



Impact of Covid-19 on Islamic Stock Markets: An Investigation using Threshold Volatility and Event Study Models

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Abstract

The Covid-19 is an unexpected event in the world history with substantial socio-economic impact on the global economy. The global financial market was also badly affected as reflected by the extreme volatility as well as weak performances in the stock markets all over the world. How do the Islamic stock markets in various parts of the world behave during the Covid-19 shock? The objective of this study is to identify the impact of the Covid-19 pandemic as declared by the World Health Organization on the Islamic stock markets. Using the threshold volatility and event study models, the study analyses the impact of the Covid-19 announcement on the Islamic stock indices in the Indian Stock Exchange (represented by the Bombay Stock Exchange - BSE Shariah Index) and Indonesian Stock Exchange (represented by the Jakarta Islamic Indices - JII). With the date of event identified as 11th March 2020, the event window consists of 60, 30, and 20 days. The results show that the BSE Shariah and JII have positive coefficients, with the BSE Shariah Index shows negative response to the announcement of Covid-19 as global pandemic. On the other hand, the JII reacted positively to the event. The study shows the reaction of a stock exchange is dependent on other economic factors unique to the country, resulting in the events impact of the Covid-19 to vary from one country to another.

Keywords: Covid-19, Stock Market, Volatility, Event Study, TARARCH Model

JEL Classifications: C13, C22, C53, G15

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I. Introduction

1.1. Background

The year 2020 started with an unprecedented event with the global economy being affected badly by the Novel Coronavirus (henceforth Covid-19) that disrupted whole economic activity. First identified in Wuhan, China in December 2019, the Covid-19 spread very fast and uncontrollably around the globe. The Covid-19 outbreak was termed as a 'black swan' because it was creating an unexpected economic difficulties and had a widespread effect on the whole world (Alali, 2020). On 30th January 2020, the World Health Organization (WHO) announced the Covid-19 outbreak a Public Health Emergency of International Concern (PHEIC) (Panyagometh, 2020). On 11th February 2020, the WHO named coronavirus disease COVID-19, and subsequently on 11th March 2020, announced it as a global pandemic (Asia, 2020). The managing director of the International Monetary Fund, Kristalina Georgieva stated that "We anticipate the worst economic fallout since the Great Depression" (Toi, 2020). The Covid-19 is also classified as zoonotic as it can be transferred between people and animals (Kulal, 2020). The epidemic rapidly spread around the world. As of 13th August 2020, there were greater than 20.6 million confirmed Covid-19 cases in 188 countries and more than 749,000 deaths reported (Panyagometh, 2020).

India was not spared from the impact of the Covid-19 pandemic. As the country with the second-largest population in the world, India has 176 million poor people, with the lowest rank in sanitation and medical amenities (Alam & Chavali, 2020). The first Covid-19 case in India was identified on 30th January 2020 and spreading very rapidly with the current number of confirmed cases estimated at (World Health Organisation (WHO), 2020). Therefore, Covid-19 pandemic became an important concern for the Government of India. Prime Minister Narendra Modi declared 21 days countrywide lockdown on 24th March 2020, and further extended the lockdown period until 3rd May 2020 as the situation further worsened. Similarly, the Covid-19 situation in Indonesia was also very bad. Indonesia reported its first two confirmed cases on 2nd March 2020 (Alam & Chavali, 2020). As the situation did not show any sign of receding, the President of Indonesia declared Covid-19 as national disaster on 13th April 2020. By 1st May 2020, Indonesia reported cases of more than 23,000 (Chong et al., 2020).

From a serious health crisis, the Covid-19 pandemic has resulted in an economic crisis that affected the world economic growth and societies as a whole (Panyagometh, 2020). The epidemic undoubtedly creates one of the biggest challenges ever confronted by humanitarian organization and global development as it gives indirect impact on political, economic & social system (OECD, 2020). The outbreak of the Covid-19 pandemic has resulted in

significant economic fallout to the global economy, especially because China is the main exporter to many countries. Many countries depend on raw materials from China, thus this dependency has tremendously affected the global economic activity (Kulal, 2020). Economic disruptions due to the Covid-19 have led to industrial output losses as well as job losses in many sectors. According to the International Monetary Fund (IMF) forecast, global growth is expected to decline by 6.3% in 2020. Likewise, the Organisation for Economic Cooperation and Development (OCED) expects a downturn in global economic growth by 1.5%, while the Asian Development Bank (ADB) estimates the US \$4.1 trillion global costs of the Covid-19 pandemic, which is estimated to be more than forty times compared to the SARS pandemic cost in 2003. Moreover, the International Labour Organization predicts a 25 million increase in global unemployment (Khatatbeh et al., 2020).

Previous researches have shown that there exists strong relationship between key events including political events, geopolitical events, terrorist occurrences, environmental events, and disease outbreaks such as animal diseases, Ebola and SARS, with the financial markets, particularly the stock market returns (Bash, 2020). With the current large-scale nature of the Covid-19 as shown by the total number of infected cases of 60,074,174 and 1,416,292 deaths till 26th November 2020 (WHO, November 2020), the global stock market shows a sound response to the world events. In the past when unexpected events occur share market investors are encouraged to exit from an unbalanced market. They are a move towards balanced and secure financial investment.

Therefore, the purpose of the study is to identify the impact of the Covid-19 event on the Islamic stock indices in the Indian and Indonesian stock market returns. Specifically, this study aims to achieve the following objectives:

- To conduct an event study of pre and post Covid-19 on the Islamic stock indices in the Indian Stock Exchange and Indonesian Stock Exchange;
- To measure the asymmetric threshold of Covid-19 new cases, and Covid-19 death cases on the Islamic stock indices in the Indian Stock Exchange and Indonesian Stock Exchange.

The paper is organized into five sections, consisting of the first introductory section. The second section starting with the background theory of the research and focus on the previous studies related to the topic. The second part describes the past studies that include previous events' impact on the selected stock market. The third section includes the research methodology applied in the study. The fourth section is concerned with the results and analyses of the study. It involves the findings of the research. The final section

presents the conclusion and future recommendations. It defines a summary of the study and areas for further research.

II. LITERATURE REVIEW

1.1. Background Theory

In the stock market, new events frequently impacted on stockholders behaviour that directly affects stock prices. The previous event study-based research presented by Fama in 1969 was helpful in understanding of market reaction on selected particular events (Fama et al., 1969).

"A market in which prices always "fully reflect" available information is called efficient."

[Fama (1970)]

The concept of efficient market hypothesis presents three forms of the market. The weak form efficiency, semi-strong form efficiency and strong form efficiency. The weak form of EMH suggest that past performance of returns can't predict future price. It assumes that securities price reflects all public information of market but not shows new information which not yet available publicly. The semi-strong form assumes that price of securities adjusts rapidly to any new information which publicly available. The strong form of EMH recommended prices reflect both public & private information (Jonsson & Radeschnig, 2014). The past scenarios show many literatures based on event study impact on stock market prices. The event study is widely used by researcher in the area of Finance. It is become the common in business studies. The previous study includes the past events like Covid-19, global financial crisis, terrorist attack, elections, data breach disclosure, ban on the sale of restricted shares, stock market index composition changes, monetary policy execution, demonetization etc.

