

# A Study on Abnormal Returns of Major Stock Markets Due to Pandemic

Neha Patidar <sup>1</sup>, Dr. Harshal Shah <sup>2</sup>

<sup>1</sup> Research Scholar, Faculty of IT and CS, Parul University, Vadodara, Gujarat

<sup>2</sup> Associate Professor, Parul Institute of Engineering, Parul University, Vadodara, Gujarat

\*Corresponding Author's e-mail: harshal.shah@paruluniversity.ac.in

**ABSTRACT**-This study looks at impacts of COVID-19 epidemic affected the security markets of 20 developed and developing nations. The 20 developing and developed countries that the indexes in our sample reflect are examined using an event study technique, and panel data regression is used to ascertain the reasons for abnormal returns (ARs). Although the observational frame starts 58 days after the COVID-19 pandemic was highlighted by the worldwide press, the estimate period begins 150 days prior to the date of event. In 4 of the 58-day sub-event periods, we find negatively correlated ARs that are statistically significant. Both emerging and developing economies suffer from negative ARs. The investigation's findings show that the CAAR (Cumulative Average Abnormal Return) varied by 0.70 percent to 42.69 percent in the time span of day 0 to day 43. The CAAR fluctuated from day 43 to day 57, from -42.69% to -29.77%, showing the stock markets' recovery after a substantial stock price decline caused by COVID-19. Furthermore, findings from panel data analysis corroborate the optimistic stock market recovery.

**Keywords**-20- Developing and developed nations, COVID-19, pandemic illness, Event Research, Random Effect Model

**JEL Codes**- O16, C19, C40

## INTRODUCTION

A wide range of empirical evaluations of security market responses to the onset of serious systemic illnesses are provided in the present research. Research looks into the effects of major incidents, including the onset of the pandemic ("Loh, 2006; Chen et al., 2007, 2018; SARS"), corporate events ("Maitra and Dey, 2012; Ranju and Mallikarjunappa, 2019; Seal and Matharu, 2018"), natural disasters ("Caporale et al., 2019; Tavor and TeitlerRegev, 2019; Wang and Kutun, 2013"), public messages ("Li, 2018; Ormos and Vázsonyi, 2011"), and guidelines ("Beaulieu et al., 2006; Bash and Alsaifi, 2019; Ismail and Suhardjo, 2001; Nazir et al., 2014; Shanaev and Ghimire, 2019") in inventory markets. The current corona virus disease outbreak (COVID-19) will unavoidably have a detrimental effect on the world's capital markets and financial system. In the early phases of educational research on the disease, "Al Awadhi et al. (2020), Liu et al. (2020), Ahmar and Val (2020), and Zhang et al. (2020)" observed a detrimental effect of the COVID19 outbreak in the stock markets.

The WHO's classification of COVID-19 as a pandemic led to a decline in share values around the globe. Several COVID-19 investigations looking at stock rate reactions found indications of panic purchasing, promotion, and ongoing volatility in both regional and global security markets. The National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) banned trading and promotions between March 13 and March 23, 2020, for a total of 15 days, due to a rise in anxiety and panic buying and selling. In March 2020, the circuit breaker was identified four times in ten days on the American stock market (Economic Times, 2020). The security markets largely had an unfavorable reaction to the COVID-19 problem.

## LITERATURE REVIEW

Liu et al. (2020) recently used event research approaches to look at how the COVID-19 epidemic affected stock markets in the most affected countries. The stock markets underperformed as a result of the COVID-19 epidemic, according to the information they gave. We have assessed both general and nation-

specific patterns of systemic risk. They showed that due to the uncertainty in market conditions, financial market risks had escalated and that the world's markets had become extremely volatile.

They demonstrated in the instance of the US that unorthodox policy intervention (quantitative easing) could exacerbate existing economic issues regarding the deadly virus's effect on financial volatility. According to Albulescu (2020), 4,444 deaths and newly verified COVID-19 cases may have had a favorable impact on the Chinese and global market volatility index (VIX). Additionally, he made the argument that financial volatility in the stock market would increase in direct proportion to how widely the

deadly virus spread across the nation. It was proposed that ARIMA is superior to his ARIMA in anticipating the short-term impact of the corona virus on the stock market based on the data. The connection between disease outbreaks and stock market responses has been examined in a number of earlier studies.

In the individual financial markets of Canada, China, Hong Kong, Singapore, and Thailand, Loh (2006) found a substantial correlation between the existence of SARS and the performance of airline shares. She also discovered that the strain she used for activities other than flying was less delicate.

