Changing Dynamics of Patterns of Risk and Returns of PSX During COVID-19

By

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Abstract

The purpose of this study is to evaluate the change in patterns of returns and risk of stock market companies of Pakistani due to Covid-19 outbreak. For this purpose, an event study has been performed in context of the companies listed with Pakistan stock exchange (PSX). The data of stock returns of KSE-100 firms before and after the event (i.e. 26th February, 2020) has been collected from which the normal return, expected return, and abnormal returns have been computed to proceed the analysis. The event study and analysis shows that the uncertainty of returns of PSX firms increased after the event date because stocks showed highly varying returns after the event date. It indicates that Covid-19 has caused significant changes in patterns of returns and risk of PSX listed firms. Furthermore, results of the current study have proved the increased volatility and variation of returns due to Covid-19 outbreak so, it is found through the study that Covid-19 outbreak has led to significant changes in patterns of risk and returns of PSX listed firms. This study would make significant contributions to the literature of investor's behavior and relevant theories and would enhance the practice of investment decisions in stock market of Pakistan.

Keywords: Covid-19 outbreak, stock returns, stock market, PSX, Pakistan

Chapter 1

Introduction

1.1. Introduction

The present chapter of the dissertation introduces the current study by highlighting its importance, aim, rationale, and objectives. In this chapter, the background of Covid-19 pandemic and response of different stock markets to this pandemic has been elaborated in order to highlight the need for investigating the effect of this pandemic on performance and risks in stock market. Given the background of research and practice regarding the influence of Covid-19 on the risk and returns of stock market, the current chapter highlights the research problem to be addressed and states the rationale for conducting the current study so, the research objectives, research questions, significance, and organization of this study have been introduced in this chapter.

1.2. Background

1.2.1. Covid-19 Outbreak

A novel virus named as corona virus (Covid-19) has dramatically changed the world in 2020. This virus was unknown to people till 2019 but at the end of 2019, the identification of this virus and its speedy transmission from person to person and from country to country worldwide has drastically affected the world. The first case of Covid-19 was identified by the "World Health Organization" (WHO) in Wuhan China on 31st December, 2019 after which the virus began to spread across other provinces of China. Dispersal of virus was supported by the massive movement of Chinese towards their hometowns for celebrating the New Year. This huge movement of people across different provinces in China made this outbreak to be transformed into a national crisis in mid-January 2020 (Ahmad, Haroon, & Hui, 2020; Yue, Gizem Korkmaz,

& Zhou, 2020). Once the seriousness of issue was identified, officials in Wuhan put a complete ban on travelling in terms of residents of Wuhan. However, this ban still was no enough to stop the dispersal of Covid-19 and the virus kept spreading. On January 30, the WHO announced a global emergency associated with the speedily spreading Covid-19. Such global emergency has been declared only the 6^{th} time so, it indicates the seriousness of the outbreak (Ahmad et al., 2020; H. Liu, Manzoor, Wang, Zhang, & Manzoor, 2020).

After its first detection in China, Covid-19 reached more than 180 countries across the world and affected the world economy (Duncan & Lyall, 2020; Fernandes, 2020). The disease was associated to a virus family termed as coronavirus by scientists of China. This family includes the "severe acute respiratory syndrome" virus as well as "Middle East respiratory syndrome". Symptoms of this disease are likely to occur within 2-14 days after the exposure or contact with a Covid-affected person. It means that the occurrence of symptoms of the disease even after 14 days makes it difficult to diagnose, confirm, and control this virus and disease at early stages. Given the risk of global dispersal of virus and its seriousness, WHO declared the Covid-19 as the pandemic in March, 2020. Although the death rate of Covid-19 is quite low in comparison to other viruses, but the higher infection rate of Covid-19 caused it to be termed as pandemic. China, Italy, and United States were reported to be having the highest number of Covid-19 cases as on March 23, 2020 respectively (H. Liu et al., 2020).

Normally, Covid-19 causes flu but in serious case, it may cause different enteric and neurological illnesses, kidney failure, pneumonia, severe respiratory syndrome, and even death of the patient (Anthony & Fauci, 2020). As this virus spreads mostly through respiratory droplets and contact with the patient so, many countries became compelled to put partial or complete lockdown during this pandemic. This virus has shattered the economies drastically by

extensively reshaping and affecting various sectors e.g. education sector, tourism sector, hospitality sector etc. (Fernandes, 2020; Nicola et al., 2020) The corporate sector is not exempted from the effects of Covid-19. The threats and challenges associated with this pandemic have really affected the optimism of people so, Covid-19 has resulted in changing dynamics of patterns of risk and returns of Pakistan Stock Exchange (PSX). Hence, Covid-19 has caused a substantial influence on performance of sectors around the world. However, the existing literature about Covid-19 and its influence on different sectors, economics, and countries is very limited yet because many countries are still finding it difficult to get rid of this virus and to recover from its effects. Therefore, researchers should perform in-depth studies for evaluating the influence of this pandemic on economies, countries, sectors, and different markets.

1.2.2. Economy and Stock Markets in Response to Pandemic

Although Covid-19 outbreak has led the world to a terrible health crises but problems associated with this pandemic go beyond the health or mortality because it has affected the entire globe. The severe outcomes of this pandemic on businesses as well as economies around the world are being discussed by recent analysts and researchers (S. R. Baker, Bloom, Davis, & Terry, 2020). Although Covid-19 started as the health crisis but it tends to end with the economic crisis because it has halted the economic activities largely. Different levels of lockdown imposed due to the spread of this disease have resulted in the complete or partial shutdown of markets, businesses, offices, flight operations, travelling, and other sectors around the world. It means that world seems to be frozen due to this pandemic and so, economies of the world (Desai & Patel, 2020). These circumstances have really shocked the economics due to which a number of economies have come to their knees. For example, global GDP faced the decline of 3% due to this pandemic (Fernandes, 2020). Furthermore, according to World Bank, the global economy

tends to further reduce by 5.2% in 2020 due to the pandemic and that will be one of the most shocking declines of the last 150 years (zumbrun, 2020). This large effect of Covid-19 pandemic is due to the fact that Covid-19 outbreak has not left any business or organization unaffected by the results of this pandemic. It means that all businesses ranging from a small retail shop to large billion dollars businesses/firms have been affected by the outcomes of this pandemic.

Consequences of Covid-19 pandemic are not limited to one or two sectors but, it has affected each and every sector of the world. For example, the stoppage of travelling has damaged the aviation sector, tourism sector, transportation etc. around the world (Adiga et al., 2020; Ashraf, 2020b;Delbard, 2020). Similarly, insurance industry and pharmaceutical sector have also been largely influenced by this disaster because the increased health pressure on pharmaceutical companies has led them to struggle for fulfilling the medical needs including medicines and medical equipment in times of shortage of resources and raw materials caused by the limited import (Ahmad et al., 2020; Vinci, Polidori, & Polidori, 2020). Companies have not faced declines only during this pandemic. Instead, this pandemic has given rise to the demand of many industries due to which those companies and industries have faced significant growth and success during this pandemic. For example, the increased demand for medical products such as masks, sanitizer, medicines etc. has provided large opportunity to pharmaceutical companies to get new streams of revenues and witness growth in their profitability and market value (Bain&Company, 2020; S. R. Baker, N. Bloom, S. J. Davis, K. Kost, et al., 2020; D. Zhang, Hu, & Ji, 2020). Besides these sectors, the corporate sector is one of the most important sectors that have faced obvious effects of Covid-19 pandemic. It is because the pandemic has given rise to varying investor's behavior that is in turn, affecting the stock markets largely. As this pandemic is associated with different types of feelings (positive, negative, mixed), emotions, thoughts, and

mental states so, these changing mental and emotional situations tend to result in varying investor's behavior (S. R. Baker, N. Bloom, S. J. Davis, K. Kost, et al., 2020; H. Liu et al., 2020; Phan & Narayan, 2020). However, the effects of this pandemic on economy, different sectors, and stock market performance need to be defined through proper research because the existing research is very limited and insufficient to explain the economic and stock market effects of Covid-19 pandemic.

Stock markets are interdependent, which means that change in one stock market may affect the other stock market. It has been argued by several prior researchers that the cross-market correlations become more significant during crisis/pandemic. For example, Chiang, Jeon, and Li (2007) found the existence of strong correlation among nine Asian markets while examining the daily stock returns of those market for the period 1996-2003. They suggested that the high correlation existed among those nine markets during the crises. Similarly, the high integration of Malaysia, Southeast Asia, Thailand, and Vietnam with China was also found in a recent study performed by Sun and Hou (2019). Morales and Andreosso-O'Callaghan (2012)Suggested that the interdependence of global markets was increasing and the pandemic/crisis in one market/country would spend to the other market eventually. It means that stock market movements have become largely correlated so, pandemics or events in one country can affect the markets across the borders of the country. Outbreak such as some infectious disease pandemic can influence the sentiments of investors negatively that are predictor of their investment decision. It means that the negative effect of such outbreaks on the investor's sentiments is faced in the form of ultimate investment decision of the investor. Hence, the investment decision affected by the pandemic may shape the stock market prices and cause them to increase or decrease accordingly. It is suggested by researchers that countries with low institutional

participation and high cultural susceptibility to herd-like actions are likely to face higher and obvious effect of investor's sentiments on stock markets (Donadelli, Kizys, & Riedel, 2017; He, He, & Wen, 2019; Parveen, Satti, Subhan, & Jamil, 2020). Hence, it is found that the effect of pandemic on investor's sentiments and the interdependence of stock markets causes an event/pandemic in a country to affect the market of another country as well.

During Covid-19 pandemic, WHO and other public health officials attempted to perform the part of a mediator for communicating the risk of the pandemic to investors and shaping their sentiments towards the infectious disease. Investor's sentiments play a significant role in shaping the stock markets. When market trends upward and the perceived risk in the market is low, then optimism level of investor rises so, investor is very likely to behave more optimistically. In contrast, when market trends downward and the perceived risk is high, then optimism level of investor declines so, investor is very likely to behave more pessimistically. In this situation, investor will be likely to wait for the revival of market to enter the market (Burns, Peters, & Slovic, 2012; Shu, 2010). It means that such situations result in the short-term overreaction of the investor. The study of Shu (2010) suggests that the variations in the mood of investor can shape the financial market behavior by directly affecting the projected returns and prices of equilibrium assets. Another factor influencing the stock market during pandemic is the media coverage because the number of articles covering the event affects the investor's action. Higher media coverage (i.e. higher number of articles related to the event) of some negative event leads to the higher number of withdrawals from the financial market (Del Giudice & Paltrinieri, 2017).

Globalization is another factor contributing towards the higher interdependence of stock markets because globalization has made the economies of the world interlinked. Particularly in recent years, this globalization has significantly made the global financial markets highly

interdependent, which ultimately affects the global investor's decisions (Siddiqui, 2009). Despite of introducing a number of benefits to economies and financial markets, globalization may also bring a number of substantial disadvantages. For instance, it played the huge role in times of infectious global crisis including Crimean Congo hemorrhagic fever, SARS, avian flu, Ebola virus, Zika virus, Nipah Virus etc. (Lee & McKibbin, 2004; H. Liu et al., 2020). The dispersal of infectious disease does not only affect the health and life of people, but also affects the economic growth. Similar is the case with Covid-19 because it has raised a number of challenges related to the economy, lifestyle, society, and psychology. People around the world are panicking due to this quickly spreading Covid-19. In other words, such shocks are likely to result in the decline of economic trends and change in the investor's sentiments. The anxiety associated with this pandemic tends to produce a negative feeling among investors, which can affect their investment decision and the ultimate returns on assets (Marinč, 2016). Hence, different economic, psychological, and behavioral factors associated with the pandemic/Covid-19 and interdependence of markets are likely to affect the investment behavior and decision of investors in different stock markets.

1.2.3. Covid-19 and PSX

PSX is not expected from the effects of Covid-19 because Covid-19 and uncertainties associated with it tends to affect the sentiments and ultimate investment decision of investors of this market as well. Due to Covid-19 and increasing number of cases in Pakistan, the PSX started trading on a bearish note with KSE-100 index as the benchmark and it faced its biggest collapse since 2009. Furthermore, the increasing number of cases of Covid-19 in the country pushed the KSE-100 index to touch to intraday low at 27228.80 points by losing 1336.03 percentage descent of 4.68. KSE went through highly instable two weeks of trading during March 2020 as it faced a series of

bearish sell-offs during that time (Times, 2020). However, the PSX does not only faced falls during this pandemic. Rather, the stock market also reacted positively to the Covid-19 recoveries various times. It means that the risk and returns of PSX substantially reacted to Covid-19 situations.

The obvious effects of Covid-19 on the performance of PSX have attracted a number of researcher to examine this phenomenon but no study has yet effectively addressed this phenomenon (Ashraf, 2020a, 2020b;Waheed, Sarwar, Sarwar, & Khan) because these studies provide mixed findings. Some studies suggest the significant positive relationship between Covid-19 and performance of PSX (Ashraf, 2020a, 2020b) while some analysts highlighted the negative association between Covid-19 and performance of PSX (Shahid, 2020; Times, 2020). It means that the actual effect of Covid-19 on performance of PSX is unknown and inconsistent in past analysis and studies. Therefore, there is need to examine the changing dynamics of patterns of risk and returns of PSX caused by Covid-19. The Covid-19 and its linkage with the financial and market performance of firms are gaining great attention of modern researchers worldwide as the number of deaths, cases, and recoveries of Covid-19 cause obvious variations in the returns of stock markets (Al-Awadhi, Al-Saifi, Al-Awadhi, & Alhamadi, 2020; Phan & Narayan, 2020; D. Zhang et al., 2020).

The role of pandemics and crisis in deriving the returns of stock markets has been emphasized by a number of past researchers who identified a number of crisis and events that caused significant change in the patterns of risk and returns of stock exchange of different countries e.g. (R. Ali & Afzal, 2012; Anagnostidis, Varsakelis, & Emmanouilides, 2016; McTier, Tse, & Wald, 2013; Smith, Keogh-Brown, & Barnett, 2011; Z. Wang, Yang, & Bessler, 2003). These studies emphasize that the global pandemic or crisis have the potential to cause significant changes in

the risk and returns of stock markets of various countries. It means that the Covid-19 and threats and hopes associated with it affect the returns as well as variations in returns of the stock market so, variations in both returns as well as risks of PSX are argued to be associated with the Covid-19. However, the existing literature provides a very little explanation of the phenomenon of changing dynamics of patterns of risks and returns of PSX during Covid-19.

1.3. Problem Statement

Stock prices tick up and down constantly due to fluctuations in supply and demand and the relationship between supply and demand is highly sensitive to the news and economic condition of country. Negative news normally causes people to sell stocks and earn negative returns. Stock markets have become largely interdependent, due to which the event/pandemic in one country/market is likely to affect the market of other country soon. Covid-19 has been declared as the global pandemic due to its quick dispersal and serious effects on health, economy, and other domain of countries around the world. Existing theory provides insights that such pandemics have the potential to affect the financial markets by influencing the investor's sentiments, investor's behavior, and investor's decisions. However, the existing literature is yet unable to explain how the Covid-19 pandemic has affected the stock markets of different countries and risks and returns in those markets. The Covid-19 outbreak has given rise to panic behavior and feelings among people around the world and people are increasingly becoming worried about their assets, investments, and life. These changing sentiments of people due to Covid-19 tend to affect their investment behavior, decisions, and ultimate supply and demand of stocks.