2.2. Previous Studies

In determining the impact of first recorded coronavirus case on Indian stock market, Bash (2020) analyses the Cumulative Average Abnormal Return (CAAR) of 30 countries. The results show that there is negative impact of Covid-19 on the stock market returns. The stock markets in these countries reacted negatively after first case if the Covid-19 was reported. (Khatatbeh et al., 2020) try to find Covid-19 impact on immediate response to infected countries. Results revealed that there was significant negative impact on 11 global share market indices. Alali (2020) examines the announcement of WHO regarding Covid-19 as a global pandemic and its impact on five biggest stock exchange. The study concludes that declaration of World Health Organization shows significant negative impact on returns of largest Asian share markets.

Kulal (2020) empirically identifies Covid-19 impact on Indian Stock Exchange using data from January 2, 2020 to January 22, 2020 of the NSE (National Stock Exchange). The result showed short-term downturn in stock market returns, and that there is significant effect of Covid-19 on the Indian stock market. Similarly, Alam & Chavali (2020) describe the effect of Covid-19 lockdown period on the Indian stock market by applying the event study on 31 listed company in BSE.. The analyses on the 35 days event window consist of pre 20 days & post 15 days data show significant positive response in event window period, with the stock market responded significantly during the lockdown period.

Chavali et al. (2020) identified event of elections impact on the share market. The election event of 2014 was studied. The period of the study consists of 2014 to 2019. Sample includes 31 listed companies of BSE. The 82 days event window defined result that market react positively on election event. It was drawn from the analyses that Efficient Market Hypothesis Semi-Strong form is true for emerging country like India. Tahir et al. (2020) elaborate event of terrorist attack on stock market of Pakistan. The data taken in the research was 1st June 2014 to 31st May 2017. The analyses of the research show significant long-term impact on stock market of Pakistan. Atsu & Prasad (2020) examine data breach disclosure event on share market volatility. The data of S&P 500 index of 96 companies revealed that there is significant difference in after and before breach disclosure. It stat that breach disclosure event has significant impact on equity market volatility.

Another important event that potentially affecting the global financial market is the US trade war with China. Setiawan et al. (2020) explore the impact of the US trade war with China on the Asian stock market returns. While the study showed that the market has positive returns before event, it recorded negative returns in the short-term event window. Finally, the study provides empirical evidence that market is efficient and stock prices reacts on information quickly. Alam & Chavali (2020) investigates the Indian stock market and how it impacted in lockdown period due to Covid-19. The sample consist of 31 listed companies in BSE. The period of study is 24th February 2020 to 17th April 2020. The data revealed that there is significant positive response seen in the market. The stock market of India reacted well in lockdown period. Market & Jung (2020) examine Korean Exchange performance in long-term horizon with empirical power and specification of test. The result found greatest empirical power in Korean Exchange. The simulation method gave result of best testing technique is mixture of Wilcoxon signed rank test with a book to market test. Liu (2020) investigate breaking news impact on stock market. In the short-term abnormal returns shows impact of hot news. It was also suggested from study that breaking news can help in pace with market performance. (Chaudhary et al., 2020) explore share market volatility in

Covid-19 situation. The indices of top 10 nations analysed by using GARCH model. The data period of the study consists of January 2019 to June 2020. The research concludes negative returns during Covid-19 period. The GARCH model shows significant positive impact for selected market indices. Meher et al. (2020) identify effect of Covid-19 on price variation in natural gas & crude oil. The data collected from the period 1st May 2017 to 30th April 2020. The result suggests that there is significant effect of coronavirus pandemic on variation in natural gas & crude oil prices. Shehzad et al. (2020) analyse stock market returns of US & Japan and impact due to Covid-19. The result of GARCH model shows the impact for the S&P 500, Nasdaq Composite Index, DAX 30, Nikkei 225, FTSE MIB, and SSEC.

Zhikun (2019) explores the impact on China's share market due to the ban on the sale of restricted shares. The outcomes recommend that the pressure formed by the announcement of the restricted stock has negative influence on the whole share market. (Skrinjaric, 2019) analysed the stock market index composition changes event on Zagreb Stock Market (ZSM) returns. The period of data is 2nd January 2015 to 21st March 2018. The research concludes negative impact of stock exclusion on Zagreb Stock Market returns. Additionally, it was also mentioned that stock market index composition changes impacted on ZSM returns. Šafár & Sini (2019) evaluate the announcement of QE federal reserve on the starting phase of market response. The result revealed that on the other day of declaration noted profits, the market shows positive response of announcement.

The study by Gok & Dayi (2018) identified the association between share market returns with general elections of Turkish. The election period taken in the study was 1st February 2020 to 31st December 2017. The data analysed by GARCH model. The analyses declared that June 2015 election has a major negative effect on share market of Turkish. Nisar & Yeung (2018) Aims to analyse association between variation in FTSE 100 with UK political sentiment. The results conclude that there is short-term relation between variations in stock market with public sentiment. It gives evidence that there is relationship exist between public mood and investors behaviour. Case (2018) empirically analyses association between Share markets with monetary policy executed by central bank of Brazil. The study declared that there is significant impact of implementation of monetary policy on stock market. In terms of Industry, financial sector is mostly affected.

Chauhan (2017) described the impact of demonetization on the Indian stock market. The data of S & P Bombay Stock Exchange 100 companies was studied. The result found no significant effect of demonetization on stock exchange. It shows the short-term market fall because of some other reasons. Gunawardana (2017) observe the THAIFEX influence to share market in Thailand. Focusing on the food and beverage industry, the study finds that

semi-strong form of efficient market hypothesis does not hold true in terms of marketing event of exhibition. Jin et al. (2017) focused on financial market trends on significant returns of stock market. Using the Delta Naïve Bayes approach, the study finds that multisource predictions consistently outperform the single source predictions.

Katsikides et al. (2016) attempt to explore the association between stock market reaction and corporate social responsibility. The event used in the study is BP and Exxon oil spills, HSBC – money laundering; Barclays and Royal Bank of Scotland – Libor scandal. The analyses revealed that only HSBC event does not affect share market performance. In other four events stock market reacted significantly.

Pérez-rodríguez & López-valcárcel (2012) studied impact of public info like process of research & development in pharma on the valuation of the subsidizing company. Specifically, Sanofi-Aventis and its competitors Abbott and Roche were studied. The study revealed that there is no significant effect in the starting phase of news of R&D process. It identified that news regarding safety warning had gave negative reaction on valuation of respective firm.

III. METHODOLOGY

3.1. Data

To reiterate, this study aims to analyse the impact of the Covid-19 global pandemic event on the performance of Indian Stock Exchange and Indonesian Stock Exchange. The research is empirical in nature and relies on secondary data sources. The Bombay Stock Exchange and Jakarta Stock Exchange selected for the study. The stock market data collected from BSE & JSE official website.

