



Asian Journal of Management and Commerce

E-ISSN: 2708-4523

P-ISSN: 2708-4515

AJMC 2023; 4(1): 90-97

© 2023 AJMC

www.allcommercejournal.com

Received: 03-10-2022

Accepted: 05-11-2022

Jabir Yousuf Sheikh

Research Scholar, SOC,
DAVV, Indore, Madhya
Pradesh, India

Dr. Ranjana Kanungo

Assistant Professor, Christian
Eminent College, Indore,
Madhya Pradesh, India

Analyzing the impact of COVID-19 on Indian airline stocks: An empirical analysis using event study methodology

Jabir Yousuf Sheikh and Dr. Ranjana Kanungo

DOI: <https://doi.org/10.22271/27084515.2023.v4.i1b.148>

Abstract

The outburst of Covid-19 pandemic has slowed down the economic progress both in developed and developing nations. Since its outburst, the stock markets have declined all around the globe. However, some industries become profoundly weak while others proceed to perform well even in the crisis period. Given this new phenomena we try to study the short-term effects of the outburst of new contagious disease COVID-19, on four BSE listed aviation companies in India by employing event study methodology. The outcomes reveal that Indian aviation stock returns drop more significantly than the BSE stock market returns in response to the four main COVID-19 press statements that were made during first half of year 2020. Generally, stockholders respond contrarily in the four selected events. The strong over response shown by the investors is noted during the on-event period of the announcements made by World Health Organization and the Indian government. Besides, the results endorses that investors of Indigo and Spicejet were more reactive to the announcements made related to Covid-19 outbreak. The findings demand for instant policy framework in order to lighten the bad effects of the pandemic in the airline sector in India.

Keywords: Abnormal returns, aviation industry, airline stock returns, COVID-19, cumulative abnormal returns, efficient market hypothesis, event study

1. Introduction

Covid-19, a contagious disease caused by the new type of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which first emerged in Wuhan, a Chinese city, in December 2019. Since its confirmation the widely spread disease has caused havoc all around the globe. In January 2020 the World Health Organization first declared it a Public Health Emergency of International concern and later a pandemic in March 2020, (WHO). As of 4 December 2020, total number of confirmed COVID-19 cases has crossed over 21.5Cr with around more than 44.8L deaths all across the globe, (WHO). Countries such as United States, India, Brazil, Russia, France, Spain, United Kingdom, Italy and Argentina were mostly affected by it so far in terms of confirmed cases.

The pandemic has shaken the interconnected global economic activity and it left the immediate adverse impacts on global growth, global production, international trade and foreign direct investment, employment and ultimately individual livelihoods. The COVID-19 pandemic has gravely wounded the world economy with serious consequences impacting all communities and individuals. The COVID-19 contagion has produced far-reaching costs on the global economy with Kristalina Georgieva International Monetary Fund (IMF) Managing Director, stating the crisis “the worst economic fallout since the Great Depression.” The international economy is likely to decrease by 4.9 percent, a sharper drop than the 3 percent predicted in April (IMF, 2020) ^[9].

The economic crisis set in the motion by the outbreak of COVID-19 is disturbing economies, both developed and developing economies. The covid-19 economic crisis is affecting unevenly developing and unindustrialized economies. They will take the painful hit, as they have “less resources to protect themselves against this dual...health and economic crisis.” World Bank President David Malpass also cautioned that the global economic downturn could set back years of progress in developing countries. As a result, developing countries could see income losses in excess of \$220 billion, (UNDP). Developing economies haven't

Corresponding Author:

Jabir Yousuf Sheikh

Research Scholar, SOC,
DAVV, Indore, Madhya
Pradesh, India

felt this type of crisis since the Great Depression.

India's economy contracted by nearly a quarter, 23.9%, throughout the April to June period compared with the previous year, its worst growth performance since quarterly data started in 1996.

The outburst of pandemic has affected the world's 2nd largest developing nation India in a gigantic way, specifically the countrywide lockdowns which brought societal and commercial life to a halt. There is a multi-industrial impact of the pandemic in India as the economic activities have slowed down almost in every industry. Sectors such as healthcare, aviation, travel and tourism, realty, education, retail, recreation and media were mostly damaged by it. The airline industry is possibly the worst hit during the COVID-19 pandemic, which led to the cancellation of flight operations- both international and domestic – by the end of the march in India, to curb cross-country passenger movement and to stop more spread of the disease. Indian aviation passengers' facilities remain on hold for 60 days (25 March 2020 to 24 May 2020), carried huge loss to the industry. DGCA reported 33% drop in passenger traffic flow (from 11.5 million reported in March 2019 to 7.8 million in March 2020) during six days discontinued flight operations in March 2020. Airports Authority of India stated a 92% drop in revenue, (Rs 239 crore during April-June 2020 from Rs 2,973 cr in 2019), resulting in the shrunk of market value of the aviation business. Therefore, the situation necessitates examining the short-run impact of Covid-19 on the stock performance of Indian airline industry.

