Impact of Covid-19 pandemic on financial markets in emerging market economies: An evidence from Pakistan

Qazi Syed Bilal ul Haq

Master of Philosophy in Economics

Department of Economics

University of Oslo

November 2021

Impact of Covid-19 pandemic on financial markets: An evidence from Pakistan
Qazi Syed Bilal ul Haq

http://www.duo.uio.no/

Print: Reprosentralen, University of Oslo

Acknowledgments

Foremost, I would like to express a deep sense of gratitude towards Allah Almighty, who blessed me with the strength to complete this thesis successfully.

I cannot express enough thanks to my mentor and supervisor, Mr. Jin Cao, who inspired me, taught me the methodology, and guided me through any complications that I faced while working on this thesis.

Besides my supervisor, I would like to extend my heartfelt thanks to my friends Fredrik Han, Jiaxun Lyu, and Chris Kowk, who took a keen interest in my work and provided insightful comments throughout my research. I am deeply indebted to them for the countless stimulating discussions we had, their continuous support and encouragement. Last but not the least, a special thanks to my family for their undulating love, valuable prayers, and innumerable sacrifices.

Abstract

The emergence of Covid-19 cut short many lives, tempered economic and financial activities as people withdrew into their homes for the fear of apocalyptic, lumbering clouds of Covid-19. The objective of this paper is to examine the impact of Covid-19 on equity returns in the context of Pakistan stock market. The frequency of the dataset used in the analysis is monthly and spans from July 2018 to June 2021. The focus of the study is centered towards how the effects of the outbreak moderated onto the Pakistan stock market through a series of key determinants that drive equity returns. The explanatory variables used in the model are GDP growth, interest rates, investor sentiment and the covid cases. A traditional OLS estimator is used to conduct the analysis. The effects of each individual variable on stock returns are assessed separately via an interaction term where Covid-19 is treated as a moderating variable. In the process of investigation, it is found that Covid-19 acted as a stimulating factor in driving stock returns during the outbreak with its effect being channelized onto the stock market through GDP growth, interest rates and investor sentiment. It is found that the stock market returns are more sensitive to the growth in covid cases rather than the pandemic itself. The study also revealed that GDP growth and investor sentiment has no significant effect on stock returns during the pre-pandemic period while the effect of interest rates is found to be significant both in the pre-pandemic and pandemic period.

Keywords: Covid-19, macroeconomic factors, investor sentiment, stock market returns

Contents

1 Introduction

In December 2019, a viral respiratory disease caused by an unusual strain of coronavirus erupted and spread across Wuhan, Hubei province of China. The disease, later named Covid-19, caused a widespread epidemic throughout China. To stem local transmission, the Chinese government quarantined nearly 60 million people. However, despite these unprecedented measures, covid ailment spread beyond China's borders and in mid-January 2020 spilled the damage over to other parts of the globe. On January 30, 2020, World Health Organization (WHO) rang its highest alarm and declared the outbreak as a global pandemic on the 11th of March 2020.

The prevalence of Covid-19 not only throttled the life out of humans but also crumbled the economies across the world. Because of a sharp uptick in covid cases, governments around the globe took several measures such as imposing strict lockdowns to curb its spread. These measures helped contain the virus but had dire consequences for the economic activity. The deadly outbreak led to global economic shutdown and triggered panic selling in the stock markets worldwide. Share prices witnessed a sharp decline and the instability in the stock market sky-rocketed exceeding the levels seen during the Global Financial Crisis of 2008. As measured by the Chicago Board Options Exchange Volatility Index (VIX) which represents market expectation about the near-term volatility and the values for which are taken from FRED (https://fred.stlouisfed.org/series/VIXCLS). The VIX was recorded at 82.7 on March 16th, 2020 while during the Global Financial Crisis of 2008 the highest level recorded was 80.9 on November 20th, 2008. Following WHO's announcement, the stock markets in US, Europe, and Asia slumped and tailed spin into chaos and put investors in a state of uncertainty. From 1st January 2020 to 1st April 2020, stock indices such as Dow Jones (-27%), S&P500 (-24%), Nasdaq (-19%), FTSE100 (-28%), DAX (-29%), NIKKEI225 (-22%) and Shanghai (-11%) hit rock bottom. The data for the values of stock indices has been taken from (www.investing.com). Before the world drowned in the eye of the Covid-19 storm, several similar outbreaks named Ebola (1976), SARS (2003), and MERS (2012) hit the globe. However, all of them were lesser in magnitude than Covid-19, 2020. For example, Baker et al. (2020) found out that no previous epidemics like Bird Flu (1997-98), SARS (2003), Swine Flu (2009) and Ebola (2015) have influenced the stock market as greatly as the Covid-19 pandemic.

As Covid-19 reshapes the contours of the world, the issue at hand is to find out how the effects of the deadly disease were channeled onto the stock markets. Since the onset of the pandemic,

several studies have been undertaken regarding the impact of the pandemic on the stock markets around the globe and are more centered towards developed economies. However, the literature on the impact of the disease on the stock markets in emerging economies is limited. This thesis attempts to investigate the impact of COVID-19 on Pakistan stock market an emerging economy measured by its leading stock index, namely the KSE-100 Index (Karachi Stock Exchange).

On 25th of February 2020, Covid-19 made its way into Pakistan and affected the overall economy. Although the first Covid-19 case was reported in Pakistan in February 2020, it had already spurred chaos across stock markets in other parts of the globe. The effects of the movement of international markets automatically spilled over into Pakistan even before the emergence of Covid-19 in the country and put the KSE-100 index, the benchmark index of the Pakistan Stock Exchange, under stress, at the beginning of 2020 as panicked foreign investors withdrew their investments due to the growing uncertainty. When the pandemic struck Pakistan, the KSE-100 index plunged by 30%, shed 11,591 points during jittery weeks that followed, and finally dropped to the level of 27267 points by March 26, 2020. Moreover, the panic selling ratcheted up downward pressure and brought the market to a halt on eight occasions during March 2020 (State Bank of Pakistan, 2020). Nevertheless, from April 2020 onwards, these risks started to diminish with the support of prompt policy measures. Hence, the decline in stock turned out to be brief, and the KSE-100 index made a strong and quick rebound by the end of March 2020. Though there are stark economic and financial differences between the developed and developing countries, the behavior of stock markets in both emerging and advanced economies showed a similar behavior during Covid-19 i.e., the initial steep fall in stock prices followed by a quick rebound. Thus, in order to fully gauge the response of financial markets towards Covid-19, it is imperative to examine the reasons behind these absurd movements in the stock prices at the onset of the pandemic.

The literature on the impact of Covid-19 on the Pakistan stock market is sparse. Prior studies focused on the response of the Pakistan stock market to the pandemic, however, most of the studies do not incorporate the factors that are instrumental in driving the stock market. For example, Waheed et. al (2020) investigated the impact of Covid-19 on the Karachi Stock Exchange (KSE-100 Index). They concluded that Covid-19 had a positive impact on the returns of the KSE-100 index because of the timely intervention of the government. Though, they did not account for other fundamental economic variables which affect stock market performance. Similarly, Yar (2020) studied the impact of pandemic on the performance of the Pakistan stock

market in response to the Covid-19 related positive cases, fatalities, and recoveries. He found that only Covid-19 recoveries had a significant impact on the stock market while the positive cases and fatalities had an insignificant impact.

The objective of my study is to gauge the impact of Covid-19 on the stock market returns in Pakistan. The set-up of my model is based on the premise that the effects of Covid-19 were channelized onto the stock market through a series of key determinants that drive equity returns namely GDP growth, interest rate and investor sentiment. Numerous studies have been conducted on how these variables affect the stock market returns which will be discussed in detail in the forthcoming sections. The Covid-19 outbreak had grave consequences for the global economy. The pandemic called for introduction of unprecedented measures which imposed restrictions on mobility and hindered economic and financial activity. The supply shock triggered by the sudden economic shutdown across the globe transitioned into a large-scale demand shock that bore dire socioeconomic consequences. According to OECD, (2020), the global GDP is approximated to have fallen by almost 3% during the first three months of 2020. In the first three months of 2020, the level of world trade waned at a rapid rate and the volume of goods and services were approximated to have declined by 3.75%. In order to revive the pandemic-ravaged economy, the governments across the globe intervened in the form of monetary and fiscal policy measures. These monetary and fiscal policy interventions proved to be a harbinger of good news for the deteriorating economy. Moreover, Central Banks responded with expansionary monetary policy stances, extended liquidity support, and adopted a lenient approach towards credit extension to borrowers. Likewise, financial sector also could not escape the perils of Covid-19. Risk aversion among investors increased substantially and investor sentiment dampened to a great extent. The prevalence of Covid-19 and the enforcement of stringent containment measures led to massive drop in financial asset prices with equity prices falling by 30-50% in many countries. The key determinants of stock returns, GDP growth, interest rate and investor sentiment were greatly affected by the pandemic and therefore serve as useful tools for explaining the movements in stock market during Covid-19.

The remaining paper is arranged as follows: Section 2 summarizes the emerging literature on Covid-19 and how it has affected the financial markets. It also briefly discusses the financial markets' response towards Covid-19 and previous outbreaks such as SARS, and how Covid-19 has affected stock market returns around the world. Further it examines the relationship of macroeconomic variables with, and the effect of investor sentiment on stock returns. Section 3 highlights the methodology employed in examining the impact of the Covid-19 on stock returns

i.e., the Ordinary Least Squares (OLS) method used in a multiple regression model setup. Section 4 discusses the estimations and results found using various regression equations. Section 5 touches upon the limitations of my study. Lastly, Section 6 concludes the thesis by summarizing the main findings.

2 Literature Review

2.1 Covid-19 pandemic and financial market responses

The outbreak of corona virus in China and East Asia at the inception of 2020 led authorities to take stringent measures to curb the spread of the infectious disease which was later declared as a pandemic. At the beginning, the economic turmoil from the lockdown measures was mostly contained within Asia, however, this changed as the virus spread across international borders in February and March 2020. Resultantly, institutions such as International Monetary Fund (IMF) and European Commission expected even the advanced economies to sunk into the most severe recession since the Great Depression. Covid-19, a pandemic that became the defining feature of the 21st century, left its footprint on both the emerging and developed economies of the world. The occurrence of demand and supply side shocks triggered by this pandemic forced the economies to question their growth prospects. The interplay of these shocks disrupted all the major economic sectors including the financial sector of the affected countries.

To control the spread of the virus, various containment measures were adopted by nations which caused a global economic slump primarily driven by demand and supply shocks (Eichenbaum et al., 2020; Gormsen& Koijen, 2020; Malden & Stephens, 2020; Fetzer et al., 2020). These shocks triggered large fluctuations in the labor market, commodity prices, oil prices, income, output, exchange rates, export and import activities, savings, share prices, investment spending and availability of credit to households and businesses affecting the position of the aggregate demand and aggregate supply curve (IMF, 2020; Banco, 2020; Pak et al., 2020; Maliszewska et al., 2020; WTO, 2020; World Bank, 2020). As a result of this global macroeconomic disequilibrium, different sectors in the economies were impacted with financial markets being one of the hardest hits.

The uncertainties of Covid-19 led to global financial instability and cause a nosedive in market indices worldwide (Zhang et al., 2020). One of the important segments among the financial markets is the stock market which witnessed high volatility, decline in liquidity and a steep fall in prices of equities immediately after the outbreak (Boissay & Rungcharoenkitkul, 2020). As Covid-19 continued to pose a potent threat to the global economy, several governments responded with fiscal and monetary policy tools to rectify the damage caused by the deadly pandemic. The central banks increased the money supply by reducing interest rates while the governments implemented cash transfer programs and other economy-boosting packages. (McKibben & Fernando, 2020). The degree of monetary easing differed across economies

based on the severity of the pandemic shock. Bank of Indonesia cut down the policy rate, for example, by 125 bps (basis points) cumulatively in the month of February, March, June, July, and November 2020. Similarly, the Reserve Bank of India, since March 2020, dropped its repo and reverse repo rates by 115 and 155 bps, respectively. Likewise, the Central Bank of Hong Kong adjusted the base rate by lowering it to 1.50 percent on the 4th of March and to 0.86 percent on the 16th of March 2020. To keep the economy on an even keel, the Central Bank of Philippines eased the monetary conditions and reduced its policy rate by a cumulative 200 bps in 2020 to 2.0 percent. Following a similar pattern, the State Bank of Pakistan slashed its policy rate by a cumulative 625 bps to 7.0% from 13.25% in a spanning from March till June 2020. The data for the policy rate has been taken from the International Monetary Fund's website (https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#I).
Pakistan witnessed the highest monetary policy rate cut among emerging economies (Government of Pakistan Finance Division, 2020-21). This downward revision of policy rates can affect the movements in stock markets significantly.

In the recent past, several studies have been conducted about the effects of epidemics and pandemics on the stock market and general economy. Some concluded that the effects of a pandemic might not necessarily be overwhelmingly calamitous for the economy (Jonung & Roeger, 2006) while others claimed that past epidemics did weaken the stock markets especially those in Asia (Chen et al, 2018). Researchers have come up with several findings about the impact of past epidemics on the stock market for instance Nippani and Washer (2004) inspected the effect of 2003 SARS (severe acute respiratory syndrome) episode on stock markets in Canada, China, Hong Kong, Indonesia, Singapore, Philippines, Thailand, and Vietnam by employing the Mann Whitney nonparametric tests. Except for China and Vietnam, SARS had no significant impact on the stock markets of these countries. Another study by Loh (2006) looks for the impact of SARS on airline stocks represented by the stock markets of China, Singapore, Hong Kong, Canada, and Thailand from 1 December 2002 to 5 July 2003. The study found that SARS posed a potent threat to the return of airline stocks and, in Singapore, market returns showed high volatility.