The data analysed by using Event study methodology of research. The MS excel tool used by the researcher. The event day is 11th March 2020 because on that day WHO declared Covid-19 as Global Pandemic. This day is taken as t_0 . The analyses conducted for three event windows.

Table 1. Abbreviation of Indices

Symbols	Indices
BSE	Bombay Stock Exchange
BSE Shariah	BSE Shariah 500 Index
JSE	Jakarta Stock Exchange
JII	Jakarta Islamic Index
Cov-NC	Covid19-New Cases
Cov-DC	Covid19-New Death Cases

Sources: By Author's estimated

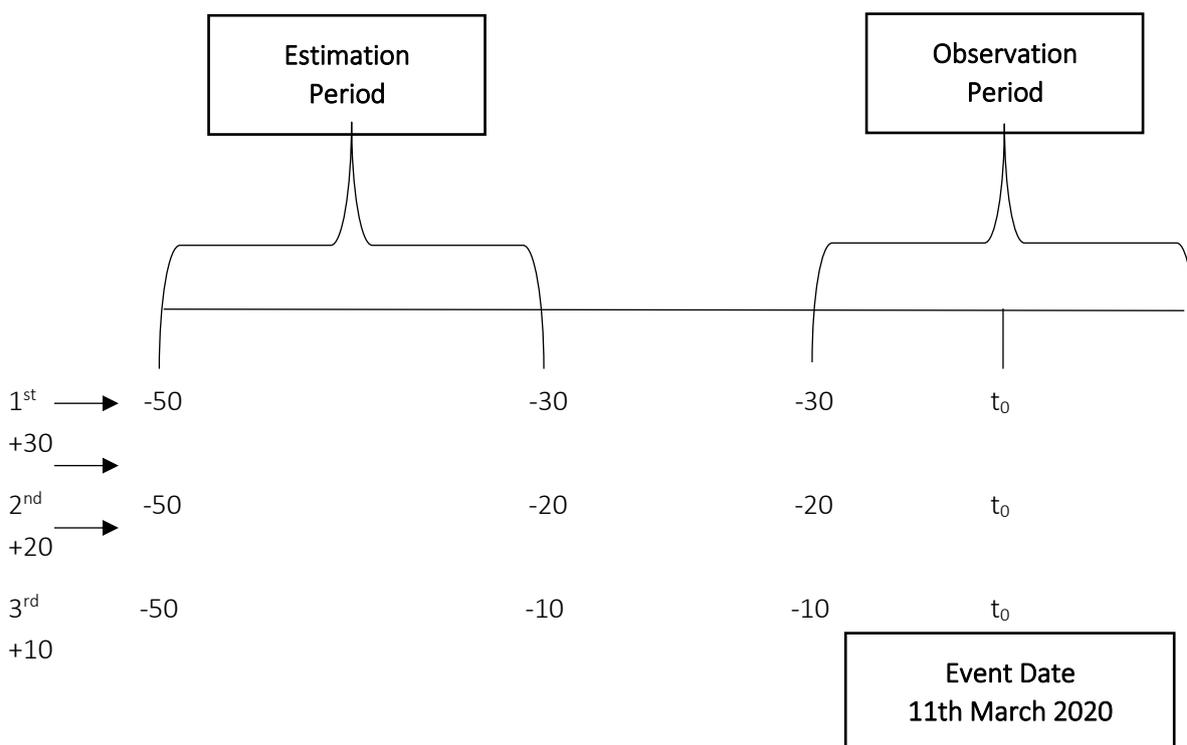
The three different event window is selected because the author wants to identify the variation in result in different time period. After that period the Lockdown was also declared in many places and virus spread very rapidly which panic humans' mind. That is the reason behind choosing three different event windows. The 1st event window consists of 60 days. It includes 30 days pre & 30 days post event data of BSE and JSE. The 2nd event window has total 40 days. It means 20 days before and after event date data is collected. The 3rd event window comprises 20 days. It contains pre & post 10 days data from the event day. The short-term impact will easily be found from selected window & the data collected. To investigate forecasting volatility for BSE, BSE Shariah, JSE, JII indices, Cov-NC and Cov-Dc. The study period covers from Jan 30, 2020, to Nov 3, 2020 long with all the time series daily data, because first covid19 case fallen on this date. The coronavirus new cases and death cases series of India and Indonesia collected from the Oxford Martin Programme on Global Development, which is a collaborative database of the University of Oxford researchers and Global Change Data Lab (Our World in Data Organization, 2020).

3.2. Model Development

3.2.1. Event Study Methodology

The event study methodology is very useful & popular methods to identify effect of event on stock market returns. The event study method provides prediction of indices reaction on declaration of an event. The method is also fruitful to establish relationship between particular event with response of selected stock market. however, the previous study recommended the event study methodology as most suitable technique to evaluate cumulative average abnormal returns of pre & post the declaration of an event. According to the data event window is made. The graphical representation of event window is presented in figure 1.

Figure 1. Event Study Timeline



According to the event, window data is gathered from BSE & JSE website. The estimation period of 50 days and observation period 30, 20 and 10 days of pre & post event data is clearly mention in the above chart. Further data is analysed by MS Excel using formulas of event methodology.

3.2.2. Method

In the every study focused on the methodology, because it will give clear picture on the objectives, The event study methodology describe below (RESEARCH, 2003) (Methodology et al., 2020).

First identify the returns of BSE & JSE from respective data set. The formula for returns is:

$$R_t = P_1 - P_0 / P_0 \quad (1)$$

Second step includes the computation of Intercept, Slop, R-square and Standard Error using excel formulas. Then expected returns is computed. The formula for E_r is:

$$E_r = \text{Intercept} + \text{Slop} * \text{Mkt. Return} \quad (2)$$

Then Average Return, Average Abnormal Return and Cumulative Average Abnormal Return is calculated. The formula is:

$$"AR_t = R_t - E_r" \quad (3)$$

Where,

R_t = Stock Return on given day

E_r = Expected Return on given day

Based on Average return Average Abnormal Return and Cumulative Average Abnormal Return is computed. Further T-test in apply on CAAR to identify significant impact of event on respective stocks. The formula of T-test is:

$$"CAAR-T = \text{Cumulative Average Abnormal Return} / \text{Standard Error}" \quad (4)$$

The significant value of t is 1.96. The result of CAAR-t is comparing with significant t-value. If the value is greater than 1.96 then result is significant and if it is less than 1.96 then it is insignificant.

ADF test

ADF test has been used for the check the stationarity in the data, when ADF-test is significant (Irfan, 2020), p-value is less than 5% and t-test is more than the critical value, after check the stationarity, we go to the run ARCH test (Enders, 1995). After ADF-test is doing Arch family model (Ibrahim, 2019).

$$"\Delta y_t = \alpha + \gamma y_{t-1} + \sum_{i=1}^p \Delta y_{t-i} + \varepsilon_t" \quad (5)$$

Where y_t data series is tested and γ_{t-i} is the 1st difference in the tested series. Therefore, Ho: $\gamma = 0$, is the null hypothesis to test the data series and H1: $\gamma < 0$, is alternative hypothesis used to check the unit root test, meaning that it is non-stationary when the ADF test vale is less that critical value (Irfan, 2017),

TARCH Model

Arch family model has various different method to check the volatility in data from the different concept. Threshold-Garch method is extended version of Garch family model. It checked the leverage effect of bad and good news in the data series. T-Garch is also used for the asymmetric check (Brooks, 2008).

