PERFORMANCE EVALUATION OF PHARMACEUTICAL INDUSTRY DURING COVID-19:
AN ANALYSIS OF RETURN & COMPANY FUNDAMENTALS

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CERTIFICATE

This is to certify that this thesis entitled: **"Performance Evaluation of Pharmaceutical Industry During COVID-19: An Analysis of Return & Company Fundamentals"** submitted by Mr. Muhammad Ibtasam Qayyum is accepted in its present form by the Department of Business Studies, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree of **MBA**.

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Dedication

I am dedicating this research work to all my family members and especially to my beloved sisters **Ms. Atiya & Ms. Rabia** who help me in every possible way for my successful future. Without your help, patience, and confidence in me, I was not able to complete this whole journey. I love both of you.

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ABSTRACT

The study examines the impact of covid-19 on the return of 12 pharmaceutical stocks listed at Pakistan stock exchange (PSX). The study has employed data from December 31, 2018, to March 31, 2020. For data analysis, event study methodology has been used. It is concluded that the average abnormal returns of the pharma companies are insignificant because market already was at its lowest point at 28764.63 (100 Index) before the announcement of covid-19. But the accumulative abnormal returns for all the companies are significant. It is recommended that investors have to take the long position in investment decisions because this type of abrupt and sudden events like Covid-19 do not have the long elastic effects on the stock markets.

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LIST OF ABBREVIATIONS

ABBT   Abbott Laboratories Pakistan Ltd

AGPL   AGP Ltd

AR   Abnormal return

CAR   Cumulative abnormal returns

DRAP   Drug regulatory authority of Pakistan

EMH   Efficient market hypothesis

Ebola   Zaire ebolavirus

ER   Expected returns

EPS   Earnings per share.

FERO   Ferozsons Laboratories Ltd

GDP   Gross domestic product

GLAX   GlaxoSmithKline Pakistan Ltd

GLAO   Glaxosmithkline Consumer Healthcare Pak Ltd

HINL   Highnoon Laboratories Ltd

IBLH   IBL HealthCare Ltd

MACT   Macter International Ltd

MAM   Mean adjusted return model.

MM   Market model

MMAM   Market Mean Adjusted model

OTSU   Otsuka Pakistan Ltd

PSX   Pakistan stock exchange

RWH   Random Walk Hypothesis

RoA   Return on Assets.

RoE   Return on equity

SARS   Severe Acute Respiratory Syndrome

SEAR   The Searle Company Ltd

SAPL   Sanofi Aventis Pakistan Ltd

WHO   World health organization

WYTH   Wyeth Pakistan Ltd

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CHAPTER 1:

INTRODUCTION

Covid-19 has brought about an unprecedented pressure on the world economy that has created a critical scenario for all the businesses around the globe. This sudden news of pandemic has severe effects on the lives of people around the world. All economies around the globe have faced challenges in all field of businesses either it is service-oriented or product-oriented. Covid-19 is started from Wuhan, a big city of china having 11 million people and a large number of industrial, educational, and scientific institutions. The first case of covid-19 has been reported on December 31, 2019. Most of the initial effected people belonged to the Hubei province in which the Wuhan city is located.

The World health organization WHO has made the first public announcement about the spread of corona virus on 4th January 2020 and on 11th March 2020 WHO has declared this disease the global pandemic named COVID-19 (Asghar et al., 2020). After the spread of this virus in other countries, human life has been on stake and has become a war of survival against this enemy. But such viruses can only be handled by precautionary measures or proper vaccination. Unfortunately, the world has no proper medication for this novel virus and the human protection now can only be saved through precautionary measures.

According to the world health organization, there are 76,250,431 confirmed cases of COVID-19, withs 1,699,230 deaths Globally, as on 23 December 2020.Pakistan has been facing a critical challenge from the day first having Total cases of 4,58,968 with cumulative total death rate of 9392 as on 23 December 2020. The spread of novel coronavirus (COVID-19) disease across the world has seriously affected people's production and life in general.

After the declaration of lockdown in Pakistan, the economic activities have been freezing across the country. All field of life including personal and commercial, are influenced by this novel virus. Most of the article

well communicated that the corona virus pandemic affected most of the industries such as travel, tourism, entertainment, airline, and hotel industry Aravind and Manojkrishnan (2020) . On the contrary note, there are several sectors that have not been severely affected by novel virus. As an example, the pharmaceutical sector played a pivotal role during the outbreak of covid-19 and has not been severely affected by the pandemic.

The pre-pandemic evaluation of Pakistan's overall market and the GDP growth rate in Pakistan during 2019 was around 3.3% and the state bank of Pakistan gave the clear indication of downfall of the GDP rate for upcoming period without taking the effect of corona virus. In the beginning of fiscal year 2020, the economy of Pakistan showed the favorable trends, but the Covid-19 nullified all the positive indication.

The traditional economic and financial theory owns that market and company characteristic-based factors influence the stocks prices. Companies in the same industry face the same regulatory and policy environment and similar macroeconomic conditions. When faced with changes in the financial environment, the operating conditions of companies in the same industry are highly associated, Grinblatt and Moskowitz (1999). According to the behavioral theory of finance, in addition to the basic value of stocks, investors' psychological and behavioral factors are influenced by unexpected events like emergencies, which, in turn, do have an impact on stock prices. believe that investor's confidence reduces the volatility for earnings, while investor's doubt increases volatility for earnings. Therefore, the event of COVID-19 will have a strong effect on the economic environment, which will obviously change the investor's sentiment, that affects stock price changes.

This study analyzes impact of covid-19 announcement on the stock prices of pharmaceutical industry in Pakistan and also analyze the financial performance of pharmaceutical sector by using different set of ratios to measure the general financial trends of this sector.

1.1 Theoretical background

The Efficient market hypothesis (EMH) is a central proposition of, and it has become the most important topic in modern era of finance that has created a revolutionary impact on the professionals of academic, asset management and portfolio management. Efficient market is the most famous topic in finance. It is believed by the Modern financial theories that these markets are efficient. Fama (1970) defines the efficient market as a market in which prices always "fully reflected" by available information, that is called "efficient market". Fama proves that an efficient market is that form of the market in which resources allocation is perfectly determined by the prices and the prices of the securities perfectly reflect the information that is publicly available. It is because the primary role of the capital market in every country is to measures and shows the real allocation of ownership that explain the economy's capital stocks.

Sewell (2011) Provides the definition of efficiency and that is if the security prices have a real effect from the information publicly available, then it is an efficient market. Another definition of efficient market is designed by the Malkiel (1989) .He says if the market has the capacity to take the effect of all the information available publicly and make sure the effect in fear determination of the security prices than it is known as an efficient market.

Sewell (2011) presents the idea of a stockbroker, Jules Regnault, back in 19th century that the time duration is linked with the profit or loss gained. How long an investor holds the security, he can win or lose, respectively. In 1880, British physicist, Lord Rayleigh, talked about the random walk for the first time and later on in 1888 John Venn, the British logician and philosopher introduced the random Walk and Brownian motion. In the very next years in 1889 George Gibson wrote a book entitled "The Stock Markets of London, Paris and New York". He, first time, introduced the efficient market(Sewell, 2011). In 1965, V Samuelson added some new knowledge and explain the efficient market in terms of martingale that is also called probability.