To understand the impact of COVID-19 on the Indian aviation sector, this study analyses the influence of different official statements made about the pandemic, by particularly focusing on the stock returns of four aviation companies listed on S&P BSE. This study will contribute to earlier works on calamities in the airline sector. Also its results are expected to support stockholders, Capital market regulatory organizations, corporate managers, and government to better apprehend the short-term variations and return performance of four Indian aviation companies and assist them make better decisions about the forthcoming impacts and repairing market sentiment in the face of the COVID-19 outbreak.

The researcher applies event study methodology in order to explore the influence of COVID-19 official media announcements on four S&P BSE listed airline stock returns. While the first COVID-19 infected patient was announced by the World Health Organization (WHO), in China on December 31, 2019 (WHO, 2020), the researcher consider four key dates linked to COVID-19: (1) January 13, 2020- the first Covid-19 case reported in Thailand, outside china; (2) February 21, 2020-the outburst in Italy, (3) March 11, 2020- WHO announced Covid-19 outbreak as global pandemic and the U.S. declared ban on travel passengers from 26 European nations and (4) March 24, 2020- the Government of India ordered countrywide lockdown. The researcher select these four dates as they exhibit essential phases about the uncontrolled COVID-19 outbreak.

2. Review of Literature

2.1. Stock market behavior and outbreak of disease

A number of past studies have analyzed the connection between the outburst of pandemic and share Market response. Pendell and Cho (2013) ^[16], while analyzing stock

market performance and spreadable animal virus outbreaks found that daily earnings with the smaller scale businesses are observing the major fluctuations. Wang *et al.* (2013) ^[20-21], in the perspective of Taiwan, examined the influence of infections, for example, Enterovirus 71, SARS and H1N1, dengue, fever on similar biotechnology enterprises' stocks' performance. They acknowledged that stockholders realistically appraise the performance of biotechnology stocks throughout the disease outbreak. Morales and Callaghan (2012) ^[15] stated that because of globalization, markets all around the world are mutually dependent, and calamity in one nation is expected to disturb other nations as well. Lee and McKibbin (2004) ^[12], while conducting their study reported high degree of influence of the SARS epidemic on financial integration besides its severe impact on human society. Zouaoui *et al.* (2011) ^[23] documented that the impact of a disease outbreak on an investor's sentiment is more prominent in culturally interdependent countries. In recent times, Liu *et al.* (2020) ^[13] examined the influence of the COVID-19 pandemic on the highly disturbed stock markets applying the event study method. They found that the stock markets reacted unfavorably to the COVID-19 outburst, resulting in negative stock return performance. Zhang *et al.* (2020) ^[22] reported that world financial markets have turn into highly volatile and financial systematic risk has surged in reaction to the uncertainty created by ongoing outbreak of COVID-19. In the context of the US, they anticipated that unconventional policy interventions (quantitative easing) may possibly increase new difficulties for the economy. Albulescu (2020) ^[1] in his study concerning the influence of the COVID-19 pandemic on stock market fluctuations found that new confirmed Corona cases and death positively impact market volatility index (VIX) both inside and outside of China. Furthermore, he proposed that there is a positive correlation between the spread of the COVID-19 virus and the financial volatility in the financial market of a country.

2.2 International events and aviation industry

The aviation sector has been disturbed by different global crises throughout history. From the SARS, oil blockade, terrorist attacks, airline deregulation the Sector has faced many storms resulting in the decrease of overall performance (Davies, 2016) ^[3]. Franke and John (2011) ^[5] stated that the 9/11 attack triggered a substantial decrease in flight operations and aviation sector struggled to continue its smooth operations. Kim and Gu (2004) ^[11] found that the average weekly stock return of aviation companies does not fluctuate intensely after 9/11, while investigating the impact of the 9/11 terrorist attacks on the stock returns and uncertainties of airline stocks on the stock market. Also there has been a significant increase in the market risk and total value of airline stocks. Loh (2006) ^[14] reported that aviation companies listed in China, Canada, Singapore, Hong Kong, and Thailand were highly responsive to SARS official announcements than non-aviation stocks, and that the adverse effects of SARS on stocks surge volatility instead of decrease in average returns. Also it was found that after the outbreak of SARS the stocks of aviation companies tends to be more aggressive.

Harbison (2003) ^[8] find out that during the strong wave of the SARS outbreak, the passenger travel traffic decreased by 5.6%, pushing certain airlines functioning in the Asia-Pacific countries to defer orders and to downscale the

number of employees in order to minimize the total cost of service. Wang (2013) ^[20-21] examined the connection between global events and stock returns of international airlines from 1996 to 2010, resulting that major global events may have a risk impact on earnings of airline stock prices. Borenstein and Zimmerman (1988) ^[2] use CAPM market model to analyze the impact of 74 plane crashes on the airline sector in the US from the 1960s to 1985. They reported that airline crashes has an adverse impact on the revenue growth. Sato (2013) ^[17] Comparing the performance of European airline and North American stock portfolios, points out the 2008 global financial crisis has a main effect on the North American market compared to the European one. Sakkakom and Suntichai (2020) examined the short-range impact of the new COVID-19 pandemic on 52 listed aviation companies across the globe by using event study methodology. They found that that stock returns of aviation companies decline more substantially than the market returns after three main COVID-19 official press releases were made.

