

CAPITAL UNIVERSITY OF SCIENCE AND
TECHNOLOGY, ISLAMABAD



**Impact of Foreign Exchange Risk
on Stock Market: Moderating
Role of Covid-19 in Perspective of
SAARC Countries**

by

Muhammad Shoaib Nawaz

A thesis submitted in partial fulfillment for the
degree of Master of Science

in the

**Faculty of Management & Social Sciences
Department of Management Sciences**

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To My Beloved Parents



CERTIFICATE OF APPROVAL

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(Muhammad Shoaib Nawaz)

Abstract

The objective of this study is to explore the impact of foreign exchange risk on stock market with moderating role of COVID-19. The research includes four major stock markets of the SAARC member countries PSX from Pakistan, CSE from Sri Lanka, Dhaka stock exchange from Bangladesh and BSE from India. The countries chosen are based on availability of the historical data from major stock exchanges in member countries. The time span of the study is from 01-01-2010 to 18-02-2021. E-GARCH model is used to find out the volatility of the exchange rate and stock returns and whether asymmetric information prevails or not and COVID-19 impact exist or not. In first model of stock returns Pakistan, Sri Lanka and India, results show past values does predict the current value of stock returns. Persistency volatility prevails in PSX and significance shows negative news has less impact on volatility. The result shows that COVID-19 impact exist in the market but this impact is not so bad. Mean value of Bangladesh is significant and positive, which shows past returns predict the current value of stock returns. Second model shows the results of exchange rate risk and its impact on stock returns and during the period of pandemic how COVID-19 affect both markets. The results show the persistence of volatility exist in all currencies and it also shows that negative impact is not considerable and it also shows that COVID-19 affect is not negative on all markets. The research will help policy makers to formulate economic policies in the post-COVID era and beneficial from the standpoint of investors, to make financial decisions in the event of a pandemic too.

Keywords: Exchange rate, Stock markets, SAARC, E-GARCH, volatility.

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Abbreviations

AR	Autoregressive
ARIMA	Autoregressive integrated moving average
ASEAN	Association of southeast asian nations
BSE	Bombay stock exchange
CAPM	Capital asset pricing model
CSE	Colombo stock exchange
CSR	Corporate social responsibility
E-GARCH	Exponential generalized autoregressive conditional Heteroskedasticity
FDI	Foreign direct investment
FTSE	Financial times stock exchange
FY	Fiscal year
GDP	Gross demestic product
GMM	Generalized method of moments
GSV	Gross sales value
IMF	International monetary fund
KOSPI	Korea composite stock price index
KSE	Karachi stock exchange
MA	Moving average
PSX	Pakistan stock exchange
SAARC	South Asian association for regional cooperation's
SARS-COV-2	Severe acute respiratory syndrome coronavirus 2
SSE	Shanghai stock exchange
TEJ	Taiwan economic journal
TWSE	Taiwan weighted stock exchange

VAR	Vector auto-regressive
WHO	World health organization

Chapter 1

Introduction

This research is mainly focus on two points the first one is studies on the impact of Covid-19 on the foreign exchange returns, and how pandemic create impact on the stock market. In first point it tells us how pandemic effects the exchange rate of respective countries in term of dollar. Second point examines how exchange risk and Pandemic effects on the stock prices of the stock market.

The SAARC is the South Asian Association for Regional Cooperation primary purpose of this cooperation is the integration and development of the region. Member countries of this union is the Pakistan, India, Bangladesh, Afghanistan, Sri Lanka, Bhutan, Nepal and Maldives. This union was formed in 1985 and the Headquarter is located in (Kathmandu) Nepal. After the collapse of Bretton Wood Agreement currencies are able to freely float in the market on the basis of demand and supply. If demand of a currency increases currency will appreciate which is good for the imports of the country and when demand of a currency decreases currency will depreciate which is good for export.

Abor (2005) examine that Volatility of the demand and supply is effected by many factors, higher volatility of the currency is due to the floating currency system.Examined that there is effect on the stock market due to change in the exchange rate and interest rate (Ahmad et al., 2010).

COVID-19 pandemic is also known as Corona Virus Pandemic caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2). At first this virus

identified in Wuhan city China. WHO World Health Organization declare it as a global health emergency and in March declared as pandemic.

At the start of the January 2020 Covid-19 virus spread throughout the world after the spread in china. At that time there is celebration of the new year and massive crowd was there. After the spread out of virus Wuhan city was completely ban for any kind of movement. At the end of January 2020 WHO declares as a global emergency.

Covid-19 also has huge impact on the financial markets and the economy of the world drastically. According to Al-Awadhi et al. (2020) the pandemic has an impact on the funds invested and the business atmosphere in China. Our findings put forward the proof of a considerable negative effect of the two dimensions. On stock returns throughout the corporations added in the Hang Seng Index and Shanghai Stock Exchange Composite Index covering the span of time between 10 January to 16 March 2020.

The pandemic has brought the financial and labor market under considerable stress globally, resulting in unusual financial and health turbulence. It's being considered that the global economy will undergo a grave recession due to the pandemic after the Great Depression. Apergis & Apergis, (2020) examine in their studies that the contagious illness, for instance covid-19, can badly affects stock market returns and their volatility.

The impact of COVID-19 is the social and economic disruption. It is the largest global recession after the great recession. This pandemic also impacts on the stock Market, exchange returns and exchange rate is highly volatile in this time period. Like pandemic when an uncertain event happens then investors become conscious and this impact shows in the stock market. In the financial year 2007-2008, when there was net inflow of US\$20.3 billion, there was a net outflow of 15 billion in FY 2008-2009 from Indian market because foreign portfolio investors aspired for security and mobilized assets in order to make the financial statements of their head corporations strong. This immense outflow of FII generated fear in the stock markets. As a consequence, the equity suffered the loss of their index value greater than 60% (Goudarzi & Ramanarayanan, 2011).

Exchange rate is one of the most important macroeconomic factor which plays

a vital role in countries trade, economic growth and have greater impact on the stock market. Exchange rate reacts rapidly due to the changes in the events and changes happened due to economic factors, political factors and social factors. Volatility of exchange rate depends on the supply and demand of the currencies. The reason behind the highly volatile exchange rate is the financial breakdown of developing countries preoccupancy of global monetary is the major force and in these countries Economic liberalization are being followed (Azhar et al., 2015).

Qureshi et al. (2010) explain that Volatilities of the exchange rate is the important factor in expansionary changing of the international trading specially related to stock prices in the macro level. According to Hooy & Choong (2010) there is no work have been done on the volatility of the exchange rate on trade offers for the SAARC countries.

If prices of the exchange rate rapidly change over time and if it cannot be hedged and control the cost, then by appreciation the real domestic currency it adversely affects the import/ export firms. Firms mainly based and support by suppliers, financing and foreign customers exposed to negative changes in currency and regulations. Dritsaki (2019) explore that the volatility of exchange rates impacts the competitive aspects of import-exports, payments of debts dues of different countries and global portfolios for investments. Furthermore, the volatility of exchange rates has affected economic circles of business and flows of capital, establishing the terms and conditions for trade with the other countries. This, in turn, impacts the economic situations of each and every country.

Constantly changing of exchange rate may affect the businesses of the two countries. This is good for some investors who take advantage of this situation and they increase their revenues and for some investors this is not a favorable situation because it reduces their earnings. If the exchange rate is highly volatile it confuses the investors due to high volatility FDI (foreign direct Investment) can be delay and ultimately it effects the economy of the country. Steady exchange rate volatility is, in general, suitable to improve durable growth in the economy and the advancement of the economy of rising markets.

Liu et al. (2020) Towards the beginning and middle of January 2020, corona virus began to make its presence in different regions of China. At the same time,

there were a large number of people who came back to their hometowns for the celebration of Chinese New Year, which resulted in the spread of the virus and a state emergency was declared. Despite stringent restriction of movement on the people, the Virus transmitted at a very quick pace. On January 30, 2020, the WHO declared covid-19 as pandemic due its high rate of transmission. This was the sixth time, when such an emergency was declared worldwide. In the past a similar emergency was announced in connection with Democratic Republic of Congo, where Ebola and Zika Virus erupted.

1.1 Theoretical Background

Arbitrage pricing theory (APT) is a valuation model for assets which characterizes stock returns as a result of a set of risk factors. Roll and Ross came up with the theory (1976). The idea is a development of Sharpe and Litner's Capital Asset Pricing Model (CAPM), which claimed that stock returns are only a measure of beta risk. Unlike CAPM, APT states that stock market returns are influenced by a number of risk factors ranging between firms to macro level. The assumptions of APT theory are less restricted than those of CAPM. The APT theory implies that markets are fully competitive, that investors choose more capital with assurance over less, and that asset returns reflect a stochastic steps outlined as a linear model of n risk variables.

The APT theory of the n risk factor model is as follows:

$$E(R_{it}) = \lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2} \dots \dots \lambda_n b_{in}$$

$E(R_{it})$ = the expected return on asset I during a specified period of time, $i=1, 2, 3 \dots n$

λ_0 = the expected return on the asset with zero risk (the asset's estimated return with no risk)

λ_n = the risk premium related to the nth common risk factor; (the risk premium for the nth most common risk factor)

Financial time series put forward specific attributes, for instance, leptokurtic,

volatility clustering and the Generalized Autoregressive conditional Heteroscedasticity (GARCH) model of Bollerslev (1986), which has acquired prominence in terms of its capability to cope up with these concerns.

According to Thorlie et al. (2014) Analysts repeatedly give an immense importance on preparation of models and predicting volatility of exchange rate returns. In case of inaction towards modeling, the financial market may also suffer the collapse.

Lim et al. (2013) examines in his study that the operation of GARCH-type models relies on the time/periods, for instance period before the crisis, during the crisis and the period after the crisis and the measurement of inaccuracy as well. Generally, the aggregate rank portrays that GARCH/TGARCH model functions at best before the crisis period and TGARCH model operates well in the period after the crisis in seizing the stock market volatility in Malaysia.

Dritsaki (2019) explore that in the previous decades, extensive exchange of dialogues took place about the exchange rate volatility. As a result, multiple models were formulated in order to study volatility. The widely used models to scrutinize the uncertainty in exchange rates are Autoregressive Conditional Heteroscedasticity-ARCH designed by Engle (1982) and Generalized ARCH-GARCH models developed by Bollarslev (1986) and Taylor (1986).

Most of the researchers have used GARCH type models to predict the volatility of the stock and due to uncertain event and its impact whether it is positive or negative and also analyze asymmetric information prevails in it or not. Park (2002) examined that the GARCH models are prominently and extensively applied models to predict the time changing volatility, varying on the basis of time. Such volatility is noticeable in numerous financial returns as they are suitable into the financial facts and figures, which possesses heavy-tailed distribution and volatility clustering. Engel (1982) claims that a sufficient volatility model is ideal for modeling heteroscedasticity adequately in terms of turbulence and seizes the stylized fact present in stock return series like Autoregressive Conditional Heteroscedasticity (ARCH) effect, volatility clustering and asymmetry.

In this research Exponential GARCH model is used to analyze that whether volatility and asymmetry information exist in the market or not. Atoi (2014) examine

that popular volatility models utilized in numerous researches comprises of Autoregressive Conditional Heteroscedasticity and its supplements, like Generalized ARCH, Threshold GARCH, Exponential GARCH and Power GARCH.

Stock market are one of the major part of the economy. The role of stock market is very important it provide finance to the different sectors private and public. Stock market is sensitive to any events which happened in domestic or in international level and stock market react according to the event positively and negatively.

It has been noticed that stock volatility shows a clustering phenomenon, i.e. big changes lead to big changes. Similarly, slight changes lead to slight changes. Our interest in studying Asian markets is further boosted by the current events in market phenomena.' The liberalism in the financial industry in numerous Asian countries recently, stock prices and capital flows are prone to news, return differentials, changes in technologies, alternation in business situations, and political circumstances in the local and the global markets. As a consequence, the fluid nature of asset returns comes into interaction with the global shocks.

Chiang & Doong (2001) explain that in order to give more precise data to help the portfolio executives in accomplishing an effective mean-variance parameter and to give policy formulators a clear base to devise suitable tactics for handling the risk, it is important to perform a practical study on the stock-return reaction to the uncertainty.

For the purpose of expansion of wealth, investors need exact and authentic data for determinants of prices of stock. Mwaurah et al. (2017) examine in the study the axioms of effective market theories argue that stock prices give response to news that comes out in the markets, which are available in the format of financial records, press conferences or internal information.

The estimation was made by Ahmad et al. (2008) about the impact of exchange rate on the Stock market of Ghana. Considering supplies of money, rate of foreign exchange, rates of Treasury bill, trade deficit and inflation like independent determinants, using Exponential Generalized Autoregressive Conditional Heteroscedasticity(EGARCH), it was discovered that there exists a direct association between consumer price index and Stock market. It was also discovered that whenever the inflation rate shoots up, the volatility of stock returns also grows. All-in-all

their conclusion portrays that the connection between stock returns and macro variables are crucial.