The supply and demand of assets/stocks in the market causes the stock prices to fluctuate accordingly. For example, the negative news about the economic condition of a country raises

the negative investor's sentiments and the investors become likely to sell stocks. At the same time, some investors may be thinking optimistically that they can buy shares at lower prices today but they would sell them at high prices in the future. It means that different types of investor's sentiments are associated with the information disseminated by this pandemic. These investor's sentiments result in different investment decision and behavior of those investors so, returns of stocks vary ultimately. Different factors including the interdependence, anxiety, investor's sentiments, economic projections etc. can be the reason behind changing patterns of stock returns and risk in a stock market. However, it is still unknown that how exactly Covid-19 pandemic has affected the patterns of risks and returns of different stock markets such as PSX. This problem is not limited to PSX only rather the stock markets around the world are being affected by uncertainties associated with Covid-19. The global context of this phenomenon requires proper research and evidence regarding this phenomenon so that, it can be found that how the uncertainties of Covid-19 have affected the risk and returns of stock markets. The effects of Covid-19 outbreak on stock markets seem to be more pertinent in developing countries like Pakistan. The existing limited literature provides mixed findings about these effects as some studies suggest that positive relationship exists between Covid-19 pandemic and stock market performance while some studies suggest that negative relationship exists between Covid-19 pandemic and stock market performance. Therefore, there exists the need for examining empirically what effects have been caused by Covid-19 on risk and returns in PSX. The current study intends to address this issue by evaluating the changing patterns of stock market returns and risk in PSX during Covid-19. In this study, researcher hinges and deliberates upon to find out the impact of Covid-19 on risk and return patterns in PSX.

1.4. Aim and Research Objectives

Given the problem highlighted in previous section and the limitation of the literature to explain the influence of Covid-19 on patterns of risk and returns of PSX, the current study aims to assess the impact of Covid-19 outbreak on patterns of risk and returns of PSX. For achieving this aim, following research objectives are developed to address the problem:

- To assess the impact of covid-19 outbreak on returns of PSX listed firms;
- To analyze the impact of covid-19 outbreak on risks of PSX listed firms;
- To draw guidelines how the patterns of risk and returns of PSX listed firms have changed during Covid-19 outbreak.

1.5. Research Questions

The research objectives developed in the current study are achieved by answering following research questions:

- What is the impact of covid-19 outbreak on returns of PSX listed firms?
- What is the impact of covid-19 outbreak on risks of PSX listed firms?
- How the patterns of risk and returns of PSX listed firms have changed during Covid-19 outbreak?

1.6. Justification and Rationale

Although a number of hypotheses and past theories support the argument that the global disaster and crisis influence the performance and patterns of risk and returns of stock markets but the existing literature seems to be very limited with respect to the empirical evidence of the impact of Covid-19 on the performance of stock markets of different countries. Despite of different studies relevant to the signaling theory, efficient market theory, intertemporal asset pricing

theory, rational expectations etc. existing in the literature, it is still unknown how these theories support the viewpoint of effects of some disaster like Covid-19 on the stock market returns and risk patterns. It is because prior researcher have though explained how these theories are relevant to the investor's behavior and decision but they have not efficiently explained the aspect of these theories to shape the investor's behavior with particular reference to some pandemic like Covid-19. The current study intends to reduce this shortage in the literature by explaining and linking these theories to the effects of Covid-19 outbreak on investor's sentiments/behavior and ultimate stock returns and risk. Despite of some studies regarding the effect of the disaster on stock returns and performance, particular studies addressing the change in patterns of risk and returns of stock exchange listed companies due to the very recent pandemic i.e. Covid-19 are very scarce in number. This is because Covid-19 is a recent outbreak, which has not received enough attempts of researchers yet. The obvious effects of Covid-19 on the performance of PSX during some last months have gained attention of a number of researchers but they still have not addressed and explained these effects evidentially and efficiently.

Most of the past studies examining or discussing the change in patterns of share return and risk due to this pandemic are descriptive or exploratory in nature because the world is still under the effects of this pandemic. It means that those studies mostly discuss this problem/issue/phenomenon in detail or identify consequences of this pandemic but they do rarely provide any statically analysis to demonstrate the change the in patterns of risk and returns caused by Covid-19 pandemic. This lack of explanatory studies in this regard needs to be removed. The current study tends to fill this gap by statistically analyzing the change in patterns of returns and risk of PSX listed firms due to Covid-19 outbreak. It is found through the review of literature that a very few recent studies that attempt to explain the impact of Covid-19 on

patterns of risk and returns of PSX, provide mixed findings. Some studies suggest the existence of significant positive relationship between Covid-19 and performance of PSX (Ashraf, 2020a, 2020b) while reports highlighted the negative association between Covid-19 and performance of PSX (Shahid, 2020; Times, 2020). This lack of empirical evidence and harmonized conclusion about the influence of Covid-19 on patterns of risk and returns of PSX firms raises the need for efficient and detailed explanation and analysis of the changing dynamics of patterns of risk and returns of PSX firms during Covid-19. Therefore, the current study attempts to fill this gap by performing an empirical research and providing an empirical evidence about the effect of Covid-19 on the patterns of risk and returns of PSX firms. It means that studies like the current one are strongly needed to address the highlighted gap.

1.7. Scope of Study

The current study has been performed to evaluate the changing patterns of risk and returns of PSX listed firms during Covid-19 so, it has a wide theoretical and practical scope. Theoretically, this study covers the efficient market theory (EMT), rational expectations, intertemporal asset pricing theory (ITAPT), and market capitalization because these theories have been included as the support of the current arguments regarding the effect of Covid-19 on stock market returns and risks. Furthermore, the present study includes the discussion and literature review of stock markets, stock returns, stock risk, and Covid-19 outbreak. Therefore, the current study covers the literature related to these theories and effect of pandemic/Covid-19 on stock markets. Practically, the current study covers the firms listed on PSX so, the findings of the current study will be applicable on Pakistani firms listed with PSX. These findings will guide investors and firms how the Covid-19 outbreak was able to shape the rise and falls of stock returns and risks. It means that practically, the current study covers PSX listed firms of Pakistan so, its findings are

expected to help PSX listed companies and ultimately corporate sector of Pakistan to grow. As the corporate sector entails a large importance in the economy of Pakistan so, it can be said that scope of the present study goes beyond the sector and reaches to the economy of Pakistan.

1.8. Significance of Study

The significance of this study is determined by its theoretical and practical contributions. The current study tends to enhance a broad area of literature because the literature about the signaling theory, EMT, rational expectations, ITAPT, and stock market effects of Covid-19 will be significantly enhanced through the current study. Although these theories have been discussed and explained largely by prior researchers and theorists but the literature is still insufficient to explain how these theories can support the viewpoint of the effects of Covid-19 like disasters on stock returns and investor's behavior. Therefore, the current study will add value to the literature of these theories by linking them with the effect of Covid-19 outbreak on stock performance, stock returns, and stock risk. In this way, it can be said that the current study will be a good addition to the literature of these theories.

The empirical evidence about the impact of Covid-19 on the patterns of risk and return of PSX firms will be improved through the current findings and suggestions. As the currently existing literature about the effect of Covid-19 outbreak on patterns of stock returns and risk is very limited due to the recent arrival of this pandemic so, the current study will be a significant theoretical contribution to the literature. Furthermore, the current study will help the researchers to bring the harmony in the literature about the effect of Covid-19 pandemic on patterns of stock returns and risk because currently, the literature is unable to provide harmonized results about the effects of Covid-19 pandemic on stock return and risk. In this way, the current study and evidential findings provided by it tend to be the significant contribution to the literature.

Therefore, it can be said that the current study will make significant contributions to the very limited literature of Covid-19 outbreak, its linkage with stock market, its effects on stock returns and pattern of returns, and its linkage with investor's behavior theories.

Practically, the current study will help firms, investors, and policymakers to realize how the Covid-19 affected the performance and volatility of firms. As far as the investors are concerned, findings of the current study will help investors to have better understanding of the changing dynamics of patterns of risk and returns of PSX firms during Covid-19 so, they will get help from this study in making their investment decisions. Investors will be able to understand through this study that how different Covid-19 news and events have caused changes in patterns of return and risk of different PSX listed firms so, they would be better able to understand and forecast the performance of PSX listed firms. By identifying and understanding the effect of Covid-19 on patterns of return and risk of shares, investors would be better able to formulate their investment portfolio, minimize their risk, and take effective steps to ensure high returns. Hence, the current study tends to be very significant for investors of PSX.

Besides investors, the present study tends to be very significant for firms listed at PSX as well. Firms will be able to get guide from these findings that how their returns respond to such pandemic and disasters. Evidential findings of this study would help PSX listed firms of Pakistan to understand the rise and fall of their stock returns and change in risk in response to Covid-19. As the economies around the world are still under the threat of Covid-19 outbreak so, firms of PSX would find this study helpful in coping with the currently going times. In this way, they would be better able to draw projections of their risks and returns associated with pandemic. Furthermore, firms would be able to understand through their current findings how the investor's sentiments have been influenced by Covid-19 outbreak so, firms and their management/boardcan

design better strategies and actions to enhance the investor's confidence on them and reduce their insecurities so that, they can attract and retain their investors. The present study will also be significant for policymaking as policymakers will come to know the role of Covid-19 outbreak and different types of information and news disseminated about Covid-19 in shaping the stock market performance. It means that they can develop better policies to control the broadcasting and dissemination of information regarding Covid-19 outbreak in order to direct the PSX in the desired way. Hence, the theoretical, practical, and policymaking aspects of this study make it a very significant study.

1.9. Organization of Study

The current study has been organized into five key chapter that are as follow:

Chapter 1 – Introduction

In this chapter, the study, its purpose, need, importance, objectives, rationale, and organization have been elaborated that introduce the nature and reason behind conducting this study to the reader.

Chapter 2 – Literature Review

In the second chapter, supportive theories and literature have been reviewed based on which the hypotheses of the current study are developed. In this chapter, major theories providing support to the current study and literature relevant to the effect of Covid-19 outbreak on stock markets are reviewed in detail.

Chapter 3 – Methodology

This chapter elaborated the research methods and approaches adopted to complete the current study. In this chapter, particular methodological choices selected for the current study and reasons behind selecting them are justified.

Chapter 4 – Analysis and Results

This chapter provides in-depth presentation of results generated through the analysis of data. It provides the elaboration of different tests applied on the data an results of those tests based on which the decision to accept or reject the current hypotheses are made.

Chapter 5 – Discussion and Conclusion

The last chapter deals with the discussion and comparison of results of the study with past studies in order to identify similarities and differences between findings. Furthermore, this chapter concludes the whole study and provides its implications.

1.10. Summary of Chapter

The current chapter shows that the Covid-19 has affected the stock markets around the world and the past literature also provide insights that such infectious diseases and pandemic can affect the stock markets. However, given the significant shortage of the literature about the impact of Covid-19 outbreak on stock returns and risks in PSX, the current study aims to assess the effect of Covid-19 outbreak on returns and risks of PSX firms. This study will shorten the gap in the existing literature and will contribute to a number of theories through its evidential findings.

Chapter 2

Literature Review

2.1. Introduction

This chapter provides a detailed review of literature regarding the Covid-19 outbreak, efficient market theory (EMT), rational expectations, intertemporal asset pricing theory (ITAPT), and market capitalization, and the effect of pandemics like Covid-19 on stock returns and risks. To draw a significant support for the current study and argument, theories have been reviewed and linked with the current argument. It has been discussed in the current chapter how these theories support the idea that the Covid-19 and associated uncertainties can influence the stock market performance. Based on these theories and prior studies, hypothesis of the current study is developed in this chapter.

2.2. Covid-19 Pandemic

Covid-19 was first appeared in Wuhan City of China during December 2019. After its first appearance, it wasnoticed around the world due to its rapid spread. Chinese government responded to this virus by putting the complete lockdown in Wuhan city and this step proved to be an effective action for controlling the pandemic associated with Covid-19. Putting the lockdown did not prove as an effective measure only in Wuhan but also in many other countries of the world. After China, the major pandemic of Covid-19 was faced by South Korea. After its first appearance, Covid-19 has spread so rapidly and massively. The number of positive cases of Covid-19 hasbeen consistently increasing since its first appearance and now this number has reached around 9.1 million cases. Although, the rate of spread of this disease has slowed down in

a number of countries but Covid-19 is still spreading quickly in different regions such as Asia and America.

Given the serious spread and effects of Covid-19 on the world, it was declared as the global pandemic on March 11, 2020 by WHO. Covid-19 has largely affected the world in economic, environmental, social, and other aspects. Since the great depression, the global economy as well as financial markets have been greatly shaken by Covid-19 disease and its effects. Although different preventive measures such as social distancing and partial or complete lock-downs have been proved as effective measures to some extent but they also have an opportunity cost in terms of the decline in economic activity, business sales, and even the complete closure of different firms and sectors. Different economic and financial losses and outcomes associated with Covid-19 outbreak have largely affected the stock markets of the world. It is suggested by scholars that the obvious effect of Covid-19 pandemic on stock markets has been observed around the world because this pandemic has affected the stock markets of almost all continents. The stock market of Pakistan is also one of those exchanges that have faced the significant effects of Covid-19 outbreak.

Covid-19 has given rise to many costs for lives and other economic challenges due to which researchers in the existing literature focus on different illness-associated medical costs as well as economic effects of the outbreak. For instance, a study performed by Siu and Wong (2004) aimed to examine the economic impacts of SARS epidemic in Hong King. According to them, the most severe negative economic effect of SARS epidemic was faced on the consumer side due to the change in local consumption particularly in the field of tourism and other air travel-related services. However, any serious supply shock was not faced by the economy because the manufacturing base existing in the Delta of the Pearl River was not affected. Furthermore,

products were being habitually exported to Hong Kong. Lee and McKibbin (2004)also attempted to study the economic impacts of SARS by using the C-Cubed model. They suggested that the SARS epidemic has affected the society across the world severely because of the spread of this disease as well as spread of economic shock from one country to others due to the financial integration and markets interdependence.

Besides these studies, a study performed by Marinč (2016) to examine the effect of Ebola outbreak on stock prices also suggest that the geographical immediacy of information dispersed by the Ebola outbreak in 2014 combined with the broad media coverage has negatively influenced the US stock/asset prices. Furthermore, it was suggested by the mentioned study that the domestic media reporting significantly affected the local trading and this effect was more distinct in smaller and risky assets and less stable industries. Despite of these studies, the effect of the current Covid-19 pandemic on economy is still uncertain because the spread of this disease, death rate associated with this disease, severity of this pandemic, the responsive policies of policymakers, and individual behavior and response to this disease and outbreak are unknown. Covid-19 has added fuel to the volatility and uncertainty by causing huge disruption and transformation in lives of people across various countries in health, economy, social, and many other perspectives.

The things and processes that were not imaginable in the past, are now happening and more than one third of the world's population is living under the complete curfew, partial curfew, or curfew-like situations. These circumstances are leading towards fear, stoppage of economic activities, panic buying, and closure of many sectors including education, industries etc. (S. Ramelli & A. Wagner, 2020; S. Ramelli & A. F. Wagner, 2020a). Therefore, governments of all influenced countries are taking steps for containing economic and health impacts of this

outbreak. For this purpose, they need to first understand that how this pandemic has affected their economy, markets, and different sectors. However, the existing literature is very limited in explaining the phenomenon through which Covid-19 pandemic has derived different changes to their economies, financial markets, and other sectors.

2.3. Interdependence of Stock Markets

Economies of the world have become interlinked and interdependent particularly in recent years due to the globalization due to which the significant changes in one economy or financial market cause significant changes in another economy and financial market. Researchers argue that this interdependence of financial markets causes significant influence on decision-making of global investors and their behavior regarding the asset allocation and investment. Furthermore, this interdependence of financial market is also said to be largely associated with the decision-making regarding economic policies for ensuring the economic stability. A study performed by In, Kim, and Yoon (2002) examined the dynamic linkages of international stock markets and collected the evidence from the financial crisis in Asia. They argued and found that the interdependence and linkage between markets significantly increased during the financial crisis in all Asian economies except Malaysia.