Fama (1970) defines the efficient market for the first time and introduced the different types for the efficient market. In the same year, Samuelson presents the economic arguments that proves the efficient market and the idea of security pricing fluctuation randomly.

Fama (1970)also explains in detail about the random theory how it effects the stock prices for the user of fundamental and technical analysis.

Sewell (2011) states that Harry Roberts later uses the term efficient market hypotheses and make the difference between strong and week form of the efficient market which is now become the lexicology of the efficient market. In the next year, Ball and Brown are the first two persons who have published the "event study" that is an important methodology to analyses semi strong form of the efficient market. This is the brief story of three types that have been a major discussion topic for the professionals of academic and investment management. In 1969, Fama again undertook the event study and generated the results that are the major proof to the efficient market's reality. Not only this happened but he wrote two more reviews on the efficient market theory later on.

It is stated by Sewell that Andrew W conducts a test for long term dependencies and concludes that there is no reality for long term dependencies. On the contrary statement, Fama writes the second review and explains the week form of the efficient market that is generally tested for return predictability.

The last review on efficient market was written by Fama after the contrary statement of Elroy Dimson and Massoud Mussavian. In 1998 Elroy Dimson and Massoud Mussavian demonstrated the history of market efficiency. Fama proves that market efficiency survives the challenge from the literature on long-term return anomalies.

On the other hand, there is a lot of criticism on Fama's paper related to efficient market. Most of the economist believe in non-existence of efficient market because of the "fully reflect" that is used in the definition of efficient market. Sewell winded up the debate with the statement that

financial economy is a social science. This is enough to create a hypothesis that despite of the contention. EMH is the strongest hypothesis in the social sciences. if though science appeals for the best hypothesis but without wrong hypothesis is replaced by right hypothesis, criticism is of limited value.

Fama presented 3 different categories of efficient market that are weak form, semi-strong form, and strong form of efficient market. These categories are on the basis of available information. Below are the classifications which are discussed by Fama on the basis of available information set:

1.1.1 Week form of efficiency: This market form of efficiency states "*a market is said to be weak form efficient if current prices fully reflect all historical information contained in past prices*". It means that future stock prices cannot be measured on the basis of past prices and abnormal return cannot be earned by investors using prior information of stock prices. Dong Loc et al. (2010).

1.1.2 Semi strong form of efficiency: The second form of efficient market defines that *"current prices reflect all publicly available information, for example information about exchange rate, interest rate, money supply, earnings announcements, dividend announcements, stock splits, etc."*. This form of efficient market means investor cannot earn abnormal return using the published information of the companies. Annual reports and financial statements of the companies are useless in semi strong form of the market. Because every good or bad news that is published in the reports immediately change the stock prices.Dong Loc et al. (2010)

1.1.3 Strong form of efficiency: The strong form of efficient market means that *"securities reflect all relevant information including both public information and private information"*. This form of market efficiency directs that it is not simple to get private information (insider information) by the investors for generating abnormal returns in the market. Because it is assumed that all the information is useless because the effect of information is equal to all the market participants. In real world, this notion does not exist. So, this form of efficient market is supposed not to be hold. There is zero probability to get super abnormal return by using market news Dong Loc et al. (2010).

Fama (1970) Provides different names to the market efficiency studies. The first type consists of the test of return predictability whereas the second type is known as event study. The last type contains the test of private information.

There are fewer studies that have been conducted in semi strong and strong form of the market. Most of the research work has been done in the field of Random Walk Hypothesis (RWH).

1.2 History of pharmaceutical industry in Pakistan:

Pakistan has an exciting and forward-looking pharma industry("historical overview of pharma sector," 2020). At the time of separation from united India, Pakistan had not even a single pharma industry due to lack of raw material and related skills to establish the pharmaceutical sector. But with the passage of time, pharma sector has been grown up rapidly over the years("historical overview of pharma sector," 2020).

Today Pakistan has approximately 759 pharmaceutical manufacturing units in different geographical locations. The portfolio of pharma sector is owned by both national and multinational companies as some pharma manufacturing units are operated by the 25 multinational companies

in the country. In 1954 pharmaceutical companies rose to 15 and in the next year the number reaches to 31.

Now the total number of pharmaceutical companies meet the figure of 60. The Pakistan pharmaceutical industry fulfil 70% requirement of finished medicine. According to the policy research institute of market economy July,2017, Pakistan has exported pharma products worth 200 billion USD$ to more than 60 countries("historical overview of pharma sector," 2020).

The Pakistan pharmaceutical industry has shown a tremendous growth, especially in the last decade. The pharma sector invested substantially and gradually to upgrade the protocols and meet the requirements of good manufacturing practices.

Pharmaceutical industry is among the top of the Pakistan's scientific research-based industry with the capacity ranging from simple pain killer to sophisticated antibiotics and other complex cardiac compounds. The industry has ranked the top pharmaceutical in the third world countries based on the standardized manufacturing and researched oriented formulas. Pakistan pharmaceutical industry now has the capacity to make all types of sophisticated Biotech, Oncology and Value-Added Generic compounds("pakistan pharmaceutical manufacturer's association,").

Taking the history of pharma in Pakistan, Colombo plan mission has a magnificent role in the history of pharma sector's growth. The expert visited Pakistan and exposed the grounded loopholes related to secrecy of pharma experts, unappropriated quality control and the non-standardized material equipment.

According to the policy research institute of market economy, July,2017, the number of manufacturers of pharmaceutical industry reaches to 759 but the official statement takes the contradiction note on the full number of licensed manufacturing units in Pakistan. This shows a wide gulf among the stakeholders of pharma industry at governmental level that is unfortunately

very common factor in pharmaceutical landscape in Pakistan("historical overview of pharma sector," 2020).

1.2.1 Growth of pharmaceutical industry:

Geographically, the pharmaceutical manufacturers are spread in all over the countries. if though the number of manufacturing unit are existing in the Punjab province but in terms of production capacity, source utilizations, volume of the businesses and size of the businesses, the capital of Sindh province, Karachi, leads the way("pakistan pharmaceutical manufacturer's association,"). Following are the tables that shows the real picture of the pharmaceutical industry's expansion in Pakistan.

Figure 1.1:

years	Pharma Firms
2000	304
2010	406
2020	759
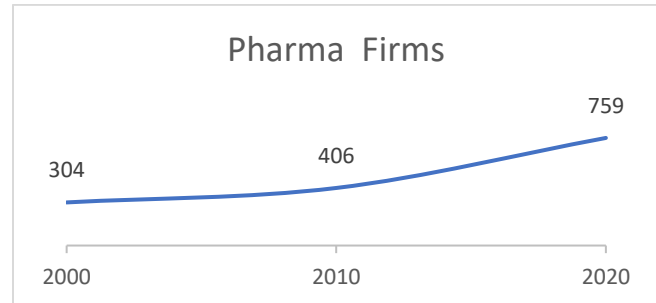
The numbers in the table above indicate the substantial growth in the pharmaceutical sectors over the years.

