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Impact of Covid on Stock Return: A Comparative Study of Emerging and Developed Countries

by

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This thesis is dedicated to my parents & teachers, who are always a light for me in the dark and their unwavering support guided my Unfocused words into Coherent ideas.

CERTIFICATE OF APPROVAL

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Abstract

The main objective of the study is to explore the impact of COVID-19 on the returns in seven developed and seven emerging stock markets by using daily data from January 1, 2018 till December 31st, 2020. Event Study is used to study the impact on return. The returns of COVID period are different in case of U.K., Germany, U.S., and France. Moreover the results reveal significant impact on markets of China, Brazil, Russia. Whereas no impact on markets of Australia, Indonesia, South Africa, UK, US, Canada, Germany, France and Italy during the COVID-19 pandemic reports positive returns during the crisis period. Moreover the Japan equity market is influenced by the high COVID. The results of Cumulative Abnormal Returns of emerging countries also indicate that China, Brazil, Russia and Pakistan are highly effected markets while Indonesia and South Africa indicates that they are less effected. Whereas comulative abnormal returns of developed countries indicates that Japan and US are affected by Covid whereas UK, Germany, France and Italy show less effect. The link between Covid relation is also caused by the slow regression but no significant link is found. This study is helpful for portfolio managers, speculators, investors, policy makers and risk managers in diversifying portfolios of most affected countries by COVID-19 pandemic and also beneficial in risk management. This study also helps investors in designing different investment strategies as this study provides information regarding the effect of crises like Covid-19.

Keywords: Returns Spillover, Volatility Spillover, COVID Period, Spillover, Developed and Emerging markets, Stock Market, Event Study, GARCH, Evaluated Accumulated Return (EAR), Cumulated evaluated return (CAR).

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Abbreviations

AORD	ASX Stock Exchange
BOVESPA	Bolsa de Valores de Sao paulo
CAC-40	Continuous Assisted Trading
CAR	Cumulated Accumulated Return
COVID-19	Corona Virus Disease of 2019
DAX	Frankfurt Stock Exchange
EMH	Efficient Market Hypothesis
EVD	Ebola Virus Disease
FTSC-100	London Stock Market
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
GSPC-500	Nasdaq Composite Stock Market
GSPTSC	Toronto Stock Exchange
JKSE-100	IDX Stock Market
JSE	Johannesburg Stock Exchange
KSE-100	Pakistan Stock Exchange
MFI	Money Flow Index
MIBTEL-30	Italy 50 Index
MOEX	Moscow Stock Exchange
NIKKIE-225	Tokyo Price Index
RSI	Relative Strength Index
SARS	Severe Acute Respiratory Syndrome
S&P 500	Standard and Poor 500 Index
SSE	China Shanghai Composite Stock Market
VAR GARCH	Vector Autoregressive GARCH

WHO World Health Organization

Chapter 1

Introduction

Stock market behavior is assessed by the role of information either it is macroeconomic or firm-specific. Because investment in different securities or other financial assets is based on the information that different market participants use. Efficient Market Hypothesis (EMH) states that prices make adjustment with the arrival of new information in the market either its good or bad. The stock market behavior is effected from many economical & social factors. There are many crises which affect the stock prices which creates bankruptcies of institutions. In addition to this most of the crises are related to financial institutions which are engaged in operations of lending and securitization. The institutions are impacted due to immediate crisis such as bankruptcies of institutions financial crisis etc.

In recent times a new virus appeared in the city of Wuhan, China. The deadly COVID-19 disease is first reported in December 2019 and then it is announced as a pandemic around the globe. In March 2020 pandemic was the biggest crisis of history by the (WHO) World Health Organization. According to Chaudhary, Bakhshi, & Gupta, (2020) lockdown is considered to be a larger economic price. The financial performance of the economy resulted in a bearish stock market. In the top ten countries i.e, the U.S, Germany Italy, China, Japan, Canada, Brazil, the U.K, France, Italy, and Indonesia the nominal GDP during this COVID-19 was 66% of the worlds economy.

In 2019 market faces a huge loss associated with the United States of China trade war and the most important in 2020 is Brexit which is considered to be the main

factor that impact the global financial markets. The virus is believed to spread from one diseased person to another diseased person which can create high rates of deaths in specific regions. This virus impacted 221 countries. WHO announced it as a Public Health International Emergency. In the middle of June 2020, the coronavirus impacted 8.5 million people which caused 450 thousand deaths. According to and Moen, Kelly, Tranby, & Huang, (2011) viruses created fear in society due to high mortality rates and health-related issues. According to Wang et al.,(2020) the most affected countries were Italy, China, and the US that had confirmed the highest number of COVID cases.

The pandemics create fear in the market and that fear triggers the activity of buying and selling. Due to globalization, all the equity markets are interconnected with each other. So fear caused by the pandemic in one market affects other markets as well. The International crude oil market has also been the center of attention and is linked with both emerging and developed equity markets of the world. The fluctuation in the crude oil market has also influenced equity markets. This relationship is bidirectional. Fluctuations that are caused by the pandemic in the equity market are transferred to the crude oil market and abnormal movement in the oil market has certain repercussions on the equity market as well.

Pandemic COVID-19 impacted the economies of the world and in this impact most important is the country of U.S. During this pandemic the government of U.S announced lockdown in the country of India, due to which in the U.S everything came to halt, like oil prices dropped, the global market crashed and unemployment increased. During this pandemic, the nationwide lockdown was abnormal, for that purpose event study is needed under a semi-strong form of market efficiency hypothesis. This event study shows that how security prices act to the announcements of the lock down due to COVID-19. As semi-strong efficient market hypothesis suggests that current market prices not only reflect information about historical prices of stock but also reflect publicly available information. There is a lag time in the semi-strong form of market efficiency before the prices reflect information.

An important study gets support from the semi-strong form of EMH in the stock market of the U.S (Derdas, 2012). During a very limited period, the COVID-19

pandemic push the economy of the world due to which the real gross domestic product of the United States decreased in this pandemic (Nayebvali, Gharehgozli, & Zamanian, 2020). Many countries are forced to impose border shutdowns and travel restrictions. Such involvement has an impact on economic developments, supply chain, and foreign trade. For measuring the role of infectious disease they use local and global impact of the news. This study finds out no other infectious disease in the past few studies of 1985. Pandemics create fear in the market and that fear creates the sudden action of buying and selling.

According to EMH, positive or negative news related to a COVID-19 is the tool of a large daily U.S stock market, and the flow of large daily stock markets during this period is extraordinary. Pandemics create rise and fall in the equity market and it is transferred in equity market other market and it also includes that abnormal transmission in across market affects equity market. Between 1st January 2020 and 4th, April 2020 stock markets faced a severe decline. Stock market indices were in the historical low state S&P500-24%, DAX -29%, NIKKEI225 -23%, Nasdaq -18% FTSI100 -29%, and Shanghai -10% fell down. Same in that time prices of oil declined by -53%. However, not any of these outbreaks carry out the approximate size of the COVID-19 virus.

On March 09 2020 during the COVID-19 pandemic Saudi Arabia and poured the market with a large quantity of oil due to which the oil prices decreased by 20% within a day. In the history of the world according to (Albulescu, 2020) crude oil prices with high volatility followed by poor stock market crashes. MERS reported cases in 27 countries globally. The majority of these cases were found out in Saudi Arabia. The impact of the breakout for the global markets began to increase quickly.

For instance, In China COVID-19 breakout was not begin to stop it from transmitting despite severe quarantine measures. Crude oil prices declined from $61 to 12$ to the extreme declining demand in the international market (Prabheesh, Padhan, & Garg, 2020). Due to COVID-19 in history when the oil demand declined the oil prices varied on daily basis with the record of low stock prices. By the COVID-19 pandemic equity market and oil market, both were seriously impacted. Besides, there was a serious impact of COVID-19 on the stock market around the globe.

This study finds out the impact of COVID-19 on the stock market to spread insight into the virus.

According to Salisu & Akanni (2020), the COVID-19 pandemic impacted the developed equity markets along with the United States equity market was declined by 32%, the U.K. stock market by 27.9%, and the Itlay stock market by 39.3%. So, as this the emerging markets were also badly impacted in contrast with Brazil equity market, that fell by 40.5%, Russia by 24.2%, and Chinese financial market by 10.1%. This aggregate loss examined by financial markets were about 9 trillion US dollar between January and May and the same as that stock markets value is decreased by 12.35% collectively.

Investors generally in the stock market buy and sell with fear of high volatility and a great depression. According to Zingales, (2008) they put their stocks for selling in fear that creates global financial issues. These issues made investors depressed in making the investment plans which are depending upon future indices. Post-crisis investors focused on diversifying their investments with changing volatilities.

Therefore, all the markets around the world have made volatility indexes to measure volatility. The volatility index is determined, which is based on the price for different options and that obtains a value of volatility. In the middle of March 2020 volatility level exceeds and it was last seen in October 1987 and December 2008. To find out the outcome for recovery the main purpose of China was to compress the curve for COVID-19 to restart the economic activity.

Extraordinary macroeconomic decisions were needed to compensate for the economic meltdown (Liu, Sun, & Zhang, 2020) which was according to the view of the financial cycle. To stop the turmoil in financial markets emerging countries took severe measures. For this purpose majority of them decided to spend out trillions of dollars to save their economies, this is why? Because the activity of buying and selling is impacted by the COVID-19. In well-developed and emerging economics the COVID-19 has a bad severe effect, for this purpose, extreme policy measures helped them in bringing back these economies, because if the reaction occurred to the bad news of COVID-19 then macroeconomic policies will create a positive step in minimizing the risks.

1.1 Theoretical Background

1.1.1 Efficient Market Hypothesis (EMH)

In finance, the most debated topic is stock market efficiency. In modern finance markets, these markets are efficient. With the stock prices, the term efficiency is connected to the association of information. In this regard, EMH is connected to the stock prices timely and is based on relevant information. According to Reilly and Brown, (2011) from any investment no investor will get an abnormal return. According to Fama (1970), the efficient market reflects the available information and gives a fair price about stocks which helps gather resources. It is necessary to observe the behavior of the market for the objective of resource allocation.

According to Jones, (2007) if there is a quick response from the market then the market is said to be efficient. Dyckman and Morse (1986) say that Security market is efficient if **(1)** The information is reflected in the market like the price of the security is traded at the market and **(2)** Market price is an accurate price for the security that is traded in any market and gather the information which is important for a transaction that is always unfavorable for the new information which is coming.

On the other side, there is a reason that stock does not contain correct information and also investors will not gather better information. Which may be the output of inefficiency and reject EMH (Aumeboonsuke and Dryver, 2014). For any implication, the idea of EMH has not been considered. The market reflects all periodic events which are argued by the study (i.e, past, present, and future events), moreover with price changes it does not show a relationship. In 1965, Samuelson in modern economic literature made a new revenue by enlarging the work of Bachelier (1900).

It proposes that if the price will rise it will have already increased and creates a bonding with random ups and down behaviors with changes in prices. EMH phenomenon has become a major challenge by academic scholars. The great changes in prices are followed by great changes in daily prices as the study observed. Changes are positive and negative which is happen means price changes are random and it

cannot impact investment decisions with efficiency.

For the new approach of market efficiency from 1965 to 1998 Famas studies on market, efficiency is developed. Changes in prices are connected with individual securities as concluded from many debates from the 1960s to 1970s. Fama and French, (1988) show evidence and are connected with the hypothesis that prices show information. Practically EMH was subdivided in 1967 by Robert which then extended the idea of Robert, Fama discover the word efficient market. The idea of efficiency covers different groups in the parameters of economics and finance. In 1970, Fama describes market efficiency into three groups which are weak form, semi-strong form, and a strong form of efficiency based on given information. Following are the different groups that are proposed by Fama based on available information.

1.1.1.1 Weak Form of Efficiency

It is the weak form of efficiency which defines that a market is a weak form of efficiency if historical information is reflected by the current prices in the context of past prices. This means that previous prices cannot be used to judge future prices. According to Truong (2006), it means no investor can earn an abnormal return by using historical prices.

1.1.1.2 Semi Strong Form of Efficiency

It is the second form of efficiency which indicates that public information is reflected by the current prices for example information about money supply, exchange rate, dividend announcements and stock splits, etc. It indicates that it is not for the traders to earn abnormal returns by using published information. It is because with the arrival of good or bad news market adjusts the prices connected by published reports (Truong, 2006).

1.1.1.3 Strong Form of Efficiency

A strong form of efficiency indicates that securities show all information with both public and private information. It is strict to get private information for any

market as this form indicates because insider information cost is zero. In reality, this form does not realize to hold.

In 1970, Fama creates his hypothesis for EMH with a statement known as security prices which reflect information. Study shows that prices reflect information to the point where marginal benefits on the information do not cross marginal costs. In 1998, Fama also tells that alternative describes the range of outcomes good for market efficiency, which is that the expected value of abnormal returns is zero.

In 2003, Malkiel criticizes the EMH that stock prices cannot be predicted and suggested that prices are predicted. For the response of Famas argument, it states when new information comes it transfers quickly and is stuck in the prices without any delay. If information flow is unimpeded and quickly incorporated in stock prices then-incoming news changes in coming prices will be reflected as said by Malkiel. So, past price changes to predict future prices and analysis help an investor to select stock based on a comparison of earnings. Markets are efficient because judgments are also wrong at some point in time as there is always rationality in the market.

1.2 Gap Analysis

There is a lot of research that has been done in the literature on financial economics on return in financial markets. Commonly the various studies are done on analyzing return linkage across countries. Many of the researchers explain that information that occurred in one market is transmitted to another market through the contagion effect.

Thats why any type of information that is occurred in one market impacts the mean of the other markets (Hamao, Masulis, & Ng, 1990; King & Wadhwani, 1990; Engle & Susmel, 1993; Lin, Engle, & Ito, 1994; Karolyi, 1995; Nieh & Lee, 2001; Franck & Young, 1972; Pan et al., 2007). There exists a research gap between the instability of stock return predictability and its linkage with COVID-19. According to Liao & Suen, (2006), Hong, Bian, & Lee, (2021) and Hong et al., (2021) may be break for S&P 500 and DJIA return prediction models. For

this break may increases in the return predictability. So, for market participants pandemic information which maybe found by the market.

1.3 Problem Statement

The economic activity decreased because of the spread of coronavirus. Investors feel sorry about investing in equity markets due to Covid-19. pandemic. Most importantly due to the lockdown policy, people are not participating in investment activities. There is also an effect of Covid-19 on volatility due to economic activities decline, the aviation industry is stagnant and roads are blocked. For this purpose, this study provides an insight to the international investors to invest in those stock markets which are less influenced by the pandemic. So, thats why it is necessary to find out that during the Covid-19 period shocks from the volatility market impact the stock market or not. In addition to this, this research gives an insight that to make changes in the price of equity markets which impact the volatility stock market during the period of Covid-19.

1.4 Research Questions

Research questions of this study are following:

Research Question 1

Does the news of pandemics creates abnormal return in the stock market?

Research Question 2

Does the Covid-19 influence the equity return?

Research Question 3

Is there any difference in return behavior due to local news and global news?

1.5 Objectives of the Study

The primary objectives of the study are given below:

Research Objective 1

To analyses the effect of covid-19 announcements on Stock Markets.

Research Objective 2

To analyze the effect of covid-19 on the return of the stock markets.

Research Objective 3

To study the impact in return due to local and global news.

1.6 Significance of the Study

Due to globalization, we all know that markets are connected. Investors who make their investment globally have the risk because of the COVID-19 pandemic. Overseas investors require insight into volatility and return during the period of COVID-19 so that they can invest in those equity markets which are less impacted by the global COVID-19 pandemic. Investors should also have information about the volatility of the stock market through shocks of financial markets. In addition to this, they also made a portfolio diversification to split up their risk in those stock markets which are less impacted by the COVID-19 pandemic.

Equity markets are the sign so that the economic activity of future periods can be forecast by looking at the cash flows of the equity market. In the equity market because of the pandemic when prices decrease, it gives the sign that future period economic activity will be decreased. Therefore, we can say that equity markets are the sign of the decrease in demand and the stock market demand can be forecast by looking at the cash flows of financial markets. This study is significant as there is no study done before which determines the effect of Covid-19 on both emerging & developed countries. So, this study help investor‘s portfolio and managers in deciding which stock market is better to invest during Covid-19 pandemic.

1.7 Plan of the Study

This study is planned and split up into five Chapters. Chapter 1 is composed of the introduction, theoretical background, gap analysis, problem statement, research

questions, the objective of the study, and signicance of the study. Chapter 2 covers a review of several studies of existing literature and provides a way to the relevance and outcome of this study.

Chapter 3 is based on methodology explaining about data description, population and sample of study, econometric model, GARCH, description of variables, relative strength index, money flow index change in daily confirmed and death cases, in the connection between investor sentiment and stock market index, the difference in difference approach and descriptive statistics. Chapter 4 comprises of analysis of data and results. Chapter 5 summarizes all conclusion, recommendations of this study and have a few recommendations for further future studies.