The emergence of the Covid-19 pandemic led to several researchers unfold the effects of the outbreak on the stock markets around the globe. Zeren and Hizarci (2020) looked for Covid-19's impact on the stock market from 23rd of January to 13th of March 2020. Their study comprises of data taken from France, Germany, Italy, South Korea, China, and Spain. Employing cointegration test, the results hinted at a co-integrated structure between Covid-19

deaths and stock markets of all the countries present in their sample. Moreover, they discovered a long-term relationship among Covid-19 daily total cases and majority of the stock markets present in their sample. Al Ali (2020) pondered over the impact of the first case of Covid-19 reported in 11 countries which includes mostly developed economies. He also studied the consequences of the first reported case on the stock market performance of these countries. He found out that the WHO announcement bore a more profound impact on the stock exchange than the report of the first Covid-19 case. Baig et al. (2020) deliberated over the effect of covid-19 on equity markets in the USA. He found out that the increase in Covid cases and deaths was significantly associated with a deterioration in market liquidity and an increase in volatility. Liu, Manzoor, Wang, Zhang, and Manzoor (2020) studied the Covid-19's impact on stock markets of 21 countries which included Singapore, Japan, Italy, Korea, United Kingdom, Germany and United States with data spanning from February 21st, 2019 to March 18th, 2020. The results showed that Covid-19 had a significant negative impact on the returns of the stock markets across all the countries in their sample. In addition to this, they also found out that the stock markets in Asia reacted more quickly to COVID-19 and that investor sentiment played a key role in affecting the performance of the stock markets during the outbreak. Akbar and Tahir (2020), while examining returns and volatility in the United States stock market, postulated that Covid-19 cases (total and new) and deaths were linked to stock returns. Using a multivariate GARCH model, they found a significant and positive conditional correlation between Covid-19 cases and stock returns and concluded that the uncertainty caused by Covid-19 led to an increase in return volatility. Similarly, Ashraf (2020) analyzed data taken from 64 countries and discovered that the equity markets gave a negative reaction to the pandemic. He found that the growth in daily Covid-19 cases had a strong negative correlation with the stock market returns. His study also revealed that the stock market's response was more profound due to the surge in Covid cases as compared to the number of deaths.

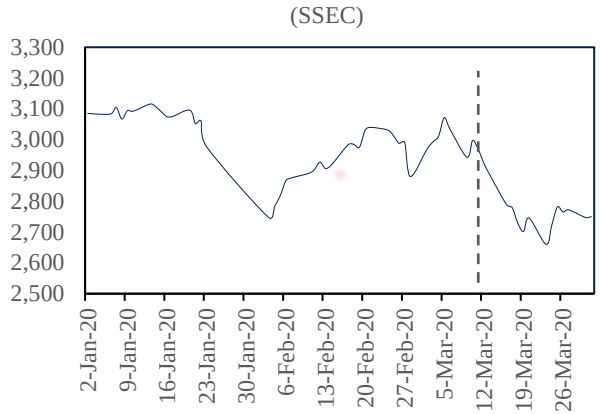
The WHO announcement of declaring Covid-19 as a global pandemic bore serious repercussions for the stock markets of both emerging and developed economies of the world. The following graphs illustrate how stock markets of emerging economies like China, Thailand, India, the Philippines, Indonesia, Malaysia, and Pakistan and developed economies like United States, United Kingdom and Canada responded following the day of the announcement. Shanghai composite Index fell by 1.52 percent the very next day; Thailand's SET Index witnessed a loss of 10.80 percent; the stock prices at India's BSE Sensex 30 plummeted by 8.18 percent; bears ruled the roost at Philippines stock exchange as PSEi composite suffered a loss of 9.71 percent and Bursa Malaysia's main index FTSE Malaysia KLCI showed dismal

performance as well and lost 1.69 percent following the day of the announcement. Likewise, the news spooked the investors at the Pakistan Stock Exchange as KSE-100 index reported a significant decline of 4.56 percent. The United States S&P500 index went south by 9.51 percent; United Kingdom's FTSE100 index posted a loss of 10.87 percent and Canada's TSX Composite index dipped by 12.34 percent as it stepped into the shoes of its contemporaries the day after the announcement.[1] [2]

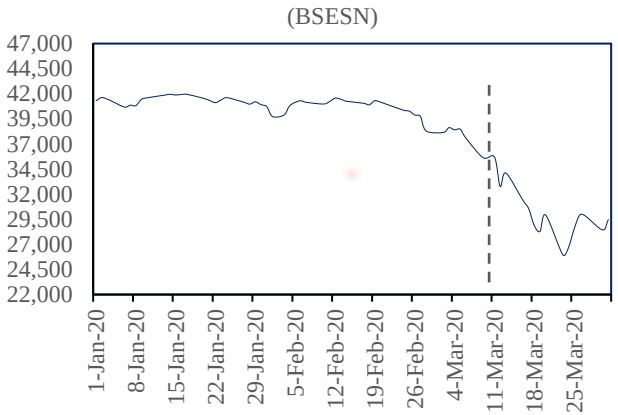
As the pandemic progressed, emerging markets experienced foreign capital outflows as worried investors hurried towards safe-haven assets. Consequently, within 75 days, emerging markets lost 97billion dollars–72 billion in equity and 25 billion in debt–exceeding the outflows during the 2008 global financial crisis. From September 8, 2008, portfolio investors withdrew almost US$25 billion from emerging markets in a short span of 90 days during the global financial crisis. Likewise, Pakistan's equity market suffered grave pressures as both local and foreign investors plunged into panic selling, and foreign portfolio investors withdrew US$138.2 million from the market from January 2020 to March 2020. 0n 31st March 2020, the KSE-100 index plunged to 29,232 points, showing a decline of 28.2 percent during the third quarter of fiscal year 2020 (State Bank of Pakistan, 2019-20). Similarly, the stock markets of developed economies had their own woes to narrate following the declaration of Covid-19 as a pandemic.

[1] The vertical line in the graphs below depicts the date (11th of March 2020) at which the WHO (World Health Organization) declared COVID-19 as a global pandemic

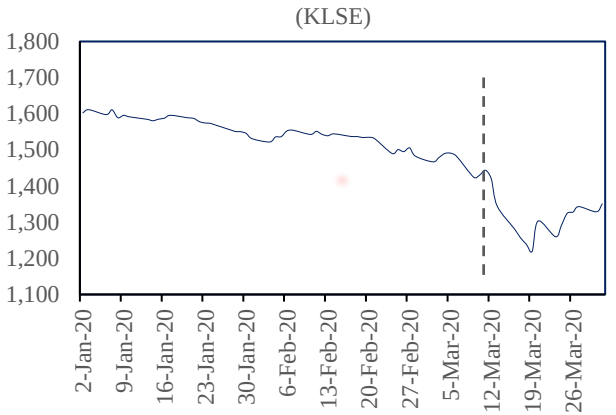
[2] The data for the indices has been retrieved from www.investing.com



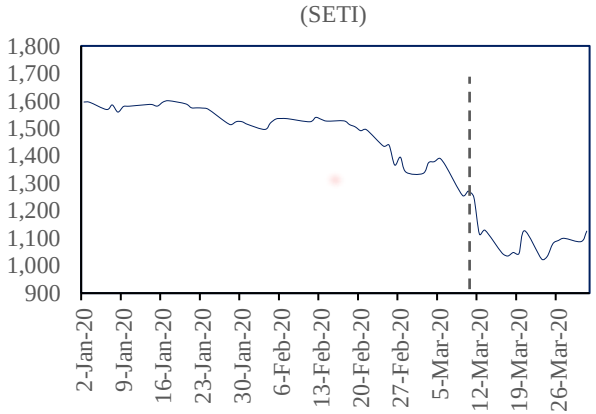
Shanghai Composite Index (China)



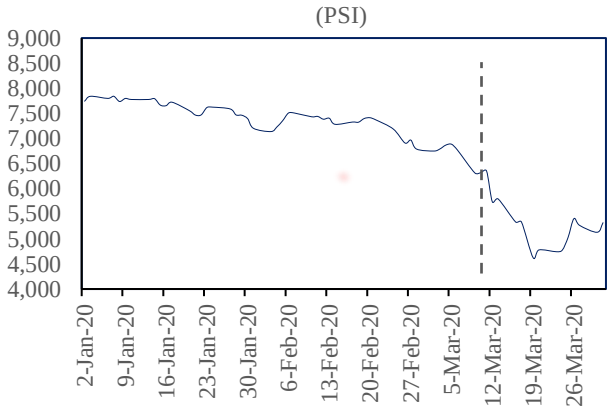
BSE Sensex 30 Index (India)



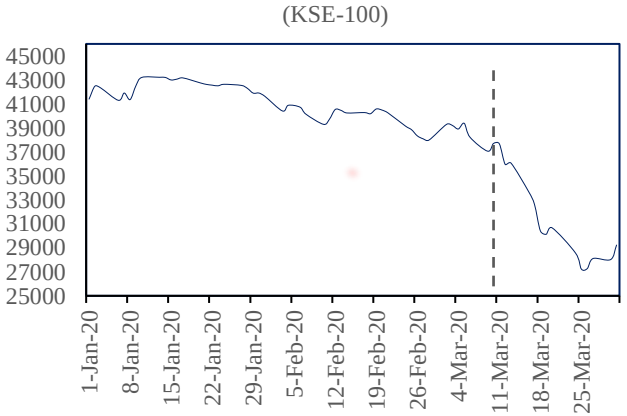
FTSE Malaysia KLCI Index (Malaysia)



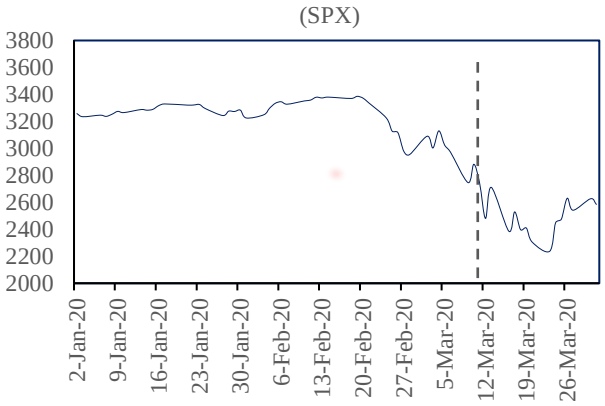
SET Index (Thailand)



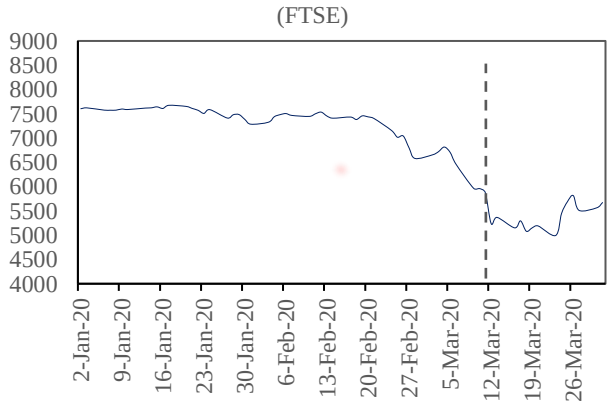
PSEi Composite Index (Philippines)



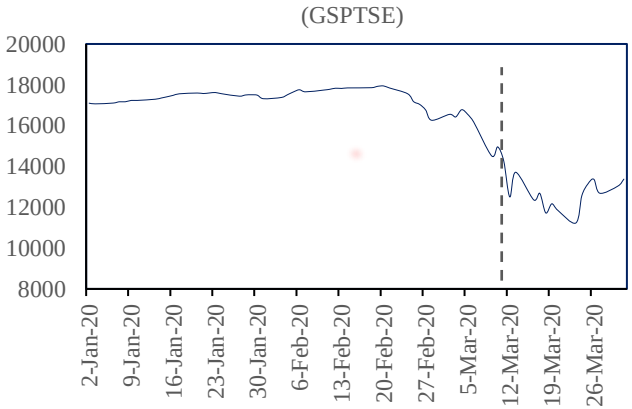
Karachi 100 Index (Pakistan)



S&P 500 Index (United States)



FTSE 100 Index (United Kingdom)



S&P/TSX Composite Index (Canada)

2.2 Macroeconomic factors and stock market returns

Studies of the factors affecting stock returns has remained a popular area of financial research. To inspect the association among macroeconomic variables and stock returns, past studies have used different macroeconomic variables to investigate the factors that have a pivotal impact on stock returns. Using empirical evidence, Chen, Ross, and Roll (1986) expanded the risk factors beyond the concept of the equity risk premium established in the Capital Asset Pricing Model (Sharpe, 1964; Lintner, 1965; Mossin, 1966). As with CAPM, several macroeconomic shocks were included in the market model including inflation, industrial production index, risk premium and term structure. They discovered that these macroeconomic factors could significantly help in explaining equity returns and are useful in asset valuation. Therefore, understanding the linkage between macroeconomic factors and stock market is vital as these factors tend to have a systematic effect on the returns of the stock market.

Two macroeconomic factors are used in this study: economic growth which reflects the health of an economy and interest rate. The economic growth mirrors the difference in real economic activities. Many studies have also utilized industrial production index as a proxy for economic activity. As established by (Chen, Ross & Roll, 1986), the growth in the production index should be in line with the company's average growth of sales and cash flows. Hence, this index can also serve as a useful tool in the capital asset pricing model. The use of industrial production index as a viable proxy for economic activity is also proven by the study of Humpe and Macmillan (2009) who employed cointegration analysis in both US and Japanese markets and discovered a positive association between stock prices and industrial production index.

As per economic theory, stock prices should mirror the expectations about how well the corporations perform in the future. In essence, corporate performance provides an insight into the level of economic activity occurring in a country which is reflected onto the changes in stock prices that determine stock market returns. The same notion is backed by Fama (1990), Liu and Sinclair (2008), Oskooe (2010), who, among other things found out that economic growth affects the profitability of companies by influencing the expected earnings, dividends, and variations in stock prices.

Moreover, it is important to study the link and the direction of causality between economic growth and stock returns. For this purpose, several studies have been conducted to examine the association between these two. The "supply leading" relationship highlighted in the study conducted by Patrick (1966) demonstrates that stock price is a viable indicator to predict economic growth as when stock market is performing well, the savings are mobilized into investment, which in turn boosts economic growth. Similarly, study conducted by Lee (1992) suggest that the stock returns help in explaining the changes in real activity to a great extent. Furthermore, Liu and Sinclair (2008) examined the association between stock prices and economic growth by undertaking causality test using the VECM methodology. They found that in short run causation runs from stock prices to economic growth and the reverse is true in the long run.

Conversely, a number of empirical studies supported the view that economic growth causes the stock prices to change and not the other way around, as when economic growth happens, it creates a demand for stocks and other financial instruments which would generate an effective response by stock and financial markets. This was labeled as "demand-leading" relationship by Patrick (1966). Thus, the direction of causality presumably runs from economic growth to stock price, as highlighted in the study conducted by Gjerde and Saettem (1999). Gjerde and Saettem (1999) examined the relationship between stock market returns and macroeconomic factors in Norway by using a multivariate VAR model. They found that the level of real activity affected stock returns and that there is a positive relationship between the two.

Furthermore, Wongbangpo and Sharma (2002) pondered over the association between stock prices and various macroeconomic variables such as gross national product, money supply, interest rates, exchange rates and consumer price index in ASEAN countries which include Thailand, Philippines, Indonesia, Singapore, and Malaysia. Their results posited that in the long run the stock prices exhibit a positive association with growth in output. Likewise, Sikarwar et al. (2011) investigated the relationship between index returns on the Taiwan stock index and major macroeconomic variables such as GDP, inflation, exchange rate, money supply and employment rate. Their analysis was based on returns on different stock portfolios divided into small, medium, and big size companies. Their findings revealed that GDP had a positive relationship with returns of medium and big size companies stock portfolios.