It is embraced by almost all analysts that the financial markets keep moving in the similar direction across different countries. However, variation may appear in the sense that some financial markets seem to be more correlated with each other than other stock markets (Y. Liu, 2020). Therefore, despite of a large number of benefits associated with the globalization, it is argued by researchers that it can play a huge role particularly during infectious worldwide crises. This interdependence of financial/stock markets has been an important topic of research particularly in behavioral finance studies. Covid-19, challenges associated with it, and extreme

happenings of infection and death due to it have made people panicked. These external and uncertain shocks have the potential to affect the investor's sentiments and associated investor's behavior. For example, Kaplanski and Levy (2010) argue that the anxiety level and mood of the investor can influence his/her investment decision and higher anxiety level may make the investor more pessimistic about the future returns. Therefore, anxious investors are likely to make less risky investment decisions because anxiety tends to raise the negative feelings. The unfamiliar situation raised by thus Covid-19 pandemic creates an opportunity for researchers to evaluate the impact of this pandemic on stock markets of nations that have been affected by this disease.

2.4. Relevant Theories

The following portion reviews different theories that provide support to the argument of this study that Covid-19 pandemic has caused variations in the patterns of risk and return of PSX companies. Review of literature of finance and economics shows that three key theories are used and considered while explaining the stock market behavior that are classical, behavioral, and efficient capital market perspectives. The classical theory suggests that the behavior of stock market is evaluated in form of interval between demand and supply schedules and the steadiness of this interval at the equilibrium position. Such mechanism is indicated by some type of Walsarian process. This process enables the stock prices to respond to excess supply or demand or pejorative demand through a constricting device, which enables the exchange to happen only once the balance is disseminated and reached (Eisner & Nadiri, 1968; Martin, Gomez-Mejia, & Wiseman, 2013). It means that this theory regards the fluctuations in prices of stocks as the consequence of shifts in demand force, supply force, or both forces. Hence, the classical theory provides insights that the stock price fluctuations under any situation are the result of the amount

of stocks demanded by the general public and supply of stocks offered in the market (Meade, 2013; Sui & Sun, 2016). However, the viewpoint of the long-term equilibrium, lack of stability characteristics of the classical amendment process, and lack of fitness of the viewpoint of free competition to the economy of modern era tend to make this theory limited and sometimes insufficient to explain the stock market behavior.

Another theory used by finance researchers to explain the stock market behavior is the behavioral theory, which attempts to predict and explain the decision making behavior and patterns of investors in the market (Ruhani, Islam, & Ahmad, 2018). This theory suggests that the investment decisions regarding the securities are made by investors based on the information available to them and based on the general environment under which they are living. The behavioral theory suits well with the current study because the current study intends to explain the effect of Covid-19 related information and environment on investor's behavior and ultimate stock returns. The behavioral theory is applicable when investors in a stock market tend to react to misfortune of the environment and situation by pulling out their money from the market due to the fear feelings and expected declines in returns of shares. This reaction of investors leads to the decrease in stock prices and thus, the decline in stock returns (Bouteska & Regaieg, 2020; Ricciardi & Simon, 2000;Shiller, 2003). This theory is quite applicable on the current situation of Covid-19 where investors are afraid of decreased returns in the future so, they are reacting to this misfortune situation and pulling out their money from the stock markets. This reactions of investors in this situations tends to results in the decreased stock prices. This theory is very efficient in explaining the stock market behavior so, it is regarded as a better approach to explain the stock market behavior by some researchers e.g. (Ackert, 2014; Bloomfield, 2010;Hirshleifer,

2015). Hence, the behavior of investors is regarded as the response to information and environment available to them according to the behavior theory of finance.

The third theory mostly used by researchers to explain the investor behavior is the efficient capital market theory, which suggests that the stocks markets are efficient capital market where the stock prices are fully reflective of the information available about the stocks and companies. This theory has been prominently used by many researchers for explaining the fluctuating approaches of the stock market behavior because it includes the explanation of the stock price movements through the statistical time-series models. The concept of efficient capital market is well defined by Eugene F Fama (1970) who regard the market as the efficient capital market when prices of stock in that market reflect all the information available about the firm value. This proposition is also termed as the efficient market hypothesis and "Random Walk theory". According to this hypothesis, stock prices in an efficient capital market tend to reflect all information about the firm and its value without any method of making excess profits and using some explicit information (Borges, 2010; Sewell, 2011). This theory and hypotheses are applicable to the currently going situation of Covid-19 outbreak because it explains well the global capital market as well as capital market of Pakistan. As investors during this Covid-19 pandemic are unclear about the prospect performance of firms and securities and shares of different industries in PSX are indicating high risks so, investor's confidence in PSX listed firms is varying due to high uncertainty. These variations in investor's sentiments and confidence on PSX and other global stock markets result in the change in patterns of return and risk of those firms and stock markets. Hence, the behavioral theory and efficient market hypothesis are key perspectives that are relevant to the current study. Following are some other finance theories that are relevant to the current situation of Covid-19 outbreak and its impact on patterns of return and

risk of stock exchange companies. In this section, signaling theory, efficient market theory, rational expectations theory, intertemporal asset pricing theory, and market capitalization are reviewed and support for the current argument is drawn.

2.4.1. Signaling Theory

This theory is based on the assumption that information is not always adequately available to concerned individuals, to make suitable decisions upon that. Asymmetrical information, which serve as signal for investors may lead companies to make corporate financial decisions. These signals are directly prepositional to investor's financial decisions. Investor's act according to the signal they receive and their investment decisions are heavily dependent on it. Signaling theory was first coined by Ross in 1977, it state that managers/investors capital structure varies, if they have inside information (Morris, 1987; Peso, Elgar, & Barron, 2015;Ross, 1977). John M. Clark, T. Bettina Cornwell and Stephen W. Pruitt in 2002, examined signaling theory and results showed that inside information plays an important role for investor's decision for buying stock. This information affects investors optimism level (Clark, Cornwell, & Pruitt, 2002).

Information of profitability indicators is the focal point of this theory, which helps investors, to take part in financial market activities. Performance indicators of profitable firms disclose profitability index and vice versa. Investors react favorably if future prospective is optimistic, and they have inside source information too. Investment decisions are never based on Speculation /thinking pattern of investor/growth matrix of the organization but on quantitative indicators/inside information. Bini, Giunta, and Dainelli (2010) studied this theory and results revealed that profitability indictors directly proportionate investors' decision. This study was conducted in Italy and UK and they have considered profitability as their focal point of the study. Doctored ratios are always not welcomed by the investors, because the main purpose from

market signals is, to get higher return on investment (Bini, Giunta, & Dainelli, 2010). A study conducted by Drover, Wood, and Corbett in 2018 state that congruent signals positively hit investors cognition and tend to result in higher investment patterns. These signal also include the profitability indices of the organization which help in strengthening the investment cognition (Drover, Wood, & Corbett, 2018).

Inside signals/ market information have the profound effects on investor's behavior/physiology of the receiver. Investor decisions are based on their emotion and behavior. Studies have shown that investor's sentiments are negatively affected if overall economic condition are the country is struggling. This effect the optimism level of investors and hence result in less investment motive (Peso et al., 2015; Six, 2007). Profitable organizations are perceived to be a good opportunity for investors while doctored ratios are always avoided. Favorable signals positively impact investor's decision. These signals can be organization's annual report, economic conditions, environmental effect, inside source information, positive market trends, political conditions (Miller & del Carmen Triana, 2009). Many studies have been conducted on signaling theory and many factors that affect the decision making of investors have been discovered and finite literature review is available on them but how COVID-19 has effected decision making of investors and how signaling theory can play an important role in it, still needsto be discovered more. However past studied conducted relevant to the signaling theory do not effectively explain the phenomena, to which this study can explain the effect of some disaster i.e. COVID-19 on performance of job exchange. This pandemic has hit the world economy and hence affected it badly.

2.4.2. Efficient market Theory (EMT)

This theory state that share prices reflect all the information available in the market. This is also called speculation theory of Louis Bachelier (1900) who proposed in his PHD thesis that this theory also known as efficient market theory. It explains that how prices of stocks and commodities varies, and how market information is used to determine the expected prices of the stock. Efficient market theory makes testable forecasting and minimize risk on market anomalies (Bachelier, 2011). A market is efficient, if it reflect completely to the available information. EMT is served as base for modern asset pricing and risk adjustment theories (Sewell, 2011). EMT positively impact decision making of the investors. It serves as a base for their decision regarding to investment with minimum risk threat. This theory support investor's verdict and leads to optimism investment level. Studies have investigated EMT and have shown strong empirical basis of it. Stock prices are reflected by market information and it leads to higher return on investment. Investor's optimism level increases, if market is efficient and expected risks are minimized. Investors are straightforwardly concerned about the intrinsic stock prices and return on investment (Guerrien & Gun, 2011).

Market is said to be on equilibrium state, if the stock price reflects its true intrinsic value. Here true intrinsic value states the market efficiency towards stock prices (Gabriela ğiĠan, 2015; Yalçın, 2010). Yalcin(2010) stated that EMT studies a market, where rational investors are competing for profit maximization purpose. It also state that a market is said to be efficient, where, latest important information is available to all the investors and they react accordingly. This study was conducted in micro-level, hence cannot be applied for macro investment decisions as world is changing and so it the market. Market anomalies now a days, have made it difficult to respond to the information available about stocks. Prospective future speculation

leads to greater investment trend from investor and investors are ready to invest if market is efficient and reflect favorably to its information. Market efficiency directly proportionate to investment behavior of the investors for short period of time (Ramon, 2011).

Naffa (2009) investigated efficient marketing theory. In this study market, was divided into three parts weak form of efficiency, semi-string form of efficiency and strong form of efficiency. It represent that investors imagination reflects market efficiency and their investment patterns are decided according. Many people reject this theory, as stock prices do not always reflect market information and fluctuate irregularly. This study revealed that EMT not always reflect favorable results and hence, is applicable for short term investment decisions (Naffa, 2009; Santoso & Ikhsan, 2020). Market information, during natural disaster directly proportionate the investment behavior of the investors. However past studied conducted, relevant to the efficient market theory, do not effectively explain the phenomena, to which this study can explain the effect of i.e. COVID-19 on investment behavior of the investors. Hence market situations during this pandemic are struggling, and investors will strongly rely of information available in market, for future investment.

2.4.3. Rational expectation theory

Rational expectations theory (RET) posits that investor's decisions are manipulated by three factors i.e. human rationality, available information and past experiences. This concept is widely used in macroeconomic. Rational expectations theory reveals, foreseen factors of economics i.e. interest rate and inflation in economy. High interest rates play a major role for inculcating investment behavior of investors. They tend to invest more, if future prospective is high but consider past data as a valuable information too. This theory was proposed by Muth (1961). Investors are conferenced about risk and return of their investment. High inflation and low

interest rate are always discouraging investors moral for future investment. Past outcomes influence future outcomes of investors. This theory helps in decision making of investors as serve as a cornerstone of efficient market hypothesis.

Kanjilal (2014) investigated that investment behavior of the investors, is influenced by, the market information available and past experiences of market/individuals. They have also studied long term/short term return on investment (Kanjilal, 2014). Future investments are highly effected by the past experiences of investors. Hence this study was conducted in India and they have different interest rates and inflation situation which varies in every country. Past studies have revealed that higher inflation rate in past are expected to the same in future. investors behavior for future investment are directly proportional to the past inflation situations and past interest rates (J. Zhang, 2019). Handsome return on investment positively impact buying behavior of investors and their optimism level increases. This also leads to higher investment trend in future because past experiences influence future decision of investors. Jian-yuan (2005)investigated investment trend of official bodies and found that past investment trends play a major role in future monetary policy making. As discussed above, this theory is widely used as a tool of macroeconomic which help in construction of monetary policies and to define future interest rates of financial institutions. Shanghai Interbank Offered Rate (Shibor) was analyzed for this study and other factors are held to be constant for this study, which is said to be a limitation of this research paper(Jian-yuan, 2005). Past experiences are directly proportional to future investment trends. Investors are highly concerned for return and risk associated with the investment and they minimize the risk and maximize the return with the help of past data and available information. Feridun, Folawewo, and Osinubi (2005) stated in their study while investigating rational expectation theory and its effect on monetary policy of Nigeria. This study

revealed that high interest rates of monetary policy are highly welcomed by the investors. Previous economic condition directly affects investor's decisions. It means that people tend to invest if available market information reflects clear stock value and past experience related to investment was promising (Feridun, Folawewo, & Osinubi, 2005). Hence it proves that investor's sentiments are positively attached, with accurate current market information and favorable past experience. Bad experiences lead to low investment trend and vice versa. For example, if inflation rate is higher in previous year than it is expected by the investor that, inflation rate this year will also be higher than before. However past studies have discussed rational expectation theory very well but they haven't effectively explained the effect of natural disaster i.e. COID-19 financial performance of organizations.

2.4.4. Intertemporal Asset Pricing Theory (ITAPT)

Intertemporal asset pricing theory is consumption-based asset pricing theory which states that investors evade their risk by efficiently calculating the return of the investment. This theory states that investors are proactive and they calculate their ROI and expected risk associated with the investment. It means that investors are aware of the risk associated with the investment yet they make investment because the calculated return is higher than the risk of investment. Robert Merton presented this theory and stated it as a linear factor model theory which aims higher returns. This theory admit the fact that, investors hedge their risks and make future prospect investments (Breeden, 2005; Duffie, 2010). Investors are future optimistic for their return, investment with regular cash flows and minimum risk level are accepted and welcomed by the investors. Securities which imply regular cash flow and time to time increasing weighted return, are highly popular for investment.

J. M. Chen (2017)InvestigatedIntertemporal Capital Asset Pricing Theory (ITCAPT) and suggests that investors desire to preserve their future investment with minimum or no risk securities which yield higher expected return on investment.Portfolio selection is of main importance, which securities to invest in. A mix of such securities is preferred which generate favorable current and future ROI. While discussing this theory, liquidity of securities, risk tolerance level and other factors are held constant which lemmatized the scope of this study. Intertemporal Asset Pricing Theory (ITAPT) help investors for their current and future investment. Risk is the focal point while discussing this theory. Investment is made, taking into account the possible risk, profit expectation and liquidation. This is general behavior of investors and global phycology; the aim of investment is higher return with low or not risk attached. Intertemporal asset pricing theory is directly linked with the investment trends/behavior of the investors. Optimal portfolio theory and consumption choices of investors are strongly linked with asset pricing theory (Duffie, 2010). Duffie(2010) stated in his study that, investors tend to have positive reaction for investing in portfolios if marginal cost of substitution is low. This state higher return expectation and low risk fear. An unfavorable economic condition also plays a major role for investment trends in any economy. Investors are reluctant to invest, if promising future is not expected. Uncontrollable natural factors also affect investment behavior of the people. Low future expectation leads to lower investment. Human rationality, current market situations, high risk eversion, promising ROI are push indicators for investment (Bali & Engle, 2010; M. Khan, 2008). However past studied conducted relevant to the Intertemporal Asset Pricing Theory (ITAPT) do not effectively explain the phenomena, to which this study can explain the effect of i.e. COVID-19 on investment behavior of the investors. Dynamic of past studies are different, as discussing effect of a world-wide pandemic attack and its consequences

on investors behavior for investment, need time and how this theory will help manipulate investor's decision.

2.4.5. Market Capitalization

Market capitalization state worth of the company in term of market value of all outstanding shares. This theory was introduced to make comparison, in order to know the market worth of one company over the other. This theory will enable investors to determine the worth of the investing company and its future prospective. Because higher worth reflects higher investment behavior of the investors and vice versa. People put trust on promising organization for their investment (Anam, Fatima, & Majdi, 2011). Capitalization is termed as an indicator about the net worth of the company in opinion of people. This indicates the worth of company to the public, so that, they trust firm's operations and invest in for future returns. Stock valuation help determining the net worth of the company and it help investors to make investment decision between different organizations. Investors behave favorably to the capitalized organizations and it make their investment decision easy (Kumar & Shah, 2009). Studies have revealed paradigm shift of market capitalizations for investment purposes. Investors are ready to invest in companies with higher net worth because it guarantees their actual investment and its return.