Table 1. Share Market Indices of 20- developing and developed Nations

<b>Indices</b>	<b>Stock Exchange</b>	<b>Abbreviation</b>	<b>Name of the Countries</b>	<b>Economic Status of Country</b>
S&P Merval	Bolsas y Mercados Argentinos Exchange	MERV	Argentina	Developing Economy
S&P/ASX 200	Australian Securities Exchange	AXJO	Australia	Developed Economy
Bovespa	Brasil Bolsa Balcão	BVSP	Brazil	Developing Economy
S&P/TSX Composite	Toronto Stock Exchange	OSPTX	Canada	Developed Economy
Shanghai Composite Index	Shanghai Stock Exchange	SSEC	China	Developing Economy
CAC 40	Paris Stock Exchange	CAC 40	France	Developed Economy
Deutscher Aktienindex	Frankfurt Stock Exchange	GDAXI	Germany	Developed Economy
Nifty 50	National Stock Exchange of India	Nifty50	India	Developing Economy

IDX Composite	Indonesia Stock Exchange	IDXC	Indonesia	Developing Economy
FTSE MIB	Borsaitaliana	FTSEMIB	Italy	Developed Economy
Nikkei 225	Tokyo Stock Exchange	NI225	Japan	Developed Economy
IPC MEXICO	Mexican Stock Exchange	MXX	Mexico	Developing Economy
MOEX Russia	Moscow Exchange	MOEX	Russia	Developed Economy
Tadawul All Share	Saudi Stock Exchange	TASI	Saudi Arabia	Developing Economy
JSE FTSE ALL SHARE INDEX	Johannesburg Stock Exchange	JALSH	South Africa	Developing Economy
KOSPI Composite Index	Korea Exchange	KOSPI	South Korea	Developing Economy
BIST 100	Borsa Istanbul	XU100	Turkey	Developing Economy
FTSE 100 Index	London Stock Exchange	FTSE100	UK	Developed Economy
Dow Jones Industrial Average Index	The New York Stock Exchange	DJI	USA	Developed Economy

Source: Authors

“Pendell and Cho (2013)” discovered that daily earnings were more volatile for smaller enterprises in connection to stock market activity and outbreaks of infectious animal diseases. In 2013, Wang et al. investigated the impact of illnesses including Enterovirus 71, dengue fever, SARS, and H1N1 on the performance of the stocks of related biotechnology companies in Taiwan. They demonstrated that investors logically evaluate the success of biotechnology shares during a disease epidemic.

The catastrophic effects of the SARS outbreak on human society and financial integration were described by “Lee and McKibbin in 2004”.

“Chiang et al. (2007)” looked into a strong correlation between Asian nations during times of significant events. As a result of globalization, markets are linked, and a disaster in one country is likely to have an impact on other connected countries as well, claim Morales and Callaghan (2012). According to studies by “Donadelli et al. (2017) and Zouaoui et al. (2011)”, countries with more integrated cultures are more likely to suffer the detrimental consequences of an epidemic on investor’s confidence. Outbreaks of contagious diseases have a detrimental influence on investor sentiment, which leads to poor investment choices and affects stock prices (Liu et al., 2020). We explore the information efficiency and ORH theories as well as the security markets’

reactions to the Corona Virus-19 outbreak in accordance with earlier studies.

Two sections make up the analysis. We first do an event analysis to determine the impact of the COVID-19 outbreak on the stock market's reaction. We next do a regression analysis on the volume of trade, market returns, economic indicators for emerging and wealthy nations, and the number of verified COVID-19 cases. The number of confirmed cases determines how directly COVID-19 affected the stock market, while trading volume, market activity, the Dow Jones global index performance, and a proxy for developing and developed economies determine market return and whether the corona virus outbreak in developing economies had a sizable impact on the abnormal return (Bradley et al., 2001; Field & Hanka, 2001; Brau et al., 2004; Plerou et al., 2001).

### **OBJECTIVES OF THE STUDY**

The article's goal is to examine how the financial markets in 20 industrialized and developing nations responded to the COVID-19 epidemic. Additionally, the goal of our survey is to establish a prediction technique that examines the correlations between the ARs, the index return, the market return, the verified COVID-19 instances, the aberrant trading volume, and the relevant nations' situations (developing and developed).

### **METHODOLOGY**

#### **Event Study Methodology**

To understand how the financial markets, particularly the stock market, react to news of the COVID-19 epidemic, empirical work in this study is based on the event research methodology. The event research method is thought to be among the most well-liked and suitable approaches for analyzing how an event affects security returns over the course of an period.

#### **Event Window**

The event window, which includes the day that preceded the announcement along with the 57 days after it was revealed that there were

Event researches make it easier to forecast how securities and indexes will act in response to the publication of an incident (Anwar et al., 2017). Announcement of an event that might have a positive or negative impact on the stock price. The event research technique is frequently used to examine the relationship between business events like mergers and acquisitions, transfers, dividends by stock, free stock, consolidation, etc. and stock market performance. Many academics employ event research techniques to investigate how non-corporate events, such the onset of illness, affect the stock market ("Chen et al., 2017, 2018; Liu et al., 2020; Pendell & Cho, 2013").