Interest rate is another important macroeconomic variable that has large implications for the economy in general and the stock market in particular. The connection between the market indexes and interest rates is a distinctive feature that several researchers, policy makers and investors have been studying for a long period of time. Theoretically, an inverse relationship exists between interest rates and stock prices. Several theories explain how this relationship works. One of the most famous concepts in finance is the time-value of money which uses the discounted cashflow model to value assets. Using this model, the present value of a stock is calculated by discounting future cash flows using a discount rate. According to Panda, (2008), this discount rate corresponds to the interest rate level in an economy and is the risk-adjusted required rate of return. Thus, a rise in interest rate leads to a decline in the present value of the stocks. Moreover, increasing interest rates trims down the cash flows by reducing corporate profitability. This results in a reduction in the present value of the stocks as well as stock prices. The reverse is also true. Hence, the impact of even a noticeably minute increase in interest rates can have a profound impact on present values if it's spread across number of years. Further, Thorbecke, (1997), investigated how stock returns respond to changes in monetary policy. Their theory postulated that the stock price is equivalent to the discounted value of the future expected cashflows. Using several empirical techniques, they found out that changes in interest rates could have a significant impact on ex-ante and ex-post stock returns.

Parallel to this notion, the theory of capital flow also helps in explaining the inverse relationship. According to this theory, a decline in the interest rate gives rise to higher capital flows into the stock market and increases the expected rates of return, while a surge in interest rates stimulates more savings, which decreases the capital flow to the stock markets (Eldomiaty, Saeed, Hammam & AboulSoud, 2020, p. 151). As interest rates are risk-free returns on bonds, an increase in these rates makes bonds more lucrative than stocks. As a result, the asset allocation changes in favor of bonds rather than stocks. This results in funds flowing from the stock market to the bond market which subsequently causes the stock prices to decline (Panda, 2008). The inverse is true when interest rates decline.

The literature is inundated with several studies suggesting a negative association between interest rates and stock returns. Alam and Uddin (2009), for example, utilized monthly data from January 1988 to March 2003 to examine the link between interest rate and stock index for a sample of 15 developed and developing countries: Australia, Chile, Canada, Bangladesh, Jamaica, Italy, Germany, Japan, Colombia, Malaysia, Mexico, South Africa, Philippines, Venezuela, and Spain. Their results indicated that interest rates have both a significant and

negative association with stock prices in all countries. In six countries -Colombia, Japan, Malaysia, South Africa, Bangladesh, and Italy- changes in interest rates had a significant and negative association with changes in the share price. Hasan and Javed (2009) explored the long-term relationship between the equity prices of Pakistan and monetary variables which include foreign exchange rate, money supply, treasury bill rates and the Consumer Price Index for the period June 1998 to June 2008. The data was examined using a co-integration and granger causality test. In the process of investigation, they found that the interest rate shock had a negative impact on the stock returns in Pakistan. Moreover, through a variance decomposition analysis they also discovered that the interest rate shock contributed towards the stock return volatility in Pakistan. Similarly, Uddin and Alam (2010) conducted a study Dhaka Stock Exchange to examine the relationship between stock price and interest rate using monthly data from May 1992 to June 2004 by employing a OLS regression method. The results of their study showed that the interest rates had a significant inverse relationship with stock prices.

Moreover, several researchers have also investigated stock market's response to the term structure of interest rates. Empirical study undertaken by Rigobon and Sack (2004) pondered over the effects of changes in monetary policy on stock prices of US stock indexes. Their study revealed that a rise in short-term interest rates negatively impacted the stock prices on these indexes. Similarly, Zhou (1996) utilized the term structure of interest rate to explain the changes in stock prices and stock returns traded on the New York Stock Exchange (NYSE) and American Stock Exchange (AMEX). They found out that the interest rates bore a significant impact on stock returns over the long horizons. Moreover, his results indicate that long-term interest rates have an ability to explain much of the variations in dividend-price ratios and indicate that the high volatility of the stock markets is linked to the high volatility of long-term bond yields.

2.3 Investor sentiment and stock market returns

Investor sentiment is an extensively discussed topic in financial literature. Investor sentiment plays two important functions: firstly, it exposes the biases of investors pertaining to predictions about stock markets and secondly it creates opportunities for earning extra returns by taking advantage of these biases (Fisher & Statman, 2000). Behavioral finance theory proposes that investor sentiment determines part of asset prices and also holds a predictive power for stock returns (McGurk, Nowak & Hall, 2019). Sentiment is claimed to have an effect on returns as investor's optimism or pessimism can stimulate mispricing's to occur in the stock market. Optimism or pessimism may lead to investors undervaluing or overvaluing stock prices, thus causing them to deviate from their underlying fundamental value (Anusakumar, Ali & Hooy, 2017).

The figure below aims to explain the association between stock returns and investor sentiment. As seen below, any news, hearsay, or past market behavior can induce feelings of optimism or pessimism among investors which, can be measured by direct or indirect approaches of measuring investor sentiment. The investor belief then determines whether investors overreact or underreact to the triggering event which, consequently, influences the market behavior.

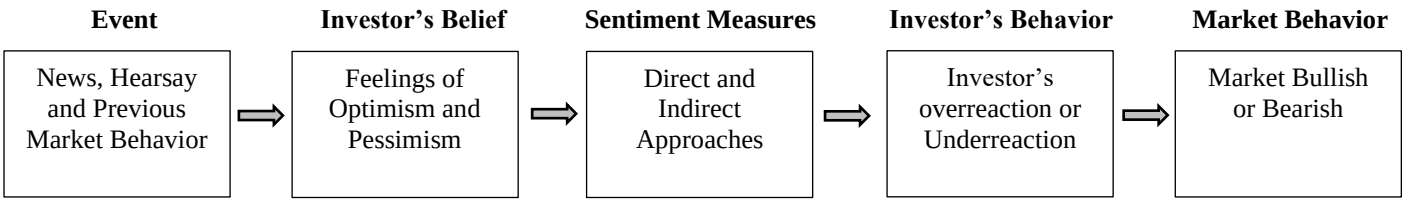


Figure 1: Theoretical illustration of Sentiments and Returns

Emotions play a major role in decision-making (Kuhnen & Knutson, 2011). Depending on the economic climate, investors become more optimistic or pessimistic about the stock market considering not only rational factors but also irrational factors, for instance, investor sentiment (Qadan & Aharon, 2019). Brown and Cliff (2005) contend that sentiment can have a lasting effect, thus with time the demand shocks of irrational traders can have a correlation, resulting in strong and persisting mispricing. The effect of investor sentiment on stock returns also tends to be influenced by the culture of a country. Culture of a country can be of two types, either collectivist or individualist. The study conducted by Chui, Titman and Wei (2008) aims to assess how returns of momentum strategies are affected because of cultural differences among

countries using the individualism index built by Hofstede, (2001).[3] He concluded that culture, whether individualistic or collectivistic (less individualistic), has an important influence on stock return patterns because, in varied cultures, investors are prone to different biases and interpret information differently. This means that in collectivistic cultures stock markets are heavily influenced by investor sentiment as investors tend to rely on the opinion of their peers and follow herd-like overreaction. In financial markets, it is assumed that herd-like overreactions, defined as correlated actions of irrational traders as a result of excessively optimistic or pessimistic expectations, drive sentiment-return relationships. On the other hand, in individualistic culture, investors depend more on their opinions and beliefs than others which is believed to produce momentum gains while the reverse is true for less individualistic countries. Literature has shown that emerging markets are more prone towards the sentiment factor due to their collectivist nature as compared to developed markets. Lucey and Dowling, (2013) reviewed the role played by investor psychology and culture in emerging markets (Asian, Latin American, African, and Eastern European countries). They observed that in emerging markets the collectivist culture is more prevalent as compared to developed markets. Therefore, exploring investor sentiment is vital in order to enlighten investors regarding the sentiments effect on stocks.

Furthermore, the type of the market participants either institutional or individual also plays an important role in explaining the sensitivity of stock market returns to the sentiment factor. Individual investors are more vulnerable to the sentiment factor as compared to institutional investors. This might be due to the information advantage that the institutional investors have over individual investors. Unlike institutional investors, individual investors usually lack a cohesive level of information and resources to conduct intensive analysis before making investment decisions. Thus, it can be inferred that a market, where the individual investors are more than the institutional investors, would be more sensitive to the sentiment factor. Chen and Haga (2021) unearthed the relationship between investor sentiment and stock return in order to understand the effect of investor sentiment on the functioning of stock market. In their study they took Chinese capital market (where 70% of the investors are individuals while the remaining 30% are institutional investors) as a reference and found out that Chinese investors are more inclined towards speculative trading behavior as the information accessible to general public is sparse which leaves the market more vulnerable to hearsay. These among other factors

[3] This index was constructed by Hofstede (2001) to measure individualism and collectivism. The index quantifies the level to which people in different countries act, either in groups or as individuals.

can easily lead to market perception being misguided. In Pakistan's context, the sentiment factor plays a huge rule in driving stock returns as a major chunk of the investors in the Pakistan stock market are individual investors.[4] ("Pakistan Stock Exchange", n.d.) Thus, understanding how the stock market and investor sentiment interact in Pakistan is important.

Empirically, a key challenge faced by researchers has been to develop a suitable proxy to measure investor sentiment as it is not directly observable. One of the most cited works regarding the investor sentiment is of Baker and Wurgler (2006, 2007), who gathered information from six proxies and built a unique investor sentiment index.[5] [6] In this study, Baker and Wurgler employed the principal component analysis method to identify the first principal component of these proxies as the measure of investor sentiment. The first principal component extracts the most important element from the six proxy variables. Moreover, various other methods have also been proposed to measure investor sentiment, including survey-based, news-based, and market-based methods (Qadan and Aharon, 2019).

Most empirical financial literature has shown an overwhelming relationship between investor sentiment and stock returns, however, there is no unanimity among researchers regarding the direction of causality between the two. Fisher and Statman (2003) discovered a positive association between investor sentiment and contemporaneous stock return. However, they noticed a negative relationship between investor sentiment and future stock returns. Schmeling (2009) found out that investor sentiment is a strong predictor of market returns on average across 18 industrialized countries. He noted that the predicting power of the sentiment is more conspicuous for short- and medium-term horizon spanning up to six months. Also, he proposed that there exists a bidirectional causality in such a manner that investor sentiment relies on previous returns and returns rely on prior investor sentiment. Further, Brown and Cliff (2004), conducted a study on the US stock indexes to explore investor sentiment and its link with near-term stock market returns. He employed different proxies for investor sentiment and noticed that the sentiment levels and changes have a positive and strong correlation with the contemporaneous stock returns. They also investigated the causal relationship between the level of investor sentiment and change with stock returns and inferred that stock market returns serves as a decent predictor of both individual and institutional investor sentiment. Moreover,

[4] Investors on the Pakistan stock exchange include 1,886 foreign institutional investors, 883 domestic institutional investors and around 220,000 retail investors.

[5] The latest number of google citations of Baker and Wurgler (2006) and (2007) is around 8839

[6] The six proxies used in the study are trading volume, closed end fund discount, dividend premium, number of IPOs, first day returns on IPOs and the equity share in new issues

Moreover, Sadaqat and Butt (2016) utilized top-down approach for measuring investor sentiment and employing six types of market variables to investigate the effect of investor sentiment on stock returns for Pakistan stock market. They used the data extending from 2001 to 2015 and noticed that investor sentiment had a significant positive contemporaneous effect and negative lagged effect on excess stock returns. Contrarily, Khan and Ahmad (2018) took data spanning from 2006 to 2016 and discovered that the stock market returns had a significant positive relationship with the contemporaneous investor sentiment and a significant negative relationship with the lagged sentiment. They also found out that sentiment's effect on returns usually disappears after one month.

3 Data & Methodology

This study is empirical in nature. The population of the study consists of returns on the Pakistan Stock Exchange measured by its largest stock index namely KSE-100 Index (Karachi Stock Exchange). The KSE-100 index comprises of the top 100 companies listed on the exchange, selected based on sector representation and the largest free float market capitalization. This index captures around 70% to 80% of the total free float market capitalization of the companies listed on the exchange and is therefore regarded as the benchmark index of the Pakistan stock market. This index is designed to provide an overview of how the Pakistan's equity market is performing and hence serves as an indicator of the level of economic activity in various sectors.

The data used in the study has been divided into two subgroups. The first dataset comprises of the stock index data while the second dataset consists of the macroeconomic factors. The stock index data has been retrieved from the official Pakistan Stock Exchange website (www.psx.com.pk) while several domestic and international data sources have been used to collect data for the macroeconomic variables. As this study is centered on how the outbreak of the Covid-19 pandemic affected the stock market, I will use a difference in difference approach to gauge its impact.

The data spans 36 months and encompasses the pre-pandemic and the period during Covid-19. The pre-pandemic period commences from 1st of July 2018 to 31st of December 2019 while the period during Covid-19 ranges from 1st of January 2020 to 30th June 2021. The dataset contains both high and low frequency data depending on their availability. The frequency of the data used in the model is 'monthly'. My analysis is based on monthly returns on the KSE-100 index, the response variable under study. Using a set of different variables, I will investigate the impact of Covid-19 on the Pakistani stock market. The macroeconomic variables used in the study are GDP growth and interest rates. The reason for including GDP growth in my model is that index returns depend on how the companies listed on the index are performing which is reflective of the health of an economy. This can be tracked through the GDP. The data for GDP growth has been extracted from the State Bank of Pakistan's official website (www.sbp.org.pk). Likewise, interest rates appear to exhibit an inverse relationship with equity returns. A decline in interest rates prompts the investors to move their capital from the fixed income market to the equity market as returns there become more desirable. The injection of new capital causes the equity markets to rise vice versa. As a representative of the interest rate data, yield on 10-year Pakistan Investment Bond is used. The reason for using 10-Year bond yield instead of the

discount rate as a proxy for interest rate is that equity investments are generally considered long-term whereas the discount rates are short-term. In addition to this, the 10-year bond yield is the most widely used proxy in the financial markets as a measure of risk-free rate to calculate the expected return on securities. The data for this variable has been gathered from (www.investing.com) which is a global financial website. As established by Chen, Roll and Ross (1986), macroeconomic variables affect stock market returns, such as spread between long and short interest rates, industrial production expected and unexpected inflation and other macroeconomic variables. Sotomayor and Cadenillas (2009) also suggested that market behavior is affected by long-term macroeconomic conditions that should be included in the market model. Lastly, I will use 'investor sentiment' as the third variable in my system of equations as it is an important factor which affects stock market outcomes. As assumed in several economic models, investor decisions are not rational and are driven by emotions (Kuzmina, 2010). Historical evidence shows that investor sentiment has the tendency to influence the stock markets to a great extent. When the market is in an uptrend, there is less perceived risk among investors which lead to them behaving more optimistically and vice versa (Burns, Peters & Slovic, 2012). The spread of COVID-19 compounded uncertainties worldwide, intensified fear among investors and created a pessimistic sentiment about future returns.

