CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY, ISLAMABAD

Comparative Analysis of The Impact of Covid 19 on The Volatility & Liquidity of Shariah & Conventional Stock Indices (Evidence from South Asia)

by

Rimsha Kamran

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To My Parents and Respected Teachers

CERTIFICATE OF APPROVAL

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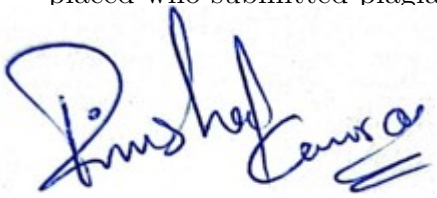

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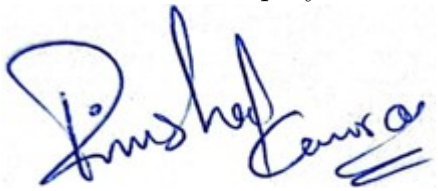

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Abstract

The main goal of this research is to find out whether Shariah-compliant and non-compliant stock indices performed differently or remained more stable during the pandemic, particularly with regard to liquidity and volatility. The South Asian region selected as the focal point of this study to achieve the purpose. The only nations in this region that have separate stock indices for Shariah and non-Shariah compliant are Bangladesh, Pakistan, and India. For that reason, we compiled data from these six indices covering the years 2010–2022. Data on controlled factors including money supply, inflation rate, real interest rate, and Brent oil prices also utilized to improve the efficacy of capturing the impact of the COVID-19 pandemic. Three alternative approaches proposed by Parkinson, Gallant, Hsu, and Garman Klass are employed for the estimation of volatility for each index. Subsequently, an ARIMA model is used for volatility analysis. Liquidity Price-based and Transaction cost-based indicators are employed to assess the liquidity of each index, while the study of liquidity used the Weighted Average Standard Deviation method. Based on the result it can be inferred that non-Shariah compliant stock indices have a somewhat higher level of stability compared to Shariah compliance stock indices non-Shariah compliant indices demonstrate a lower degree of sensitivity towards controlled variables i.e. oil prices and inflation.

(ARIMA) Auto-Regressive Integrated Moving Average, Shariah and Non-Shariah Compliant Stock Indices, Standard Deviation Weighted Average Scale Method.

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Abbreviations

(*)	Significant Result
ARIMA	Autoregressive Integrated Moving Average
DJIA-30	Dow Jones Industrial Average
DJIMI	Dow Jones Islamic Market Index
DSES	Dhaka Stock Exchange Shariah
DSEX	Dhaka Stock Exchange Broad
FTSWIND	Financial Times Stock Shariah India
GARCH	Generalized Autoregressive Conditional Heteroskedasticity
GFC	Global Financial Crises
IR	Inflation Rate
KMI-30	Karachi Meezan Index
KSE-100	Karachi Stock Exchange
MEH	Market Efficient Hypothesis
MGR	Money Growth Rate
NASDAQ100	National Association of Securities Dealers Automated Quotations
NIFTY-50	National Stock Exchange India
OPC	Oil Prices Change
RINT	Real Interest Rate
S & P-500	Standard And Poor 500 Index
WHO	World Health Organization

Chapter 1

Introduction

This introduction of a research paper provides a brief overview of the issue, highlights its significance, and explains the objectives, laying the groundwork for the following sections.

1.1 Background of the Study

Coronavirus respiratory syndrome (COVID-19) is a contagious illness. The Chinese city of Wuhan was the site of the initial diagnosis in December 2019. The World Health Organization chosen covid 19 as an epidemic on March 2020. The virus was formally termed COVID-19 on February 11, 2020. (Papadamou et al., 2020; Yang et al., 2020; Al-Awadhi et al., 2020). It began to take attention especially after the (WHO) on March 12th 2020 designated the virus a global pandemic. At once majority of international securities markets reported big losses, indicating that the global stock market experienced multiple severe daily dips. This pandemic has not spared Pakistan. Pakistan had reported 569846 COVID-19 cases and 12563 deaths as of February 22, 2021 (WHO, 2021). COVID-19 has shocking effects on public healthiness as well as on the global economy, society, politics, and finance. Al-Awadhi et al. (2020) investigated impact of event on security exchanges, including impact of catastrophe, news and sports, environmental events on returns how political changes affect returns. Bash et al. (2020) investigated how political events affect stock returns. Pandemic like the severe acute respiratory

syndrome outburst and the "Ebola virus disease" epidemic have also been demonstrated to have an impact on stock returns (Ichev and Marinč, 2018). Fear has an impact on people's thinking, including investors throughout the world, combined with the immediate impact of the rising number of cases & deaths, which has an impact on the global financial markets (Al-Awadhi et al., 2020; Carter et al., 2020; Duxbury et al., 2020; Papadamou et al., 2020).

The performance of several stock markets around the world was hit by the spread of COVID-19. For instance, the Standard & Poor's Global Broad Market Index (S&P Global BMI), which measures all international shares, experienced a decline of 22.3% in the first quarter of 2020. S&P Global BMI Shariah beat its conventional counterparts by 500 basis points while S&P Global BMI Shariah underperformed by 17.2%. The same pattern has been seen in several markets; for example, the S&P 500 outperformed its traditional rivals by 2.7%.

The different ways that Shariah-compliant and non-Shariah indices reacted to the crises which can be explained by the fact that they have different screening criteria and financial traits. Shariah-compliant indices use growth-based small-capitalization industries as one of their screening criteria. Shariah-compliant index industries have low account receivable and low leverage, which makes them less vulnerable to financial risk in times of crisis like the COVID-19 outbreak (Farooq and Alahkam, 2016).

Due to the effects of the Covid-19 on international financial market, the stock market has gone through fluctuations that have never happened before. This volatility makes the stock market more uncertain and riskier, and it hurts the way the stock market works in general. To make things less uncertain, it is very necessary to measure the risk of market returns accurately. Consequently, the theoretical and literary relevance of volatility must be understood in order to estimate the volatility of stock index return.

Volatility is an important topic of study in economics and finance. Volatility is an essential element of financial markets. It is intimately tied to market uncertainty and influences firm and individual investment behavior. Volatility in the financial markets is mostly indicated by the variance in the predicted future value of assets. Volatility represents the uncertainty associated with the future price of an asset.

Liquidity in the stock market refers to the ease with which a company's shares can be bought or sold on the market. It affects the ability to enter or exit a position without impacting the stock price. Many factors make liquidity crucial. First, it enables investors to purchase or sell shares rapidly and at a reasonable price. Second, liquidity is a crucial element in determining the price of a stock. When liquidity is strong, the market is efficient and the stock price is reflective of all available information.

Thirdly, liquidity is essential for the stock market's overall health. When liquidity is strong, more investors are enticed to invest, which improves trading activity and market efficiency. A lack of liquidity, on the other hand, can reduce market activity and the number of investors. Liquidity effects the capacity to enter or leave a position quickly and at a fair price, determines the price of a stock, and adds to the general health of the stock market. Overall, stock market liquidity is an important consideration for investors when deciding which stocks to invest in and how to execute trades. A liquid market can provide greater price stability and efficiency, while a less liquid market can make it more difficult to execute trades and potentially impact the price of the stock.

Shariah-compliant businesses are those that operate in line with Islamic law, which restricts certain activities including interest-based transactions (riba) and investments in businesses that deal with prohibited goods and services (haram). According to studies, Shariah-compliant businesses can offer investors favorable profits. Baele et al. (2013) discovered that Shariah-compliant stocks in emerging economies outperformed non-compliant stocks by an average of 1.25 percentage points each month between 2000 and 2010. Overall, the returns of Shariah-compliant companies can give investors with chances to engage in socially responsible enterprises that correspond with their beliefs and have the potential to generate good financial returns. Comparative analysis is necessary because when there is a pandemic or global crises investors having risk averse nature always go towards the resilient stocks or towards those stock which provide protection to the investors and shariah compliant stocks are considered as safer investment opportunities because of having extra financial screening criteria for this reason comparing the performance of shariah and non shariah compliant stocks is crucial. By luring investors who

might not have invested in the stock market otherwise, Shariah-compliant enterprises might enhance market participation. This can boost the market's liquidity and depth and assist to overall growth of the financial sector. The market for Sharia-compliant investments is expanding rapidly, in both Muslim and non-Muslim nations like the United States etc.

1.2 Theoretical Perspective

1.2.1 Efficient Market Hypothesis

The Market Efficiency Hypothesis (MEH) is a fundamental concept that has a significant influence on financial research and investment strategies. It is used for analyzing and contrasting the effect of covid 19 on the volatility & liquidity of shariah and non-shariah compliant stock indices. Eugene Fama's postulated Market Efficiency Hypothesis (MEH) in the 1960s suggests that financial markets are characterized by informational efficiency. This implies that prices precisely incorporate all pertinent information.

The inclusion of the MEH in this study is essential as it may be utilized to assess the reaction of both shariah compliant and non-shariah compliant stock indices to exceptional disruptions created by the covid 19 epidemic. As to efficient market hypothesis (EMH), in case of market efficiency, asset prices should promptly incorporate the consequences of a worldwide crisis such as COVID-19, which affects liquidity and volatility. This study aims to analyze potential disparities in market responses by comparing Shariah compliant and non-Shariah compliant indices. The findings of this study add to the mountain of literature that investigated the effects of efficient markets during various economic downturns and booms. It lays the theoretical groundwork for comprehending market efficiency by drawing on, among other things, (Fama, 1970; Malkiel, 2003) and (Lo and MacKinlay, 1988). In addition, the research incorporates recent studies that have looked at how global events affect financial markets, including studies that have looked at covid epidemic. By incorporating MEH into the current study, it will advance the understanding of how shariah compliant and non-shariah stock indices perform

and react during periods of severe market stress, illuminating possible departures from the efficient market hypothesis as well as the specific dynamics at work in these investment contexts.

1.3 Gap Analysis

The performance of faith-based investments is a topic of significant debate and disagreement when compared to their traditional equivalents. Most recent Shariah-compliant Investments, a constituent of ethical finance, have garnered increasing attention in empirical study due to various factors. One factor is the ongoing debate in current financial theory suggesting that Shariah-compliant indexes are riskier than conventional ones because they lack diversification (Albaity and Ahmad, 2008). The second rationale is based on the belief that faith based (Islamic) indices are more profitable compared to other indices since they satisfy extra financial screening criteria (Atta-Alla, 2012; Hussein and Omran, 2005; Sherif, 2020). Previous research on Shariah-compliant investments concentrated on the DJIMI (Dow Jones Islamic Market Index) (Hadhri and Ftiti, 2019). The majority of these studies employed a consistent technique to assess the performance of DJIMI in comparison to other benchmarks. However, the specific benchmarks chosen for comparison differ throughout investigations. (Wu et al., 2017) examined the performance of the FTSE and other Islamic indices and provides a mixed picture of findings. According to Tahir and Ibrahim (2020), Shariah-compliant businesses experienced superior performance in accounting and market returns compared to non-Shariah-compliant enterprises.

However, several studies have examined the financial markets during specific event but few have focused on the specific features and performance of Shariah compliant stock indices during the crisis. This research intends to provide insight about liquidity and volatility of Shariah compliant stock indices versus non-Shariah compliant counterparts in Asian markets by conducting a comparative analysis. The findings of this specific study will enhance the comprehension of investors, policymakers, and market participants regarding the dynamics of Shariah-compliant stocks in comparison to conventional stocks during periods of crisis. Additionally,

it will contribute to the existing body of knowledge on the impact of COVID-19 on financial markets. This is a factor that should be considered.

1.4 Problem Statement

The Covid-19 pandemic has left a significant impact on the global economy, leading to unforeseen fluctuations and availability of liquidity in the Asian Stock Markets. Although shariah-compliant equities have gained popularity as prospective investment opportunities, it is crucial to assess how they performed in difficult circumstances in order to give investors insightful information. So, the problem is identified that Shariah-compliant corporate investors may have trouble judging volatility and liquidity. They may have had limited information on how these characteristics contrasted to similar enterprises in other countries. This may have affected investors' ability to assess these enterprises' risks and profits. Investors and policymakers should know the best practices of shariah-compliant businesses. This study will provide a significant contribution to provide insight about identified problem because the comparative analysis will give investors with international perspectives on the financial stability of these stocks. And the highlighted problem will be addressed by assisting investors in making informed investment selections and enhancing their portfolios' overall financial stability. This study aims to analyze and contrast the volatility and liquidity of shariah-compliant stocks and non-shariah compliant stocks in Asian financial markets during the Covid-19 pandemic. The objective is to identify the crucial factors that impact their performance and assess their potential as a secure investment option during periods of economic turbulence.

1.5 Research Questions

The study formulated the research questions below:

Research Question 01

Do Covid-19 influences Volatility of shariah compliant stocks?

Research Question 02

Do Covid-19 have impact on Volatility of non shariah compliant stocks?

Research Question 03

Is the covid's impact on Volatility of Shariah Non-Shariah compliant stock indices different?

Research Question 04

Does money supply have impact on volatility?

Research Question 05

Do oil prices have influence on volatility?

Research Question 06

Does inflation influence volatility?

Research Question 07

Do real interest rate impact volatility?

Research Question 08

Do Covid-19 influence Liquidity of shariah compliant stocks?

Research Question 09

Do Covid-19 have impact on Liquidity of non shariah compliant stocks?

Research Question 10

Is the covid's influence on Liquidity of Shariah & Non-Shariah compliant stock indices different?

Research Question 11

Do money supply impact liquidity?

Research Question 12

Do oil prices have influence on liquidity?

Research Question 13

Does inflation influence liquidity?

Research Question 14

Do real interest rate impact liquidity?

1.6 Research Objectives

Objectives of the study are outlined below:

Objective 01

To assess the impact of Covid-19 on the Volatility of Shariah & Non-Shariah compliant stocks.

Objective 02

To explore the impact of macroeconomic variables on the Volatility of Shariah & Non-Shariah compliant stocks.

Objective 03

To examine the covid's impact on the Liquidity of Shariah & Non-Shariah compliant stocks.

Objective 04

To explore the impact of macroeconomic variables on the Liquidity of Shariah and Non-Shariah compliant stocks.

Objective 05

To provide insight about differences in impact of Covid-19 on Volatility, Liquidity of Shariah & Non-Shariah compliant stocks.

1.7 Significance of the Study

Shariah-compliant equities are becoming increasingly popular internationally, and the market has experienced tremendous growth in recent years. Shariah-compliant stocks offer an alternative investment option to Muslim investors who may feel uneasy investing in traditional stocks that may contradict with their religious convictions. The covid's influence on financial markets is important for various reasons. First, this study addresses a major knowledge vacuum by concentrating on the epidemic's penalties on Sharia-compliant in contrast with non shariah compliant stocks. Secondly, we may assess these instruments' resilience by studying COVID-19's influence on liquidity and volatility. This evaluation aids investors

and financial institutions in assessing the viability and effectiveness of investment plans that adhere to Sharia principles in periods of significant uncertainty. In the context of Sharia-compliant investments vs non-shariah compliant stocks, the research outputs will allow stakeholders to make more accurate judgements in areas like portfolio management, risk assessment, and policy creation.

1.8 Plan of Study

Chapter 01 covered the Introduction, Theoretical Perspective, Gap Analysis, Problem Statement, Research Objectives and Questions, Significance of the study. Chapter 02 covered Liquidity and Volatility patterns of stock market during the time of different pandemics and significance of controlled variables money supply, inflation, real interest rate and oil prices have on stock market and hypothesis of the study are also discussed in chapter 02. Sample, Variable Description, Research Methodology (ARIMA MODEL) are discussed in the Chapter 03. Chapter 04 discussed the results obtained from applying ARIMA MODEL, least Square Regression Method, Conclusion and Recommendations of the study as well.