According to earlier studies, the event study approach is the best way for calculating abnormal returns (ARs) following the announcement of an event ("Brown & Warner, 1985; MacKinlay, 1997"). We compute abnormal returns (ARs) using event studies, in accordance with Bowman's (1983) recommendations, and this involves making choices regarding the estimation and modelling methodologies for a particular event of interest, event period, and estimation period.

#### **Event of Concern and Date of Event**

Recently, a lot of researches have been performed to determine how the corona virus outbreak would affect stock market returns (Liu et al., 2020; Zhang et al., 2020; Nicola et al., 2020). The study's intriguing development is also the COVID-19 news story that first appeared in Chinese media. In his initial press conference about the illness pandemic on January 20, 2020, Zhong, Nanshan, the leader of a team of specialists at the NHFC, China, said that the rare corona virus may be passed from one person to another. 2020 (Liu et al.). Following his interview, news of the epidemic made headlines in print and electronic media all over the world and drew a lot of public attention. Hence, the date of event for this study is January 20, 2020, the day that the virus was first reported in the new transmitted diseases, is 58 days long. Compared to corporate events, the COVID-19 pandemic has a longer-lasting effect on stock performance. We contend that distinct pandemic cycle phases may cause the stock markets to act in different ways.

The entire event period is separated into six smaller event periods in order to assess the impact of outbreak on various time periods: (0-9), (10-20), (21-30), (31-40), (41-50), and (51-57).

### Estimation Period

The predicted returns are estimated using an estimating window, as seen in Figure 1. In line with earlier studies (Lalwani et al., 2019; Anwar et al., 2017;) the estimation period spans 150 trading days from day -150 to day -1, the day before the event day when news of the novel corona virus first surfaced in the stock market.

### Estimation Technique

In the very first section of the event research, we compute the daily return using Equation (1):

$$R_{(i,t)} = \ln\left[\frac{P_{i,t}}{P_{i,t-1}}\right] \times 100 \quad (1)$$

Here

On day t, return for index i is  $R_{i,t}$ , natural logarithm is denoted by ln, closing price on day t for index i is  $P_{i,t}$  and closing price on previous trading day for index i is  $P_{i,t-1}$

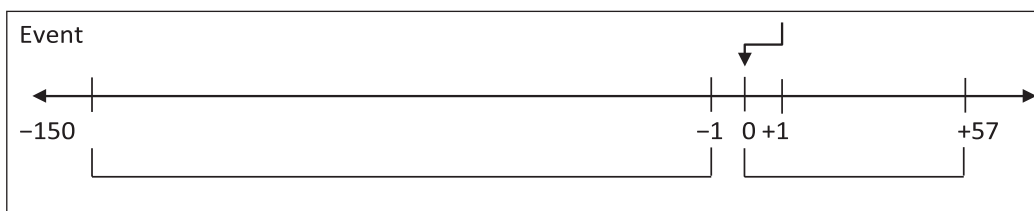


Figure 1. Event Study Timeline(in days)

To calculate the expected value of mean return for index i, Equation (2) is being used, where during the estimation period (-150 to -1), daily return of index i is denoted by  $R_{i,t}$ .

$$\bar{R}_i = \frac{1}{N} \sum_{t=-150}^{-1} R_{i,t} \quad \text{for } i = 1, 2, 3, \dots, N \quad (2)$$

Abnormal Return for each day for each index is calculated using Equation (3), after calculating the value of expected mean return  $[E(\bar{R})]$

$$AR_{i,t} = R_{i,t} - \bar{R}_i \quad (3)$$

Using Equation (4), "Cumulative abnormal return" (CAR) over a period from  $t_0$  to  $t_1$  is calculated for index i.

$$CAR_i(t_0, t_1) = \sum_{t=t_0}^{t_1} AR(i, t) \quad (4)$$

We may determine "Average Abnormal Returns" (AAR) using Equation (5), here on each event day, we calculate the Arithmetic Average of ARs for all indices, where N is the total number of indices.

$$AAR_i = \frac{1}{N} \sum_{i=0}^N AR(i, t) \quad (5)$$

"Cumulative Average Abnormal Returns" (CAARs) are gathered to examine the event's cumulative effects over a predetermined time frame. The term CAAR refers to the total of each day's AARs for the specified event window ( $t_0, t_1$ ). Using Equation (6), CAAR for the pre-specified timeframe is determined.

$$CAAR_i(t_0, t_1) = \sum_{t=t_0}^{t_1} AAR(i, t) \quad (6)$$

Using the time series of AARs of the estimation period, standard deviation is calculated, as mentioned in Equation (7):

$$\sigma(AAR(t)) = \sqrt{\sum_{t=-150}^{-1} (\overline{AR}(t) - \overline{\overline{AR}})^2 / 150} \quad (7)$$

$$\text{Where } \overline{\overline{AR}} = \frac{1}{150} \sqrt{\sum_{t=-150}^{-1} \overline{AR}(t)}$$