To quantify investor sentiment, I will setup an index inspired by the work of Baker and Wurgler (2006) that standardized six commonly employed proxies including trading volume, closed end fund discount, dividend premium, number and first day returns on IPOs and the equity share in new issues. Due to limitation of data availability, I have only used two proxies from the original list which are dividend premium and trading volume. In addition to this, I have introduced a new proxy when constructing the sentiment index namely 'margin financing' which will be discussed in detail later. The data for dividend premium and trading volume has been obtained from the Pakistan Stock Exchange (www.psx.com.pk) website while the data for margin financing has been taken from National Clearing Company of Pakistan (NCCPL) website which is an institution responsible for providing clearing and settlement services to the stock exchange (www.nccpl.com.pk). Lastly, I will use data of Covid-19 cases reported on daily basis acquired from the website (www.ourworldindata.org) as the moderator variable in my regression. Also, I used logged values for Covid cases to normalize the dataset.

3.1 GDP growth interpolation (Denton Method)

As GDP data for Pakistan is reported annually on a fiscal year basis, I have employed Denton's (1970) method of interpolation to convert annual values into monthly using EViews10 software. This method seeks to find an interpolated series by establishing a link between a higher frequency indicator series and a lower frequency benchmark series. The objective of Denton interpolation is to preserve the movement of the indicator series which in turn produces an interpolated series that should follow the growth rate of the indicator series as closely as possible.

The indicator that I have used for interpolation is Economic Activity, Industrial Production and Manufacturing index (AIPMA_IX) for which the monthly data has been retrieved from the International Monetary Fund (IMF) website (data.imf.org). This index acts as an indicator of economic activity and therefore serves as a close proxy of economic growth. The reliability of the derived interpolations depends on the extent to which the indicator series correlates with the underlying benchmark series.

By conducting a correlation test between the annual GDP and industrial production index over a period of 10 years, the series turned out to be strongly positively correlated with a Pearson correlation coefficient of 0.88 (See. Table 2 and Table 3 for the data used and the interpolated values). A similar study was conducted by Rashid et al (2013) for deriving quarterly GDP, investment spending and government expenditure figures from annual data for Pakistan using different disaggregation techniques namely Denton (1970), Chow-Lin (1971) and the cubic spline interpolation method for the period 1971-2010. The indicator variables used in their study were consumer price index (CPI) and the industrial production index (IPI). They also performed relevant tests for stationarity and cointegration of benchmark and indicator variables and found the time series to be stationary and cointegrated. They concluded that the methods provide robust and reliable quarterly estimates for the underlying variables.

3.2 Construction of the sentiment index

Numerous studies have been carried out to investigate the existence and impact of sentiments in financial markets. First and foremost, it is vital to shed light on the meaning of investor sentiment and why it has gained considerable importance with the passage of time. Investor sentiment is also referred to as market sentiment because it reflects the trends in financial markets determined by the psychological perception of the market participants.

Constructing the sentiment index requires identifying relevant proxies which gauges investor sentiment and in turn reflects their view towards the market. In the past, several proxies have been used for the construction of the sentiment index. The selection of proxies for measuring investor sentiment has remained a disputed topic in behavioral finance literature. The statistical data of the financial market reported by different countries is more or less similar to each other, but it differs in how the data captures the sentiment factor depending on the functioning of different financial markets. Hence, careful consideration and analysis is required when selecting proxies according to the dynamics of the relevant market.

The proxies that I have used to construct the sentiment index are dividend premium, trading volume and margin trading. Dividend premium is a widely used parameter in the stock market that reflects investors perception (optimistic or pessimistic) about the market. Baker and Wurgler (2004a) describe it as the difference between the average market-to-book ratios of dividend paying and non-dividend paying firms. Dividend premium has an inverse relationship with sentiment, as bullish investors are more likely to be interested in stocks that offer greater investment opportunities than dividend's attractiveness. An increase in dividend premium gives rise to bearish sentiment as dividend paying stocks tend to behave more like bonds which implies that investors are avoiding risky investments and are concerned more about stable income stream and vice versa. As explained by Baker and Wurgler (2004b) a decline in dividend premium shows that the demand for dividend-paying stocks (mature stocks) as compared to non-dividend paying stocks is weak and therefore signals a bullish market sentiment.

Trading volume is viewed as another important proxy for measuring investor sentiment due to its liquidity feature. It is analogous to market turnover ratio used in prior studies which captures the liquidity aspect of the securities market. Debata, Dash & Mahakud, (2017), using the data from April 2002 to March 2015 aimed to explore the impact of investor sentiment on the

liquidity of the emerging stock market. They found that that a rise or fall in investor sentiment gives rise to market liquidity or illiquidity. Moreover, they found that when investor sentiment is positive stock market liquidity increases significantly. Similarly, Baker and Stein (2002) stated that an increase in trading volume indicates rising investor sentiment and can therefore serve as a measure of investor sentiment.

Lastly, margin trading is also considered as an important proxy of investor sentiment. Margin trading is a measure of leverage and in layman terms can be explained as an act of borrowing for transacting trades. Margin trading can either be long or short, which can increase the overall liquidity of the market. According to Chen et al. (2020), when the margin balance grows investors are confident, the investment climate in the market is favorable and the investor's eagerness for long positions is high. Conversely, a decline in the margin balance suggests that investors are willing to sell their shares, the investment climate in the market is gloomy, and investors play a waiting game by staying in a watch-and-see mood. Thus, margin balance is considered as an important element when analyzing stock returns. Similarly, Zhang et al. (2005) examined the relationship between margin borrowing, stock returns and price volatility for the US stock market. They found a significant positive causal relationship between prior stock returns and contemporaneous margin borrowing.

3.3 Principal Component Analysis (PCA)

The method used in this paper to construct the sentiment index is PCA. PCA is a popular technique used in econometrics and statistics for dimensionality reduction. Through this process, the number of predictor variables in a dataset are reduced while minimizing the loss of information. In this way the original variables are combined and reduced to form fewer comprehensive indicators which reflects the main information contained in those variables. The analysis is performed using daily data for the three sentiment proxies in the model. The data used is for the respective period i.e., from 1st July 2018 to 30th June 2021. The calculation for dividend premium is done using a sample of 20 companies from the KSE-100 Index. As most of the companies listed on the KSE-100 index pay dividends, the sample is divided into two groups namely the dividend paying firms and the non-dividend paying firms. The first group comprises of companies which pay a dividend yield of greater than 5% while the second group include companies which pay a dividend yield of less than 5%. Firm-level data (book value) is extracted from the relevant companies' websites whereas stock price data is retrieved from the Pakistan Stock Exchange. The data source for the other two proxies has been mentioned earlier.

To conduct PCA for the construction of sentiment index, the original data is first standardized for all the proxy variables due to the differences in units of measure. The purpose of standardizing the data is to make the comparability between the proxy variables easier. Then the principal component analysis is implemented. The software used to run the PCA is Stata/MP 17.0. Table 4 shows the results from PCA.

Component	*Eigen Values*	*Proportion variance explained (%)*	*Cumulative explained (%)*
Comp1	*1.611*	*53.69*	*53.69*
Comp2	*1.086*	*36.19*	*89.88*
Comp3	*0.304*	*10.12*	*100.00*

Table 4

As seen in Table 4, the Eigen values for the first two components are greater than 1 and therefore account for most of the variance in the data. The first principal component explains 53.69% of the variance in the data while the second component explains 36.19%. The cumulative explanatory power of the first two components is 89.88%. In the final step, the weighted average of the scores of the first two principal components is used to compute the sentiment index. The values computed for the sentiment index are then converted into monthly average to be used in the regression analysis.

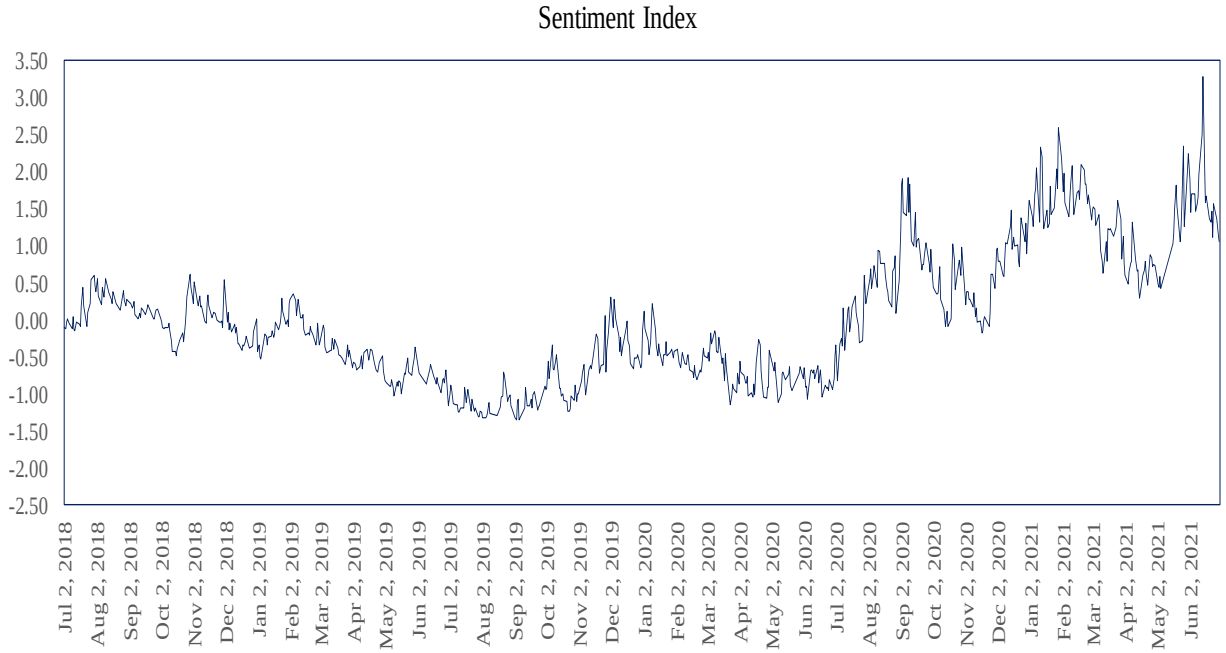


Fig.1

Source: Author's own research

3.4 Research Model

This paper focuses on studying how COVID-19 affected the stock market returns via a series of important macroeconomic and behavioral factors. My analysis is based on a multiple regression model using the Ordinary least square (OLS) method. The dependent variable in the model is the index return which will be regressed against a set of independent variables that are: 1) GDP growth 2) Interest rate 3) Sentiment index and 4) Covid cases. Due to a relatively small sample size, one might lose significance when regressing multiple predictor variables against an outcome variable simultaneously. Also, there might be some other factors that may generate correlation between variables causing a problem of multicollinearity. In order to address this problem, I will focus on testing the impact of each independent variable on the index returns individually.

The model consists of two groups containing a set of six regression equations. The first group comprises of equations for each explanatory variable and an interaction term. The interaction term in the first group represents the interaction between the explanatory variable and Covid-19 where the latter has been treated as a dummy variable. A value of 0 denotes the absence of Covid-19 (pre-pandemic period) while a value of 1 indicates its presence (pandemic period). The first group of equations tells what difference Covid-19 brings related to the impact of the explanatory variables on the index return following the pandemic shock. However, this method does not give information about the severity with which the pandemic affects the index returns. In order to test that, I have set up a second group of equations which follows the same pattern, though, this time in the interaction term the logarithmic first difference of covid cases is used instead of a dummy variable. The logged difference of Covid cases reflects the magnitude of the pandemic. These equations will tell the contribution of Covid-19 towards the index returns driven by its determinants: GDP growth, interest rate and sentiment. The following regression equations are specified for my analysis contained in both groups:

$$Index\ return_t = \propto + \beta_1 GDP_t + \beta_2 GDP_t * Covid_{Dummy_t} + \varepsilon_t \quad (1)$$

$$Index\ return_t = \propto + \beta_1 GDP_t + \beta_2 GDP_t * lnCovid_t + \varepsilon_t \quad (2)$$

$$Index\ return_t = \propto + \beta_1 Interestrate_t + \beta_2 Interestrate_t * Covid_{Dummy_t} + \varepsilon_t \quad (3)$$

$$Index\ return_t = \propto + \beta_1 Interestrate_t + \beta_2 Interestrate_t * lnCovid_t + \varepsilon_t \quad (4)$$

$$Index\ return_t = \propto + \beta_1 Sentiment_t + \beta_2 Sentiment_t * Covid_{Dummy_t} + \varepsilon_t \quad (5)$$

$$Index\ return_t = \propto + \beta_1 Sentiment_t + \beta_2 Sentiment_t * lnCovid_t + \varepsilon_t \quad (6)$$

Index return $_t$ denotes the percentage change in monthly closing price of the index from period *t-1* to period *t*. Similarly, GDP growth $_t$ denotes the percentage change in GDP value from period *t-1* to period *t*. Interest rate and sentiment are specified at levels. Lastly, ln Covid $_t$ is the logarithmic first difference of the number of new cases reported in period *t* and *t-1*. The software used to run the regression is Stata/MP 17.0.