Chapter 2

Literature Review

This section provides a complete grasp of the current level of knowledge in the topic by synthesizing and analyzing major findings, theories, and approaches from relevant studies and also states the hypothesis.

2.1 Volatility of Shariah & Non-Shariah Stocks During Pandemics

Changes in stock indexes and returns, both up and down, are examples of market volatility (Bhowmik and Wang, 2020). Global financial markets and economic activity may be severely hampered by the advent of unfavorable events like pandemics (Chowdhury et al., 2022). Reaction of stock market to worldwide pandemic emergencies has been the subject of recent scholarship. Using the (GARCH) model, (Onali, 2020) investigated the influence of covid 19 on the volatility of the Dow Jones stock-market and the (SP) 500 index. It was discovered that the pandemic significantly influenced stock-market's volatility and these changes persisted for a long time after the pandemic had ended. Baker et al. (2020), analyzed data from the US stock market, arrived at identical conclusions. It was also observed that the global stock market volatility significantly affected by the COVID-19 epidemic. They studied a substantial dataset in order to validate the findings of previously conducted studies on the volatility of stock markets. As the decline in stock prices and market indices persisted in virtually all stock markets throughout

the world, it became abundantly evident that the outbreak is to blame for the situation.

Baig et al. (2021) examined the correlation between the mortality rate, confirmed COVID-19 instances, and implementation of lockdown measures in the United States. This analysis aimed to analyze the impact of these factors on the stock market's volatility and liquidity. The results of a study examining the liquidity and volatility of the market using the GARCH model indicated that the occurrence of fatalities, lockdowns, and confirmed cases had a substantial and negative influence on these market factors. The study indicated that the stock market's volatility heightened due to the reception of adverse news on the outbreak. Furthermore Akhtaruzzaman et al. (2021) noted a contingent correlation among death rates, confirmed cases, and stock market return in the G7 nations. Hedging prices for risk coverage were also revealed to be affected by the contagion effect, which was discovered to be much bigger for financial businesses than for non-financial firms. Non-financial firms were found to be significantly less affected by the contagion effect. According to the finding's the volatility of the market was substantially affected by both positive and negative news.

To make matters even worse, Sharif et al. (2020) reported that the covid 19 epidemic increased volatility in US stock markets, political risk, & oil prices in the second half of the year 2020. The time-frequency paradigm was utilized throughout this study to investigate the connections between the rapid spread of covid-19, a shock in the instability of oil prices, the stock market, geopolitical risk, and the uncertainty of economic policy in the United States. The coherence wavelet approach and wavelet-based Granger causality tests, when applied to recent daily data in the United States, revealed the extraordinary impact of COVID-19. It's possible that the threat posed by COVID-19 perceived as an economic catastrophe in the short term, but in the long term, people may have a very different perspective on it. According to studies demonstrating that the pandemic had an effect on the Asian market as well, there was an increase in the probability of market volatility and a larger volatility persistence after COVID-19. Sharma et al. (2021) explored similarities in volatility among the five developed Asian economies of Hong Kong, Japan, Russia, Singapore, and South Korea. Furthermore, study

examined if the covid 19 pandemic impacted the usual levels of volatility observed in the Asian region. These findings revealed that the volatility experienced during the covid-19 period had a greater resemblance to Singapore than to the other four economies. Bora and Basistha (2021) stated that the COVID-19 pandemic had a significant influence on the unpredictability of the Indian stock market. When GARCH model was applied to the data, it was discovered that there was a significant growth in the market's uncertainty over covid.

Mofijur et al. (2021); Uddin and Alam (2017) conducted a similar study using data from 34 stock markets around the globe hypothesized that volatility rose after the covid's pandemic. Study concluded that economic qualities determinants at the country level helped to mitigate the volatility caused by the virus epidemic. Dharani et al. (2022) investigated how COVID-19 affects volatility and return from 2010 to 2020, taking into account Shariah and non-Shariah indices from the SP-1200. Findings revealed that Shariah indices were, on average, more stable than their non-Shariah equivalents. This was the finding. During the COVID-19 period, it was also observed that typical shariah index has lower risk and higher return than overall market. Tsegay et al. (2022) carried out an investigation quite similar to above, however this time the study compared how conventional stocks and Islamic equities performed throughout covid's pandemic. According to the results, Islamic stocks continued to have a lower level of sensitivity to the latest pandemic news compared to their conventional counterparts. This research contributed to the recent heated debate that compared and contrasted the outcomes of shariah compliant stocks with those of non-Shariah compliant companies during the covid-19 shock in such a way that they used data on firm level stock returns to provide solid indication that shariah compliant stocks outstripped their conventional counterparts during the covid's crash. This was in contrast to the existing literature, which draw conclusions based on data from stock market indices. In particular, the study found that stock prices that complied with shariah law observed fewer negative returns than stock prices that did not comply with Shariah law in reaction to rise in the number of cases of covid 19 and efforts of the government to socially distance itself from its citizens. According to the findings

of the study, equities that adhered to Shariah standards perform, on average, significantly better during the Covid-19 crisis than those that did not comply with shariah. In another study that was conducted not too long ago, Salisu and Shaik (2022) compared the overall performance of Islamic stocks to that of conventional stocks while also taking into consideration the recognized hedging capacity of conventional stocks. It was found that Islamic stocks outperformed conventional stocks during the COVID 19 pandemic, despite the fact that its hedging efficiency had reduced. This was the case despite the fact that Islamic stock hedged less effectively than conventional stock. As discussed earlier, most research that took into account the penalties of covid's pandemic relied on a sample of traditional stock-market indices. Few studies have looked into how COVID-19 affects Islamic stock index volatility. Sharif et al. (2020) performed an investigation into the effect the epidemic had on Islamic stock indices as well. On the other hand, there is a dearth of research that compares traditional and Islamic indexes with regard to their degree of volatility and their lifespan. The author investigates the potential effects of the COVID-19 epidemic on both the conventional and Islamic financial systems. As it turns out, Islamic bonds, also known as Sukuk, perform the function of a safe haven during this epidemic. At the same time, however, the spillovers between traditional stock markets and Islamic stock markets get stronger. Ali et al. (2022) investigated, as part of the research whether or if the KSE and KMI indices of the PSX offer investors any degree of protection during the COVID-19 crisis. According to the findings, it would appear that Islamic and non-Islamic stock indices both responded in a manner that is comparable to the emergency situation caused all over the world by the COVID-19 epidemic. For instance, the crisis has the same negative impact on volatility and return for both categories of stocks, and the reactions of investors to the crisis had a negative effect on both forms of stock. This has a negative effect on both types of stock. In addition, after the pandemic's breakout, investors were more risk averse, which has a detrimental influence on market activity. Volatility shocks brought on by the covid's pandemic continue to exist for a longer time period as compared to pre-crisis era of the sample. These data also demonstrated that Pakistan Stock Exchange maintains a higher level of volatility during times of crisis than at other periods of the year. Bugshan et al. (2023) investigated that during the Global Financial

Crisis covid whether or not Shariah compliant and non-Shariah compliant stock markets in developed and developing nations offer any diversification choices. In order to accomplish this, they made use of daily data for Shariah indices as well as non-Shariah indices beginning on October 29, 2007, and ending on December 31, 2021. Using multivariate GARCH-DCC and wavelet techniques, an investigation into the potential for diversification in the markets were carried out. According to the findings, stock returns in developing markets were highly volatile, but the conventional indices in Malaysia were the most volatile. The most volatile conventional indices were in Malaysia. This indicated that Shariah indices has lower risk profiles and greater diversification compared to their standard counterparts. The conventional Japanese market index and the Shariah index in the United States are two of the developed market indexes that have among the highest levels of volatility. In addition, the wavelet power spectrum data show that there was tremendous volatility throughout covid's disaster, which was meaningfully larger than the volatility seen during GFC. The conventional Chinese market was unaffected in any way by either the global financial crisis or the COVID-19 outbreak. The results of the wavelet-coherence transform, on the other hand, showed that investors from the United States could have been able to benefit more from the Shariah-based market in Japan during covid 19 outbreak. Albulescu (2021) did an empirical study on how government statements regarding the number of new COVID 19 cases and the fatality ratio affect the volatility of US financial markets. By considering COVID 19 data from both international and local sources, the study showed that the crisis leads to an increase in the actual volatility of the SP 500. It has been discovered that the ongoing COVID 19 pandemic is a major cause of financial instability, which presents a considerable obstacle to risk management efforts. This finding holds true in several model scenarios. Kusumahadi and Permana (2021) studied the influence of COVID-19 on the volatility of stock returns which was evaluated for 15 nations. According to their analysis of daily data from January 2019 through June 2020, the study discovered that fluctuations in exchange rates have a negative effect on stock returns in most nations. The study also discovered long-term structural shifts, which occurred not just after the first occurrence of COVID-19 but also before. Evidence was established, using GARCH, that the appearance of covid 19 influenced stock return's volatility in all

of the nations studied with the exception of the United Kingdom.

2.2 Liquidity of Shariah Non-Shariah Compliant Stocks During Pandemics

Market liquidity is a fascinating area of study in the financial markets. There has been a lot of discussion over how liquidity should be defined, what it should signify, and how it should be measured. Further studies, such as those by Gofran et al. (2022), found that liquidity can be measured along four dimensions: trading quantity, trading speed, trading costs, and price influence. Trading quantity refers to the amount of a security that can be traded at a given cost, trading speed to the amount of shares that can be traded at a given cost with a given quantity, and trading costs to the total cost of trading a given quantity of an asset. Papadamou et al. (2020), investigated that Internet searches for topics linked to COVID-19 were shown to be connected with increased risk aversion and volatility in the stock market, they used panel data analysis to arrive at their findings. This research revealed that the pandemic of 2019 rocked global capital markets in a multitude of ways. These ways can be assessed by numerous liquidity-related indicators, such as bid-ask spread, market depth, returns, and volatility, among others.

Furthermore, in order to evaluate the efficiency of the conventional and Islamic stock indices in linear a nonlinear frameworks, Jawadi et al. (2021) examine influence of covid on their liquidity & volatility. Stock market data (price, volume) & COVID-19 numbers are used differently. In particular, they used varied definitions of liquidity & volatility calculated rate of covid' disaster spread, and relied on strong linear & non-linear regression to identify distinct coronavirus manifestations before, during, and after the pandemic. No matter whatever proxy is used, this research shows that liquidity and volatility vary significantly over time. Second, they discovered that the stock market had a significant reaction to exogenic news regarding corona-virus outbreak, indicating that these markets were inefficient and that the variation in contamination and death rates related to the pandemic had been nonlinearly driving market trading, liquidity, and volatility.

Furthermore, they did not discover that Islamic funds were more resistant to the pandemic than traditional funds.

Gofran et al. (2022) examined the equity markets of the United States of America, the United Kingdom, Brazil, China, Germany, and Spain in order to evaluate the impact that the COVID-19 might have on liquidity. The study came to the conclusion that the pandemic was responsible for the temporary reduction in liquidity, which was demonstrated by the significant widening of the bid ask spread. In addition, the results of a price impact ratio analysis demonstrate that covid have influence on financial stability of China. Analyzing spreads reveals not only the impact that increased trading costs around pandemic news play in spread widening, but also the function that information asymmetry plays in the widening of spreads. This finding is consistent across all investigated financial markets, except China.

According to another study by Alaoui Mdaghri et al. (2021), the stringency index is only significant for the liquidity depth measure, but the confirmed number of cases has a significant impact on the liquidity of both small cap and big cap businesses. In addition, the findings of the examinations conducted at the sector and national levels demonstrated that COVID-19 has a significant and negative impact on the liquidity of the stock markets. According to the findings of this study, the global pandemic decreased the liquidity of the stock market in depth. Study by Mouline and Filali Allach (2023) seeks to evaluate the effects of shariah other economic, financial firm specific factors on the liquidity levels of enterprises. The findings of this study have important implications for the fields of Islamic & corporate finance. 42 companies trading on the Casablanca Stock Exchange were designated for this study. The analysis included 12 years' worth of financial-data, from 2007 to 2019 was conducted using panel-data estimation techniques. Their findings were pretty definitive, showing that Shariah-compliant businesses have far more liquid assets than their non-compliant counterparts. According to their findings, cash on hand, cash flow, and growth potential are all positively correlated with economic and financial factors. Then they learned that a firm's cash on hand is severely impacted by factors such as its size, its working capital requirements, and its level of debt leverage.

It has been discovered that Shariah compliant stocks has considerable impact on the financial choices made by corporations in many nations and regions with a Muslim majority, where Shariah compliance has developed into an essential component of corporate finance. A pattern of cash holding is one of the areas in which these effects are seen to have the most significant impact, businesses that adhere to Shariah law have bigger cash reserves than non-Shariah compliant stocks. This is because shariah law places tighter limits on the use of external finance and places greater demands on their financial resources. For example Bugshan et al. (2021) investigated that shariah compliant enterprises in Gulf Cooperation Council nations maintain more cash than conventional firms. This is due to transaction cost reason for having cash as well as the limited external financing choices that are accessible to shariah compliant firms. Non-shariah compliant firms hold lower cash than shariah compliant firms. Musarat and Ullah (2015) made the discovery that shariah compliant companies listed on the Karachi Stock Exchange during 2006 to 2011 hold large amounts of cash than non-Shariah compliant corporations. This was shown to be the case due to Islamic financing limits and the higher cost of external financing. Additionally, Guizani and Abdalkrim (2021) found that Shariah compliance had a beneficial influence on the financial reserves of businesses. This result can be rationalized by pointing to the constraints that Shariah law places on commercial enterprises in order to ensure that they remain compliant. In Indonesia, Hakim et al. (2021) discovered that shariah compliant companies store less cash as a result of the reputational advantage of a shariah compliant index as well as stricter monitoring and reporting regulations.

Tiwari et al. (2022) made important contributions to the expanding corpus of study that investigated the detrimental effects of the virus on a variety of facets of international markets. The study analyses correlations and causal linkages between covid 19 and overall stock market liquidity of China, Australia, and the G7 nations by using data on daily frequency from three liquidity proxies (Amihud, Spread, and Traded Value). Their method consisted of an empirical technique that incorporated a linear Granger causality test, wavelet coherence, and phase differences. As per results of the linear causality test, there is a link that may be considered to be causative between the number of corona infections and liquidity

of the stock market

2.3 Oil Prices and Shariah Non-Shariah Compliant Stocks

Considering the possible consequences of oil prices on market state and economic conditions, they should be included as a controlled variable. It's common knowledge that changes in the global economy, geopolitical tensions, and supply-demand imbalances can all have a significant impact on oil prices. Oil prices can have indirect implications on market volatility and liquidity during economic uncertainty, like COVID-19. Traders and investors reacted to the rapid surge in oil prices by making changes to their portfolios and trading techniques out of fear for increased production costs and potential inflation. These shifts in investor psychology may exacerbate market uncertainty. The liquidity levels in the market also change as market participants re-evaluate their investment strategies in response to the changes in oil prices.

The effect of oil prices fluctuation on business profits was studied by Bugshan et al. (2021). Since Shariah-compliant businesses must adhere to rigorous guidelines, this research looked into whether or not impact of oil price volatility differ for these businesses than to their non-Shariah compliant counterparts. From 2005-2019, the non-financial companies trading on Gulf Cooperation Council stock markets were included in the study's sample. Two different types of models, one static one dynamic were employed to assess association among oil price volatility and profitability. Profitability for businesses is substantially impacted by the ever-changing price of oil. Furthermore, the fluctuation in oil prices showed greater impact on shariah compliant businesses than on their non-Shariah compliant. The findings indicated that oil price shocks have asymmetric effects on company with significant oil price uncertainty putting shariah compliant companies at a higher hazard of bankruptcy than non-shariah compliant companies.