T-Garch model finds the negative news will be influence more than the good news, Zakoian (1990) and Glosten et al (1993). T-Garch have divided into two parts, mean variance and conditional variance, meaning that asymmetric response arrival of bad and good news (P.P. & Deo, 2013).

The conditional variance is now given by:

$$“\sigma_t^2 = \omega + \sum_{j=1}^p \beta_j \sigma_{t-j}^2 + \sum_{i=1}^q \alpha_i u_{t-i}^2 + \sum_{k=1}^r \gamma_k u_{t-k}^2 I_{t-k}” \quad (6)$$

IV. RESULTS AND ANALYSIS

The data analysis is a crucial part of the research. Here, the author interprets charts and tables that help in analyzing data. This part includes BSE and JII performance in the Covid-19 situation. The cumulative average abnormal returns and t-test justify the results. The presented graph shows movements in the Indian & Indonesian stock prices. Further, ADF & TARCH model represents its respective findings. It would give a clear explanation of market reaction in the pre-Covid event & post-Covid event.

4.1. Results

4.1.1. BSE Shariah Index - Results & Interpretation of Event Study

Table 2, describes the cumulative average abnormal returns for 60 days. It includes 30-day pre event market returns and 30-day post event market returns. The pre event window shows negative returns and post event window also found negative returns. The one thing noted from the table is that before the event the market is already showing downturn values and after the event the negative returns is increased tremendously. Overall, the table shows all the CAAR value in negative terms and T-stat also found negative. The data concludes that returns is significant in pre-post event period. It gives clear idea that Covid-19 event has gave some negative impact on BSE Shariah indices.

Table 2. Calculation of Cumulative Average Abnormal Return & T- test (30 Day)

Pre-Event Data				Post-Event Data			
Day	CAAR	CAAR-T	CAAR -T, Sig	Day	CAAR	CAAR-T	CAAR -T, Sig
30	-1.171715712	-398.8164025	Yes	1	-1.62439	-552.894	Yes
29	-1.173354808	-399.3743009	Yes	2	-1.6807	-572.059	Yes
28	-1.180239247	-401.7175547	Yes	3	-1.7274	-587.954	Yes
27	-1.193010736	-406.0645812	Yes	4	-1.78044	-606.007	Yes
26	-1.192188862	-405.7848402	Yes	5	-1.85465	-631.266	Yes
25	-1.193952506	-406.3851309	Yes	6	-1.90362	-647.933	Yes
24	-1.198874947	-408.0605802	Yes	7	-1.96804	-669.862	Yes
23	-1.207833783	-411.1098957	Yes	8	-2.01799	-686.864	Yes
22	-1.210080046	-411.8744552	Yes	9	-2.086	-710.01	Yes
21	-1.215098513	-413.5825889	Yes	10	-2.15828	-734.613	Yes
20	-1.224105262	-416.6482124	Yes	11	-2.21057	-752.411	Yes
19	-1.23308683	-419.705265	Yes	12	-2.25534	-767.65	Yes
18	-1.237767852	-421.2985427	Yes	13	-2.30353	-784.051	Yes
17	-1.246145765	-424.1501296	Yes	14	-2.35069	-800.102	Yes
16	-1.256484818	-427.6692288	Yes	15	-2.38355	-811.289	Yes
15	-1.267454741	-431.4030569	Yes	16	-2.40728	-819.366	Yes
14	-1.275735491	-434.2215725	Yes	17	-2.43265	-827.999	Yes
13	-1.286660609	-437.9401506	Yes	18	-2.453	-834.927	Yes
12	-1.302053371	-443.1793788	Yes	19	-2.45474	-835.52	Yes
11	-1.318840267	-448.8931277	Yes	20	-2.46007	-837.334	Yes
10	-1.339880824	-456.0546935	Yes	21	-2.47929	-843.877	Yes
9	-1.362306235	-463.6876217	Yes	22	-2.49975	-850.838	Yes
8	-1.395117134	-474.8554539	Yes	23	-2.51744	-856.859	Yes
7	-1.427329245	-485.8194771	Yes	24	-2.53537	-862.963	Yes
6	-1.450929247	-493.8522004	Yes	25	-2.5537	-869.201	Yes
5	-1.469551349	-500.1905976	Yes	26	-2.57382	-876.051	Yes
4	-1.485084423	-505.4775839	Yes	27	-2.58868	-881.109	Yes
3	-1.49607024	-509.2168218	Yes	28	-2.61629	-890.505	Yes
2	-1.510282828	-514.0543545	Yes	29	-2.65138	-902.449	Yes
1	-1.532697743	-521.6837103	Yes	30	-2.68365	-913.433	Yes

Source: Author's projected by Excel

Table 3. Calculation of Cumulative Average Abnormal Return & T- test (20 Day)

Pre-Event Data				Post-Event Data			
Day	CAAR	CAAR-T	CAAR -T, Sig	Day	CAAR	CAAR-T	CAAR -T, Sig
20	-0.31093	-89.7576	Yes	1	-0.84899	-245.082	Yes
19	-0.31398	-90.6388	Yes	2	-0.94145	-271.775	Yes
18	-0.31347	-90.4908	Yes	3	-1.02791	-296.733	Yes
17	-0.31767	-91.7046	Yes	4	-1.128	-325.628	Yes
16	-0.32486	-93.7799	Yes	5	-1.25217	-361.47	Yes
15	-0.33359	-96.2985	Yes	6	-1.34443	-388.104	Yes
14	-0.33876	-97.7904	Yes	7	-1.46875	-423.993	Yes
13	-0.34744	-100.299	Yes	8	-1.57573	-454.877	Yes
12	-0.36343	-104.914	Yes	9	-1.68611	-486.738	Yes
11	-0.38148	-110.125	Yes	10	-1.80172	-520.112	Yes
10	-0.40541	-117.032	Yes	11	-1.90343	-549.474	Yes
9	-0.43158	-124.588	Yes	12	-1.9936	-575.503	Yes
8	-0.47304	-136.556	Yes	13	-2.09262	-604.09	Yes
7	-0.51482	-148.616	Yes	14	-2.19397	-633.347	Yes
6	-0.54686	-157.865	Yes	15	-2.27042	-655.416	Yes
5	-0.57502	-165.995	Yes	16	-2.33886	-675.173	Yes
4	-0.60032	-173.299	Yes	17	-2.40415	-694.02	Yes
3	-0.62436	-180.236	Yes	18	-2.4667	-712.077	Yes
2	-0.65839	-190.061	Yes	19	-2.51231	-725.242	Yes
1	-0.70083	-202.313	Yes	20	-2.56102	-739.304	Yes

Source: Author's projected by Excel

Table 3, shows the T-test description as well as CAAR value. The data shows total 40 days analyses. The pre 20 days of event and post 20 days event data declares negative values. The before 20days of event returns is in minus term. After the event the market is became more volatile and the returns is decreased. The table shows the significant t- values for all 40 days. The CAAR-t value describes Yes that indicates the result is significant in 40days event window. The analyses revealed significant impact on returns of BSE. It suggests that the declaration by WHO gave negative impact on BSE Sariah Index.