Table 5: Descriptive statistics

Pre-Pandemic period					
Variable	**Observations**	**Mean**	**Standard deviation**	**Min**	**Max**
Index return	18	0.0003	0.0643	-0.0847	0.1486
GDP growth	18	-0.0031	0.0702	-0.1477	0.1141
Interest rate	18	0.1238	0.0141	0.1000	0.1414
Sentiment Index	18	-0.4233	0.4773	-1.1400	0.3200

Pandemic period					
Variable	**Observations**	**Mean**	**Standard deviation**	**Min**	**Max**
Index return	18	0.0121	0.0860	-0.2304	0.1669
GDP growth	18	0.0035	0.1676	-0.3339	0.4227
Interest rate	18	0.0969	0.0081	0.0814	0.1117
Sentiment Index	18	0.4211	0.9315	-0.8300	1.7900
ln Covid	18	0.5823	1.6835	-1.3070	6.2700

Entire period					
Variable	**Observations**	**Mean**	**Standard deviation**	**Min**	**Max**
Index return	36	0.0062	0.0751	-0.2304	0.1669
GDP growth	36	0.0002	0.1267	-0.3339	0.4227
Interest rate	36	0.1103	0.0177	0.0814	0.1414
Sentiment Index	36	-0.0011	0.8459	-1.1400	1.7900
ln Covid	36	0.2911	1.2099	-1.3070	6.2700

Table 6: Correlation Matrix

Pre-Pandemic period					
	Index return	*GDP growth*	*Interest rate*	*Sentiment Index*	
Index return	1.00				
GDP growth	0.32	1.00			
Interest rate	-0.36	0.02	1.00		
Sentiment Index	-0.03	0.00	-0.58	1.00	

Pandemic period					
	Index return	*GDP growth*	*Interest rate*	*Sentiment Index*	*ln Covid*
Index return	1.00				
GDP growth	0.08	1.00			
Interest rate	-0.38	0.27	1.00		
Sentiment Index	0.10	-0.13	0.33	1.00	
ln Covid	-0.62	-0.34	-0.11	-0.55	1.00

Entire period					
	Index return	*GDP growth*	*Interest rate*	*Sentiment Index*	*ln Covid*
Index return	1.00				
GDP growth	0.13	1.00			
Interest rate	-0.27	0.06	1.00		
Sentiment Index	0.09	-0.08	-0.44	1.00	
ln Covid	-0.46	-0.29	-0.22	-0.29	1.00

4 Estimation results

Table 7: GDP growth estimates

		Dependent Variable		
		Index Return		
		Observations		36
		F-statistic		0.68
		Prob (F-statistic)		0.51
		R- Squared		0.04
Variable	***Coefficient***	***Std.Error***	***t-statistic***	***P > |t|***
GDP growth	0.289	0.262	1.100	0.278
GDP growth × Covid (D)	-0.249	0.286	-0.870	0.390
Constant	0.007	0.013	0.520	0.604

Note: 'D' is the dummy variable

		Dependent Variable		
		Index Return		
		Observations		36
		F-statistic		1.88
		Prob (F-statistic)		0.17
		R- Squared		0.10
Variable	***Coefficient***	***Std.Error***	***t-statistic***	***P > |t|***
GDP growth	-0.021	0.113	-0.180	0.855
GDP growth × Ln Covid Cases	0.096	0.054	1.770	0.087
Constant	0.010	0.012	0.840	0.410

Average marginal effects				
Variable	***dy/dx***	***Delta-method std.err***	***t-statistic***	***P > |t|***
GDP growth	0.007	0.106	0.070	0.948

The results for Equation 1 and Equation 2 are presented in Table 7. The main effect of GDP growth on index returns as captured by the first term in Equation 1 and Equation 2 turned out to be statistically insignificant. A plausible explanation could be that during normal times the financial markets are competitive, efficient, and usually foresee future changes in GDP growth. Hence, efficient markets discount the anticipated future state of the economy into current prices (Mladina, 2016). Thus, stock market in usual circumstances may not consider GDP as an important component in driving index returns because of the effects of GDP been already incorporated into the stock prices. Hence, the contemporaneous stock returns may not be affected by the changes in GDP occurring in the same period.

Conversely, with the interaction terms the picture seems a bit different. As in the case where Covid-19 is treated as a dummy variable there is no significant statistical interaction between GDP growth and Covid-19. This is because the pandemic is a longtime horizon during which the ups and downs in GDP are inevitable. So, when the pandemic is considered as an entire period, the effects of GDP on stock returns might fade overtime due to its cyclical nature. However, in the interaction term, where the growth in Covid cases is accounted for, I found positive significant statistical interaction between GDP growth and growth in Covid-19 cases. The growth in Covid-19 cases captures the severity of the pandemic shock. During pandemic, the market sentiment is generally pessimistic due to the uncertainty looming over the global economy. Since the outset of the pandemic, uncertainty became prevalent and made it difficult to foresee changes in GDP. The emergence of Covid-19 called for unprecedented restrictions being enforced on several economic and financial fronts that triggered supply and demand shocks in the economy. During crisis of such nature, economic activity dwindles and expectations regarding GDP growth wear down. The equity market perceives this as a bad omen as returns on stocks are linked to the performance of the economy. Thus, if GDP experiences a positive growth amid such conditions, it has an amplified impact on stock returns as shown in the results. As evident from the results of Equation 2, the coefficient estimate for the interaction term is positive and marginally significant up to 10% level. The results can be interpreted as: a logarithmic growth of 1 in covid cases with a subsequent increase in GDP by 1% will result in an increase in index returns by almost 0.096%. So, during pandemic, the GDP growth actually stimulates the stock market returns. Hence, from these estimates it can be inferred that the greater the severity of the pandemic, the larger will be the impact of GDP growth on index returns.

Further, it is also important to test how the GDP affects the index returns on the whole. For that I have calculated the marginal effect of GDP growth which captures its effect on index returns on average during the pre-pandemic and pandemic period combined. As shown in Table 6, the average marginal effect of GDP growth on index returns is insignificant as it shows the regime shift where the coefficient estimate for GDP growth was insignificant before the pandemic and thus likely to overshadow its impact during the pandemic which makes it insignificant on average. The margin term for GDP growth tells, given that other variables are constant, a 1% growth in GDP will increase the index returns by 0.007%. The results are in-line with the aforementioned computations of GDP being significant during pandemic and insignificant during pre-pandemic period.

Table 8: Interest rate estimates

		Dependent Variable		
		Index Return		
		Observations		36
		F-statistic		2.49
		Prob (F-statistic)		0.10
		R- Squared		0.13
Variable	***Coefficient***	***Std.Error***	***t-statistic***	***P>|t|***
Interest rate	-2.233	1.007	-2.220	0.034
Interest rate × Covid (D)	-0.524	0.359	-1.460	0.154
Constant	0.278	0.125	2.220	0.033

Note: 'D' is the dummy variable

		Dependent Variable		
		Index Return		
		Observations		36
		F-statistic		10.45
		Prob (F-statistic)		0.00
		R- Squared		0.39
Variable	***Coefficient***	***Std.Error***	***t-statistic***	***P>|t|***
Interest rate	-1.656	0.590	-2.810	0.008
Interest rate × Ln Covid Cases	-0.370	0.090	-4.100	0.000
Constant	0.199	0.066	3.000	0.005

Average marginal effects				
Variable	***dy/dx***	***Delta-method std.err***	***t-statistic***	***P>|t|***
Interest rate	-1.762	0.597	-2.950	0.006

The results for Equation 3 and Equation 4 are shown in Table 8. The coefficient estimates capturing the main effect of interest rates proved to be very consistent with respect to its relationship with index returns and significance. As shown in the results for Equation 3 and Equation 4, the first term is negative and statistically significant exhibiting an inverse relationship between interest rates and index returns irrespective of the period i.e., pre-pandemic or during pandemic. These results conform to prior studies (Alam and Uddin (2009) and Hasan and Javed (2009)) conducted where a negative relationship between interest rates and index returns was observed. Contrary to this, for the interaction terms different outcomes were noted for Equation 3 and 4. In the case where Covid-19 is treated as a dummy variable, there is no significant statistical interaction between interest rates and Covid-19. A reasonable explanation for this could be, during pandemic period, Central banks will vary the interest rates depending on the level of spread and severity of Covid-19. These fluctuations in interest rates will have an effect on stock returns; however, with the passage of time stock returns will not remain as responsive to these changes in interest rates.

On the other hand, the interaction term where the growth in Covid cases is considered, a significant statistical interaction is observed between the two variables. Based on the results of Equation 4, the estimated coefficients for the main effect of interest rate and the interaction term are negative and highly significant at almost 1% and 0.1% level, respectively. The coefficient estimate for the first term can be interpreted as: a 1 percentage point increase in interest rates will decrease the index return by 1.65% on average regardless of the period. However, during the pandemic, there will be an additional effect of interest rate on index returns based on the severity of the shock which is captured by the interaction term and is interpreted as: given a logarithmic growth of 1 in covid cases, a 1 percentage point increase in interest rate will decrease the index return by 0.37%. From these results, it can be concluded that the relationship between interest rates and index returns is negative and that the index returns become more sensitive to the level of interest rates during the pandemic period.

Moreover, results for the average marginal effect of interest rate on index returns also paints a similar picture. The coefficient estimate for the marginal effect of interest rate is highly significant at almost 1% level. The result can be interpreted as: a 1 percentage point increase in interest rate will decrease the index returns by 1.76% on average considering the overall sample period.

Table 9: Sentiment index estimates

		Dependent Variable		
		Index Return		
		Observations		36
		F-statistic		0.17
		Prob (F-statistic)		0.85
		R- Squared		0.01
Variable	***Coefficient***	***Std.Error***	***t-statistic***	***P>|t|***
Sentiment index	0.002	0.033	0.060	0.953
Sentiment index × Covid (D)	0.009	0.041	0.210	0.834
Constant	0.004	0.016	0.280	0.780

Note: 'D' is the dummy variable

		Dependent Variable		
		Index Return		
		Observations		36
		F-statistic		1.79
		Prob (F-statistic)		0.18
		R- Squared		0.10
Variable	***Coefficient***	***Std.Error***	***t-statistic***	***P>|t|***
Sentiment index	0.008	0.015	0.520	0.608
Sentiment index × Ln Covid Cases	0.028	0.016	1.810	0.080
Constant	0.014	0.013	1.100	0.280

Average marginal effects				
Variable	***dy/dx***	***Delta-method std.err***	***t-statistic***	***P>|t|***
Sentiment index	0.016	0.015	1.040	0.305

The results for Equation 5 and Equation 6 are reported in Table 9. The results for the sentiment index are analogous to that of GDP growth. The estimates show that the main effect of investor sentiment on index returns as explained by the first term in Equation 5 and 6 is statistically insignificant. A likely explanation for this could be when stock markets are functioning without disruption the sentiment factor may take a back seat and play a trivial role in determining the stock prices. Moreover, both fundamental and emotion driven sentiment are instrumental in causing change in stock market returns. The fundamental aspect is tied to the performance of the companies traded on the stock market while emotions are associated with investor's attitude towards the market. In usual circumstances, the fundamental driven sentiment may play an insignificant role in driving stock returns as markets are efficient and usually foresee how the companies will perform in the future. Similarly, the emotion driven sentiment may also not affect stock markets because during normal times the investors are less likely to react towards variations in economic conditions and expect that any disequilibrium within the economy will be stabilized overtime. Thus, in such circumstances, the stock market may not consider sentiment as an important factor in driving index returns as it is likely to be incorporated into stock prices. Therefore, the contemporaneous stock returns may not be affected by the changes in investor sentiment in the same period.

However, when the growth in Covid cases is accounted for in Equation 6, significant statistical interaction is observed between the two variables implying that during uncertain times of pandemic, investor sentiment plays an important role in driving stock market returns. As shown in the results for Equation 6, the coefficient estimate for the interaction term is positive and marginally significant up to 10% level. The results can be interpreted as: given a logarithmic growth of 1 in covid cases, a 1 unit rise in sentiment will increase the index return by 2.8%. Thus, it can be inferred from the results that during pandemic the sentiment factor actually stimulated the stock market returns, though it requires a large change in the sentiment factor to affect the index returns.[7]

Additionally, the marginal effect spells out the average effect of the sentiment index on index returns when pre-pandemic and pandemic period are taken together. The results show that the marginal effect of the sentiment index on index returns is also insignificant. This can be due to the tendency of the insignificant impact of the sentiment index in the pre-pandemic period to dominate during pandemic as well.

[7] 1 unit of sentiment (approximately equivalent to 118% of the standard deviation of the sentiment index)

5 Limitations

Similar to other empirical research, my study has several limitations as well. The sample period is small containing fewer observations which imposes restrictions on the number of control variables that are used in each model. This can result in certain important variables being excluded from each regression equation causing biasedness in the coefficient estimates. In my case, I suspect an impure form of heteroskedasticity due to certain omitted variables which might lead to model misspecification. In order to mitigate this problem, I used Eicker–Huber–White robust standard errors for Equation 2, Equation 4, and Equation 6 to correct the potential biasedness in the coefficient estimates. As seen in the results in Table 10 (See Appendix), the coefficient estimate for the interaction term in Equation 2 is now statistically insignificant. Similar results are observed for Equation 6 (Table 12, See Appendix). However, the coefficient estimates for Equation 4 (Table 11, See Appendix) still remain statistically significant to the new specification. Nevertheless, using robust standard errors is not a viable option for smaller sample sizes. As stated by Wooldridge, (2012), using robust standard errors and robust t-statistics is only justified as the sample size becomes large, even if the classical linear model assumptions remain valid. However, when the sample size is small, the robust t statistics can have distributions that are not close to the t distribution, that might render the inference invalid. The problem of heteroskedasticity caused by omitted variables might affect the estimates and lead to biasedness in results. Due to a restrictive sample size, this issue cannot be addressed quantitatively but rather qualitatively.

5.1 Factors causing biasedness

Before Covid-19, Pakistan's economy was going through an unstable growth pattern with regular fluctuations in the economic cycle. Amidst myriad challenges, the economy was hit by the most severe global health crisis in modern history. The Covid crisis had serious repercussions for the economy as the initial supply shocks triggered by the sudden business shutdown transitioned into extraordinary demand shocks that lead to a macroeconomic disequilibrium. To combat these challenges, like every other country in the world, government of Pakistan also introduced a number of policy measures which included fiscal and monetary incentives. This included a fiscal stimulus package of Rs. 1.2 trillion including industrial support packages alongside accommodative monetary policy stance to mitigate the effects of Covid-19. Since the Covid-19 outbreak in February 2020, State Bank of Pakistan reduced the policy rate by a cumulative 625bps between March and June 2020 (Government of Pakistan Finance Division, 2020-21). Due to the fragile state of the economy, Pakistan could not afford

to adopt stringent containment measures like other economies to control the spread of the virus and therefore imposed a partial/smart lockdown policy which helped in restarting economic activities early during the pandemic. As a result of these measures, Pakistan witnessed a V-shaped economic recovery propelled by a broad-based growth across all major sectors with industrial, agriculture and services sector posting a growth of 3.57%, 2.77% and 4.43%, respectively. The data for growth of these sectors has been taken from Ministry of Finance website (https://www.finance.gov.pk/survey_2021.html). This was reflected in the higher GDP growth for fiscal year 2021 reported at 3.94% as compared to a negative growth of 0.47% in fiscal year 2020. The effects of these measures were not only restricted to the industrial sector but were also felt in the financial sector. Further, Pakistan stock market overcame Covid-19 induced economic downturn reflected by its benchmark KSE-100 index rising by almost 62% by the end of June 2021 from March 2020. The improved performance of the index was due to a number of factors: monetary easing by the Central Bank, fiscal stimulus package, the reforms introduced by the Securities Exchange Commission of Pakistan (SECP) and rise in industrial activity. All of these factors helped in reviving investor confidence and subsequently stock market returns. One of the reforms introduced by the SECP was the reduction in the margin call requirement from 30% to 10% against the listed shares on the stock exchange which encouraged investor borrowing and stimulated trading activity. Another salient feature during the Covid period was the five initial public offerings that took place at the bourse during the first nine months of the fiscal year 2021. This meant that the companies were confident about the economy prospects which helped in elevating investor sentiment even further. The positive investor sentiment was reflected in the increased trading activity at the bourse where the average daily shares volume rose substantially during the period (See Figure 2).