And

$$\overline{AR(t)} = \frac{1}{N} \sum_{i=1}^N AR(i, t)$$

Equations (8) and (9), respectively, are used to determine the importance of the coefficient of AAR on event day t and of CAAR for a certain event window (t<sub>1</sub> – t<sub>2</sub>).

$$t\text{-Test}_{AAR} = AAR / \sigma(AAR(t)) \quad (8)$$

$$t\text{-Test}_{CAAR} = \frac{CAAR(t)(t_2 - t_1 + 1)}{\sigma(AAR(t))} \quad (9)$$

### Sampling and Data Collection

We chose the 20-growing and advanced nations' indices as a pattern for this study since our goal is to investigate the effects of the Corona Virus outbreak (2019) epidemic on inventory indices across the globe (refer Table- 1). 20-G includes the most developed and expanding economies. The pattern includes indexes for 19 different economies (except the European Union). According to media sources, the development of the unusual corona virus is posing significant challenges for 20-growing and developed countries. Because global indices like the Dow Jones Global Index are severely influenced by the systemic nature of COVID-19. To calculate the expected returns for corresponding nations, we employ a model that is mean-adjusted for the assessment period. Using the website investing.com, information about the intraday remaining charges of the 20-growing and advanced nations' indexes from 18 February 2019 to 17 April 2020 has been gathered (a free, publicly accessible website that shows global stock and index prices in real-time). OurWorldInData.org (an internet site that gives statistics on corona virus instances across the world) has also been used to generate statistics

on corona virus cases in 20 developed and developing nations. Furthermore, Microsoft Excel spreadsheets were used to evaluate the entire collection of facts.

### FINDINGS AND DISCUSSION

#### Mean of Returns of 20- developing and developed Indices

Table 2 shows the 20 developing and developed indices' average returns and standard deviations. The standard deviation and pre-event mean are shown in section (A) of Table 2, whereas the standard deviation and post-event mean are shown in section (B).

As shown in Part A, with the exception of IDXC and TASI, all 20 developing and the developed indices posted positive average returns prior to the outbreak of COVID-19. The financial markets and 20 emerging and developed nations' index had a negative median return during the devastating corona virus epidemic, with a higher standard deviation than before COVID-19. Indexes for Argentina, Australia, Brazil, France, Italy, Indonesia, India, Mexico and the UK have suffered as a result of the corona virus outbreak. The US and Italy saw COVID-19's biggest post-China impacts; during this time, the median stock market returns were -0.31% and -0.55%, respectively. Despite the COVID-19 outbreak in China, SSEC has a substantially smaller average negative yield (-0.14%) than other stock markets. This is most probably due to the Chinese government's quick corrective response and virus containment measures. Both developing and developed nations' stock markets have suffered as a result of the COVID-19 epidemic.

Table 2. Mean Returns and Standard Deviation of 20- developing and developed Indices

Developing Economies				Developed Economies			
Indices	No. of Trading Days	Event group's Mean %	Event group's Std. Dev. %	Indices	No. of Trading Days	Event group's Mean %	Event group's Std. Dev. %
<b>Part A: Pre-event period from 18-02-2019 to 19-01-2020</b>							

MERV	222	0.056	4.330	AXJO	232	0.064	0.694
BVSP	227	0.090	1.103	OSPTX	229	0.042	0.435
SSEC	227	0.049	1.135	CAC 40	233	0.071	0.800
Nifty50	223	0.067	0.885	GDAXI	229	0.079	0.835
IDXC	224	-0.014	0.718	FTSEMIB	230	0.075	0.897
MXX	230	0.028	0.834	NI225	220	0.055	0.851
TASI	228	-0.006	0.937	MOEX	230	0.112	0.691
JALSH	227	0.029	0.777	FTSE100	231	0.026	0.705
KOSPI	227	0.008	0.788	DJI	231	0.054	0.728
XU100	227	0.078	1.335				
<b>Part B: During event period from 20-01-2020 to 17-04-2020</b>							
MERV	58	-0.601	4.677	AXJO	62	-0.407	3.155
BVSP	62	-0.659	4.991	OSPTX	63	-0.319	3.872
SSEC	58	-0.138	1.835	CAC 40	63	-0.483	3.204
Nifty50	60	-0.479	3.446	GDAXI	63	-0.383	3.188
IDXC	63	-0.485	2.618	FTSEMIB	63	-0.551	3.698
MXX	61	-0.454	2.209	NI225	62	-0.305	2.527
TASI	65	-0.362	2.315	MOEX	63	-0.368	2.707
JALSH	63	-0.290	3.169	FTSE100	63	-0.448	2.901
KOSPI	62	-0.261	2.865	DJI	62	-0.308	4.126
XU100	65	-0.328	2.344				