Panagiotidis (2005) studied the impact of market capitalization on investor's behavior of investment. It stated that high net worth of outstanding shares of the organizations leads to high investment opportunities for the firm. This study has added value to market capitalization theory and investment pattern of people are closely investigated while conducting this study (Panagiotidis, 2005). Corporate governance directly impact market capitalizations. Good corporate governance facilitates monitoring of the capital market organizations and it adds value to the company as investors expect higher return on investment. Efficient corporate governance

leads organizations to higher corporate value of the organization in market. Al Mubarak and Hamdan (2016) studied market capitalization and stated its positive impact on investment trend in market. It also state that good corporate governance minimize business risk which results in higher share value and investors trust in the organization. Investors seek investment activities with the organizations which have high market worth. High market share directly states the good corporate governance of the organization and it enhances credibility of investor for investment (Al Mubarak & Hamdan, 2016). This study have discussed market capitalization wrt corporate governance only and discussed it with great deal of importance.

Abdolmohammadi (2005) discussed market capitalization theory in his research paper, which states that capital markets significantly affect economy of nation and it help investors in decision making. As higher investment will result in higher growth and overall economy will also boost up. Market capitalizations serves economy in its broader term and hence bring favorable changes in investment trends. Every single invest is termed as a value addition for the firm and the economy. Time is main constraint while conducting this study as this gigantic concept cannot be discussed by have limited number of year data (Abdolmohammadi, 2005). Hence, past studies have significantly explained market capitalization theory but this phenomena was not effectively explained for the current situations prevailing across the globe. The present study can explain the effect of natural catastrophe i.e. COVID-19 on financial performance of organizations.

2.5. Impact of Disasters on Economy and Stock Market

Pandemic are rapid spread of epidemic disease to large number of people with in short period of time. Numerous pandemics have attacked world economy which result in loss of humans, peace of mind, social and economic disaster, business breakdown, and so on (WHO, 2021). In 6^{th} to 8^{th} century, first plangue pandemic have affected world's economy and then second

planguepandemic hit the world which result in loss of human lives. Another example of a deadly pandemic is the meningococcal infections, which have attack rate of 15 cases per 10,000 people. Black Death was also a pandemic which hit Europe with major breakdown and killed 40%-60% population of the Europe, which accumulated at least 75 million people. Here is some more data of pandemic attacks and their loss to the human lives i.e. Spanish Flu killed 50 million people, Influenza A virus subtype H1N1 was a worldwide pandemic with estimated death rate of 151,700 - 575,400 people, and recently attacked pandemic Coronavirus disease 2019 / COVID-19 have affected worldwide and its consequences are threating as it killed more than 2 million people across globe and still it has drastic effects on human health and world economy (WHO, 2021). Studies revealed that pandemic after effects are also very challenging for developing country economy and to overcome from these setback is a time taking process (M. A. F. Ali, Amjad, & Ali, 2020). The unseen disease has drastically affected country's social, economic and financial performance and hence leads to less investment trend. Pandemic attack harms overall market performance and recovery of which takes great amount of time and effort.

Although the Covid-19 pandemic and its effects on different economic aspects is a new phenomenon but there have passed different pandemics and disasters in the past that had affected the economy and financial markets in different ways. Therefore, a number of studies are found in the literature examining the effect of different natural disasters on economic aspects. For example, many studies have attempted to identify and explain the market reaction to "1995 Hanshin–Awaji earthquake". A study performed by Yamori and Kobayashi (2002) examined whether Japanese insurance companies got benefits from this event or not. The Hanshin–Awaji earthquake hit the Tokyo urban area in 1995. An event study performed by the mentioned researchers through Ordinary Least Squares (OLS) and a group of thirteen insurance companies

showed the calculation of abnormal returns of groups companies from day zero to day 9 of the earthquake. Findings showed that the abnormal return on day zero of the earthquake (when earthquake happened) was zero. Therefore, this study rejected the hypothesis that insurance companies got benefited from demand raised for their offerings after the natural disaster. These findings were contrary to a number of studies conducted in insurance sector of US who accepted this hypothesis. However, this study did not provide efficient explanation of why this different of findings occurred. Another study performed by Lamb (1995) provided an evidence of the negative effect of disaster on stock prices as this study examined the response of stock price on properly liability insurance companies after the happening of Hurricane Andrew in Florida and Louisiana in 1992. They used a sample of 37 publicly held property liability insurers and used their daily stock returns for calculating abnormal returns for ten days before the event and 30 days after the event. This event study shows that the stock prices of those companies have responded negatively to the disaster.

Another study conducted by Shelor, Anderson, and Cross (1992) attempted to investigate the "gaining from loss" hypothesis by examining the 1989 California earthquake in the US. They performed an event study by using "Generalized Least Squares" and "Non-generalized Least Squares" for calculations. By creating two portfolios of insurers (i.e. one with 47 property obligation insurance companies and the other with 32 different product insurance companies), they used daily stock returns for calculating abnormal returns for the period ranging from day 0 to day 15 of the event. They checked the stability for the period before the event as well as after the event and found that there occurred no change in stock beta before and after the event. Hence, the "gaining from loss hypothesis" is supported by these results because they provide evidence of the significance rise in stock value after the earthquake. Hence, the literature seems

to provide a number of evidence and explanations of effects of different disasters like earthquake and financial crisis on stock market and stock prices. However, Covid-19 pandemic being a very new event, has been rarely examined by recent researchers to see its effects on stock markets and stock value.

Financial performance of the organizations hasbeen badly affected by the recent pandemic attack i.e. Covid-19 all over the world. It not only affects human health but also the social and economic environment of any country. Lin at al. (2013) studied the impact of natural disaster on performance of financial institutions. This study investigated the breakdown in financial bodies and discussed how corporate governance And Capital Asset Pricing models help in minimizing the risk of investment. It stated that investment decisions vary if future is not promising and it directly affects financial organizations performance. Impact of natural disaster is not easily absorbed by the financial institutions and result in significant wealth loss. This study was conducted in US and japan while the financial bodies of Pakistan react differently to the natural disaster, as the risk tolerance of Pakistan is less than other countries in globe (L. Wang & Kutan, 2013). Pandemics affect to financial performance is critical and it leads to create a void between investors behavior and market investment trend.Toya and Skidmore (2007) studied the impact and discussed the investor's behavior, residing in different geographical boundaries and degree to which risk tolerance is achieved. It stated that countries with higher national income, per capita GDP, and with strong financial systems, survive the pandemic period and have potential of growth in near future (Toya & Skidmore, 2007). This study investigated the investment behavior of developed countries and room for new research work is available, as it doesn't studied developing nation like Pakistan and its financial institutions.

Another study of Natural disasters led by Benson and Clay (2004) stated that severe negative impact is expected on financial performance of organizations. Immediate impact of natural hazards is difficult to handle by economies while in long run the vulnerability can shift rapidly. Impact of pandemic attack can be severe vulnerable in developing countries like Pakistan. Drastic impact is expected on economic growth, development, loss of human capital (Benson & Clay, 2004). The formal limitation includes that, it necessitate the need to discuss this study empirically rather than just theoretically. However previous studies have discussed various pandemic affects and its implications on financial performance of the institutions. Whereas this research paper entail the effect of natural deserter i.e. COVID-19 on organizational performance.

Frequent natural disasters have direct and immediate effect on domestic financial organization and negatively impact their performance. Studies have shown that economic breakdowns negatively affect domestic Stock Market Indexes and its effect last long. Long term investment are discouraged by the investors in pandemic attack which adversely affect performance of financial entities (Cavallo & Noy, 2011). Cross country direct and indirect impact of pandemic attacks have been checked in this research study but impact on developing countries is not measured which created a gap and have suggested future research in this gap domain. Studies revealed that pandemics attacks/natural disasters pace have increased from past few decades and this trend will rise world-wide. This states alarming situation for all the countries across globe and intergovernmental panel on climate change (IPCC) reported that this rising trend of natural disasters will not stop in future. Natural disasters are sudden shock for the society and regions where such catastrophes appearance is frequent, they took these catastrophes as “normality” rather than exceptional (Raschky, 2008). This study undertakes those countries, where

occurrence of natural disaster is frequent while it has not discussed countries/regions for whom natural disaster is a drastic sudden shock.

2.6. Impact of COVID-19 Outbreak on Stock Markets

Rapid spread of epidemic disease draws unfavorable consequences for financial bodies. COVID-19 has badly affected the whole world economy and this epidemic is still causing life threat to people across globe. 223 countries are badly affected by this pandemic. According to the World Health Organization (WHO) it is to state that confirm cases of COVID-19 are 92, 983, 900 while death rate is 20, 097, 81 (WHO, 2021). COVID-19 has negatively affected the performance of stock exchange markets in Pakistan. Investors are reluctant to invest in PSX because their optimism level is badly hit by this pandemic and risk of investment is more than the chances of adequate ROI. Effect of this pandemic is relatively more on small and medium-size enterprises (SME's) than multinational organizations (Anderson, Heesterbeek, Klinkenberg, & Hollingsworth, 2020; K. KHAN et al., 2020). Financial Stability Report (FSR) published in April 2020, stated that COVID-19 have negatively impacted global financial markets (Fund, 2020). FSR have also stated that equity markets breakdown is faster than commodity market. PSX is experiencing major breakdown and investors are reluctant to invest. Wren-Levis (2020) claimed that COVID-19 directly proportionate to reduced GDP of the nation. As low demand of consumer goods and services results in lower production. And the situation will be worse if banks are unable to meet the financial need of the organizations after this sudden downfall in demand. This will collapse stock markets across globe (Wren-Lewis, 2020). Research showed that closure of production facilities will disturb the global supply chain of product and it will ultimately result in low share prices and increased risk of loss on investment. High

environmental insecurity will lead to higher opportunity cost investment (Boone, Haugh, Pain, & Salins, 2020; S. Ramelli & A. F. Wagner, 2020b).

PSX have experienced severe decline in share price of the stocks due to COVID-19 attack. Production facilities were closed at start of this pandemic. Economy of Pakistan faced strict lockdown for many months. This has badly effect working of stock exchange market. Social and economic breakdown led capital market to slow down their pace (Ahmed, 2020). Studies revealed that COVID-19 have negatively impact the stock markets of emerging countries. It also studied that Asian stock exchange market experienced downfall in stock prices and diminishing trend in investment (Topcu & Gulal, 2020). Overall economy of Pakistan was affected due to this pandemic, which result in low investment behavior of the people. Market information was not favorable which results in downfall of stock market in Pakistan. Studies revealed that, people of Pakistan have tendency of "getting rich quickly" which positively impact their investment decisions. But risk eversion is the bigger matter of concern for investor upon which zero tolerance is expected. Study revealed that people are ready to invest but future irregularities due to this pandemic have negatively affect their decision (Riaz, Ahmed, Parkash, & Ahmad, 2020). Impact of COVID-19 on stock exchange markets is investigated by AslamFaheem in 2020, which divided the stock market in three dimensions i.e. developed, emerging and frontier. This study have discussed stock market of developed countries and just introduced the other two market which need to be explored in near future (Aslam et al., 2020).

Stock exchange dynamics lead to fluctuating investment behavior. The increasing threat of covid-19 outbreak and its negative prospects have affected the investor's sentiments and confidence in the stock market. As the investors are very unclear about the future performance of stocks and firms so, this increased uncertainty has resulted in the declined level of investor's

confidence on the firm, stock, and the market. It means that the investor's sentiments are varying according to this situation of Covid-19 outbreak. At this time, some investor may be thinking of positive prospects and some investors may be thinking of negative prospects so, they are likely to react to this situation differently as per their sentiments (Ashraf, 2020b; S. R. Baker, N. Bloom, S. J. Davis, K. Kost, et al., 2020). Such variation in investor's confidence and sentiments results in the variation of their investment decision and patterns so, the return of stocks are affected accordingly.

COVID-19 drastically reduced demand for luxury product and services and focused on necessities of life product.As in the period of complete lockdown people have cutoff extravagance expenses. But a sad reality is that,this pandemic has collapsed economic activities i.e. manufacturing units and service centers. Major downfall is practiced in PSX as well. Investment decisions depend upon the individual human rational and current market trends. Hence COVID-19 has setback financial firm operations. It jolted global economy and financial bodies to a great deal. Recovery from this wild-spread epidemic attack is relatively slow. Investors are pessimistic during this period of time and so it their cognition towards investment (Falato, Goldstein, & Hortaçsu, 2020). Developed countries financial market experienced less capital loss while developing countries like Pakistan have been greatly influenced by this pandemic and recovery to which, is challenging. Pakistani financial markets are reflective to the global crisis and global environmental issues. Whereas now, the situation of COVID-19 have drastically impacted business in Pakistan and SME's is the sector, which suffered the most and effects of which can be seen in capital market of the nation (Cepel, Gavurova, Dvorský, & Belas, 2020). Investors seek help from past theories for investment decision and this is how their investment cognition is developed under struggling period of time e.g. pandemic attack. Capital

markets are source of profit generation and investors tend towards them for profit generation, in normal circumstances but under struggling economic conditions it is difficult for investors to risk their investment as they already know the challenging situation of the economy.

2.7. Impact of COVID-19 on risk and return in stock markets

Risk and return are two main factors that inculcate investment behavior in an economy. Return is the probable benefit associated with the purchase of a stock while risk is the degree of fluctuation in return of the stock. Investment decisions are made in between of these two factors. The stock return refers to the percentage change in the prices of stock over a defined period of time, which is computed as the difference in the share prices between two periods divided by the initial stock price. It means that the stock returns are the capital gains that shareholders or investors get, by investing in a particular firm at a particular time period. These returns or capital gains may be computed daily, monthly, semi-annually, or annually(Bley & Saad, 2011; Y. Y. Chen & Young, 2010). The risk of returns refers to the volatility or the standard deviation of stock returns, which is computed by taking the square root of the "variance" of returns. There are many factors that affect the stock returns and cause variations in returns. These factors have been identified in a number of past studies, for example different microeconomic factors specific to firms including market beta, size of the firm, leverage, market value, book equity, market equity etc. are key factors that can influence the stock returns (Basarda, Moeljadi, & Indrawati, 2018; Osisanwo & Atanda, 2012). Eugene F Fama and French (1992) also suggested that the industrial production, market index, risk premium, consumption factor, oil prices, and other relevant factors have the potential to affect the stock prices so, they can shape the stock return ultimately.

Stock market refers to the market in which a number of securities including bonds, equity shares, debentures, insurance products, and mutual funds are traded. Initially, share prices and stock

market were considered as two easy ways of making money. However, in the modern times, the situation has changed and awareness about stock market and stock prices has increased among people so, now people tend to consider stock as the key medium of investment as they are being engaged in investing in different firms' shares(Fu, Zhou, Liu, & Wu, 2020). Purchasing the share of some company and making investment in that company's shares is not an easy and simple decision now. Rather, investors have to evaluate those shares before purchasing by considering risks and returns of that share (Cetorelli & Peristiani, 2015; Gajera & Bhayani, 2019; He et al., 2019). Stock market provides a physical or online medium to investors and companies where options to buy shares or other securities of publicly traded companies are offered and parties intered in those securities are tend to be indulged in exchange of those securities. Stock market behavior and its trends have been largely discussed by prior studies to explain and study it in different aspects because of large importance of stock market in a country and globe e.g. (Borges, 2010; Bouteska & Regaieg, 2020; Cetorelli & Peristiani, 2015). However, particular studies relevant to the stock market reacting to the very recent pandemic i.e. Covid-19 outbreak are found rarely in the literature.

