, -10)	-0.0081	-2.1738	0.0376	-0.0487	-5.3247	0
(-10, -5)	-0.0004	-0.1102	0.3965	-0.0025	-0.2699	0.3847
(-5, -1)	0.0034	0.9091	0.2639	0.017	2.0327	0.0505
(-3, -1)	0.0183	4.8958	0	0.0548	8.4797	0
(-1,0)	-0.007	-1.867	0.0698	-0.0139	-2.6403	0.0122
(-1, +1)	-0.0169	-4.5355	0	-0.0508	-7.8557	0
(0, +1)	-0.0279	-7.4751	0	-0.0558	-10.5713	0
(+1,3)	-0.0131	-3.5155	0.0008	-0.0394	-6.089	0
(+1, +5)	-0.0205	-5.4789	0	-0.1023	-12.2511	0
(+5, +10)	0.0102	2.7386	0.0094	0.0614	6.7081	0
(+10, +15)	0.0121	3.237	0.0021	0.0725	7.9289	0
(+15, +20)	0.0114	3.0595	0.0037	0.0686	7.4942	0

Table 7. presents daily cumulative abnormal returns and average abnormal returns for transportation services firms on the happening of the Covid-19

Days	AAR	t-stats	P-value	CAAR	t-stats	P-value
-20	-0.0003	-0.0436	0.3986	-0.0003	-0.0095	0.3989
-19	0.0048	0.6884	0.3148	0.0045	0.1442	0.3948
-18	0.0148	2.1422	0.0402	0.0192	0.6394	0.3252
-17	-0.0007	-0.0994	0.397	0.0186	0.6335	0.3264

-16	-0.0148	-2.1381	0.0406	0.0038	0.1333	0.3954
-15	0.0013	0.1813	0.3924	0.005	0.1827	0.3923
-14	-0.0117	-1.6881	0.096	-0.0066	-0.2472	0.3869
-13	-0.0002	-0.0277	0.3988	-0.0068	-0.2633	0.3854
-12	-0.007	-1.0116	0.2392	-0.0138	-0.5538	0.3422
-11	-0.0006	-0.0856	0.3975	-0.0144	-0.6011	0.333
-10	-0.0214	-3.0934	0.0033	-0.0357	-1.5605	0.1181
-9	0.0022	0.3227	0.3787	-0.0335	-1.5346	0.1229
-8	-0.0189	-2.7392	0.0094	-0.0524	-2.5307	0.0162
-7	0.0199	2.8886	0.0062	-0.0325	-1.663	0.1001
-6	-0.0115	-1.665	0.0998	-0.044	-2.4071	0.022
-5	-0.0283	-4.1008	0.0001	-0.0723	-4.2741	0
-4	-0.0249	-3.6096	0.0006	-0.0972	-6.2963	0
-3	0.0035	0.5046	0.3513	-0.0938	-6.7872	0
-2	0.0054	0.7883	0.2924	-0.0883	-7.382	0
-1	-0.0081	-1.1686	0.2016	-0.0964	-9.8674	0
0	-0.0091	-1.3204	0.1668	-0.1055	-15.2751	0
1	-0.0484	-7.0115	0	-0.1539	-15.7589	0
2	0.0224	3.2415	0.0021	-0.1315	-10.9956	0
3	-0.0304	-4.4085	0	-0.162	-11.7267	0
4	-0.0548	-7.9387	0	-0.2168	-14.039	0
5	0.0017	0.2516	0.3865	-0.2151	-12.7131	0
6	0.022	3.1922	0.0024	-0.193	-10.5635	0
7	0.0187	2.7074	0.0102	-0.1743	-8.924	0
8	0.0126	1.8241	0.0756	-0.1617	-7.8056	0
9	0.0245	3.5483	0.0007	-0.1372	-6.283	0
10	0.0059	0.8476	0.2785	-0.1314	-5.735	0
11	-0.0417	-6.0375	0	-0.1731	-7.2338	0
12	0.0358	5.1804	0	-0.1373	-5.5132	0
13	-0.0033	-0.4841	0.3548	-0.1406	-5.442	0
14	0.0243	3.5205	0.0008	-0.1163	-4.2104	0.0001
15	0.0309	4.4705	0	-0.0854	-3.0928	0.0033
16	0.0175	2.5362	0.016	-0.0679	-2.3854	0.0232
17	0.0209	3.0229	0.0041	-0.047	-1.6056	0.1099
18	0.022	3.1807	0.0025	-0.0251	-0.8331	0.282
19	0.0203	2.9359	0.0054	-0.0048	-0.1555	0.3941
20	0.0007	0.0944	0.3972	-0.0042	-0.1312	0.3955

Table 8. presents period wise cumulative abnormal returns and average abnormal returns for transportation services firms on the happening of the Covid-19

Windows	AAR	t-stats	P-value	CAAR	t-stats	P-value
(-20, -15)	0.0008	0.1218	0.396	0.005	0.2983	0.3816
(-15, -10)	-0.0066	-0.9542	0.2531	-0.0395	-2.3372	0.026
(-10, -5)	-0.0097	-1.3979	0.1502	-0.0579	-3.424	0.0011
(-5, -1)	-0.0105	-1.5172	0.1262	-0.0524	-3.3926	0.0013
(-3, -1)	0.0003	0.0414	0.3986	0.0009	0.0718	0.3979
(-1,0)	-0.0086	-1.2445	0.1839	-0.0172	-1.76	0.0848
(-1, +1)	-0.0219	-3.1668	0.0026	-0.0656	-5.4851	0
(0, +1)	-0.0288	-4.1659	0.0001	-0.0575	-5.8915	0

(+1,3)	-0.0188	-2.7261	0.0097	-0.0565	-4.7218	0
(+1, +5)	-0.0219	-3.1731	0.0026	-0.1096	-7.0953	0
(+5, +10)	0.0142	2.0619	0.0476	0.0854	5.0505	0
(+10, +15)	0.0086	1.2496	0.1828	0.0518	3.0608	0.0037
(+15, +20)	0.0187	2.7068	0.0102	0.1122	6.6302	0

V. CONCLUSION

In this paper, we have attempted to explore the impact of Covid-19 on the Indian Automobile and Allied sectors. Further, we compared the impact of Covid-19 on the Indian Automobile sector with the Auto Index and market as a whole. We have used the event study method to explore the above-mentioned event in the Indian Automobile and Allied Sector. Our findings suggest that transportation services have experienced the highest negative returns on the outbreak of the pandemic. In addition, NSE-listed firms have experienced the somehow low impact of the outbreak. Automobile firms have experienced negative returns, but the firms in the Auto index have experienced less impact on the outbreak of Covid-19. The plausible reason is that the Auto index firms are significantly larger than the other firms in the automobile sector. The finding of this study will be useful for investors during extreme events such as pandemics, recession, and rest. Our analysis helps investors to make an investment decision and safeguard from capital erosion during extreme events. Our study can be further explored using different research methodologies and in different countries.

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