In stock returns of Pakistan, Bangladesh and Sri Lanka regional and local economic factors influence while stock returns of India highly influenced by the global economy or global economic factors (Khan et al., 2015).

In many studies, first-order GARCH models have been reliable in terms of modeling and predicting financial time series. (Bera and Higgins, 1993; Hansen and Lunde, 2005; Goudarzi and Ramanarayanan, 2011; Hsieh, 1991; Ayodeji, 2011).

1.2 Research Gap

There is a lot of work that has been done on the stock market, exchange rate during the pandemic period and financial crises and other worldwide economic events. World major countries including Japan, Singapore, Germany, the USA, Italy, Korea and the UK examine the impact of pandemic on stock market (Liu et al. 2020).

Similarly, 47 countries firm's data examined to find out the impact of corona virus and due to this pandemic value of firm changes or not (Bose et al. 2021). There is a lot of work that has been done on stock returns during in crises and after the crises. To evaluate the influence of financial risk on stock returns (Kabeer, 2017) examined 9 banks data listed in stock returns from 2006 to 2015. He finds out the impact in two ways one is impact of individual financial risk on stock returns and second is financial risk of multivariate impact on stock returns.

Exchange rate is one of the important factor for international trade, Foreign direct investment, and for stock market as well. A lot of research work has been done to find out the volatility of exchange rate and in different countries and on different Currencies. When an event occurs its rapid impact goes to the exchange rate of the country. Dritsaki 2019 in his study explained that to find out the volatility of the exchange rate different models have been developed. Monthly data from August 1953 to January 2017 is taken to find out volatility of exchange rate on Euro to US dollar. Exchange rate its volatility and modeling explored in variety of studies GARCH, EGARCH model (Chiang and Doong, 2001; Thorlie et al., 2014; Atoi, 2014; Park, 2002).

The Gap which found in previous papers is that Researcher worked on American Countries and Japan from Asian Countries. This study used data of Asian SAARC Countries where volatility and returns is high with uncertain events. Also relate this with Covid-19 pandemic and will analyze its effect on these economies.

1.3 Research Questions

Research Question 1

Do Foreign exchange rate influence the Stock market?

Research Question 2

How COVID-19 moderates between exchange rate and stock returns?

Research Question 3

Does COVID-19 affect exist in the stock market of the SAARC countries?

1.4 Objectives of the Study

- Specifically, study look on the SAARC countries prospective because as an emerging economy these countries effect the most.
- To examine that after breakout of the uncertain event (Covid-19) how stock market affects by this pandemic.

1.5 Problem Statement

Due to outbreak of the COVID-19 economic growth is stopped and investors are now become conscious and hesitate to invest in the stock market. Pandemic hit the economic activities so badly. Lockdown shut downs the manufacturing and production activities which ultimately effect the stock market returns and exchange rate. This research will help international investors to find out which stock market and currency affect the most and where they can invest. This study also helps to find out is foreign exchange rate affect the stock returns of the countries and if it affect in which country it affect the most during the COVID-19. Exchange risk is

worth investigating in SAARC countries perspective as Covid-19 & its impact on stock market is still explainable.

1.6 Significance of the Study

This article enriched the writings of global finance on two scales. Firstly, it illustrates the testimonies of pertinence of currency risk as an element to elaborate the time series of stock returns. It also explains the link of currency betas with value/growth and size characteristics, where generally, small and growth stock are greatly vulnerable to risk of currency. Secondly, it gives the proof that currency risk aids in elaborating the stock returns cross section in SAARC countries. This study analyzes the Covid-19 effect and implications on Stock market and their returns in perspective of SAARC countries.

1.7 Plan of Study

This study strives to establish and elaborate the features of volatility of exchange rate on currency of respective country to US dollar using daily data from 1st Jan, 2010 until 18th February, 2021. The rest of the writing presented in the following manner: Second Section gives a summarized literature review. Third Section illustrates the analysis of methodology. Fourth section gives the brief details of the data and the descriptive statistics. The empirical results briefed in fifth section and sixth section comprises the details of forecasting results. At last, the concluding section contains the final remarks.

Chapter 2

Literature Review

Numerous studies have been conducted which describes the exchange rate volatility and its relation with stock market returns and pandemic which broke out time to time and also the financial crises. The literature review in this study described in three parts. First part is about the exchange rate, volatility of exchange rate and models. Second part is about stock market and role of stock market in the economy. Third part tells us about the financial and pandemic crises when it occurs and their impact on economy.

2.1 Exchange Rate, Volatility of Exchange Rate and Models

Exchange rate is considered as one of the important factors it refers as the appreciation and depreciation of the currency of any country. Exchange rate is very sensitive as little variation can make the regular changes. Exchange rate changes regularly since 1973 after breakdown of the Breton woods system after that value of currency changes according to the demand and supply. Muller and Verschoor (2006) found that in a set of industrialized and emerging markets, small firms and firms involved in international activities are more sensitive to currency risk. Many studies also highlight the importance of exchange rate like It's perceived that exchange rate acted as a crucial impetus to macroeconomic skepticism impacting the performance and the value of firm in global arena.

Goudarzi and Ramanarayanan, (2011) examined foreign investment and its connection with Indian stock market. Undoubtedly, the FII performs an immensely favorable part in the Economy of India. The economic collapse of 2008 witnessed that it is also a possible danger. Such a financial threat with less fluctuation, but having severely grave effects, is termed as catastrophic risk in the literature. Such risks are speculative in nature and are irrecoverable. The principal goal of this paper was to make an inquiry about the interconnection and causal association between the Indian stock market and foreign Investment (FII) in India at the time of financial unrest of 2008. The interconnection and the causality between the both were studied by the application of the Engle-Granger (1987), Johansen(1991,1995a) and Granger (1969) approaches. The research revealed that the BSE500 stock index and FII series are mutually connected and the causal relationship is mutual.

To manage exchange rate risk derivatives are also used in emerging countries. Currently, the markets for options with other derivatives begin to emerge in the emerging economies. These derivatives, which are specified in the exchange rate list of developing nations, along with government debt facilitate corporations to manage currency and political risks (Bailey & Chung, 1995).The outcomes give the suggestion of ordinary determinants in rising market equity, sovereign debt markets and currency. They also have multiple consequences for corporate and portfolio management. Time series regression model was put into practice. The series of return data on a monthly basis were observed from the period of January 1986 to June 1994.

Several nations accepted the system of floating exchange rate when the Bretton Woods system shattered. During the shift towards the system of floating exchange rate, the exchange rate volatilities came into the scenario as the greatest issue for nations. The exchange rate volatility affects the anticipated advantages of foreign Direct Investment (FDI) as it enhances risks for investors. The volatility in exchange rate indicates all types of shifts and fluctuations those are important for valuation or depreciation of a currency (Martins, 2015. p. 14). The volatility in exchange rate is a crucial element that investors take into consideration at the time of deciding about investing in abroad. The volatility of exchange rate

influences the costs and volumes of the inputs and outputs of the Multinational companies and directs toward the path of global competitiveness (Kumarasamy, 2010). Exchange rate volatility has effects on the anticipated earnings from the FDI, which are regarded as transfers of capital. Thus, the levels of these pair i.e exchange rate and volatility might influence the level of investment (Chowdhury and Wheeler, 2008; Asmah and Andoh, 2013). The volatility of exchange rate might boost or hinder FDIs.

With the introduction of the floating exchange rate, overhauling of markets of finance in the initial years of 1990s, the tragic condition of the Asian currency in 1997-1998 have together formed a powerful ground for the dynamic connection between markets of foreign exchange and the stock. Conventionally, both markets have been considered as delicate division of financial market as the influence of any alternation in policy have a direct effect on these markets. Concurrently, disturbance in one or the both of the markets has a tendency to increase the anxiety among the policy formulators, both markets have greater ramification of policies. The dynamic connection between these markets ignited the interest of many analysts and researchers to undertake descriptive examination of this correlation.

Although there is an absence of any conceptual agreement on the connection between exchange rates and costs of stock, intermediate factors like interest rates, demand for money and wealth are the crucial players in determining the connection between the two. For example, flow-oriented a proaches p (Dornbusch and Fischer 1980) of exchange rate fixation emphasizes on the current account or the balance of trade. This approach argues that movement of currency influence global competitiveness and trade balance domains and therefore, the actual output of the nation, which subsequently influences the present and forthcoming anticipated flows of cash of corporations and their prices of stock. It happens due to numerous corporations raise funds through loans in terms of foreign currency to investment in the functioning. In this way, the effect is because of two factors if the corporations are an exporting industrial unit or a heavy user of imported inputs.

The other reason for the connection between costs of stock and exchange rates is

explained with the help of 'stock oriented models'. These models of exchange rates or portfolio-balance focus on capital account as the principal factor of dynamics of exchange rate. The portfolio-balance model has its foundation on the hypothesis that agents ought to divide the whole wealth between local and overseas assets, with currencies included in their portfolio. Therefore, exchange rates have an important function of establishing the balance of the demand for and supply of assets. The reasonable conclusions drawn in terms of adverse influence of stock prices on exchange rates are as follows: a rise in costs of local stock directs investors to raise the demand for local assets. In order to increase the purchase of local stock, the foreign assets are required to be sold out as these overseas assets are comparatively less fascinating now. Hence, the domestic currency experiences an appreciation because of a hike in the demand for local assets. Alternatively, the discussion outlines a hike in wealth because of increase in local prices of assets will direct investors to raise their money demand, which lead to increase in local interest rate. The greater increase in the interest rate will fascinate foreign capital, which in turn result in local currency appreciation. In the period of 1992, the liberal system of exchange rate brought in the convertibility of current account and, specifically from 1997, capital account is initiated for the investment in global market.

Besides, the inception of floating exchange rates, the 24-hour screen-based international dealing rolled in, the rise in the use of domestic currency in foreign land, and innovative approaches in the globally dealt products of finances demanded re-evaluation of the connection between the overseas sector of the economy of India. The modern outlook, practitioner and analysts conducted studies to comprehend the present economical functions and the system of finance. The analysis of the stock market was brought to the forefront as it is the utmost fragile segment of the economy and is regarded as the thermometer that help to observe the nation's exposure to the outside lands. The current research is an effort in this regard.

The changes in the foreign exchange rate covered by flexible or floating system of exchange rate are the principal issue to consider for the corporations of Philippine whether they are involved in overseas trading and finance or not. The changes in Exchange rate influence companies via their straightforward influences on the companies' net foreign real and financial local assets and via their indirect influence

on collective industrial demand the transaction costs of goods, on imported competitive products, and on anticipation of inflation. Nevertheless, these variations theoretically, are regarded as a medium of threat that might be directed toward hedging or diversification in a perfectly organized market of finance. Specifically, the modern portfolio theory outlines solely the threats, which are not possible to be diversified away; besides regarded as systemic risks, for which pricing ought to be determined with the help of the capital market considering that premium is to be reimbursed to investors for taking the risks. In case of the insignificance of foreign exchange risks or diversification of assets through hedging, the risk of the medium ought not be levied any cost. Hence, it should not be added to the capital costs of the corporations.

The exchange rates share a favorably considerable impact on the Colombo Stock exchange, Sri Lanka and Dhaka Stock exchange, Bangladesh. On the contrary, the exchange rates influence KSE, Pakistan negatively. Since 2011, the stability of exchange rates of Bangladesh in comparison to the other neighboring countries has a reason. In Sri Lanka, the government devalues their currency to encourage the investors. Similarly, the new elected government of Pakistan intentionally decreases the value of US\$.

Wongbangpo and Sharma (2002) discovered the effects of three non-dependent variables of the economy like foreign direct investment, inflation (CPI), and foreign exchange in SAARC nations plus China and compared the outputs into separate categories of greater frequency monthly inputs of variables which are dependent and independent both. These data were acquired from multiple genuine origins from the last five years practice inputs. In order to meet the requirement of the study, the author put the ordinary least square (OLS) to ascertain the multiple regression models and the Pearson's correlation coefficient. Wongbangpo and Sharma (2002) argued that a positive or a negative relationship may exist between share price changes and variations in the money supply.

Thorlie et al. (2014) Rapid changes in the value of a currency by appreciation and depreciation is called volatility. It's crucial to consider the fact that hedging strategies, portfolio selection, assets valuations, risk management and option pricing furnish the significance of modeling and predict the conditional volatility

of exchange rate returns. Taking the research data of 3634 international active corporations of Asia, Authors came to the conclusion that between January 1993 to December 2003, approximately one-fourth of these corporations underwent considerable economic exposure due to the US dollar, and 22.5 percent of corporations experienced economic effects due to the Japanese yen. The depreciation (appreciation) of the currency of Asia with respect to overseas currencies affects negatively (positively) on stock market revenue of corporations of Asia. The research observes that greater than seventy percent of corporations of Asia getting enormously impacted by the US dollar exchange rate flexibility in the long run.