Narayan and Narayan (2010) studied in what way changes in the price of oil affected the stock market in Vietnam. Data for 2000–2008, with the nominal

exchange-rate included as an extra factor in determining stock prices. The study discovered that stock prices, oil prices, and nominal exchange rates were all cointegrated. Furthermore, it discovered that oil prices have a positive statistically significant effect on prices of stock. This conclusion did not match the expectations that were derived from the theory. The increase in the prices of oil occurred concurrently with the expansion of the Vietnamese stock market. This study analyzes how fluctuations in oil prices interact with market dynamics and may amplify or dampen volatility and liquidity effects by treating them as a controlled variable. The inclusion of oil prices as a controlled variable allows us to investigate the broader economic factors that can affect the volatility and liquidity of shariah non-shariah compliant stocks during times of market stress.

2.4 Money Supply Shariah Non-Shariah Compliant Stocks

To isolate the influence of covid on Sharia-compliant & non-Sharia-compliant stock liquidity and volatility, this study uses money supply as control variable. It can distinguish pandemic-related effects from monetary policy actions by looking at money supply fluctuations. Money supply changes can affect market liquidity and investor behavior.

Central banks worldwide implemented monetary policy to address pandemic-related economic issues. Changing money supply through interest rate adjustments and quantitative easing can affect liquidity and volatility in financial markets, including Sharia-compliant and non-Sharia-compliant equities. Money supply affects liquidity because it affects investment and trading funds. More investors can access funds when money supply rises, increasing market liquidity. Increased liquidity can lower bid-ask spreads, transaction costs, and stock trading ease. A decline in money supply may affect liquidity.

The growing amount of the money supply can have an effect on stock prices in one of two ways: it can either cause switch in portfolio or it can impact prospects of inflation. This is because inflation has a positive link with money growth rate

(Fama, 1981), positive changes in the money supply may cause stock values to fall. This is because inflation has positive link with the money growth rate. Liljeblom and Stenius (1997) investigated the connection between unstable macroeconomic conditions and a volatile stock market in Finland. The data they employed from the years 1920–1991 and analyzed with both GARCH and the vector autoregressive (VAR) approach. According to the findings, fluctuations in the stock market are influenced by industrial production, inflation, and amount of money in circulation.

Humpe and McMillan (2020) looked at the US stock market and found that the shutdown of Covid-19 cut US manufacturing production by 15% in the first five months of 2020. At the same time, the SP500 stock market measure fell by 30% and then almost got back to where it was before the crisis. But central banks have helped financial markets by giving out more money supply than ever before. This might explain why the stock market has been so resilient. The study used a cointegration framework to figure out how macroeconomic factors and the US stock market are related. Results showed that the rise in money supply is responsible for about half of the stock market recover.

2.5 Interest Rate, Inflation Rate & Shariah and Non-Shariah Compliant Stocks

This study of how covid effects on liquidity & volatility of Sharia-compliant & non-Sharia-compliant stocks is not sufficient without including real interest rates and inflation as control variables. Since real interest rates reflect the cost of borrowing and lending after adjusting for inflation, they have a direct impact on choices of investors and borrowers make. By including them as controls variables, we can more accurately measure their impact on liquidity and volatility by isolating the effects caused by the epidemic from those caused by fluctuations in interest rates.

The dynamic connections between equities market performance and interest rate have been the topic of numerous empirical investigations in recent years. Earlier research from the likes of Mishkin et al. (1977) found that rising stock prices and interest rates went hand in hand, with the former leading to greater investment

activity. In most cases, a low interest rate guided the actions of the investors put their money into the stock market because they expect increased earnings in situations where a high interest rate is recommended. Bank deposits, and savings correspondingly cuts down on investment in publicly traded stocks.

MUKTADIR (2013) recently analyzed a study that Bank interest rates effects on the stock-market volatility by using data for the economic history of Bangladesh from 1991 to 2012 on monthly basis. The results suggested a reliable & lasting link over the long term among the chosen variables. Furthermore, it has been determined that a 13.20% increase is caused by an interest rate increase of 1% drop in the market's index over time.

Similarly using annual data for Pakistan between the years 1990 and 2017, Mustafa et al. (2013) conducted an empirical study of the impact of interest exchange rates on stock-market capitalization. The primary objective of study was to use the econometric Johansen approach, Error Correction Model, Variance Decomposition to examine short-run, long-run interconnectedness among market capitalization and macroeconomic variables. The findings showed that for every 1% increase in interest rates and 1% increase in exchange rates, the market cap moves down by 0.23% and up by 3.17%, respectively.

The growth of a nation's economy is heavily impacted by different factors, two of them are stock market, interest rate. The outcomes of changes in interest rates on stock market have significant implications for monetary policy, risk management practices, the value of financial securities, and the approach that the government takes towards the financial markets. Evidence supporting the existence of market efficiency was investigated by Uddin and Alam (2010) based on data collected from the daily general price index between 1994 and 2005. Their research also showed an experiential relationship between the stock index and interest rate. It has been discovered that there is a large inverse linkage between interest rates and share prices, and that there is also a significant inverse association between growth in interest rates and growth in share prices.

Another study by Muktadir-al Mukit (2012) raised more the effects of the interest rates in addition to the exchange rates on the return of the equity market by picking monthly data for Bangladesh spanning the years 1997-2010 using the method of

estimating cointegration analysis, it was discovered that a one percent increase in both the policy rate and the currency rate contributes the 1.71% and 1.04% fall in the stock index, respectively.

Similarly, inflation, which impacts market sentiment, investor expectations, and purchasing power, should also be included as a control variable. Inflation is the tendency for prices to increase generally and persistently Boediono, 2016. The price increase of only one or two goods cannot be considered inflation unless it has an effect on the price increase of the majority of other goods. By separating inflation's effects from those of other pandemic-related issues, we may gain insight into how changes in inflation interact with the effects covid has on liquidity and volatility. Equity market performance and economic drivers have been the subject of a large number of research studies over the past many years.

Omran and Pointon (2001) studied the relationship between the rate of inflation in Egypt the performance of the stock market. The implications of inflation rate on key stock market performance characteristics are given special attention, particularly in terms of liquidity of market. Beginning with cointegration examination and continuing over the error correction method. ECM significant long run short run connections are obtained among the variables, which suggested the inflation rate has an impact on the performance of the Egypt stock market.

The effects of interest and inflation rates on stock prices were examined in a study presented by Eldomiaty et al. (2020) From 1999 to 2016, the study used quarterly data from non-financial firms in the DJIA30 and NASDAQ100. If you want to know how changes in interest rates and inflation affect stock prices, you should use the stock duration model. Johansen cointegration, normality and linearity tests, cointegration regression, Granger causality test, and vector error correction modelling were among the well-established statistical methods used in the study. Stock prices and inflation rates are inversely related, according to the results of the cointegration regression study. Real interest rates also tend to go hand in hand with stock values. Based on the results of the Granger causality test, the study also shows that changes in inflation and real interest rates significantly impact stock price movements.

Although studies have examined the effect of covid on financial markets, there is limited research comparing the performance of conventional and Sharia stock markets during the pandemic in south Asia. This research study aims to provide a comprehensive understanding of the similarities and differences between these market types in terms of liquidity and volatility by conducting a comparative analysis. By addressing the gap in the literature, the study on the comparative examination of the effect of COVID-19 on quality and volatility of shariah & conventional stock markets will make a significant contribution to the existing body of knowledge, provide a comprehensive understanding of market dynamics during crises, and offer practical advice to various stakeholders for navigating future challenges. This analysis shed light on the resilience and adaptability of Islamic financial systems in times of global disruption.

2.6 Hypothesis of the Study

Hypothesis 01:

There is significant influence of Covid on the liquidity of Shariah-compliant stock indices.

Hypothesis 02:

There is significant influence of Covid on the liquidity of non-Shariah compliant stock indices.

Hypothesis 03

There is significant influence of Money supply on the liquidity of non-Shariah compliant stock indices.

Hypothesis 04

There is significant influence of Money supply on liquidity of Shariah compliant stock indices.

Hypothesis 05

There is significant influence of Real Interest Rate on liquidity of non-Shariah compliant stock indices.

Hypothesis 06

There is a significant influence of Real Interest Rate on liquidity of Shariah compliant stock indices.

Hypothesis 07

There is significant influence of oil prices on liquidity of non-Shariah compliant stock indices.

Hypothesis 08

There is significant influence of oil prices on liquidity of Shariah compliant stock indices.

Hypothesis 09

There is significant influence of inflation on liquidity of non-Shariah compliant stocks indices.

Hypothesis 10

There is significant influence of inflation on liquidity of Shariah compliant stocks indices.

Hypothesis 11

The influence of Covid-19 on liquidity differs significantly between Shariah-compliant and non-Shariah compliant stock indices.

Hypothesis 12

There is significant influence of Covid-19 on volatility of Shariah-compliant stock indices.

Hypothesis 13

There is significant influence of Covid-19 on volatility of non-Shariah compliant stock indices.

Hypothesis 14

There is significant influence of Money supply on volatility of non-Shariah compliant stock indices.

Hypothesis 15

There is significant influence of Money supply on volatility of Shariah compliant stock indices.

Hypothesis 16

There is significant influence of Real Interest Rate on volatility of non-Shariah compliant stock indices.

Hypothesis 17

There is significant influence of Real Interest Rate on volatility of Shariah compliant stock indices.

Hypothesis 18

There is significant influence of oil prices on volatility of non-Shariah compliant stock indices.

Hypothesis 19

There is significant influence of oil prices on volatility of Shariah compliant stock indices.

Hypothesis 20

There is significant influence of inflation on volatility of non-Shariah compliant stocks indices.

Hypothesis 21

There is significant influence of inflation on volatility of Shariah compliant stocks indices.

Hypothesis 22

The impact of Covid-19 on volatility differs significantly between Shariah-compliant and non-Shariah compliant stocks.

Chapter 3

Data Description & Methodology

This chapter include the research methods. The chapter also describes the research sampling procedures, data collection tools, and analytical methods.

3.1 Population and Sample of Study

The population of the study comprised of Shariah-Compliant Stock Indices as well as Conventional Stock Indices of South Asia. South Asia includes the countries of Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka. The sample consists of three Shariah-Compliant Indices and three Conventional Indices of South Asian Nations. Only Pakistan, Bangladesh, and India have Shariah-Compliant Indices on their own, hence these are the only countries represented in the sample.

Table 3.1: Shariah Complaint Stock Indices

Sr. No	Shariah Compliant Indices	Country
1	Karachi Meezan 30 (KMI-30)	Pakistan
2	FTSE Shariah India (FTSWIND)	India
3	Dhaka Stock Exchange Shariah Index (DSES)	Bangladesh

This table provides information about selected Shariah Complaint equity markets.

TABLE 3.2: Conventional Stock Indices

Sr. No	Conventional Indices	Country
1	Karachi Stock Exchange (KSE-100)	Pakistan
2	Nifty-50	India
3	Dhaka Stock Exchange Broad (DSEX)	Bangladesh

This table provides information about selected Conventional equity markets.

3.2 Data Collection

The analysis makes use of data on monthly basis from 2010 to 2022. and the reason for considering the time span from 2010 to 2022 is that in long term law of averages holds and due to average results got from analysis are likely to be more accurate and better. And historical data of stock indices of Pakistan, India and Bangladesh is collected from Investiong.com. The data of macroeconomic variable such as (oil prices, inflation, money supply and real interest rate is taken from Refinitiv work space.

3.3 Research Methodology

This study employees the ARIMA model extensively throughout this study because of its utility as an analytical tool. The incorporation of the ARIMA model has enriched our research by allowing us to investigate the complex historical patterns inside the stock index data with greater precision. Autoregressive Integrated Moving Average (ARIMA) is a statistical model with a long and storied history that can be traced back to the middle of the twentieth century. The demand for a flexible and reliable method to examine and foretell time series data led to the development of this model. The realization that many phenomena in the real world, such as financial markets, exhibit complex temporal correlations that are difficult to describe using more basic statistical approaches encouraged its development. The link between the major dependent variable and the independent variable can be influenced by a number of additional factors, which may be present in a great

number of real-world scenarios. And during the pandemic several factors showed the abnormal movements for example oil prices showed abnormal behaviour due to lock down conditions and during the tenure of covid for the survival of businesses interest rates reduced globally, so in order to isolate the impact of covid more accurately these variables are used. The use of controlled variables is an effective way to account for these confounding variables, which helps to ensure that the relationship you are attempting to examine is more accurate and can be interpreted correctly. That is why relevant controlled variables are used in this paper to capture the impact of covid on liquidity and volatility more accurately.

This equation demonstrates the correlation between several macroeconomic indicators and the volatility of stock market indexes that adhere to Shariah principles and those that do not.

$$V_t = \beta_0 + \beta_1 Cov_t + \beta_2 RIR_t + \beta_3 OP_t + \beta_4 INF_t + \beta_5 MS_t + \mu_t \tag{3.1}$$

Where;

- V_t = Volatility at time t
- Covt = Covid-19 at time t.
- RIR_t = Real Interest Rate at time t.
- OP_t = Oil Prices at time t.
- INF_t = Inflation Rate at time t.
- MS_t = Money Supply at time t.
- μ_t= Error Term

This equation shows the correlation between several macroeconomic variables and the liquidity of stock market indexes that adhere to Shariah principles and those that do not.

$$Lt = \gamma_0 + \gamma_1 Cov_t + \gamma_2 RIR_t + \gamma_3 OP_t + \gamma_4 INF_t + \gamma_5 MS_t + \mu_t \tag{3.2}$$

Where;

- L_t= Liquidity at time t
- Cov_t = Covid-19 at time t
- INF_t = Inflation rate at time t
- OP_t = Oil Prices at time t
- MS_t = Money Supply at time t
- RIR_t = Real interest rate at time t
- μ_t = Error Term

This equation demonstrates the differences in volatility between Shariah and Non-Shariah compliant Indices.

$$V_t = \beta_0 + \beta_1 Covid_t + \beta_2 RIR_t + \beta_3 O_t P + \beta_4 INF_t + \beta_5 MS_t + \beta_6 SC_t * Covid_t + \mu_t \quad (3.3)$$

This equation demonstrates the differences between Shariah and Non-Shariah compliant Indices' liquidity:

$$l_t = \gamma_0 + \gamma_1 Covid_t + \gamma_2 RIR_t + \gamma_3 O_t P + \gamma_4 INF_t + \gamma_5 MS_t + \gamma_6 SC_t * Covid_t + \mu_t \quad (3.4)$$

3.4 Description of Variables

3.4.1 Volatility

Volatility is the term used to describe the rate at which the price of a stock increases or decreases within a specific timeframe. Increased stock price volatility is often correlated with increased risk. In order to calculate the volatility of a stock index, it is necessary to have access to the returns of the index. The rate of return is a crucial determinant of volatility. It is typically computed using historical returns because it reflects past price movements and incorporates the observed volatility patterns during that period. Volatility in this study is calculated as follows:

A simple measure of volatility by Alizadeh et al. (2002); Gallant et al. (1999):

$$V_{(s,t)} = ln(H_t) - ln(L_t) \tag{3.5}$$

The Parkinson (1980) model is a volatility measure that assumes an underlying geometric Brownian motion.

$$V_{p,t} = 0.361 R_t^2 = 0.361[ln(H_t/L_t]^2 \tag{3.6}$$

Garman and Klass (1980) introduced an alternative measure of volatility that relies on the opening and closing prices.

$$V_{GK,t} = \frac{1}{2}[ln(H_t) – ln(L_t)]^2 – [2ln2 – 1][ln(C_t) – ln(O_t)]^2 \tag{3.7}$$

3.4.2 Liquidity

A stock's "liquidity" is its ability to be bought and sold quickly and easily without substantially impacting its price in the financial markets. Stocks with poor liquidity could be tough to sell, and if that happens, you could end up losing more money. Numerous ratios and other measures were suggested as means of measuring liquidity in the pertinent corpus of academic literature on financial topics. Following the lead of the vast majority of other studies in this field, we begin by putting forward a surrogate measure for the liquidity of the stock market based on an examination of the spread between the highest and lowest stock values. So, in this paper we estimated liquidity by 2 different methods one of them is given below:

$$LIQ_i = (Hp_t^i – Lp_t^i)/Hp_t^i$$

Where:

- Hp_t denotes the high price in an index
- Lp_t presents lowest price in an index

• In the equation **i** denotes Index itself.