Chapter 2

Literature Review

Various stock market explains the volatility and return. The literature review of this portion is divided into two parts. The first part of this study describes the Asian markets response to the pessimism of historic pandemics and the second part discusses the market return and volatility dynamics of the Asian market.

2.1 Asian Markets Response to the Pessimism of Pandemics

There are various types of pandemics in this world. In literature, the previous pandemics are Spanish Flue, SARS, EBOLA virus and HIV/AIDS. Recently the world is facing with new virus i.e, the COVID-19 pandemic which has attacked the markets of the world worse. The literature has described the influence of pandemics on world markets by using the event study approach, market model, regression model, GARCH based approach, etc. In the 21st century, the first virus was the Severe Acute Respiratory Syndrome which is known as (SARS). It was started in China during the last month of 2002, it was transferred to 29 countries in which there were 813 deaths and 8000 cases. During this period most of the countries were impacted by the SARS pandemic. The economy of Hong Kong was badly destroyed due to an unexpected decline in demand for consumer products and the services that were exported (Siu & Wong, 2004). SARS hurt the stock returns of China (Nippani & Washer, 2004). Besides, the countries which were le-

-ss affected are Indonesia, Thailand, Brazil, Canada and Singapore. For that purpose daily data was used based on two periods i.e, the SARS period and the Pre-SARS period. To test the significance between the SARS period and stock returns of impacted countries the event study was used.

According to Chong, Lu, & Wong, (2010), event study analysis suggests that there was an effect of SARS on the Chinese economy. So pharmaceutical and the tourism industry were the two returns of the Chinese economy when the stock returns of the pharmaceutical industry and tourism industry were used for examining the impact of SARS. In the tourism industry the abnormal returns were found to be insignificant that explains that the performance of the tourism industry dropped and after the SARS outbreak performance of the pharmaceutical industry was very good. According to Lee and Mckibbin (2004) effect of SARS on the global economy was investigated by using the Asia-Pacific G-cubed model. For this purpose daily data was used which was based on the first case reported in the year 2003 in Asia-Pacific belt. Another study examined that Chinas economy was at the receiving end of SARS. The fixed exchange rate suspended the costs of SARS. One other thing to note was the decline of one country had an impact on the economy of another country due to the globalization of financial markets.

Because of the decreasing number of tourists and visitors, the number of Taiwans economy during the SARS was affected. For the analysis, the social accounting matrix and general equilibrium model were used. In this pandemic, employment and GDP were impacted by the number of tourists and visitors as they identified. Another study was about the focus on the service sector of Singapore during the SARS pandemic as described by (Lee & Warner, 2006). A two-pronged methodology was used by collecting information related to SARS through certain links, then other is that they do site research by taking interviews of the Singapore economy. In the Singapore economy service sector, consumer demand and labor demand were negatively impacted due to unforeseen situations of the SARS economy.

Chou, Kuo, & Peng, (2004) used a multiregional computable general equilibrium model to test the impact of SARS based on short-term shocks to the service sector of Taiwan. For this purpose 16 regions and 31 sectors for the analysis were used. As compared with mainland China results showed that Taiwan was impacted by

the SARS epidemic moderately, it was because of a high decrease in the tourism industry. By the event study methodology Taiwan hotel industry stocks were analyzed (Chen, Jang, & Kim, 2007). Due to unforeseen conditions of the SARS pandemic negative cumulative abnormal returns were recorded. Thats why hotel stocks of Taiwan were matched with the SARS announcement.

To analyze the co-movement relationship between Asian countries indices co-integration analysis technique was used during the SARS outbreak. For stock markets daily data of China, Singapore, Taiwan and Indonesia were used which covers the period of January 1, 2001, to February 25, 2003 as pre-crisis period and February 26, 2003 to December 31, 2004 as SARS period. Asian financial markets come very close to each other due to the Sars outbreak in the unforeseen situation of pandemic (Bhuyan, Lin, & Ricci, 2010). According to David, Incio Jr, & Machado, (2021) the same methodology was used on the stock price data of developed economies like Japan, Germany, the U.S, France and Itlay. SARS, Ebola and HIV/AIDS create abnormal movement which was transferred to these financial markets. For the analysis, 79 days of infected cases of four diseases were used. Results shosws that large the number if cases, large will be the decrease in cash flows of financial markets.

By using the weekly data of stock indices covering the period of 1998 to 2008 which is five years before the SARS outbreak (M.-P. Chen, Lee, Lin, & Chen, 2018) investigated the long-term co-movement strength between China and Asian countries i.e, Taiwan, Singapore and Indonesia. To test whether the pandemic had strengthened the long-term relationship between China and other Asian stock markets time-varying co-integration technique was used. But the study showed that long-term relationships in the financial markets weaken due to pandemics. As it is experienced in the past that global pandemics and the tourism industry have a good bonding with each other. Whenever health-related issues occurred then it had difficulties on the stocks of tourism in the impacted country.

Spanish Flu began in March 1918 during the end of world war. It resulted in the death of 50 million people. Then the second wave was more dangerous and which was started from September to November 1918, then even more people suffered from the third wave in 1919 (Patterson & Pyle, 1991). The effect of the Spanish

Flu on stock markets of European and US countries was felt by (Noy & Uher, 2021). By using panel regression model compared the rates with stock markets returns and found that stock markets acted negatively during the Spanish Flu. To test the effect of a pandemic on the Swedish economy an extension of the difference of different approaches was used and their results show the negative bonding with the capital incomes of Sweden.

Recently on March 23, 2014, WHO announced another disease known as the Ebola virus disease (DEVD). By this disease in Southeastern Guinea first case was recorded. Then with the time 39 deaths and 49 cases were recorded. This virus was transmitted from diseased animals to humans (Sifolo & Sifolo, 2015). Via direct contact with blood or bloody fluids from one human to other human from the infected person, it was transferred. When EVD news was announced in the market, then it created a great effect on the financial markets.

According to Ichev & Marin, (2018) event study, there is an important influence of the virus on stock returns of the U.S. For the Ebola outbreak, 2014-2016 one-factor model and two-factor model were used. Their ndings suggested that events like the Ebola outbreak were followed by negative returns in the nancial markets. Therefore, this virus a the tourism industry and has a good deal with the economic growth of a country. Sifolo & Sifolo, (2015) find that Ebola largely affected the Tanzania tourism sector.

Public health emergencies had a direct and indirect impact on the economy of developed and emerging countries. COVID-19 created a critical bonding between the stock market and the oil market. By Salisu & Akanni, (2020) analysis was done on the oil stock nexus in the COVID-19 pandemic in which they search the reaction of stock market and oil market shocks of COVID-19 pandemic. This study used the event study by using the data of stock prices of US, UK, Brazil, Indonesia, Canada, China, Singapore and Germany oil prices. Like this negative stock was shown by the impulse response function during a difficult time. In this regard financial markets performed in a well-mannered way during the pandemic in which the fiscal policies make strong decisions to address the cash flows of the stock market. GARCH model was used by Prabheesh et al., (2020) who used the time-varying conditional correlation in four Asian countries which are China,

India, Japan and Korea in February, March, April and May 2020. The sample period was starting from January 1, 2020 to June 8, 2020. The month of March was considered to be a good bonding for four stock markets. Moreover, during the pandemic COVID-19, there was a positive movement in Asian countries and stock market.

Sherif, (2020) used panel data analysis for testing the UK conventional index UK (FTSE 100), Dow Jones sharia-compliant index and other 10 UK sectorial indices. The period for daily data stock returns was from 20th January 2020 to 20th May 2020. As compared to the FTSE-100 index Islamic Dow index appeared to be less exposed in the COVID-19 pandemic. The IT-based sector was performing well during a pandemic and the consumer sector was not performing as well as IT sector. Financial reforms make the conventional equity market indices well that were exposed to risk. Ashraf, (2020) used the panel data technique methodology in which daily data of impacted financial markets from 64 countries from the period of 22nd January 2020 to 17th April 2020. These findings indicated that due to the impacted cases equity market response was negative in comparison to the deaths rate due to the pandemic of COVID.

From China, during COVID-19 the center was transferred to the rest of the globe that affected the financial markets in all the world, and during this time equity and stock markets were more at stake. By taking MSCI indices through the process of GARCH the most impacted countries were the US, UK, China, Germany, France, Spain, Switzerland, Itlay and South Korea were discussed. The sample period in this regard is from 1st January 2020 till March 20th, 2020. Casualties were used in three steps. When casualties enlarge in China the US market becomes less volatile in 1st step.

When casualties increased in the second step in Europe the American financial market volatility was impacted. In the last step when casualties increased in the US, the China market was brought back to European markets, and when epidermic becomes pandemic the US market volatility was high. The increasing death level has direct bonding with the financial markets volatility and its the reason is that center transferred from China to Europe and then to the United States. The impact of a pandemic on the volatility of WTI, Brent, Gas, Silver

and Gold was studied by Lahmiri & Bekiros, (2020) seven major world markets. The daily closing prices period is from August 01, 2019, to December 31, 2019, as pre-pandemic and the COVID time was from January 2, 2020 to May 26, 2020. Results about the S&P500 index volatility and precious metals volatility were affected by the pandemic as compared to stock markets volatility.

Due to COVID, the equity index of S&P500 was found to be more volatile in comparison of other markets. More commonly WTI was more volatile than Brent. Investors faced financial distress around the world by the COVID-19 pandemic. By using the regression analysis the death cases ratio by the COVID-19 was noticed with the financial market volatility index. The financial volatility was increased due to the new cases ratios increased as proposed by (Albulescu, 2020).

The relationship between the investor and volatility during pandemic COVID-19 was proposed by (Huang & Zheng, 2020) by using the Granger co-integration method. The crude oil market volatility index was used by investors and WTI prices were used as a proxy for the oil market. For analysis daily data was used from January 2, 2020 to May 11, 2020. Their study explained that there were two structural breaks in COVID. They showed a significant relationship in vestor sentiment. The second change was stronger than the first change. By investor attitude, stock market volatility is stronger in the COVID period. According to Sharma, (2021) in the pandemic COVID-19 Asian market volatility is also affected.

Sharma used the daily data of five economies i.e, South Korea, Singapore, Russia, Hong Kong and Japan and its period was from 1st January 2020 to 25th September 2020. GARCH based model was used for these economies. COVID-19 pandemic influenced the volatility of these countries like Singapore, Japan, South Korea. The volatility level of these countries like Hong Kong and Russia was not impacted. To study the between the Japanese stock market and Japanese Yen GARCH model was used in the COVID-19 pandemic. As compared to pre- COVID time the level of bonding between the stock returns and exchange rate was strong during a pandemic. According to Narayan, Devpura, & Wang, (2020) depreciation of the Japanese currency was because of a decrease in the stock returns of Japans financial market and due to this depreciation value of Japanese currency also decreased during the COVID-19 pandemic.

Firstly, Chinas pandemic COVID-19 showed great influence on the Chinese insurance market. For this purpose month-wise data was taken from the year 2018, 2019 and 2020 which was based on the Chinese insurance market and this was considered as a good step. In panel data, a fixed impact model is used in which data of 29 provinces taken. This outcome showed the increased number of cases, and growth premium and gross premium were decreased. According to Wang, Ma, Niu, & He, (2020) by the pandemic property insurance premium was impacted as compared to personal insurance premium.

Two important structural changes about the Indian economy which were goods, services and taxes was investigated on the Indian financial market for the pandemic fear. Net foreign institutional investment data and exchange rates data were used from the time of 3rd January 2020 to 30th April 2020. Then to determine the impact of COVID on the financial market of India Markov Switching VAR nonlinear dynamic model was used. Negative stock returns, negative growth and more volatility were the outcomes for the pandemic COVID-19. Therefore, there was a huge influence on Indian stock market returns.

Anh & Gan, (2020) used the regression model to examine the impact of pre-lock down on the equity returns of stock markets. Stock returns daily data was used from the time of 30th January 2020 to May 30th, 2020, and their outcomes showed a negative influence on the equity returns during pre lockdown. While then there was a positive effect on the equity performance of the financial market. Good macroeconomic policies provide investors good confidence due to which in the country economic activity record high. Due to coronavirus human life was disturbed.

The empirical research was done by (ztrk, iman, Uslu, & tak, 2020) for the Turkish financial market in which they used panel data analysis. On the Turkish metal products, insurance, banking, machinery, sports, sectors and retail trade fixed impact model was applied from the time of 2nd January 2020 to 15th April 2020. For the analysis number of coronavirus cases, volatility index and Turkeys daily default credit swap were used. By the increasing number of COVID cases stock indices of the industry were impacted. As compared to other sectors retail and wholesale sectors were less impacted. Therefore, the behaviour of investors towards

the other sectors changed as time passed, and support by the government become more clear.

Through the event study conducted by S. Singh, Mathur, & Kumar twenty-six stocks of Borsa Istanbul financial market returns were examined, in this, they find the negative cumulative average abnormal returns. In addition to this due to the pandemic COVID-19, they find the sport industry and transportation industry mostly affected. In March 2020 standard and poor index (S&P-100) analyzed the 1500 firms of the United States. In history, the big break by the stock prices was discussed through event study analysis. Some of the stocks during pandemic COVID-19 performed abnormally which were the food sector, natural gas sector and health sector. While according to Mazur, Dang, & Vega, (2021) hospitality sector, real estate sector and petroleum industry were declined.

From March 4, 2019 to April 22, 2020 an event study analysis was used to determine the effect of the COVID announcement by WHO on the stock returns of Japan, China, India, South Korea and Hong Kong. As compared to pre-COVID time market adjusted model and mean adjusted model produced the negative returns after the announcement of COVID. In addition to this after the COVID-19 pandemic cumulative abnormal returns and abnormal returns were recorded negative. The effect of the COVID emergency on stock prices of 21 impacted countries which were Itlay, Australia, France, the US and Japan etc is discussed by (Liu et al., 2020). The data of stock market returns covered the time from 21st February 2019 to 18th, March 2020. Therefore, the event study showed the negative relationship between COVID and stock returns. Asian markets were very near during the receiving end for COVID.

For the pessimistic situation of COVID in the worlds leading airline industries event study methodology was used. When the rst case was reported outside China and the announcement of WHO to declare the outbreak as a pandemic had a signcant impact on the returns of the airline industry. Similarly, the overreaction by the global travel ban and pandemic news had put the stocks of the airline industry into a free fall most commonly according to (Maneenop & Kotcharin, 2020) in the US, UK, Canada and Australia were the fewer performers. Susan (2020) by using regression analysis realized the bonding between the stock returns

of the US and China with a high number of impact cases of COVID-19. Stock market returns were used from March 1, 2020 to March 25, 2020.

Shanghai Index results finding shows a positive connection in stock markets which had a direct impact on stock returns of Shanghai Index. Stock returns of Pakistans performance were discussed during the first half of the pandemic with positive cases and recoveries by using data of PSX100 index returns. Simple regression analysis by (Ahmed, 2020) was used by taking the dependent variable of stock market prices of Pakistan and the independent variable of positive cases of Pakistan and recoveries. Outcomes show the market performance of Pakistan has a negative connection with the mortality rates and there is a positive connection with the recovery and the stock performance was impacted by the recovery rates.

During the difficult time of COVID-19 for stock markets, the reaction of financial markets was extended by co-integration analysis and Nonlinear Autoregressive Distributive Lag approach of UK, US, Germany and Itlay. The period for this was from 10 February 2020 to 9 April 2020. According to Szulc & Smith, (2021) results showed that there was the existence of long-run co-integration in the economic health and stock markets. For this purpose mortality rates were used according to their study. US stock markets were negatively impacted by the economic crisis. If we talked about Spains COVID-19 pandemic creating a lot of damages to the stock market in comparison to the health crisis, In the long run, Itlay had different conditions. Same as in the German stock market economic uncertainty created by the COVID-19 pandemic was very high which was followed by the equity market.

Albulescu, (2020) used the approach which is named ARDL in which they examined the link between daily corona cases with financial market volatility index. The time used was the early days of the COVID-19 pandemic, which started from January 21, 2020 to March 9, 2020. In financial volatility, the existence of negative short-run and long-run co-movement was detected. In this scenario, new cases of corona stopped the economy of the world which in turn impacted the stock market. To test the significance between daily cases reported and in total deaths (Zeren & HIZARCI, 2020) used the Maki co-integration analysis technique with most Covid impacted countries i.e, Itlay, France, China, Germany, Spain and South Korea and period for this is from January 23, 2020 to March 19, 2020. Co-integrates with

total impacted cases were found in Spain, China and the Korean stock market. This means that the financial markets which were less impacted investors should invest in those markets.

According to Topcu & Gulal, (2020) the Driscoll-Kraay estimator explains that there exists a negative impact of the COVID-19 pandemic on the emerging markets during March, but April it showed negative results. For which the sample period time was in three steps that is March 10th to March 31st, March 10th to April 10th and March 10th to April 17th. In this regard data of exchange rates, infection rates and stock prices were used. The highest effect on Asian emerging markets and lowest effect on European markets in 26 emerging countries was discovered.