Figure 1.2:

Area/province	2000	2010	2020
Punjab	160	370	440
Sindh	101	163	183
KpK	32	98	114
Baluchistan	2	13	15
Kashmir	9	6	7
Total	304	650	759
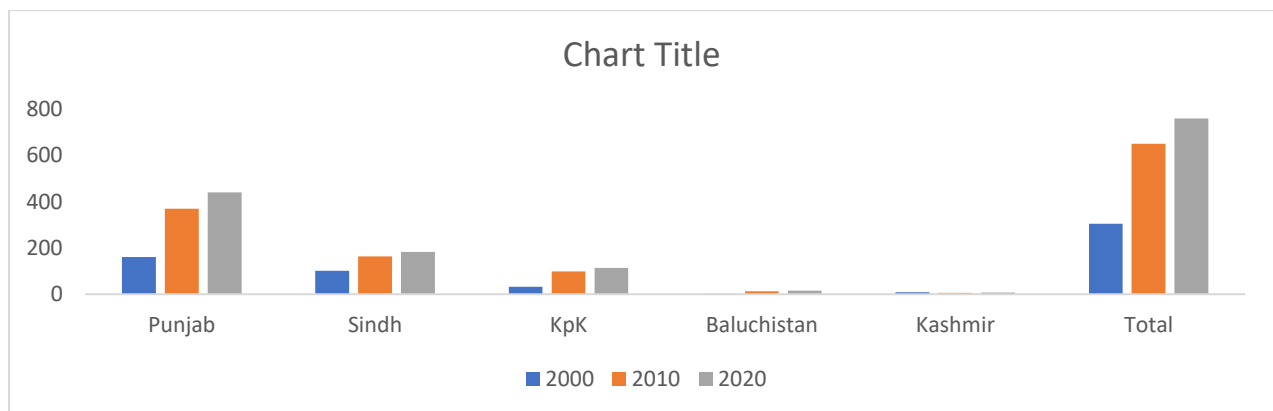
In terms of monetary worth, Pakistan has a big size of $3.10 billion USD in the pharmaceutical sector that is hardly 0.5 percent share of the total market in the world as the value of whole global market is assessed to be over 1 trillion.

Pakistan pharmaceutical sector has unlimited raw material resources that make the doing of businesses relatively easier. In spite of the fact that Pakistan has to import raw material for manufacturing drug but the access to resource is easier. Pakistan imports 95% of the raw material and uses only 5% from domestic resources. The government of Pakistan takes a pragmatic step to liberalize the import policy generally and specifically for the pharmaceutical sector. The government of Pakistan helps the pharmaceutical sector directly by minimizing the duties on import and indirectly by removing the trade barriers.("historical overview of pharma sector," 2020)

1.2.2 Major drivers of expansion:

It is showed by the above-mentioned commentary that the pharmaceutical sector has a bullish trend over the years that indicate the expansion of the production of the drug in Pakistan.

There are some other drivers of expansion that projects the future growth of the pharmaceutical sector. Among the bundle of reasons, the growth of population in the world and specifically in Pakistan is an indication for the growth of pharma sector. According to the UN, population in Pakistan is going to reach the figure of 25 million by 2030 and 300 million by 2045.

In case of Pakistan, another indirect implication is that government of Pakistan invest hardly 1% of the budget in health sector that is not appropriated to the requirement of health. This fact, however, brings about the lack of health dynamic and ease the way to bundle of diseases in Pakistan. Ultimately, it will cause the greater need of medicine in the country. This projection is a

major driver of expansion of pharma industry in Pakistan.("historical overview of pharma sector," 2020)

Another driver that gives the real significant indication of pharmaceutical sector's growth is to increase the per capita income generally in all the countries and specifically in Pakistan. Increment in per capita income will allows the majority to afford the quality-based medicine. This is also a positive indicator for the future growth of pharmaceutical industry in Pakistan.

Self-medication or self-description is also a major cause of the more drugs in Pakistan.

Bilal et al. (2016) estimates that majority of the population in rural areas prefer self-medication. This study is done taking the sample size of 595 person from the rural areas. This is not limited to the rural areas but in the urban areas where the health facilities are good, people tend to use self-medication policy. Akhtar (2009)states that 76% of the stratum in Karachi university uses the medication by self-description.

1.2.3 Investment in pharmaceutical sector:

According to the policy research institute of market economy, July,2017, Pakistanis at the highest population growth rates in the world and lowest rate to access the quality health care. With this clear and crystal stance, Pakistan has the market opportunity for domestic and foreign direct investment in the pharmaceutical industry but unfortunately, the investment in this sector decreased drastically. Pakistan, just not having the substantial demand for medicine but also having the low wages environment, is the efficient market but this sector is neglected more("historical overview of pharma sector," 2020).

1.3 Problem statement:

Stock market is very volatile place where the stock's prices are significantly influenced by upcoming news eighter it is good or bad. The semi strong form of efficient market states that ***"current prices reflect all publicly***

available information, for example information about exchange rate, interest rate, money supply, earnings announcements, dividend announcements, stock splits, etc."Dong Loc et al. (2010). In this study, firstly, the problem strongly relates to the volatility of the pharmaceutical sector's stocks that have been trading in the Pakistan stock exchange. Secondly, what are the major dynamics that influence the stock returns.

1.4 Research Questions:

This study has the following research questions.

1. How does the financial performance of pharmaceutical industry at the time of covid-19 outbreak?

2. What is the impact of Covid 19 outbreak announcement on the stocks of pharmaceutical companies?

1.5 Objectives of the study:

The study has the following research objectives.

1. To investigate financial performance of pharmaceutical industry when the covid-19 outbreak happens

2. To examine the effects of Covid 19 outbreak announcement on the stocks of pharmaceutical companies

1.6 Research Gap:

During the pandemic, a number of research works are done with respect to different angle of the pandemic's effects. Most of the works are done in those fields that have been affected by pandemic but there are less works on the other side where the pandemic news affected positively. Ahmed (2020) conducts a study aiming to check the impact of COVID-19 on the performance of Pakistani Stock Exchange. The findings of the research suggest that recoveries of COVID-19 patients are highly correlated to the performance of the index and the performance of stocks are insignificantly influenced by the daily positive cases and fatalities.

Riaz et al. (2020)conducts a study to analyze those factors, by which investors' behavior is affected in Pakistan stock market during spread of COVID-19. The findings of the study states there are most common behavioral patterns of investors and adequate paths adopted by the investors, which lead Pakistan Stock Market towards the growth. After deep observation of the current works, it is found that pharmaceutical sector is one of those sectors where the effects of covid-19 pandemic are not analyzed. Moreover, there is not any event study approach to check the performance evaluation of pharmaceutical sector. Recent literature review states that the pharmaceutical sector is neglected in all over the world and specially in Pakistan. Some works have been done in pharmaceutical sector but that is totally related to the governance and compliance side or related to the supply chain and demand side but the production and the return on the stock of pharmaceutical sector has not been investigated. There is not enough work on the pharmaceutical sector with regards to the efficient market. This is the untouched areas that create the big gap for further research.