Market liquidity can be evaluated by comparing the highest and lowest prices, as indicated by Equation (1). A higher level of market liquidity is associated with a smaller spread between high prices (HP) and low prices (LP).

Second method for liquidity calculation used in this paper is transaction cost measure for liquidity. Transaction costs refer to the comprehensive range of expenditures that are incurred throughout the process of purchasing or selling a financial asset. The costs encompass not solely the bid-ask spread, but also encompass additional charges and expenditures, such as brokerage commissions, taxes, and slippage.

Transaction costs in financial markets may be decomposed into two main components: the bid-ask spread and other associated fees and expenses. The disparity between the highest and lowest prices that buyers and sellers are prepared to accept for an item is called the bid-ask spread.

$$LIQ = (P_A – P_B)/((P_A + P_B)/2) \tag{3.8}$$

Where:

• PA is the ask price

• PB is the bid price

3.4.3 Money Supply

The money supply is a numerical representation of the overall quantity of currency in circulation within an economy. The term "money in circulation" refers to monetary assets such as bank deposits, currency notes, and other liquid assets. The M2 money supply is frequently used as a stand-in for "real" money in economic discussions. The following is an explanation of how we compute the growth of money.

$$\Delta LMS_t = ln(\frac{MS_t}{MS_t – 1}) \tag{3.9}$$

3.4.4 Oil Prices

The market value of a unit of crude oil. The law of supply and demand determines oil prices, which in turn have a significant impact on economies. Oil prices tend to rise when supplies are low and demand is high. Oil prices also tend to fall when supply increases and demand decreases. Here is how we figure out the fluctuation in oil prices:

$$\Delta LOP_t = ln(\frac{OP_t}{OP_t{-}_1}) \tag{3.10}$$

3.4.5 Real Interest Rate

The interest rate refers to the percentage by which the principle is increased from the borrower each year to account for the effect of the time value of money. Below are some common methods for assessing interest rate fluctuations:

$$\Delta LIR_t = ln(\frac{IR_t}{IR_t{-}_1}) \tag{3.11}$$

3.4.6 Inflation Rate

Inflation is measured by looking at how quickly the overall cost of living, including both goods and services, has gone up over a specific amount of time. In order to assess the degree to which prices for goods and services have shifted over the course of time, this investigation makes use of the CPI. According to the formula, inflation rates are determined by taking the change in the CPI.

$$\Delta LCPI_t = ln(\frac{CPI_t}{CPI_t{-}_1}) \tag{3.12}$$

3.4.7 Covid

Covid is taken as dummy variable. As covid is declared as Global pandemic on March 2020 by World Health Organization. So, the period before March 2020 will be considered as 0 and from March 2020 to Dec 2022 it will be considered as 1.

Chapter 4

Data Analysis and Discussions

This chapter includes the descriptives of the variables used their moving trends through graphs and thorough analysis is discussed.

4.1 Descriptive Statistics

Descriptive analysis is essential in research as it offers a brief summary and understanding of the fundamental characteristics of the gathered data. The aim of the mean computation is to determine the average values of volatility and liquidity for both Shariah & non-Shariah compliant stocks over covid-19 period.

4.1.1 Descriptive Statistics for Variables Related to Pakistan

These descriptive are given country wise we have 3 countries in our sample which are Pakistan, India and Bangladesh at first, we have descriptives for variables containing data of Pakistan.

Table 4.1: Descriptive Statistics for Pakistan

	Variable	Index Type	Mean	Maximum	Minimum	Std.Dev	Skewness	Kurtosis	Jarque-Bera
Pakistan	**RIR**	**KSE-100**	0.235736	1.923977	-0.43202	0.4299	1.67703	6.7614	164.029
	MGR		0.010599	0.071126	-0.03502	0.0208	0.34684	2.6335	3.975013
	OPC		0.000079	0.367359	-0.50491	0.1012	-1.11456	8.8585	253.7513
	INF		0.086258	0.2717	0.01452	0.0474	1.34419	6.0135	105.3257
	V1		0.076104	0.38797	0.02416	0.0392	3.60122	27.391	4177.219
	V2		0.002641	0.054338	0.00021	0.0046	9.30252	103.93	68023.28
	V3		0.006824	0.143854	0.00033	0.0127	8.36196	88.283	48778.8
	L1		0.080246	0.473986	0.02445	0.0457	4.43098	36.882	7921.206
	L2		-0.07631	-0.02415	-0.38318	0.0389	-3.5073	26.419	3859.935
	V1	**KMI-30**	0.08268	0.451371	0.02748	0.0447	3.93848	31.199	5536.443
	V2		0.003184	0.073549	0.00027	0.0062	9.80994	111.97	79172.51
	V3		0.008038	0.195935	0.0004	0.0169	9.06473	99.618	62411.64
	L1		0.0795	0.353059	0.02959	0.0377	2.92682	19.866	2058.411
	L2		-0.08364	-0.03004	-0.42875	0.0437	-3.62611	26.968	4049.806

4.1.2 Movement Patterns of Controlled Variables In Pakistan

Data for the variables is collected from 2010 to 2022.

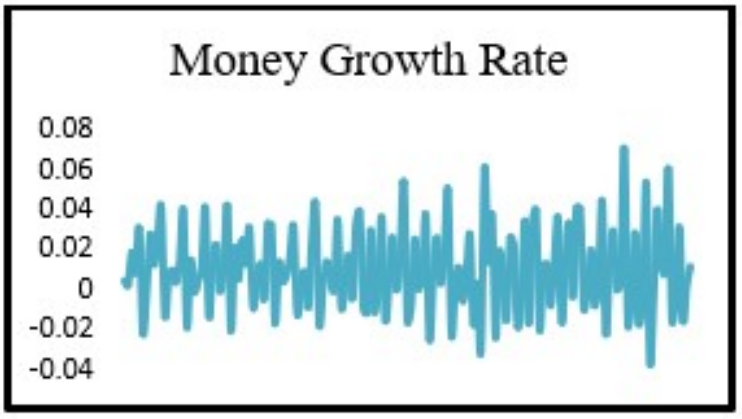

FIGURE 4.1: MGR in Pakistan

FIGURE 4.2: Oil Price Change in Pakistan

The descriptives dataset for Pakistan indicates crucial trends. Real Interest Rate RIR has a mean of 0.236 with occasional extreme rates maximum 1.924, and a positively skewed distribution, indicating a bias for higher values. The Money Growth Rate MGR deviates slightly from normalcy Jarque-Bera 3.975, with a mean of 0.011. The standard deviation is small 0.021, and the mean is also quite stable 0.011. The deviation from normality Jarque-Bera 253.751 and skewness -1.115 of the Oil Price Change OPC are both highly significant, with a mean of 0.00008. The distribution of inflation INF is positively skewed, with moderate variability standard deviation = 0.047 and rare extreme values maximum=0.272.

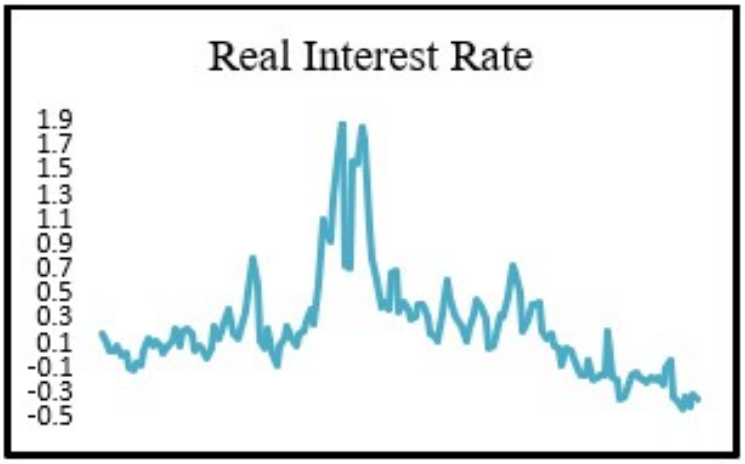

FIGURE 4.3: RIR in Pakistan

FIGURE 4.4: Inflation Changes in Pakistan

These findings, backed up by numeric values, help shed light on the distribution, central tendency, and deviation from normality of each financial variable in the Pakistan's dataset, which is useful for gaining an appreciation of their behaviors and associated dangers.

4.1.3 Descriptive Statistics for Variables Related to India

In this study the second country is India now the descriptive statistics for variables related to India are given below:

Table 4.2: Descriptive Statistics for India

	Variable	Index Type	Mean	Maximum	Minimum	Std.Dev	Skewness	Kurtosis	Jarque-Bera
India	**RIR**	**Nifty-50**	0.091271	1.947154	-0.63667	0.4626	1.19113	4.5167	50.84345
	MGR		0.009429	3.801663	-3.77854	0.436	0.01359	75.626	33625.31
	OPC		0.00011	0.367359	-0.50491	0.1018	-1.10975	8.7619	243.0513
	INF		0.066823	0.16114	0.0146	0.0295	0.68538	3.0703	12.01
	V1		0.074554	0.420122	0.02409	0.0419	4.07851	32.123	5830.973
	V2		0.002635	0.063717	0.00021	0.0054	9.72413	109.41	74597.97
	V3		0.006294	0.167214	0.00031	0.0142	9.68526	108.85	73817.83
	L1		0.071077	0.343033	0.02381	0.036	3.24714	23.222	2875.903
	L2		-0.07446	-0.02409	-0.41405	0.0415	-3.99284	31.143	5455.763
	V1	**FTSE**	0.089805	0.41	0.03	0.0466	2.764	17.088	1469.614
	V2		0.002338	0.06	0	0.0064	5.32201	43.552	11278.87
	V3		0.009101	0.149823	0.00042	0.015	6.24063	53.696	17491.09
	L1		0.085383	0.338763	0.02816	0.0403	2.25847	12.831	746.1413
	L2		-0.09016	-0.02856	-0.40784	0.0465	-2.74429	16.904	1424.415

4.1.4 Movement Pattern of Controlled Variables in India

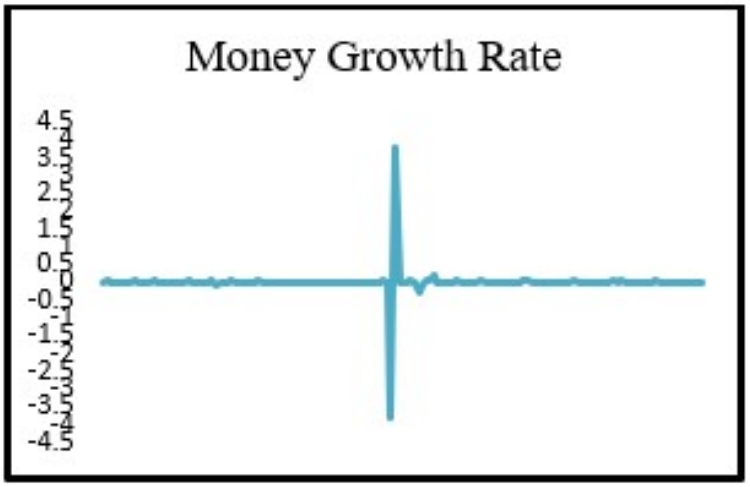

FIGURE 4.5: MGR in India

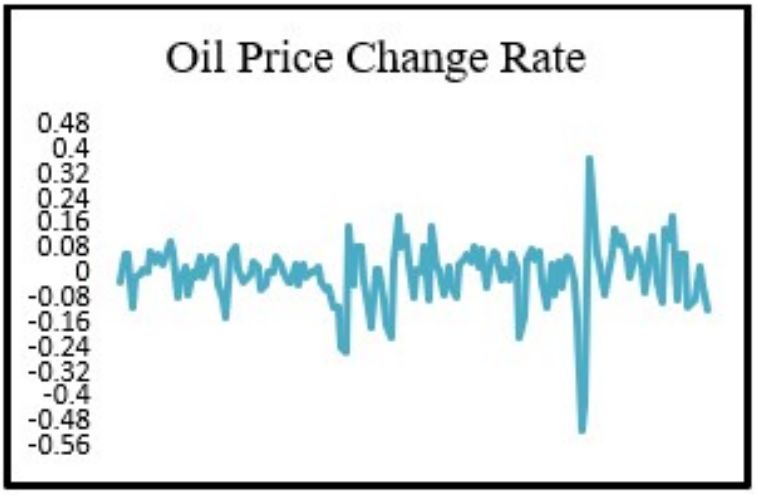

FIGURE 4.6: Oil Prices Change in India

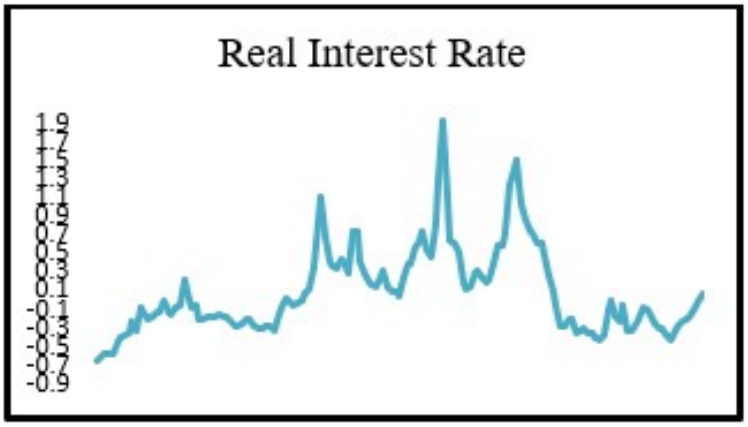

FIGURE 4.7: RIR in India

FIGURE 4.8: Inflation in India

The group of Indian variables reveals. The mean Real Interest Rate (RIR) is 0.091, indicating a low mean rate. Distributions with a positive skewness 1.191 tend to have more frequent high values, whereas those with a leptokurtic shape Kurtosis 4.517 likely to have more frequent low ones. A significant deviation from normalcy was found using the Jarque-Bera test p=50.843. The distribution of Money Growth Rate MGR is very leptokurtic Kurtosis=75,626, indicating the occurrence of extreme values, with a mean of 0.009. The Jarque-Bera value 33625.31 considerably deviates from normality and the nearly symmetric distribution Skewness=0.014 both point to separate properties. The distribution of Oil Price Change (OPC) deviates from the normal distribution in several ways: its mean is 0.00011, its Skewness is -1.110, indicating that OPC values tend to drop, and its Kurtosis is 8.762, indicating that values can go to extremes on occasion. The inflation rate INF has a positively skewed distribution, with a mean of 0.067. In figure 4.5 money growth rate suddenly falls and then rises in year 2016 it is because Indian government announced demonetization of 500 and 1000 Indian rupees which caused sudden fall in money supply and after that new notes of 500 and 2000 Indian rupees were issued in place of demonetized banknotes.