Table 4. Calculation of Cumulative Average Abnormal Return & T- test (10 Day)

Pre-Event Data				Post Event Data			
Day	CAAR	CAAR-T	CAAR-T, Sig	Day	CAAR	CAAR-T	CAAR -T, Sig
10	0.457105	131.1576	Yes	1	0.244834	70.25035	Yes
9	0.449495	128.9741	Yes	2	0.178683	51.26976	Yes
8	0.427818	122.7542	Yes	3	0.119422	34.26579	Yes
7	0.405995	116.4925	Yes	4	0.048376	13.88058	Yes
6	0.39354	112.9188	Yes	5	-0.04605	-13.2125	Yes
5	0.385179	110.5197	Yes	6	-0.1104	-31.6769	Yes
4	0.379668	108.9385	Yes	7	-0.2025	-58.1042	Yes
3	0.376218	107.9486	Yes	8	-0.2781	-79.7945	Yes
2	0.364481	104.5809	Yes	9	-0.36102	-103.587	Yes
1	0.344318	98.79551	Yes	10	-0.449	-128.831	Yes

Source: Author's projected by Excel

Table 4, revealed significant t-test value of cumulative average abnormal returns. The pre and post event data of 20 days presented above. The table describes pre vent CAAR returns in positive way but in decreasing terms. However, post event data shows downturn but positive returns for four days. On the 5th day from the announcement table specifies negative returns. Day by day it is showing an increasing negative CAAR values. Inclusively the table conclude that in the 20 days of event window returns move towards positive to negative. The CAAR t-test value in “Yes” terms. It indicates that there is significant impact of Covid-19 event on Indian stock market.

4.1.2. Jakarta Islamic Index- Results & Interpretation of Event Study

Table 5. Calculation of Cumulative Average Abnormal Return & T- test (30 Day)

Pre-Event Data				Post Event Data			
Day	CAAR	CAAR-T	CAAR -T, Sig	Day	CAAR	CAAR-T	CAAR -T, Sig
30	0.105532	30.21174	Yes	1	0.249719	71.48955	Yes
29	0.108374	31.02541	Yes	2	0.288288	82.53085	Yes
28	0.109744	31.41746	Yes	3	0.327738	93.82464	Yes
27	0.113813	32.58244	Yes	4	0.365205	104.5509	Yes
26	0.120097	34.38124	Yes	5	0.405981	116.2242	Yes
25	0.124003	35.49944	Yes	6	0.479688	137.3249	Yes
24	0.12841	36.76111	Yes	7	0.550834	157.6927	Yes
23	0.126421	36.19171	Yes	8	0.617619	176.8116	Yes
22	0.122604	35.09903	Yes	9	0.681227	195.0216	Yes
21	0.11886	34.02722	Yes	10	0.735795	210.6431	Yes
20	0.114556	32.79495	Yes	11	0.79043	226.284	Yes
19	0.104667	29.96392	Yes	12	0.868081	248.5138	Yes
18	0.087711	25.10992	Yes	13	0.948922	271.6571	Yes
17	0.076238	21.82535	Yes	14	1.041864	298.2645	Yes
16	0.063435	18.16016	Yes	15	1.125065	322.0833	Yes
15	0.055147	15.78751	Yes	16	1.210518	346.5466	Yes
14	0.046851	13.41249	Yes	17	1.3047	373.509	Yes
13	0.042971	12.30173	Yes	18	1.401868	401.3261	Yes
12	0.038943	11.14862	Yes	19	1.500203	429.4777	Yes
11	0.031446	9.002469	Yes	20	1.599077	457.7831	Yes
10	0.020137	5.764684	Yes	21	1.697393	485.9291	Yes
9	0.020726	5.933406	Yes	22	1.796728	514.3668	Yes
8	0.015783	4.518333	Yes	23	1.901358	544.32	Yes
7	0.027675	7.92282	Yes	24	2.02136	578.6743	Yes
6	0.03944	11.29093	Yes	25	2.150164	615.5482	Yes
5	0.057751	16.53291	Yes	26	2.292459	656.2844	Yes
4	0.077416	22.16258	Yes	27	2.438797	698.1778	Yes
3	0.103132	29.5247	Yes	28	2.605082	745.782	Yes
2	0.135956	38.92157	Yes	29	2.784277	797.0818	Yes
1	0.166549	47.67968	Yes	30	2.952376	845.2051	Yes

Source: Author’s projected by Excel

Table 6. Calculation of Cumulative Average Abnormal Return & T- test (20 Day)

Pre-Event Data				Post Event Data			
Day	CAAR	CAAR-T	CAAR -T, Sig	Day	CAAR	CAAR-T	CAAR -T, Sig
20	0.307085	91.37815	Yes	1	0.455159	135.4399	Yes
19	0.300693	89.47613	Yes	2	0.484064	144.041	Yes
18	0.286862	85.36053	Yes	3	0.510573	151.9294	Yes
17	0.278554	82.88831	Yes	4	0.533284	158.6873	Yes
16	0.269021	80.05171	Yes	5	0.55588	165.4111	Yes
15	0.264326	78.65459	Yes	6	0.612981	182.4024	Yes
14	0.260202	77.4274	Yes	7	0.664305	197.6747	Yes
13	0.260749	77.59009	Yes	8	0.710485	211.4163	Yes
12	0.259703	77.27891	Yes	9	0.760486	226.295	Yes
11	0.255055	75.89572	Yes	10	0.804769	239.4721	Yes
10	0.245543	73.06525	Yes	11	0.847266	252.1176	Yes
9	0.246205	73.26227	Yes	12	0.914784	272.2089	Yes
8	0.240418	71.54032	Yes	13	0.984505	292.9554	Yes
7	0.250429	74.51931	Yes	14	1.06881	318.0418	Yes
6	0.262399	78.08109	Yes	15	1.145745	340.9351	Yes
5	0.282626	84.09989	Yes	16	1.222878	363.8871	Yes
4	0.304161	90.50812	Yes	17	1.309165	389.5634	Yes
3	0.330171	98.24763	Yes	18	1.39817	416.0483	Yes
2	0.358932	106.8061	Yes	19	1.488471	442.9188	Yes
1	0.385789	114.7978	Yes	20	1.577282	469.3458	Yes

Source: Author’s projected by Excel

Table 5, explains the value of cumulative average abnormal return with t-test result of Jakarta stock exchange. The event window of 60 days period is analysed. It includes 30 days both before & after data. The CAAR value around the selected window shows positive returns. Here, the pre event CAAR value is positive but volatile in nature. here it is shown that after the declaration the JII returns is increased & indicates positive upward movement in the market. The t- test CAAR value is suggest that returns is significant. It is described from data that Jakarta stock market impacted by Covid-19 event.