In the world media is another source of high volatility. The media coverage index was used by (Haroon & Rizvi, 2020) which is related to covid news. Data contains the world index and Dow Jones index which is started from 1st, January 2020 to 30th, April 2020. They realized that the world index had a direct connection with the panic index volatility. On the US market volatility of negative sentiments there exists an opposite impact and therefore, media coverage shows less volatility in world markets.

Therefore, it is hard to assess the investors prediction because it is just like a roller coaster for making good results and policies about the portfolio. By the corona virus, outbreak government intervention was the important element to survive the economic crisis. In developed a regression model for the period of January 22nd, 2020 to April 17th, 2020 with a sample of 77 countries. The result provided a strong connection in equity returns and government. In the indexes, three types of government responses were used to identify the nexus in the government intervention and equity returns which are health index, strictness index and economic support index. They find the indirect positive and direct negative bonding between the index and stock market returns which shows that social distancing is panic for stock returns because of termination to economic activities. Besides, this strictness index helped in decreasing the number of coronavirus cases which will be positive stock markets later. On the equity market returns testing, health and quarantine policies had a positive effect. Public awareness programs and social distancing by the government were very effective for the financial markets progress.

For the betterment of the economy during difficult times of covid policy intervention had an important role. According to Zeren & HIZARCI, (2020) pandemic influence on the stock returns of equity markets that are Korea, Japan, Iran and Singapore. From December 31st, 2019 till March 27th, 2020 patterns of standard deviation for financial markets were used. To study the risk factor of the financial markets daily coronavirus infection cases were used for the analysis.

These patterns tell that there is an increase in the risk factor from February to March. This risk factor for all the countries has increased from an average of 0.0071 in February to 0.0196 in March. The COVID-19 is acting like once in a century because of its impact on the world economy according to (Gates, 2020). The risk factors can be decreased by the macroeconomic policies which are zero-interest policy and unlimited easing.

The analysis shows that stock market returns are not only impacted by the COVID-19 pandemic but it was impacted by the health steps taken by the government. By the global pandemic, market efficiency cannot be measured but it can be measured by making the proper rules. The economic system and health system are supported by macroeconomic policies in which it has a great influence on the volatility of financial markets other than pandemic COVID-19. As compared to Itlay whose drop line is 30% Switzerlands drop line is 11% because of the good health system of Itlay. According to Capelle-Blancard & Desroziers, (2020) economic policies during worse high conditions have a big influence on the financial market performance.

The Asian market is in so relationship with each other that a shock in the Asian market during some financial issues have an indirect and direct impact on the returns of another stock market. Likewise, market return and volatility from the stock market can be used to predict the volatility of the Asian market. The association between the stock market and the Asian market is a very deep topic for the researchers most importantly in the area of global economic events. In the world pandemic issues has some significance on the returns of the stock market and equity markets. Thats why other equity markets are influenced when volatility is high in one market. Between the financial markets, some studies have discussed return and volatility connections. By using the bivariate GARCH model Sakthivel,

Bodkhe, & Kamaiah, (2012) explore the spillover in financial markets. The sample of five developed equity markets which are Japan, Australia, India, the UK and the US is taken and bidirectional volatility is observed in the United States and India that indicate that there is a strong relationship between the two economies. In the case of Japan and the United Kingdom to India, the unidirectional spillover is seen. Pan and Hsueh (1990) examine the United States and Japan equity markets for volatility and return transmission. The period of 1989 to 1993 is used for analysis. Returns and volatility of Japans equity market can be predicted from the return and volatility of the US equity market.

Koutmos & Booth, (1995) insight Tokyo stock exchange, New York stock exchange and London stock exchange from volatility transmission. Multivariate GARCH model is used on the daily stock returns which cover the time of 1986 to 1993. There exists return spillover and volatility spillover from the US equity market to the UK equity market. Further outcomes show the asymmetry in all markets. In all equity markets there exist negative variations which have more effect the volatility of equity markets in comparison to positive variations.

Theodossiou & Lee, (1993) find the interdependence in equity markets by taking weekly data for stock returns from the time of 1980 to 1991. The outcomes of their study explain that the returns of the US impact the returns of the UK, Canada and German financial markets. Likewise, the German stock market returns affect the returns of Japans equity markets. For all the equity markets the forecasted volatility has no value to predict returns. US stock market can be used to predict the volatility of the other four equity markets.

Canadian financial market predicts the UK market volatility and like this German equity market predicts the Japan equity market. The event study model is used to test the volatility relationship between South Africa index and some other developed markets i.e, China, UK, Germany and US and its data is from 1995 to 2007. In all the financial markets bad news create more volatility, returns and volatility spillover exist in other indices and South Africa. Further more according to(Chinzara & Aziakpono, (2009) quick transmission is found in the US, China and Australia and quick transmission is due to the negative investor sentiment. Nath Mukherjee & Mishra, (2010) examine the newly emerging Indian stock market and

the Asian counterparts for volatility spillover and market integration.

GARCH model is used to find the impact of 12 Asian equity markets on Indian equity markets. Indices with their opening and closing prices are taken from 1997 to 2008. Its main objective is to test the spillover in trading and non-trading hours. The outcomes show that only Srilanka stock market has no impact on the Indian stock market. In case of returns spillover all financial market returns have a two-way relationship with the Indian stock market. More results show that the Asian portion influences Indias financial market highly. From India to other Asian countries non-trading hours volatility is found to be weak.

A lot of empirical work has been done in which event study methodology is adopted to assess the impact of a shock on asset prices. The study of Ruiz and Barrero (1920) about stock market volatility and price reactions as a response to market shock adopted an event study approach to investigate the effect of the 2010 Chilean natural disaster on the stock market. Empirical outcomes show the responses about abnormal returns and rise in stock market volatility which is impacted by the earth quake shocks, in which te stocks is some sectors i.e, banking, construction and retail had experienced positive (L. Wang et al., 2020) use the GARCH models and examine that how natural disasters impact stocks in the insurance industry. Moreover, wealth impacts in the insurance market indicate that the wealth in these two markets was redistributed.

Sorescu, Warren, & Ertekin, (2017) describe that the event study approach is based on an efficient market hypothesis in which the new information in the market enters and is received by the investors were the outcomes of unexpected events influence future and current asset prices. Another approach to measure the impact of an event on idiosyncratic volatility by using the GARCH (1 1) model to estimate the abnormal returns due to the spin-off statement of the selected portfolio developed by (Hilliard & Savickas, 2002). This study suggests that the corporate spin-off statement impacted the volatility of the parent companys idiosyncratic asset returns. This approach is a subscription of the studies discussed before on the impact of events on the volatility of asset returns, which is composed by the authors with the nonparametric method significance test for the assessment of abnormal returns, which connect with event-induces volatility developed by (Bo-

-ehmer, Masumeci, & Poulsen, 1991).

The event study method was first composed by Dolley before the Ball and Brown and Famaet as believed by Mackinlay. According to event study theory when the efficient market hypothesis is clear then the impact of the event will be thrown back in the change of stock price, to describe the impact of return on stocks to information. So, the event study is used in finance and economics to explain the effect of events. Like for example Agrawal and Kamakura gives the impact of celebrity endorsement with the analysis of abnormal stock returns.

In addition to this similar studies on the effect of diseases on the stock market have used the event study method. Where as, Wang et al., tells that how outbreaks of infectious diseases impacted the performance of biotechnology stocks. Taiwans biotechnology industry had abnormal returns based on infectious diseases. Event study methodology is used to investigate the abnormal returns (ARs) and cumulative abnormal returns (CARs) of the stock indices of impacted countries in the COVID-19 pandemic. To examine the uncertain impact on the returns on the instruments such as crude oil, gold and bitcoins etc several studies have been conducted. According to Aysan, Demir, Gozgor, & Lau, (2019) he found the long returns on bitcoin which is considered as the dependent variable with the period of July 2010 to November 2017. They used the Bayesian Graphical Structural vector autoregressive (BGSVA) model with the Ordinary Least Squares (OLS) and Quantile on Quantile (QQ) regression estimation to estimate the power of economic policy index on daily returns.

For this purpose, they used 60 days rolling estimation window in which a positive effect at large quantiles recommended bitcoin as a good instrument for hedging is found. Bilgin, Gozgor, Lau, & Sheng, (2018) found the effect of four uncertainty measures on gold prices, in which they used the nonlinear autoregressive distributed lag (ARDL) model. This data is monthly From January 1997 to May 2017 to find the rise in EPU to rise in gold prices. The effect of uncertainty measures on gold volatility and returns is studied by (Pandey & Kumari, 2021) by using the BGSVA model. This sample data was taken from February 1997 to December 2017. In which they have seen that gold prices depend on the lagged values of the US real effective exchange rate returns. To study the effect of an

event on securities returns over the event period event study method is one of the most common methods.

According to B. Singh, Dhall, Narang, & Rawat, (2020) event study facilitates forecasting that how indices will react in connection to the announcement of an event. On the prices of stocks, the event announcement may have a positive or negative effect. Similarly, the most often event study approach is used to examine the connection in the occurrence of corporate events such as splits, bonus shares, amalgamation, stock dividends and mergers and acquisitions etc. Some researchers such as (Chen et al., 2018; Liu et al., 2020; Pendell & Cho, 2013) use the event study method to investigate the effect of a non-corporate event for example outbreak of the disease on stock markets.

Between the stock market and certain equity markets there is volatility and return transmission as suggested by (Arouri, Lahiani, & Nguyen, 2011). Daily equity market prices of Kuwait, Oman, Qatar, UAE and Saudi Arabia are from 2005 to 2010. Equity prices are used in comparison with the stock markets. Higher volatility of six-member Gulf Corporation Council financial markets gives the result that high stock market volatility, it is due to ups and down in the international stock market prices. Stock market comparison with GCC countries will help in improving the risk of uncertainty that occurred due to global financial issues.

Harjoto et al (2020) use (WHO announcement) on March 11, 2020 and the Federal Reserve Bank announcement on April 9, 2020 as a two events that explains the shock and the stimulus show that COVID-19 is a negative shock to the global stock markets more importantly in emerging markets. Other results show that US stock market has a positive abnormal return from the fed stimulus in comparison to emerging markets and other developed countries. In their study they also tell that positive abnormal returns in the stimulus are observed by the US firms. The main part here to be discussed is that it is necessary to investigate the volatility spillover in stock markets during the COVID-19 pandemic. Pandemic has a great impact on the world major markets and stock markets, so the difference in across equity market is needed to be investigated in the part of volatility spillover. Emerging markets and developed markets have a strong relationship that may also be influenced by the pandemic.

2.2 Hypothesis of the Study

The following hypothesis are formulated:

H1: There is a significant impact of Covid-19 on the Stock Markets of Asian Countries.

H2: There is a significant effect of Covid-19 on the return of selected stock markets.

Chapter 3

Research Methodology and Data Description

The research methodology is split into two parts. The first part discusses the events study conducted for the fourteen developed markets and emerging markets. These are the US, UK, Japan, France, Germany, Italy, Brazil, China, Russia, South Africa, Pakistan, Indonesia, Australia and Canada. In the second part of the research methodology discusses the impact of COVID on the equity markets of emerging countries and developed countries in the period of the COVID-19 pandemic.

The time series data is used to detect the impact and amount of effects of COVID on market returns. Moreover, GARCH Model has been employed in the research to elaborate the volatility of those returns. Briefly GARCH is a model that assists in analyzing financial data into meaningful statistical information, for instance, fluctuation in returns over bonds, share and market indices. Secondary data sources are used for data collection. Daily data is taken over the period Jan 2018 - Dec 2020.

3.1 Data Description

3.1.1 Population and Sample of the Study

All developed and emerging countries with the stock markets are the population of this study. While the sample of the study consists of data about seven developed countries and seven emerging countries with the stock markets. Emerging economies include China, Brazil, Russia, Australia, Indonesia, South Africa and Pakistan, whereas developed countries include UK, US, Canada, Japan, France, Germany and Italy. These countries are selected based on the availability of data and there is no such study that explains the impact of covid on both emerging and developed stock markets.

Table 3.1 describes all about the indices used for the study with their country name and indexes. Generally, financial time series data is non-stationary, for this purpose we transform the closing prices of all the stock markets into returns.

TABLE 3.1: Emerging Stock Markets

S. No.	**Stock Market**	**Index**	**Country**
1	China Shanghai Composite Stock Market	SSE	China
2	Johannesburg Stock Exchange	JSE	South Africa
3	Moscow Stock Exchange	MOEX	Russia
4	Bolsa de Valores de Sao paulo	BOVESPA	Brazil
5	Pakistan Stock Exchange	KSE-100	Pakistan
6	ASX Stock Exchange	AORD	Australia
7	IDX Stock Market	JKSE-100	Indonesia

Table 3.2: Developed Stock Markets

S. No.	Stock Market	Index	Country
1	Frankfurt Stock Exchange	DAX	Germany
2	Tokyo Price Index	NIKKIE-225	Japan
3	London Stock Market	FTSC-100	UK
4	Nasdaq Composite Stock Market	GSPC-500	US
5	Toronto Stock Exchange	GSPTSC	Canada
6	Continuous Assisted Trading	CAC-40	France
7	Italy 50 Index	MIBTEL-30	Italy

3.2 Sample Technique

For this study, the purposive sampling technique has been used. Because the main purpose of this study is to explore the impact of covid on emerging and developed countries stock exchange.

3.3 Description of Variables

The main purpose of this study is to determine the impact of Covid on the equity markets of seven emerging and seven developed countries. For this purpose, daily data has been taken from 2018-2020. Therefore, returns are calculated by the following formula:

$$Return = ln\frac{P_t}{P_{t-1}} \tag{3.1}$$

Whereas:

Return= Return of stock market Index

ln = natural logarithm

P_t= current day prices at time "t"

$P_(t-1)$ = previous day prices at time "t-1"

3.4 Econometric Model

3.4.1 The Impact of COVID on Stock Return as an Event Study

This study explains the effect of COVID-19 on the return and volatility of the stock market returns by using an event study. To test the effect this study uses (-1, -180) as an estimation window to explain returns. The semi-Strong form hypothesis (all publicly available information regarding the prospects of a firm must be already reflected in the stock price) is examined as an Event Study.

The event study measures the normal returns by using the least square (OLS) and market model. To estimate the effect of the event for a specific time, we calculate abnormal returns and cumulative abnormal return. The event window used in this study is ten days.

An event is significant if its p-value is less than a certain threshold which is called a level of significance. The insignificant means that the p-value is over and above a certain threshold. This study estimates the normal returns through the market model using the least square estimation technique applied through the following equation.

$$ER_t = \beta + \beta Rm_t + \mu_t \tag{3.2}$$

Where ER_t is the expected return of the index at time t and Rm_t is the market return on day t with μ_t being the error term. α and β are the parameters to be estimated. Abnormal returns are calculated as under:

$$AR_t = R_t - ER_t \tag{3.3}$$

Here, ER_t is the expected return, R_t is the actual return and AR_t is the abnormal return on day t. The average abnormal return on day t is determined as:

$$AAR_t = \frac{\sum AR_t}{N} \tag{3.4}$$

So, cumulative abnormal return (CAR) of from $t-0$ to $t-1$ and cumulative average abnormal are calculated as under:

$$CAR_i(t_0, t_1) = \sum AR_t \tag{3.5}$$

$$CAAR_i(t_0, t_1) = \sum AAR_t \tag{3.6}$$

3.4.2 Impact of Covid on Equity Return and Volatility

To study the impact of Covid on return, the following equation can be considered:

$$R_t = \beta_0 + \beta_2.Covid \tag{3.7}$$

$$\sigma_t^2 = \gamma_0 + \gamma_1 \mu_{t-1}^2 + \gamma_2 \sigma_{t-1}^2 \tag{3.8}$$

Chapter 4

Data Analysis and Discussion

The main purpose of this research is to explore the impact of Covid on seven emerging and seven developed countries stock markets by taking data from 2018 to 2020.This section includes all the empirical results which are found by running the GARCH model. Descriptive Statistics is performed to determine the average mean and variability of data.

A unit root test is performed to check the stationarity of the data. Abnormal returns and cumulative abnormal returns are also determined for emerging and developed countries. It also identifies the effect of the COVID-19 pandemic on the equity market. It shows the estimates of volatility and return of the stock market estimated by using the GARCH model are influenced by Covid.

4.1 Descriptive Statistics

To know the behavior of the data we use descriptive statistics. Descriptive statistics determines the initial statistics. In the descriptive statistics, we see three things which are a measure of central tendency, location of the data and measure of dispersion. The measure of central tendency is used to seeing median and arithmetic mean, location of data is observed by for looking at the skewness and kurtosis. The measure of dispersion is the standard deviation of the data that shows the average risk per day. Whereas, Maximum and minimum values show high and low return as per the specific date of the specific market.