4.1.5 Descriptive for Variables Related to Bangladesh

The descriptive for Bangladesh's shariah and non shariah compliant stocks are given below:

Table 4.3: Descriptive Statistics for Bangladesh

	Variable	Index Type	Mean	Maximum	Minimum	Std.Dev	Skewness	Kurtosis	Jarque-Bera
Bangladesh	**RIR**	**DSES**	0.0249	0.286072	-0.4294	0.1577	-0.83431	2.8422	12.40716
	MGR		0.009209	0.045661	-0.00754	0.0095	0.89252	4.3622	22.26843
	OPC		-0.00278	0.367359	-0.50491	0.1177	-0.9605	6.9908	86.63919
	INF		0.060117	0.095153	0.05023	0.0085	2.13457	7.8924	186.2097
	V1		0.018692	0.227545	0	0.0386	2.53705	10.689	417.2408
	V2		0.00066	0.018691	0	0.0021	6.13548	48.347	10850.7
	V3		0.001635	0.038278	0	0.0052	5.38986	34.986	5601.637
	L1		0.017157	0.207913	0	0.0349	2.66211	11.906	475.5043
	L2		-0.01795	0	-0.23203	0.0373	-2.88378	13.752	657.5124
	V1	**DSEX**	0.017973	0.233084	0	0.0374	2.89586	13.858	668.8915
	V2		0.000616	0.019612	0	0.0022	6.80772	55.355	12925.21
	V3		0.001671	0.043182	0	0.0058	5.61409	36.583	5537.946
	L1		0.017157	0.207913	0	0.0349	2.66211	11.906	475.5043
	L2		-0.01795	0	-0.23203	0.0373	-2.88378	13.752	657.5124

4.1.6 Movement Pattern of Controlled Variables in Bangladesh

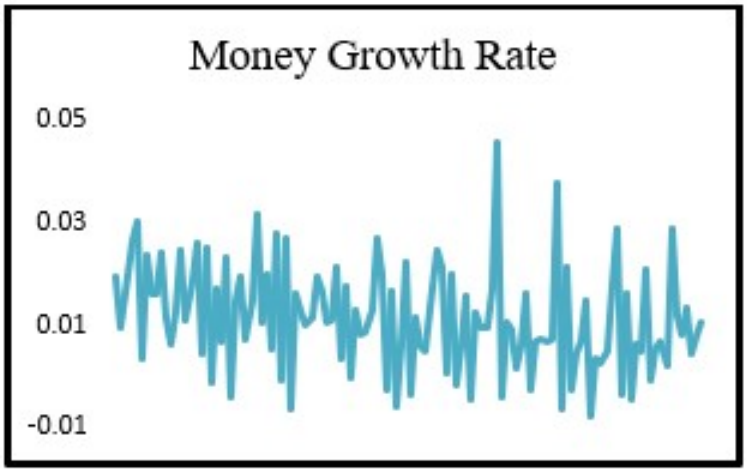

FIGURE 4.9: MGR in Bangladesh

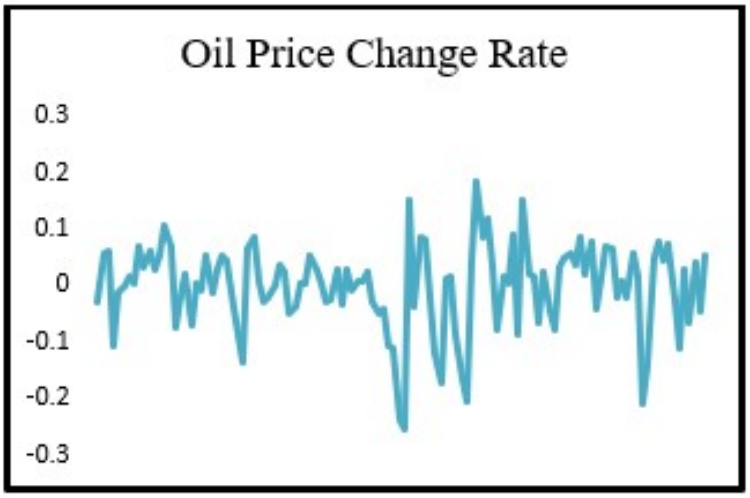

FIGURE 4.10: Oil Prices change in Bangladesh

Insight into the nature of the variables is provided by the descriptive statistics of the Bangladeshi index. The average Real Interest Rate RIR is 0.0249, therefore it's not very high. Skewness -0.83431 and Kurtosis 2.8422 both point to a distribution that is negatively skewed, suggesting a trend towards lower rates. The Jarque-Bera test 12.40716 suggests a departure from normality. The distribution of Money Growth Rate MGR is positively skewed Skewness = 0.89252 and highly peaked Kurtosis = 4.3622, with a mean of 0.0092. The Jarque-Bera value 22.26843 indicates that there is a possible deviation from the mean. The distribution of Oil

FIGURE 4.11: RIR in Bangladesh

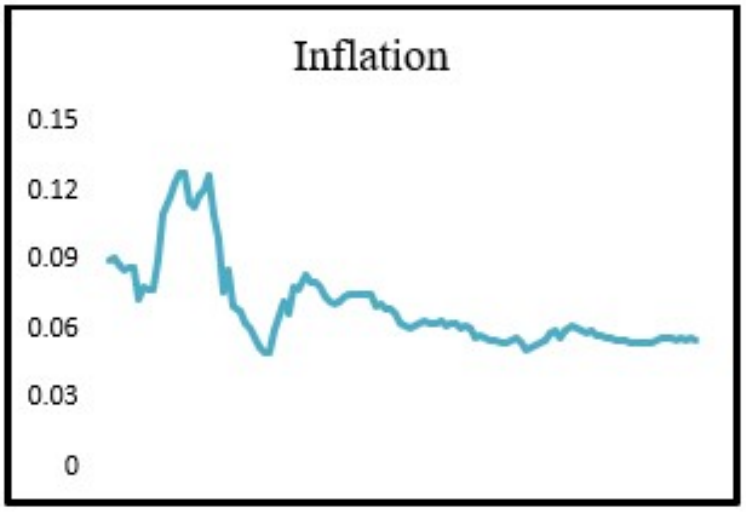

FIGURE 4.12: Inflation in Bangladesh

Price Change OPC is negatively skewed Skewness -0.9605 and moderately Kurtotic 6.9908, with a mean of -0.00278. Distribution of Inflation INF is positively skewed Skewness = 2.13457 and moderately peaked Kurtosis=7.8924, with a mean of 0.06001. According to the Jarque-Bera statistic 186.2097, something is not quite right. These results, backed up by numeric values, shed light on the dispersion, mean, and variance of the Bangladeshi index dataset. By summarizing and understanding data properties, descriptive analysis is essential to research. The mean computation calculates the average volatility and liquidity for Shariah and non-Shariah stocks during COVID-19. In India, FTSE has a mean value of 8.9%, while in Bangladesh, DSES has 0.066%. The minimum and highest numbers indicate

the data range, revealing volatility and liquidity limits. The highest range for V1 for DSES (Bangladesh) is 0.227545, while the minimum range is 0 in Table 4.3. A higher standard deviation suggests more variability, while a lower one indicates less. These descriptive statistics provide a complete overview of volatility and liquidity in Shariah and non-Shariah compliant equities during COVID-19. These statistics also allow comparisons between categories. This approach also helps identify dataset abnormalities and variations from the predicted distribution. Among all the variables presented above in graphs majorly oil prices have noticeable fluctuations the moving trend of oil prices is decreasing in between 2019 to 2021 due to peak of covid. Throughout the course of the COVID-19 epidemic, the price of oil underwent a precipitous drop that was both considerable and noticeable. As a result of the epidemic, lockdowns, travel restrictions, and decreased economic activity, there was a significant drop in the demand for oil across the globe. All of these factors contribute to greater variations in stock prices.

4.2 Volatility Estimation by Using ARIMA Model

Volatility in this paper is calculated by a simple measure of volatility by Alizadeh et al. (2002); Gallant et al. (1999)

$V_{(s,t)} = ln(H_t) - ln(L_t)$

A volatility measure assuming an underlying geometric Brownian motion by Parkinson (1980):

$V_{(p,t)} = 0.361R_t^2 = 0.361[ln(H_t/L_t]^2$

Another volatility measure is based on opening and closing prices by Garman and Klass (1980):

$V_{(GK,t)} = \frac{1}{2}[ln(H_t) - ln(L_t)]^2 - [2ln2 - 1][ln(C_t) - ln(O_t)]^2$

After calculation of volatility ARIMA Model has been used to calculate the volatility and results for each country are given below. The dependent variable is volatility of shariah and non-shariah compliant indices. And with in the tables independent variables are given.

4.2.1 Volatility Estimation of Pakistan's Conventional & Islamic Stock Indices

Volatility of Pakistan's shariah and non shariah compliant stock indices KSE-100 & KMI-30 is estimated through method by Gallant et al. (1999) $V_{(s,t)} = ln(H_t) - ln(L_t)$. The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A $p - value$ is denoted by one symbol $(*)$ if it is lower than 0.05. A $p - value$ is denoted by 2 symbols $(**)$ when it is smaller than 0.01. A $p - value$ is denoted by 3 stars $(***)$ when it is smaller than 0.001.

TABLE 4.4: Volatility Estimation by Gallant and Tauchen's Method

	Conventional Index		**Shariah Index**	
Variables	**Coefficient**	**Prob**	**Coefficient**	**Prob.**
COVID	0.023933	0.112	-0.004992	0.7956
RIR	0.018276	0.1591	0.007769	0.5831
OPC	-0.134978	0(***)	-0.156182	0(***)
MGR	-0.093785	0.5379	-0.050393	0.7869
INFLATION	-0.03158	0.8357	0.006544	0.9718
C	0.069951	0	0.081735	0
AR (1)	0.848099	0	0.569719	0.1431
MA (1)	-0.694405	0.0008	-3.77E-01	0.379
SIGMASQ	0.001242	0	0.001629	0

The table 4.4 presents the independent variables. And dependent variable volatility of shariah & non shariah compliant stock indices. On left side of the table coefficients and p-value of conventional stock index is given and on the right-side coefficients and p-value of shariah compliant stock index is given. Main variable covid's coefficient is found to be insignificant for both shariah and conventional stock indices because covid's coefficient has probability of 0.112 and for conventional index and 0.79 for shariah compliant index. Similarly in accordance with the results for conventional and Islamic stocks the p-value 0 of coefficient of OPC

is found significant because it is below the 0.05 level of significance which means that only oil prices has strongly influenced the volatility of the shariah and non shariah compliant stocks and coefficients of OPC for shariah and non shariah compliant stocks are -0.134978 and -0.156182 respectively both of them are negative it means if there is per unit increase in the oil prices then it will lead to decrease in the volatility of both the stock indices. Rest of variables RIR, MGR, INFLATION are found to be in significant due to having p-values of 0.1591, 0.5379, 0.835 respectively these values are above the significance level which indicates that there is no significant impact of real interest rate, money supply, inflation and covid on the volatility of Conventional stock index. Similarly in case of non-conventional counterpart RIR, MGR, INFLATION are also found insignificant due to having p-value above than threshold 0.05 significance level. The significance of AR's coefficient for conventional stock indices indicates that the volatility observed in the past will persist in the future. For shariah-compliant stock index the insignificance of AR's coefficient indicates that there is no correlation between past and future volatility.

The table 4.5 represents the volatility estimation through the second method by Parkinson (1980):

$V_{p,t} = 0.361R_t^2 = 0.361[ln(H_t/L_t)]^2$.

The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol $(*)$ if it is lower than 0.05. A p-value is denoted by 2 symbols $(**)$ when it is smaller than 0.01. A p-value is denoted by 3 symbols $(***)$ when it is lower than 0.001.

Based on the findings associated to conventional and Islamic stocks, it is observed that the main variable covid's coefficient is found to be insignificant for both shariah and conventional stock indices because covid's coefficient has probability of 0.1236 and for conventional index and 0.748 for shariah compliant index. Similarly, the p-value 0 associated with the coefficient of OPC is deemed significant as it falls below the level of significance 0.05. This indicates that only oil prices have a substantial impact on the volatility of both shariah and non-shariah compliant stocks. The coefficients for shariah and non-shariah compliant stocks are found to be -0.025971 and -0.019505, respectively. The non-Shariah and shariah

TABLE 4.5: Volatility Estimation by Parkinson Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob**	**Coefficient**	**Prob.**
COVID	0.003653	0.1236	-0.002126	0.7487
RIR	0.001431	0.449	0.000148	0.953
OPC	-0.019505	0(***)	-0.025971	0(***)
MGR	0.005783	0.8149	0.013542	0.7194
INFLATION	-0.004986	0.8182	0.001385	0.9711
C	0.001818	0.4629	0.003337	0.4902
AR (1)	0.88899	0	0.954831	0
MA (1)	-0.780887	0	-9.00E-01	0.0001
SIGMASQ	1.63E-05	0	2.99E-05	0

complaint stock indices' coefficient are negative, which indicates an inverse relationship between oil prices and the volatility of the stock indices. This implies that an increase in oil prices leads to a fall in stock index volatility, with a per unit increase in oil prices resulting in a corresponding decrease in volatility. The variables RIR, MGR, INFLATION are determined to be statistically insignificant, as their respective p-values are found to be 0.449, 0.8149, 0.8182. The aforementioned results exceed the predetermined significance level, suggesting that there is no statistically significant influence of real interest rate, money supply, inflation, and the COVID-19 pandemic on the volatility of the Conventional stock index. Similarly, in the case of non-conventional counterparts the variables RIR, MGR, inflation, and Covid, are found insignificant their p-values above the threshold significance level of 0.05. The significance of AR's coefficient for both conventional and shariah compliant stock indices indicates that the volatility observed in the past will persist in the future.

Table 4.6 represents the volatility estimation of Pakistan's shariah and non-shariah compliant indices by Garman and Klass (1980): $V_{GK,t} = \frac{1}{2}[ln(H_t) = ln(L_t)]^2 - [2ln2 - 1][ln(C_t) - ln(O_t)]^2$ The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one

symbol (∗) if it is below than 0.05. P-value is denoted by 2 symbols (∗∗) when it is lower than 0.01. P-value is denoted by 3 symbols (∗ ∗ ∗) when it is lower than 0.001.