Stock return refers to the fluctuation in prices of a share/asset over the time, which is donated in form of percentage change or price change. When an investor buys a share, he/she is likely to receive dividend on it, which is the part of stock return. Therefore, stock dividend and price change of the share both make up the stock return (Bintara & Tanjung, 2019; Cremers & Weinbaum, 2010). The price change can be sometimes positive and sometimes negative depending upon different factors e.g. firm value, environmental optimism, and ultimate investor's sentiments. The higher fluctuations in stock prices lead to higher risk of those stocks. These fluctuations rise when the environment and investor's sentiments are fluctuating. For

example, in the current times of difficulty associated with Covid-19 pandemic, the investor's confidence and decision to buy stocks have been largely affected (H. Liu et al., 2020; Phan & Narayan, 2020). As the stock return and stock risk are related concepts and the change in stock return is closely linked with the change in patterns of risk so, both these concepts are mostly discussed and examined together in research studies. A number of studies are found in the existing literature that attempt to find and explain different antecedents of change in patterns of stock return and stock risk and other aspects including their outcomes etc. Stock risk is basically the change in the share return or price in reference to its mean point so, the risk associated with the common share in termed as the stock risk (Chava & Purnanandam, 2010; Kim, Li, & Li, 2014). It is linked to the abrupt fluctuation in the environment, market value of the stock, and other change in the investor's sentiments and confidence of the time. Shares with low risk tend to represent that the stock value does not fluctuate abruptly and it does not go through the abrupt and dramatic fluctuations so, such shares are considered to show high steadiness (CAI, QIANG, & ZHOU, 2013). In contrast, the shares with high risk tend to represent that the stock value fluctuates abruptly and it goes through the abrupt and dramatic fluctuations so, such shares are considered to show low steadiness. Hence, the process of understanding and evaluating the share returns and share risk is really crucial in perspective of investors. Although stock returns and stock risk have been examined by many prior studies but their linkage with the novel Covid-19 pandemic has been scarcely examined yet.

Investor'ssentiments aredefined as the belief about constant or increasing cash flow of investment and low risk propensity. Hence, risk and return depends upon time, climate conditions, natural disasters, global economic conditions and political stability of a country (Hunjra, Azam, Niazi, Butt, & Azam, 2011). Study performed by M. Baker andWurgler (2007)

suggest that investor's sentiments plays focal role in investment decisions. Qualitative measures have been adopted to identify the investment behavior of investors (M. Baker & Wurgler, 2007). However, findings of this study only discussed sentimental approach of investment and did not discuss COVID-19 pandemic effect on investor's behavior. Another study performed by H. Liu et al. (2020) stated that investor's sentiments directly influence stock market. i.e. less perceived risk result in optimal investment behavior and high risk leads to pessimist sentiments (H. Liu et al., 2020). This study was conducted in European countries, most of which are developed, while PSX is still struggling from the after effects of this pandemic.

A longitudinal study suggests that fear of loss changes the investment decisions of the people. Investors are concerned about the corporate earning of a specific investment. Previous performance of the firm also helps investors in making satisfactory investment decision (Burns et al., 2012). Negative emotions are attached with market crisis and this study has discussed risk factor and investor's behavior in frontier markets, where investors are sensitive to risk. While this study will check the impact of COVID-19 on risk and return of stock exchange market of Pakistan. Study held in 2007, stated that pandemic attacks badly affect long term investment behavior of investors. It also constituted ground realities and drastic impact of epidemic diseases on economic growth of country and its consequences to national capital market (Skidmore & Toya, 2002). Hence it is evident that natural disasters/ epidemic diseases reduce expected return on investment and people in 21st century are more realistic while investing in any portfolio as they estimate risk and return before the investment. Economic growth leads to improvement in Factors of production (FOP) and high propensity of investment. Focus of this study is to check risk and return impact on stock exchange market of Pakistan (PSX).

The effect Covid-19 on firms and business due to the increased health and economic risks has been faced and embraced by a number of past reports, analysts, and researchers. For instance, a report by World Bank Group (2020) suggests that this pandemic has been declared as the “black swan” effect on companies by policymakers. This is because it has even affected the well-established and large companies due to the abrupt fluctuation in the value of their financial assets and interest rates. Among different assets influenced by this pandemic, shares come among top of the list because the consistently fluctuating stock prices throughout this outbreak are leading towards the decline of demand for those shares. Although such price fluctuations tend to benefit to short-sellers as they can gain benefits by selling and purchasing shares whose value is being fluctuated rapidly but still, this pandemic has hit the stock market in largely different way. Besides shares, the market indices have also been largely affected by the abrupt fluctuations associated with Covid-19 pandemic as they are facing massive volatility in stock market.

In a study performed by Ibikunle and Rzayev (2020), it has been argued that the high share volatility is associated with this Covid-19 pandemic as companies faced high share volatility during months of February and March in 2020 when the Covid-19 was on the peak. It is suggested by these researchers that the stock volatility was raised by the increased fear and spread of this disease and pandemic. In their study, they used 55 shares having the dark trading restrictions as the control group while 55 shares having no dark trading boundaries as the tested/treated group of the study. The analysis and comparison of exchange dynamics among those 110 shares indicated that the exogenous risk on the informed and unaware investors makes them able to assess the origin to share risk and its effects of market quality. It is further suggested by this study that the trading volume of tested/treated group of stocks increased by two times during aggressive risk period. It means that the rise in the trading activity is unavoidable

because of the situation prevailing as the result of Covid-19. The risk and volatility of the stocks after the happening of this pandemic are significantly different from the volatility before this pandemic. Hence, the stock market volatility has the potential to share the market dynamics and market quality particularly during crises times.

A study performed on G7 countries including Canada, Germany, UK, France, US, Italy, and Japan also investigated the effects of Covid-19 pandemic on stock market dynamics (S. Baker et al., 2020; ŞENOL & ZEREN, 2020). They found and suggest that the pandemic has hit different sectors of these countries significantly as it has caused a potential transition in those countries. They further argued that the effect of Covid-19 pandemic is universal for all sectors and countries but the most affected sectors due to this pandemic are consumer services and health sectors. The technology sectors has also faced serious effects of this pandemic (Izzeldin, Muradoglu, Pappas, & Sivaprasad, 2020). A study performed by Sharif, Aloui, and Yarovaya (2020) also examined the effect of Covid-19 outbreak on share market and the change in trading volumes and share risks during this pandemic by using one year data ranging from April 8, 2019 to April 9, 2020. They found that the increasing number of Covid-19 cases and deaths associated with it around the world has negatively affected the stock market by affecting the stock risk and market volatility.

The effect of Covid-19 outbreak on stock returns has been though less examined till yet but literature provides considerable insights into this effect. For example, S. Ramelli and A. Wagner (2020) suggest that the stock prices are important for evaluating the investor's expectations of the future payoffs and benefits of the share so, these aspects of stock prices tend to continue even during this pandemic. Gormsen and Koijen (2020) also examined the effect of Covid-19 outbreak on stock prices and investor's growth expectations by using the data of stocks market of

US. They suggested that a significant change has been caused in stock prices and growth expectations due to the arrival of this health crisis.

Shen, Fu, Pan, Yu, and Chen (2020) stated that COVID-19 has drastically impacted firm performance and leads to negative correlation to investment trend. They have done descriptive analysis of COVID-19 on firms performance (Shen, Fu, Pan, Yu, & Chen, 2020). Descriptive analysis to analyze the investment behavior of investor in not enough. Theory should be supported with numerical analysis as empirical studies add value to the research paradigm. Stressful events lead to lower investment intention of investors. These events create ambiguity for future, to which investors are reluctant to invest in stocks with such uncertainties (Falato et al., 2020). However, past researches conducted relevant to COVID-19 do not effectively explain the phenomena, to which this study can explain the impact of COVID-19 on risk and return of stock Exchange of Pakistan (PSC). Azimli(2020) examined the impact of COVID-19 on risk and return on investment. It state that asymmetric portfolio selection can minimize risk of the investment and favorable return is expected in near future, once economy is stabilized (Azimli, 2020). It also states that this method can only be useful in short period of time, and in long run, high net-worth organization will be able to survive in breakdown period. This study was conducted in US which amplifies that results of this study reflect circumstances of developed countries. Investor's biases directly affect investment decisions of investors. A study performed by Rahim, Shah, Jan, and Aamir (2020) emphasizes that overconfidence bias of investor leads them to pursue investment behavior, which at the end is favorable for financial institutions. This theory state that "people rate themselves above average and under this bias make investment decisions", which may not be favorable for them and they suffer loss. It reveals that people make irrelevant investment decisions, which are caused by emotion. However, this study does

notconsider the market information theory or consider firms previous performance (Rahim et al., 2020). Therefore, these limitations in previous studies raise the need for an efficient and empirical study for examining the effect of Covid-19 pandemic on risk and returns of stock market companies by considering the viewpoints of market information theory and other theoretical perspectives.

The relationships of Covid-19 with the stock returns and risk are also supported by empirical studies including (Al-Awadhi et al., 2020; Ashraf, 2020b; S. R. Baker, N. Bloom, S. J. Davis, K. Kost, et al., 2020; Phan & Narayan, 2020). Furthermore, a number of past studies have documented and explained the influence of pandemic and disasters on the patterns of risk and returns in stock market e.g. (R. Ali & Afzal, 2012; Anagnostidis et al., 2016; McTier et al., 2013; Smith et al., 2011; Z. Wang et al., 2003). These studies highlighted and explained how the financial crisis, Avian flu, and other global disasters caused significant variations in patterns of risk and returns of stock markets of various countries worldwide. However, Covid-19 being a new outbreak, has not been researched well yet. Based on past theories, hypotheses, and studies, the current study hypothesizes that:

H1: Covid-19 has a significant influence on stock returns of PSX firms.

H2: Covid-19 has a significant influence on risk of stock returns of PSX firms.

2.8. Summary of Chapter

This chapter provides a detailed review of the existing literature relevant to the effect of some disaster or crises such as Covid-19 pandemic on stock markets. In this regard, different prior theories including signaling theory, efficient market theory, rational expectations theory, intertemporal asset pricing theory, and market capitalization are reviewed. To conclude, these

theories provide enough support to argue that the information, expectations, and signals associated with Covid-19 outbreak have the potential to shape the sentiments of investors. In short, Covid-19 outbreak has led to different patterns of fear, anxiety level, panicked buying, pessimism, optimism, and other feelings in investors so, these feelings and situations can give rise to different investors' sentiments that act as the determinants of their investment decision. It is found through the review of past studies and literature that although there exist a number of studies and theories discussing the effect of different disasters or pandemic (such as financial crisis, Avian flu, and other global disasters) on investors' sentiments, investment decisions, and ultimate performance of stock markets, but these studies cannot explain efficiently how the Covid-19 pandemic has affected the stock markets because severity and circumstances of Covid-19 vary from those previous disasters and epidemics largely. Furthermore, it is found by reviewing different studies related to the effect of Covid-19 outbreak on stock markets that despite of different studies explaining the effect of this particular pandemic on stock market returns and risk patterns, the literature stills provides mixed findings about the effect of Covid-19 pandemic on stock markets and there is a clear lack of harmony between existing researchers about the direction of the effect of Covid-19 pandemic on stock market returns and risks. Furthermore, it is found through the detailed review of the literature that not a single study has efficiently explained the effect of Covid-19 pandemic on patterns of risks and returns of PSX firms particularly. Therefore, a gap is identified in the empirical literature regarding the effect of Covid-19 outbreak on risk and returns of PSX firms.

Chapter 3

Research Methodology

3.1. Introduction

This chapter has been designed to elaborate the methodology of the current study in detail. In this chapter, the researcher explains particular research methods, approach, assumptions, and procedures selected for this study and rationale behind choosing those methodological tools and approaches. In doing so, all layers of research onion have been explained with reference to this study. In addition to stating the particular methodological choices adopted by the current study, the current chapter also elaborates why that particular methodological approach/assumption has been adopted in comparison to other methodological choices. In this way, the in-depth methodological roadmap of the present study is deliberated in this chapter by specifying the research assumptions taken by this study, research approach adopted by it, nature of this study, research method and research design employed by this study, analytical models applied in the present study, and ethical considerations followed by this study.

3.2. Research Philosophy

Research philosophy refers to the assumptions made by the researcher to complete a study. These assumptions make a researcher the positivist or the interpretivist. Therefore, it can be said that according to the research philosophy and assumptions made by a study, the study can be either based on positivism or interpretivism. Positivism considers the reality as the set of objective and quantitative information. Positivism is said to be adopted by the researcher when he/she considers the reality objective and relies on the objective data and information. According to positivism, the reality can be found and evaluated through scientific data and quantitative information only so, a positivist researcher is likely to rely mostly on quantitative and objective

data and information. This type of research philosophy is mostly adopted for the studies in which purpose is just to analyze some theory or phenomenon instead of discovering or exploring some issue or phenomenon in detail. Interpretivism considers the reality as the set of subjective and qualitative information. Interpretivism is said to be adopted by the researcher when he/she considers the reality subjective and relies on the subjective data and information such as observations, detailed views, opinions etc. According to Interpretivism, the reality can be found and evaluated through subjective data and qualitative information including detailed views, opinions, perceptions, observation, and thoughts. Therefore, an Interpretivist researcher is likely to rely mostly on qualitative and subjective data and information. This type of research philosophy is mostly adopted for the studies in which purpose is to get detailed understanding of some issue, problem, or phenomenon. It means that the key difference between positivism and Interpretivism is based on the objectivity vs. subjectivity of the researcher (Idowu, 2016; Rivas, 2010).

As far as the assumptions made by the current study are concerned, the current study follows the assumptions of positivism because the aim of this study is just to evaluate the impact of Covid-19 outbreak on patterns of risk and returns of PSX. For this purpose, the current research did not need to collect data about detailed views, feelings, and thoughts of investors or managers of firms because the assessment of the impact of Covid-19 outbreak on patterns of risk and returns of PSX does not need such type of qualitative data. Furthermore, the current researcher does not need to interfere or interpret the results and data of this study according to his personal perceptions and feelings. Rather, the current study only needs to collect objective information about the patterns of risks and returns of PSX firms during and before Covid-19 pandemic and analyze the change in patterns of risk and returns of those firms. Hence, there are no chances of

researcher's personal involvement, interference, and biasness with results of this study. Therefore, the reliance of this study on objective information and quantitative data instead of subjective data and information makes the current study a positivist study.

3.3. Research Approach

Research approach refers to the methodological style adopted by a researcher to complete the study. The research approach adopted by a study makes the study deductive or inductive. The deductive approach is said to be adopted by the researcher when the researcher tends to end up the study with some deduction and particular conclusion about a theory or phenomenon. In contrast, the inductive approach is said to be adopted by the researcher when the researcher tends to end up the study with some new theory. In deductive study, the researcher starts with some existing theory, collects data about it, analyzes the theory, and deduces some conclusion about the theory. It means that some research questions are formulated based on an existing theory and then, they are tested with the new data to reach particular conclusion. This research approach is mostly adopted in studies where the purpose is to analyze or enhance an already existing theory so, this approach is mostly linked with the theory-testing approach as it moves from a general theory to specific conclusion. In inductive study, the researcher starts with some observations and ends up with some new theory. It means that based on some observation, some new viewpoint is explored and a new theory is developed regarding that phenomenon. This research approach is mostly adopted in studies where the purpose is to formulate a new theory so, this approach is mostly linked with the theory-forming approach as it moves from a specific context/observation to a new theory. It means that the direction and purpose of the study determines the approach adopted by it. For example, a study with the purpose to evaluate an already existing theory is said to be deductive while a study with the purpose to develop a new

theory is said to be inductive (Bell, Bryman, & Harley, 2018; Saunders, Lewis, Thornhill, & Wang, 2009).

As far as the research approach of the present study is concerned, the current study adopts the deductive approach because it is not aimed at developing some new theory regarding the Covid-19 outbreak or investor's behavior. Rather, the aim of this study is just to assess the impact of Covid-19 outbreak on patterns of risk and returns of PSX. To achieve this purpose, researcher does not need to rely on some new observations and develop new theory but to simply collect the data of risks and returns of PSX firms before and during Covid-19 for assessing the impact of pandemic on risks and returns of PSX firms. The inductive approach is not suitable for the current study because developing some new theory would not help the researcher to achieve the aim and objectives of this study regarding the evaluation of the effect of Covid-19 outbreak on risks and returns of PSX firms. Therefore, deductive approach is perfectly aligned with the purpose of the current study because it would help the researcher to formulate research questions about the effect of Covid-19 outbreak on returns and risks of PSX firms based on some existing theories of investor's behavior, answer those research questions by analyzing the new data collected from PSX firms, and deducing specific conclusion about the phenomenon. Hence, the deductive approach is adopted by the current researcher.