TABLE 4.1: Descriptive Test for the Period of 2018-2020 for Emerging Countries

	Mean	**Maximum**	**Minimum**	**Std. Dev.**	**Skewness**	**Kurtosis**
SSE	-0.0001	0.4685	-0.4351	0.0539	0.5834	40.7146
JSE	0.0004	0.2929	-0.297	0.0383	-0.8383	27.9824
MOEX	0.0003	1.0734	-1.0381	0.0874	-0.3128	73.3765
BOVESPA	0.0006	0.4802	-0.5074	0.0582	-1.2523	31.8738
KSE100	0.0000	0.3119	-0.3226	0.0412	-0.4857	30.5549
CAC40	0.0008	0.2527	-0.1485	0.0290	1.4880	33.3421
MIBTEL30	0.0000	0.5075	-0.4868	0.0766	0.3328	31.5657

Mean return measure the performance of the stock market indices of the selected developed and emerging countries. The descriptive statistics result shows that all the equity market indices have a positive return except China Shanghai Composite Stock Market (SSE) and Tokyo Price Index (NIKKIE-225) indicating the negative return of (0.01%) and (0.02%) per day respectively. The highest mean return is earned by the Continuous Assisted Trading (CAC-40) of about (0.08%) per day. Whereas the lowest mean return is shown by Tokyo Price Index (NIKKIE-225) which is (0.02%).

The standard deviation of the Moscow Stock Exchange (MOEX) is the highest among all equity market which is 8.74% indicating Moscow market is highly volatile as compared to other equity markets or we can say this market bear high risk. However, Continuous Assisted Trading (CAC-40) shows the lowest standard deviation (2.90%) among all equity markets indicating the market is less volatile and bearing less risk. Further maximum and minimum values show the highest a-

TABLE 4.2: Descriptive Test for the period of 2018-2020 for Developed Countries

	Mean	**Maximum**	**Minimum**	**Std. Dev.**	**Skewness**	**Kurtosis**
DAX	0.0004	0.2492	-0.2943	0.0453	-1.2822	22.4000
NIKKIE 225	-0.0002	-0.0004	0.0627	-0.0773	0.0127	8.5269
FTSC100	0.0001	0.2653	-0.2693	0.0407	-0.8876	24.8011
GSPC500	0.0002	0.2949	-0.2889	0.0445	0.3368	25.6921
GSPTSC	0.0003	0.2041	-0.3460	0.0447	-1.9987	25.1794
AORD	0.0001	0.2572	-0.2611	0.0369	-0.9036	25.0431
JKSE100	0.0003	0.2431	-0.2397	0.0405	-0.3431	17.6856

-nd lowest return earned per day by the equity market indices i.e. The highest-earning is shown by Moscow Stock Exchange (MOEX) which is (107.34%) and minimum loss earned per day is (103.81%), while for Bolsa de Valores de Sao Paulo (BOVESPA) highest gain is (48.02%) and loss is (50.74%) and so on. Results of kurtosis indicate that all the values of kurtosis are greater than 3, it means all the returns are leptokurtic and it indicates that there will be higher peaks as compared to normal distribution. Whereas results of skewness indicate that some equity markets are positively skewed and some are negatively skewed.

4.2 Stationarity of Data

In data analyzing, the first stage is about to feel of data, that whether data is stationary or non-stationary. Most of the time economically time series data is nonstationary, but when that data is converted into return series then it becomes stationary. It means that stationarity of data means that mean does not change and mean is constant. However variance may not constant. It means that data is heteroskedastic if the variance is not constant.

To detect the stationarity and heteroscedasticity of data, the most basic method is to plot the data and to see behavior of data through visualization whether it shows some known characteristics of stationary and heteroscedasticity. In the graphs, it is observed that for all the time series data and the year 2020 volatility is high which an indication of the COVID-19 effect.

4.2.1 Abnormal Return for Emerging Countries

Table 4.3 refers to the results of Abnormal returns and their significance for emerging markets. Abnormal returns of indices in emerging countries at a time T are shown in Table 4.2 from day 1 to 21. Interpretation of each country is described as follows:

China shows positive significant abnormal return at day t+2, t+3, t+4, t+5t+21. Whereas significant negative abnormal returns are shown at days t+2,t+3, t+4 and t+5. The highest abnormal return is shown at time t+6 which is 0.0349. Results of Chinese markets show significant results which indicates that shocks of Covid affect the stock returns of the Chinese market. Results of Brazil indicate all values of abnormal returns are significant for day t+2 to t+9. Thus, during the outbreak of the Covid Brazilian stock market is effected by shocks.

Abnormal returns of Russia indicate that Covid impacts Russian stock markets negatively and significantly. Highest abnormal return is shown at time t+8 which is 0.068. Hence significant results are shown except day 8 which showed insignificant results. Results of Australian stock markets indicate significant results except at day 17 which shows an insignificant result of 0.07. Likewise, insignificant and po-

Table 4.3: Abnormal Return for Emerging Markets

	China		Brazil		Russia		Australia		Indonesia		South Africa		Pakistan	
	AR	**T**	**AR**	**T**	**AR**	**T**	**AR**	**T**	**AR**	**T**	**AR**	**T**	**AR**	**T**
t+1	0.0005	0.1894	-0.0049	-0.9373	-0.0119	-2.3283	-0.0036	-0.3732	0.0849	0.0854	0.0242	0.0242	0.0183	0.0183
t+2	-0.0061	-2.1877	0.0125	2.4046	-0.0240	-4.7034	0.0033	0.3420	0.0169	0.0173	-0.0047	-0.0047	0.0040	0.0040
t+3	-0.0163	-5.8215	-0.0374	-7.1810	0.0179	3.5057	0.0124	1.2952	0.0085	0.0090	0.0057	0.0057	-0.0173	-0.0173
t+4	-0.0118	-4.2159	0.0344	6.6129	-0.0091	-1.7849	-0.0096	-1.0035	0.0228	0.0233	0.0131	0.0131	-0.0275	-0.0275
t+5	-0.0162	-5.7891	-0.0074	-1.4126	-0.0249	-4.8905	-0.0175	-1.8378	0.0000	-1.9996	0.0000	0.0000	0.0018	0.0018
t+6	0.0349	12.4759	-0.0191	-3.6643	-0.0107	-2.0986	-0.0076	0.0204	-0.0025	-0.0020	0.0136	-81.9864	0.0149	0.0149
t+7	-0.0128	-4.5604	-0.0106	-2.0396	-0.0164	-3.2117	0.0086	0.0252	-0.0179	-0.0175	0.0009	-384.9991	0.0084	-988.9916
t+8	-0.0492	-17.5624	-0.0840	-16.1397	0.0685	13.4374	-0.0027	-0.0021	-0.0069	-0.0065	0.0072	-1454.9928	0.0184	-4064.9816
t+9	0.0135	4.8264	0.0152	2.9268	-0.0061	-1.1974	0.0035	0.3698	0.0012	0.0016	-0.0249	-2336.0249	0.0034	-423.9966
t+10	-0.0192	-6.8596	-0.0078	-1.4933	0.0062	1.2077	-0.0085	0.0046	0.0002	0.0006	-0.0035	-1749.0035	-0.0011	-553.0011
t+11	-0.0280	-9.9991	-0.0495	-9.5052	0.0309	6.0702	0.0077	0.3759	-0.0169	-0.0165	0.0081	-771.9919	-0.0382	-1167.0382
t+12	-0.0075	-2.6962	-0.0113	-2.1718	0.0164	3.2124	-0.0120	-0.4777	-0.0158	-0.0153	0.0125	-4172.9875	-0.0179	-3499.0179
t+13	-0.0661	-23.6259	0.0000	0.0034	0.0110	2.1631	-0.0369	17.6561	-0.0112	-0.0108	-0.0008	-4.0008	-0.0214	-0.0214
t+14	-0.0257	-9.1789	-0.0208	-3.9908	-0.0251	-4.9187	-0.0026	-0.2747	-0.0467	-0.0463	-0.0029	-27.0029	0.0096	0.0096
t+15	-0.0144	-5.1493	0.0108	2.0665	0.0326	6.3911	-0.0055	-1.1936	0.0261	-37.9734	-0.0026	-11.0026	-0.0180	-0.0180
t+16	-0.0360	-12.8522	0.0188	3.6192	-0.0145	-2.8497	-0.0317	-0.0843	-0.0053	-0.0049	0.0477	-22.9523	-0.0127	-0.0127
t+17	-0.0073	-2.6109	0.0124	2.3754	-0.0035	-0.6879	0.0732	-0.1533	0.0016	-54.9980	-0.0057	-31.0057	0.0206	0.0206
t+18	0.0129	4.6176	0.1274	24.4824	-0.0057	-1.1249	-0.0077	-0.0004	0.0048	-106.9948	0.0125	-33.9875	0.0856	0.0856
t+19	-0.0040	-1.4206	0.0121	2.3231	-0.0009	-0.1712	-0.0014	-0.1517	0.0169	-103.9827	-0.0060	-128.0060	-0.0201	-0.0201
t+20	-0.0021	-0.7666	0.0025	0.4864	-0.0017	-0.3390	-0.0060	-0.6330	-0.0467	-103.0463	-0.0219	-155.0219	0.0050	0.0050
t+21	-0.0073	-2.5948	-0.0366	-7.0315	-0.0442	-8.6794	0.0007	-0.0087	0.0261	-129.9734	0.0083	-151.9917	-0.0028	-0.0028

Where "AR" denotes the Abnormal Return of the parameter of COVID slope, Values with the Abnormal Return denotes the "t" value of the parameter of COVID slope for Emerging Countries

-sitive abnormal return is showed by Indonesian stock market at dat t+1 which is 0.08 but from next days significant results are showed by the market which indicates that stock market of Indonesia is highly effected from the outbreak of Covid.

South Africas abnormal returns are significant as all the values are less than 0.05 so the stock market of South Africa highly responds more rapidly to the outbreak of Covid. Whereas the results of Pakistani stock market indicates significant results for day t+7 to t+12. It means the Pakistani stock market is also affected by Covid. So it is concluded from the results, China and South Africa are countries that are highly effected by Covid as they showed significant results from day 1 to 21. Whereas Brazil, Russia. Indonesia, Australia and Pakistan showed significant results for some days.

In this event study, the methodology represents the abnormal return on actual stock return and normal return, which is forecasted on the two inputs that are the relationship in the firms stock and its index i.e, express by the and . We measure the total effect of the event over a specific time, we add individual abnormal return. In contrast to this return, model is most commonly used here which describes that the actual returns that investors earn are the difference of the actual return.

4.2.2 Abnormal Return for Developed Countries

Table 4.4 refers to the results of Abnormal returns and their significance for developed markets. Below table shows the abnormal returns per day and the T value of the developed countries. We use the event study method to find out our results. Abnormal returns of the UK are significant except for day t+4,t+8, t+12, t+15 and t+19 which is 0.11. Significant results indicate that current day returns are different from expected return.The highest abnormal return for the UK is 0.11. For the US market, insignificant results have been shown except for the day t+11, t+12 ,t+19 which indicates that the US market is highly affected by covid but at time t+19 US market shows no volatility from covid. Abnormal returns of Canada indicate insignificant results for all days except for time t+8,t+12 and t+18 which is is also the highest abnormal interval for the Canada stock market.

Table 4.4: Abnormal Return for Developed Markets

	UK		US		Canda		Japan		France		Germany		Itlay	
	AR	**T**	**AR**	**T**	**AR**	**T**	**AR**	**T**	**AR**	**T**	**AR**	**T**	**AR**	**T**
t+1	0.0142	1.4601	0.0070	0.6786	-0.0010	-0.0775	0.0133	22.8033	0.0209	6.1318	0.0344	2.8010	0.0092	0.3711
t+2	0.0122	1.2555	-0.0168	-1.6341	-0.0161	-1.2140	0.0080	13.7738	0.0115	3.3650	-0.0138	-1.1256	-0.0173	-0.6955
t+3	-0.0154	-1.5812	-0.0157	-1.5236	-0.0026	-0.1973	0.0056	9.6480	0.0109	3.2063	0.0049	0.3995	0.0137	0.5511
t+4	-0.0251	-2.5725	-0.0141	-1.3672	-0.0218	-1.6379	0.0066	11.3124	0.0037	1.0776	-0.0086	-0.6996	-0.0063	-0.2522
t+5	-0.0067	-0.6906	0.0043	0.4135	0.0016	0.1206	-0.0010	-1.7565	-0.0019	-0.5671	0.0245	2.0000	0.0078	0.3150
t+6	0.0061	0.0041	-0.0013	-0.0019	0.0077	-0.0999	-0.0052	-0.3908	-0.0061	-0.0010	0.0595	0.0212	0.0130	0.0350
t+7	0.0053	0.5448	0.0170	1.6519	-0.0057	-0.4273	-0.0135	-0.6323	0.0028	0.8299	-0.0049	-0.4029	0.0263	1.0589
t+8	0.0208	2.1338	0.0068	0.6595	-0.0037	-0.2808	0.0099	0.3675	0.0038	1.1078	0.0080	0.6526	0.0239	0.9622
t+9	0.0028	0.2907	0.0015	0.1431	-0.0013	-0.0950	-0.0039	-0.1162	0.0103	3.0191	-0.0299	-2.4399	-0.0055	-0.2199
t+10	-0.0113	-1.1584	-0.0003	-0.0325	-0.0579	-4.3568	-0.0029	-0.0904	0.0025	0.7193	-0.0080	-0.6540	0.0036	0.1441
t+11	-0.0002	-0.0217	-0.0377	19.6799	-0.0028	0.0277	-0.0082	-0.3000	0.0033	-3.3776	0.0294	1.3859	-0.0315	-0.8991
t+12	-0.0220	-2.2596	-0.0286	-2.7867	0.1672	12.5827	-0.0001	-0.0073	-0.0030	-0.8696	0.0033	0.2663	-0.0120	-0.4823
t+13	-0.0169	-1.7322	0.0019	0.1874	0.0107	0.8062	-0.0107	-0.4503	-0.0034	-0.9908	0.0372	3.0332	-0.0225	-0.9052
t+14	-0.0160	-1.6440	0.0011	0.1109	-0.0073	-0.5497	-0.0140	-0.7054	0.0015	0.4436	-0.0398	-3.2477	0.0223	0.8985
t+15	0.1105	11.3270	-0.0120	-1.1704	-0.0259	-1.9485	-0.0119	-0.7036	0.0041	1.2044	0.0234	1.9044	0.0101	0.4047
t+16	0.0027	-0.1233	0.0092	0.0005	-0.0132	-0.4771	-0.0095	-1.0942	0.0107	3.1544	-0.0032	-0.0023	0.0081	-0.0090
t+17	0.0105	1.0758	0.0115	1.1185	-0.0046	-0.3448	0.0027	0.3080	0.0007	0.2198	0.0042	0.3385	-0.0325	-1.3081
t+18	-0.0136	-1.3899	-0.0011	-0.1030	-0.0301	-2.2665	-0.0129	6.2149	-0.0025	-0.7430	-0.0020	-0.1652	0.0092	0.3691
t+19	-0.0212	-2.1742	0.0802	7.8013	-0.0155	-1.1697	-0.0030	0.1836	-0.0942	-27.6353	0.0463	3.7729	-0.0227	-0.9145
t+20	-0.0049	-0.5000	0.0010	0.1014	0.0117	0.8799	0.0081	-0.2884	0.0120	3.5298	-0.0631	-5.1442	0.0146	0.5853
t+21	0.0144	-0.1164	0.0001	0.2771	0.0096	-0.0202	0.0041	-0.1098	0.0125	0.0040	-0.0181	7.7536	-0.0019	0.2136

Where "AR" denotes the Abnormal Return of the parameter of COVID slope, Values with the Abnormal Return denotes the "t" value of the parameter of COVID slope for the Developing Countries

However, the abnormal returns of Japan are significant from day 1 to 4. All the returns are positively and significant which shows that stock market of Japan is highly responds to covid. Likewise, the abnormal returns of Italy also show insignificant results from t+1 to t+21. It shows that for all the countries whose values are significant shows that return is affected by covid. The result explains that stock markets to the equity market during COVID.

4.2.3 Cumulative Abnormal Return for Emerging Countries

Table 4.5 presents cumulative abnormal return CAR for emerging countries. Table 4.5 explains the parameters of Cumulative abnormal return from stock market to equity markets of emerging countries of China, Brazil, Russia, Australia, Indonesia, South Africa and Pakistan during the event of the COVID-19 period by the event study model. The event study model is used to find out the effect of a pandemic.

The Cumulative Abnormal Return (CAR) is a total return of the period after the announcement of the Covid-19 pandemic by the World Health Organization (WHO). Cumulative Abnormal Returns (CAR) of China indicates that all the values of CARs are negative and significant as they are less than 0.05 so it indicates that stock market of China shows high volatility and effected by the outbreak of Covid 19. All the stock returns of the Chinese stock market are predicted by the previous stock market return adjustments.