1.7 Significance of the study:

This is an important study for the investors, asset management and portfolio management professionals. It will help the above-mentioned stakeholders for designing the portfolio of their investment. The effects of past pandemics and the research works relate to those pandemics are the major sources for investors, asset management and portfolio management professionals. So, this is the requirement of the time to investigate the covid-19 effects on different sectors and specifically on those sectors that are neglected during the covid-19 outbreak. In this study, *the investors' behavior to pharmaceutical companies' stocks, positive/negative effects of covid-19 outbreak on stocks returns and the volatility are measured*. Moreover, this is an *event study approach* to check the performance evaluation of pharmaceutical sector. This study will paint the real picture of this pandemic and highlight the Important points that will be nutshell by the investment point of view and lead the professional to take the optimal decision any time in the future.

1.8 Hypothesis of the study:

H1 : There is significant relationship between returns of pharmaceutical firms and Effect of Covid 19.

H2 : There is no significant relationship between returns of pharmaceutical firms and Effect of Covid 19.

1.9 Organization of the study:

Chapter 1 discusses the introduction to this thesis, theoretical background, history of pharmaceutical industry in Pakistan, research gap, problem statement, research questions, objectives, and significance of the study. Chapter 2 presents an overview of empirical background in context of past pandemics to different financial markets across the world. Chapter 3 provides the data methodology regarding data used in study, sources of data and other statistical measurement that usually used to investigate the data behavior. Chapter 4 consists of the results and interpretation of that results. Whereas chapter 5 comprises of Conclusion and recommendations, and the future direction for further research works.

CHAPTER 2:

LITERATURE REVIEW:

This chapter provides comprehensive background knowledge by discussing the main findings from Existing literature.

C.-D. Chen et al. (2009)investigate the SARS (severe acute respiratory syndrome) impacts on specific industries in Taiwan. How this pandemic brings about the negative or positive effects on different sectors. The result shows that SARS has the negative effects on the stock return in Taiwan stock market that leaded to the average abnormal return on different sector, but the biotechnology sector has the positive returns during the pandemic. This study shows that there is a lot of angles to consider how the pandemics and epidemics put the negative and positive effects on different sectors. These sectors moreover lead to the bullish and bearish trend in the capital market of the country.

 M.-H. Chen et al. (2007)aim to analyze the effect of SARS pandemic on hotel stock prices volatility of Taiwanese market using an event-study approach during the SARS outbreak period. The finding of the study confirms that tourism industry is affected by the SARS outbreak that brought about the negative impact on the hotel industry. This study has a magnificent link to study of tang, & huang, 2009 that is also focuses on the cause-and-effect relationship between pandemics and the stock returns of different sectors in both positive and negative directions.

Ichev and Marinč (2018) examine how the mass-media news affect the stock prices of the companies during the time period when the Ebola virus outbreak starts and causes the major decline in stock returns in the effected markets. This paper shows the result that the information of Ebola (Zaire ebolavirus) pandemic is more related to the stock prices of the company. This also

shows that the effects are more related to the small and volatile stocks as well as for those stocks that are more discussed during the media coverage.

Nippani and Washer (2004) examine the initial effect of the event on the stock market of following countries: Philippines, Singapore, Thailand, Hong Kong Special Administrative Region of China, Indonesia, Canada, and China. The result shows that the SARS has not affected the major indices of Thailand, Canada, Philippine. However, it has affected the China and Vietnam's indices. This study is contradictory of numerous studies in this context. But the central point is still meet the conceptual framework of all the studies that has been conducted in this regard.

 M.-P. Chen et al. (2018)design a study to check the long-term relationship of the SARS between China and 4 Asian stock indices. The results shows that there is strong relationship of a time-varying cointegration relation with the aggregate stock price indices. Moreover, the S.A.R.S. epidemic dose weaken the long-run relationship of China stock market with other four markets in the region. This paper presents the real time picture of SARS pandemic and shows the weak relationship between the regional stock markets that proves the anomaly in the trading behavior between China and 4 other stock indices in the same region of Asia.

Barker and Bacon (2015) present the semi-strong efficient market by examining the effect of Ebola on the risk adjusted rate of return taking the example of different airlines and how swiftly the information and fear of Ebola effects the stock prices. The time spam used for this study is 30 days before and after the pandemic. The result shows that adjusted rate of return starts decline prior to the event and rapidly declines after the announcement of the Ebola. This research work has a significant relationship to the other related studies and depicted the same theme of effecting the stock markets by pandemics that furfure create the diminishing trend in stock returns.

Nzietchueng et al. (2019) aims to measure the area of opportunity in health care sector and to provide the investment opportunity in the health sector.

African countries in sub-Saharan invest with unappropriated way to build and maintain the proper way for health facility even though the availability of funds is more in quantity. This requirement of investment in health sector provides a clue about the gap that created by the Ebola virus. This has also affected the health sector in terms of growing business and production that would ultimately cause the changes in stock returns.

Metawa et al. (2019) focus on to examine the correlations between demographic of the investors and their investment. The study has a mediating effect from behavior of the investors. The result shows that the demographic has a positive relationship toward investment decision. Behavior of the investors significantly affects the decision of investment. But experience of the investors has no relationship to investment decision. This specific scenario set a casual effect on the investment decision and that action leads to worsen normal trends of the stock trading.

Haque et al. (2018) the effects of tourism decline in Brunei as compared to global financial crisis. The result shows that tourism has been reduced significantly due to swine flu and some small countries like Brunei has lost 15% tourism in the post 12 months of swine flu. This economic activity has been affected due to the swine flu in Brunei. This is the clear and crystal indication for the established country's stock markets that how rapidly and effectively different sectors have been started to decline due to the pandemics.

Ru et al. (2020)examine how earlier experience of SARS affects the responses to the stock market during the covid-19 as this virus had already been experienced in 2003 in shape of SARS. The result proves that the country without prior experience of the virus cannot combat the situation as compared to those who have the SARS outbreak experience in 2003.this is not the problem of few

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countries, but it needs the consideration from the whole globe. Because due to globalization not even a single country but all the country' stock market is effected by some others.

Bai et al. (2020)investigates the effects of infectious disease on the USA, UK and Japan stock markets. The study shows that the infectious diseases have the significant positive effect on the permanent volatility in the global stock market. These effects continue even after the situation of the worst condition minimized. This study endorses the study of Lin, & Chen, 2018 that has proved the existence of long-term relationship between the volatility of stock markets and the worse condition during the pandemics.

(Wang, 2006) aims to test the effects during the Asian flu between Thailand, China, and Hong Kong stock markets. This investigation shows the positive and increased correlation and coefficient that indicate there is a positive contingent effect exist in these stock markets. The Asian flu has significant causal effects on the Asian stock markets and has worsen most stock indices.

Chan-Lau and Ivaschenko (2003) aim to find out the reason and the level of correlation among the stocks across the countries. If thought, there are different financial systems and different levels of production. This paper shows that the US market is the big reason to spillover the price and stock volatility in Asian- pacific countries' markets. These studies are done taking the three-basic period: pre-Long Tenn Capital Management crisis period, the "tech bubble" period, and the "stock market correction" period. This is obvious condition due to inter-relationships of the stock market as well as the effect of globalization in terms of stock return and in terms of worse conditions in the stock markets.