Frank and Young's (1972) study was the first to examine the connection among stock prices and macroeconomic variables in order to identify the effects of exchange rate fluctuations on equity markets. They looked at six various exchange rates and identified no link among two financial factors.

Sekmen (2011) used the squared residuals from the autoregressive moving average (ARMA) models to analyses the impact of exchange rate fluctuation on stock market returns in the United States from 1980 to 2008. The research reveals the exchange rate changes had a negative impact on U.S. market returns because hedging strategies were unable to mitigate the negative impact of exchange rate volatility on transaction volume. Using the Johansen cointegration tests, Olugbenga (2012) investigated the long- and short-run impacts of exchange rate upon stock market development in Nigeria from 1985 to 2009. In the short run, the stock market outperformed the exchange rate significantly, while in the long run, the stock market outperformed the exchange rate significantly.

To control the increasing and decreasing value of a currency researchers discover many methods and these methods made a significant change to control the volatility. Park (2002) in his study *Considering Volatility as a tool in measurement of uncertainty*, it's been a long-term engagement of financial economists to discover exact benchmarks and predictability of future volatility. Assuredly, the Generalized Autoregressive conditional Heteroscedasticity (GARCH) model has been extensively adopted for the mentioned purpose.

Thorlie et al. (2014) explain that different models have been used to find out the volatility of the exchange rate but the GARCH model and class of GARCH

model is widely used by researchers. These models help the investors and policy makers to make the strategy to how to improve the stability of exchange rate. The outcomes indicate that the GJR-GARCH model, when accompanied with a skewed student t-distribution, executes wonderfully with the dataset. This will be more competent and appropriate at charting out risk management strategy for the Sierra Leone/US dollars exchange rate returns. They impart valuable information and criteria to investors and policymakers for decision making in order to comprehend the investment strategies and improve exchange rate stability of the economy. The basic GARCH model seizes the symmetrical collapse (favorable shocks) and is incapable of trapping shocks which are asymmetric in nature (adverse shocks). It is generally observed that adverse shocks lead to the generation of higher volatility as compared to favorable shocks of equal intensity. The EGARCH approach has the capacity to seize symmetrical and unsymmetrical shocks.

The EGARCH model is chosen by a myriad of researchers in order to investigate volatility spillover between markets of foreign exchange and stock. These models are fitted in monthly exchange rate returns, statistics covering the period of January 2004 to December 2013. The finding advises that the mentioned frameworks are appropriate for formulating models for the exchange rate volatility of Sierra Leone and unsymmetrical GARCH models portray the unsymmetrical exchange rate returns, which results in the existence of leverage effects.

Dritsaki (2019) also explores that ARIMA (0,0,1)-EGARCH (1,1) models were utilized for the purpose of registering the Volatility of exchange rate. Besides, the leverage effect is seized from the assessment of ARIMA (0,0,1)- EGARCH (1,1) model, indicating that positive shocks bring about less volatility in comparison to negative ones. The paper strives to frame and scrutinize the features of exchange rate volatility on the Euro/US dollar utilizing the data on the monthly basis from August 1953 until January 2017. It also found that the exchange rate fluctuation might accelerate the cost of transaction and lower the profits to global trade. The understanding of exchange rate volatility assessment and predicting is crucial for determination of prices of stock and managing the uncertainty.

Chiang and Doong (2001) also analyzed by the GARCH model and results shows volatility and stock returns have strong correlation GARCH is an enormously

effective tool for assessment of the day-to-day return series in the context of all the evaluated Asian stock markets. Nonetheless, the magnitude and the importance of the GARCH influence gets reduced in the weekly-return series. It has been documented that GARCH has a very slight impact on monthly data with some exceptional cases. The study put the everyday indexes of stock-price 7 stock markets of Asia compiled over the period of January 1988 till June 1998. Evaluating the correlation between Stock returns and volatility varying on the basis of time by putting Threshold Autoregressive GARCH (1,1)- into use. Applying the technique their study discovers that 4 out of 7 Stock markets of Asia possess a strong correlation between stock returns and unpredicted volatility. Generally, unforeseen volatility has a higher influence on stock returns as compared to predicted elements.

Bailey and Chung (1995) find out that exchange rate have a strong and deeper effect on the country's economy and foreign direct investment. The study includes the influence of exchange rate variation and political vulnerability on risk premium, which is evident in cross-sections of individual equity returns from Mexico. The country has undergone considerable political and monetary turmoil. Azhar et al. (2015) identify that in India and Pakistan, the real exchange rate favorably affects the FDI. On the contrary, In Sri Lanka, both variables share an adverse relationship. Here, the real exchange rate weakens FDI. In all the three countries, the exchange rate volatility has a substantially adverse influence on FDI. Time series inputs are put to use in this paper over the period of 1981-2013. The data has been lifted from the website of the World Bank. The output exhibits that there exist adverse relations between foreign direct investment and exchange rate volatility for these nations and the outcomes of all the other variables are in accordance with our anticipation and studies conducted beforehand. For the purpose of providing a remedy for indignity, In this study the model which was utilized is the Generalized Method of Moments (GMM) tactic of assessment in order to acquire blooming results.

Ahmad et al. (2010) identify that the variation in interest rate has an unfavorable influence, while the exchange rate has a favorable effect. The outcomes of the study revealed that if the interest rate is raised the cost of business also increases,

which in turn, decreases the yields. Contrarily, a lower interest rate gradually stimulates the Stock market and Stock returns. The variation in the exchange rate fluctuates in the similar manner, but it moves the reverse direction. The statistics of short run interest rate, exchange rate (Rs/US) and returns of stock market (KSE-100) from 1998 to 2009 is compiled. A multiple regression model is deployed in order to evaluate the prominence of alteration of interest rate and exchange in terms of stock returns.

Atoi (2014) also used GARCH model and found that negative news creates more volatility than positive news. The research inspected the relevance of the order GARCH category models supplemented with three alternative error distributions. The unsymmetrical frameworks of these models exhibit the proof of influence of leverage in stock returns, signifying that stock returns volatility in the Nigerian capital market hardly responds equally with the similar intensity of adverse and favorable shocks.

Putting Nigeria All Share Index starting from January 2, 2008 to February 11, 2013 to use, the research evaluates first order symmetric and unsymmetrical volatility models each in Normal, Student's-t and generalized error distributions having the purpose of choosing the highly reliable predicting volatility model with the best suited error distribution. The graph of NIC endorses the response to volatility to shocks, which unveils that prospective volatility reacts more to negative news than its response to favorable news of same intensity.

Different class of GARCH models perform in different stages like before event, during the event and post event. Lim and Sek (2013) by using GARCH model examined the data which is taken from January 1990 to 2010. Generally, the aggregate rank exhibits that GARCH/TGARCH model is top performing before the period of financial turbulence. But the GARCH yields decent results at the difficult period and TGARCH model performs best after the financial tragedy in seizing the stock market volatility in Malaysia. The results of assessment concur with the outcome of estimation which indicates symmetric GARCH functions well before the time of crisis and asymmetrical GARCH model(s) can be a better model to fix volatility of stock market Malaysia in the apocalypse and post-apocalypse. The statistics extend from January 1990 to December 2010. The data is split into

three-time frames, i.e. before the crisis of 1997, at the time of crisis and after the crisis 1997.

Drimbetas et al. (2007) investigate the impact of good and bad news through EGARCH model. Nelson put forward the EGARCH model in order to tap asymmetric characteristics of data. According to the statistics, the impact takes place when the price falls due to an increase in bad news. On the other hand, there is an unpredicted hike in price due to good news of the same intensity. Analyzing the data (August 1997–April 2005) with the help of an EGARCH model it is shown that the introduction of derivatives has induced a reduction of the conditional volatility of the FTSE/ASE20 index and consequently it has increased its efficiency. Scrutinizing the input (from August 1997 until April 2005) with the help of an EGARCH model it is illustrated that the installation of derivatives has excited the conditional volatility of the FTSE/ASE20 index to decline and resultantly it has raised its performance.

2.2 Stock Market and Role of Stock Market

Stock market is considered as a backbone of the economy change in the stock returns or happening of any event directly affect the economy of the country. Jamaludin et al (2017). put in discussion the influence of four macroeconomic independent factors like supply of broad money, domestic output, rate of interest and inflation rate and the dependent factors of Thailand, Malaysia, Singapore, Indonesia and the Philippines (ASEAN stock market). In order to estimate the earnings on the stocks, the research applied the formula, which was used by (Purnamasari et al., 2021; and Predescu and Stancu, 2011) in ascertaining the earning on stocks:

Equation 2.1: Equation Formula to determine returns on stocks

$$R_{i,t} = \ln \left(\frac{P_t + D}{P_{t-1}} \right) \quad (2.1)$$

Where, R , indicate the continuously compounded individual bank stock returns at time t . P_t denote price of stock at the end of the duration, P_{t-1} show the price of

stock at the end of the preceding cycle of time and d_t indicate the dividend in the form of cash in the course of time.

Sohail and Hussain (2009) reported a negative relationship between inflation and share prices in the Lahore Stock Exchange in Pakistan, whereas industrial production, exchange rates and the money supply all had a positive relationship with share prices. Ahmed et al. (2010) found that the performance of the domestic economy was more important in influencing the stock market than international trade and FDI. Qayyum and Kamal (2006) examined the volatility spillover effects of the two financial markets for Pakistan.

Phylaktis and Ravazzolo (2005) conduct the research in short and long run dynamics among the exchange rate and stock prices by applying cointegration and multivariate Granger causality tests for a few pacific basin nations. Their outcomes document that prices of stock and FX markets are favorably connected. Zhao (2010) analyzes the dynamic relationship between the real effective exchange rate and the Chinese stock price, using a VAR with a multivariate GARCH model. The results show that there is no stable long run equilibrium relationship between the two financial markets.

Ajayi et al. (1998) provide evidence to indicate unidirectional causality from the stock to the currency markets for advanced economies and no consistent causal relations in emerging markets. Pan et al. (2007) examine dynamic linkages between exchange rates and stock prices for seven East Asian countries, excluding China.

Jorion (1991) estimated an unconditional multifactor model using monthly data on U.S. stock returns and found that exchange rate risk is not priced into the U.S. stock market. Hou et al. (2011) discovered that domestic elements are of greater use in explaining the stock returns as compared to international elements, particularly in terms of developing nations. When an event happens it directly affect the stock market returns in a positive or in a negative way. Similarly, when pandemic hit the stock market its effect can be seen in global stock markets. Al Awadhi et al. (2020) observed that the Coronavirus Pandemic responds adversely to Stock Market returns. As a reasonable analysis, panel data analysis use to scrutinize the influence of the coronavirus, an infectious illness, on the stock market of China. Use the statistics of the corporations stated in the Hang Seng Index and

Shanghai Stock Exchange Composite Index covering the duration of January 10 to March 16,2020.

The stock markets of Asian Countries have a prompter response to volatility with the outburst of the pandemic. Some of them, but positively restored in the subsequent period of the Pandemic (Liu et al., 2020). The paper assesses the influence of covid-19 outburst in a short run on twenty major stock markets indices in seriously blanketed countries like Korea, Japan, Singapore, Germany, Italy, The USA and the UK etc. The ramifications of the contagious illness are extensive and have had a direct effect on global stock markets. Asian nations underwent greater adverse and unusual returns in comparison to other nations. The method of event study was put to use.

Riaz et al. (2020) examined that At the time of unpredictable situations, immense assurance given to investors pushes them to end uncertain and troublesome exercises in prediction of forecasting trends. (Riaz, Ahmed, Perakash, & Ahmad, 2020). The responses were gathered from variant investors, indicating a huge feedback rate of approximately 86.5% out of 167 respondents. From the research, it was discovered that highly crucial and considerably determining factors of decisions making in terms of investment in Pakistan Stock Markets are attributed to : being rich at fast pace, hostility and phobia towards loss, anticipated corporate returns and dividends, intuition towards the economical situations, the preceding efficiency of the corporate stock and the viewpoints of the shareholders, and gradually, the instructions given by stockbrokers, friends and relatives.

In nine Countries in Asia, Amare and Mohsin (2000) investigate the long-run relationship among stock values and currency rates (Japan, Hong Kong, Taiwan, Singapore, Thailand, Malaysia, Korea, Indonesia, and Philippines). Thailand, Japan, Taiwan, Malaysia, Philippines, Indonesia, Korea and Singapore). They used a cointegration technique to analyses monthly data from January 1980 to June 1998. Only Singapore and the Philippines showed a long-term link among stock values and currency rates. They justified the absence of cointegration between the variables on the bias caused by the "omission of significant factors." They identified cointegration among share prices, exchange rates, and interest rates for six of the nine countries when they included the interest rate factor in their

johansen cointegration test.