Source: Authors

Table 3. Average Abnormal Returns and Cumulative Average Abnormal Returns of Indices in 20-developing and developed Economies

EW	AAR <sub>t</sub> (%)	tAAR- Statistic	CAAR <sub>t</sub> (%)	tCAAR- Statistic	Skewness	Kurtosis
0	0.054	0.133	0.054	0.133	0.356	0.578
1	-0.757*	-1.859	-0.702	-1.220	-2.034	6.028
2	-0.016	-0.039	-0.718	-1.019	0.418	-0.745
3	-0.712*	-1.749	-1.430*	-1.757	-0.557	0.663
4	-0.748*	-1.837	-2.178**	-2.393	-2.372	6.863
5	-1.587***	-3.899	-3.765***	-3.776	0.955	0.443
6	0.500	1.229	-3.264***	-3.031	0.326	0.290
7	0.128	0.314	-3.137***	-2.725	-0.412	0.374
8	-0.628	-1.544	-3.765***	-3.084	-0.270	-1.112
9	-0.841**	-2.065	-4.606***	-3.578	1.102	1.042
10	0.283	0.695	-4.323***	-3.202	0.684	2.254
11	1.036**	2.544	-3.287**	-2.331	-0.599	0.638
12	0.378	0.928	-2.909**	-1.983	-0.390	-1.144
13	0.118	0.290	-2.791*	-1.833	0.998	2.079
14	-0.175	-0.429	-2.966*	-1.882	1.253	2.744
15	-0.276	-0.678	-3.241**	-1.991	-0.268	2.043

16	0.318	0.783	-2.923*	-1.742	-1.722	5.884
17	0.380	0.934	-2.543	-1.473	0.053	0.104
18	-0.415	-1.021	-2.959*	-1.668	-2.732	9.273
19	-0.429	-1.055	-3.388*	-1.861	-1.194	1.534
20	0.136	0.334	-3.252*	-1.744	-0.800	2.088
21	-0.495	-1.217	-3.748**	-1.963	-1.080	2.893
22	0.380	0.934	-3.367*	-1.725	-0.968	0.695
23	-1.060***	-2.605	-4.427**	-2.220	-0.803	-0.344
24	-0.947**	-2.326	-5.374***	-2.641	0.755	1.648
25	-2.783***	-6.838	-8.157***	-3.931	-0.503	-0.256
26	-1.377***	-3.384	-9.534***	-4.508	-0.596	0.401
27	-0.846**	-2.079	-10.381***	-4.820	-0.334	-0.699
28	-1.531***	-3.762	-11.912***	-5.435	1.070	0.216
29	-1.903***	-4.678	-13.816***	-6.197	0.484	-0.721
30	0.914**	2.246	-12.901***	-5.693	0.264	0.423
31	0.409	1.005	-12.492***	-5.426	-0.973	0.680
32	-0.728*	-1.789	-13.220***	-5.654	-0.479	-0.429
33	-3.588***	-8.817	-16.809***	-7.083	-1.830	2.876
34	-2.752***	-6.763	-19.561***	-8.124	0.638	0.047
35	-4.260***	-10.466	-23.821***	-9.755	0.284	-1.031
36	-3.962***	-9.735	-27.783***	-11.222	-0.387	0.828
37	-0.957**	-2.352	-28.741***	-11.455	0.445	1.943
38	-6.271***	-15.408	-35.012***	-13.775	0.380	-0.561
39	-0.632	-1.553	-35.644***	-13.847	-0.794	1.098
40	-4.930***	-12.115	-40.575***	-15.569	0.216	1.227
41	-0.277	-0.680	-40.852***	-15.488	-0.682	-0.079
42	-0.851**	-2.091	-41.703***	-15.626	0.385	0.792
43	-0.988**	-2.427	-42.691***	-15.813	-0.313	1.631
44	2.725***	6.696	-39.966***	-14.638	-0.214	-0.734
45	0.237	0.582	-39.729***	-14.392	0.682	-0.413
46	4.129***	10.146	-35.600***	-12.758	0.004	-0.959
44	2.725***	6.696	-39.966***	-14.638	-0.214	-0.734
45	0.237	0.582	-39.729***	-14.392	0.682	-0.413
46	4.129***	10.146	-35.600***	-12.758	0.004	-0.959
47	0.883**	2.170	-34.716***	-12.312	0.054	0.298
48	0.632	1.552	-34.085***	-11.964	-1.090	0.510
49	-0.727*	-1.785	-34.811***	-12.096	0.377	-1.013
50	-0.665	-1.633	-35.476***	-12.205	-0.296	-0.976
51	0.741*	1.823	-34.734***	-11.835	-0.899	0.500
52	-0.338	-0.830	-35.072***	-11.837	1.035	1.029
53	1.801***	4.427	-33.270***	-11.124	0.737	0.394

54	1.301***	3.198	-31.969***	-10.591	0.383	-0.757
55	1.668***	4.098	-30.301***	-9.949	0.129	-1.417
56	0.409	1.006	-29.892***	-9.728	-1.787	3.820
57	0.120	0.296	-29.771***	-9.605	0.307	0.898

Source: Authors

Notes: EW = Event window; AAR = average abnormal return; CAAR = cumulative average abnormal return. AAR and CAAR are significant at: \* $p < 0.10$ ; \*\* $p < 0.05$ ; and \*\*\* $p < 0.01$ .