Forbes (2004) aims to examine that how the Asian and Russian industries affect the other countries and their firms. Results shows that firms competing with exports from the crisis

countries, or with direct sales exposure to the crisis countries, has significantly lower abnormal stock returns. Firms with higher debt ratios, however, do not experience lower abnormal returns.

Aravind and Manojkrishnan (2020) conducts the study on pharmaceutical sector in India taking the top 10 companies that are listed on the national stock exchange. The purpose of this study is to analyses the covid-19 effects on the Indian pharmaceutical sector. The firms are taken by the high capitalization. The result shows that the pharmaceutical sector perform with the general trend of the market and there is no effect of covid-19 that push the market to contrary side.

Søreide et al. (2020) conducts a study stating lack of surgical instrument from the market. Millions of the patient are deprived from the surgical tools. This study is done by using the electronic databases, webinars, society websites and the preprint repositories. This is a behavioral study in nature. The result shows that majority of the patient are deprived from the surgical tool. This is not for the shortage of supply, but this is the effect of abrupt increase in demand. This shows that the pharmaceutical sector has not been effects by the covid-19 as the other sectors are affected. condusts the research to fine out the relationship of news to the trading.How the news affect the trading momentum.It is found that there is a strong profe that sopport the momentum strategy which buys past winner shares and sells past loser shares. It is also found that Contrarian Investment Strategy, which indicates that investors overreact to every type of news.It is stated that winner's portfolios outperform the loser's portfolios.

 (Schiereck et al., 1999) conducts a study on the gereman listed companies. There are two fundamental strategies: (1) investing based on price momentum, (2) value-based contrarian investing. These two strategies are used in this study. It is found that there is a significant relationship between assessment of the investors for future profit on the returns on the equity.

Dandona et al. (2017) conduct a study and suggest that the contrarian strategy can bring about the major portion of profit in both short and long term. this study is conducted to evaluate the health facilities in India.

Morrin et al. (2002) conduct a study by using a finance theory, with its focus on aggregate marketplace behavior and find that majority of the investor of the pharmaceutical sector uses the contrarian strategy to maintain their portfolio and few uses the momentum strategy. This study is conducted on the listed companies of the New York stock market.

(Firoozabadi, 2019) conduct a study by using the cross-sectional absolute deviation In the Tehran stock market and suggest that strong herding has a negative impact on the pharmaceutical sector for all the time. But there is exception for the bust period in which the relationship dose affect opposite.

 (Ellison et al., 2001) reports that the contemporary news has a direct effect on the pharamseutical sector in short term.The result is derived by using the isotonic regression.Result shows that the decline in pharamsutical accure gradually when any type of comtemprary news come in to the market.

Schumaker and Maida (2018) conducts a study by using sharp ratio and found that withdrawl a specific drug from the pharmaceutical sector causes the positive or negitive effects on the pharmaseutical stocks.Secondly, this study also found that articles released through Wall Street journal, Reuters United Kingdom Focus, New York Times and Financial Times, all experienced significant positive returns, whereas articles that are published in Barrons, Market Watch, Forbes and Bloomberg experienced significant negative returns.Another point that is raised by this study is that the articles released at specific times has abnormally high price movements than random

chance.Lastly, it is found that positive news trends upwards and suddenly reverse direction for any other news in the article released.

Hwang (2013)conducts a study and concludes that return of stocks due to negative events is greater than abnormal returns of stocks due to positive events.This study states effects on the return of pharmaseutical stocks due to sever bad news.But in the context of this study,the pharmaceutical sector should be affacted with positive indication.

Abdollahiasl et al. (2014) finds by using Data modeling techniques that the pharmaceutical stocks's return is based on multiple market factors that includes net profit margin, operating cycle, working capital, inflation rate. Although these are the finding of this study but the market information, that is also a major dynamic for the stocks return, is not discussed in this study.

 Masoumi et al. (2019) condust a study aming to examin the relationship between positive shocks and the pharmaseutical stocks in Tehran stock market.By using an autoregressive model, it is found that some positive news to the variable, such as collection period of quests, currency rate, and healthcare costs cause the decreament in stock return of pharmaceutical sector but on the contrary note, some positive information to the variable, such as GDP, and money volume, cause the increasement in the stocks of pharmaceutical sector.

(Son, 2009) conducts a study for the koreon market and asks the local government to monitor the global institutional investors that have the metual funds ,heagding funds, and offshore funds.It is clamed that the behaviour of sudden pullout of the foreign investor is not in the favour of the local dovernment.It is recommended that there should be an early warning system (EWS) which warn by signal against the possible massive selling of global institutional investors (GII) at the local market. To fulfill this requirment, this study introduces machine learning algorithm which

monitors and predicts the behavior of global institutional investors (GII) by forecasting future conditions.

Banerjee and Thakurta (2015) conducts a study aming to highlight the main factors of pharmaseutical sector's growth in india and suggest the foundation of an effective business modle that has the potentioal of innovation , best research and development.It is estimated that this trend will transform india into a producer of innovative pharmaceutical products.

In our study, the same case happens in Pakistan. It has a potentioal to be a producer of innovative biochamical drugs but due to lack of research and development, the pharmaseutical sector is not in a position to cop up with this global trend.

Topcu and Gulal (2020) conducts a study to analyze the effects of covid 19 on stock of different markets for the period of March 10 to April 30, 2020.This study shows that the negative impact of covid-19 has gradually fallen and begun to take upwards trend by mid-April. The study also highlights that the effects of covid-19 is very sever in asian market and reletively lower in European emerging maekts. Moreover, the response time to covid 19 and size of stimulus package by governments have a significant role in this regard.

 Song et al. (2020) examine the effects of covid-19 on US restaurants firms' stocks by using three dimensions (financial conditions, corporate strategies, and ownership structure).

This study finds that larger size of restaurant firms that have leverage, more cash flows, less ROA, and more internationalization are more resilient to stock declines reacting to COVID-19 than otherwise similar firms. Whereas institutional ownership, dividend, franchising, and managerial ownership did not show any significant moderating effect on the relationship between COVID-19 and stock returns.

KHAN et al. (2020) aims to examine the effects of covid-19 on stock markets of 16 countries by using OLS regression, T-test, and Mann-Whitney. The findings of the study reveals that the weekly new cases of COVID-19 are negatively correlated to the return in stock market. The results more reveal that initially investors do not pay attention to the media briefing on the covid-19 in these countries during the pendemic. However, after the confirmation of transmissibility from one human to another human, all of the stock market indices reacted negatively to the news in the short- and long-event window. Interestingly, it is noticed that Shanghai Composite Index that has been fallen at the initial stage of announment, started grow up during the long event window.This shows that the Chinese government takes pragmatic measures to contain the spread of the pandemic and tried to regaine the confidence of investors in china.