Whereas CARs of the Brazilian stock market also indicate that all indices show negative and significant returns because of the outbreak of the breaking news of the coronavirus on media. So it is interpreted that stock market of Brazil is also a volatile market and this volatility can be predicted by past price behaviors. Highest cumulative abnormal return of Brazilian stock market is 0.0076 at t+2 while t+14 shows lowest CAR which is -0.194. Cumulative abnormal returns of Russia also show significant results. Positive returns are showed from t+11 to t+20 while on other days negative returns are observed. Russia responds highly to Covid so it is highly volatile and therefore its current day prices are predicted

TABLE 4.5: Cumulative Abnormal Return for Emerging Countries

	China		Brazil		Russia		Australia		Indonesia		South Africa		Pakistan	
	CAR	**T**	**CAR**	**T**	**CAR**	**T**	**CAR**	**T**	**CAR**	**T**	**CAR**	**T**	**CAR**	**T**
t+1	0.0005	0.1894	-0.0049	-0.9373	-0.0119	-2.3283	-0.0036	-0.3732	0.0849	27.5666	0.0242	0.0003	0.0183	1.5478
t+2	-0.0056	0.1894	0.0076	1.4672	-0.0358	-2.3283	-0.0003	-0.0312	0.1018	33.0395	0.0196	0.0002	0.0224	1.8900
t+3	-0.0219	0.1894	-0.0297	-5.7138	-0.0180	-2.3283	0.0121	1.2640	0.1103	35.8026	0.0253	0.0003	0.0050	0.4262
t+4	-0.0337	0.1894	0.0047	0.8991	-0.0271	-2.3283	0.0025	0.2606	0.1331	43.2110	0.0384	0.0004	-0.0225	-1.8970
t+5	-0.0499	0.1894	-0.0027	-0.5136	-0.0520	-2.3283	-0.0151	-1.5772	0.1331	43.2012	0.0384	0.0004	-0.0207	-1.7460
t+6	-0.0150	0.1894	-0.0217	-4.1778	-0.0627	0.0051	-0.0227	0.0608	0.1306	1.5380	0.0521	2.1504	-0.0057	-0.3133
t+7	-0.0277	0.1894	-0.0324	-6.2174	-0.0790	0.0025	-0.0141	-0.0411	0.1127	1.1073	0.0530	2.7082	0.0026	0.1169
t+8	-0.0769	0.1894	-0.1164	-22.3572	-0.0106	-0.0034	-0.0168	-0.0129	0.1058	0.9590	0.0601	2.3760	0.0211	4.1766
t+9	-0.0634	0.1894	-0.1011	-19.4304	-0.0167	0.0066	-0.0132	0.0132	0.1069	0.8033	0.0352	0.9177	0.0244	-1.0885
t+10	-0.0826	0.1894	-0.1089	-20.9236	-0.0105	0.0024	-0.0217	0.0118	0.1071	0.8047	0.0317	0.8257	0.0234	-1.1307
t+11	-0.1106	0.1894	-0.1584	-30.4288	0.0204	0.0057	-0.0141	-0.6888	0.0902	0.6905	0.0398	0.7642	-0.0149	2.5914
t+12	-0.1181	0.1894	-0.1697	-32.6006	0.0368	0.0037	-0.0261	-1.0356	0.0744	0.6603	0.0523	0.9875	-0.0328	-12.5279
t+13	-0.1842	0.1894	-0.1697	-32.5972	0.0478	-0.0009	-0.0630	30.1518	0.0632	0.5974	0.0515	0.8560	-0.0542	-2.5717
t+14	-0.2099	0.1894	-0.1904	-36.5881	0.0227	0.0099	-0.0656	-0.1774	0.0165	0.1539	0.0486	1.3790	-0.0446	-1.8254
t+15	-0.2244	0.1894	-0.1797	-34.5216	0.0553	-0.0098	-0.0711	-15.3783	0.0426	0.3977	0.0460	1.4506	-0.0626	-2.6785
t+16	-0.2603	0.1894	-0.1609	-30.9023	0.0408	-0.0020	-0.1028	-0.2734	0.0372	0.4129	0.0937	2.3550	-0.0753	5.0653
t+17	-0.2676	0.1894	-0.1485	-28.5270	0.0373	-0.0037	-0.0295	0.0618	0.0388	0.5216	0.0880	1.6834	-0.0547	1.6683
t+18	-0.2547	0.1894	-0.0211	-4.0445	0.0316	-0.0055	-0.0372	-0.0021	0.0436	0.6900	0.1006	1.9543	0.0309	-0.5703
t+19	-0.2587	0.1894	-0.0090	-1.7214	0.0307	0.0024	-0.0387	0.1407	0.0605	3.6736	0.0945	1.9460	0.0108	-0.2421
t+20	-0.2608	0.1894	-0.0064	-1.2351	0.0290	-0.0019	-0.0447	0.0374	0.0137	0.3223	0.0726	1.5783	0.0158	-0.2531
t+21	-0.2681	0.1894	-0.0430	-8.2665	-0.0153	0.0042	-0.0440	0.5215	0.0399	1.0703	0.0809	0.8636	0.0130	-0.1730

Where "CAR" denotes the Abnormal Return of the parameter of COVID slope, Values with the Abnormal Return denotes the "t" value of the parameter of COVID slope for the Emerging Countries

by the past prices. The Australian stock market also show significant cumulative abnormal retuns from day 1 to 21.

All days show negative returns except t+3 and t+4 which show positive returns. Thus it is also considered a volatile market. However the returns of Indonesia and South Africa are insignificant therefore these markets are less volatile and their current prices are not predicted by past prices. These markets are not affected by Covid and they show no volatility.

On the other hand, stock exchange of Pakistan shows significant returns so it is also considered as a volatile market. So it is concluded that among all emerging countries China, Brazil,Russia, Australia and Pakistan are volatile markets whereas Indonesia and South Africa show insignificant values it means no volatility exists in these countries.

4.2.4 Cumulative Abnormal Return for Developed Countries

According to the results of the table given above, cumulative abnormal return of UK is showing significant results from t+1 to t+13 while insignificant results are shown from t+15 to t+18. So UK market is affected by the covid wave but from days 15 to 18, there is no effect of covid. US market is showing significant results from day 1 to 21 so it is a highly volatile market.

It shows that after the outbreak of covid wave, US market is highly affected by covid and their current day returns are predicted by past price behavior. However the cumulative abnormal returns of Canada, Germany, France and Italy showed both significant and insignificant results which indicates that they are less affected by covid and show less volatility.

Whereas Japan shows significant results from day 1 to 21 it indicates that stock market of Japan is highly affected by covid and their returns show high fluctuation. So, among all developed nations, Japan and US are highly volatile nations whereas Canada, Germany, France, Italy and UK show insignificant values which indicates that they are less volatile nations.

Table 4.6: Cumulative Abnormal Return of Developed Countries

	UK		US		Canada		Japan		France		Germany		Itlay	
	CAR	**T**	**CAR**	**T**	**CAR**	**T**	**CAR**	**T**	**CAR**	**T**	**CAR**	**T**	**CAR**	**T**
t+1	0.0142	1.4601	0.0070	0.6786	-0.0010	-0.0775	0.0133	22.8033	0.0209	6.1318	0.0344	2.8010	0.0092	0.3711
t+2	0.0265	2.7156	-0.0098	-0.9555	-0.0172	-1.2915	0.0213	36.5771	0.0324	9.4967	0.0205	1.6754	-0.0081	-0.3244
t+3	0.0111	1.1344	-0.0255	-2.4791	-0.0198	-1.4888	0.0270	46.2252	0.0433	12.7030	0.0254	2.0748	0.0056	0.2267
t+4	-0.0140	-1.4381	-0.0395	-3.8462	-0.0416	-3.1267	0.0336	57.5375	0.0470	13.7806	0.0169	1.3752	-0.0006	-0.0255
t+5	-0.0208	-2.1287	-0.0353	-3.4327	-0.0400	-3.0061	0.0325	55.7810	0.0450	13.2135	0.0414	3.3752	0.0072	0.2894
t+6	-0.0147	-0.0101	-0.0366	-0.0539	-0.0322	0.4159	0.0273	2.0554	0.0390	0.0064	0.1009	0.0360	0.0202	0.0544
t+7	-0.0094	-0.0075	-0.0196	-1.9074	-0.0379	-2.8514	0.0139	0.6491	0.0418	12.2628	0.0960	7.8247	0.0465	1.8708
t+8	0.0114	-0.0072	-0.0128	-1.2479	-0.0416	-3.1322	0.0238	0.8811	0.0456	13.3706	0.1040	8.4772	0.0705	2.8330
t+9	0.0143	-0.0055	-0.0114	-1.1048	-0.0429	-3.2272	0.0199	0.5917	0.0559	16.3897	0.0740	6.0373	0.0650	2.6132
t+10	0.0030	-0.0043	-0.0117	-0.0283	-0.1008	-7.5840	0.0169	0.5200	0.0583	17.1091	0.0660	5.3833	0.0686	2.7573
t+11	0.0027	0.6621	-0.0494	25.7798	-0.1036	1.0371	0.0087	0.3189	0.0616	-62.2956	0.0955	4.4933	0.0371	1.0590
t+12	-0.0193	-0.0354	-0.0780	-7.5935	0.0637	4.7902	0.0086	0.6222	0.0587	17.2203	0.0987	8.0505	0.0251	1.0089
t+13	-0.0362	-0.0170	-0.0761	-7.4061	0.0744	5.5964	-0.0021	-0.0877	0.0553	16.2295	0.1359	247.3279	0.0026	0.1037
t+14	-0.0522	-0.1797	-0.0750	-7.2952	0.0671	5.0467	-0.0161	-0.8102	0.0568	16.6731	0.0961	7.8359	0.0249	1.0022
t+15	0.0583	-0.0503	-0.0870	-8.4656	0.0412	3.0982	-0.0280	-1.6547	0.0609	17.8776	0.1195	9.7403	0.0350	1.4069
t+16	0.0609	-2.8101	-0.0778	-0.0040	0.0279	1.0070	-0.0375	-4.3056	0.0717	-0.0212	0.1162	0.0839	0.0431	-0.0480
t+17	0.0714	-0.0316	-0.0663	-6.4472	0.0234	1.7575	-0.0349	-4.0484	0.0724	21.2518	0.1204	9.8148	0.0106	0.4255
t+18	0.0579	-0.0334	-0.0673	-6.5502	-0.0068	-0.5089	-0.0478	22.9593	0.0699	20.5088	0.1183	9.6496	0.0198	0.7946
t+19	0.0367	-0.0223	0.0129	1.2511	-0.0223	-1.6787	-0.0508	3.1558	-0.0243	-7.1266	0.1646	13.4225	-0.0030	-0.1199
t+20	0.0318	0.0028	0.0139	1.3526	-0.0106	-0.7988	-0.0427	1.5255	-0.0123	-3.5968	0.1015	8.2783	0.0116	0.4654
t+21	0.0461	-0.3742	0.0140	29.8551	-0.0010	0.0021	-0.0386	1.0280	0.0002	0.0672	0.0834	-35.6951	0.0096	-1.0672

Where "CAR" denotes the Abnormal Return of the parameter of COVID slope, Values with the Abnormal Return denotes the "t" value of the parameter of COVID slope for the Developing Countries

4.3 Average Abnormal Return and Cumulative Average Abnormal Return for Emerging and Developed Countries (from t+1 to t+10)

The purpose of the study is to describe the abnormal and cumulative abnormal returns with their significance level. Table 4.7 indicates the results of Average Abnormal Return (AAR) for emerging market and developed countries from day 1 to 10.

We check whether it is significant or insignificant. If value is less than 0.05, it means that the corresponding value is significant. And if the value is greater than 0.05 it means that the corresponding value is insignificant.

On days 1 and 2 significant results are shown by developed and emerging countries which indicates that on days 1 and 2, covid 19 affects the stock markets of these countries insignificantly. But from day 3 to 9 (t+3 to t+9) insignificant results indicate that stock markets of emerging and developed countries show no effect from day 3 to 9.

However, on day 10 stock markets of emerging and developed countries show significant results which means that these markets are affected by the outbreak of the Covid wave.

4.4 Average Abnormal Return "AR" for Emerging and Developed Countries (from t +11 to t+21)

Table 4.8 shows Average Abnormal Return "AR" for Emerging and Developed Countries. According to the table given below i.e. Table 4.8, average abnormal returns and their significance level are high. Insignificant results are shown by the stock markets of emerging and developed countries from t+11 to t+21 except for t+14 which shows significant results.

Table 4.7: Results of Average Abnormal Return (AAR) for Emerging Market and Developed Countries

	T+1	T+2	T+3	T+4	T+5	T+6	T+7	T+8	T+9	T+10
AAR	0.0147	-0.0022	-0.0018	-0.0038	-0.0026	0.0070	-0.0009	0.0015	-0.0014	-0.0077
SE	0.0058	0.0033	0.0039	0.0043	0.0029	0.0049	0.0032	0.0084	0.0031	0.0038
Significance For AR	Sig	sig	Insig	Insig	Insig	Insig	Insig	Insig	Insig	Sig
AAR/SE	2.5520	-0.6602	-0.4628	-0.8748	-0.8780	1.4210	-0.2803	0.1765	-0.4671	-2.0170

Where "AAR" denotes the Accumulated Abnormal Return of the Covid intercept, SE denotes standard error of the Covid intercept, t statistic is shown for the "AAR" for Emerging and Developed Countries from t+1 to t+10.

Table 4.8: Average Abnormal Return "AR" for Emerging and Developed Countries

	T+11	T+12	T+13	T+14	T+15	T+16	T+17	T+18	T+19	T+20	T+21
AAR	-0.0095	0.0049	-0.0092	-0.0119	0.0091	-0.0021	0.0060	0.0126	-0.0024	-0.0065	-0.0025
SE	0.0060	0.0117	0.0059	0.0045	0.0082	0.0051	0.0055	0.0102	0.0093	0.0055	0.0046
Significance For AR	Insig	Insig	Insig	Sig	Insig	Insig	Insig	Insig	Insig	Insig	Insig
AAR/SE	-1.5810	0.4234	-1.5757	-2.6142	1.1063	-0.4057	1.0791	1.2428	-0.2578	-1.1953	-0.5395

Where "AAR" denotes the Accumulated Abnormal Return of the Covid intercept, SE denotes standard error of the Covid intercept, t statistic is shown for the "AR" and "CAR" denotes the parameter of Covid intercept of Emerging and Developed Countries from t+11 to t+21.

4.5 Stock Market Intercept from Equity Market With Covid-cd, Covid-g and Covid-dd

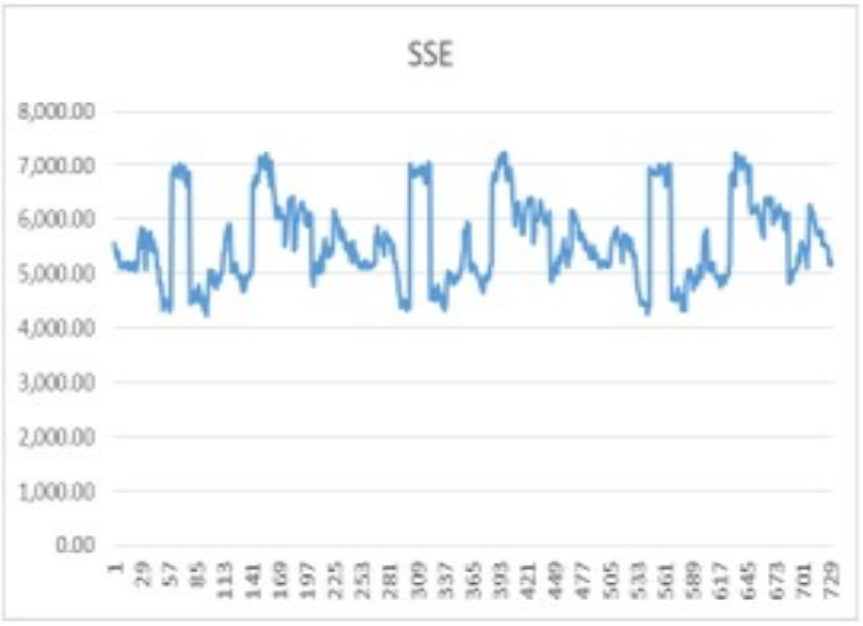
TABLE 4.9: Stock Market Intercept from Equity Market With Covid-cd, Covid-g and Covid-dd during Covid-19 Pandemic- GARCH Model