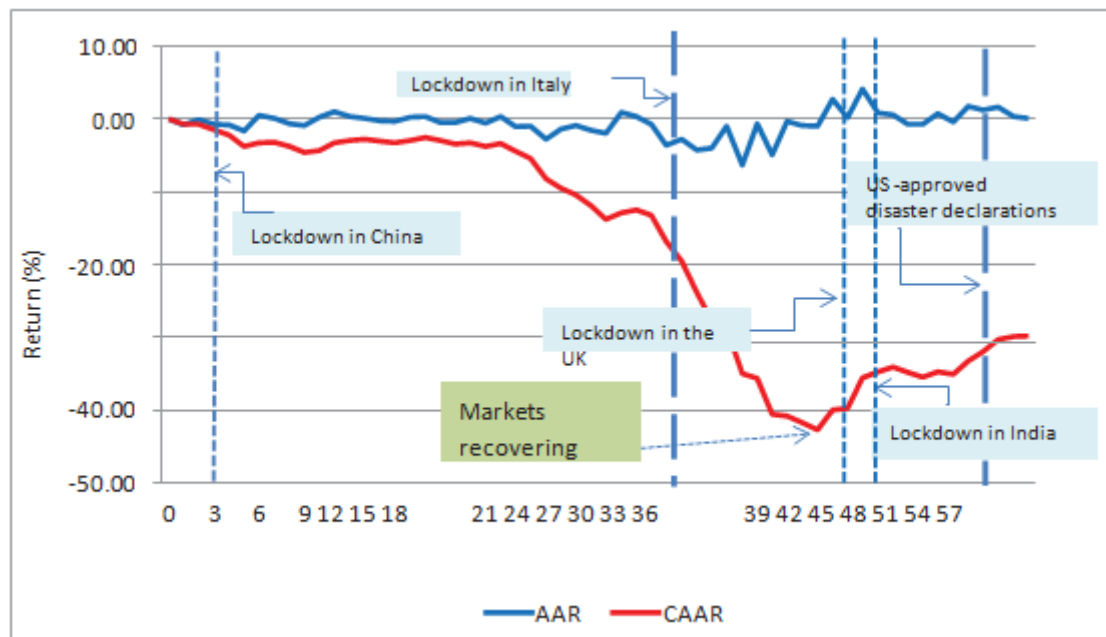


Figure 1. Average Abnormal Returns and Cumulative Average Abnormal Returns from Day 0 to Day 57

### CONCLUSION

The global impact of the Corona Virus outbreak has been devastating. A large portion of global economic activity is still halted as a result of the present pandemic. As a result, every significant macroeconomic statistic indicates a gloomy future. Stock market changes can be a sign of COVID-19's direct or financial effects. We examine how the COVID-19 pandemic has affected stock markets in a sizable sample of 20 developed and developing nations. According to Table 3, our research shows that financial markets throughout the world experienced declines after the COVID-19 outbreak. The stock market has recovered since the unfavorable impacts of COVID-19, according to the panel data regression findings. Overall, our data suggest that the COVID-19 outbreak first triggered a panic sale of stocks on global stock exchanges owing to unpredictability of the future. A capital

influx is now occurring on the stock market, which is encouraging a recovery. Decision-makers including central banks, stock exchange regulators, investors, and governmental organizations may be impacted by this article. The ORH indicates that investors are behaving rationally and that extra steps have been taken by central banks, securities regulators, and government officials in 20 developed and developing countries to promote investment. It implies that during this period of uncertainty, noise trading dominates the market. We propose that market volatility needs to be addressed and that this might be examined in future research studies while keeping in mind the noise trading theory. According to our study, buying stocks is the best course of action to take when the market is weak so that you may pursue a long-term investment strategy.

**REFERENCES:**

Ahmar, A., & Val, E. d. (2020). SutteARIMA: Short-term forecasting method, a case: Covid-19 and stock market in Spain. *Science of the Total Environment* (Epub ahead of print). <https://doi.org/10.1016/j.scitotenv.2020.138883>

Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., & Alhammadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioral and Experimental Finance*, 27 (Epub ahead of print). <https://doi.org/10.1016/j.jbef.2020.100326>

Albulescu, C. (2020). Coronavirus and financial volatility: 40 days of fasting and fear. *Computational Finance* (Epub ahead of -print). <https://arxiv.org/abs/2003.04005>

Anwar, S., Singh, S., & Jain, P. K. (2017). Impact of cash dividend announcements: Evidence from the Indian manufacturing companies. *Journal of Emerging Market Finance*, 16(1), 1–32.