In Ghana, South Africa, Egypt, Kenya, Mauritius, and Nigeria, Adjasi and Biekpe (2005) explored the relationship between stock prices and currency rate fluctuation. The connection among stock prices and exchange rates was investigated using a VAR model. According to their findings, for Egypt, Ghana, Kenya, Mauritius, Nigeria, and South Africa, there's no long-run consistent link among stock market values and currency rates.

Mwaurah et al. (2017) find out the effect of the risk involved in stock returns has a favorable connotation with stock returns when assessed separately. The domain of foreign exchange when taken together with other financial threats, gives rise to unfavorable relations with the stock returns. The yearly data over the period of 2006 till 2015 has been taken into use. The data for the stock return of nine banks listed in the period of 2006 to 2015 was utilized. The research embraced a multivariate generalized least square regression model.

Macroeconomic factors have impact on stock market as Sohail and Hussain (2009) observe an adverse connection between inflation and share prices in Lahore Stock Exchange in Pakistan was observed. On the other hand, the money supply, industrial production and exchange rates are positively related to share prices. The conclusion of variance decompositions discovered that out of 5 macroeconomic variables, the consumer price index exhibited a default in the forecast for the Index.

For the period January 1994 to December 2000, Muhammad and Rasheed (2002) investigated studied the long - term and short relation among stock prices and macroeconomic variables in four south Asian countries: Pakistan, India, Bangladesh, and Sri Lanka. Monthly data was used in the study, and co-integration, an error correction modelling technique, and standard Granger Causality tests were used. The following are the study's main findings. For Pakistan and India, there is no long-run equilibrium relationship between exchange rates and stock prices. There is a long-run association between the variables evaluated for the study in Bangladesh. The findings for Sri Lanka reveal a long-run link for lags one and two, but no cointegration between the stock price and the exchange rate at higher lag orders. For Sri Lanka, however, the Engel and Granger tests revealed a

co-integrating link among stock prices and currency rates. In both Pakistan and India, the Granger Causality test found that there appears to be no short-run relationship between stock prices and currency rates. In the case of Sri Lanka, the error correction model verified bi-directional long-run causality. For Bangladesh and Sri Lanka, though, there seems to be no short-run causation in either direction. Similarly, Mwaurah et al. (2017) by using Multiple Linear Regression models explored the exposure of Foreign Exchange together with other financial threats are adversely related to the stock returns. The data show that at the time of financial threats, Banks are required to secure some of the uncertainty to diminish the negative effect on the shareholder market value. are put in place.

EGARCH model used by Jebran and Iqbal (2016) to analyze unsymmetrical volatility spillover influence between foreign exchange market and stock market. The documented proofs indicate that there exists a two-directional substantial volatility spillover of stock and foreign exchange market for Pakistan, Hong Kong, China and Sri Lanka. In India, the study unveils one-directional stock market volatility spillover to foreign exchange market. In the case of Japan, both financial markets (foreign exchange market and stock market) portray no proof of volatility spillover between them. There was an absence of symmetry of the volatility spillover in all the markets (more volatility was caused by negative shocks as compared to positive shocks of the same intensity). The continuity of foreign exchange market volatility as a whole is detected to be greater than stock market volatility. The finding examined the everyday data beginning from 4th January, 1999 to 1st January 2014.

In contrast the study of Zhang and Chen (2011) shows stock markets are not exposed by the uncertain event, the reaction of Chinese stock returns is not powerful at the time of encountering the turbulence in the oil market of the world. The revelation of the assessment unveils that there exist leaps, which have variation with respect to time in the stock market of China, and China stock returns are connected only with anticipated volatilities in oil prices of the world, the results are opposite to the last study.

On 2965 data the duration of June 1, 1998 to November 30, 2010 with the everyday observations on the Shanghai Stock Exchange(SSE) Composite Index acquired

from the Wind Database also used on Europe Brent Spot Price procured from the U.S Energy Information Administration. Annas and Mohamoud (2013) made an enquiry about the influence of financial leverage and inherent threat on stock yield for industries at the Amman stock exchange during the time from 2000 to 2009. The structured threat was scaled by beta coefficient. At the same time financial leverage was evaluated by debt ratio. The research outlined that intrinsic threat and financial leverage impact 4.4% of the stock returns variability of industrial corporations registered in the Amman stock exchange that was decided by the scrutiny as a minor influence.

Sobia et al. (2015) undertook research to look into the influence of financial threat on the vulnerability of stock yield. The research was taken up in the period of 2003 till 2012, inputs were derived from 115 corporations at Karachi Stock Exchange in Pakistan taking the financial threat in the arena of the industrial sector, corporation specific including exporting companies and non-exporting companies. The Returns from the stock was considered as a dependent factor. On the other hand, independent factors of financial threat include rate of interest, rate of exchange, economical exposure and aggregate threat. The size of the corporation was considered as a control variable. The research exposes a considerably significant association of rates of interest and rates of exchange at the corporation level and at the level of firms with the stock yields. On the contrary, aggregate threat, rate of development, size of the company and financial exposure was irrelevant on the industrial sector and at the level of the firm.

Le and Lu (2021) investigated the impact of COVID-19 on Taiwan stock market, the sample of research comprises corporations registered with the Taiwan Stock Exchange (TWSE), for which details are accessible in the Taiwan Economic Journal (TEJ) database. The paper categorizes these corporations as CSR companies and non-CSR companies. Out of 941 companies registered in the TWSE, 86 of them were categorized as CSR companies. The Taiwan Stock market declined by up to 3500 points at the time of corona eruption in the starting of January 2020. As per the factual conclusions, the ARs for the whole Stock market were highly negative on the very first day of the eruption of the corona crisis in Taiwan. The outcome gives indications that CSR companies did not have any considerable

effect by the pandemic (i.e. the breakout of the corona virus produced a relatively insignificant decrease in the prices of their stock.

Patrick and Wai (1973) stated that markets such as stock markets are involved in long, as well as, short term capital investment . In these markets corporations trade with their stocks for generating long run capital, that can be diverted into generating alternatives for earning. It happens because investors are more willing to connect with the profit making companies. The investors retain their stock for the earnings in the future. The trading in relation to buying and selling is utmost important for allotment of capital within the economy. The markets dealing with stock are imperative in developed as well as developing economy, more importantly, the research discovered that the connection between financial variables and development is highly paramount.

2.3 Financial and Pandemic Crises

The studies discovered that Covid-19 had a considerable adverse influence on stock returns and their linked volatility across both alternative Covid-19 measures. The parallel studies tell that Covid-19 had a favorable and statistically substantial influence on the volatility of stock returns. The adverse effect of Covid-19 on the stock returns rolled out to be more intense when the corona crisis measures were considered by the total number of deaths. Moreover, the model that encompasses the covid-19 factors emphasized an improved out-of-sample predictable performance (Apergis & Apergis, 2020).

The outcomes give the suggestion of ordinary determinants in rising market equity, sovereign debt markets and currency. They also have multiple consequences for corporate and portfolio management. Time series regression model was put into practice. The series of return data on a monthly basis were observed from the period of January 1986 to June 1994.

The research shows the primary study of the influence of corona virus on both mean and the conditional volatility of the Chinese stock market returns, making the use of simply GARCHX conditional volatility model, covering the duration of 22 January 2020 to 30 April 2020. For the purpose of scrutinizing the effect of

corona outbreak on stock returns and their volatility in China, the study takes into consideration the GARCHX model which has the foundation upon GARCH structure.

Through EGARCH model Ali and Afzal (2012) examined the Pandemic pronounced the favorable outcome to the Volatility of stock returns of these markets. However, the stock return of Indian Stock volatility is greatly impacted by the pandemic as compared to Pakistan Stock markets. The discrepancy of effects between the two markets occurred due to the huge size of Indian Economy in comparison to the Economy of Pakistan. The day-to-day data starting from the period of 1st January 2003 to 31st August 2010 of KSE and BSE-100 indices, presenting respective stock market's indices of Pakistan and India, are put to use. Current financial turbulence caused a low degree of adverse influence on stock returns and improved volatility in Pakistani and Indian stock exchanges, however, this effect is more pronounced on Indian stock market.

Pandemic hit the stock market and the firms considerably it decreases the value of the firms Bose et al. (2021) examined the outburst of the contagious illness impacts the economy considerably and influences the stock markets favorably worldwide. This fact is proved by the examples below: the study combined annual data of the corporation under all the three (Stock returns, Financial accounting data and sustainability performance data) databases for the year 2019-2020. Survey-duration is restricted to the Refinitiv ESG database. Observation with 9,328 corporations studied by the Refinitiv ESG database for 2019-2020.

It was discovered that corporations throughout the world have suffered a reduction in their value because of the Pandemic. Nevertheless, the adverse effect of the disease on firm value hardly affected the corporations with greater sustainability performance, corporations located in the Nations with lesser culture of environment-value, and corporations in a Nation with the stakeholder more in focus.

Walid et al. 2011 examined the influence for alteration in FX rate on the volatility of stock market, applying data on a weekly basis for developing markets (Singapore, Mexico, Hong Kong and Malaysia). Our approach has its foundation on 2 regimes Markov-EGARCH model permitting different evaluation for ascertaining

the connection between stock and FX markets in both “peaceful” and “troubled” phases. Outcomes give powerful proof of regime switching attitude in terms of volatility on developing stock markets and discover the existence of 2 volatility regimes.

Akinlo and Awolowo (2015) explore in the article whether there is a connection between a boost in the stock market and foreign exchange reserves. In order to fulfill the purpose, a multivariate modeling method was initiated, which brings in rates of interest. The research utilized the yearly data for Nigeria throughout the period starting from 1981 to 2011; the data has been retrieved from CBN statistical data. The outcomes exhibited the long term connection present among the variables at both bivariate and multivariate stages. The outcomes portrayed that foreign reserves had a favorable influence on stock market boost.

In the article, Panyagometh (2020) took up the event study tool to examine the stock price response and market volatilities in reaction to the unparalleled outbreak of the coronavirus. Putting the GARCH elements and event study approach, the research practically estimated the unusual yielding and irregular volatilities in the Stock Exchange of Thailand at the time of the event window of the virus outbreak. The studies recommend that the bulk of the stocks in the SET have been negatively impacted by the corona outbreak, as noticeable by the irregular adverse yielding at the time of the event window of Pandemic, in comparison to usual circumstances when there is no spread of virus. Utilizing a Sample of 46 stocks enlisted in the Stock Exchange of Thailand, in the article, an event study method is devised taking unusual volatility into consideration to ascertain the responses of market volatility and Stock prices in Thailand in the period of virus outbreak.

The study of Hassan and Gavilanes (2021) practically assesses the adverse effect of the pandemic on the conduct of the stock market in China, Italy, Spain, the United States, Japan and South Korea. The outcomes of various research recommend that a 1 percent rise in spread of virus, declines the stock market yields by 2.3 per cent every day. The outcomes of the panel least square Vector Auto-Regressive (VAR) examination verify the adverse short run influence of the rate of corona contamination on the stock market returns indices.

Shear et al. (2021) ascertain the influence of the attentiveness of investors to the Pandemic on yielding from stock market and the mediocre impact of situations present in a particular country. Utilizing everyday input from thirty-four nations in the time duration starting from 23 January till 12 June 2020, and evaluating investor's observation at the Google search volume (GSV) of the term 'coronavirus' for every nation, this study discover that investor's improved alertness to the corona pandemic resulted in adverse stock market yielding. The research discover that the weak influence of investor's alertness on stock market yielding is more powerful in nations where investors have greater risk aversion values inherent in culture.

Testing E-GARCH model Goudarzi and Ramanarayanan (2011) shows that leverage impact is present in the Stock market of France just prior to the duration of pandemic; however, the leverage influence is prevalent in Stock market of UK only at the time of pandemic. This shows that the UK stock market addresses any influences created by any anticipated negative news and initiates appropriate measures prior to getting into the trap of crises of corona contamination because it was the period of virus outbreak worldwide or the financial disaster during the Pandemic. It suggests that cost constraints and size distribution ought to be reviewed due to the state of the economy and the sequences of trading in the stock market. This gives the indication about the effects due to adverse news, which exhibits a powerful outcome on conditional volatility contrary to the favorable announcements. That's why, leverage impact in the UK stock market, Russian, Spain, France, USA, Italian and Indian markets at the time of pandemic emanate that any adverse influence in the international markets can commonly create spillover effect in these markets, which adversely affects the UK stock market, Russian, Spain, France, Indian, Italian and USA stock markets because of turbulence due to coronavirus outbreak.

Predescu and Stancu (2011) scrutinized portfolio uncertainty in the context of economic turbulence worldwide applying volatility models of ARCH and GARCH with the standard indexed of UK, USA und Romania. The purpose of this research was to determine the portfolio unpredictability during the period of economic turbulence. The Formulation of the of stock returns volatility of the indexes

confirmed that threat of portfolio was impacted by intrinsic determinants of the economical disturbance. The research also determined that diversifying action of the portfolio of 3 indexes at the time of crisis seldom decrease the uncertainty in portfolio. The occurrence of changes could be the result of alternation in the amount of cash flow for as earnings, interest or dividends earnings or due to any shift in favorable or unfavorable prices.