TABLE 4.6: Volatility Estimation by Garman & Klass Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	0.038011	0(***)	-0.004838	0.8099
RIR	0.009858	0.0569	0.003578	0.6225
OPC	-0.046061	0(***)	-0.069744	0.0001(**)
MGR	0.009619	0.8657	0.036749	0.7122
INFLATION	0.03457	0.68	0.014136	0.8856
C	-0.011799	0.6124	6.53E-03	0.5582
AR (1)	9.79E-01	0	9.20E-01	0.0018
MA (1)	-6.74E-01	0	-0.831632	0.0107
SIGMASQ	0.00012	0	0.000226	0

In keeping with the findings for non shariah compliant stock index covid has significant positively correlated impact on the volatility as it has p-value of 0 but for shariah compliant stock index it has no statistical significance of volatility due to having value 0.8099. And the p-values 0 of coefficients of OPC are significant because they are below the 0.05 level of significance, indicating that only oil prices significantly affect the volatility of non-shariah and compliant stocks, whose coefficients are -0.046061 and -0.069744 respectively. Since the OPC coefficients for both non-shariah and shariah are negative, it may be concluded that volatility of stock indexes is inversely linked to the price of oil. If there is an increase in the price of oil per unit, then the volatility of the stock index will decrease. The other variables, RIR, MGR, and INFLATION, each have p-values that are insignificant, coming in at 0.0569, 0.8657, and 0.68 correspondingly. Given that these numbers are greater than the significance level, it may be concluded that the real interest rate, money supply, inflation, and covid do not have any impact on the volatility of conventional stock indexes. In a similar vein, the RIR, MGR, and INFLATION

variables for the volatility of Islamic stock indexes are found to be inconsequential. It can be deduced from the fact that AR's coefficient is significant for both conventional and shariah compliant stock indexes that the volatility that has been noticed in the past will continue to be experienced in the future. It can be deduced from the fact that the AR's coefficient is insignificant for the shariah-compliant stock index that there is no association between the volatility of the past and the volatility of the future.

Now table 4.7 shows the comparative analysis of effect of covid-19 on volatility of shariah & non shariah compliant indices of Pakistan.

TABLE 4.7: Comparative Study of influence of Covid-19 on volatility (by Gallant & Tauchen's Method) of Shariah vs Non-Shariah compliant Indices

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	0.002952	0.007663	0.385286	0.7003
OPC	-0.151725	0.023069	-6.576895	0
MGR	-0.055282	0.10828	-0.510548	0.61
INFLATION	-0.023872	0.065386	-0.365099	0.7153
COVID	0.002929	0.008035	0.364553	0.7157
SC*COVID	0.000434	0.009662	0.04488	0.9642
C	0.080674	0.007457	10.81894	0

The variations in volatility of shariah compliant and non-shariah compliant stock indexes in reaction to global pandemic are indicated by the variables (SC*covid) in the table that is located above. There is a positive coefficient of SC*covid, which is 0.0000434, and its p-value is 0.9642, which is higher than the significance level of 0.05. Also, the coefficient is positive. It may be deduced from this that the impact of covid on the volatility of shariah-compliant stock index is not dissimilar to the impact that it has on the volatility of non-shariah-compliant stock index.

The variations in volatility of shariah compliant and non-shariah compliant stock indexes in reaction to the global pandemic are indicated by the variables ($SC * Covid$) in the table that is located above. The p-value of SC*covid is 0.5268, which is higher than the significance level of 0.05. The coefficient of SC*covid is

TABLE 4.8: Comparative Study of Influence of Covid-19 on Volatility (by Parkinson Method) of Shariah vs Non-Shariah Compliant Indices

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	-0.00043	0.000957	-0.449173	0.6536
OPC	-0.023738	0.002882	-8.235778	0
MGR	0.010504	0.013529	0.776397	0.4381
INFLATION	-0.00574	0.00817	-0.702654	0.4828
COVID	0.001028	0.001004	1.023919	0.3067
SC*COVID	-0.000765	0.001207	-0.633668	0.5268
C	0.003259	0.000932	3.49797	0.0005

negative, with a value of -0.0000765. It may be deduced from this that the impact of covid on the volatility of shariah-compliant stock index is not dissimilar to the impact that it has on volatility of non-shariah compliant stock index.

TABLE 4.9: Comparative study of Influence of Covid-19 on Volatility (by Garman & Klass Method) of Shariah vs Non-Shariah Compliant Indices

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	0.000374	0.002643	0.141591	0.8875
OPC	-0.063791	0.007957	-8.016814	0
MGR	0.031163	0.037348	0.834386	0.4047
INFLATION	-0.008833	0.022553	-0.391638	0.6956
COVID	0.003371	0.002771	1.216206	0.2249
SC*COVID	-0.002168	0.003332	-0.650562	0.5158
C	0.007282	0.002572	2.831091	0.0049

The variables (SC*Covid) in the table 4.9 indicate the differences in the volatility of shariah-compliant and non-shariah-compliant stock indices in response to the global pandemic COVID-19. The coefficient of SC*covid is positive at -0.007282 & its p-value is 0.5158, which is greater than the 0.05 significance level. This indicates the impact of covid on volatility of shariah compliant stock index is not distinct from its effect on volatility of non-shariah compliant stock index.

4.2.2 Volatility Estimation of Indian Conventional & Islamic Stock Indices

The volatility of India's shariah and non-shariah compliant stock indices, FTSE and Nifty-50, is evaluated using a method that was developed by Gallant et al. (1999). $V_{s,t} = ln(H_t) - ln(L_t)$. A total of three of the most frequently used levels that are considered to be important are shown by stars in the table. In the event that the p-value is less than 0.05, it is represented by the sign (*). If a p-value is less than 0.01, it is represented by two symbols, which are signified by the symbol **. P-value is presented by 3 symbols (***) when it is lower than 0.001, as indicated by the symbol.

TABLE 4.10: Volatility Estimation by Gallant and Tauchen's Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	0.021287	0.1519	0.016818	0.4297
RIR	-0.019794	0.3745	-0.011139	0.7277
OPC	-0.164401	0(***)	-0.188668	0(***)
MGR	0.003598	0.9303	0.002723	0.8406
INFLATION	-0.015952	0.9604	0.057016	0.9036
C	7.25E-02	0.0066	0.082975	0.0344
AR (1)	4.27E-01	0.2166	0.515706	0.0326
MA (1)	-0.159583	0.6652	-0.222274	0.4294
SIGMASQ	0.001226	0	0.001558	0

The table 4.10 shows that the major variable covid's coefficient is found to be insignificant for both shariah and conventional stock indices because covid's coefficient has probability of 0.1519 and for conventional index and 0.4297 for shariah compliant index. RIR, MGR, INFLATION variables have no meaning full impact on the volatility of shariah and conventional stock indices because their p-values are above than benchmark significance level of 0.05 so the relationship between real interest rate, money supply, inflation is in significant. But unlike RIR, MGR,

Covid and INF only oil prices have significant impact on volatility of both type of indices. The respective p-value of OPC's coefficient is 0 which is lower at 0.05 significance level and coefficient for conventional stock index is negative -0.164401 which means that they are negatively correlated i.e., if there is one unit increase in the oil prices the volatility of stock index will fall. Like conventional stock index the coefficient of OPC for Islamic stock index is also negative -0.188668 it means the OPC is inversely linked with volatility. The significance of AR's coefficient for shariah compliant stock index indicates that the volatility observed in the past will persist in the future. For non shariah-compliant stock index the insignificance of AR's coefficient indicates that there is no correlation between past and future volatility.

Table 4.11 represents volatility estimation of Indian stock indices through the second method by Parkinson (1980): $V_{p,t} = 0.361R_t^2 = 0.361[ln(H_t/L_t]^2$. In the given table stars are meant to indicate only three of the most widely used levels as significant levels. A p-value is marked with a single star $(*)$ if it is lower than 0.05. P-value is presented with 2 symbols $(**)$ if it is lower than 0.01. P-value with 3 symbols $(***)$ if it is lower than 0.001.

Table 4.11: Volatility Estimation by Parkinson Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	0.002621	0.2933	0.000589	0.8179
RIR	-0.001521	0.683	-0.002919	0.5097
OPC	-0.02443	0(***)	-0.029613	0(***)
MGR	0.000255	0.9217	0.000163	0.988
INFLATION	-0.001096	0.985	-0.015759	0.7978
C	2.25E-03	0.6365	0.003502	0.4832
AR (1)	5.55E-01	0.465	0.435227	0.6317
MA (1)	-0.453457	0.5669	-0.343805	0.7229
SIGMASQ	2.11E-05	0	3.15E-05	0

As per the table 4.11, the main variable covid's coefficient is found to be insignificant for both shariah and conventional stock indices because covid's coefficient has probability of 0.2933 and for conventional index and 0.8179 for shariah compliant index. RIR, MGR, INFLATION, and Covid have no meaningful impact on the volatility of shariah and conventional stock indices because their p-values are above the benchmark significance level of 0.05. Unlike RIR, MGR, Covid, and INF, only oil prices affect volatility of both indexes. OPC's coefficient has a p-value of 0 and it is lower at the 0.05 significance level, and conventional stock index's coefficient is negative -0.02443, indicating that if oil prices rise one unit, stock index volatility will fall. Like conventional stock index, Islamic stock index OPC coefficient is also negative -0.029613, indicating inverse correlation with volatility. The AR's coefficient for both conventional and non-conventional stock indices is insignificant indicates that the volatility observed in the past has nothing to do with future's volatility.

Table 4.12 represents the volatility estimation through Garman and Klass (1980): $VG_{k,t} = \frac{1}{2}[ln(H_t) - ln(L_t)]^2 - [2ln2 - 1][ln(C_t) - ln(O_t)]^2$. The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol $(*)$ if it is below 0.05. P-value is denoted by 2 symbols $(**)$ when it is lower than 0.01. P-value with 3 symbols $(***)$ when it is lower than 0.001.

Based on the data in the table 4.12, the main variable covid's coefficient is found to be insignificant for both shariah and conventional stock indices because covid's coefficient has probability of 0.2959 and for conventional index and 0.3096 for shariah compliant index which is above than 0.05 level of significance. It is also clear that the real interest rate, money supply, inflation, variables do not have a statistically significant impact on volatility of shariah and conventional stock indices. Only oil prices, have a significant effect on the volatility of both types of indices. The OPC coefficient for the conventional stock index is -0.06433, and the probability of the OPC is 0 for both indices which is less significant at the 0.05 level, showing a negative correlation which means that one-unit rise in oil prices will reduce the volatility of the stock index. In the same way as OPC is inversely related to volatility for conventional stock indices, it is likewise negative -0.067994

TABLE 4.12: Volatility Estimation by Garman & Klass Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob**	**Coefficient**	**Prob.**
COVID	6.83E-03	0.2959	0.008883	0.3096
RIR	-0.003594	0.712	-0.002954	0.8164
OPC	-0.06433	0(***)	-0.067994	0(***)
MGR	0.000888	0.9147	0.00083	0.9137
INFLATION	-0.003372	0.9819	-0.006954	0.971
C	5.28E-03	0.6605	0.007718	0.6247
AR (1)	0.551012	0.4456	0.623848	0.0141
MA (1)	-4.47E-01	0.551	-0.351785	0.2898
SIGMASQ	0.000148	0	0.000155	0

for Islamic stock index as well. The significance of AR's coefficient for shariah compliant stock index indicates that the volatility observed in the past will persist in the future. For non shariah-compliant stock index the insignificance of AR's coefficient indicates that there is no correlation between past and future volatility.

Now table 4.13 shows the comparative analysis of the effect of covid-19 on volatility of shariah & non shariah compliant indices of Index of India.

TABLE 4.13: Comparative Study of Influence of Covid-19 on Volatility (by Gallant & Tauchen's Method) of Shariah vs Non-Shariah Compliant Indices

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
RIR	-0.020684	0.011044	-1.872947	0.062
OPC	-0.178438	0.023221	-7.684322	0
MGR	0.001088	0.005311	0.204882	0.8378
INFLATION	0.002903	0.162894	0.017823	0.9858
COVID	0.008182	0.009357	0.874418	0.3826
SC*COVID	0.004247	0.009796	0.433529	0.6649
C	0.081594	0.013137	6.210837	0

The variables (SC*Covid) in the table 4.13 indicate the variances in the volatility of shariah compliant & non-shariah compliant stock indices in response to global pandemic COVID-19. The SC*covid' coefficient is positive at 0.009796, & its p-value is 0.6649, which is above than the 0.05 significance level. That indicates the influence of covid on the volatility of shariah compliant stock index is not distinct from its influence on the volatility of non-shariah compliant stock index.

Now table 4.14 presents analysis of disparities in pandemic's effect of volatility.

TABLE 4.14: Comparative Study of Influence of Covid-19 on volatility (by Parkinson method) of Shariah vs non-Shariah compliant Indices

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	-0.002645	0.001427	-1.853163	0.0648
OPC	-0.027633	0.003001	-9.206664	0
MGR	0.000154	0.000686	0.224332	0.8227
INFLATION	-0.011682	0.021055	-0.554833	0.5794
COVID	0.001854	0.001209	1.532553	0.1264
SC*COVID	-0.001617	0.001266	-1.277075	0.2026
C	0.003277	0.001698	1.930049	0.0545

The variables (SC*Covid) in the table 4.14 indicate the variances in the volatility of shariah compliant & non-shariah compliant stock indices in response to global pandemic COVID-19. The coefficient of SC*covid is negative at -0.001617, and its p-value is 0.2026, which is above than the 0.05 level of significance. That indicates that influence of covid on the volatility of shariah compliant stock index is not distinct from its effect on the volatility of non-shariah compliant stock index.

The variables (SC*Covid) in the table 4.15 indicate the variances in volatility of shariah compliant & non-shariah compliant stock indices in response to global pandemic COVID-19. SC*covid's coefficient is positive at 0.000802, & its p-value is 0.7973, which is above than the significance level of 0.05. That indicates the influence of covid on volatility of shariah compliant stock index is not distinct from its influence on the volatility of non-shariah compliant stock index.

TABLE 4.15: Comparative Study of Influence of Covid-19 on Volatility (by Garman & Klass Method) of Shariah vs Non-Shariah Compliant Indices

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	-0.006289	0.003516	-1.788964	0.0746
OPC	-0.0687	0.007392	-9.293315	0
MGR	0.000572	0.001691	0.33835	0.7353
INFLATION	-0.029456	0.051857	-0.56802	0.5704
COVID	0.003236	0.002979	1.086378	0.2782
SC*COVID	0.000802	0.003119	0.257057	0.7973
C	0.009423	0.004182	2.253189	0.025

4.2.3 Volatility Estimation of Bangladesh's Conventional & Islamic Stock Indices

Volatility of Bangladesh's shariah and non shariah compliant stock indices DSEX & DSES is estimated through method by (Gallant, Hsu and Tauchen, 1999) $V_{S,t} = ln(H_t) - ln(L_t)$. The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol $(*)$ if it is below than 0.05. P-value is denoted by 2 symbols $(**)$ when it is lower than 0.01. P-value is denoted by 3 symbols $(***)$ when it is lower than 0.001.

TABLE 4.16: Volatility Estimation by Gallant and Tauchen's Method

	Conventional Index		**Sharia Index**	
Variable	Coefficient	Prob.	Coefficient	Prob.
COVID	5.87E-02	0(***)	0.077546	0(***)
RIR	0.04291	0.481	0.058855	0.2265
OPC	0.075403	0.1218	-0.039834	0.0204(*)
MGR	-0.223284	0.3756	-0.221572	0.634
INFLATION	0.34729	0.711	-1.167498	0.0234
C	-2.08E-02	0.7536	0.063747	0.0824
AR (1)	0.379442	0.0407	-0.030392	0.981
MA (1)	6.04E-02	0.7928	-0.064737	0.9603
SIGMASQ	0.000647	0	0.000505	0

In case of Conventional stock index, the positive coefficient 5.87E-02 of covid suggests direct association between COVID volatility. Volatility rises as COVID cases rise. The correlation between COVID and volatility is statistically significant with probability 0. This implies that COVID cases statistically affect conventional stock index volatility. And similarly for the Islamic stocks covid coefficients' p-value is 0, OPC's coefficient p-value is 0.0204 and inflation's coefficient's p-value is 0.0234 which shows the significant relationship with volatility and Covid is positively correlated with volatility but INFLATION and OPC are negatively correlated with volatility.