Banik, A., Nag, T., Chowdhury, S. R., & Chatterjee, R. (2020). Why do COVID-19 fatality rates differ across countries? An explorative cross-country study based on select indicators. *Global Business Review*, 21(3), 607–625. <https://doi.org/10.1177/0972150920929897>.

Bash, A., & Alsaifi, K. (2019). Fear from uncertainty: An event study of Khashoggi and stock market returns. *Journal of Behavioral and Experimental Finance*, 23, 54–58.

Baumol, W. J. (1965). The stock market and economic efficiency (Issue 6). Fordham University Press.

Beaulieu, M., Cosset, J., & Essaddam, N. (2006). Political uncertainty and stock market returns: Evidence from the 1995 Quebec referendum. *The Canadian Journal of Economics (Revue canadienne d'Economie)*, 39(2), 621–641.

Bhawanr S., Rosy D., Shahil N. (2020).The Outbreak of COVID-19 and Stock Market Responses: An Event Study and Panel Data

Analysis for G-20 Countries.*Global Business Review*,1-26

Boubaker, S., Farag, H., & Nguyen, D. K. (2015). Short-term overreaction to specific events: Evidence from an emerging market. *Research in International Business and Finance*, 35, 153–165.

Bowman, R. (1983). Understanding and conducting event studies. *Journal of Business Finance and Accounting*, 10(4), 561–584.

Bradley, D. J., Jordan, B. D., Yi, H., & Roten, I. C. (2001). Venture capital and IPO lockup expiration: An empirical analysis. *Journal of Financial Research*, 24(4), 465–493.

Brown, S., & Warner, J. (1985). Using daily stock returns: The case of event studies. *Journal of Financial Economics*, 14(1), 3–31.

Brau, J. C., Carter, D. A., Christophe, S. E., & Key, K. G. (2004). Market reaction to the expiration of IPO lockup provisions. *Managerial Finance*, 30(1), 75–91. <https://doi.org/10.1108/03074350410768859>.

Burch, T. R., Emery, D. R., & Fuerst, M. R. (2016). Who moves markets in a sudden marketwide crisis? Evidence from 9/11. *Journal of Financial and Quantitative Analysis*, 51(2): 463–487.

Caporale, G. M., Plastun, A., & Makarenko, I. (2019). Force majeure events and stock market reactions in Ukraine. *Investment Management and Financial Innovations*, 16(1), 334–345.

Chen, M.-H., Jang, S., & Kim, W. G. (2007). The impact of the SARS outbreak on Taiwanese hotel stock performance: An event-study approach. *International Journal of Hospitality Management*, 26(1), 200–212.

Chen, M.-P., Lee, C.-C., Lin, Y.-H., & Chen, W.-Y. (2018). Did the S.A.R.S. epidemic weaken the integration of Asian stock markets? Evidence from smooth time-varying cointegration analysis. *Economic ResearchEkonomiska Istraživanja*, 31(1), 908–926.

Chiang, T. C., Jeon, B. N., & Li, H. (2007). Dynamic

correlation analysis of financial contagion: Evidence from Asian markets. *Journal of International Money and Finance*, 26, 1206–1228.

Chordia, T., Roll, R., & Subrahmanyam, A. (2001). Market liquidity and trading activity. *The Journal of Finance*, 56(2), 501–530

Cucinotta, D., & Vanelli, M. (2020). WHO declares COVID-19 a pandemic. *Acta Bio Medica Atenei Parmensis*, 91(1), 157–160.

De Bondt, W. F. M., & Thaler, R. (1985). Does the stock market overreact? *The Journal of Finance*, 40(3), 793–805.

De Bondt, W. F. M., & Thaler, R. H. (1987). Further evidence on investor overreaction and stock market seasonality. *The Journal of Finance*, 42(3), 557–581.

De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1989). The size and incidence of the losses from noise trading. *The Journal of Finance*, 44(3), 681–696.

De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1990). Noise trader risk in financial markets. *Journal of Political Economy*, 98(4), 703–738.

Donadelli, M., Kizys, R., & Riedel, M. (2017). Dangerous infectious diseases: Bad news for Main Street, good news for Wall Street? *Journal of Financial Markets*, 35, 84–103.

Economic Times. (2020, March 23). Covid-19 impact: How stock exchanges are protecting their markets from intense volatility. <https://economictimes.indiatimes.com/markets/stocks/news/covid-19-impact-how-stockexchanges-are-protecting-their-markets-from-intensevolatility/greece/slide-show/74772309.cms>

Eli, O., & Richardson, M. (2000). The IPO lock-up period implications for market efficiency and downward curves (Working Paper Series 99-054). New York University.