3. Purpose of the study

The purpose of this study is to evaluate the stock performance in terms of stock returns of four Indian airline companies before and after the four important official press announcements were made related to COVID-19 outbreak. Additionally this study attempts to test the quickness with which Covid-19 announcements are absorbed by the stocks of companies belonging to Indian aviation industry.

4. Research methodology

4.1 Sample and data

As the purpose of the present study is to investigate the impact of unexpected Covid-19 pandemic on the Indian aviation sector which is highly vulnerable and had shown high stock price fluctuations during the initial phase of Covid-19 outburst. So the study uses four aviation companies- Interglobe aviation, Spice jet, Jet Airways, and Global Vectra listed in Bombay Stock Exchange as its sample to conduct this study.

S&P BSE SENSEX, an index reflecting the overall stock market performance in India, is preferred as the standard index to estimate the abnormal returns of combined stocks of sample companies. The daily closing prices data of S&P BSE SENSEX and the four sample companies have been collected from websites, bseindia.com and in.finance.yahoo.com (a website which provides free real time stock quotes, financial news, historical stock data etc.).

The time interval used for collection of data is from 1st January 2019 to 3rd May 2020, including both the time period before and during Covid-19 outbreak.

4.2 Research model

The researcher utilized event study approach as proposed by Fama *et al.* (1969) ^[4] to carry out empirical work on how the stocks of Indian aviation sector, perform after the explosion of Covid-19 news. This approach is recognized as one of the most popular and important methodology applied in the economic and finance writings, to examine the impact of arrival of fresh information from a specific event on stock returns. This method is applied to test semi-strong form market efficiency (Fama, 1970, Fama, 1991), which assumes that the announcement of new relevant public information gets reflected quickly and immediately through current stock prices. It holds that stock prices have already absorbed all relevant information available in the market. It summarizes that extra returns cannot be obtained by means of technical and fundamental analysis.

4.3 Events of Concern and Event dates

In the present study four significant events depicting the development of the COVID-19 outbreak have been considered, which are, Event 1 (January 13, 2020), the first Covid-19 positive patient registered outside China in Thailand; Event 2 (February 21, 2020), the Covid-19 outburst in Italy; Event 3 (March 11, 2020), U.S. declared ban on travel passengers from 26 European nations and WHO declaration on COVID-19 as global pandemic outbreak; Event 4 (March 24, 2020), the Government of India ordered countrywide lockdown

4.4 Event window

To investigate the impact of COVID-19 outbreak over stock returns of Indian aviation companies, the author use an window event of 4 days prior to every single event date to 4 days subsequent to every single event date [-4,+4]. The [-4, +4] event window is applied to calculate the abnormal returns of four Indian aviation companies. To reduce the influence of unrelated information on share prices, a short event window is normally preferred.

4.5 Estimation window

Estimation window is the time duration covering the historical trading days, on which the investigator wants to estimate the expected returns. The estimation window selected for this study is one year before the event window.

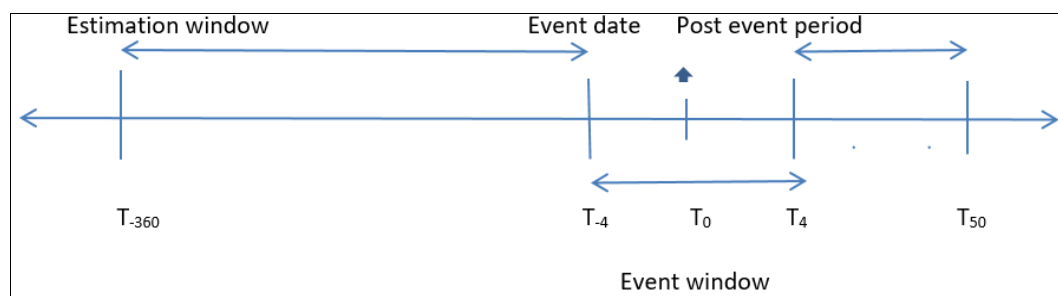


Fig 1: Event Study Timeline

4.6 Method of Analysis

There are three basic methods to calculate abnormal returns using event study methodology.

- **Mean adjusted returns model (MAR)**

Which is simply used to find the difference between the return on a stock on a particular day and the average

return on the stock.

$$AR_t = R_t - \bar{R}_j \tag{1}$$

Where, R_t and \bar{R}_j are the daily stock returns on a given day and average return on the stock and AR_t is the resulting figure abnormal return on a given day.

- **Market-adjusted return Model (MKAR):** This looks for the difference between the return of a stock on particular day and the corresponding stock market index return.

$$AR_t = R_t - R_{Mt} \tag{2}$$

Where, R_{Mt} represents the market return on a given day. The above mentioned two event study models are not commonly used to estimate the abnormal returns in order to investigate the impact of new relevant information on stock returns. Therefore in present study the author applies the third method, described below, for conducting the empirical analysis on how the stock prices of Indian aviation companies behaved during the initial phase of Covid-19 outbreak.