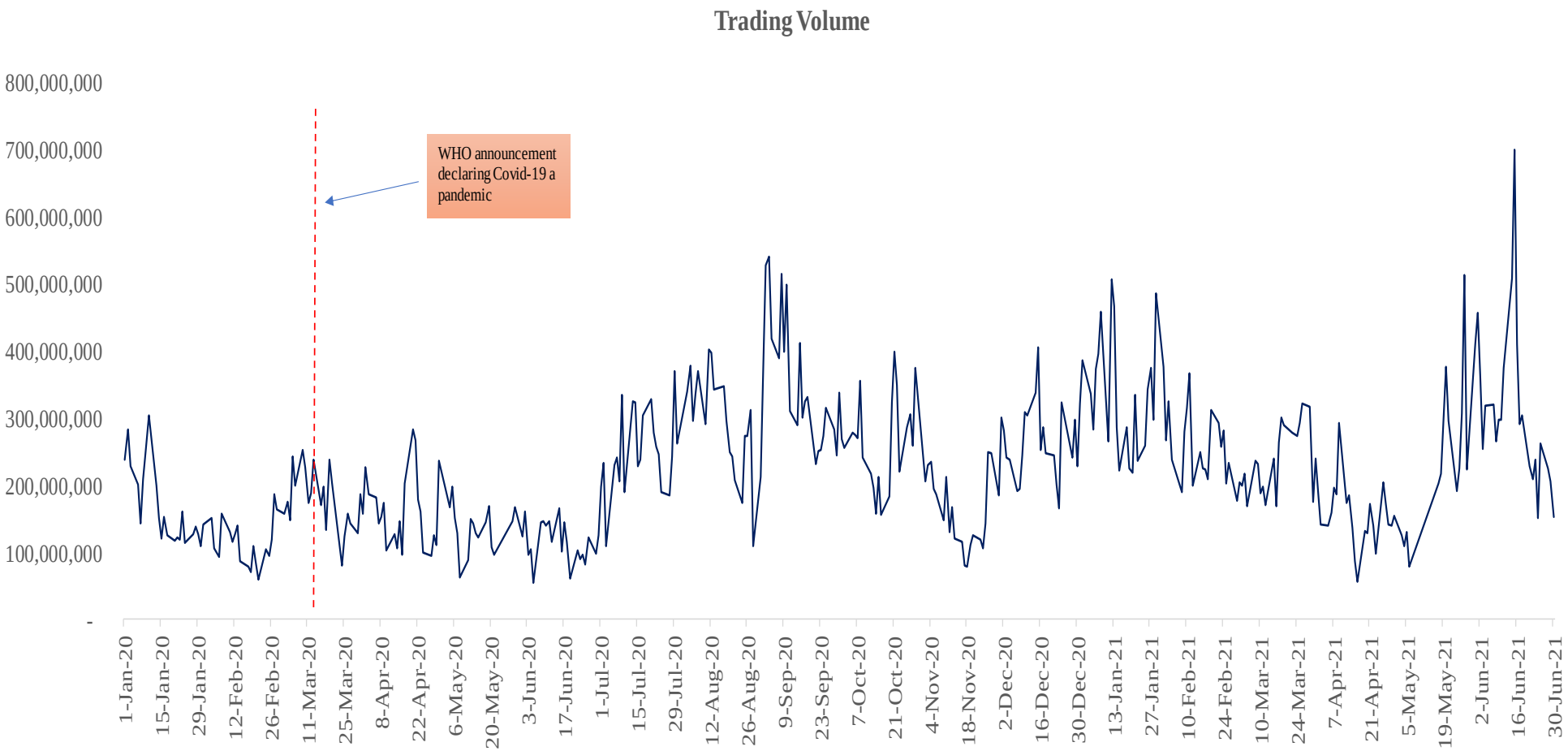


Fig.2

Source: Data retrieved from www.kse.com.pk

5.2 Biasedness in estimates

Based on the aforementioned factors, I suspect an element of biasedness in my estimates. In the case of GDP growth, the effect might have been overestimated (referring to Equation 2). The explanation for this is the existence of omitted variable bias that can be mistakenly captured by the GDP estimates. One of the contributing factors for the overestimation in GDP estimates could be the fiscal stimulus package announced by the government of Pakistan in the wake of Covid-19. Pakistan is a consumption driven economy where private consumption takes up a large share in GDP (nominal terms) of around 80.7% as of fiscal year 2021. The data for private consumption has been taken from CEIC website (https://www.ceicdata.com/en/indicator/pakistan/private-consumption--of-nominal-gdp). The fiscal stimulus induced private consumption and led to an increase in the overall aggregate demand and consequently higher GDP growth. Private consumption was reported to grow by 17% during fiscal year 2021 as compared to 4% in fiscal year 2020. The data for private consumption is taken from Ministry of Finance website (https://www.finance.gov.pk/survey_2021.html). This is one of the reasons that might have led to an overestimation of the effect of GDP on stock returns during the Covid period.

With respect to interest rates, the results remained quite consistent in the pre-pandemic and pandemic period signaling a negative relationship between interest rates and the stock market returns. The results were also statistically significant. However, the biasedness of the estimate still remains to be addressed. To the best of my knowledge, the effect of interest rates on stock returns can be overestimated due to certain omitted variables. As discussed earlier, when pandemic hit Pakistan in February 2020, the State Bank of Pakistan responded proactively by adopting a dovish monetary policy stance to boost aggregate demand which had dropped precipitously due to Covid-19. During Covid-19 catastrophe, the monetary policy was steered towards supporting growth and employment rather than price stability. The monetary policy decision was further supported by a noticeable decline in inflation momentum, slowdown in domestic demand and a reduction in inflation expectations. For these reasons, the effect of interest rate on stock returns might have been overestimated due to the omittance of the inflation factor. Inflation tends to have a negative relationship with stock returns as the rise in inflation increases the riskiness of the assets raising the required rate of return. Thus, an increase in the future expected returns implies that the current stock prices should drop leading to a negative impact on stock returns (Ammer, 1994). Before Covid-19 made its way into Pakistan in February 2020, inflation was already following a downward trajectory (see Figure

3) which was further supported by softening food prices and decade low global oil prices. This encouraged monetary authorities to lower interest rates. Hence, the effect of falling inflation may have been captured by the interest rates leading to an overestimation in the estimates.

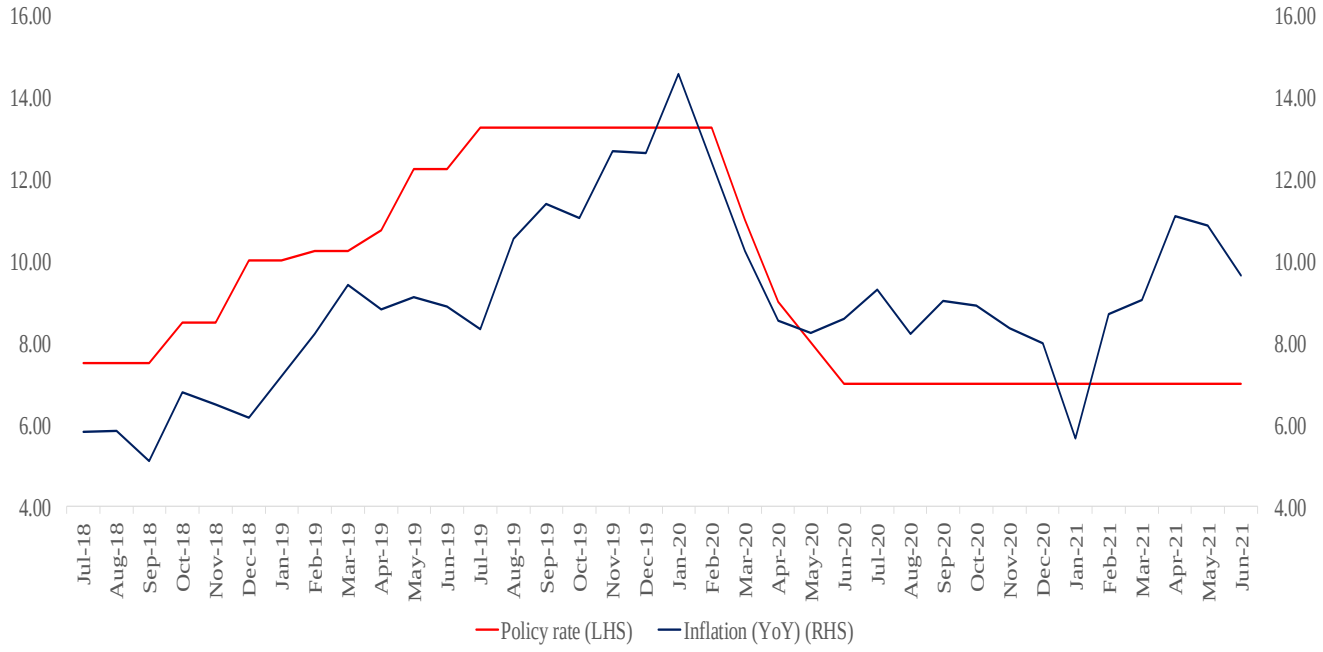
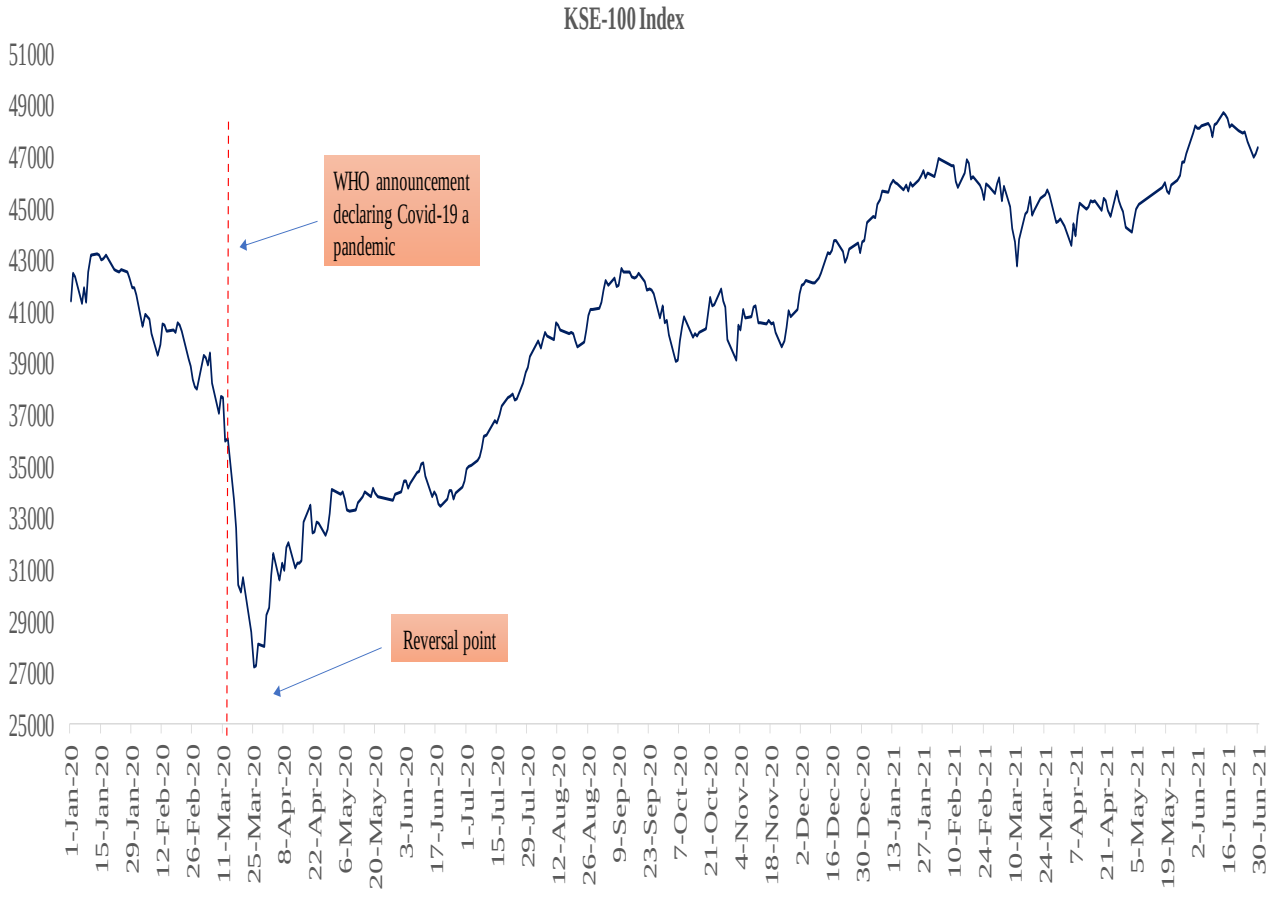


Fig.3

Source: Data for policy rate is retrieved from www.zakheera.com and for inflation the data is taken from www.pbs.gov.pk



Source: Data retrieved from www.kse.com.pk

Fig.4

Lastly, the effects of the estimate of investor sentiment on stock returns may have been overestimated too (referring to Equation 6). This could be due to certain factors which have not been accounted for in the model. The Covid-19 pandemic caused a plunge in the global stock markets in March 2020 and struck fear into investors regarding the recovery of the stock market. However, the rebound took place in a short time. Similar trend was observed in the Pakistan stock market (see Figure 4). One of the factors contributing to the overestimation of results could be the fiscal stimulus provided by the government which helped in subsiding the woes of the investors concerning the state of the economy due to Covid-19. During periods of crisis, economy slows down and investor are pessimistic about the future direction of the market. However, in such conditions, if there are any positive developments in the economy, investors appreciate it and react with extra exuberance which helps in stimulating stock market returns. In addition, another factor that could possibly have contributed to the overestimation is the leniency in the stringency measures taken by the Pakistan's government to contain the spread of the virus. Due to the country's weak macroeconomic position, Pakistan could not afford to impose country wide lockdowns like developed countries and therefore adopted a partial/smart lockdown policy instead which involved sealing areas where staggering increase in covid cases was observed whilst loosening restrictions on economic activities. These policies aided in reviving the economic cycle and as a result Pakistan witnessed an early recovery as compared to other economies. This is also evident from the quantum index of manufacturing (QIM) for Pakistan which tracks the changes in the production of large-scale manufacturing industries. As seen in Figure 5, QIM after witnessing an initial drop in April 2020, observed an uptrend over most of the sample period despite the fact that the number of new cases reported were increasing. The stringency index created by the University of Oxford to track the strictness of government policies during Covid-19 calculated using nine metrics (school closures, workplace closures, restrictions on public gatherings, cancellation of public events, stay-at-home requirements, closures of public transport, public information campaigns, restrictions on internal movements, and international travel) also painted a similar picture. The metric is scaled from 0 to 100 where 100 signifies strictest response. Moreover, Figure 6 shows that Pakistan's government policy response to curb Covid-19 followed a downward trend and became less rigorous after peaking in March 2020. The early resumption of economic activity coupled with governments fiscal support and targeted financial initiatives helped in improving investor confidence and boosting the stock market. Thus, the exclusion of these factors may have resulted in an overestimation of the effect of sentiment on stock returns.