At the standard significance level of 0.05, the coefficient of RIR, OPC, MGR & INFLATION's p-value is 0.481, 0.12, 0.3756 and 0.711 respectively which means that their relationship with volatility is not statistically significant for non shariah compliant stock indices. The significance of AR's coefficient for shariah compliant stock index indicates that the volatility observed in the past will persist in the future. For non shariah-compliant stock index the significance of AR's coefficient indicates that there is correlation between past and future volatility. And for shariah compliant stock index there is no correlation between past's volatility and future's volatility.

Table 4.17 represents volatility estimation of Bangladesh's stock indices through the second method by Parkinson (1980): $V_{P,t} = 0.361R_t^2 = 0.361[lnH_t/L_t)]^2$. The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol $(*)$ if it is below than 0.05. P-value is denoted by 2 symbols $(**)$ when it is lower than 0.01. P-value is denoted by 3 symbols $(***)$ when it is lower than 0.001.

Islamic stock covid coefficients' p-value is 0.0192, and their coefficient is 0.003491, indicating a positive correlation with volatility. If covid cases rise, volatility will rise, however in non-shariah-compliant stock indexes, covid has no effect on volatility because its coefficient is negligible. RIR 0.64, OPC 0.5271, MGR 0.6203, and INFLATION 0.8009 were above the 0.05 significant level, indicating that these variables do not affect conventional stock volatility under this technique. OPC's coefficient p-value is 0, indicating a significant link with volatility, and its coefficient is -0.006659. So, its relationship with volatility is inverse. RIR, INFLATION,

TABLE 4.17: Volatility Estimation by Parkinson Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	2.01E-03	0.0687	0.003491	0.0192(*)
RIR	0.002339	0.64	0.004781	0.3351
OPC	0.003573	0.5271	-0.006659	0(***)
MGR	-0.01625	0.6203	-0.010871	0.7806
INFLATION	0.019353	0.8009	-0.039879	0.4158
C	-1.12E-03	0.8407	0.001855	0.5864
AR (1)	0.260272	0.6193	-0.09511	0.9006
MA (1)	-1.16E-01	0.827	-0.146861	0.8476
SIGMASQ	3.45E-06	0	2.95E-06	0

and MGR coefficients have p-values over 0.05. This is why these variables did not affect Islamic stock index volatility.

Table 4.18 represents the volatility estimation of Bangladesh's shariah and non shariah compliant stock indices through Garman and Klass (1980):

$VG_{k,t} = \frac{1}{2}[ln(H_t) - ln(L_t)]^2 - [2ln2 - 1][ln(C_t) - ln(O_t)]^2$. The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol $(*)$ if it is below than 0.05. P-value is denoted by 2 symbols $(**)$ when it is lower than 0.01. P-value is denoted by 3 symbols $(***)$ when it is lower than 0.001.

The p-value for the coefficients of Islamic stocks in relation to Covid is 0.0336, indicating a statistically significant relationship, it is positively corelated and for conventional stocks covid's coefficient is non-significant as it has probability of 0.0523. The conventional stock index exhibited p-values for RIR 0.614, OPC 0.5092, MGR 0.4736, INFLATION 0.7522. All of these values exceed the significance level of 0.05, indicating that these variables do not have a significant impact on the volatility of conventional stocks according to this particular technique. Similarly, the p-value for OPC's coefficient is 0.0014, also indicating a significant relationship with volatility. The negative coefficient of OPC -0.013511 indicates

TABLE 4.18: Volatility Estimation by Garman & Klass Method

	Conventional Index		**Sariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	5.26E-03	0.0523	0.00923	0.0336(*)
RIR	0.005347	0.614	0.01231	0.4142
OPC	0.008287	0.5092	-0.013511	0.0014(**)
MGR	-0.055204	0.4736	-0.010312	0.9256
INFLATION	5.12E-02	0.7522	-0.096515	0.531
C	-0.002898	0.8126	0.004259	0.6924
AR (1)	-1.59E-01	0.9133	0.126655	0.8653
MA (1)	2.16E-01	0.881	-0.32717	0.6599
SIGMASQ	2.06E-05	0	2.19E-05	0

an inverse relationship with volatility. The p-values of the coefficients for the remaining variables RIR, INFLATION, and MGR are higher than the conventional significance level of 0.05. Hence, the observed correlation between these variables and the volatility of the Islamic stock index was determined to be statistically negligible. The AR's coefficient for both conventional and non-conventional stock indices is insignificant indicates that the volatility observed in the past has nothing to do with future's volatility.

Now table 4.19 shows the comparative analysis of the effect of covid-19 on volatility of shariah & non shariah compliant indices of Bangladesh.

The variables (SC*Covid) in the table 4.19 indicate the variances in the volatility of shariah compliant and non-shariah compliant stock indices in response to global pandemic COVID-19. SC*covid's coefficient is positive at 0.004375, & its p-value is 0.5857, which is above than significance level of 0.05. That indicates the influence of covid on volatility of shariah compliant stock index is not distinct from its influence on the volatility of non-shariah compliant stock index.

The variables (SC*Covid) in the table 4.20 represent the variances in volatility of shariah compliant & non-shariah compliant stock indices in relation to worldwide

TABLE 4.19: Comparative Study of Influence of Covid-19 on Volatility (by Gallant & Tauchen's Method) of Shariah vs Non-Shariah Compliant Indices

Variable	**Coefficient**		**t-Statistic**	
RIR	0.023499	0.019963	1.177106	0.2404
OPC	0.009008	0.019092	0.4718	0.6375
MGR	-0.252082	0.190791	-1.321245	0.1878
INFLATION	-0.022067	0.227713	-0.096907	0.9229
COVID	0.054494	0.005579	9.767414	0
SC*COVID	0.004375	0.008015	0.545861	0.5857
C	0.0047	0.016459	0.285553	0.7755

TABLE 4.20: Comparative Study of Influence of Covid-19 on Volatility (by Parkinson Method) of Shariah vs Non-Shariah Compliant Indices

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
RIR	0.002226	0.001402	1.588322	0.1137
OPC	-0.002369	0.001341	-1.767384	0.0786
MGR	-0.015335	0.013396	-1.144722	0.2536
INFLATION	0.011246	0.015989	0.703355	0.4826
COVID	0.00195	0.000392	4.978608	0
SC*COVID	0.000462	0.000563	0.820642	0.4128
C	-0.000651	0.001156	-0.563006	0.574

pandemic. The coefficient of SC*covid is positively correlated with a value of 0.000462. The p-value associated with this coefficient is 0.4128, which exceeds the significance level of 0.05. This suggests that influence of covid on volatility of shariah compliance stock index is not discernibly different from its influence on fluctuation of non-shariah compliant stock index.

Table 4.21 Comparative analysis of influence of Covid-19 on volatility (by Garman & Klass method) of Shariah vs non-Shariah compliant Indices.

The variables (SC*Covid) in the table 4.21 represent the variances in volatility of shariah compliant & non-shariah compliant stock indices in relation to worldwide

TABLE 4.21: Comparative Study of Influence of Covid-19 on Volatility (by Garman & Klass Method) of Shariah vs Non-Shariah compliant Indices

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
RIR	0.00523	0.003551	1.472726	0.1423
OPC	-0.004344	0.003396	-1.279055	0.2022
MGR	-0.036822	0.033942	-1.084858	0.2792
INFLATION	0.028902	0.040511	0.713451	0.4763
COVID	0.005204	0.000993	5.242633	0
SC*COVID	0.001208	0.001426	0.847011	0.3979
C	-0.001736	0.002928	-0.593032	0.5538

pandemic. The coefficient of SC*covid is positively correlated with a value of 0.001208. The p-value associated with this coefficient is 0.3979, which exceeds the significance level of 0.05.

This suggests that influence of covid on volatility of shariah compliance stock index is not discernibly different from its influence on fluctuation of non-shariah compliant stock index.

4.3 Estimation of Liquidity by Using Standard Deviation Weighted Scale Method

Using the standard deviation weighted scale approach in EViews to estimate index liquidity has many benefits. First and foremost, it assesses liquidity using standard deviation, a statistical term that measures data variability. This strategy reduces subjectivity by assessing liquidity objectively using statistics. By weighting liquidity-affecting components, i.e., (RIR) the weighted scale technique improves this analysis. This flexibility lets analysts focus on certain liquidity variables for achieving research goals.

4.3.1 Liquidity Estimation of Pakistan's Conventional & Islamic Sock Indices

Liquidity is estimated by 2 different methods one of them is price-based method:

$LIQ_i = HP_{i,t} - LP_{it}/HP_i$ And other one is transaction cost-based method $LIQ = (PA - PB)/(PA + PB)/2$

The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol $(*)$ if it is below than 0.05. P-value is denoted by 2 symbols $(**)$ when it is lower than 0.01. P-value is denoted by 3 symbols $(***)$ when it is lower than 0.001.

Table 4.22: Liquidity Estimation by Price Based Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	2.96E-01	0.0002(***)	0.179193	0.0009(***)
RIR	0.036523	0.4834	0.063242	0.1098
OPC	-0.201413	0.1567	-0.220809	0.0199(*)
MGR	-0.869411	0.0009(***)	-0.910211	0(***)
INFLATION	3.00E-01	0.2303	0.223833	0.2178
C	0.054619	0.0584	0.05441	0.0149

The table 4.22 shows independent variables and dependent variable which is liquidity. As per the results in above table we made the following indications:

In case of conventional stock index major independent variable covid's coefficient has probability of 0.0002 and for shariah compliant stock index covid's coefficient probability is 0.0009 which is significant because it is lower than 0.05 significance level and for both kind of indices covid is positively correlated which means if covid cases rise liquidity of index will also rise. RIR has coefficient of 0.036523. An increase or decrease in liquidity as a result of a one-unit change in the real interest rate is represented by this coefficient. This coefficient has a corresponding probability value (p-value) of 0.4834. This p-value indicates that the real interest rate variable's coefficient isn't statistically significant at the 0.05 or 0.01 level of

significance. This means that the analysis does not provide sufficient statistical evidence to establish that changes in the real interest rate will impact the liquidity. Similarly, for non shariah compliant indices OPC, INFLATION coefficients are not statistically significant at 0.05 level of significance. Money supply is significant as its coefficients has corresponding p-value of 0.0009. Now moving from conventional to Islamic stock index RIR, INFLATION coefficients have corresponding p-value of 0.109 & 0.2178 as it exceeds the threshold 0.05 level of significance so statistically, they don't impact the liquidity of the index. Now the coefficients of OPC, MGR have corresponding p-value of 0.01, 0 which means they have meaningful impact on liquidity of Islamic stock index as they are statistically significant due to having value lower than 0.05.

Liquidity of KSE-100 & KMI-30 is calculated by transaction cost method results are given below: The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol ($*$) if it is below than 0.05. P-value is denoted by 2 symbols ($**$) when it is lower than 0.01. P-value is denoted by 3 symbols ($***$) when it is lower than 0.001.

Table 4.23: Liquidity Estimation by Transaction Cost Based Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	-2.29E01	0.0007(***)	-0.232146	0.0003(***)
RIR	-0.033113	0.4827	-0.069834	0.1086
OPC	0.164658	0.1751	0.258218	0.0207(*)
MGR	0.80896	0.0008(***)	0.981446	0(***)
INFLATION	-2.65E-01	0.2395	-0.253401	0.2061
C	-0.054496	0.0363	-0.054607	0.0266

In case of conventional stock index major independent variable covid's coefficient has probability of 0.0007 and for shariah compliant stock index covid's coefficient probability is 0.0003 which is significant because it is lower than 0.05 significance level and for both kind of indices covid is positively correlated which means if covid cases rise liquidity of index will also rise. RIR coefficient is -0.03313. This

coefficient's p-value is 0.4827. This p-value means the real interest rate variable's coefficient is not statistically significant at 0.05 or 0.01. The analysis does not give enough statistical evidence to show that real interest rate changes affect liquidity. At 0.05, INFLATION coefficients for non-shariah compliant indices OPC are not statistically significant as well. Money supply has significant coefficient with p-values of 0.0008. From conventional to Islamic stock index RIR, INFLATION coefficients have p-values of 0.1086 & 0.2061, which above the 0.05 level of significance and don't affect index liquidity. OPC, MGR coefficients have p-values of 0.0207, 0 respectively, which suggests they affect Islamic stock index liquidity since they are statistically significant. Liquidity is positively correlated with OPC and MGR.

Now table 4.24 shows the comparative analysis of covid-19's impact on liquidity of shariah & non shariah compliant indices of Index of India.

TABLE 4.24: Comparative Study of Influence of Covid-19 on Liquidity (by Price Based Method) of Shariah vs Non-Shariah Compliant Indices

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	0.004006	0.008298	0.482732	0.6297
OPC	-0.168325	0.024763	-6.797376	0
MGR	-0.01201	0.120936	-0.099311	0.921
INFLATION	-0.031225	0.072387	-0.431364	0.6666
COVID	0.011457	0.008928	1.283351	0.2006
SC*COVID	-0.003982	0.01003	-0.397004	0.6917
C	0.082227	0.008074	10.18447	0

In the table 4.24, the variable denoted as SC*Covid represents the disparities in liquidity between stock indices that adhere to shariah principles and those that do not, as a consequence of the worldwide pandemic covid-19. SC*covid has a negative coefficient of -0.003982 & p-value of 0.6917, which exceeds the significance of 0.05. This suggests that the effect of COVID-19 on liquidity of stock index that adhere to shariah principles is similar to its impact on stock indices that do not adhere to shariah principles.

TABLE 4.25: Comparative Study of Influence of Covid-19 on Liquidity (by Transaction cost Method) of Shariah vs Non-Shariah Compliant Indicess

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	-0.004745	0.00819	-0.579319	0.5629
OPC	0.167698	0.024441	6.861356	0
MGR	0.010688	0.119362	0.089544	0.9287
INFLATION	0.040383	0.071444	0.565239	0.5724
COVID	-0.019056	0.008811	-2.162645	0.0315
SC*COVID	0.015363	0.0099	1.551861	0.122
C	-0.081831	0.007969	-10.26902	0

In the table 4.25, the variable denoted as SC*Covid represents the disparities in liquidity between stock indices that adhere to shariah principles and those that do not, as a consequence of the worldwide pandemic covid-19. SC*covid has a positive coefficient of 0.015363 & p-value of 0.122, which exceeds significance level of 0.05. This suggests that the influence of COVID-19 on liquidity of stock index that adhere to shariah principles is similar to its impact on stock indices that do not adhere to shariah principles.

4.3.2 Liquidity Estimation of Indian Conventional & Islamic Stock Indices

Liquidity of Nifty-50 and FTSE shariah India is estimated by 2 different methods one of them is price-based method: $LIQ_i = HP_{it}–LP_{it}/HP_i$. And other one is transaction cost-based method $LIQ = (PA–PB)/((PA + PB)/2)$. Table 4.26 represents the liquidity estimation by Price based method. The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol $(*)$ if it is below than 0.05. P-value is denoted by 2 symbols $(**)$ when it is lower than 0.01. P-value is denoted by 3 symbols $(***)$ when it is lower than 0.001.