3.4. Research Method

Research method refers to the way of performing a study, collecting data for it, and analyzing it. Research methods are of three key types that are qualitative method, quantitative method, and mixed method. Therefore, a study can be qualitative, quantitative, or mixed study according to the research methods adopted by it. The research method to be adopted by a study is completely reliant on its purpose and objectives. Qualitative research methods are employed by the

researcher who wants to develop or formulate a new theory. Qualitative methods are mostly employed in inductive studies where the researcher has to end with a new theory. Qualitative studies are those studies in which the data is collected in a qualitative way from qualitative sources and through qualitative tools such as interviews, open discussions, focus group etc. Such methods are used mostly in those studies where the purpose of the researcher is to create an in-depth understanding and detailed knowledge about some phenomenon or to reach some new theory. Qualitative data tends to vary from one source to another or from one person to another (Bell et al., 2018; Melkert & Vos, 2010; Park & Park, 2016; Saunders, Lewis, Thornhill, et al., 2009).

Another type of research method is the quantitative method, which is based on the objectivism. Quantitative research method is employed in the study where the purpose is to enhance an existing theory and reach some conclusion about the theory. Quantitative methods are mostly employed in deductive studies where the researcher has to end with a conclusion of a theory. Quantitative studies are those studies in which the data is collected in a quantitative way from quantitative sources and through quantitative tools such as closed-ended responses, numeric data, survey etc. Such methods are used mostly in those studies where the purpose of the researcher is to analyze and test some phenomenon or existing theory. The third type of research method is the mixed method in which both qualitative and quantitative methods are employed to achieve the purpose of the study. In a mixed study, a combination of qualitative such as interviews and quantitative method such as survey questionnaire is applied at a time. Such method is implied in the study in which the researcher wants to examine the phenomenon from both aspects i.e. qualitatively as well as quantitatively (Bell et al., 2018; McCusker & Gunaydin, 2015).

The research method employed in the current study is the quantitative method because the aim of this study is just to assess the impact of Covid-19 outbreak on patterns of risk and returns of PSX firms. For this purpose, researcher does not need to collect qualitative and subjective data about the feelings, thoughts, and perceptions of investors or firm's managers about the prices, returns, and risks of shares. Instead, the current study requires the quantitative and numeric data about the returns and risks of PSX firms so that, the change in patterns of risks and returns of those PSX firms due to Covid-19 can be computed and analyzed. Therefore, the quantitative method is an appropriate research method for the current study. The qualitative research method is not needed for the current study because the study does not require the collection of subjective data and such data could not be analyzed quantitatively to reach the conclusion about the effect of Covid-19 outbreak on returns of risk of PSX firms. Therefore, the qualitative method is not appropriate for this study. The mixed method is also not an appropriate choice for this study because the purpose of the study is to simply analyze the change in patterns of risks and returns of PSX firms due to Covid-19 only instead of creating the in-depth knowledge or new theory about this phenomenon. Hence, the quantitative method is the most appropriate methodological choice for the present study.

3.5. Nature of Research

Nature of the study is determined by the purpose of the study, which can make a study the exploratory, explanatory, or a descriptive study. The descriptive study is a study, which aims to just describe a problem, phenomenon, or theory in all aspects. In other words, the research conducted to discuss and describe a problem or phenomenon wholly is called a descriptive study. In a descriptive study, antecedents, problem, and consequences of the problem are elaborated in details. To complete a descriptive study, maximum information about a problem is collected to

better describe it in all aspects. However, a typical descriptive study does not provide a solution to the problem. Another type of the study according to the nature is the exploratory study in which the purpose of the study is to discover new factors or new theory about some phenomenon. The exploratory nature of the study is aligned with the purpose of developing a new theory. Therefore, the exploratory study is mostly linked with a theory-forming study. In an exploratory study, researcher tends to end up with the exploration or discovery of new knowledge and theory. Qualitative methods are mostly suitable for exploratory studies. Another type of the study according to the nature is the explanatory study in which the purpose of the study is to explain an existing theory. The explanatory nature of the study is aligned with the purpose of checking and enhancing an already existing theory. Therefore, the explanatory study is mostly linked with a theory-testing study. In an explanatory study, researcher tends to end up with the specific conclusion and assessment of an existing theory. Quantitative methods are mostly suitable for explanatory studies (Bryman & Bell, 2014; Kowalczyk, 2015; Saunders, Lewis, & Thornhill, 2009).

As far as the nature of the current study is concerned, it is an explanatory study because its purpose is purely to explain already existing theories about the investor's behavior by examining the effect of Covid-19 outbreak on returns and risks of PSX firms. As the purpose of the study mainly decides the nature of the study so, the purpose of this study makes it an explanatory study because the aim of the present research is to evaluate the effect caused by Covid-19 pandemic on PSX firms' returns and risk patterns. The current study does not need to discover any new factors or theory about the effect of some disaster or financial crises on stock market returns. Instead, it just intends to enhance already existing literature about the effect of disasters or pandemic like Covid-19 outbreak on returns and risks of PSX firms so, the nature of exploratory study does not

fit with the current study. Furthermore, the present study is also not a descriptive study because it does not intend to simply describe the problem of Covid-19 outbreak or change in patterns of risks and returns. Instead, it intends to find and evaluate the effect of this pandemic on returns and risks of PSX firms so, proper data collection and analysis are needed to test and explain the change in patterns of risk and returns caused by this pandemic. Hence, the nature of the current study associated with its theory-testing approach makes it an explanatory study.

3.6. Time Horizon

Time horizon of a study makes it a cross-sectional study, a longitudinal study, or a time-series study. The time horizon of the study is also decided based on the purpose and nature of the study. A research where the purpose is to examine the change in some phenomenon before and after an event, the longitudinal approach is adopted. The longitudinal approach is the approach in which the data is collected at multiple stages to assess the phenomenon at different periods of time in order to see the change over that time. The longitudinal study is also sometimes termed as the 'before and after study' because in such type of studies, data collection is mostly performed at two stages i.e. before some event and after some event. The second type of time horizon is the cross-sectional approach. A research where the purpose is to examine some phenomenon at a single stage of time or to assess some relationship between two variables, the cross-sectional approach is adopted. The cross-sectional approach is the approach in which the data is collected at a single stage to assess the phenomenon at that time instead of evaluating that phenomenon at different periods of time. The cross-sectional study is also sometimes termed as the 'Cause and effect study' because in such type of studies, the effect of some cause on a particular variable is examined (Burbridge, 1999; Saunders, Lewis, & Thornhill, 2009).

The third type of study according to the time horizon is the time-series study in which the researcher wants to study or evaluate some phenomenon or change in that phenomenon over a particular time period. In a time-series approach, the data is collected for a continuous period of time to study the in-depth change in that phenomenon over that time period. However, the current study can be regarded as the longitudinal study according to its time horizon. As this study evaluated the changes in patterns of returns and risks of PSX firms due to Covid-19 outbreak so, the data about returns and risks of PSX firms before the arrival of Covid-19 and after the arrival of Covid-19 outbreak needs to be collected and analyzed in order to examine the change in them. As the current study does not need to evaluate the relationship between two variables or study the change in some phenomenon over a continuous time period so, cross-sectional and time-series approaches are not appropriate for the current study. Therefore, the longitudinal time horizon is adopted for the present study in order to fulfil the purpose of the study (Burbridge, 1999; Saunders, Lewis, & Thornhill, 2009).

3.7. Population

The population refers to the group of entities or individuals that seem to be included in a study due to having targeted characteristics. The research population is of two types i.e. target population and accessible population. Target population refers to the group of individuals that are targeted by the researcher for a particular study. The accessible population refers to the group of entities/individuals that are available to the researcher for the data collection. The target population and accessible population of the study may be similar to each other or different from each other. The target and accessible population of the current study are similar to each other. As the current study aims to evaluate the change in patterns of risks and returns of PSX firms due to Covid-19 outbreak so, the target population of the current research consists of all PSX firms. As

the researcher is based in Pakistan so he has the easy access to PSX firms and their financial data. Therefore, the accessible population of the present study also consists of firms listed on PSX. Hence, the population of the current study consisting of PSX firms and their returns data is aligned with the purpose and nature of the study (Bell et al., 2018; Saunders, Lewis, & Thornhill, 2009).

3.8. Sampling

The sampling refers to the process through which the sample for the data collection is extracted from the population. A sampling framework consists of all key features and characteristics that should be present in an entity to be included in the sample of a study. The sampling framework of the current study requires a firm to be listed on PSX in order to be included in the current study. The sampling techniques are mainly of two key types that are probability sampling and non-probability sampling. In a probability sampling, all individuals of the population have equal chances of being selected as the participants of the study. In contrast, in a non-probability sampling, all individuals of the population do not have equal chances of being selected as the participants of the study (Bell et al., 2018; Saunders, Lewis, & Thornhill, 2009). The current study has adopted the purposive sampling to select the sample from the population. As the purpose is to assess the change in patterns of risks and returns of PSX firms due to Covid-19 so, the firm's best representing the PSX firms should be included in the current sample. In this regard, KSE-100 index firms are the best appropriate choice as KSE-100 represents the PSX in the best way. It means that 100 firms listed at KSE-100 make up the sample of the present study. The data of returns and variation of returns of these 100 firms has been computed and analyzed to assess the change in their patterns due to Covid-19 outbreak.

3.9. Data Collection and Research Procedure

Data for the current study is collected from PSX databases from where the data of raw returns of all PSX firms for selected periods of time have been collected. Through these raw returns, the risk and returns have been computed in the following ways:

3.9.1. Risk and Return

To examine the short-run returns, the researcher has calculated the market adjusted abnormal return, symbolized by MAAR. It has been computed for each firm using PSX (KSE 100 Index) as a benchmark. The researcher has followed the methodology used by Aggarwal, Leal and Hernandez (1993) to measure the short-run performance:

$$\text{Market Adjusted Abnormal Return} \quad \left[\frac{i,1}{m,1} - 1 \right] \times 100 \qquad (1)$$

Where Ri,1 is the raw return of stock at the end of first trading day i.e. 26th February 2020. Total return is calculated as: $R_{i,1}$ $\frac{i,1 \quad i,0}{i,0}$ where $P_{i,1}$ is the price of stock *i* at the close of the first trading day, $P_{i,0}$ is the price of stock on 26th February 2020. $R_{m,1}$ is the market return measured during the corresponding period as: $R_{m,1}$ $\frac{m,1 \quad m,0}{m,0}$ where $I_{m,1}$ is the market index at the close of on 26th February 2020 and $I_{m,0}$ is the market index opening value on 26th February 2020. MAAR is computed on the first, fifteenth and thirtieth trading day from 26th February 2020; Risk refers to the aftermarket risk level of the stocks and is defined as the standard deviation of post-issue pricing during the first 45 trading days from 26th February 2020.

Besides MAAR, “Buy and Hold abnormal return” (BHAR) is also used in the current study for determining the medium-term returns. BHAR is based on the principle of buy and hold investment strategy and it computes the abnormal returns by subtracting the normal buy-and-

hold return from the actual buy-and-hold return. In contrast, MAAR computes the abnormal return by deducting the expected return from the realized return. BHAR is the better calculation of the abnormal return if the purpose is to determine the returns for a longerperiod (e.g. medium-term returns) while MAAR is the better calculation of the abnormal return if the purpose is to determine the return for a shorted period (e.g. short-term returns). Therefore, the current researcher has used the Buy and Hold Abnormal Return (BHAR) technique to determine the medium-term returns (6 months from Pre Covid-19 i.e. 26th August, 2019 to 26th February, 2020 and 6 months during Covid-19 i.e. 26th February, 2020 to 26th August, 2020). Following Loughran and Ritter (1995), BHAR for firm *i*at time *t* has been computed as:

$$BHAR_{it} \quad 1 \quad R_{it} \; - \; 1 \qquad 2$$

$$BHAR_{it} \quad \frac{1}{i} \quad 1 \quad R_{it} \; - \; 1 \quad R \qquad 3$$

Where R_{it} represents the return of stock *i*at time *t* and R_{mt} indicates the return on the benchmark index (KSE 100). To determine the market adjusted normal returns, the corresponding KSE 100 is used as a benchmark index for each Stocks listed on PSX. *n* denotes the number of stocks listed on PSX. Risk refers to the aftermarket risk level of the stocks and is defined as the standard deviation of post-issue pricing during the first 180 trading days from 26th February 2020.

3.9.2. Mean Return

Researcher also measures the returns for sample exchanges through following formula:

$$\log \; — \qquad 4$$

Daily market return for each index is calculated as $_t$ log $\frac{ndex}{ndex}$. Where $_t$ explains the average market return of each exchange for day *t*, and and represent the overall weighted index. Risk refers to the aftermarket risk level of PSX which is defined as the standard deviation of post-issue pricing during the first 45 trading days from 26th February, 2020 for short-run and 180 day for medium term.

3.10. Data Analysis

The data for the current study has been analyzed by applying statistical tests on the data collected and computed about the returns and risks of PSX firms before and after Covid-19 outbreak. As the current study is based on quantitative research methods and quantitative and numeric data so, the quantitative analysis is used to evaluate that data. The event study analysis is applied to see the change in patterns before and after the event. First, the descriptive analysis is performed to assess the descriptive statistics of abnormal return, expected return, and normal returns. After the descriptive analysis, risk and normal returns of firms for ten days before the event data (i.e. 26th February, 2020) and ten days after the event date have been computed. The calculation of BHAR and analysis of changes in patterns of risks and returns before and after the event lead to the desired findings for this study. For testing pre and post sample variance in each of data stream, F-test has been applied according to following formula, which evaluates the variance of two different sets of values:

—

For applying F distribution under null hypothesis, mean values of two given data sets (i.e. pre-COVID and post-COVID) are determined and then, variance between them is calculated.

$$\frac{\sum \quad - \ ^{-}}{\quad - 1}$$

Where, is variance, *x* is value given in a set of data, ¯ is mean data and *n* is total number of observations.

3.11. Ethical Considerations

The current study has followed all ethical considerations while proceeding and completing this study and dissertation. Ethical considerations refer to the ethical concerns being fulfilled by a study in its different steps and processes. First, the publicly available data of PSX firms has been used for the current study and no private data of those firms has been accessed without the permission of those firms. Secondly, the data collected about those firms has been used for the research purpose only and no other personal purpose is associated with this data. In addition to honest and confidential data collection procedures, the current study has also taken all steps to protect the data from unauthorized party. For this purpose, the researcher used encrypted files to save and protect that companies' data and stock market data from unauthorized party so that, the collected data could be used only for the research purpose. The data has been collected, computed, and analyzed with complete honesty and no window dressing has been done while recording data. It means that the data of returns taken from reliable PSX databases has been honestly recorded and analyzed without conducting any fraudulent activity. Ethical considerations have also been followed while reporting results of this study as the findings of this study are purely genuine generated through the authentic data of returns and risks of PSX before and after the Covid-19 outbreak. Results have not been interfered or window dressed by the researchers so, these results are providing the accurate picture of the change in patterns of returns and risks of PSX firms due to Covid-19. Besides ensuring the ethical perspective of the

current study in data collection and reporting, the current study has also made it sure that all the work and writing included in this dissertation is original and purely belongs to the researcher. It means that the work of others has not been used in the current study and any work of others cited in the current study has been properly referred to them. Therefore, the current study does not entail any issue of plagiarism or copying the work of others. Hence, the current study is an ethical study in all aspects.