- **Risk-adjusted returns Model:** this is the most superior method among the three because it considers the risk adjustments. While applying this method we have to run regression of the stock returns against the market returns and then find intercept and slope to estimate, expected stock returns (fair values). The estimated stock returns are then subtracted from the actual stock returns to find out abnormal returns. So to calculate expected returns, the author starts with the market model based on regression as seen below.

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \mu_{i,t} \tag{3}$$

Where $R_{i,t}$ is returns on daily basis of a particular stock at time t and $R_{m,t}$ is market index returns on daily basis of a

5. Results and Discussion

5.1 Abnormal Returns

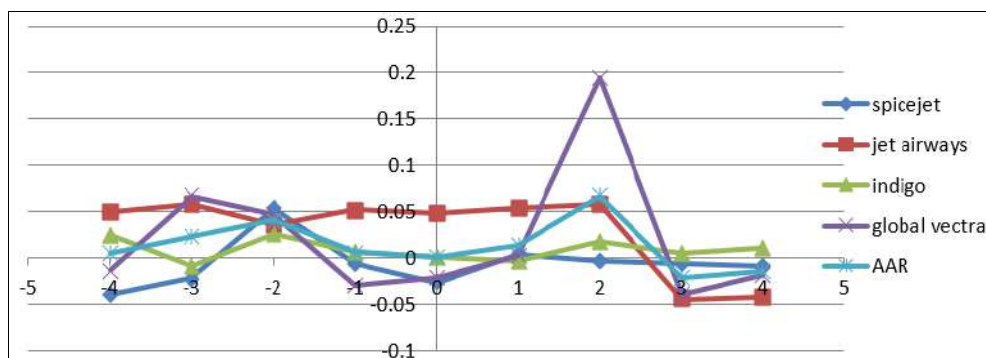


Fig 2: Daily abnormal returns of the entire sample in response to the first Covid-19 press announcement made on 13 January 2020.

Figure 2 depicts the abnormal returns of four Indian aviation companies in response to the first Covid-19 press announcement made on 13 January, 2020. On the event day, the stocks of Spice jet and Global Vectra show insignificant negative abnormal returns at 5% level. The abnormal returns of Spice jet and Global Vectra were negative for most of the days during the event window. As shown in figure, the

particular market at time t . $\mu_{i,t}$ is the residual of a particular stock at time t , which is independent and identically distributed. α_i and β_i are intercept and slope of the market model. After estimating the intercept and slope the following formulae are used to compute the estimated return and abnormal return.

$$E(R_{i,t}) = \alpha_i + \beta_i R_{m,t} \tag{4}$$

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \tag{5}$$

Where $E(R_{i,t})$, $R_{i,t}$, and $AR_{i,t}$ are estimated return, actual return and abnormal return of a particular stock at time t . $AR_{i,t}$ reflects the impact of the announcement of information related to three Covid-19 events discussed above, on aviation stocks. If $AR_{i,t}$ is equal to zero, it means that market value is equal to estimated value (fair value), if not then market value deviates from estimated value. Also we can compute the mean value of abnormal returns using equation 6.

$$AAR_t = \sum_{i=1}^N AR_{i,t} / N \tag{6}$$

To explore the aggregate impact of the different events mentioned above during pre-defined time period, cumulative abnormal returns (CAR) of particular stock i throughout the period t_0 and t_1 are obtained using equation 7.

$$CAR_i(t_0, t_1) = \sum_{t=t_0}^{t_1} AR_{i,t} \tag{7}$$

The present study examines whether the market value shows much deviations from estimated values by testing, if $CAR_i(t_0, t_1)$ is substantially different from zero. During the investigation period when the market responds to the new relevant information, deviation from the estimated values can be in terms of either positive or negative $CAR_i(t_0, t_1)$.

abnormal returns of the entire sample do not show deep fluctuations between days -4 to day -2. After day +2 a little deep fluctuation from positive AR to negative AR occurs in the stocks of Global Vectra and Jet Airways. The insignificant impact is observed before and after the event date after analyzing the values of abnormal returns in table 1, with the help of T stat at 5% level of significance.

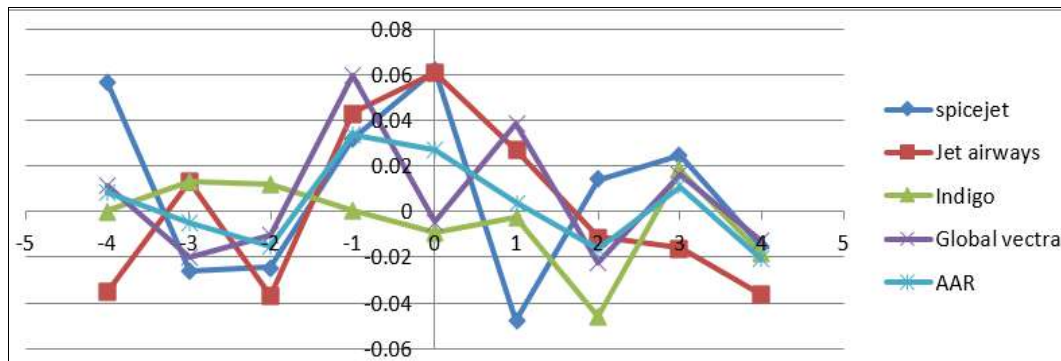


Fig 3: Daily abnormal returns of the entire sample in response to the second Covid-19 press announcement made on 20 February 2020.