Table 6, analyses t-test value of cumulative average abnormal value. It shows 40 days event window. The table indicates pre 20 days and post 20 days analyses. The table indicates that market was already gave positive returns before the announcement but there is some variation in the returns. After the declaration by WHO the returns are noted upward market movement & reacted positively. The result declares the significant impact on the JII index. It mentions clear idea about Covid-19 impact on Indonesian stock market.

Table 7. Calculation of Cumulative Average Abnormal Return & T- test (10 Day)

Pre-Event Data				Post Event Data			
Day	CAAR	CAAR-T	CAAR -T, Sig	Day	CAAR	CAAR-T	CAAR -T, Sig
10	-0.05909	-16.7121	Yes	1	0.298656	84.46866	Yes
9	-0.0492	-13.9151	Yes	2	0.35408	100.1444	Yes
8	-0.04414	-12.4848	Yes	3	0.412096	116.5529	Yes
7	-0.0215	-6.08023	Yes	4	0.469213	132.7074	Yes
6	0.000438	0.123833	No	5	0.53141	150.2985	Yes
5	0.028497	8.059852	Yes	6	0.626174	177.1004	Yes
4	0.058239	16.47177	Yes	7	0.72006	203.6543	Yes
3	0.095016	26.87321	Yes	8	0.810227	229.1562	Yes
2	0.141068	39.8983	Yes	9	0.89454	253.0023	Yes
1	0.18506	52.34032	Yes	10	0.968701	273.9773	Yes

Source: Author’s projected by Excel

Table 7, explore the CAAR value as well as T-test for Jakarta stock market of 20 days event window. The before and after 10 days impact of Covid-19 is analysed. In the pre event window the returns are negative for few days. After it shows positive upgrading. After the event date the CAAR value is constantly improved or showing positive upward movement in the market. The T-test of CAAR identify significant impact of Covid-19 event. It shows that Jakarta stock market positively responded after the event declaration date.

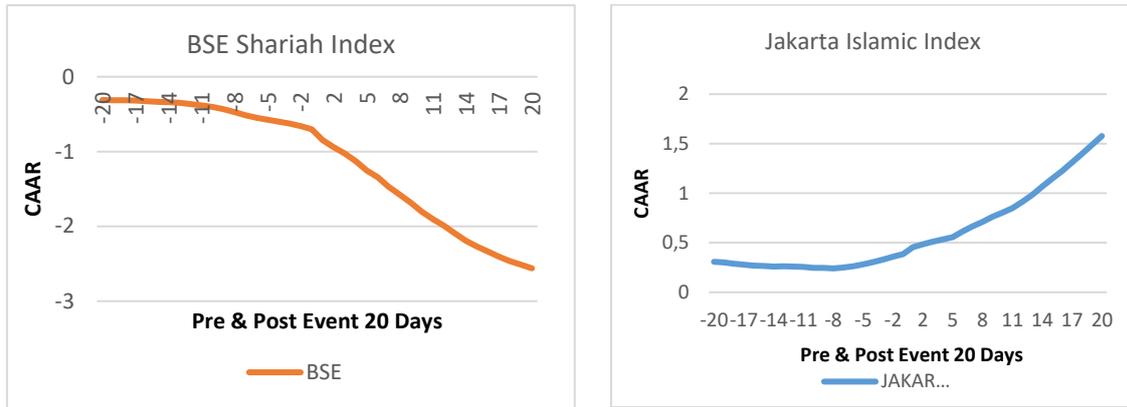
Figure 2, presented pattern of behaviour of Bombay stock market and Jakarta stock exchange. The figure explains the market reaction in both before and after event day. The figure covered 60 days performance. It describes that BSE Sariah index & JII index reacted differently on Covid-19 event. The Indian stock market shows downward sloping and Indonesian stock market describe upward sloping graph. It is stated from the pattern that the BSE Sariah’s returns impacted negatively on Covid-19 event. Furthermore, the JII index has significant positive reaction of Covid-19 announcement.

Figure 2. Cumulative Average Abnormal Return of BSE & Jakarta (30 Day)



Source: Author’s projected by Excel

Figure 3. Cumulative Average Abnormal Return of BSE & Jakarta (20 Day)

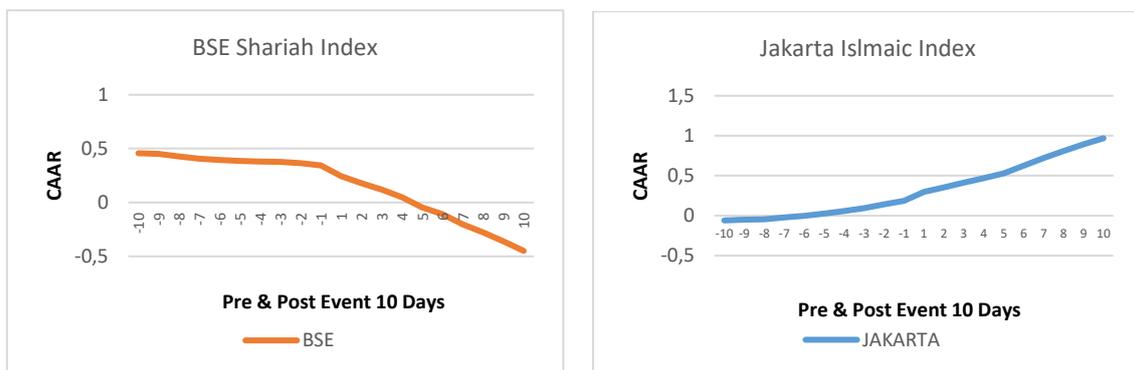


Source: Author's projected by Excel

Figure 3, plotted reaction of Indian & Indonesian stock market returns. The 40 days event window show the BSE Sariah and JII reaction on Covid-19 event. It is describing that Covid-19 event give negative impact on Bombay stock market. The Jakarta stock exchange shows positive response to Covid-19 event. The stock market of both the country gave opposite reaction to the Covid-19 event. Finally, it is declared that the announcement by WHO lead to different impact for different countries stock market.

Figure 4, explains the event window of pre & post 10 days reaction of BSE Sariah index and JII index. The plot itself told the stock market reaction for both the countries. The Indian stock exchange index shows downward sloping after the Covid-19 event take place. The Indonesian Stock Exchange display upward sloping post Covid-19 event date. It clearly gives picture about BSE and JII response during pre & post WHO announcement regarding Covid-19.