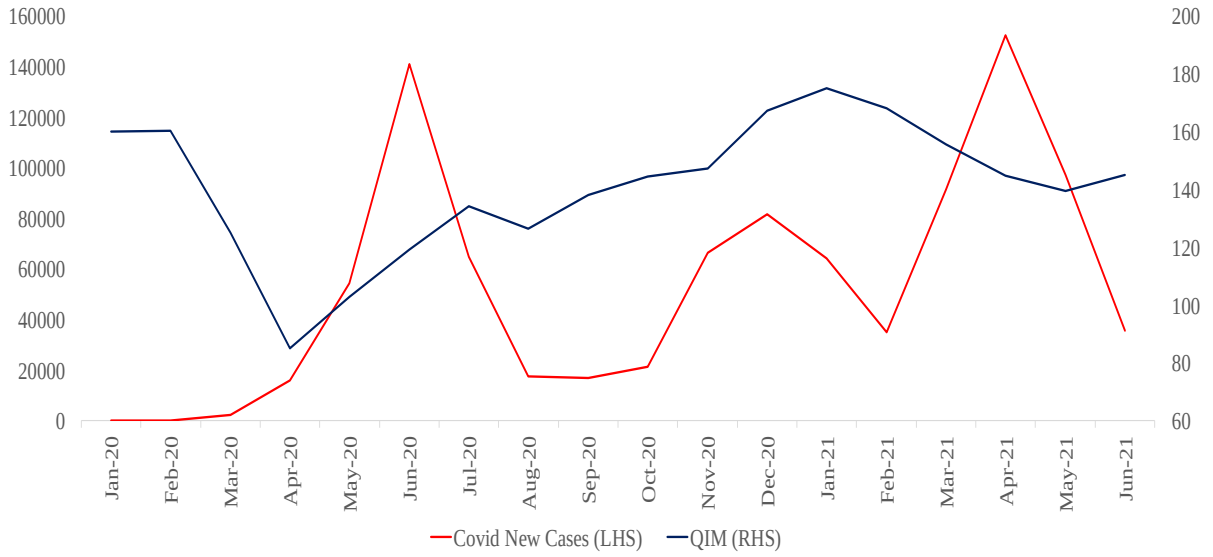


Fig.5

Source: Data for covid cases is retrieved from https://ourworldindata.org/ and for QIM Index the data is taken from www.pbs.gov.pk

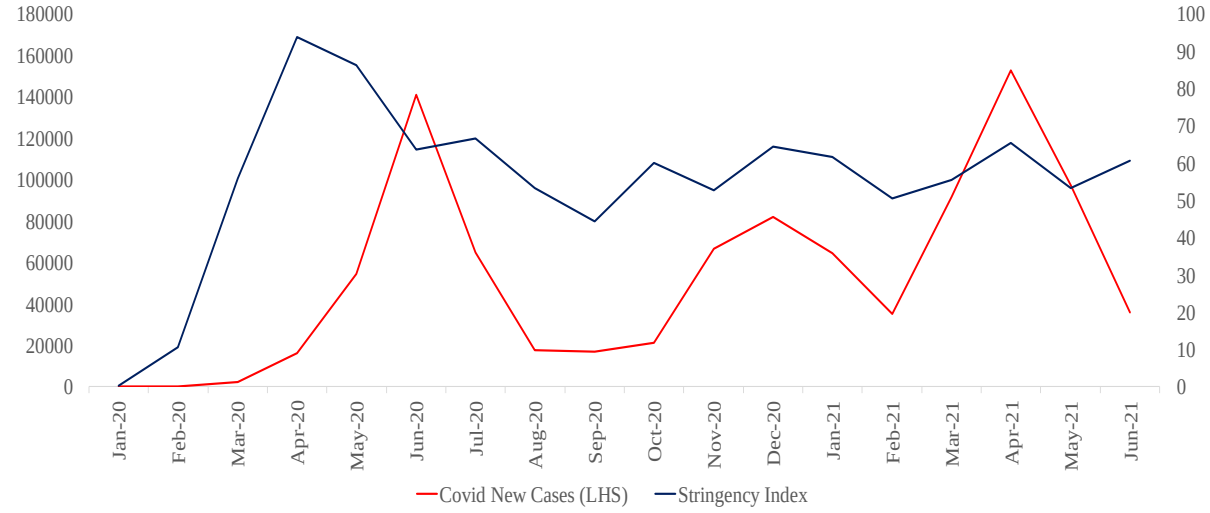


Fig.6

Source: Data retrieved from https://ourworldindata.org/

6 Conclusion

This paper studies how Covid-19 impacted the equity returns in the Pakistan stock market using a monthly-level data spanning from July 2018 to June 2021. The literature on the effect of Covid-19 on the Pakistan stock market is sparse and is more centered towards how the pandemic impacted the stock market volatility without accounting for other key variables that potentially drive equity returns. Thus, this study aims to fill this gap in literature by examining how the effects of the pandemic moderated onto the stock market through a series of important determinants that drive equity returns namely GDP growth, interest rates and investor sentiment. A traditional OLS estimator is used to conduct the analysis.

There are some important inferences that can be drawn from the empirical findings. In the process of investigation, it is found that the stock market returns are more sensitive towards the growth in Covid cases rather than the pandemic itself. The estimate of the impact of GDP growth on stock return is found to be statistically insignificant in the pre-pandemic period indicating that stock market returns may not react to changes in GDP during normal times. However, significant statistical interaction is observed between GDP growth and growth in Covid cases implying that the shock of the pandemic actually stimulated the impact of GDP on stock market returns. Hence, during periods of uncertainty, stock markets are more reactive to changes in GDP. A similar observation is noted for the sentiment factor where the estimate of the impact of investor sentiment on stock return is statistically insignificant during the pre-pandemic period but is statistically significant when the growth in covid cases is accounted for. This discrepancy can be explained by the stock markets being efficient during normal times when investor sentiment is usually not considered as an important factor in driving stock returns. During periods of severe stress, stock markets become less efficient, and sentiments remain dampened by uncertainty. This high level of uncertainty among investors exacerbates the impact of sentiment on stock returns. Lastly, estimates for interest rates produced consistent results indicating an inverse relationship between the interest rates and stock market returns in both the pre-pandemic and pandemic period. However, during pandemic an additional effect of interest rate on the stock returns was observed.

The ups and downs observed in the Pakistan stock market at the onset of the pandemic was subject to some other variables as well. Further studies can be conducted by accounting for other control variables like inflation rate, fiscal measures and stringency actions taken by the government so that a clearer picture of the pandemic-related variables affecting the

performance of the Pakistan stock market can be understood. Based on the results, it is clear that the severity of the pandemic had a profound impact on the stock market performance. The policy actions taken by the government all over the world to counter the effects of the pandemic shock turned out to be fruitful with respect to maintaining the stability of the financial markets. However, there are some concerns that need to be addressed as severity of the pandemic increases. The governments efficiently fought with the pandemic by rolling out huge stimulus packages along with monetary easing measures to keep the economies on an even keel. However, as the severity of the pandemic increases substantially, governments will now have to undertake far greater measures to maintain the stability of the financial markets. Nonetheless, this might be problematic for the emerging markets and developing economies. The extraordinary fiscal measures taken during the pandemic aggravated the already high level of public debt, which can prove to be troublesome for most emerging markets and developing economies. Moreover, the risks to economic and financial stability could be exacerbated due to the fear of early exit or delayed withdrawal of support from the government. It is therefore crucial that support measures are managed in an optimal way especially in these economies.

References

Akbar, M. and A. Tahir (2020), 'Stand Still and Do Nothing: COVID-19 and Stock Returns and Volatility', https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3684782

Alam, M.M., and Uddin, M.G.S. 2009. Relationship between Interest Rate and Stock Price: Empirical Evidence from Developed and Developing Countries, International Journal of Business and Management, Vol. 4(3), pp. 43-51.

AlAli, M.S. (2020). Risk Velocity and Financial Markets Performance: Measuring the Early Effect of COVID 19 Pandemic on Major Stock Markets Performance, International Journal of Economics and Financial Research, 6(4), 76-81. DOI: 10.32861/ijefr.64.76.81

Anusakumar, S. V., Ali, R., & Hooy, C. W.(2017). The effect of investor sentiment on stock returns: Insight from emerging Asian markets. Asian Academy of Management Journal of Accounting and Finance, 13(1), 159–178. https://doi.org/10.21315/aamjaf2017.13.1.7

Ammer, J. (1994). "*Inflation, inflation risk, and stock returns*," International Finance Discussion Papers 464, Board of Governors of the Federal Reserve System (U.S.). https://www.federalreserve.gov/pubs/ifdp/1994/464/default.htm

Ashraf, B.N. (2020b), 'Stock Markets' Reaction to COVID-19: Cases or Fatalities? *Research in International Business and Finance,* 54, 101249.

Baig, A., Hassan, A.B., Haroon, O., Rizvi, S.A.R. (2020). Deaths, Panic, Lockdowns and US Equity Markets: The Case of COVID-19 Pandemic. Available at: https://www.ssrn.com/abstract=3584947

Baker, M. and Wurgler, J. (2006). Investor sentiment and the cross-section of stock returns. The Journal of Finance, 61(4):1645–1680.

Baker, M. and Wurgler, J. (2007). Investor sentiment in the stock market. Journal of Economic Perspectives, 21(2):129–152.

Baker, Malcolm, and Jeremy Stein, 2002, Market liquidity as a sentiment indicator, NBER Working Paper Series, No. 8816.

Baker, M., & Wurgler, J. (2004a). A catering theory of dividends. The Journal of Finance, 59(3), 1125–1165. https://doi.org/10.1111/j.1540-6261.2004.00658.x

Baker, M., & Wurgler, J. (2004b). Appearing and disappearing dividends: The link to catering incentives. Journal of Financial Economics, 73, 271–288. https:// doi.org/10.1016/j.jfineco.2003.08.001

Baker, Malcolm, Wurgler, Jeffrey, 2006. Investor sentiment and the cross-section of stock returns. Journal of Finance 61, 1645–1680

Baker, S.R. et al. (2020), 'The Unprecedented Stock Market Impact of COVID-19', *NBER Working Papers,* No. 26945. Washington, DC: NBER.

Banco, de E. (2020). Reference macroeconomic scenarios for the Spanish economy after COVID-19. *Economic Bulletin*, No. 2/2020

Boissay, F., & Rungcharoenkitkul, P. (2020, April 17). Macroeconomic effects of COVID-19: An early review. *BIS Bulletin*, No. 7. Bank for International Settlements.

Brown, G. W., Cliff, M. T. (2004). Investor sentiment and the near-term stock market. Journal of Empirical Finance, 11(1), 1-27.

Brown, G. W., Cliff, M. T. (2005). Investor Sentiment and Asset Valuation. Journal of Business, 78(2), 405-440.

Burns, W. J., Peters, E., & Slovic, P. (2012). Risk perception and the economic crisis: a longitudinal study of the trajectory of perceived risk. Risk analysis : an official publication of the Society for Risk Analysis, 32(4), 659–677. https://doi.org/10.1111/j.1539-6924.2011.01733.x

Chen Y, Zhao H, Li Z, Lu J (2020) A dynamic analysis of the relationship between investor sentiment and stock market realized volatility: Evidence from China. PLoS ONE 15(12): e0243080. https://doi.org/10.1371/journal. pone.0243080

Chen, M. P.; Lee, C. C.; Lin, Y. H. & Chen, W. Y. (2018). Did the SARS epidemic weaken the integration of Asian stock markets? Evidence from smooth time-varying cointegration analysis. *Economic research-Ekonomska istraživanja*, 31(1), pp. 908-926.

Chen, N., Roll, R., Ross, S.A. (1986). Economic Forces and the Stock Market. The Journal of Business, 59(3), 383-403.

Chen, N.-F., Roll, R., & Ross, S. (1986). Economic Forces and the Stock Market. The Journal of Business, 59(3), 383-403. http://dx.doi.org/10.1086/296344

Chen, S. T., & Haga, K. (2021). Using E-GARCH to Analyze the Impact of Investor Sentiment on Stock Returns Near Stock Market Crashes. Frontiers in psychology, 12, 664849. https://doi.org/10.3389/fpsyg.2021.664849

Chui, Andy C.W., Sheridan Titman, and K.C. John Wei, 2008. Individualism and Momentum around the World. AFA 2006 Boston Meetings Paper.

Chow, G. C. and Lin, A.(1971), "Best linear unbiased interpolation, distribution and extrapolation of time series by related series," Review of Economics and Statistics, 53, 372-5.

Denton, F. T. (1970), "Quadratic minimization procedures for adjusting monthly or quarterly time series to independent annual totals", McMaster University Department of Economics Working Paper 70-01.

Denton, F. T. (1971), "Adjustment of monthly or quarterly series to annual totals: An approach based on quadratic minimization", Journal of the American Statistical Association, 66, 92–102.

DebataB., DashS.R., and MahakudJ.,Investorsentiment and emergingstockmarketliquidity. Finance ResearchLetters, 2017. 26: p. 15–31.

Eichenbaum, M. S., Rebelo, S., & Trabandt, M. (2020). *The macroeconomics of epidemics* (NBER Working Paper No.26882). National Bureau of Economic Research.