3.12. Summary of Chapter

To conclude, the current chapter shows the in-depth explanation and justification of the methodology of the current study. To conclude, the current study has been performed as an event study in Pakistan in which the firms listed on PSX make up the population of the study. The secondary data about the returns of PSX firms has been collected for the study. The current study has followed quantitative, positivist, deductive, and explanatory methodological approach as it aims to test an already existing theory about the effects of global pandemic/disaster (Covid-19) on patterns of risk and returns of PSX firms. For the event study, the data of returns of KSE-100 index firms of Pakistan has been collected. Through event study methodology, the stock returns of firms before and after the Covid-19 have been computed and variations in returns have been considered to see the influence of Covid-19 on patterns of returns and risk.

Chapter 4 Analysis & Results

4.1. Introduction

The present chapter deals with the analysis of the collected data, which has been gathered and computed about the normal, expected, and abnormal returns of PSX firms. In this chapter, the statistical tests applied on the data and results found from those tests are presented and stated to reach the decision about the change in patterns of returns and risks of PSX firms. The event study analysis has been performed to evaluate this change in patterns in which the t-value test shows the significance or insignificance of variations of returns caused before and after the event.

4.2. Descriptive Statistics

Before applying any other statistical test or event study analysis, the data needs to be analyzed in terms of its adequacy and normality because the accuracy and reliability of results depends upon the adequacy and normality of the data. To check the adequacy and normality of the data, key descriptive statistics are computed that are mean value, standard deviation, skewness, kurtosis, minimum value, maximum value etc. Mean Value shows the average value of the variable in the collected data and it must be falling within the normal data range. Skewness is used to evaluate any kind of alteration/distortion and irregularity in balanced bell curve relevant to the mean. The skewness value tends to fall on two key extremes that are positive and negative extremes. The positive value of skewness normally represents that the tail is falling on the right side while the negative skew represents that the tail is falling on the left side of the distribution of the data. The value of skewness must fall in the range of -1 to +1. It means that the skewness value should neither fall below -1 nor greater than +1 for data to be normal and normally skewed (Cain, Zhang, & Yuan, 2017). Table 4.1 shows the results of descriptive analysis performed for normal,

expected, and abnormal returns based on which the normality and adequacy of the data can be decided. Normal return here refers to the average rate of return that a PSX firm tends to receive in a market having conditions of perfect competition. This rate is normally used to explain the rate of gains or loss from an investment because it is the computation of the profits made from an investment after the subtraction of the capital, operating costs, and investment(McDonald & Siegel, 1984; Ross, Westerfield, & Jordan, 2008; Tirole, 2010). Normal returns are mostly used as the benchmark by investors to determine if a firm is worthy investment or not. The expected return here refers to the expected value of the return made by the investment in the particular PSX firm. Expected returnsare the computation of profits or losses that are expected by investors to be earned based on the expected rates of return. It can be seen in table 4.1 that the mean value of each of normal returns, expected returns, and abnormal returns is negative and each of it is falling between the respective minimum value and maximum value. It means that the average values of all these three types of returns fall in the normal data range so, no value is less than the minimum data range and no value is higher than the maximum data range. Hence, there exists no outlier or extreme value in the data of normal return, expected return, and abnormal return. Based on this finding, it can be said that the data of normal, expected, and abnormal returns for all firms included in the current sample is adequate. The variation of the data is further checked through standard deviation. The standard deviation shows the extent to which the data shows variation from the mean value. The value of standard deviation around $1/3^{rd}$ of the respective mean value is acceptable as it shows an acceptable variation in the data. The average normal return for selected firms and for the selected period is -0.005401, the average expected return for selected firms and for the selected period is -0.000419, and the average abnormal return for selected firms and for the selected period is -0.000534. Table 4.1 indicates that the value of

standard deviation of each of normal, expected, and abnormal returns is falling near to 1/3rd of the respective mean value so, it shows that the data of normal return, expected return, and abnormal return of PSX firms included in the current sample shows the acceptable level of variations in the data. It means that the variations in the data of these returns are not much high so, the adequacy and normality of the data is further strengthened through these results.

4.3. Skewness adjusted t-test

Skewness adjusted t-test has been applied on all windows of data included in this study i.e. short-run, long-run, pre-COVID, and post-COVID. Table 4.1 shows the significance of short-run stock return data. Results show the values of MAAR against different market capitalizations. It is found that short-run returns data is significant at 5% or 1% level because p-values against all values of MAAR are <0.05 or <0.01.

Table 4.1: Short-run on the basis of Size

Market Capitalization	MAAR1	MAAR3	MAAR6	MAAR9	MAAR12	MAAR15
Market Capitalization < = 23 (m)	23.017**	22.200**	22.521**	21.164**	18.388*	18.378*
	(7.41)	(13.09)	(21.11)	(26.24)	(27.33)	(34.30)
Market Capitalization >23.46 &< 50.59(m)	19.351*	18.763*	18.815*	20.117**	15.523	20.986*
	(11.26)	(10.52)	(19.36)	(25.01)	(23.76)	(32.07)
Market Capitalization > 50.59 &< 107.33(m)`	20.662**	21.760**	25.665**	23.004**	21.966**	20.112**
	(6.97)	(12.89)	(17.83)	(28.41)	(28.63)	(30.18)
Market Capitalization > 107.33(m)	19.048**	21.554**	26.967**	23.425**	23.632**	27.759**
	(9.44)	(12.20)	(19.07)	(27.32)	(28.48)	(34.81)

Note. * <0.05; ** p<0.01 represent significance level at the 1, and 5% respectively.

Table 4.2 shows the significance of long-run BHAR data for small size firms, large size firms, as well as overall firms. Results show the values of mean and standard deviation of BHAR. It is found that long-run

returns data is also normal and significant at 5% or 1% level because p-values against all values are <0.05 or <0.01. It means that data included in long-run window is also significant.

Table 4.2: Long-run (pre and post) on the basis of Size

	Overall Firms			**Small Size Firm**			**Large Size Firm**		
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	N	Mean	Std. Deviation
BHAR1	120	17.19*	10.93	40	23.91**	6.80	80	20.54**	4.56
BHAR2	120	18.09**	12.63	40	22.91**	7.03	80	20.38**	4.54
BHAR3	120	18.90**	22.13	40	22.90**	7.28	80	20.29**	4.63
BHAR4	120	17.63*	22.66	40	23.83**	8.04	80	20.41**	4.85
BHAR5	120	17.57*	22.61	40	23.50**	7.83	80	20.37**	5.13
BHAR6	120	17.49*	23.71	40	22.73**	8.16	80	20.47	5.38
Post Covid-19									
BHAR1	120	18.39**	24.70	40	22.27**	8.35	80	20.55	5.64
BHAR2	120	19.14**	26.50	40	21.98**	8.38	80	20.50	5.57
BHAR3	120	19.78**	27.34	40	22.21**	8.59	80	20.45	5.65
BHAR4	120	19.28**	28.83	40	22.69**	8.63	80	20.28	5.59
BHAR5	120	19.54**	27.89	40	22.60**	9.10	80	19.97	5.79
BHAR6	120	18.05*	28.40	40	22.90**	8.85	80	19.90	6.02

Note. * <0.05; ** p<0.01 represent significance level at the 1, and 5% respectively.

Table 4.3 shows the significance of long-run BHAR data in different sectors pre as well as post COVID. Results indicate that BHAR in travel services was showing increasing trend pre-COVID but post-COVID BHARs are showing decreasing trend. Similarly, values of BHAR before and after the COVID have been presented for support services sector, textile sector, real estate, health sector, financial services, oil and gas sector, chemical, electronics, and electricity sectors. Values of BHAR with * are significant showing the p-value< 0.05 while values of BHAR with ** are

significant at p-value <0.01. Hence, most of the BHAR pre-COVID as well as post-COVID are significant.

Table 4.3: Long-run (pre and post) in different sectors

	Pre-Covid			Post-Covid		
Sector	BHAR1	BHAR3	BHAR6	BHAR1	BHAR3	BHAR6
Travel services	15.81	19.98*	25.32**	27.17**	26.65**	20.96**
	(5.33)	(12.07)	(16.64)	(29.69)	(34.26)	(32.28)
Support Services	21.65**	18.44*	17.33	10.50	9.06	10.92
	(8.77)	(14.69)	(21.44)	(21.75)	(21.59)	(27.30)
Textile Sector	21.67**	22.09**	28.72**	25.99**	21.39**	25.98**
	(7.11)	(12.21)	(21.79)	(27.64)	(28.17)	(35.26)
Real Estate	14.32	24.56**	26.61**	29.61**	11.77	18.36
	(19.04)	(12.81)	(17.10)	(34.41)	(38.93)	(46.86)
Pharmaceuticals & Health care	21.84**	22.14**	19.39*	16.35	13.42	13.35
	(8.86)	(14.34)	(16.27)	(17.63)	(21.40)	(33.78)
Financial Services	21.07**	18.53*	20.84**	20.00*	17.23	23.77**
	(8.76)	(8.90)	(20.81)	(28.54)	(26.25)	(35.98)
Electronic & Electrical	21.33**	21.79**	30.63**	18.57	14.36	17.18
Equipment	(6.06)	(7.58)	(24.89)	(21.78)	(22.61)	(20.30)
Oil and Gas sector	22.50**	22.26**	22.40**	27.03**	26.57**	26.90**
	(7.25)	(12.68)	(16.66)	(27.27)	(24.23)	(37.49)
Chemical	18.80	19.34*	27.87**	26.08**	19.50*	18.86*
	(12.01)	(22.90)	(33.02)	(31.40)	(24.27)	(33.25)
Electricity Producer	25.51**	23.84**	25.10**	25.09**	21.03**	13.28
	(7.64)	(13.69)	(16.01)	(24.29)	(33.77)	(38.22)

Note. * <0.05; ** p<0.01 represent significance level at the 1, and 5% respectively.

Table 4.4 shows the significance of long-run BHAR data at different trading volume (in million rupees) pre as well as post COVID. Results indicate that all values of BHAR at all trading volumes before as well as after COVID are significant because all values are indicating the p-value <0.05 or <0.01. Hence, these descriptive tests indicate that most of the short-run as well as long-run return data pre-COVID as well as post-COVID are significant.

Table 4.4: Long-run (pre and post) in trading volume of firm in PSX

	Pre-Covid			Post-Covid		
Trading Volume	BHAR1	BHAR3	BHAR6	BHAR1	BHAR3	BHAR6
Trading Volume < = 20	20.579**	19.808**	19.596**	18.157**	14.992*	14.042*
	(8.63)	(11.63)	(17.87)	(24.57)	(26.00)	(27.39)
Trading Volume >20 &< 60	22.396**	20.384**	25.098**	22.722**	19.162**	23.058**
	(7.65)	(12.63)	(22.38)	(27.23)	(24.22)	(36.59)
Trading Volume >760 &< 100	21.833**	22.729**	21.107**	20.063**	21.617**	22.750**
	(7.21)	(12.69)	(19.19)	(26.64)	(27.56)	(33.71)
Trading Volume > 100	20.176**	22.833**	24.494**	25.015*	20.978*	22.195**
	(11.215)	(12.719)	(19.57)	(26.96)	(30.65)	(33.66)

Note. * <0.05; ** p<0.01 represent significance level at the 1, and 5% respectively.

For testing pre and post sample variance in each of data stream, F-test has been applied, which evaluates the variance of two different sets of values. Results of F-test have been presented in table 4.5. These results show whether there is a significant variation between pre-COVID and post-COVID BHAR or not.

Table 4.5: Examination of F-test

Event	BHAR	Pre	Post	F-Value	(2*Pr(F < f)) Ha: ratio = 1
COVID-19	**BHAR1**	17.19*	18.39**	0.439	0.000
	BHAR2	18.09**	19.14**	0.603	0.000
	BHAR3	18.90**	19.78**	0.636	0.000
	BHAR4	17.63*	19.28**	0.027	0.000
	BHAR5	17.57*	19.54**	0.166	0.000
	BHAR6	17.49*	18.05*	0.189	0.000

F-value must be > F-tabulated for proving the significant variation between two different data sets. It is found that there does not exist any significant variation between BHARs of PSX companies pre and post COVID because F-value for none of the BHAR value is greater than F-tabulated. Hence, F-value less than F-tabulated is indicating that there does exists any significant variation between BHARs of PSX firms before and after Covid-19.

For evaluating that 'how did PSX firms react after COVID-19?', the seasonality method has been used. Seasonality effect refers to the movement of time series data of firms and significant changes experienced by the data during some specific period of time caused due to some extra-ordinary situation. In the current research, seasonality effect refers to the fluctuations or changes

in stock indices happened due to Covid-19 outbreak. OLS has been used to assess the behavior of PSX during this crisis. In doing so, the BHAR is considered as the dependent variable while before-COVID19 (BC1-BC6) and after-COVID19 (AC1-AC6) are considered independent variables. These independent variables are quantified by 1 for the same year and 0 otherwise(Hussain, Korkeamäki, Xu, & Khan, 2015). Following econometric equation is applied:

$$t \qquad t\, b \quad b \qquad t \qquad t$$

Table 4.6: Seasonality Effect

	Overall	Small Size Firm	Large Size Firms
bc1	16.11**	17.12**	14.82**
bc2	19.13**	18.43**	17.78**
bc3	15.88*	18.22**	14.27**
bc4	14.77*	18.18**	14.45**
bc5	14.11*	17.29**	18.63**
bc6	14.67*	16.16**	16.41**
ac1	10.37	09.30	08.23
ac2	11.42	11.78	07.81
ac3	13.14	10.33	10.23
ac4	12.53*	14.35*	11.65*
ac5	16.29**	16.45**	13.35**
ac6	13.13*	16.12**	13.33**

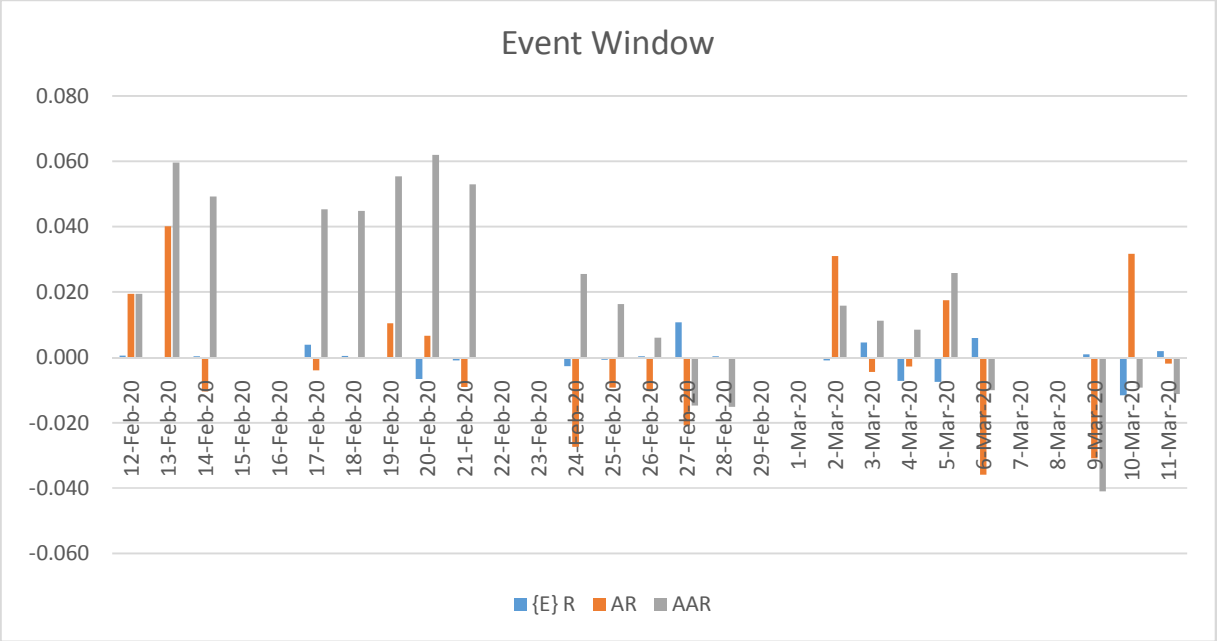
Note. * p<0.05; ** p<0.01

It is found through results presented in table 4.7 that BHAR of PSX firms showed the significant seasonality effect of COVID-19 because there occurred the significant seasonality effect of COVID-19 on BHAR of small size firms, large size firms, and overall firms of PSX during all six months before COVID-19. However, the seasonality effect of Covid-19 on BHAR of PSX firms (i.e. small size firms, large size firms, and overall firms) was not significant during the first three months after the occurrence of Covid-19 pandemic (i.e. AC1-AC3). Results show that BHAR of PSX firms showed the significant seasonality effects of COVID-19 during next three months after COVID-19 i.e. AC4-AC6. It means that COVID-19 pandemic caused the seasonality effect on returns of PSX firms after three months of its occurrence. Hence, PSX firms reacted significantly after COVID-19 and showed seasonality effect three months after the happening of Covid-19 outbreak.