Figure 4. Cumulative Average Abnormal Return of BSE & Jakarta (10 Day)



Source: Author's projected by Excel

Figure 5. Line Diagram of Indices and Variables

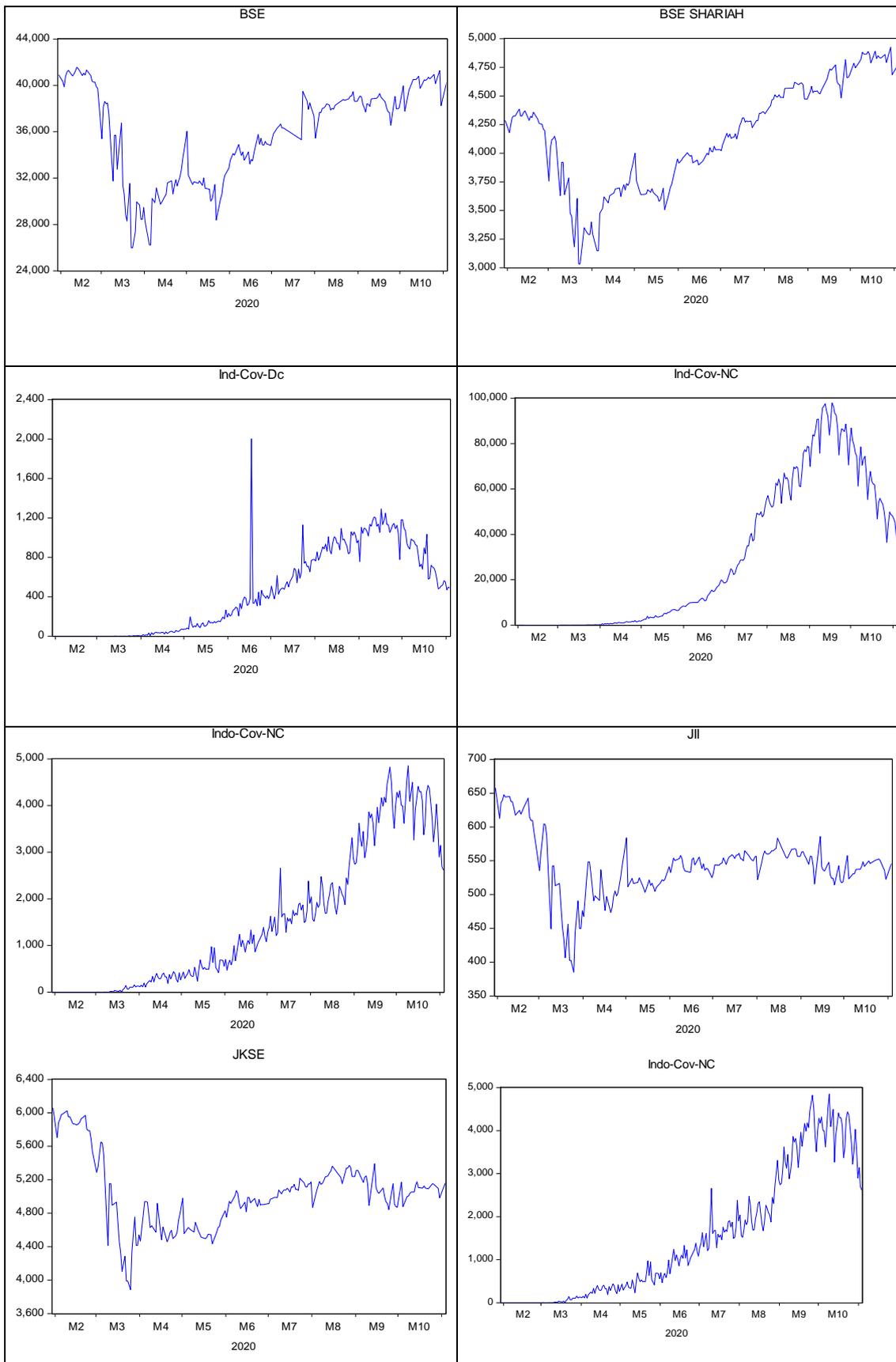




Figure 5, shows the line diagram of Indices and Variables. It shows upward & downturn movements in the respective market. Through the graph, we can easily identify variability in the selected time.

Table 8, interpreted that the values of ADF test, -14.125, which is less than its critical value, -1.215, at 5%, level of significance which implies that the all variables are stationary after the 1st difference (Irfan, 2016). The results of ADF test confirms that the other all the Shariah Indices and Cov-NC, Cov-DC are also stationary, because the values of ADF test statistic is less than its test critical value.

Table 9, An outcome of the TARCh model represent that the terms, C, are statistically significant in all the indices in conditionally mean equations. The variance equation describes that the $RESID (-1)^2$, which are statistically significant in BSE and JKSE indices, which imply that past volatility of BSE and JKSE indices are significantly not influencing current volatility. T-GARCH model is also confirming the coefficient positive significant at the 5% level. The analysis shows that there is a negative leverage effect of bad news has more than impact on conditional variance than good news. Here, Covid- New cases, Covid death cases are impacted due to coronavirus news spread in the market. Another diagnostic analysis is based on the different criteria like Akaike info criterion (AIC), Schwarz criterion (SIC), and Hannan-Quinn criteria (HQC), all these criteria have lower the value better will be results meaning that BSE Shariah, Jakarta Islamic index are lower values in comparison to the higher values of BSE and JKSE. At-last T-Garch model is more suitable for BSE Shariah and Jakarta Islamic indices.

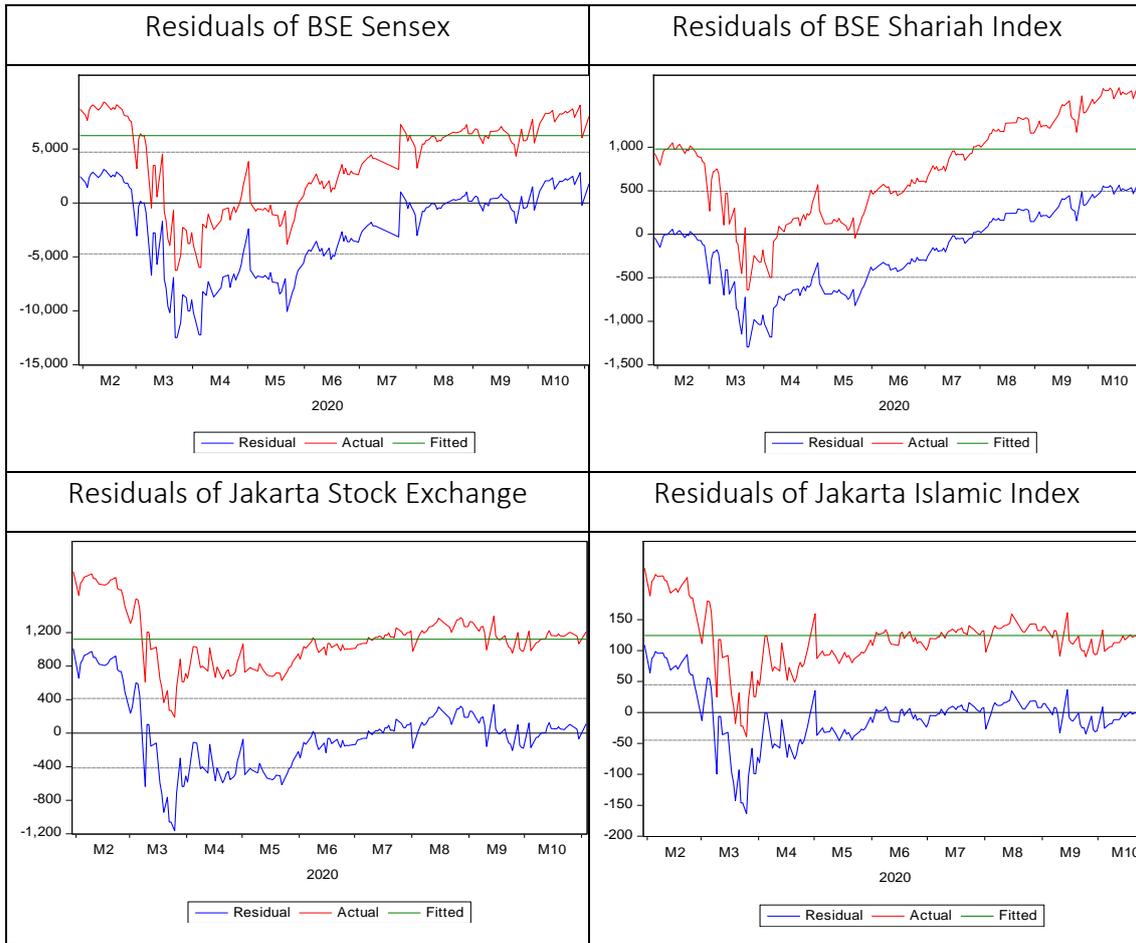
Table 8. ADF Test of Indices and Covid-19 variables