Eldomiaty, T., Saeed, Y., Hammam, R. and AboulSoud, S. (2020), "The associations between stock prices, inflation rates, interest rates are still persistent: Empirical evidence from stock duration model", Journal of Economics, Finance and Administrative Science, Vol. 25 No. 49, pp. 149-161. https://doi.org/10.1108/JEFAS-10-2018-0105

Fama, R. (1990), 'Stock Returns, Expected Returns and Real Activity', The Journal of Finance, 45, 1089-1108.

Fetzer, T., Hensel, L., Hermle, J., & Roth, C. (2020). Coronavirus perceptions and economic anxiety, *Review of Economics and Statistics, 1-36* https://doi.org/10.1162/rest_a_00946

Gjerde, O. and Saettem, F. “Causal relations among stock returns and macroeconomic variables in a small, open economy.” Journal of International Financial Markets, Institutions and Money 9(1999): 61-74.

Gormsen, N. J., & Koijen, R. S. J. (2020). *Coronavirus: Impact on stock prices and growth expectations* (Working Paper). University of Chicago Booth School of Business.

Government of Pakistan Finance Division. (2020-21). *Pakistan Economic Survey.* Retrieved from https://www.finance.gov.pk/survey/chapters_21/05Money%20and%20Credit.pdf

Hasan, Arshad & Javed, M. (2009). An Empirical Investigation of the Causal Relationship among Monetary Variables and Equity Market Returns. THE LAHORE JOURNAL OF ECONOMICS. 14. 10.35536/lje.2009.v14.i1.a5.

Hofstede, Geert, 2001. Culture’s Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations. Sage Publication, Beverly Hills.

Humpe, A., & Macmillan, P. (2009). Can macroeconomic variables explain long term stock market movements? A comparison of the US and Japan. Applied Financial Economics, 19(2), 111-119. http://dx.doi.org/10.1080/09603100701748956

Jonung, L. & Roeger, W. (2006). The macroeconomic effects of a pandemic in Europe-A model-based assessment. *Available at SSRN 920851*. Retrieved from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=920851, date: 02.19.2020.

K. L. Fisher, M. Statman, Consumer confidence and stock return, The Journal of Portfolio Management, 30(2003) 115-127.

Fisher, K.L. & Statman, Meir. (2000). Investor Sentiment and Stock Returns. Financial Analysts Journal. 56. 16-23. 10.2469/faj.v56.n2.2340.

Kuzmina, J. (2010). Emotion‘s component of expectations in financial decision making. Baltic Journal of Management , 295-306.

Khan, M. A., & Ahmad, E. (2018). Measurement of investor sentiment and its bi-directional contemporaneous and lead–lag relationship with returns: Evidence from Pakistan. Sustainability, 11(1), 1-20.

Kuhnen, C. M., & Knutson, B. (2011). The influence of affect on beliefs, preferences, and financial decisions. Journal of Financial and Quantitative Analysis, 46(3), 605e626. https://doi.org/10.1017/S0022109011000123

Lee, B.S."Causal relations among stock returns, interest rates, real activity, and inflation." Journal of Finance 47(1992): 1591-1603.

Lintner, J. (1965). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. Review of Economics and Statistics, 47, 13-37. http://dx.doi.org/10.2307/1924119

Liu, H., Manzoor, A., Wang, C., Zhang, L., & Manzoor, Z. (2020). The COVID-19 outbreak and affected countries stock markets response. International Journal of Environmental Research and Public Health, 17(8). doi:10.3390/ijerph17082800

Liu, X.H. and Sinclair, P."Does the linkage between stock market performance and economic growth vary across Greater China."Applied Economics Letters, 15 (2008): 505-508.

Loh, E. (2006). The Impact of SARS on the Performance and Risk Profile of Airline Stocks. International Journal of Transport Economics. 33(2), 401-422.

Lucey, Brian & Dowling, Michael. (2013). Cultural Behavioral Finance in Emerging Markets. Emerging Markets and the Global Economy: A Handbook. 327-346. 10.1016/B978-0-12-411549-1.00014-4.

Malden, K., & Stephens, S. (2020). *Cascading economic impacts of the COVID-19 outbreak in China* (Staff Research Report). US-China Economic and Security Review Commission.

Maliszewska, M., Matto, A., & Mensbrugghe, Van Der D. (2020). *The potential impact of COVID-19 on GDP and trade: A preliminary assessment* (Policy Research Working Paper No. 9211). World Bank.

McKibbin, W., & Fernando, R. (2020). The global macroeconomic impacts of COVID-19: Seven scenarios. In R. Baldwin & B. Weder di Mauro (Eds.), *Economics in the time of COVID-19* (pp. 45–51). Centre for Economic Policy Research.

Mossin, J. (1966). Equilibrium in a Capital Asset Market. Econometrica, 34(4), 768-783. http://dx.doi.org/10.2307/1910098

McGurk, Zachary; Nowak, Adam; and Hall, Joshua C., "Stock Returns and Investor Sentiment: Textual Analysis and Social Media" (2019). Economics Faculty Working Papers Series. 37. https://researchrepository.wvu.edu/econ_working-papers/37

Mladina, P. (2016, October 17). *The enigma of economic growth and stock market returns.* Northern Trust. https://www.northerntrust.com/europe/insights-research/2016/the-enigma-of-economic-growth-and-stock-market-returns

Nippani, S. and Washer, K. M. (2004). SARS: a Non-Event for Affected Countries' Stock Markets?. Applied Financial Economics, 14(15), 1105-1110.

Oskooe, S.A.P. (2010), 'Emerging Stock Market Performance and Economic Growth', American Journal of Applied Sciences, 7, 265-269.

OECD (2020), OECD Economic Outlook, Volume 2020 Issue 1, OECD Publishing, Paris, https://doi.org/10.1787/0d1d1e2e-en.

Pak, A., Adegboye, O. A., Adekunle, A. I., Rahman, K. M., McBryde, E. S., & Eisen, D.P. (2020). Economic consequences of the COVID-19 outbreak: The need for epidemic preparedness. *Frontiers in Public Health, 8*(241), 1–4. https://dx.doi.org/10.3389/fpubh.2020.00241

Patrick, H.T."Financial development and economic growth in underdeveloped countries." Economic Development and Cultural Change 14(1966): 174-189.

Panda, C. (2008). Do Interest Rates Matter for Stock Markets? Economic and Political Weekly, 43(17), 107–115. http://www.jstor.org/stable/40277397

Pakistan Stock Exchange. (n.d.). In Wikipedia. https://en.wikipedia.org/wiki/Pakistan_Stock_Exchange

Qadan, M., & Aharon, D. Y. (2019). Can investor sentiment predict the size premium? International Review of Financial Analysis, 63. https://doi.org/10.1016/j.irfa.2019.02.005

Rashid, Abdul and Jehan, Zanaib, 2013. Derivation of Quarterly GDP, Investment Spending, and Government Expenditure Figures from Annual Data: The Case of Pakistan.

Rigobon, R. and Sack, B. (2004) "The Impact of Monetary Policy on Asset Price"Journal of Monetary Economics, 51, pp. 1553-1575.

Sadaqat, M., & Butt, H. A. (2016). Modeling sentiment, temporal volatility and excess returns: Empirical evidence from segmented stock market. Journal of Business & Economics, 8(2), 202-228.

Schmeling, M. (2009). Investor sentiment and stock returns: Some international evidence. Journal of Empirical Finance, 16(3), 394e408. https://doi.org/10.1016/j.jempfin.2009.01.002

Sharpe, W. F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Donditions of Risk. Journal of Finance, 19, 425-442. http://dx.doi.org/10.2307/2977928

Sikarwar, Tarika Singh & Mehta, Seema & Varsha, Mundhra. (2011). Macroeconomic factor and stock returns: Evidence from Taiwan. Journal of Economics and International Finance. 2. 217-227.

Sotomayor, L.R., Cadenillas, A., 2009. Explicit solutions of consumption — investment problems in financial markets with regime switching. Mathematical Finance 19 (2), 251–279.

State Bank of Pakistan, (2020), *Financial Stability Review*. Retrieved from https://www.sbp.org.pk/FSR/2020/index.htm

State Bank of Pakistan, (2019-20). *The state of Pakistan's economy.* Retrieved from https://www.sbp.org.pk/reports/quarterly/fy20/Third/Complete.pdf

Thorbecke, W. (1997). On stock market returns and monetary Policy. Journal of Finance, 52(2), 635-654. 10.1111/j.1540-6261.1997.tb04816.x

Uddin, M.G.S. and Alam, M.M. (2010) "The Impacts of Interest Rate on Stock Market: Empirical Evidence from Dhaka Stock Exchange" South Asian Journal of Management and Sciences, 1 (2), pp. 123-132.

Wongbangpo P, Subhash CS (2002). Stock Market and Macroeconomic Fundamental Dynamic Interactions: ASEAN-5 Countries, J. Asian Econ., 13: 27-51

Wooldridge, J. M. (2012). *Introductory Econometrics: A modern approach* (5th ed.). Mason, Ohio: Cengage Learning.

Waheed, R., Sarwar, S., Sarwar, S., & Khan, M. K. (2020). The impact of COVID-19 on Karachi stock exchange: Quantile-on-quantile approach using secondary and predicted data. Journal of public affairs, e2290. Advance online publication. https://doi.org/10.1002/pa.2290

Yar, S. (2020a). Impact of COVID-19 on Performance of Pakistan Stock Exchange. (101540).

ZEREN, F., HIZARCI, A., 2020. the Impact of Covid-19 Coronavirus on Stock Markets: Evidence from Selected Countries. Muhasebe ve Finans İncelemeleri Derg. 1, 78–84. https://doi.org/10.32951/mufider.706159

Zhang W.D., Seyedian M., and Li J., Margin borrowing, stock returns, and market volatility: Evidence from margin credit balance. Economics Letters, 2005. 87(2): p. 273–278.

Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Financial Research Letters*, 101528. https://doi.org/10.1016/j.frl.2020.101528

Zhou, C., (1996). Stock market fluctuations and the term structure. Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series, 96/03.

Appendix

Table 1: Monthly Index Returns on KSE-100 Index

Month	*Close*	*Index Return*
Jul-18	*42712*	*0.019*
Aug-18	*41742*	*-0.023*
Sep-18	*40999*	*-0.018*
Oct-18	*41649*	*0.016*
Nov-18	*40496*	*-0.028*
Dec-18	*37067*	*-0.085*
Jan-19	*40800*	*0.101*
Feb-19	*39055*	*-0.043*
Mar-19	*38649*	*-0.010*
Apr-19	*36784*	*-0.048*
May-19	*35975*	*-0.022*
Jun-19	*33902*	*-0.058*
Jul-19	*31938*	*-0.058*
Aug-19	*29672*	*-0.071*
Sep-19	*32079*	*0.081*
Oct-19	*34204*	*0.066*
Nov-19	*39288*	*0.149*
Dec-19	*40735*	*0.037*
Jan-20	*41631*	*0.022*
Feb-20	*37984*	*-0.088*
Mar-20	*29232*	*-0.230*
Apr-20	*34112*	*0.167*
May-20	*33931*	*-0.005*
Jun-20	*34422*	*0.014*
Jul-20	*39258*	*0.141*
Aug-20	*41111*	*0.047*
Sep-20	*40571*	*-0.013*
Oct-20	*39888*	*-0.017*
Nov-20	*41069*	*0.030*
Dec-20	*43755*	*0.065*
Jan-21	*46386*	*0.060*
Feb-21	*45865*	*-0.011*
Mar-21	*44588*	*-0.028*
Apr-21	*44262*	*-0.007*
May-21	*47896*	*0.082*
Jun-21	*47356*	*-0.011*

Source: www.ksestocks.com

Table 2: Historical Data (Used for correlation)

Year	Units	(Million Rupees)
	AIPMA_IX	GDP
2011	105	9120336
2012	105	9470255
2013	104	9819055
2014	107	10217056
2015	107	10631649
2016	109	11116802
2017	112	11696934
2018	115	12344266
2019	119	12600651
2020	127	12541834

Source: The data for GDP and AIPMA_IX is retrieved from www.sbp.org.pk and data.imf.org, respectively.

Table 3: Interpolated values of GDP using Denton method

Month	Units	(Million Rupees)
	AIPMA_IX	GDP
Jul-18	111	997637
Aug-18	114	1018462
Sep-18	117	1042856
Oct-18	125	1110927
Nov-18	126	1116459
Dec-18	108	951584
Jan-19	117	1026362
Feb-19	114	1003185
Mar-19	124	1087299
Apr-19	123	1073995
May-19	124	1072723
Jun-19	127	1099164
Jul-19	113	972232
Aug-19	111	953412
Sep-19	125	1062166
Oct-19	128	1080028
Nov-19	118	990758
Dec-19	120	994877
Jan-20	172	1415368
Feb-20	172	1400208
Mar-20	136	1090530
Apr-20	92	726418
May-20	110	851334
Jun-20	132	1004504
Jul-20	145	1085368
Aug-20	134	986726
Sep-20	149	1072736
Oct-20	156	1106245
Nov-20	158	1104617
Dec-20	179	1237750
Jan-21	189	1292578
Feb-21	181	1230470
Mar-21	167	1128682
Apr-21	153	1026540
May-21	139	929763
Jun-21	125	834906

Source: Data for AIPMA_IX has been retrieved from data.imf.org

Table 10: GDP growth estimates

		Dependent Variable		
		Index Return		
		Observations		36
		F-statistic		0.68
		Prob (F-statistic)		0.52
		R- Squared		0.10
Variable	***Coefficient***	***Robust Std.Error***	***t-statistic***	***P>|t|***
GDP growth	-0.021	0.126	-0.160	0.870
GDP growth × Ln Covid Cases	0.096	0.083	1.150	0.257
Constant	0.010	0.011	0.910	0.369

Table 11: Interest rate estimates

		Dependent Variable		
		Index Return		
		Observations		36
		F-statistic		14.77
		Prob (F-statistic)		0.00
		R- Squared		0.39
Variable	***Coefficient***	***Robust Std.Error***	***t-statistic***	***P>|t|***
Interest rate	-1.656	0.613	-2.700	0.011
Interest rate × Ln Covid Cases	-0.370	0.081	-4.570	0.000
Constant	0.199	0.070	2.840	0.008

Table 12: Sentiment index estimates

		Dependent Variable		
		Index Return		
		Observations		36
		F-statistic		0.59
		Prob (F-statistic)		0.56
		R- Squared		0.10
Variable	***Coefficient***	***Robust Std.Error***	***t-statistic***	***P>|t|***
Sentiment index	0.008	0.013	0.590	0.559
Sentiment index × Ln Covid Cases	0.028	0.026	1.070	0.292
Constant	0.143	0.012	1.210	0.235