In the research, utilized the 1st pandemic incident in Taiwan as the occurrence date (i.e., 21 January 2020) as the incident date. It is crucial to take into consideration that there exist constraints in terms of usage of pandemic study. In case of occurrence of any other important incident in the course of the event, they may intervene with the degree of influence created by the incident on the stock market. At the time of study for this research paper, some minute happenings might have affected some specific companies. Nevertheless, Pandemic ought to be the most important occurrence and extensive incident of this time.

The previous researches were centered on the effect of the diseases like influenza and SARS on the stock market. For instance, Goh and Law (2002) exhibit that the financial disaster in 1997 in Asia had an enormous impact on tourism. Chen et al. concluded that the SARS outbreak led to a drastic sink in the value of the stock price of Taiwan's hotel industry. They also evaluated the influence of SARS eruption on the Asian stock markets, and discovered that SARS considerably impacted economic integration. Mctier et al. (2011) study the effect of influenza on U.S stock markets, and they declare that the hike in the influenza cases declined the pursuit for trading exercises and reduced stock market earnings.

He et al. (2020) examine in his research that in April 2020, International Monetary Fund (IMF) forecasts that global GDP will decline by 3% in 2020 and the World Trade Organization (WTO) forecasts the decrease in global trade by 32%. The economic influence of Pandemic has surpassed the previous domestic and serious incidents. At the same time, the 2008 financial crisis had a sizable influence on global trade and financial markets; the ongoing corona contamination has disturbed the trade in terms of demand and supply.

The escalation in the rate of interest leads to a hike of the business cost which in turns reduces the earnings. On the other hand, the reduction in the rate of

interest sends a favorable signal to the stock market and earnings on stock returns boosts up gradually. The alteration in rate of exchange reacts similarly, but in the contrary direction.

Since rate of interest is the principal player in earnings, numerous analysts scrutinize the effect of rate of interest and rate of foreign exchange on stock returns. Ahmed et al. (2010) evaluates the influence of rate of interest on stock earnings in Korea. In order to undertake this study, he selected the week based data on Korean Stock Price Index 200 (KOSPI) for 6 years (1992-1998) as dependent variable and weekly negotiable Certificates of Deposits (Korea NCD 91-Day yield) for the same period as an independent variable and run the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) and observed that the conditional market return have an adverse and crucial relation with the rate of interest.

46 Aloui (2007) evaluated US equity and market of currency, simultaneously with other five prominent European countries. The studies were conducted on the EGARCH model that validated the volatility spillover in both directions between equity and currency market. They came to the conclusion that continuous volatility of stock prices was greater than the rate of exchange. Qayyum and Kamal (2006) ascertained the spillover impacts of the volatility related to the two financial markets for Pakistan. Their outcomes indicated the statistical importance of the bidirectional method of transmission of stock earnings and earnings on rate of exchange.

Related to impact of spillover between prices of stock and rate of exchange, 49 Yang and Doong (2004) evaluate the spillovers between motion of rate of exchange and earnings on the stock in the economically emerged nations. The outcomes of their study recommend that fluctuations in the stock price influence the prospective change in the rate of exchange; however, the alteration in exchange rate hardly impacts the forthcoming changes in the stock prices. Global stock markets have been fluctuating more during the Pandemic and leverage has risen, as well, at the time of corona contamination. That's why, the influence of the corona eruption in relation to adverse news has a greater impact on global stock trading. This research took under its analysis only 8 stock markets. The research didn't contrast the stock markets of emerging and developed nations. Day-to-day time series data are

taken into consideration and gathered from the yahoo. In order to undertake the empirical study, a finance database was considered. The current Pandemic-related data was collected ranging from 1st January 2020 to 30th April 2020, four months in total. The aforementioned data was put to use for making comparisons with the pre covid-19 period, which was again four months starting from 1st September 2019 to 31st December 2019. On 30th April 2020, stock markets indexes of 8 affected nations, India (Nifty 50), Germany (DAX 30), France (CAC 40), Italy (FTSE MIB), Russia (IMOEX), UK (FTSE 100), Spain (IBEX 35), and USA (NYSE S&P 500).

Hou, Karolyi, and Kho (2011) discovered that domestic determinants illustrate earning on stocks more efficiently than global determinants, particularly in context with the developing nations. They concluded that the economies of developing nations don't tend to be in integration with other parts of the globe. That's why; they are less likely to come under the influence of change in international markets.

Oscillations in exchange rate and political risk are important catalysts that drive our anticipation of noticing the same trend of uncertainty in the equity markets of other nations. Our outcomes supplement the significance tied to rate of exchange and political uncertainty in the global finance research papers. They also substantiate the functionality of dominant empirical asset pricing concepts and methodologies in analyzing global financial affairs and, especially listing the significance of information from sovereign debt markets and currency markets.

Naser et al. (2011) undertook research to look into the influence of credit and risk of exchange on stock returns of Australian banks applying models belonging to GARCH groups. The research confirmed that the uncertainties in terms of credit and market affect the mood of stock earnings. The research outlined that threats of credit and the market are considerably favorable at making an impact on bank stock earning. As a result, the financial uncertainty was an effective instrument for stakeholders in optimization of their earnings.

Exchange rate was utilized to ascertain the stock earnings for the listed bank. The analysis included the technique of data compilation, which has its foundation on quantitative and qualitative data collection methods. They applied the Econometric methods to elaborate the impact of financial threat on stock earnings

of commercialized banks registered in Kenya. The data was primarily put under diagnostic test of normality applying Jacques Bera test, To examine autocorrelation, Breusch-Godfrey test was applied under which adoption of null hypothesis for zero autocorrelation was considered to be fit, stationary test was conducted by applying Augmented Dickey Fuller test. For conducting generalized least square regression scrutiny, least R statistical software was employed.

Chen, Jang, and Kim (2007) analyzed the long run influence of the SARS eruption on 4 vital stock markets in China and Asia and discovered that it has a considerable effect on the assimilation of the stock market. Generally, there is a lack of any extensive study about the effect of distressed events on the prices of stock of industrial units in entirety in the research writings. An event study method considered to practically comprehend the effect of the Pandemic on the stock prices of various industries of China. Study discovered that the COVID-19 adversely influenced the stock prices on the Stock Exchange of Shanghai; on the other hand, it favorably affected the prices of stock in the Stock Exchange of Shenzhen. The data chosen for this writing has been derived from the Shenzhen and the Shanghai A-share market and comprises an aggregate of 2,895 registered corporations. The period is from 3rd June, 2019 to 13th March, 2020. COVID-19 is a mysterious incident, and its outbreak, spread and its wiping away is unclear. Even the magnitude, the height and length of the impact is vague. The stock market is a thermometer of the economic condition, and the capital market portrays the overall financial condition of a nation to some degree.

The EGARCH model, which encompasses the student-t distribution, outshines the normal GARCH model. I utilize it to evaluate the guidelines combining the 3 time durations, i.e the complete duration, the time prior to economic turbulence and at the time of financial disruption. The outcome of the study indicates that the stock market of China is dramatically shaken by economic unrest and it consumes considerable time for the stakeholders to regain their trust in the market. Meanwhile, the outcome explains about the stimulus package infused by the government of China into the market, which leads to upwards movement of the stock prices again. It is a positive symbol for the Chinese financial market to grow in upcoming days. Hooy Choong (2010) examined that Exchange rate volatility is an

important player in detailing the export models in India, Sri Lanka, Bangladesh and Pakistan. The outcomes show that there is an adverse and considerable influence of exchange rate volatility on export, which reveals that greater variation in rates of exchange is likely to decrease bidirectional commerce with their SAARC counterparts. As a result, it is essential to consider the variation of rate of exchange in formulation and application of their blueprints of trade. The practical research is put to use in monthly series data ranging from January 1980 to January 2010. Inputs on bidirectional exports are collected from the IMF Direction of Trade Statistics, on the other hand, commercial productions, and exchange rates are extracted from DataStream.

58 Ryan and Andrew (2004) undertook research on market uncertainty in terms of foreign exchange and interest in banks of Australia between the duration of 1996 to 2001 applying the GARCH-in-Mean method to design the pattern of earning of stock return volatility on an everyday basis. They came to the conclusion that uncertainty in the market, brief and medium term interest with their volatility are important factors to ascertain earnings of bank stock. Nevertheless, it was discovered that rates of exchange and long run rates of interest are not important in impacting the earnings on Australian bank stocks.

59 Sukcharoensin (2013) performed a research to ascertain the impact of market, rates of exchange and interest on the time related aspects of earning from Thai banks stock, those are more vulnerable due to the existence of big sector banks than small and medium scaled Thai banks. The research determined that the rate of interest and rate of exchange are stronger forecasting elements for the vulnerability of earnings to Thai banks. In the extended duration of time, big banks are guardians in terms of hedging uncertainty of rate of exchange. That's why, risk on exchange rate hardly influence their vulnerability of their returns on stocks.

60 John Beirne et al (2009) did study about the influence of market, rate of interest, and risk related to exchange rate on earnings of Stock. In order to validate aforementioned phenomena, they chose 3 sectors (Financial Services, Banking and Insurance) of sixteen nations, some European nations included. They utilized fourvariate GARCH-M model. Their variables were debt, which has brief life, (for

instance 90 Day treasury Bills Rate) and ten-year government bond earning for all nations. All in all, the conclusion emanated that rate of interest and exchange rate impacts common in banking industry and economical services. However, in insurance industry, rate of interest and rate of exchange possess restricted influence.

Manish Kumar (2008) scrutinized the connection between cost of stock and rate of exchange. He collected the everyday closing costs of S&P CNX Nifty and INR/ USD exchange rate during 1999-2009. He undertook unit root and test of Cointegration for long term association. Besides, a test of non-linear and linear granger causality for potent connection between these variables was selected. He also stated that there is hardly any link between stock index and rates of interest; nevertheless there is two-way non-linear and linear granger causality between stock earnings and rates of exchange. Francesca Carrieri and Basma Majerbi (2006) looked into the uncertainty in terms of the cost of exchange in developing stock markets. They considered 8 nations (Thailand, Zimbabwe, Korea, India, Greece, Mexico, Chile, Argentina and Brazil) and gathered the earnings details on a month-basis. They show all the earnings in thirty days in terms of euro dollars; interest rate is treated as a riskless rate and came to the conclusion that common elements for uncertainty in the exchange are barely crucial for big sized portfolios.

2.4 Hypotheses of the Study

On the basis of above literature, the following hypothesis are drawn:

- H1:** Foreign Exchange Risk has significant positive impact on Stock market.
- H2:** Covid-19 has significant positive impact on Stock market and Exchange rate.
- H3:** Covid-19 has significant negative impact on Stock market.

Chapter 3

Research Methodology

In order to examine Exchange risk in stock returns this study selected daily data covering period from first Jan, 2010 to 18thFebruary, 2021 yielding a more than 2000 observations. The reason for using daily data is to capture more information than weekly and monthly data. Statistical tools which will be used is EGARCH Model. ARCH (Autoregressive Conditional Heteroscedasticity) is used to find out the volatility. ARCH model was first developed by Engle in (1982).

The GARCH (Generalized Autoregressive Conditional Heteroscedasticity) model was purposed by Tim Bollersliv in 1986. GARCH family variants are consisted on Integrated GARCH purposed by Engle and Bollersliv, Exponential GARCH recommended by Nelson (1991) and GARCHX is recommended by Engle, NG and Rothchild (1990). GARCH model is not used to cope with the volatility but also the asymmetry information. To identify the covid-19 impact and risk factor on the stock market this study uses EGARCH model.

The input of the stock market is included in everyday closing value of indices of stock prices. The input of the domestic currency of all the chosen exchange rates for selective nations represented in US dollar. The input of stock costs and exchange rate comprises of 5 days of dealings from Monday until Friday. Since this research encapsulated everyday inputs, some of the figures were not present in the data of many nations. It was missing because of no trading at a specific day. The missing values were computed with the help of interpolation process. The input of stock prices and exchange rate for every nation has been corresponded

with their respective value every single day. The particular set of data is regarded as closing prices of both markets i.e foreign exchange markets and stock market in a particular nation.

This study explains the methodology of this research in two main parts. In first part researcher analyze how Exchange Rate effects the stock market returns in SAARC countries. SAARC countries include Pakistan, India, Srilanka, Bangladesh. The second part tells us how Exchange rate and Stock return impact during pandemic (Covid-19) on emerging market. To determine the impact on stock market returns of exchange rate study used Covid-19 dummy as an intercept. Covid-19 dummy used in both equations first it is used in mean equation and second Covid-19 dummy is used in volatility equation separately. EGARCH model use here to find the impact of Exchange risk on stock returns during the pandemic period.