Countries	Name of Variables	Level	t-test	P-value	coefficient	1% level	5% level	10% level
India	Bombay Stock Exchange		-14.125	0.000	-1.215	-3.454	-2.872	-2.572
	BSE Sharaih index	After 1st	-14.851	0.000	-1.253	-3.454	-2.872	-2.572
	India-Covid-New Cases	difference	-14.596	0.000	-10.074	-3.455	-2.872	-2.572
	India-Covid-New Death Cases		-11.522	0.000	-3.797	-3.454	-2.872	-2.572
Indonesia	Jakarta Stock Exchange		-12.096	0.000	-1.253	-3.454	-2.872	-2.572
	Jakarta Islamic Index	After 1st	-13.178	0.000	-1.071	-3.454	-2.872	-2.572
	India-Covid-New Cases	difference	-7.421	0.000	-2.329	-3.454	-2.872	-2.572
	India-Covid-New Death Cases		-12.066	0.000	-3.408	-3.454	-2.872	-2.572

Table 9. TARCh of Indices and Covid-19 variables

Variable	BSE Sensex			BSE Shariah			Jakarta Stock Exchange			Jakarta Islamic Index		
	COEF	z-Stat	Prob.	COEF	z-Stat	Prob.	COEF	z-Stat	Prob.	COEF	z-Stat	Prob.
Conditional Mean Equation:-												
C	38456	188.90	0.00	4327	595.33	0.00	5050	329.42	0.00	549	372.04	0.00
Conditional Variance Equation:-												
C	1567362	6.631	0.000	764	2.164	0.031	170625	9.789	0.000	1440	14.925	0.000
RESID(-1)^2	0.580	1.467	0.142	1.143	3.005	0.003	0.360	1.236	0.216	0.549	3.531	0.000
Covid-New Cases	-143	-2.398	0.017	2.779	4.520	0.000	-30.740	-5.176	0.000	-0.240	-12.136	0.000
Covid-New Death Cases	-1371	-0.476	0.634	-91.657	-2.303	0.021	-205.201	-0.853	0.394	-3.319	-2.199	0.028
Diagnostic Statistics:-												
Log likelihood			-2633			-2017			-2002			-1359
Akaike info criterion			18.910			14.500			14.388			9.779
Schwarz criterion			18.976			14.565			14.453			9.844
Hannan-Quinn criter.			18.937			14.526			14.414			9.805

Figure 6. Residuals of Stock Exchange & Its Index



4.2. Analysis

The present study evaluates the impact of the WHO declaration of "Covid-19 as a Global Pandemic" on the stock market of India (BSE Sariah) & Indonesia (JII). The market model method of event study shows different direction result of Indian stock market & Indonesian stock market. The results of BSE Sariah indices describe that the returns were already negative before the announcement. After the day of declaration, the Indian stock market returns move more downturns. All the three-event window- 60days, 40days & 20days results show a negative impact on the stock market of India. The outcomes of JII indices demonstrate upward positive movements for the Indonesian stock market. The declaration by WHO shows positive returns in all the three-event window of 60days, 40days & 20days. The research found negative CAAR for BSE Sariah and positive CAAR for JII. Further, BSE Sariah & JII indices results identify significant variance between market returns pre and post the announcement. The evolution and progress of any stock exchange depend on the robust economy of the country. That's why the result might vary for both

the country. In terms of India, investors take the WHO declaration negatively that was shown in the market reaction. The investors of Indonesia reacted positively to the WHO announcement that reflected on the stock market indices. However, the analyses of the present study cannot be generalized for other countries' stock exchange. It is also varying in different market environments or different periods in the future.

V. Conclusion and Recommendation

5.1. Conclusion

The coronavirus outbreak is impacted on whole world. India has major threat of coronavirus because it is the second largest country in terms of population. Likewise, other country face Covid-19 outbreak Indonesia too. The government of both the country take precautionary steps to deal with Covid-19 situation. On 11th March 2020 WHO announce Covid-19 as Global Pandemic. The main purpose of this study is to identify impact of declaration of World Health Organization "Covid-19 as global pandemic" is impacted on stock market of India and Indonesia. The analyses of both the country shows different direction movement. It is drawn from the data analyses part that the reaction of stock market is varies for different countries. Like, Indian stock market shows downward sloping after the WHO declaration and Jakarta stock exchange shows upward sloping. The downturn graph of Indian stock exchange revealed that Indian stock market negatively reacted on WHO announcement. The upward graph of Jakarta stock exchange declares positive response to World Health Organization statement. The study concludes that semi-strong form of efficient market Hypothesis is true because market is efficient in processing its information and reacted on different economic situation. TARARCH model is more suitable in BSE Shariah, Jakarta Islamic Indices. Meaning that more clearly effect of the bad news on the current market volatility.

5.2. Recommendations

The event study approach is very important in its own way. Like, in this study author analysed WHO declaration for Covid-19. The future research might be on different selected event window of Covid-19. Further, recent event like Presidential election of USA with Coronavirus pandemic can also be analyse. The study is only conducted for two countries- India & Indonesia. Therefore, upcoming research of other countries on same event can give more prediction of Covid-19 impact globally. The countries may be G8, E7, and N11 or any country based on authors' research. It would recommend conducting a comparison study by taking additional worldwide samples. There is also the

possibility of a comparative study of a different pandemic. In the future, a longitudinal study may be fruitful to identify long-term impact. Further, demographic variables like gender, age, education, etc., will be studied in the stock market with the respective event. The variable corona death & confirmed cases used in the present study in future other variables also incorporated to have a more valuable result.

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