Figure 3, exhibits the abnormal returns for the entire sample during the second event window period. On the event day, the stocks of Indigo and Global Vectra show negative abnormal returns. All the stocks of aviation companies show high fluctuations throughout the whole event window period (-4, +4). The above figure shows that on next day after the

event happened, stocks of spice jet and Indigo has shown high negative fluctuation as compared to other stocks. The abnormal returns observed between day -4 to day +4, were not found significant after applying the T statistics at 5% level of significance.

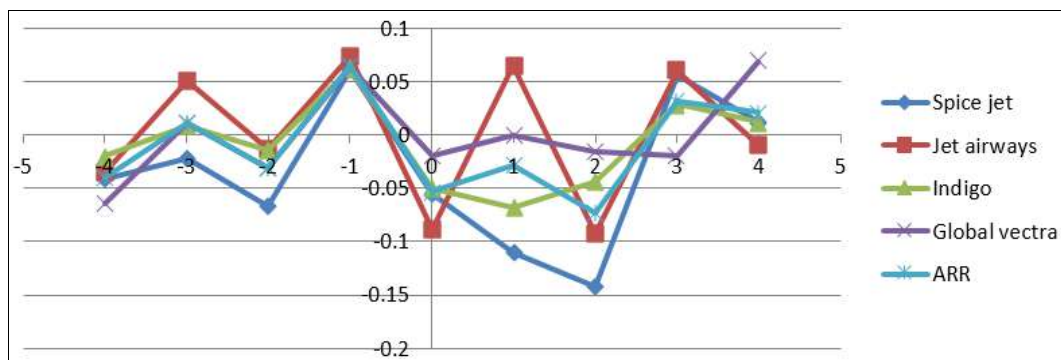


Fig IV: Daily abnormal returns of the entire sample in response to the third Covid-19 press announcement made on 11 March 2020.

Figure IV depicts the abnormal returns in response to the breaking news about Covid-19 (U.S. declared ban on travel passengers from 26 European nations and WHO declaration on Covid-19 as global pandemic outbreak). On the event day stocks of entire sample reported negative abnormal returns indicating the event did attract the attention of stock

traders. The abnormal returns of all stocks on event day were found insignificant except Indigo at 5% level. It is also observed that the abnormal returns of stocks of Spice Jet and Indigo on the next day after the event day, were significantly negative at 5% level.

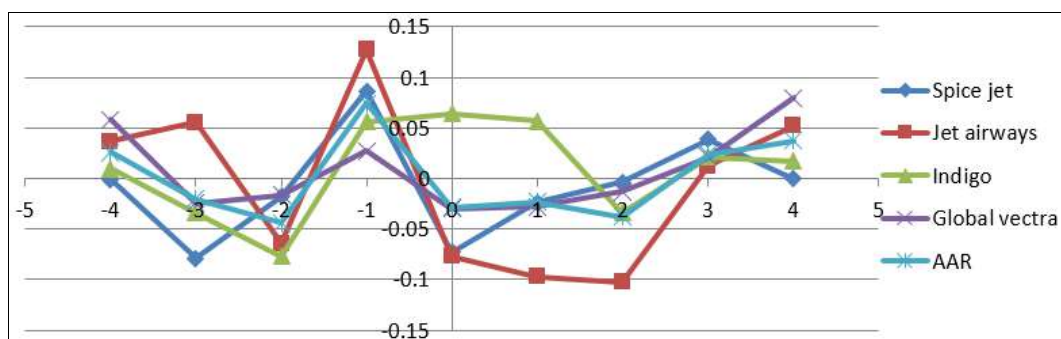


Fig V. Daily abnormal returns of the entire sample in response to the fourth Covid-19 press announcement made on 24 March 2020.

Figure V, illustrates the response of Indian aviation stocks after the Indian govt. declared countrywide lockdown. On the event day (day 0) stocks of Indian aviation companies experienced negative abnormal returns except Indigo indicates that the stock traders reacted immediately after the countrywide lockdown announcement were made. Spice jet

among the entire sample showed negative abnormal returns in most of the days during event window, but the significant abnormal returns were found only on day 0, day -1, and day-3 at 5% significance level (Table 1). Indigo airline is found to have significant and positive abnormal returns on day 0, day 1, day -1, day -2 at 5% level of significance.