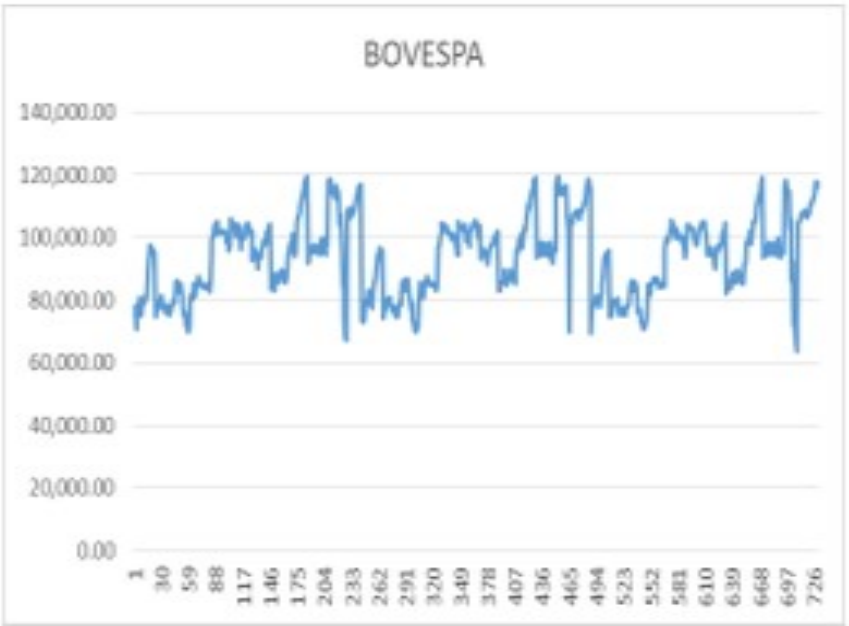
	China					
	Intercept	**Covid-cd**	**intercept**	**Covid-g**	**intercept**	**Covid-dd**
Coefficients	-0.0003	0.0000	-0.0001	0.0000	-0.0002	0.0005
Standard Error	0.0020	0.0000	0.0023	0.0045	0.0024	0.0044
t-stat	-0.1301	0.6401	-0.0409	-0.0048	-0.1019	0.1093
P value	0.8965	0.5223	0.9674	0.9962	0.9188	0.9130
	Brazil					
	Intercept	**Covid-cd**	**intercept**	**Covid-g**	**intercept**	**Covid-dd**
Coefficients	0.0003	0.0000	0.0000	0.0022	0.0002	0.0015
Standard Error	0.0024	0.0000	0.0025	0.0049	0.0025	0.0049
t-stat	0.1269	0.3188	0.0196	0.4452	0.0829	0.3161
P value	0.8991	0.7500	0.9844	0.6563	0.9339	0.7520
	Russia					
	intercept	**Covid-cd**	**Intercept**	**Covid-g**	**intercept**	**Covid-dd**
Coefficients	0.0018	0.0000	0.0022	-0.0021	0.0024	-0.0029
Standard Error	0.0031	0.0000	0.0034	0.0065	0.0033	0.0066
t-stat	0.5920	-0.1416	0.6665	-0.3244	0.7222	-0.4344
P value	0.5540	0.8874	0.5053	0.7457	0.4704	0.6641
	Australia					
	intercept	**Covid-cd**	**intercept**	**Covid-g**	**Intercept**	**Covid-dd**
Coefficients	0.0008	0.0000	-0.0016	0.0022	0.0001	0.0002
Standard Error	0.0027	0.0000	0.0055	0.0060	0.0053	0.0059
t-stat	0.3103	-0.4326	-0.2876	0.3716	0.0162	0.0377
P value	0.7566	0.6657	0.7739	0.7105	0.9871	0.9700
	Indonesia					
	intercept	**Covid-cd**	**Intercept**	**Covid-g**	**intercept**	**Covid-dd**
Coefficients	0.0005	0.0000	0.0006	-0.0011	0.0006	-0.0015
Standard Error	0.0017	0.0000	0.0018	0.0034	0.0018	0.0035
t-stat	0.2898	-0.3352	0.3150	-0.3252	0.3578	-0.4185
P value	0.7721	0.7376	0.7528	0.7452	0.7206	0.6757
	South Africa					
	intercept	**Covid-cd**	**intercept**	**Covid-g**	**intercept**	**Covid-dd**
Coefficients	0.0001	0.0000	0.0003	-0.0001	0.0004	-0.0003
Standard Error	0.0015	0.0000	0.0017	0.0032	0.0016	0.0033
t-stat	0.0363	0.5287	0.2026	-0.0161	0.2350	-0.0797
P value	0.9711	0.5972	0.8395	0.9871	0.8143	0.9365
	Pakistan					
	Intercept	**Covid-cd**	**Intercept**	**Covid-g**	**Intercept**	**Covid-dd**
Coefficients	-0.0007	0.0000	-0.0015	0.0019	0.0022	-0.0032
Standard Error	0.0034	0.0000	0.0060	0.0067	0.0046	0.0056
t-stat	-0.2192	0.3597	-0.2504	0.2844	0.4898	-0.5843
P value	0.8267	0.7193	0.8025	0.7764	0.6247	0.5595

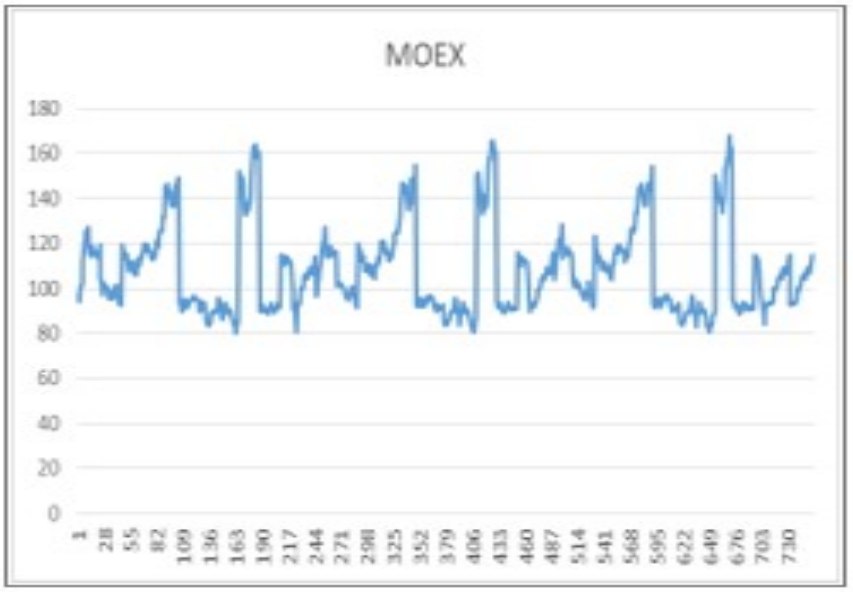
Where Stock Market Intercept from Equity Market is showed with Covid-cd, Covid-g and Covid-dd during Covid-19 Pandemic- GARCH Model. In which lower and upper values of countries are 95%. Greater than 0.05 shows intercept value along with p-value and t-statistics.

The abnormal table shows that there is no significant relation between domain and the returns. Results are constant when there is less to explain the link. Stock markets of the emerging countries include China, Brazil, Russia, Australia, Indonesia, South Africa and Pakistan. The results are for all emerging markets the impact of global announcements of covid 19 has also been examined on relation of selected emerging markets , no significant impact of covid has been observed.

4.5.1 Graphical Representation of Emerging Countries



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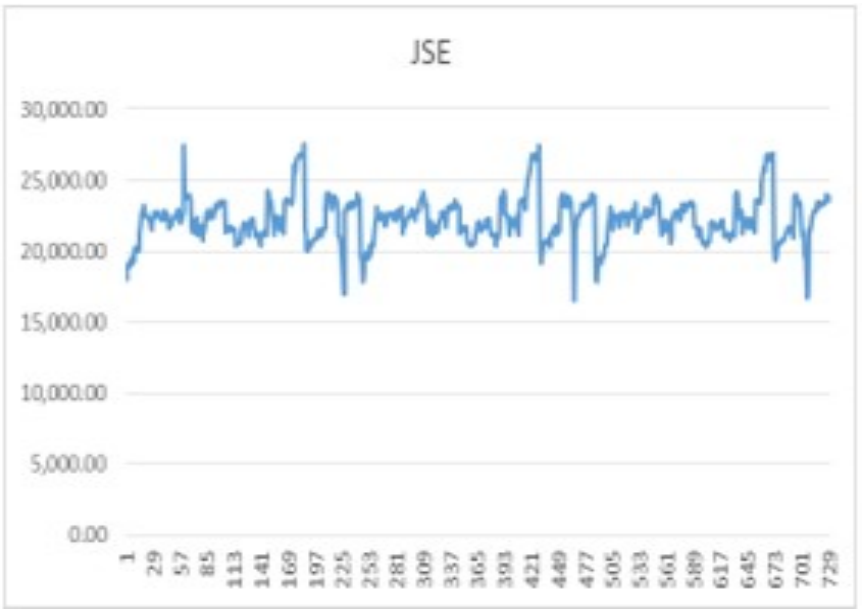


4.6 Impact of Covid on Stock Markets of Developed Countries

The abnormal table shows that there is no significant relation between domain and the returns. Results are constant when there is less to explain the link. According to the results of the tables given above, the effect on stock markets of the developed countries can be calculated with three proxies or intercepts covid cd, covid dd and covid-g by using GARCH model. Stock markets of the emerging countries include

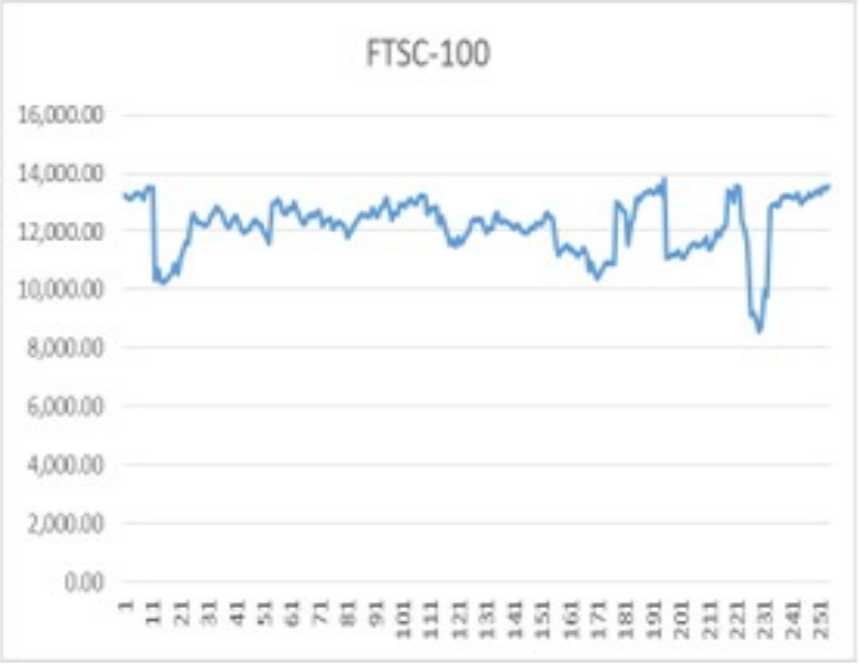
TABLE 4.10: Stock Market Intercept from Equity Market with Covid-cd, Covid-g and Covid-dd during Covid-19 Pandemic- GARCH Model

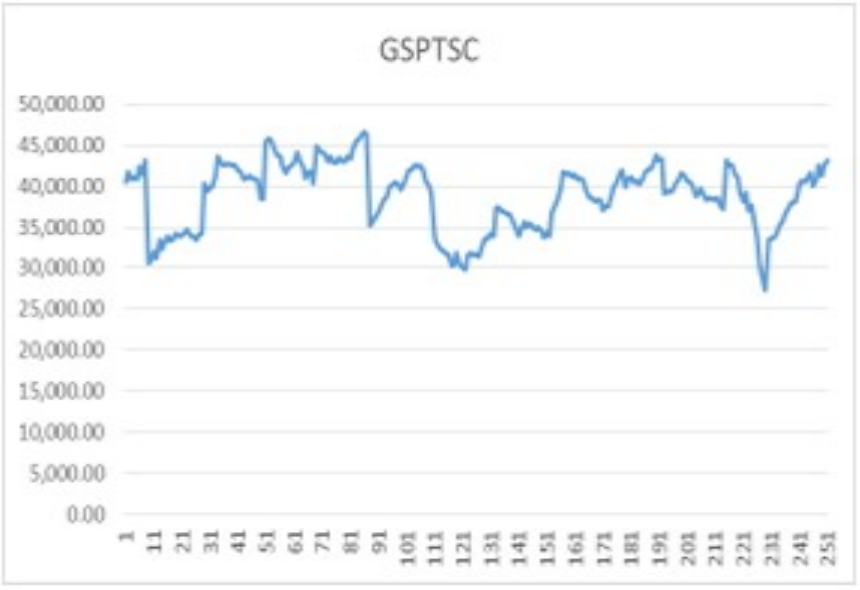
			UK			
	Intercept	**Covid-cd**	**Intercept**	**Covid-g**	**Intercept**	**Covid-dd**
Coefficients	0.0004	0.0000	0.0004	0.0000	-0.0044	0.0054
Standard Error	0.0031	0.0000	0.0031	0.0000	0.0062	0.0068
t- stat	0.1309	-0.1641	0.1309	-0.1641	-0.7048	0.7954
P value	0.8960	0.8698	0.8960	0.8698	0.4816	0.4272
			US			
	Intercept	**Covid-cd**	**Intercept**	**Covid-g**	**Intercept**	**Covid-dd**
Coefficients	0.0012	0.0000	0.0002	-0.0002	0.0030	-0.0035
Standard Error	0.0037	0.0000	0.0065	0.0072	0.0070	0.0076
t- stat	0.3262	-0.4710	0.0348	-0.0277	0.4248	-0.4536
P value	0.7445	0.6381	0.9722	0.9779	0.6713	0.6505
			Canada			
	Intercept	**Covid-cd**	**Intercept**	**Covid-g**	**Intercept**	**Covid-dd**
Coefficients	0.0021	0.0000	-0.0017	0.0023	0.0068	-0.0083
Standard Error	0.0035	0.0000	0.0066	0.0073	0.0064	0.0071
t- stat	0.5902	-0.9293	-0.2643	0.3165	1.0620	-1.1612
P value	0.5556	0.3536	0.7918	0.7519	0.2893	0.2467
			Japan			
	Intercept	**Covid-cd**	**Intercept**	**Covid-g**	**Intercept**	**Covid-dd**
Coefficients	0.0040	0.0000	-0.0003	-0.0093	-0.0001	-0.0095
Standard Error	0.0032	0.0000	0.0036	0.0069	0.0036	0.0068
t- stat	1.2651	-6.3020	-0.0715	-1.3607	-0.0394	-1.3939
P value	0.2062	0.0000	0.9430	0.1740	0.9686	0.1638
			France			
	intercept	**Covid-cd**	**Intercept**	**Covid-g**	**Intercept**	**Covid-dd**
Coefficients	0.0009	0.0000	0.0022	-0.0019	0.0023	-0.0020
Standard Error	0.0022	0.0000	0.0044	0.0049	0.0041	0.0046
t- stat	0.3907	-0.1377	0.5042	-0.3811	0.5555	-0.4331
P value	0.6964	0.8906	0.6146	0.7035	0.5791	0.6653
			Germany			
	Intercept	**Covid-cd**	**Intercept**	**Covid-g**	**Intercept**	**Covid-dd**
Coefficients	0.0006	0.0000	-0.0027	0.0037	-0.0002	0.9784
Standard Error	0.0033	0.0000	0.0066	0.0074	0.0069	0.0076
t- stat	0.1769	-0.1631	-0.4075	0.5050	-0.0271	0.0798
P value	0.8597	0.8706	0.6840	0.6140	0.9784	0.9365
			Italy			
	Intercept	**Covid-cd**	**Intercept**	**Covid-g**	**Intercept**	**Covid-dd**
Coefficients	0.0000	0.0000	0.0027	-0.0034	-0.0115	0.0139
Standard Error	0.0055	0.0000	0.0114	0.0126	0.0115	0.0126
t- stat	-0.0017	-0.0205	0.2421	-0.2741	-1.0009	1.0993
P value	0.9986	0.9837	0.8089	0.7842	0.3179	0.2727

Where Stock Market Intercept from Equity Market is showed with Covid-cd, Covid-g and Covid-dd during Covid-19 Pandemic- GARCH Model. In which lower and upper values of countries are 95%. Greater than 0.05 shows intercept value along with p-value and t-statistics.

the UK, US, Canada, Japan, Germany, France and Italy. The results are for all developed markets the impact of global announcements of covid 19 has also been examined on relation of selected emerging markets, no significant impact of covid has been observed.