In case of conventional stock index major independent variable covid's coefficient has probability of 0.1172 which is insignificant and for shariah compliant stock

TABLE 4.26: Liquidity Estimation by Price Based Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	-6.77E-03	0.1172	-0.016302	0.0005(***)
RIR	0.033278	0.1374	0.028308	0.3218
OPC	0.005731	0.909	-0.072427	0.3375
MGR	0.001499	0.0924	0.000956	0.7254
INFLATION	-1.30E-01	0.4748	-0.651232	0.0099(**)
C	0.061203	0.0003	0.108485	0

index covid's coefficient probability is 0.0005 which is significant because it is lower than 0.05 significance level and for shariah compliant stock index covid is negatively correlated with liquidity if there is an increase in covid the liquidity will tend to decrease under this method. In above table for conventional stock index, we found the p-values of variable RIR, MGR, NFLATION & OPC's coefficients are above than the significance level 0.05 as they are 0.13, 0.09, 0.4748, and 0.909 respectively. This is why there is no effect of oil prices, real interest rate and money supply on the liquidity of conventional stock index. For Islamic stock index coefficients of inflation has p-value of 0.0099. As the inflation has negative coefficient which shows that 1 unit increase in inflation will tend to decrease in liquidity of the Islamic stock index. Similarly for Islamic stock index RIR, OPC & MGR's coefficient corresponding p-values are above then threshold significance level 0.05. So RIR, OPC & MGR has no meaning full impact on the liquidity of Islamic stock index.

Table 4.27 represents liquidity estimation for Indian stock indices through transaction cost-based method. The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol (*) if it is below than 0.05. P-value is denoted by 2 symbols (**) when it is lower than 0.01. P-value is denoted by 3 symbols (***) when it is lower than 0.001.

In table 4.27, the key independent variable covid's coefficient has probability 0.119 for conventional stock index and 0.7122 for shariah-compliant stock index, which

Table 4.27: Liquidity Estimation by Transaction Cost Based Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	7.17E-03	0.1196	0.008618	0.7122
MGR	-0.001586	0.092	2.015847	0.0045(*)
RIR	-0.036006	0.1333	0.041886	0.1401
OPC	-0.005768	0.914	0.247251	0.0097(**)
INFLATION	1.39E-01	0.476	-0.20036	0.6508
C	-0.06323	0.0004	-0.104654	0.0092

is negligible because it is above 0.05. We observed that RIR, MGR, NFLATION, and OPC coefficients have p-values above 0.05: 0.133, 0.092, 0.476, and 0.914. This is why oil prices, real interest rate, money supply doesn't affect conventional stock index liquidity. MGR, OPC have p-values of 0.0045 and 0.0097, respectively, because money supply and oil prices have positive coefficients. This means that unit increases in MGR and OPC will improve Islamic stock index liquidity. For Islamic stock index INFLATION, RIR's coefficient p-values exceed 0.05. Thus, these do not affect Islamic stock index liquidity.

Now table 4.28 shows the results of the examination of differences in the covid's impact on liquidity of shariah vs non shariah stock index.

Table 4.28: Comparative Study of Influence of Covid-19 on Liquidity (by Price Based Method) of Shariah vs Non-Shariah Compliant Indicesd

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
RIR	-0.019736	0.008855	-2.228735	0.0266
OPC	-0.147092	0.020169	-7.29309	0
MGR	0.001248	0.004623	0.270016	0.7873
INFLATION	-0.006895	0.12849	-0.053659	0.9572
COVID	0.011084	0.007822	1.417132	0.1575
SC*COVID	-0.006874	0.008521	-0.80675	0.4205
C	0.078797	0.010443	7.545585	0

In table 4.28, the variable denoted as SC*Covid represents the disparities in liquidity between stock indices that adhere to shariah principles and those that do

not, as a consequence of the worldwide pandemic covid-19. SC*covid has a negative coefficient of -0.006874 & p-value of 0.4205, which exceeds significance level of 0.05. This suggests that the influence of COVID-19 on liquidity of stock index that adhere to shariah principles is similar to its impact on stock index that do not adhere to shariah principles.

TABLE 4.29: Comparative Study of Influence of Covid-19 on Liquidity (by Transaction cost Method) of Shariah vs Non-Shariah Compliant Indices

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	0.0224	0.010111	2.215372	0.0275
OPC	0.177174	0.02303	7.693318	0
MGR	-0.001467	0.005278	-0.277928	0.7813
INFLATION	0.013896	0.146715	0.094714	0.9246
COVID	-0.013184	0.008931	-1.476212	0.1409
SC*COVID	0.007654	0.009729	0.78674	0.4321
C	-0.083211	0.011924	-6.97847	0

In table 4.29, the variable denoted as SC*Covid represents the disparities in liquidity between stock indices that adhere to shariah principles and those that do not, as a consequence of the worldwide pandemic covid-19. SC*covid has a positive coefficient of 0.007654 & p-value of 0.4321, which exceeds the significance level of 0.05. This suggests that influence of COVID-19 on liquidity of stock index adhere to shariah principles is similar to its impact on stock index that do not adhere to shariah principles.

4.3.3 Liquidity Estimation of Bangladesh's Conventional & Islamic Stock Indices

Liquidity of DSES & DSEX is estimated by 2 different methods one of them is price-based method: $LIQ_i = HP_{it}–LP_{it}/HP_i$. And other one is transaction cost-based method $LIQ = (PA–PB)/((PA + PB)/2)$. The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol $(*)$ if it is below than 0.05. P-value is denoted by

2 symbols (∗∗) when it is lower than 0.01. P-value is denoted by 3 symbols (∗ ∗ ∗) when it is lower than 0.001.

Table 4.30: Liquidity Estimation by Price Based Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	2.08E-01	0(***)	0.207913	0(***)
MGR	-1.88E-16	0.5475	1.04E-16	0.2219
OPC	-2.96E-16	0(***)	-9.96E-17	0(***)
RIR	-3.89E-17	0.5456	3.08E-17	0.1894
INFLATION	6.61E-17	0.8996	-8.27E-17	0.647
C	0.00E+00	1	0	1

In table 4.30 for conventional & Islamic stock indices coefficients of Covid & OPC have corresponding p-value lower than 0.05 significance level. For conventional stock and Islamic stock indices Covid & OPC has coefficient of 0, 0 respectively which shows that oil prices and covid have strong influence on the liquidity of both the indices. For shariah and non shariah compliant stock indices OPC has negative coefficients of -9.96E-17 and -2.96E-16 respectively which means that per unit increase in oil prices will lead to impact the liquidity inversely decrease. The coefficients of MGR, RIR and INFLATION has p-value above than 0.05 significance level for both conventional and Islamic stock indices so that is why statistically we found no relation between these variables and liquidity of both the indices.

Table 4.31 shows the liquidity estimation through transaction cost-based method. The table uses stars to denote only three of the most commonly utilized levels that are significant levels. A p-value is denoted by one symbol (*) if it is below than 0.05. P-value is denoted by 2 symbols (**) when it is lower than 0.01. P-value is denoted by 3 symbols (***) when it is lower than 0.001.

Covid and OPC coefficients have p-values below 0.05 for conventional & Islamic stock indexes in preceding table. Covid & OPC have p-value of 0 for conventional stock and Islamic stock indices both, indicating that oil prices and covid strongly affect liquidity. OPC has positive coefficients of 1.99E-16 for shariah and non-shariah compliant stock indices, indicating that per unit increases in oil prices will

TABLE 4.31: Liquidity Estimation by Transaction Cost Based Method

	Conventional Index		**Shariah Index**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
COVID	-2.32E-01	0(***)	-0.232034	0(***)
RIR	2.05E-17	0.6344	2.05E-17	0.6344
OPC	1.99E-16	0(***)	1.99E-16	0(***)
MGR	2.41E-16	0.2961	2.41E-16	0.2961
INFLATION	-6.61E-17	0.8611	-6.61E-17	0.8611
C	0.00E+00	1	0	1

increase liquidity. And coefficients of Covid are negative for both kind of stocks which presents that if there is per unit increase in covid cases the liquidity of both the stocks will fall. MGR, RIR, and INFLATION had p-values above than 0.05 significance level for both conventional and Islamic stock indexes, hence we discovered no significant relationship between these variables and liquidity. Among all the variables presented above majorly oil prices have significant impact on volatility of both shariah and non-shariah compliant stocks. And oil prices are mostly negatively correlated with the volatility of all the indices and as per graphical representation the moving trend of oil prices is decreasing in between 2019 to 2021 due to peak of covid. Throughout the course of the covid epidemic, the price of oil underwent a precipitous drop that was both considerable and noticeable. As a result of the epidemic, lockdowns, travel restrictions, and decreased economic activity, there was a significant drop in the demand for oil across the globe. As they negatively correlated with volatility of indices of both shariah non shariah compliant that's why volatility of both kind of stocks increased and the behind this is when oil prices fall, it typically results in greater volatility in the stock market. This is due to the fact that falling oil prices are a signal of economic uncertainty, have a negative impact on energy businesses, and stimulate fear-driven trading. All of these factors contribute to greater variations in stock prices. Oil prices were also negatively correlated with the liquidity of shariah compliant stocks because oil price drops can benefit many industries, especially energy-intensive ones.

Thus, investors may perceive a more varied and stable investment environment, increasing market activity and liquidity. Shariah compliant stocks are negatively correlated with the inflation money growth rate this is because when there is a considerable increase in the money supply, investors may expect that there will be future inflation, which can cause the real value of stocks to decrease. As investors seek assets that may better protect their purchasing power in an inflationary climate, the impression of a heightened inflation risk may lead to reduced trading activity and liquidity in stock indices.

Table 4.32 presents the findings of comparative analysis.

TABLE 4.32: Comparative Study of Influence of Covid-19 on Liquidity (by Price Based Method) of Shariah vs Non-Shariah Compliant Indices

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	0.06266	0.023946	2.616712	0.0095
OPC	-0.029043	0.012412	-2.339942	0.0202
MGR	-0.207464	0.150792	-1.375827	0.1704
INFLATION	-1.058352	0.231494	-4.571839	0
COVID	0.075904	0.007569	10.02873	0
SC*COVID	0	0.005044	0	1
C	0.056705	0.015758	3.598563	0.0004

In table 4.32, the variable denoted as SC*Covid represents the disparities in liquidity between stock indices that adhere to shariah principles and those that do not, as a consequence of the worldwide pandemic covid-19. SC*covid shows positive coefficient of 0 & p-value of 1, both of which exceeds the significance level of 0.05. This suggests that impact of COVID-19 on the liquidity of stock indices that adhere to shariah principles is similar to its impact on stock indices that do not adhere to shariah principles.

In table 4.33 the variable denoted as SC*Covid represents the disparities in liquidity between stock indices that adhere to shariah principles and those that do not, as a consequence of the worldwide pandemic covid-19. SC*covid shows positive coefficient of 0 & p-value of 1, both of which exceed the significance level of 0.05. This suggests that influence of COVID-19 on the liquidity of stock index

TABLE 4.33: Comparative Study of Influence of Covid-19 on Liquidity (by Transaction cost Method) of Shariah vs Non-Shariah compliant Indices

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
RIR	-0.071424	0.026333	-2.712381	0.0072
OPC	0.036131	0.013649	2.647134	0.0087
MGR	0.225129	0.165821	1.357667	0.1761
INFLATION	1.094212	0.254566	4.298349	0
COVID	-0.081198	0.008323	-9.755855	0
SC*COVID	0	0.005546	0	1
C	-0.057885	0.017328	-3.340504	0.001

that adhere to shariah principles is similar to its impact on stock index that do not adhere to shariah principles.

Chapter 5

Conclusion and Recommendation

This chapter comprehensively discuss the conclusion derived from analysis, Recommendation and future direct of this particular study.

5.1 Conclusion

This research article seeks to examine the stability of shariah compliance stock indices vs to non shariah compliant stock indices in the South Asian region during the Covid-19 pandemic. The study examines countries that have stock indexes that are compliant with both shariah and non-shariah principles. It uses liquidity and volatility as benchmark measures to evaluate the stability of these indices. Volatility is determined through the utilization of the ARIMA Model. The research indicates that the main determinant of the fluctuation in both shariah and non shariah compliant equities is the price of oil. Shariah compliant stocks exhibit more sensitivity compared to non shariah compliant stocks as they are more responsive to changes in oil prices. The study found that both the shariah and non shariah stock indices of Pakistan and India were equally responsive to changes in oil prices. However, the shariah compliant stock index of Bangladesh was found to be more responsive to changes in oil prices compared to its non shariah counterpart. These findings were obtained using the ARIMA Model specifically applied in this study. Investing in non-Shariah compliant stocks may be preferable because of their relatively lower sensitivity to market volatility under this Model. According

to the findings the hypothesis covering volatility H12, H13, H18, H19 are accepted and H14, H15, H16, H17 H20, H21 & H22 are rejected and corresponding null hypothesis are accepted.

The determination of liquidity in this study employs the standard deviation weighted scale method, with the real interest rate serving as the weighting factor. Based on the findings, it is observed that the liquidity of non-Shariah compliant stock indices exhibits greater stability and lower sensitivity to the effects of Covid and other macroeconomic variables. The liquidity of both Shariah-compliant and non-Shariah-compliant stocks has been impacted by factors such as changes in money supply, oil prices, and covid 19 pandemic. However, it is worth noting that the liquidity of Shariah-compliant stocks is further influenced by inflation. Consequently, the liquidity of non-Shariah-compliant stocks has been found to be slightly less responsive to macroeconomic variables. As per the results, non shariah compliant stocks exhibit greater stability compared to shariah compliant stock indices towards inflation and oil prices in terms of liquidity. Given this observation, conventional stocks are deemed more suitable for investment during the COVID-19 pandemic, as determined by the method of standard deviation weighted scale for liquidity estimation. And as per the results of analysis hypothesis covering liquidity variable H1, H2, H3, H4, H8 & H10 are accepted and H5, H6, H7, H9 & H11 are rejected.

5.2 Recommendations

Keeping in view the analysis findings and discussions this research has significant practical consequences for financial market ecosystem stakeholders. The study found that by using ARIMA Model non-Shariah-compliant stocks were more stable than Shariah-compliant stocks towards oil prices as the oil price was the crucial variable because it is majorly impacted by covid-19. This means that during economic downturns like the COVID-19 epidemic, investors may consider diversifying their portfolios with non-Shariah-compliant stocks to buffer against market volatility. These findings further stress the significance of sophisticated risk assessment for portfolio managers. Shariah-compliant stocks' inflation risk requires improved

risk management in diversified portfolios. Investors should understand these distinctions to make smart investments based on their risk tolerance and goals. As the comparative analysis does not show any major differentiation regarding covid's impact on volatility and liquidity of shariah and non shariah compliant stock indices but there are noticeable able differences in terms of inflation and oil prices because they impacted by covid-19. These findings remind policymakers and central banks to examine inflation's influence on Islamic financing instruments and market liquidity. Policies targeting inflation should consider the effects on Shariah-compliant financial markets to ensure their stability and resilience. Shariah-compliant stock investors should understand their specific characteristics and inflation sensitivity. This insight will help people make better decisions, manage expectations, and build financial goals-aligned portfolios. These practical implications can help investors, portfolio managers, policymakers, and regulators navigate Islamic finance and regular markets, improving investing and risk management decisions.

5.3 Limitations of the Study

The same study can be conducted on the other sample as well like another geographical region can be taken which isn't explored yet and instead of volatility and liquidity other variables can be taken for further research to investigate the impact of covid i.e., market capitalization, price to earnings ratios and dividend yields of shariah and non shariah compliant indices or firms. And in this study, we used Auto regressive integrated moving average for volatility but for future research any alternative model can be used because despite of having quality practical implications ARIMA Model also has some limitations. According to Ospina et al. (2023), ARIMA Model's performance is limited by extending forecasts into the future, resulting in a significant rise in inaccuracy it means that ARIMA models excel at short-term forecasting and analysis but may struggle with longer-term forecasts. They may struggle to capture long-term data patterns or structural shifts.

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