3.1 Sample of the Study

Sample of the study is based on the four Emerging countries including Pakistan, Srilanka, India and Bangladesh. In this research data of Exchange Risk and stock returns of the respective country was used.

Table 3.1 contains all the details of the Currencies which used in the research along with their symbol, currencies with their country names. Time series data is used here and it data is in stationary form.

TABLE 3.1: Currencies of SAARC Countries(Pakistan, Srilanka, India, Bangladesh)

S No.	Currency Name	Currencies	Country
1	Pakistani Rupee	PKR	Pakistan
2	Sri Lankan rupee	LKR	Sri Lanka
3	Indian Rupee	INR	India
4	Bangladeshi taka	BDT	Bangladesh

Table 3.2 contains all the details of the Stock Markets which used in the research along with their symbols with their country names.

TABLE 3.2: Stock Markets of SAARC Countries (Pakistan, Srilanka, India, Bangladesh)

S No.	Stock Market	Symbol	Country
1	Pakistan Stock Exchange	PSX	Pakistan
2	Colombo Stock Exchange	CSE	Sri Lanka
3	Bombay Stock Exchange	BSE	India
4	Dhaka Stock Exchange	DSE	Bangladesh

Following Formula is used to calculate the returns of the Exchange rate and Stock market. $\text{Return} = \log(P_n/P_{n-1})$, Where returns = Return of Exchange Rate and Stock Market, p_n is the Current day closing price and P_{n-1} is the Previous day closing price.

3.2 Timeline of the Study

In order to examine Exchange risk in stock returns this study selected daily data covering period from first Jan, 2010 to 18th February, 2021 yielding a more than 2000 observations. The reason for using daily data is to capture more information than weekly and monthly data. Statistical tools which will be used is EGARCH Model. The data for the selected stock markets of selected Asian countries is taken from Investing.com. The input of the stock market is included in everyday closing value of indices of stock prices. The input of the domestic currency of all the chosen exchange rates for selective nations represented in US dollar. The input of stock costs and exchange rates comprises of 5 days of dealings from Monday until Friday. Since this research encapsulated everyday inputs, some of the figures were not present in the data of many nations. It was missing because of no trading at a specific day. The missing values were computed with the help of interpolation process. The input of stock prices and exchange rates for every nation has been corresponded with their respective value every single day. The particular set of data is regarded as closing prices of both markets i.e foreign exchange markets and stock market in a particular nation.

3.3 Econometric Model

To examine the impact of COVID-19 on volatility of the stock returns and on mean this study construct the dummy variable which is COVID, which contains the value 0 from period 1st Jan, 2010 to 25th Dec, 2019 and 26th Dec.2019 to 18th Feb, 2021 the value is 1. Dummy multiply with mean and volatility of the Exchange Returns separately.

Dummy is used for returns first and after that dummy for volatility used. If results show significant values it means dummy variable effect the stock returns and exchange rate, if results show insignificant values that means there is no impact of Covid-19 on mean and volatility of the returns.

$$Y_{c,t} = \beta_0 + \beta_1 D_t + \beta_2 D_t \times COVID, D \quad (3.1)$$

In first equation This study used ARMA (p, q) or AR (p) as dependent variable. While using GARCH type of models it allows us to use dummy variable as per our study objective.

Different authors use explanatory variable in their research like kanas (2002), Olowe (2009) and Muhammad (2012). Following them in the study covid-19 is used as explanatory variable to find out the covid-19 effects on the stock market returns.

$$\begin{aligned} StockReturns = \alpha_c + \beta_1(COVID - 19_{C,T-1} \times Exchange Risk) + \beta_2(COVID - \\ 19_{c,t-1} + \beta_3(Exchange Risk) + \sum_k^k \beta_k X_c^k \in D_t + \epsilon_{c,t} \end{aligned} \quad (3.2)$$

Where, C presents the Country, α_c is the Constant term, t is the return of the current day, Y is the dependent variable of the equation, $(COVID - 19_{C,T-1}) \times StockReturns$ is the Interaction Term, X_c^k is the Country level control variable, D_t is the Daily fixed effect (Dummy Variable) which is Covid-19 and $\epsilon_{c,t}$ = Error Term.

3.4 Description of Variables

3.4.1 Dependent Variable

- Stock Returns

3.4.2 Independent Variable

- Foreign Exchange Risk

3.4.3 Dummy Variable

- Covid-19

Chapter 4

Results and Discussion

The Chapter provides the result of foreign Exchange rate impact on stock market and covid-19 impact on foreign exchange rate and stock market as well through different tests.

4.1 Graphical Representation

4.1.1 Stationarity of Data

In analysis the first step is to find out that either the data is stationary or non-stationary. Economic time series data normally are non-stationary in nature for stationary in this study convert data in return series data so data become stationary. Stationarity of data means the mean is constant and it does not change over time and non-stationarity of data means the mean changes over time and there is high volatility.

However, non-stationarity is due to volatility clustering means variance in the data and when this variance is high. When variance in the data is volatile than this data is called heteroscedasticity. In the graph attached below show that in some period of time data is highly volatile otherwise the data is constant. And this clearly shows that the time period when pandemic Covid-19 spread throughout the world and it drastically hit the economy in that period of time data variance is so high.

To meet the target of this examination, this study practiced EGARCH model which depends on conditional mean and variance equations and in this model condition mean equation is significant due to its explanatory variables.

Unit Root Test

TABLE 4.1: Dickey Fuller test for stationarity of Stock returns

	Ist Difference t-statistics	Ist Difference p-value	Decision
LPAK	-45.6281	0.0001	I(1)
LBAN	-11.5668	0.0000	I(1)
LSRI	-44.3487	0.0001	I(1)
LIND	-52.1778	0.0001	I(1)

TABLE 4.2: Dickey Fuller test for stationarity of Exchange rate

	Ist Difference t-statistics	Ist Difference p-value	Decision
LPAK	-42.5304	0.0000	I(1)
LBAN	-20.7605	0.0000	I(1)
LSRI	-31.5886	0.0000	I(1)
LIND	-36.5586	0.0000	I(1)

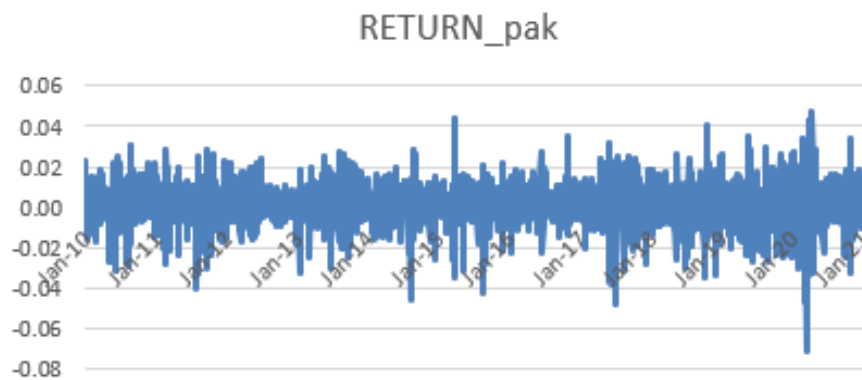


FIGURE 4.1: Stock Return of Pakistan

The above diagram shows the graphical data about the profits of PSX yearly. In the year 2013 it shows that returns are stable. However, Stock returns of Pakistan stock market turns out to be more unpredictable on the lookout. From the years 2014 to 2021 shows that the profits are volatile. In certain years, it reports that

profits are exceptionally unpredictable. Specially after the breakout of the Covid-19 stock market is highly volatile.

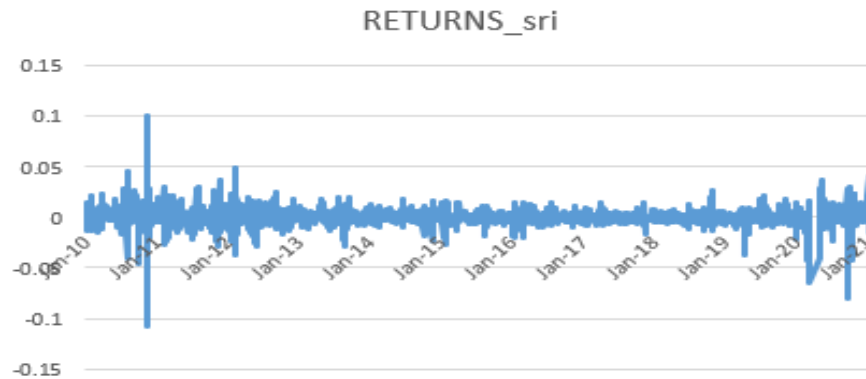


FIGURE 4.2: Stock returns of Sri Lanka

The above diagram shows the graphical data about the Sri Lanka stock market yearly. In the year 2011 it shows that is more volatile. However, after 2012 to 2019 it turns out to be less volatile on the lookout. From the years 2012 to 2019 shows that the profits are predictable. In certain years announced that profits are less unstable and in an appropriate range however in certain years, it reports that profits are exceptionally unpredictable. After the breakout of Covid-19 Stock market of Sri Lanka is volatile and results are between 0.05 to -0.05.

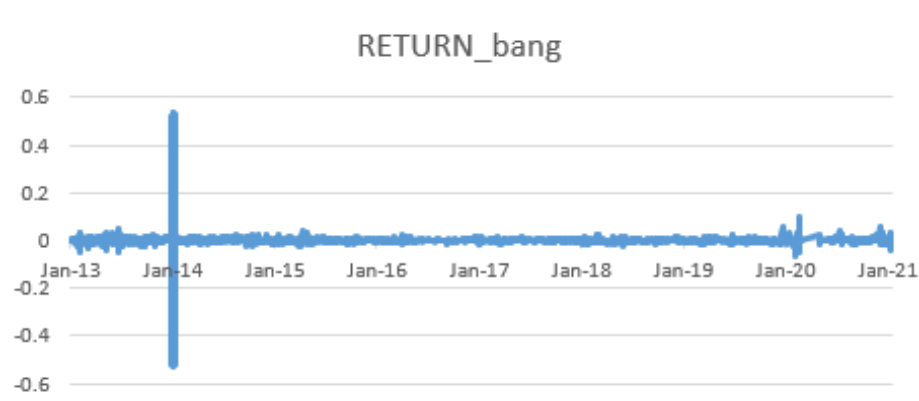


FIGURE 4.3: Stock Returns of Bangladesh

The above diagram shows the graphical data about the Bangladesh stock market yearly. In the year 2014 it shows that is more volatile. However, after 2014 to 2020 it turns out to be less volatile and shows that the profits are predictable. After the breakout of Covid-19 Stock returns are volatile but results are still predictable Covid-19 effect is minimum on Bangladesh stock market.

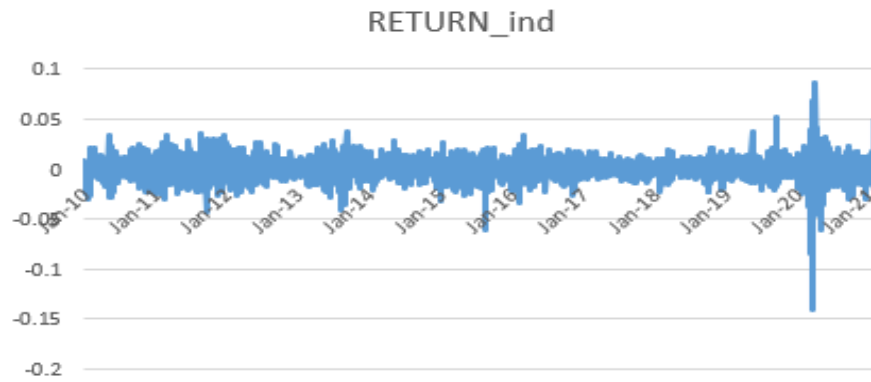


FIGURE 4.4: Stock returns of India

India stock market graphical data shows in upper diagram. It clearly shows that after the breakout of Covid-19 volatility of the stock returns increases. Results of Indian stock market is not predictable because India is included in the most effected countries and the situation is still uncontrollable.