4.6.1 Graphical Representation of Developed Countries

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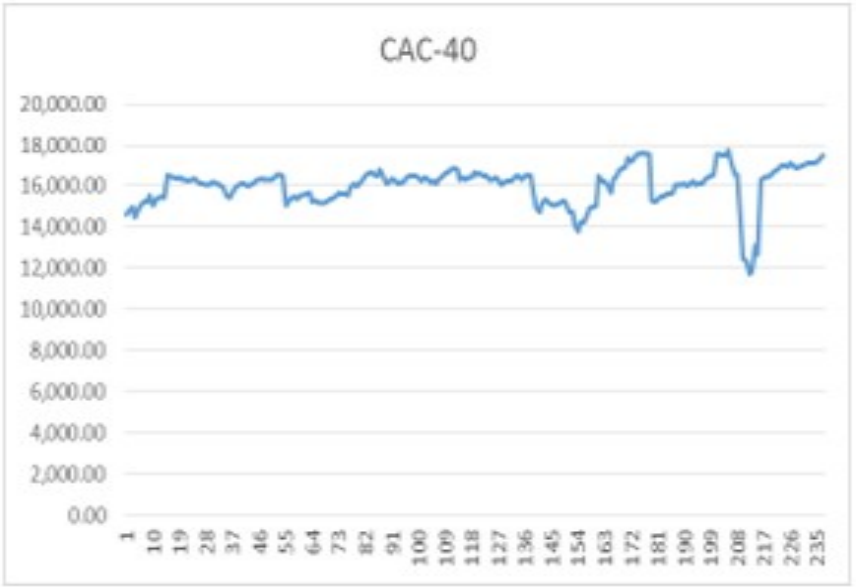
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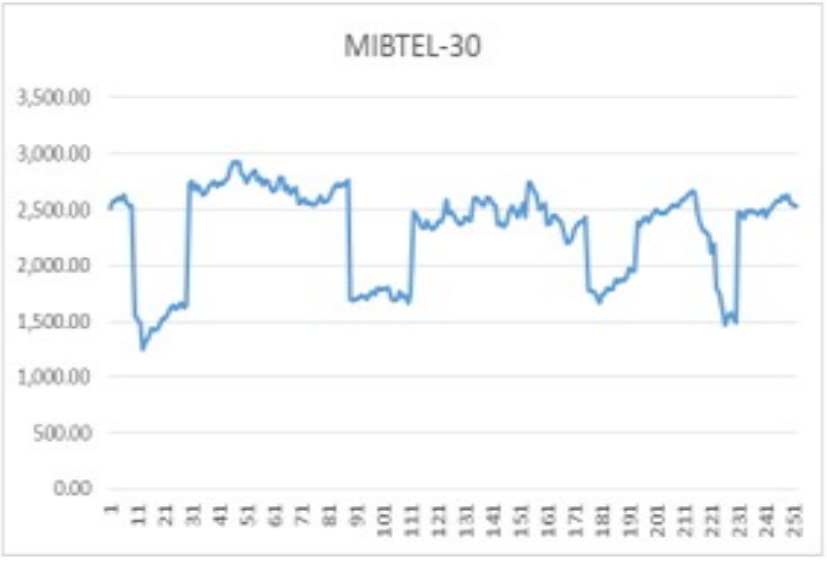
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Chapter 5

Conclusion and Recommendations

5.1 Conclusion

This study investigates the effect of COVID 19 on the stock markets of emerging and developed countries. As the financial markets are affected by the previous pandemics.Therefore this study explores how the stock markets are effected by the outbreak of Covid 19 as there is limited research is done in this context.

To analyze the effect of Covid-19 the stock market are used i.e the SSE Index to address the People's Republic of China, the MIBTEL-30 Index to address Italy, the JSE Index to address South Africa, the CAC-40 Index to address France, the BOVESPA Index to address Brazil, the MOEX Index to address Russia, the AORD Index to address Australia, the JKSE-100 Index to address Indonesia, the KSE-100 Index to address Pakistan, the FTSC-100 Index to address UK, the GSPTSC Index to address Canada, the DAX Index to address Germany, the Nikkei-225 Index to address Japan, and the GSPC-500 Index to address the US.

Secondary data is taken from various sources such as Investing.com over the period Jan 2018- Dec 2020. Abnormal returns of emerging countries indicate that China and South Africa are highly effect markets so it is not a good option for investors to invest in the stock markets of China and South Africa during Covid wave whereas abnormal returns of developed countries indicate that Japan is highly effected wh-

-ereas the UK, US, France, Germany are less effected during Covid outbreak.

The results of Cumulative Abnormal Returns of emerging countries also indicate that China, Brazil, Russia and Pakistan are highly effected markets while Indonesia and South Africa indicates that they are less effected. Whereas comulative abnormal returns of developed countries indicates that Japan and US are affected by Covid whereas UK, Germany, France and Italy show less effect. The link between Covid relation is also caused by the slow regression but no significant link is found.

5.2 Recommendations

As investors must understand which stock market is best for them to invest during the pandemic Covid-19 and which stock market is not suitable for them to invest. Therefore this study helps the investors in understanding the effect of Covid-19 on the stock markets of emerging and developed nations. Results of this study indicate that some countries show significant results while some indicate insignificant results. So according to the conclusion, some policy recommendations are given below which help the investors in making investment decisions.

1. Those investors who are risk-takers should invest in highly effected markets like China and Japan as when there is high risk there will be high return.

2. For risk averse investors, the best stock markets to invest in are Indonesia, the UK, France and Germany as these markets show less risk during the pandemic Covid-19. There stock prices are not affected by the outbreak of covid-19.

3. This study also helps investors in designing different investment strategies as this study provides information regarding the effect of crises like Covid-19.

5.3 Future Research Direction

This study takes seven emerging and seven developed countries for volatility analysis but future studies can be done by taking more countries. Likewise data is

taken over the period 2018-2020 but future studies can be done by taking more recent data of 2021. Moreover, the data used for this study is time-series data that quickly outdates. Thats why taking another data set this phenomenon can be further explored. Furthermore, all event study models used in this research were drawn overall allocation. So, a study on extreme movement using GARCH can also be conducted in near future.