Table 1: Abnormal returns and T test during four different event windows

	Spicejet AR	T test	Jet Airways AR	T test	Indigo AR	T test	Global Vectra AR	T test
Event window 1								
-4	-0.03907	-1.23706	0.049675	0.579123	0.025154	1.035154	-0.01348	-0.3133
-3	-0.02166	-0.6858	0.057831	0.583759	-0.00845	-0.34769	0.066822	1.55355
-2	0.054061	1.711725	0.036323	0.586496	0.026517	1.091223	0.04715	1.096195
-1	-0.00592	-0.18729	0.051919	0.587565	0.007231	0.297581	-0.02914	-0.67747
0	-0.02615	-0.82786	0.048403	0.587187	0.000979	0.040302	-0.02073	-0.48193
1	0.003605	0.114143	0.053475	0.585556	-0.00259	-0.10665	0.001854	0.043094
2	-0.00312	-0.09878	0.058581	0.582853	0.017324	0.712946	0.194169	4.514255
3	-0.00565	-0.17876	-0.04454	-0.59106	0.005756	0.236887	-0.03897	-0.90605
4	-0.00929	-0.2943	-0.04255	-0.58468	0.010074	0.414569	-0.0181	-0.42081
Event window 2								
-4	0.056797	1.798357	-0.035	-0.41581	0.00025	0.010581	0.011511	0.267612
-3	-0.026	-0.82332	0.01339	0.159075	0.01297	0.533778	-0.01993	-0.46346
-2	-0.02448	-0.77525	-0.03686	-0.43795	0.01195	0.491911	-0.01044	-0.24271
-1	0.031722	1.004405	0.043125	0.512334	0.00047	0.019422	0.059765	1.389486
0	0.061761	1.955536	0.060932	0.723894	-0.00916	-0.37683	-0.00448	-0.10408
1	-0.04774	-1.51174	0.027199	0.323134	-0.00246	-0.10121	0.038359	0.891821
2	0.014007	0.443503	-0.01122	-0.1333	-0.04606	-1.89539	-0.02263	-0.52619
3	0.024709	0.782359	-0.01594	-0.18936	0.01812	0.745937	0.016445	0.382328
4	-0.01504	-0.47622	-0.03627	-0.43087	-0.01816	-0.74717	-0.01307	-0.30386
Event window 3								
-4	-0.04144	-1.31223	-0.03523	-0.41858	-0.0203	-0.83548	-0.06409	-1.49007
-3	-0.02221	-0.70319	0.050249	0.59697	0.007871	0.3239	0.010374	0.24119
-2	-0.0673	-2.13078	-0.01268	-0.15064	-0.01404	-0.57777	-0.03104	-0.72158
-1	0.060824	1.92586	0.073868	0.87757	0.062462	2.57044	0.063543	1.477315
0	-0.05522	-1.74842	-0.0886	-1.05262	-0.05018	-2.06507	-0.0196	-0.45566
1	-0.11049	-3.49829	0.065054	0.77286	-0.06834	-2.81249	-0.00055	-0.01274
2	-0.14264	-4.51633	-0.09271	-1.10147	-0.04433	-1.82434	-0.01607	-0.37355
3	0.055624	1.76122	0.060069	0.71363	0.028648	1.17891	-0.01934	-0.44972
4	0.011967	0.37892	-0.0091	-0.10812	0.01198	0.49299	0.06864	1.59581
Event window 4								
-4	-0.00081	-1.35152	0.036398	0.432419	0.01001	0.411948	0.058268	1.354683
-3	-0.07908	-2.50394	0.055527	0.659678	-0.03361	-1.38303	-0.02459	-0.37591
-2	-0.01805	-0.57136	-0.0642	-0.76277	-0.07684	-3.16211	-0.01617	0.640163
-1	0.086636	2.743136	0.127114	1.510154	0.055961	2.302935	0.027535	-0.69324
0	-0.07297	-2.31057	-0.07676	-0.91194	0.064188	2.641486	-0.02982	-0.64154
1	-0.02376	-0.75227	-0.09703	-1.1527	0.056644	2.331045	-0.02759	-0.30407
2	-0.00347	-0.10986	-0.10249	-1.21758	-0.03359	-1.38221	-0.01308	0.496024
3	0.038957	1.233502	0.012722	0.151138	0.02153	0.885995	0.021335	1.854522
4	-0.00047	-0.01496	0.051991	0.617663	0.017094	0.703446	0.079768	-2.74387

**Significant @5% level of significance

Source: Authors calculation

5.2 Cumulative Abnormal Returns

Table 2 shows the cumulative abnormal returns of four major Indian aviation company stocks during four different event windows, for the four important Covid-19 events happened during the initial phase of disease outburst. We have excluded all other stocks of airline companies operating in India, not listed on any stock exchange. The above table presents the outcomes on pre event (-4, 0), on event (0, 0), and post event (4, 0) windows as below.

During the before-event (-4, 0), window the CAR of Indigo, Jet Airways and Global Vectra shown in table 2 are mostly positive but not statistically significant. The stock of Spice jet has shown negative CAR in every event except event 2. The t-test employed on the CAR of the four days before, all the events do not show any significant difference from zero. So the results shown in table 2 on pre event window (-4, 0) are not statistically significant in any of the events.