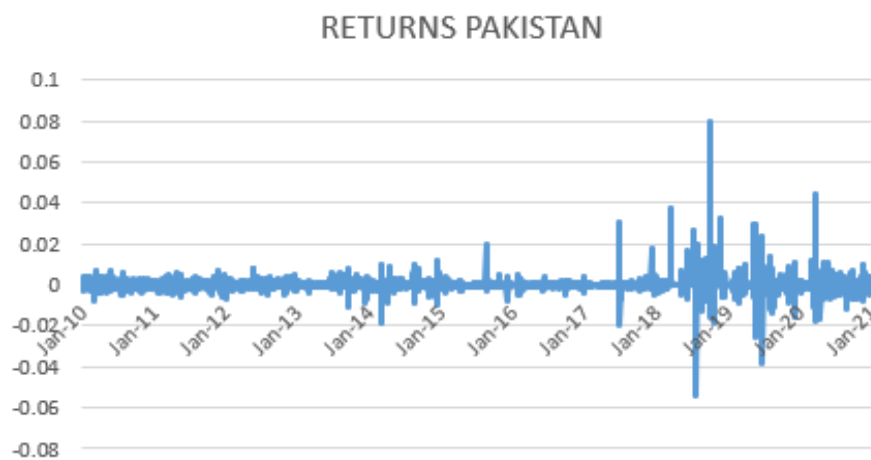


FIGURE 4.5: Exchange rate returns of Pakistan

The above diagram shows the graphical data about the Exchange rate returns of PSX yearly. From the year 2010 to 2018 it shows that returns are stable. However, from the years 2019 onward graph shows that the returns are volatile. In certain years, it reports that profits are exceptionally unpredictable. Specially after the breakout of the Covid-19 exchange risk return is highly volatile.

Srilanka exchange rate graphical data shows returns are in the year 2012-2013 are highly volatile. However, from the years 2014 to 2021 returns moved around the mean between the value 0.02 to -0.02. It shows returns are predictable. After breakout of the Covid-19 exchange risk return is not highly volatile.

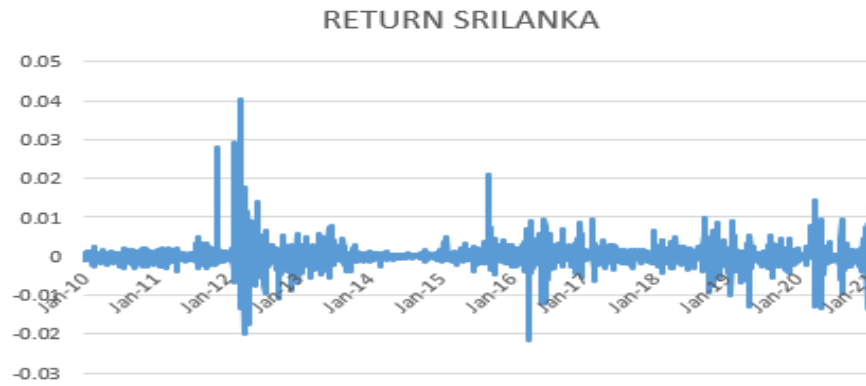


FIGURE 4.6: Exchange rate returns of Sri Lanka

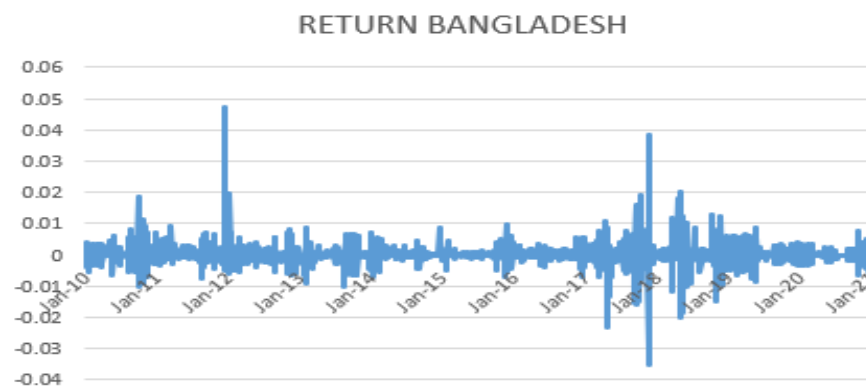


FIGURE 4.7: Exchange rate returns of Bangladesh

Bangladesh exchange rate graphical data shows returns are in the year 2012 and 2018 are volatile. However, and data in other years are not volatile after the breakout of Covid-19 returns are still predictable moved around the mean between the value 0.01 to -0.01. It shows returns are predictable.

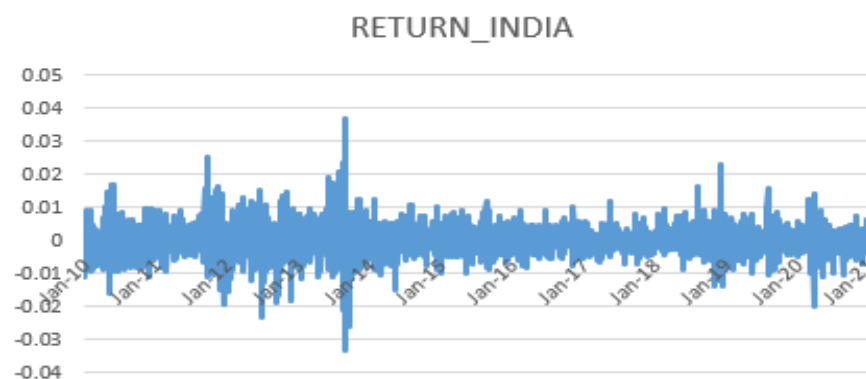


FIGURE 4.8: Exchange rate returns of India

Indian exchange rate graphical data shows returns are in the year 2012-2014 are highly volatile. However, from the years 2015 to 2021 returns moved around the

mean between the value 0.02 to -0.02. It shows returns are predictable. After breakout of the Covid-19 exchange risk return is not highly volatile its effects are not so strong.

4.2 Descriptive Statistics

Descriptive statistics tells us about the statistical behavior of the data. Descriptive statistics explain three main things like, central tendency measurement, location of the data, asymmetry effect in the series. By looking at the mean and median researchers can see the measure of central tendency. Location can be observed by looking at the kurtosis value of the data. Asymmetry effects of the data can be observed by Skewness of data. Here descriptive statistics is in two phases. In first phase descriptive statistics of Stock market is assumed during 1st January, 2010 to 18th February, 2021 which include both Covid and non-Covid period. In second phase of descriptive statistics the time period is from 1st January, 2010 to 18th February, 2021 is for the foreign exchange rate during Covid and non-Covid period.

4.2.1 Stock Market Statistics for COVID and Non-COVID Period

In this research daily data of the SAARC including (Pakistan, Sri Lanka, Bangladesh, India) countries from 1st January 2010 to 18th February 2021 were used. Data of these countries contain more than 2000 observations and data collect from Investing.com.

The purpose of the study is to find the impact of exchange rate on stock returns with moderating role of covid-19 on SAARC countries therefore, a dummy variable is used which represent 1 for the period from 26th December 2019 to 18th February 2021 otherwise 0. Covid-19 effects are still existing on stock returns and on the economies therefore, end period of the crises are not mention here.

Table-4.3 shows that SAARC countries have same and comparable trend except Bangladesh which is different. Highest Mean value is of Pakistan which is 0.000574

and Bangladesh contains the lowest mean value which is 0.000182 minimum and maximum values are almost same except Bangladesh which is higher than other stocks. Standard Deviation shows variations in the stock returns highest value is the Bangladesh which is 0.030917. Value of the skewness shows negative values of Pakistan, India, Sri Lanka which clearly indicates negative returns but Bangladesh have positive values which indicates Bangladesh have positive returns. Result shows that Kurtosis values are very large for all countries which means all markets follow leptokurtic

Table 4.3: Stock Returns Statistics of Pakistan, Sri Lanka, Bangladesh and India for the time period of 1st January 2010 to 18th February 2021 with the assumption of both during Covid and pre-Covid period distribution which shows stock markets faced changes oftentimes. Kurtosis clarifies about data shape whether it is peak or flat. Kurtosis is positive furthermore, its value is more than 3 for all countries which shows fat tails with high peak. Jarque-Bera is used to identify whether data is normally distributed or not. Jarque-Bera test is highly significant of all markets which means that stocks are not normally distributed.

TABLE 4.3: Descriptive Statistics (Stock Markets Returns)

	Pak	Sri Lanka	Bangladesh	India
Mean	0.0006	0.00030	0.00018	0.00038
Median	0.0007	0.0000	2.88E-05	0.0006
Maximum	0.0468	0.0998	0.5346	0.0859
Minimum	-0.0710	-0.1073	-0.5279	-0.1410
Std. Dev.	0.0102	0.0085	0.0309	0.0110
Skewness	-0.5878	-0.7570	0.1709	-0.9886
Kurtosis	7.2731	28.864	260.49	18.879
Jarque-Bera	2261.321	74288.	527682	29437.
Probability	0.0000	0.0000	0.0000	0.0000

4.2.2 Foreign Exchange Rate Statistics for Covid and Non-Covid Period

Table 4.4 shows the statistics of the exchange rate return of the emerging market including Pakistan, Srilanka, Bangladesh and India. The results included Mean, Median, Maximum, Minimum return of the day skewness and kurtosis of the Pkr.

The table shows that average return of the PKR is positive which is 0.0183% maximum return of the day is 7.959% which is highest in among all countries. minimum return of the day incurred is -5.409%. Average risk on return of Pakistan exchange rate is 0.352% and data is positive skewed which shows positive return. Kurtosis shows data is peaked

Average return of the Srilanka exchange rate is 0.0186% which shows mean value is positive. Maximum value is 4.010% in a single day and maximum loss incurred is -2.140%. Standard deviations show average risk is 0.258%. The value of skewness shows positive sign it means returns of Srilanka exchange rate are positive. Kurtosis values is very large it means returns follow leptokurtic distribution.

Bangladesh mean value show average return is positive, maximum return is 3.854% and minimum return is 3.497%. Average risk of Bangladesh exchange rate is 0.263%. Value of skewness contain negative sign which means returns are negative it shows that asymmetry prevails in the return.

Mean value of the Indian exchange is positive, maximum return is 3.693% and minimum return is -3.324%. Average risk of the series is 0.450%. Data is positively skewed which means positive returns. Kurtosis value show that value is so high it means data is peaked.

Table 4.4: Exchange rate Risk Statistics of Pakistan, Sri Lanka, Bangladesh and India for the time period of 1st January 2010 to 18th February 2021 with the assumption of both during Covid and pre-Covid period.

TABLE 4.4: Descriptive Statistics (Exchange Rates Returns)

	Pakistan	Sri Lanka	Bangladesh	India
Mean	0.0002	0.0002	0.0000	0.0002
Median	0.0000	0.0000	0.0000	0.0000
Maximum	0.0796	0.0401	0.0385	0.0369
Minimum	-0.0541	-0.0214	0.0350	-0.0332
Std. Dev.	0.0035	0.0026	0.0026	0.0045
Skewness	3.8476	2.1015	-0.3969	0.2696
Kurtosis	121.2386	44.5751	52.5379	9.4509
Jarque-Bera	2015851	210557	253031	5087
Probability	0.0000	0.0000	0.0000	0.0000

For Indian stock exchange return the average return is almost same like other countries. Maximum stock returns value is the lowest among other emerging countries which contains the value of 33.693 percent. Minimum return is the 3.324 percent of the BSE. The average risk of the return of BSE is second highest after Pakistan stock returns. Skewness show the value of BSE is positive which shows that data are positively skewed and returns are positive. The last column of statistical table shows the results of Indian stock exchange and kurtosis value show that data is peaked because value is more than 3.

4.3 Stock Market Response During Covid and Pre-Covid Period

The first purpose of this study is to find the response during the covid and pre-covid period on stock market returns. It also provides us the results that how market get effected from this pandemic and when it effects the returns of the stock market most. Table 4.5 shows the after effect of EGARCH about the stock returns of Pakistan, Bangladesh, Srilanka and India.

Table 4.5 contains the result of EGARCH about the stock return of PSX, CSE, DSE, BSE. Result estimation shows in two parts, first part shows mean equation and second part shows variance equation. Mean equation of Pakistan shows that AR value is insignificant and which shows that dependent variable doesn't depend on its own lag past values. MA value is significant and positive which shows that dependent variable depends on its previous value of error term.

In variance equation value of δ shows the past variance effect on current variance. Value of coefficient is 0.226 and it is highly significant and shows small shocks which have less volatility prevails in PSX and past volatility effects on current volatility. θ shows the sign effect, it is statistically significant and the sign is negative which shows that bad news exists in the market. Value of γ is statistically significant which is 0.931 and sign is positive which shows that persistence of volatility exists and coefficient value is near to 0 which tells us that persistence of volatility prevails in long run. In variance equation the last coefficient is φ which represent the

TABLE 4.5: Results of EGARCH Models Related to Stock Markets of the SAARC Countries

Variables	Pakistan	SriLanka	Bangladesh	India
Mean equation				
A	0.000662* (0.000205)	-0.000282** (0.000148)	-8.95E-05 (0.0000757)	0.000294*** (0.000182)
AR	0.000199 (0.000774)	0.000785 (0.001187)	0.000815* (0.000264)	0.000282 (0.000824)
MA	0.209855* (0.082926)	0.800891* (0.037779)	0.812262* (0.024234)	0.314964 (0.209642)
Λ	-0.020409** (0.086091)	-0.647945* (0.048258)	-0.901668* (0.014267)	-0.251118 (0.213629)
Variance equation				
μ	-0.826106* (0.077536)	-0.789330* (0.061214)	-0.781333* (0.073995)	-0.399016* (0.042381)
δ	0.226380* (0.020554)	0.366474* (0.013635)	0.740454* (0.035409)	0.110188* (0.014253)
θ	-0.167605* (0.01266)	-0.01856 (0.011685)	0.179200* (0.018361)	-0.126914* (0.008662)
γ	0.931177* (0.007514)	0.948703* (0.005391)	0.968186* (0.00665)	0.966682* (0.003975)
φ	0.026430*** (0.016138)	0.074101* (0.012452)	-0.039143*** (0.023962)	0.030652* (0.00742)

Note: *, **, *** denote for significant at 1%, 5%, 10% level. Values in () shows Standard Error

recent pandemic impact the value of this coefficient is 2.64 percent at 10 percent significance level which is positive. It confirms that during covid Pakistan returns is higher than pre-covid period. The coefficient shows during covid Pakistan stock market returns are increased but this change is not high. The results of Mean equation of Srilanka stock market depicts that AR value is insignificant while MA value is significant. This clearly shows that the dependent variable depends on the previous value of error term.