4.5. Variation of Returns due to Covid-19 outbreak

Figure 4.1 shows the change in patterns of ER, AR, and AAR over the study period. This pattern of change in AAR over the period of 21 recorded days shows that Covid-19 significantly increased the uncertainty of returns as PSX companies' returns were unable to show a continuous trend during those days. AAR of firms mostly showed significant decrease and sometimes the significant increase. However, the increased volatility and variation of return after the event date have been proved by the results so, it can be said that the Covid-19 has caused significant impact on patterns of risk and returns of PSX firms and have raised the level of uncertainty in PSX market.

Figure 4.1: Event window for impact of Covid-19 on PSX returns and risk



4.6. Summary of Chapter

The event study analysis has been performed on the data collected about the returns and risk of PSX firms in order to see the effect of Covid-19 on them. For this purpose, return and risk for ten days before the event date and ten days after the event date have been computed and compared in order to see the negative or positive change in them. To conclude the whole event study analysis, it has been found that the uncertainty of returns of PSX firms showed the increase after the event date because there was the higher instability of the increasing or decreasing trends of stock returns after the event. After the event, returns showed sharp variations that were sometimes positive and sometimes negative. However, most of the time the change was unfavorable as AAR of firms mostly showed significant decrease. It means that the increased volatility and variation of return after the event date have been proved by the results of this study. Based on these findings, it can be concluded that Covid-19 outbreak has caused significant changes in patterns of risk and returns of PSX firms and have raised the level of risk in PSX companies' share.

Chapter 5 Discussion and Conclusion

5.1. Introduction

The current chapter focuses on the deliberation of results found in the previous chapter by discussing them in practical context of PSX firms and comparing them with findings and discussions of previous studies. The purpose of the critique discussion in this chapter is to highlight the similarities, differences, and alignment of the current study and its findings with the previous literature. In addition to the discussion of results, this chapter also includes the summary of the whole study as the whole study is concluded in this chapter and its particular application in the PSX has been discussed. Besides concluding the whole study, this chapter also draws theoretical as well as practical implications of this study. Finally, the chapter is closed with highlighting the limitations of this study and stating research avenues and directions for future researchers.

5.2. Discussion of Results

The current study has been conducted in Pakistan to see the change in patterns of risk and returns of PSX caused due to Covid-19 pandemic. An event study has been performed to answer the research questions of this study. In response to the first and second research questions of this study, the current study has found that the Covid-19 outbreak has caused significant changes in patters of returns and risk of PSX listed firms. As the returns of PSX listed firms have faced higher variations and sharp decrease and increase after the event so, hypotheses of the study are accepted and it is found that the Covid-19 pandemic has significantly affected the patterns of returns and risk of PSX listed firms. It is because this pandemic has raised mixed type of feelings among investors related to fear, anxiety, optimism, and pessimism so, these mixed feelings shape the investor's sentiments differently. As the investor's sentiments are the main determinants of

his/her investment decision so, returns of stocks in PSX market have been affected accordingly. These results of the study find their support from a number of past theories and studies. For example, the findings of this study are in line with the viewpoint of signaling theory, which suggests that the information serves as the signal for the investors so, inside information can affect the optimism level of investors. These findings are also aligned with the study of Clark et al. (2002) who suggest that inside information plays an important role in determining the investor's decision for buying a stock.

Findings of the present study regarding the significant change in patterns of risk and returns of PSX listed firms due to Covid-19 outbreak are also supported by the viewpoint of efficient market theory (EMT). It means that the current findings are aligned with the suggestions of EMT, which states that share prices reflect all the information available in the market. As the Covid-19 is the most hot issue and topic of discussion during this pandemic so, information disseminated about Covid-19 outbreak is reflected in share prices and thus, the returns on those stocks are influenced. This theory further provides support to the current findings by supporting the argument that market information during natural disaster directly affects the investment behavior of the investors. Hence, the current findings show the alignment with the viewpoints of EMT as well. Another theory to which the current findings are showing alignment, is the rational expectations theory. This theory also supports the current findings by suggesting that the investor's decisions are affected by three factors i.e. human rationality, available information, and past experiences. Hence, the available information about the Covid-19 outbreak during this pandemic has affected the investor's decisions significantly due to which their returns of stocks have been significantly influenced. Hence, these findings are consistent with the viewpoint of rational expectations theory as well. The current findings regarding the change in patterns of

risks and returns of PSX listed firms due to Covid-19 outbreak are also aligned with the intertemporal asset pricing theory, which supports the argument that uncontrollable natural factors can affect the investment behavior of the people as the low future expectation leads to unfavorable investment behavior of investors. Hence, the current findings are supported by these significant theories of the literature so, the current study is in line with the prior theories.

In addition to prominent theories of investor's behavior, the current findings suggesting the significant change in patterns of risk and returns of PSX listed firms due to Covid-19 pandemic are also in line with many empirical studies and analyst reports. For instance, these findings are in line with the revelations of FSR published in April 2020, which stated that COVID-19 has negatively affected the global financial markets (Fund, 2020). As the Covid-19 has caused changes in stock markets at global level so, the interdependence of stock markets also justifies the alignment of the current results with revelations of this report. These findings are also showing consistency with the study of Topcu and Gulal (2020) who suggest that Covid-19 has negatively affected the stock markets of emerging countries. These findings are also consistent with the revelations of Riaz et al. (2020) who suggest that future irregularities due to this outbreak have negatively affected investor's decision. The present findings are also supported by Aslam et al. (2020) who suggested that the stock exchange dynamics caused due to Covid-19 lead to fluctuating investment behavior. This fluctuating investment behavior causes high risk and varying patterns of returns in stock market. Hence, the current findings are aligned with the existing literature explaining the rationale behind the change in patterns of risk and returns of stock exchange companies due to some disaster such as Covid-19 outbreak. Although most of these mentioned studies have been performed in developed countries but they provide enough

support to the current findings as the Covid-19 pandemic is a global event, which has largely affected the stock markets of many countries.

The current results suggesting the Covid-19 outbreak as the significant event to cause changes in the pattern of risk and returns of PSX listed firms are also consistent with suggestions of Skidmore and Toya (2002) who revealed that pandemic attacks badly affect the long term investment behavior of investors. Furthermore, study of Azimli (2020) also provide support to the current findings as this mentioned study also found that Covid-19 has affected the risk and return on investment. In addition to these studies, the current findings also find enough support from many other previous empirical studies. For example, Al-Awadhi et al. (2020) also found that Covid-19 outbreak has cased significant effect of stock market returns due to affecting the investor's sentiments and optimism. These findings are also in line with the discussions of S. R. Baker, N. Bloom, S. J. Davis, K. Kost, et al. (2020) who suggested that the stock market has reacted to Covid-19 outbreak extraordinarily. Similarly, these findings are also supporting the revelations of Phan and Narayan (2020) who suggest that the stock market has shown the significant change in response to the pandemic of Covid-19. In addition to these studies, the current findings are in line with many studies supporting the effect of different pandemic and disasters on the patterns of risk and returns in stock market e.g. (R. Ali & Afzal, 2012; Anagnostidis et al., 2016; McTier et al., 2013; Smith et al., 2011; Z. Wang et al., 2003). As these studies supported the role of different disasters including the financial crisis, Avian flu, and other global disasters in changing the patterns of risk and returns of stock markets of various countries across the globe so, the current findings are aligned with revelations of those studies. Although the current study finds the effect of a new event/disaster i.e. Covid-19 on patterns of risk and returns of PSX firms but it is aligned with the past revelations that such disasters or epidemic can

cause the variations in the patterns of risk and returns of stock exchange. Hence, the current study and its revelations show full consistency with the existing literature.

5.3. Conclusion of Study

The present study assessed the change in patterns of risk and returns of stock market companies due to Covid-19 outbreak in context of PSX. For this purpose, the current researcher conducted an event study on PSX listed firms by collecting data of stock returns of PSX listed firms for ten days before and ten day after the event (i.e. 26th February,2020 when Covid-19 pandemic happened). The sample for this study comprised of KSE-100 firm because they represent that PSX in the best way and represents almost all sectors of Pakistan listed on stock exchange. The data has been analyzed by applying statistical tests including descriptive analysis, event study analysis, and t-analysis to see the variations of returns and risk due to this pandemic. The current study has found that the uncertainty of returns of PSX firms increased after the event date because there was the higher instability of the increasing or decreasing trends of stock returns after the event. It means that Covid-19 pandemic has significantly caused variations in pattern of risk and returns of PSX listed firms. Furthermore, it has been found that most of the time, the variations of patterns of return caused after Covid-19 outbreak were negative. It means that the abnormal returns of PSX listed firms mostly decreased after the event. However, returns of PSX listed firms have also shown increase sometimes. Hence, the results of the current study have proved the increased volatility and variation of return due to Covid-19 outbreak.

Findings of this study show that the investor's sentiments in PSX were significantly affected by the information and situation related to the pandemic so, their investment decision and behavior showed significant variations. It is because the fear, anxiety, optimism, and pessimism associated with the Covid-19 outbreak affected the investor's sentiments and thus, his/her investment

behavior and decisions, which in turn caused the significant variations in pattern of risk and returns of PSX listed firms. Therefore, it is concluded here that Covid-19 outbreak has led to significant changes in patterns of risk and returns of PSX listed firms by raising the level of risk and making returns more volatile. The current study has found the explanation of different behavioral finance theories and efficient capital market theory in relation to Covid-19 pandemic and its effects on investor's behavior. Therefore, the current study and its findings have shown the complete alignment with the literature of those theories and prior studies examining the effect of pandemics like Covid-19 on stock market performance, stock prices, and stock volatility.

5.3.1. Implications of Study

The current study intends to make significant contributions to the theory and practices through its useful implications and suggestions. Following are key theoretical, practical, and policymaking implications of this study:

5.3.1.1. Theoretical Implications

The current study tends to be a great addition to the literature as it will enhance the existing literature in many aspects. First, the relevant theories of investor's behavior including efficient market theory, signaling theory, rational expectations theory, intertemporal asset pricing theory, and market capitalization will be enhanced through the current study and its findings because this study provides the findings supportive to those theories. As these theories somehow describe the role of different factors in shaping the investor's behavior so, the current study proving the role of Covid-19 outbreak in affecting the investor's behavior and ultimate returns and risk of PSX listed firms would be an empirical evidence related to those theories. Such empirical evidence would strengthen the argument of these theories. Secondly, although the existing literature provides a number of studies explaining the role of different past disasters in determining the

stock market performance but results of these studies are not sufficient to explain the effect of the most current pandemic associated with Covid-19 on stock market returns and risk. The current study would fill this theoretical gap in the literature.

Despite of large number of studies explaining the effect of different disasters on stock market returns and risk, particular studies on the effect of Covid-19 outbreak on stock market returns and risk patterns are very limited in number because Covid-19 outbreak is a new event and nobody was aware of even the term of Covid-19 before 2019. Due to being a new event, a very limited research is found on how this event/pandemic has changed the patterns of returns and risk of different stock exchange listed companies. Therefore, the current study and the evidence provided by this event study would help researchers to understand the role of Covid-19 pandemic in shaping the patterns of returns and risk of stock markets. Furthermore, although a few studies are found in the literature that describe or explain the changed patterns of returns and risk of shares in different stock market after Covid-19 but none of them has sufficiently and efficiently addressed this phenomenon in particular context of PSX listed firms. Most of such studies have been performed in context of developed stock markets so, PSX listed firms have faced a sort of ignorance in this regard till yet. The current study tends to address this gap in the empirical literature particularly related to PSX so, the current study will enhance the theories of investor's behavior as well as the empirical literature of the effect of Covid-19 outbreak on patterns of returns and risk of companies.

5.3.1.2. Practical Implications

In practical terms, the current study would be very beneficial for PSX listed firms as well as investors through its theoretical guidelines. As the current study shows how the Covid-19 outbreak has changed the patterns of returns and risk in PSX listed firms so, firms can get

theoretical guidelines from these findings and can develop and implement better strategies to seek the confidence of their investors. These findings will help them to understand that how their firm's returns and risk have been affected positively or negatively due to Covid-19 outbreak so, they would be better able to analyze the change in investor's sentiments and confidence about their company. After identifying the change in investor's behavior and sentiments, firms would be better able to design strategies and tactics through which they can attract more investors and gain their confidence. Besides firms, the current study would also help investors to understand how the patterns of stock returns and risk have changed in response to Covid-19 outbreak. By identifying the favorable trend and unfavorable trend of stock returns caused due to Covid-19, they can make better investment decisions to generate more returns in the market. Hence, the current study would be helpful for investors as well as firms by helping them in understanding the stock market reaction to Covid-19 outbreak and thus, making better investment decisions and designing better strategies to attract and gain investors respectively.

5.3.1.3. Policymaking Implications

The current study will also help policymakers of Pakistan to understand how their stock exchange has reacted to the Covid-19 outbreak. As the current study provides findings about the changed patterns of returns and risk of PSX listed firms during different days before and after event data so, policymakers can develop and implement better policies based on this information. For example, they would come to realize through this study and findings that how the information disseminated about Covid-19 outbreak has been reflected in stock prices and stock market performance. By understanding this aspect, they can design better policies about the disseminations and broadcasting of information related to Covid-19 situation, Covid-19 cases, and other information related to Covid-19 so that, the stock market returns can be directed in a

particular way. Hence, the current study would be very helpful for policymakers of Pakistan by assisting them in improving the stock market performance. It means that the findings of this study would benefit the whole corporate sector and stock exchange of Pakistan in broader terms. As the stock exchange is a primary element of the economy of a country so, it can be said that the current study has broad implications for the economy of Pakistan.

5.3.2. Limitations and Future Suggestions

Although the current study tends to make significant contributions and implication in the field of theory and practice but a few limitations associated with this study need to be highlighted here so that, future researchers attempt to overcome those limitations. First, the current study has taken a short tenure to conduct the event study i.e. six months before and after the event. It means that the current results are limited to six months after 26th February 2020.In contrast, the Covid-19 pandemic has extended even to 2021. Therefore, it may be said that the current findings are not fully justifying and explaining the change in patterns of returns and risk during Covid-19 outbreak because the investor's sentiments might have been changed at the later stages of Covid-19. Therefore, future researchers should perform event studies with an extended observation periodin order to analyze the behavior of the market and understand this phenomenon at later stages of Covid-19 outbreak. It is because the current study only addresses the changed patterns of risk and returns during initial stages of Covid-19 outbreak. Secondly, the current findings are limited to stock exchange companies of Pakistan only while the findings in stock markets of other countries can be definitely different depending on the investor's sentiments, cultural factors, and other social elements in those markets. Therefore, future studies are directed to assess this phenomenon by conducting cross-country/cross-national studies and comparing them in order to provide enhanced guidelines about the effect of Covid-19 on stock firms at cross-

country level. Furthermore, future researchers should incorporate other variables including interest rate, economic growth, inflation rate etc. along with the Covid-19 outbreak to see their effects on PSX returns and risk in order to ascertain the clear description of Covid-19 outbreak related variables influencing the PSX performance.

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