Table 2: Cumulative Abnormal returns and T test in individual aviation companies during different event periods

..	Window	Event 1, 13 Jan., 2020		Event 2, 20 Feb., 2020		Event 3, 11 March, 2020		Event 4, 24 March, 2020	
	Before Event	CAR	t-test	CAR	t-test	CAR	t-test	CAR	t-test
Spice Jet	(-4, 0)	-0.01258	-0.26223	0.038032	0.792555	-0.07012	-1.46134	-0.0113	-0.23545
Jet Airways	(-4, 0)	0.195748	1.623434	-0.01535	-0.1273	0.076204	0.631998	0.154835	1.284121
Indigo	(-4, 0)	0.050453	1.355102	0.025653	0.68901	0.03599	0.966655	-0.04447	-1.19454
Global Vectra	(-4, 0)	0.071357	1.120373	0.040902	0.642201	-0.02121	-0.33304	0.045047	0.707289
On event									
Spice Jet	(0,0)	-0.02615	-0.82786	0.061761	1.955536	-0.05522	-1.74842	-0.07297	-2.31057
Jet Airways	(0,0)	0.048403	0.587187	0.049091	0.060932	-0.0886	-1.05262	-0.07676	-0.91194
Indigo	(0,0)	0.000979	0.040302	-0.00916	-0.37683	-0.05018	-2.06507	0.064188	2.641486

Global Vectra	(0,0)	-0.02073	-0.48193	-0.00448	-0.10408	-0.0196	-0.45566	-0.02982	-0.64154
After event									
Spice Jet	(4,0)	-0.01446	-0.30124	-0.02407	-0.50158	-0.18553	-3.86636	0.011256	0.234575
Jet Airways	(4,0)	0.024964	0.207041	-0.03623	-0.30045	0.023308	0.193306	-0.1348	-1.11797
Indigo	(4,0)	0.030563	0	-0.04855	-1.30391	-0.07205	-1.93509	0.06168	1.656634
Global Vectra	(4,0)	0.138951	2.181682	0.019101	0.299913	0.03268	0.513118	0.06043	0.948807

**Significant @5% level of significance

Source: Authors calculation

This shows the under reaction of the investors of Indian aviation companies. The likely reason of this finding is that the investors of Indian aviation stocks expect that the spread of the Covid-19 disease would be restricted to specific areas, which is also reported by study on SARS conducted by Ru *et al.*, (2020). Another possible reason of this finding is that the investors expected that the Governments of different countries may discover a vaccine within a short period of time. Also investors do not expect that the cross-broader operations of airline companies would drop because of the lockdown policy in most of the countries. Hence, they misjudge the possible consequences of COVID-19 on world trade and industry.

During the on-event days (0, 0), the abnormal returns of stocks of aviation companies did not show much fluctuation in the first event, but ups and downs were reported during the subsequent events. Most of the negative abnormal returns were reported during on-event days specifically in the third and fourth events, indicating that these events were taken seriously by the investors of airline companies. As shown in the table 2 above, CAR of all the stocks during on-event days in the first two events is not significant at 5% level of significance. The Indigo stock in the third and fourth event shows significant CAR, demonstrating that the investors of Indigo overreacted during the third and fourth event. Also during the fourth event the Spicejet shows significant CAR at 5% level of significance. Therefore the events of third and fourth Covid-19 announcement have significantly impacted the stocks of Indigo and Spicejet aviation companies.

During after event window days (4, 0), little fluctuations were reported in almost all the stocks specifically in the stocks of Jet Airways and Spicejet. The stocks of sample companies had shown insignificant, both positive and negative abnormal returns throughout the after event windows days. After analyzing the above table 2, CAR of all the sample stocks during after event window days in the first two events do not show any significant result except Global Vectra in the first event. Also in the subsequent events the stocks do not exhibit any significant CAR except Spicejet in the third event. Hence, this finding suggests that the investors of Indian aviation companies did not overreact during after event window days.

6. Conclusion

The COVID-19 pandemic has influenced the worldwide economy of which India is a major member. India is the country with the second biggest populace on the planet, so the pandemic has been particularly risky for India. The COVID-19 influenced practically all securities exchanges all around the world. We endeavored to evaluate the stock performance in terms of stock returns of four Indian airline companies before and after the four important official press announcements were made related to COVID-19 outbreak. Four significant events depicting the development of the

COVID-19 outbreak have been considered, which are, Event 1 (January 13, 2020): the first Covid-19 positive patient registered outside China in Thailand; Event 2 (February 21, 2020): the Covid-19 outburst in Italy; Event 3 (March 11, 2020): U.S. declared ban on travel passengers from 26 European nations and WHO declaration on Covid-19 as global pandemic outbreak; and Event 4 (March 24, 2020): the Government of India ordered countrywide lockdown.