CHAPTER 3:

DATA AND METHODOLOGY:

Research methodology is a process in which various tools, techniques, and concepts are used in a study to check the answer to the research question in a methodical manner. The event study methodology is used to examine the volatility of stock returns from listed pharma companies to market index. Binder and Accounting (1998) discuss event study in details. The event study approach is a standard method that is used to measure the security price reaction to some announcement or event. In practice, event study approach is used for two major reasons. First ,it is normally used to check out the null hypothesis that the market efficiently incorporates information and second, it is used to measure the effects of some unusual events on the wealth of the investors.

3.1 Data description(Sample Selection):

This study uses the daily closing stock prices of 12 pharma companies that are listed on the Pakistan stock exchange (PSX) and the Karachi 100 Index (100index). Sample of the study is 12 pharmaceutical companies which are listed on the exchange (PSX). The sample period from December 31, 2018, to December 31, 2020, is used as estimated window. We study to examine eighter the covid outbreak put negative or positive impacts on the stock returns of biotech when compared with the past behavior of the stock market. Thus, 12 specific companies in total have been studied.

We also use the 5 years data from 2015 to 2019 to examine the ratio analysis of the above-mentioned pharma companies. This data is taken from investing.com and Pakistan Stock Market's portal.

3.2 Companies full name and data availability:

Table shows companies full name and data availability:

Sr. No.	Company	Stock Market	Data Availability
1	Abbott Laboratories Pakistan Ltd	PSX	December 31, 2018, to March 31, 2020
2	GlaxoSmithKline Pakistan Ltd	PSX	December 31, 2018, to March 31, 2020
3	The Searle Company Ltd	PSX	December 31, 2018, to March 31, 2020
4	Glaxosmithkline Consumer Healthcare Pak Ltd	PSX	December 31, 2018, to March 31, 2020
5	AGP Ltd	PSX	December 31, 2018, to March 31, 2020
6	Highnoon Laboratories Ltd	PSX	December 31, 2018, to March 31, 2020
7	Ferozsons Laboratories Ltd	PSX	December 31, 2018, to March 31, 2020
8	Sanofi Aventis Pakistan Ltd	PSX	December 31, 2018, to March 31, 2020
9	IBL HealthCare Ltd	PSX	December 31, 2018, to March 31, 2020

10	Macter International Ltd	PSX	December 31, 2018, to March 31, 2020
11	Otsuka Pakistan Ltd	PSX	December 31, 2018, to March 31, 2020
12	Wyeth Pakistan Ltd	PSX	December 31, 2018, to March 31, 2020

Event study is most famous application of the capital asset pricing (CAPM). It is basically used to determine whether specific event has any positive or negative effect on the stocks that directly effects the company's performance.

3.3 Description of variable:

The expected returns (ER) have been calculated by taking three most commonly used methods Market model (MM), Market Mean adjusted model (MMAM), and the Mean adjusted return model (MAM) to estimate the cumulative abnormal returns (CAR) and abnormal returns(AR) of pharmaceutical companies' stocks that were facing the impact of the epidemic outbreaks. The difference between estimated return (ER) and actual returns is termed as AR and the sum of AR over the window is named as cumulated average return (CAR).

The market model (MM) that is used for the estimation of returns is developed by Sharp (1963) on the assumption of the linear relationship between individual stock and market portfolio. In MM, pharmaceutical stock returns are regressed with market portfolio. It is commonly used by risk averse investor based on mean and variance return distribution for single period investment with

an expectation of maximum expected utility of terminal value, Dyckman and Analysis ((1986)). This model also addresses the small variances of abnormal returns in comparison to raw value of returns, Strong and Accounting (1992).

$$R_{j,t} = \alpha_j + \beta_j R_{m,t} + \varepsilon_{j,t} \qquad\qquad 1$$

Where Rj,t is daily return of pharmaceutical stock j at time t

$$R_{j,t} = ln\left(\frac{P_{j,t}}{P_{j,t-1}}\right) * 100 \qquad\qquad 2$$

Where Pj,t is daily closing share price of pharmaceutical j on time t and P j,t-1 is daily closing share price of pharmaceutical j on time t-1

$$R_{m,t} = ln\left(\frac{MP_t}{MP_{t-1}}\right) * 100 \qquad\qquad 3$$

Where MPt is daily closing price of market portfolio on time t and MPt-1 is daily closing price of market portfolio on time t-1: αj and βj are the parameters and εjt is random error term pharmaceutical stock j at day t.

$$AR_{j,t} = R_{j,t} - ER_{j,t} \qquad\qquad 4$$

$$ER_{j,t} = \widehat{\alpha}_j + \widehat{\beta}_j R_{m,t} \qquad\qquad 5$$

$$CAR_{it} = \sum_{t=0}^{n} AR_{jt} \qquad\qquad 6$$

Where ARj,t is abnormal return for pharmaceutical stock j at day t, Rj,t is actual return for pharmaceutical stock j at day t and ERj,t is expected return for pharmaceutical stock j at day t: $\widehat{\alpha}$j and $\widehat{\beta}$j are the estimates of true parameters.

The MAM assumes that expected return of the stock is constant based on the average historical return of the stock which may vary across other stocks Brown and Warner (1980). The comparison

period for average return of pharmaceutical stock is from 31st December 2018 to 31st December 2019. For mean return adjusted model, the illustration of AR and CAR is formulated below.

$$AR_{j,t} = R_{j,t} - ER_{j,t} \qquad\qquad 7$$

$$CAR_{it} = \sum_{t=0}^{n} AR_{jt} \qquad\qquad 8$$

Where ARj,t is abnormal return for pharmaceutical stock j at day t, Rj,t is actual return for pharmaceutical stock j at day t and ERj,t is the average return of pharmaceutical stock j over the estimation window period t

The MMAM assumes that expected return of the stock is constant based on the average historical return of market portfolio and it is constant across the other stocks, although it is not necessary. The comparison period for average return of market portfolio is from 31st December 2018 to 31st December 2019. This relationship means that market portfolio is risky assets is a linear combination of all securities.

$$AR_{j,t} = R_{j,t} - ER_{m,t} \qquad\qquad 9$$

$$CAR_{it} = \sum_{t=0}^{n} AR_{jt} \qquad\qquad 10$$

Where ARj,t is abnormal return for pharmaceutical stock j at day t, Rj,t is actual return for pharmaceutical stock j at day t and ERj,t is the average return of market portfolio m over the estimation window period t

The t-test captures the effect of average abnormal returns of COVID-19 with respect that eighter the outbreak positively or negatively affects the returns of pharmaceutical stocks. The event study

methodology has the capacity to capture the abnormal changes beyond the average market returns S. Lee and Connolly (2010).

Event study methodology is primarily used to separate the company's specific event from the relevant industry and market's event that further indicate the market efficiency. Using this application, it can be measured that if there is an abnormal return on stocks or not. Abnormal return is calculated by taking difference between expected and actual return. where the expected return of stocks is typically calculated by using market model, which relies on the market index (PSX in this study) to estimate its expected return. By using the market model, correlation can be measured between an individual stock's return (Biotech stocks in this study) and its corresponding market returns (PSX 100 index). Sometimes, we sum the abnormal returns to arrive at the cumulative abnormal return (CAR), which calculate the total impact of an event through a certain period of time, also known as the event window (Covid-19 in this study).