Field, L. C., & Hanka, G. (2001). The expiration of IPO share lockups. *The Journal of Finance*, 56(2), 471–500.

Ismail, I., & Suhardjo, H. (2001). The impact of Domestic political events on an emerging stock market: The case of Indonesia. *Proceedings of Asia Pacific Management Conference*, 235–262.

Lalwani, V., Sharma, U., & Chakraborty, M. (2019). Investor reaction to extreme price shocks in stock markets: A cross country examination. *IIMB Management Review*, 31(3), 258–267.

Lee, J.-W., & McKibbin, W. J. (2004). Estimating the global economic costs of SARS. In *Learning from SARS: Preparing for the next disease outbreak: Workshop summary*. Washington, DC: National Academies Press.

Li, K. (2018). Reaction to news in the Chinese stock market: A study on Xiong'an new area strategy. *Journal of Behavioral and Experimental Finance*, 19, 36–38.

Liu, H., Manzoor, A., Wang, C., Zhang, L., & Manzoor, Z. (2020). The COVID-19 outbreak and affected countries stock markets response. *International Journal of Environmental Research and Public Health*, 17(8), 1–19.

Loh, E. (2006). The impact of SARS on the performance and risk profile of airline stocks. *International Journal of Transport Economics*, 33(3), 401–422.

MacKinlay, A. (1997). Event studies in economics and finance. *Journal of Economic Literature*, 35(3), 13–39.

Maitra, D., & Dey, K. (2012). Dividend announcement and market response in Indian stock market: An event-study analysis. *Global Business Review*, 13(2), 269–283. <https://doi.org/10.1177/097215091201300206>

Morales, L., & Callaghan, A.-O. (2012). The current global financial crisis: Do Asian stock markets show contagion or interdependence effects? *Journal of Asian Economics*, 23, 616–626.

Nazir, M. S., Younus, H., Kaleem, A., & Anwar, Z. (2014). Impact of political events on stock market returns: Empirical evidence from Pakistan. *Journal of Economic and Administrative Sciences*, 30(1), 60–78.

Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M., & Agha, R. (2020). The socioeconomic implications of the coronavirus pandemic (COVID-19): A review. *International Journal of Surgery*, 78, 185–193.

Ormos, M., & Vázsonyi, M. (2011). Impacts of public news on stock market prices: Evidence from S&P500. *Interdisciplinary Journal of Research in Business*, 1(2), 1–17.

Pendell, D. L., & Cho, C. (2013). Stock market reactions to contagious animal disease outbreaks: An event study in Korean foot-and-mouth disease outbreak. *Agribusiness*, 29(4), 455–468.

Plerou, V., Gopikrishnan, P., Gabaix, X., Amaral, L. A. N., & Stanley, H. E. (2001). Price fluctuations, market activity and trading volume. *Quantitative Finance*, 1(2), 262–269.

Ranju, P. K., & Mallikarjunappa, T. (2019). Spillover effect of M&A announcements on acquiring Firms' rivals: Evidence from India. *Global Business Review*, 20(3), 692–707. <https://doi.org/10.1177/0972150919837080>

Saravanakumar, S. (2011). Impact of dividend announcement on Indian Bourses. *Global Business Review*, 12(3), 401–413. <https://doi.org/10.1177/097215091101200304>

Seal, J. K., & Matharu, J. S. (2018). Long-term performance of buybacks in India. *Global Business Review*, 19(6), 1554–1566. <https://doi.org/10.1177/0972150918794737>

Shanaev, S., & Ghimire, B. (2019). Is all politics local? Regional political risk in Russia and the panel of stock returns. *Journal of Behavioral and Experimental Finance*, 21, 70–82.

Tavor, T., & Teitler-Regev, S. (2019). The impact

of disasters and terrorism on the stock market. *Journal of Disaster Risk Studies*, 11(1), 1–8.

The New York Times. (2020, March 12). Halting China's Economy Was Hard. Restarting It Is Harder. The New York Times. <https://www.nytimes.com/2020/03/12/business/china-coronavirus-economy.html>

Wang, L., & Kutan, A. M. (2013). The impact of natural disasters on stock markets: Evidence from Japan and the US. *Comparative Economic Studies*, 55(4), 672–686.

Wang, Y.-H., Yang, F.-J., & Chen, L.-J. (2013). An investor's perspective on infectious diseases and their influence on market behavior. *Journal of Business Economics and Management*, 14(1), 112–127.

World Health Organization (WHO). (2020, May 1). Coronavirus. [https://www.who.int/health-topics/coronavirus#tab=tab\\_1](https://www.who.int/health-topics/coronavirus#tab=tab_1)

Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters* (Epub ahead of print). <https://doi.org/10.1016/j.frl.2020.101528>

Zouaoui, M., Nouyrigat, G., & Beer, F. (2011). How does investor sentiment affect stock market crises? Evidence from panel data. *The Financial Review*, 46, 723–747