The stocks of Indian airline companies have shown fluctuations in terms of abnormal returns in every event, but the significant fluctuations were reported only in the third and fourth event. We find under reaction by the investors during before-event days, on-event days, and after-event days in almost all of the Indian airline stocks to the first two covid-19 announcements. The investors over reacted to the third and fourth Covid-19 announcements mostly during on-event days. The stocks of Indigo and Spicejet airlines were the worst performers during event third and fourth.

The aviation industry battles with Covid-19 pandemic and it's potential after effects, which appears to be challenging and may be long drawn-out. The sustainability and existence of Indian aviation sector warrants for changes of improvement in their methodologies and business plan of action to reinforce their financial endurance. Overcapacity, strong rivalry and increasing operational cost are the key elements upsetting aviation companies' performance. To beat the negative challenges of Covid-19 catastrophe, ideal use of capital assets, collaboration as opposed to rivalry, mergers and acquisitions, cost adequacy, tax policy and government subsidies appears to be the conceivable way-outs for supporting with financially feasible take-off on harsh terrain.

References

1. Albuiescu C. Coronavirus and financial volatility: 40 days of fasting and fear. Computational Finance (Epub ahead of print); c2020. <https://arxiv.org/abs/2003.04005>
2. Borenstein S, Zimmerman MB. Market incentives for safe commercial airline operation. American Economic Review. 1988;78(5):913-935.
3. Davies REG. Airlines of the Jet Age: A History. Smithsonian Institution; c2016.
4. Fama EF, Fisher L, Jensen MC, Roll R. The adjustment of stock prices to new information. Int. Econ. Rev. 1969;10(1):1-21.
5. Franke M, John F. What comes next after recession? Airline industry scenarios and potential end games. J Air Transp. Manag. 2011;17(1):19-26. <https://doi.org/10.1016/j.jairtraman.2010.10.005>.
6. Gita G. The Great Lockdown: Worst Economic Downturn since the Great Depression; c2020. <https://blogs.imf.org/2020/04/14/the-great-lockdown-worst-economic-downturn-since-the-great-depression>.

7. Gunther CB, Adrien D. The stock market and the economy: Insights from the COVID-19 crisis; c2020. <https://voxeu.org/article/stock-market-and-economy-insights-covid-19-crisis>.
8. Harbison P. SARS hits hard. *Flight Safety Australia*. 2003;7:28-29.
9. IMF. A Crisis like No Other, An Uncertain Recovery. *World Economic Outlook Update*; c2020. <https://www.imf.org/en/Publications/WEO/Issues/2020/06/24/WEOUpdateJune2020>.
10. Kajal V, Vibhuti V. Covid-19 Pandemic Ravages World's Largest Developing Economies. *The Wall Street Journal*; c2020. <https://www.wsj.com/articles/covid-19-pandemic-ravages-worlds-largest-developing-economies>.
11. Kim H, Gu Z. Impact of the 9/11 terrorist attacks on the return and risk of airline stocks. *Tourism and Hospitality Research*. 2004;5(2):150-163.
12. Lee J W, McKibbin WJ. Estimating the global economic costs of SARS. In *Learning from SARS: Preparing for the next disease outbreak: Workshop summary*. Washington, DC: National Academies Press; c2004.
13. Liu H, Manzoor A, Wang C, Zhang L, Manzoor Z. The COVID-19 outbreak and affected countries stock markets response. *International Journal of Environmental Research and Public Health*. 2020;17(8):1-19.
14. Loh E. The impact of SARS on the performance and risk profile of airline stocks. *International Journal of Transport Economics*. 2006;33(3):401-422.
15. Morales L, Callaghan AO. The current global financial crisis: Do Asian stock markets show contagion or interdependence effects? *Journal of Asian Economics*, 2012;23:616-626.
16. Pendell DL, Cho C. Stock market reactions to contagious animal disease outbreaks: An event study in Korean foot-and-mouth disease outbreak. *Agribusiness*. 2013;29(4):455-468.
17. Sato R C. Risk assessment in airlines stocks market. *Journal of Transport Literature*, 2013;7(2):352-372.
18. UNCTAD. Impact of the Covid-19 Pandemic on Trade and Development: transitioning to a new normal; c2020. https://unctad.org/system/files/official-document/osg2020d1_en.pdf.
19. USGLC. COVID-19 Brief: Impact on the Economies of Low-Income Countries; c2020. <https://www.usglc.org/coronavirus/economies-of-developing-countries>.
20. Wang YS. The impact of crisis events on the stock returns volatility of international airlines. *The Service Industries Journal*. 2013;33(12):1206-1217.
21. Wang YH, Yang FJ, Chen LJ. An investor's perspective on infectious diseases and their influence on market behavior. *Journal of Business Economics and Management*, 2013;14(1):112-127.
22. Zhang D, Hu M, Ji Q. Financial markets under the global pandemic of COVID-19. *Finance Research Letters (Epub ahead of print)*; c2020. <https://doi.org/10.1016/j.frl.2020.101528>
23. Zouaoui M, Nouyrigat G, Beer F. How does investor sentiment affect stock market crises? Evidence from panel data. *The Financial Review*. 2011;46:723-747.