To complete the event study, 3 time periods are literally examined. Estimated Window, Event Window and Post Event Window. Estimated window is measured by market model, market adjusted model and by tow factor model. In this study we will use market model for estimated window.

To analyze the effects of covid-19 on listed pharmaceutical companies in Pakistan stock exchange, the event study methodology is applied as this method is widely used by financial analysts to measure the impact of a certain event on performance of the stocks, Chang and Zeng (2011) .For event study the following process is followed. The event window is created from 31st December 2018 to 31st March 2020, where estimated window is from 31st December 2018 to 31st December 2019, a total of 327 days. It is common to take the event window to be reasonably longer than a specific period of interest, MacKinlay (1997) . The one-month period of 2020 is taken as

an event window that is from 1st January 2020 to 31st January 2020. The second sub period is taken after announcement and is named as post-announcement period that is from 1st February 2020 to 31st March 2020.

Ratio Analysis:

(1) Return on Assets:

Return on Assets calculates how much cash flow from operation is generated from the total assets of the company. The formula is given below:

$$Cash\ return\ on\ assets = \frac{Net\ Cash\ flow\ from\ operations}{Average\ total\ assets}$$

(2) Cash Return on Equity:

Cash return on equity refers to how much cash flow generated in terms of the equity injected in the company.

$$Cash\ return\ on\ equity = \frac{Net\ Operations\ cash\ flow}{Average\ equity Financial\ Leverage}$$

(3) Financial Leverage:

Financial leverage describes the share of the capital injected in an enterprise with reference to the amount of the total assets.

$$Financial\ leverage = \frac{Average\ total\ assets}{Average\ of\ Shareholders\prime\ equity}$$

(4) Asset Turnover Ratio

Asset turnover ratio measures the company's ability to utilize its total assets in generating sales or revenues.

$$Asset\ turnover\ ratio = \frac{Sales}{Average\ total\ assets}$$

(5) Gross Profit Margin:

Gross profit margin is the basic measure to assess a firm's financial health by revealing the proportion of money left over from sales after accounting for the cost of goods sold.

$$Gross\ profit\ margin = \frac{Gross\ profit}{Sales}$$

(6) Basic Earnings Per Share

Basic earnings per share provide an estimate of the amount to be distributed to each share of the outstanding stock from company's net income. Earnings per share also help to gauge the profitability of the company.

$$Basic\ earnings\ per\ share = \frac{Net\ income}{Total\ outstanding\ shares}$$

CHAPTER 4:

4.1Results and Discussions

Table 4.1.1 Dispersion in stock returns as daily change of pharmaceutical Companies for the period of 1/1/2019 -31/12/2019.

Companies	Mean	Minimum	Maximum	Standard Deviation	Kurtosis	Skewness
ABBT	-0.001	-0.071	0.052	0.023	0.739	-0.177
GLAX	0.001	-0.055	0.054	0.026	-0.540	0.175
SEAR	-0.001	-0.053	0.054	0.029	-0.674	0.121
GLAO	0.000	-0.070	0.051	0.027	-0.579	-0.050
AGPL	0.000	-0.059	0.066	0.027	-0.280	0.006
HINL	0.002	-0.053	0.052	0.023	0.019	0.223
FERO	0.001	-0.063	0.057	0.033	-1.183	0.058
SAPL	0.000	-0.082	0.065	0.028	-0.065	0.015
IBLH	0.002	-0.068	0.060	0.030	-0.611	-0.049
MACT	-0.001	-0.068	0.093	0.027	0.503	0.149
OTSU	0.002	-0.089	0.087	0.028	0.619	-0.207
WYTH	-0.001	-0.075	0.064	0.029	-0.306	-0.108

Table 4.1 represents the descriptive statistics for the pharmaceutical companies in Pakistan for estimated period from 1/1/2019 -31/12/2019. Descriptive statistics shows that average Dailey return of ABBT for estimated period is -0.1% and the Average standard deviation is 2.3%. It means

that the average return for this company is -1 percent but the dispersion of return from the mean

value is 2.3 percent. While the average daily returns of GLAX for estimated period is 0.1% and

the standard is 2.6 %. Similarly, the average daily return of SEAR for estimated period are -0.1%

and the standard deviation for the daily return returns is 2.9 %. Further, the average Dailey returns

of GLAO, AGPL, HINL, FERO, SAPL, IBHL, MACT, OTSU, WYTH are .0%, 0.0%, .02%,

.01%, .0%, .02%, -0.01%, .02% & -0.01% respectively. While the standard deviations for the

mentioned companies are 2.7%, 2.7%, 2.3%, 3.3%, 2.8%, 3.0%, 2.7%, 2.8%, & 2.9% respectively.

Descriptive result shoes that all returns are positively skewed for the sample period except GLAO,

ABBT, IBLH, OTSU & WYTH. The values of the kurtosis for all the return's series are less than

3 which suggest that all return series are platykurtic. It means data is normally distributed and there

is no major dispersion of data from the mean values.

Table 4.1.2 Dispersion in stock returns as daily change of pharmaceutical Companies for the

period of 1/1/2020 -31/1/2020.

Companies	Mean	Minimum	Maximum	Median	Standard Deviation	Kurtosis	Skewness
ABBT	-0.005	-0.026	0.022	-0.006	0.012	-0.036	0.408
GLAX	0.005	-0.046	0.050	0.004	0.024	0.119	-0.303
SEAR	0.000	-0.051	0.038	0.000	0.021	0.744	-0.412
GLAO	-0.003	-0.050	0.049	-0.008	0.024	0.165	0.537
AGPL	0.001	-0.030	0.048	-0.002	0.022	-0.566	0.596
HINL	-0.001	-0.038	0.032	0.000	0.015	0.727	-0.377
FERO	0.002	-0.051	0.047	0.000	0.024	0.290	-0.029

SAPL	-0.008	-0.040	0.025	0.000	0.018	-0.354	-0.560
IBLH	-0.002	-0.047	0.051	-0.006	0.025	-0.150	0.308
MACT	0.001	-0.051	0.056	0.000	0.018	6.798	0.465
OTSU	0.006	-0.026	0.052	0.000	0.019	1.145	0.944
WYTH	-0.001	-0.032	0.034	0.000	0.019	-0.930	0.104

Table 2 reports the descriptive statistics for the pharmaceutical companies in Pakistan for window period of 1/1/2020 -31/1/2020. The nutshell of this window period shows a significant result of all entities. Results show that all returns are positively skewed for window period except GLAX, SEAR, HINL, FERO, SAPL. It means the general trend of profit making is significantly higher. The values of the kurtosis for all return's series are less than 3 which suggest that all return series are platykurtic. It means data is not peaks than the normal distribution. Descriptive statistics shows that the average daily returns of ABBT for window period is -0.5% and the Average standards deviation is 1.2%. While the average daily returns of GLAX for window period is 0.5% and the standards deviation is 2.4 %. Likewise, the average daily returns of SEAR for window period are 0.0% and the standard deviation for the daily return returns is 2.1%. Further, the average Dailey returns of GLAO, AGPL, HINL, FERO, SAPL, IBHL, MACT, OTSU, WYTH are -0.03%, .01%, -.01%, .02%, -0.08%, -0.02%, 0.01%, .06% & -0.01% respectively. While the standard deviations for the mentioned companies are 2.4%, 2.2%, 1.5%, 2.4%, 1.8%, 2.5%, 1.8%, 1.9%, & 1.9% respectively.