In variance equation of CSE value of δ shows the past volatility effect on current volatility. Value of coefficient is 0.366 and it is highly significant and shows small shocks which have less volatility prevails in CSE and past volatility effects on current volatility. θ shows the sign effect, it is statistically insignificant which shows no impact of news in the market. Value of γ is statistically significant which is 0.948 and sign is positive which shows that persistence of volatility exists and coefficient value is near to 1 which tells us that persistence of volatility prevails in

long run. The last coefficient of variance equation is φ which represent the recent pandemic impact and the value of this coefficient is 7.41 percent at 1 percent significance level which is positive. It confirms that during covid Srilanka returns is higher than pre-covid period. The coefficient shows during covid Srilanka stock market returns are increased but this change is not high.

We then focus on Bangladesh Mean Equation, and results from table 4.5 shows that AR value of Bangladesh's Mean equation is also significant and dependent variable depends on its own lag past values. However, MA values of DSE is significant and tells about the dependency of dependent variable on its previous value's error term.

In variance equation of DSE δ size effect is statistically significant and sign is positive which shows that big shocks which create more volatility the value of size effect is 0.740. It also shows that past volatility effects on the current volatility. Sign effect is statistically significant and the sign is positive which shows that good news impact exists in DSE market. Value of Y is statistical significant at 1 percent significance level and the sign is positive which shows that persistence of volatility exists in the market and the value of coefficient is 0.968 it means persistence of volatility exist in long run. Last coefficient of Bangladesh stock market is dummy variable φ and it is statistically significant however the sign is negative which shows that DSE returns decreases during the covid period and these returns are lower than the pre-covid period.

Last model shows the results of BSE stock market in last column. India mean equation results shows that AR and MA both values are insignificant and we can infer that tells that their dependent variable do not depends on their own lag past values and on its previous value's error term.

In variance equation of BSE coefficient of size effect shows that it is statistically significant and the sign is positive however the small shock creates small volatility. The sign effect is significant at 1 percent level of significance and it is negative which shows the existing of bad news in BSE. Value of y is statistically significant which is 0.966 and sign is positive which shows that persistence of volatility exists and coefficient value is near to 1 which tells us that persistence of volatility prevails in long run. The last coefficient of variance equation is φ which represent the recent

pandemic impact and the value of this coefficient is 3.06 percent at 1 percent significance level which is positive. It confirms that during covid India returns is higher than pre-covid period. The coefficient shows during covid India stock market returns are increased but this impact is not so high.

TABLE 4.6: Results of EGARCH Models About the Exchange Rate Returns of the Selected SAARC Countries

Variables	Pakistan	SriLanka	India	Bangladesh
Mean equation				
C	0.000406** (0.000171)	-0.00016 (0.00017)	0.000324** (0.000146)	-2.94E-05 (0.0000495)
Dummy	0.000465** (0.000445)	0.000961 (0.000762)	0.001880*** (0.00043)	0.001348*** (0.000104)
Ex Retrn	-0.005521 (0.042664)	0.044313 (0.03777)	-0.739045*** (0.029069)	-0.103818** (0.051582)
Dumy×Ex	0.167697 (0.14222)	-0.830948*** (0.058263)	-0.474176*** (0.139258)	0.558239* (0.340815)
AR	0.552372*** (0.0779)	0.849271*** (0.031182)	-0.773379*** (0.154093)	0.815319*** (0.017189)
MA	-0.423750*** (0.084929)	-0.716498*** (0.03971)	0.797338*** (0.146725)	-0.917406*** (0.008996)
Variance equation				
μ	-0.504239*** (0.036868)	-0.481942*** (0.030821)	-0.278054*** (0.017333)	-0.467128*** (0.04113)
Dummy×Ex	0.167697 (0.142220)	-0.830948*** (0.058263)	-0.474176*** (0.139258)	0.558239* (0.340815)
Δ	0.137842*** (0.010177)	0.280547*** (0.009661)	0.079843*** (0.011045)	0.496072*** (0.023774)
θ	-0.143428 (0.008146)	-0.022409*** (0.008273)	-0.093723*** (0.007335)	0.123253*** (0.011862)
Y	0.957731*** (0.003657)	0.971542*** (0.002703)	0.977305*** (0.001797)	0.983074*** (0.003587)
ϕ	14.41837** (6.691539)	10.00797** (6.005264)	46.40795*** (6.249927)	43.12566 (32.06547)

Note: *, **, *** denote for significant at 1%, 5%, 10% level. (ii) Values in () shows Standard Error

Table 4.6 contains the result of EGARCH about the exchange rate impact on stock return of PSX, CSE, DSE, BSE. Result estimation shows in two parts, first part shows mean equation and second part shows variance equation. Mean equation of Pakistan shows that past value of does predict the current values on impact of exchange rate on stock returns because AR (1) is significant at 10 percent level of significance which shows that dependent variable depends in its own lag

values. According to the analysis, MA values of PSX is significant which shows that dependent variable here also depends on its previous value of error term.

In variance equation value of δ shows the size effect the value is significant positive which shows past volatility does effect on the current volatility and value shows less volatility in the market. Value of sign effect is insignificant which shows there is no impact of news. The coefficient of γ shows that it is statistical significant and the sign is positive it shows persistence of volatility exist in the market and value of coefficient is near to 1 it means that persistence is in long term. Last coefficient shows the dummy variable and the value shows that during covid Pakistan stock market returns are increased due to change in the return of foreign exchange rate.

Srilanka results of E-GARCH model of means equation shows that AR value is statistical significant which shows that dependent variable depends on its own lag of past values in this study. Furthermore, the results show that its MA value is significant but the negative sign tells that the dependent variable of mean depends on its error term lags.

In variance equation of CSE first coefficient is this δ which represent the size effect the value of this coefficient is significant and positive which shows past volatility does effect on the current volatility. The second coefficient is the sign effect which represents by θ and the value of this coefficient is statistically significant and the sign is negative which tells us that bad news presence in the market. Value of γ is 0.971 which is statistical significant and sign is positive which represents that persistence of volatility exist in the market and this persistence is in long run. Last coefficient of the CSE is significant and positive which shows that Srilanka stock market returns increase due to change in the returns of foreign exchange rate.

We then focus on the results estimation of India exchange rate and stock returns shows that in mean equation the value of AR and MA both are statistical significant which shows that dependent variable depends on its on lag of past values. The first coefficient in the variance equation is the size effect δ which is statistically significant which shows that there is small volatility in the market. Sign effect θ shows that is there any news effect exist in the market and negative sign shows that existing of bad news in the market. γ value shows that it is statistically significant and it tells us that persistence of volatility exist in the market but this

effect is in long run.

The last column of results contains the Bangladesh stock market and exchange rate data shows in mean equation tells that its AR and MA value is statistical significant which also depicts that dependent variable here depends on its error term lags.

The variance equation of the DSE shows that it is statistically significant and positive which shows current volatility contain effect of previous volatility and it also shows that big shock creates more volatility. Next coefficient is the sign θ effect which is statistically significant and positive which tells us about the existence of good news in the market. Value of \mathbf{Y} shows that it is statistical significant at 10 percent significance level and in long run persistence of volatility exist in the market. The last coefficient value of dummy variable is 43.12 and statistically significant. The coefficient shows during Covid Bangladesh stock market retrurns are increased due to change in the return of foreign exchange risk.

Chapter 5

Conclusion and Recommendations

5.1 Conclusion

The main objective of this study is to find out the impact of foreign exchange risk on stock market. The data is used of the SAARC countries. Countries including Pakistan, Srilanka, Bangladesh and India. This research adds to the literature to find out that exchange rate impact on stock market during Covid-19. The research includes four major stock markets of the SAARC member countries PSK from Pakistan, CSE from Srilanka, DSE from Bangladesh and BSE from India. The countries are selected on the basis of major stock markets in member countries having historical data. The methodology which used in the research is EGARCH model. EGARCH model is used to find out the volatility of the exchange rate and stock returns and whether asymmetric information prevails or not and COVID-19 impact exist or not. To find out the COVID-19 impact its dummy is used. In this study take 0 value for dummy variable from 01-Jan-2010 to 26-Dec-2019 and value 1 from 27-Dec-2019 to 18-Feb-2021. The time period which is used is from 01-Jan-2010 to 18-Feb-2021.

This study explores that whether stock market effected by the exchange rate in recent pandemic COVID-19 among four countries and which effect the most either this effect is positive or negative. In first model study found that in Pakistan Mean

value shows past values have not much impact on the current value of stock returns. Persistency volatility prevails in PSX and negative news have not much impact on stock market. The result shows that Covid-19 negative effect does not have much impact on stock market returns.

Srilanka and India contains the same results as Pakistan has. Mean past value impact is not considerable on value of the stock returns. Persistence volatility exist and negative shock has small effect on the returns which means foreign exchange rate negative impact is not high. COVID-19 impact exist on the stock returns and exchange rate but this impact is little and this is not alarming for investors.

Bangladesh results shows that Mean value of Bangladesh is Significant and positive which shows past returns does predict the current value of stock returns. Result shows that stock returns are volatile however the effect of negative shocks have less impact. It means stock market does not respond on negative news more quickly. COVID-19 impact is negative on the stock market of Bangladesh.

It shows that volatility exist in the returns but positive news has a greater impact on the returns and negative news have a less impact. It also shows that COVID-19 impact exist in the market of Pakistan, Srilanka India and Bangladesh stock market however this impact is not negative.

Second part shows the results of exchange rate return and its impact on stock returns and during the period of pandemic how COVID-19 effect both market. Results show that current value of Pakistan exchange rate does not carry the past effect. Insignificance of the coefficient of crisis shows COVID-19 does effect the exchange rate. However, persistence volatility prevails in the exchange rate. Asymmetry information impact exist on both markets and positive news have more impact on volatility and COVID-19 positively hit the exchange rate and stock returns of Pakistan.

Srilanka results reveal that past returns do not predict the current value of exchange rate. Exchange rate volatility is persistence and negative new have less impact of exchange return on stock returns. Covid-19 impact is positive on exchange rate and on stock market.

This study explores that current value of exchange rate of India impact on stock

returns can be predicted by the past returns however highly clustering volatility persistence exist in the exchange rate and on stock market. Exchange rate also faces the asymmetry effect on the volatility and pandemic impact exist on the exchange rate and stock returns on India but it is not high.

The last result shows that volatility clustering exist on the exchange rate return of Bangladesh. Asymmetry information impact does exist in Dhaka exchange market and negative news also have a low impact on exchange rate and stock returns. Covid-19 hit the exchange rate but its effect is less negative.

The above results of all four countries shows that persistence of volatility exist in all currencies and negative news have lower impact on it and it also shows that COVID-19 effect exist like other countries in the world but in this case this impact is not so bad.

5.2 Recommendations

The variations in exchange rate and stock market have an impact on investment behavior. It is quite challenging them to trade in less volatile financial markets during the unpredictable pandemic condition. This research looks at which emerging economies have been harmed the hardest by the pandemic in relation to exchange rate and stock market returns. Likewise, COVID-19 positively hit the stock market of Pakistan, Sri Lanka and India however, Bangladesh stock market respond negatively to the COVID-19.

The research identifies the stock markets, which are impacted by the news of COVID-19. The research will help policy makers to formulate economic policies in the post-COVID era. This research is also beneficial from the standpoint of investors, to make financial decisions in the event of a pandemic.

5.3 Limitations and Future Directions

This research is restricted to four developing stock markets, because the COVID-19 epidemic has expanded over 220 nations throughout the World, there is significant

gap in research into the impact of the pandemic on the capital markets of all countries affected. The data for this study collected until 01-01-2010 to 18-02-2021. Because the world is currently witnessing a fourth more deadly wave of the COVID-19 pandemic, the study can expand with much more current statistics.

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