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Appendix A

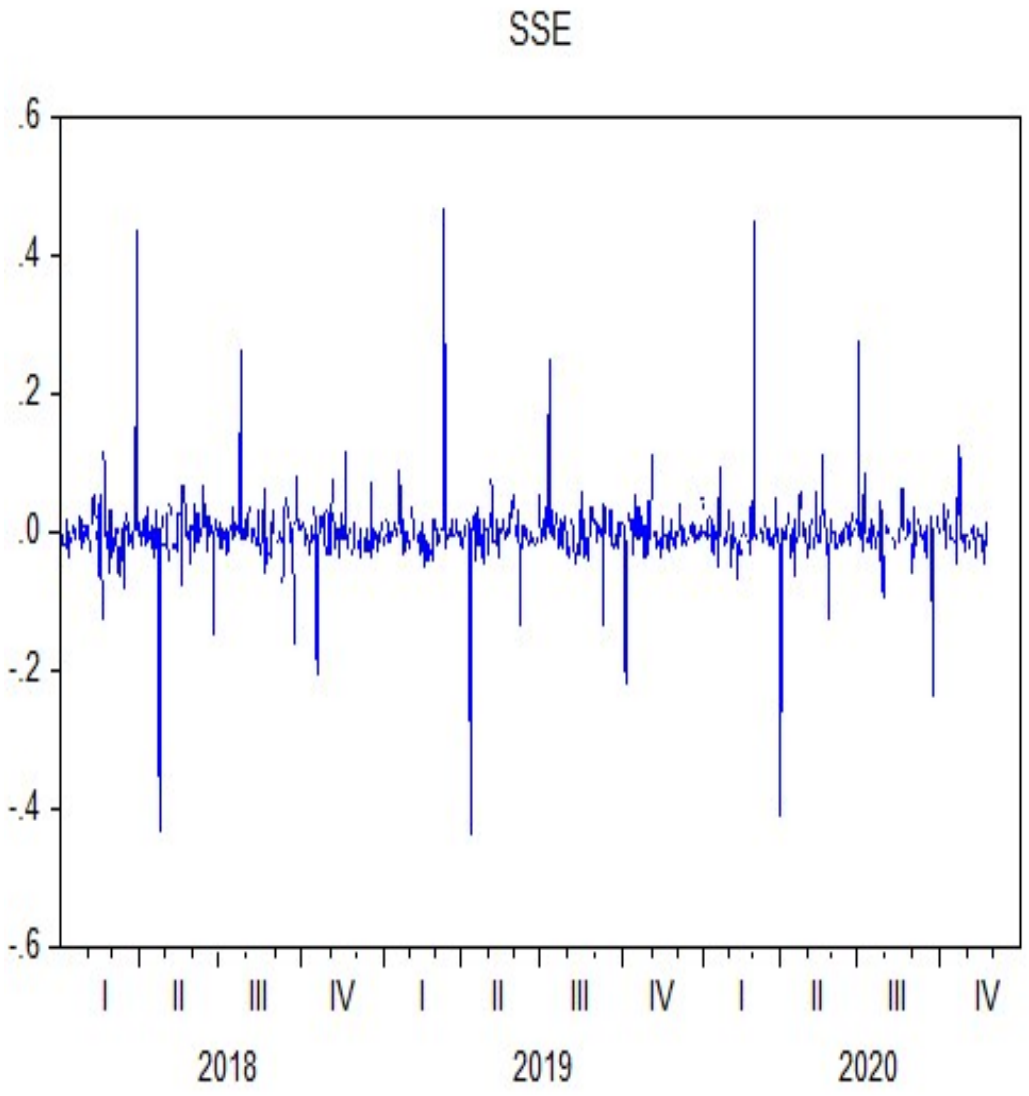

Figure 1: Return of SSE

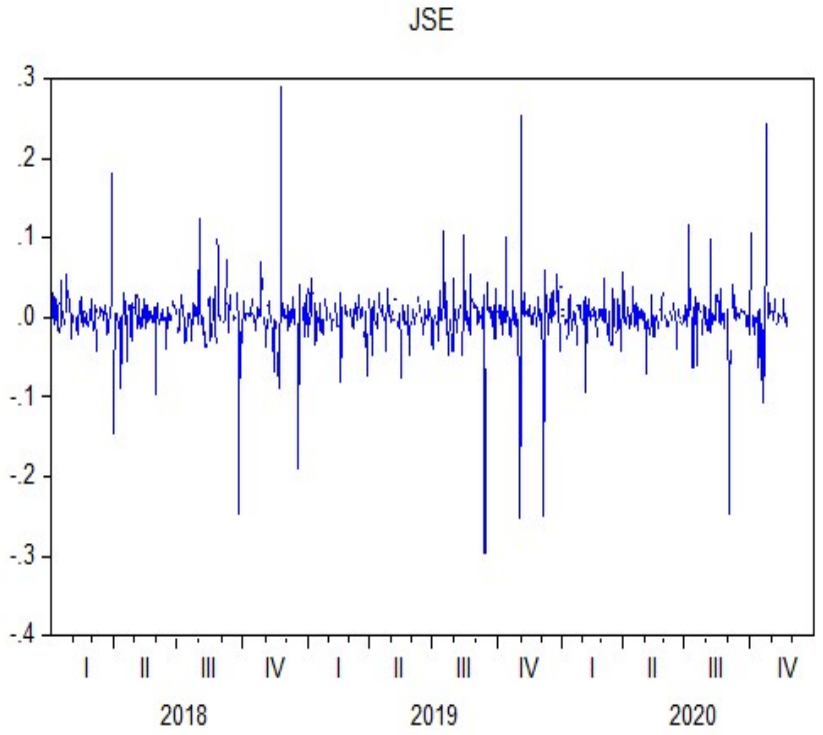

FIGURE 2: Return of JSE

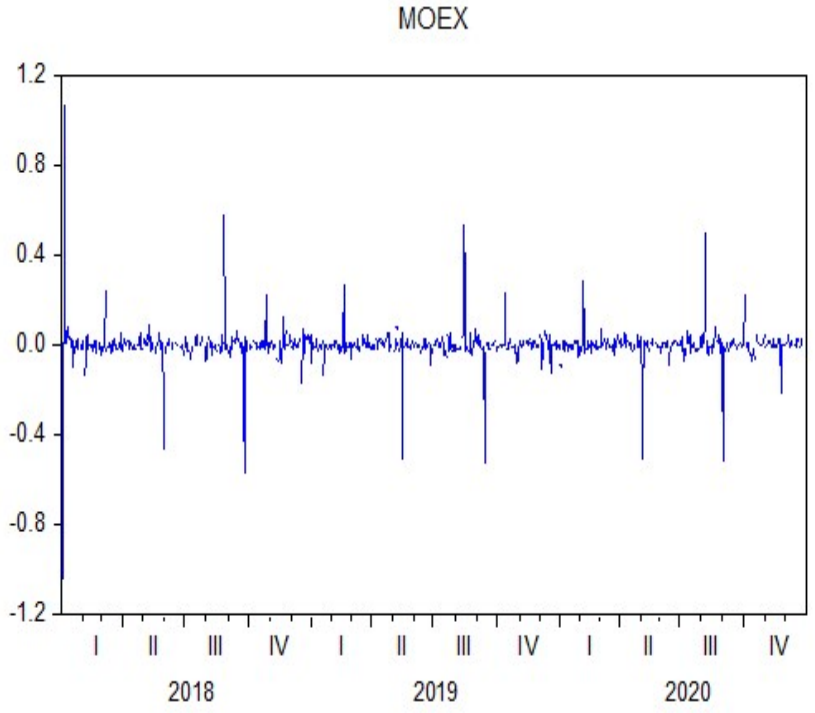

FIGURE 3: Return of MOEX

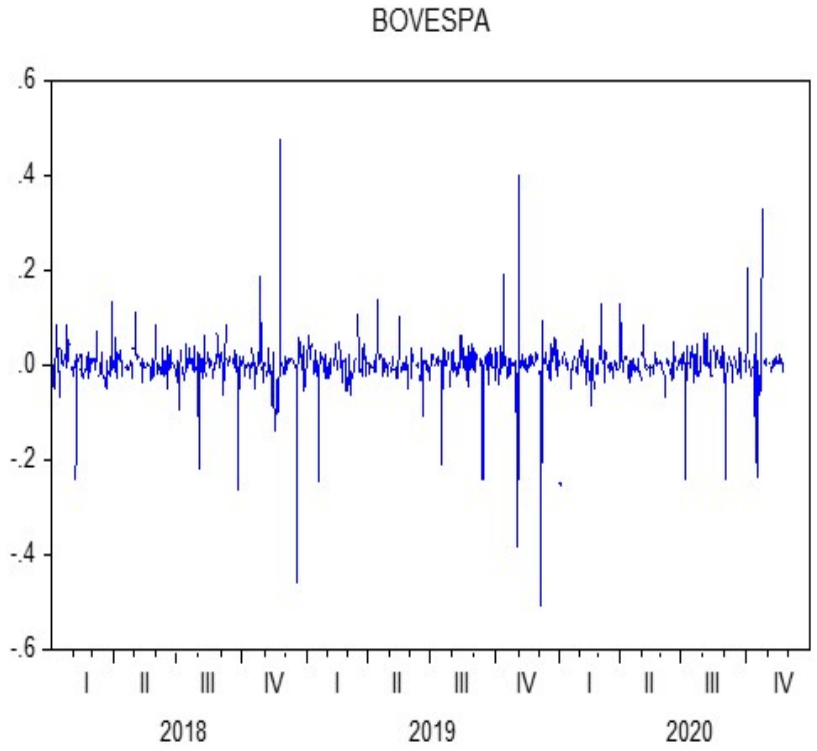

FIGURE 4: Return of BOVESPA

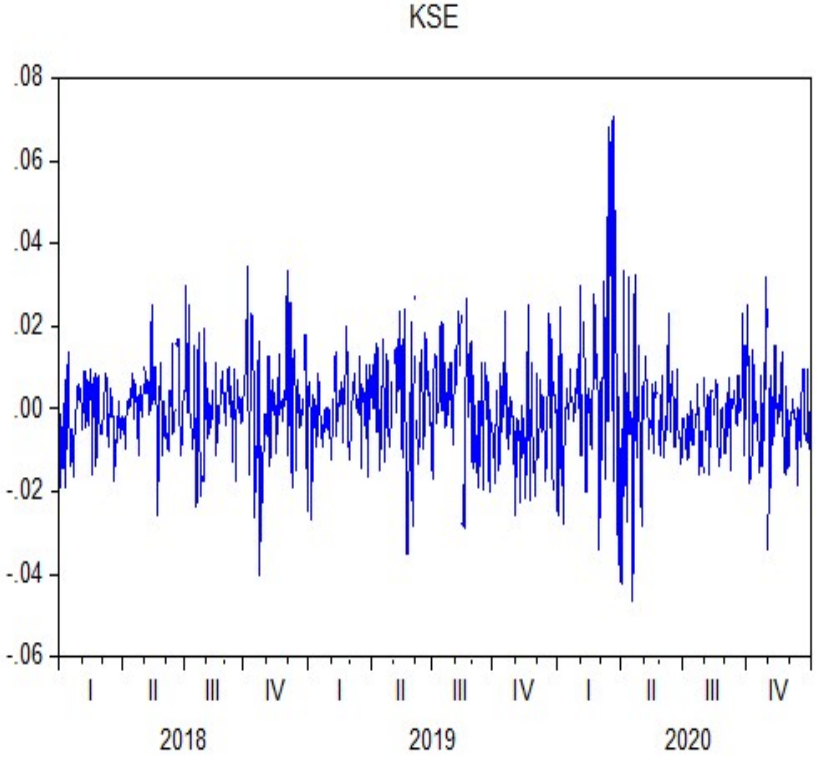

FIGURE 5: Return of KSE

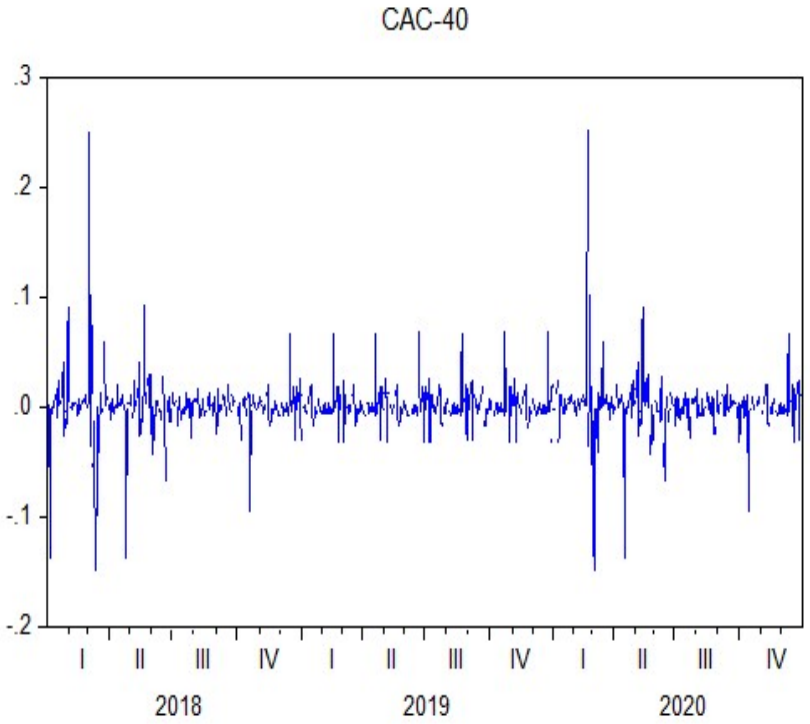

FIGURE 6: Return of CAC-40

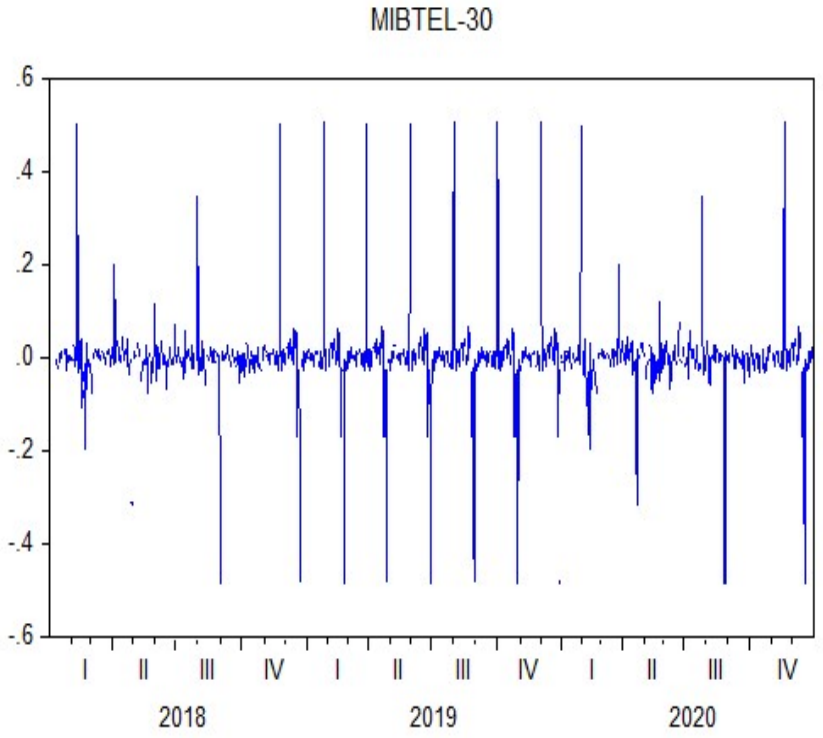

FIGURE 7: Return of MIBTEL-30

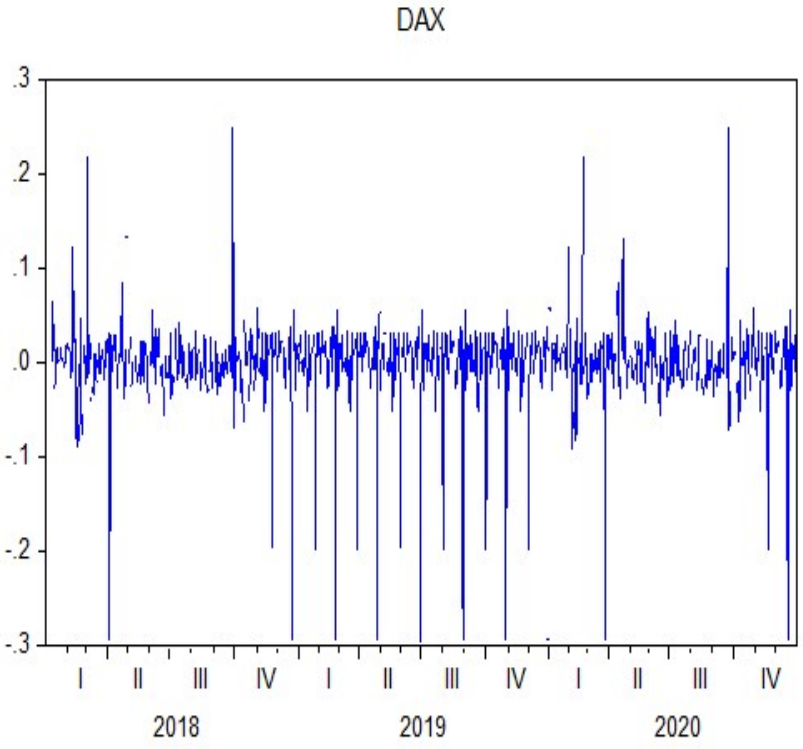

FIGURE 8: Return of DAX

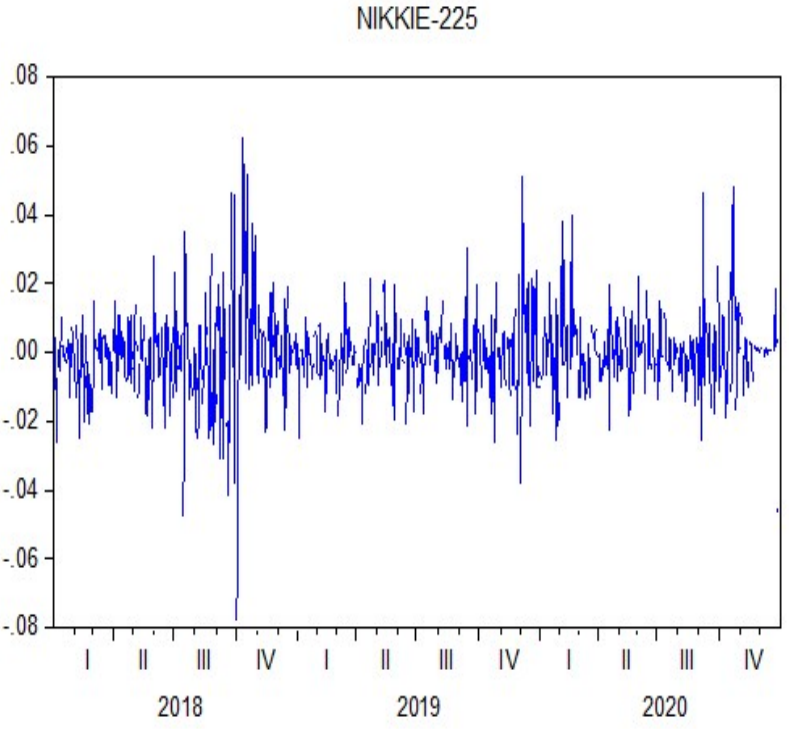

FIGURE 9: Return of NIKKIE-225

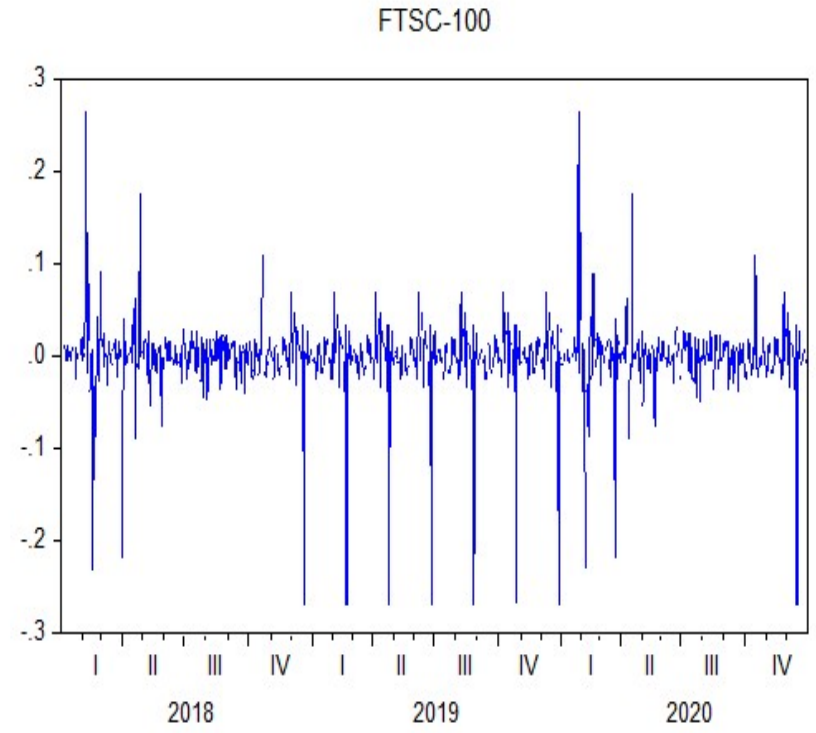

FIGURE 10: Return of FTSC-100

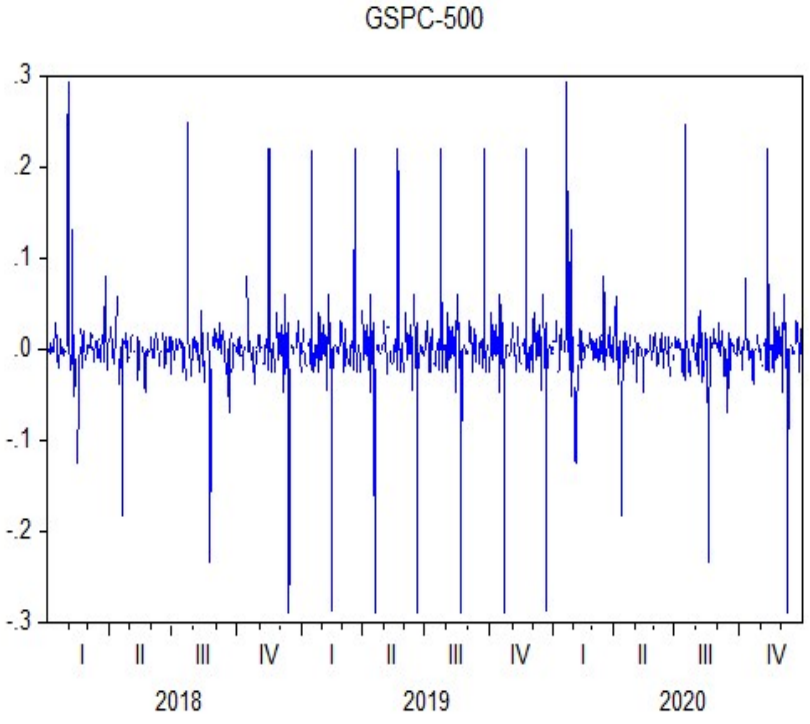

FIGURE 11: Return of GSPC-500

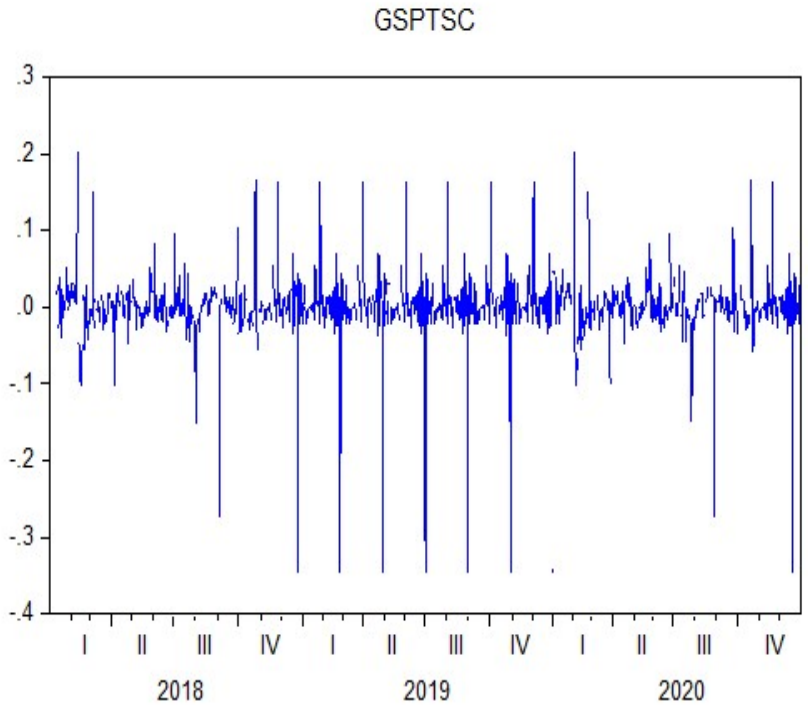

FIGURE 12: Return of GSPTSC

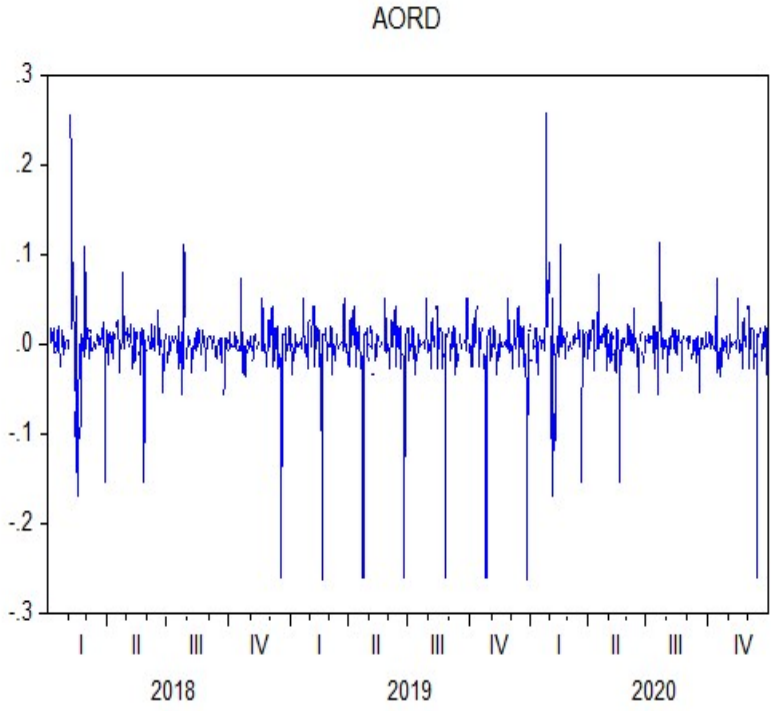

FIGURE 13: Return of AORD

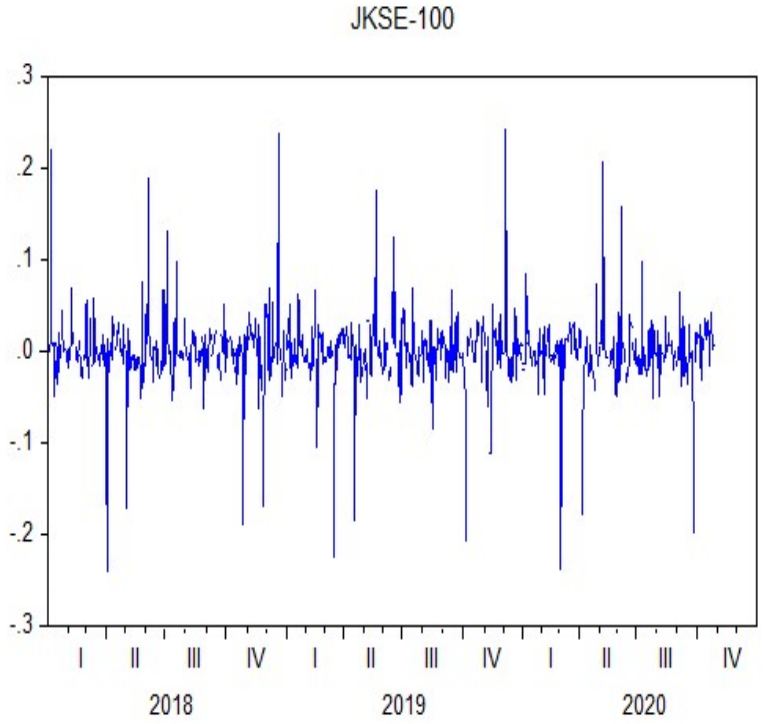

FIGURE 14: Return of JKSE-100