Table 4.1.3 Dispersion in stock returns as daily change of pharmaceutical Companies for the period of 1/2/2020 -31/3/2020.

companies	Mean	Minimum	Maximum	Median	Standard Deviation	Kurtosis	Skewness
ABBT	-0.006	-0.089	0.068	0.000	0.030	1.213	-0.426
GLAX	-0.002	-0.084	0.056	0.002	0.032	0.198	-0.573
SEAR	-0.005	-0.086	0.072	-0.003	0.038	-0.049	-0.165
GLAO	-0.005	-0.079	0.059	0.000	0.032	0.588	-0.514
AGPL	-0.005	-0.087	0.068	0.000	0.036	0.142	-0.457
HINL	-0.002	-0.094	0.052	0.000	0.030	1.196	-0.741
FERO	-0.006	-0.089	0.077	-0.005	0.042	-0.061	0.036
SAPL	0.000	-0.078	0.078	0.000	0.035	1.189	0.041
IBLH	-0.011	-0.090	0.072	-0.014	0.041	-0.576	0.040
MACT	0.000	0.000	0.000	0.000	0.000	20.500	0.000
OTSU	-0.004	-0.073	0.065	0.000	0.030	0.872	-0.569
WYTH	-0.003	-0.214	0.072	0.000	0.044	12.490	-2.499

Table 3 reports the descriptive statistics for the pharmaceutical companies in Pakistan for post window period of 2/2020 -13/3/2020. Descriptive statistics shows that the average daily returns of ABBT for post window period is -0.6% and the Average standards deviation is 3.0%. While the average daily returns of GLAX for post window period is -0.02% and the standards deviation is 3.2 %. Likewise, the average daily returns of SEAR for window period are -0.05% and the standard deviation for the daily return returns is 3.8%. Further, the average Dailey returns of GLAO, AGPL,

HINL, FERO, SAPL, IBHL, MACT, OTSU, WYTH are -0.05%, -0.05%, -.02%, -0.06%, 0.00%, -0.01%, 0.00%, -0.04% & -0.03% respectively. While the standard deviations for the mentioned companies are 3.2%, 3.6%, 3.0%, 4.2%, 3.5%, 4.1%, 0.00%, 3.0%, & 4.4% respectively. Descriptive statistics results show that all returns are negatively skewed for post window period except FERO, SAPL, IBLH, MACT. The values of the kurtosis for all return's series are less than 3 which suggest that all return series are platykurtic except MACT & WYTH. It means data is not peaks than the normal distribution.

Table 4.1.4 The results for AAR and CAR estimated through the market model are reported below.

		Avg. Abnormal Return	t-stat	results	CAR	t-stat	Results
ABBT	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-1.90827	INSIG	-0.11002%	-45.7984	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	0.124892	INSIG	0.02%	5.245448	SIG
GLAX	Pre-announcement 1/1/2020 -31/1/2020	0.00%	1.238706	INSIG	0.109246%	29.72894	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.01%	2.859898	SIG	0.42%	120.1157	SIG
SEAR	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-1.47885	INSIG	-0.0671%	-35.4924	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.01%	2.352881	SIG	0.39%	98.82098	SIG
GLAO	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.62897	INSIG	-0.06756%	-15.0953	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	1.153065	INSIG	0.20%	48.42871	SIG
AGPL	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.014854	INSIG	0.001068%	0.356503	INSIG

		0.01%	1.186545	INSIG	0.21%	49.83491	SIG
	Post-announcement 1/2/2020 -31/3/2020						
HINL	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.52096	INSIG	-0.03625%	-12.503	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	0.684046	INSIG	0.10%	28.72992	SIG
FERO	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.37695	INSIG	0.030529%	9.046803	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.01%	2.024156	SIG	0.40%	28.72992	SIG
SAPL	Pre-announcement 1/1/2020 -31/1/2020	-0.01%	-2.62544	SIG	-0.23727%	-63.0106	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.01%	1.243451	INSIG	0.33%	52.22495	SIG
IBLH	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.88077	INSIG	-0.07677%	-21.1384	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	-0.12429	INSIG	-0.03%	-5.22002	SIG
MACT	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.265915	INSIG	0.026031%	6.381951	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.01%	2.284154	SIG	0.27%	95.93448	SIG
OTSU	Pre-announcement 1/1/2020 -31/1/2020	0.00%	1.067356	INSIG	0.095014%	25.61655	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	-0.82143	INSIG	-0.16%	-34.5002	SIG
WYTH	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.68399	INSIG	-0.05205%	-16.4158	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.01%	1.146942	INSIG	0.28%	48.17158	SIG

The results reported in Table 4.4 suggest that results of Pharmaceutical industry except SAPL is

not different from the average daily returns of estimation period i.e., 31st December 2018 to 31st

December 2019. In GLAX, SEAR, FERO, MACT, average abnormal returns are different for post announcement period. However, the Cumulative average returns for all the companies are significantly different in both pre-and post-announcement period.

Table 4.1.5 The results for AAR and CAR estimated through the market mean adjusted model are reported below.

Table 4.5 Average Abnormal Returns by using Market mean adjusted model

		Avg. Abnormal Return	t-stat	results	CAR	t-stat	Results
ABBT	Pre-announcement 1/1/2020 -31/1/2020	0.00%	2.003092	SIG	0.115043%	48.0742	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.01%	1.383838	INSIG	0.27%	58.12121	SIG
GLAX	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-1.01955	INSIG	-0.1174%	-24.4691	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	0.393029	INSIG	0.08%	16.50724	SIG
SEAR	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.131647	INSIG	0.013134%	3.15953	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	0.834417	INSIG	0.21%	35.04551	SIG
GLAO	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.466397	INSIG	0.054137%	11.19353	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	0.996983	INSIG	0.21%	41.87329	SIG
AGPL	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.13102	INSIG	-0.01403%	-3.14451	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.01%	0.99129	INSIG	0.23%	41.63419	SIG
HINL	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.240366	INSIG	0.017883%	5.768795	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	0.575798	INSIG	0.11%	24.1835	SIG

FERO	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.34717	INSIG	-0.03979%	-8.33213	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.01%	0.918907	INSIG	0.25%	38.59409	SIG
SAPL	Pre-announcement 1/1/2020 -31/1/2020	0.01%	2.56975	SIG	0.229714%	61.67399	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	0.059819	INSIG	0.01%	2.512387	SIG
IBLH	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.562743	INSIG	0.069302%	13.50583	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.01%	1.795386	INSIG	0.48%	75.40619	SIG
MACT	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.22103	INSIG	-0.01894%	-5.30479	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	92.29879	SIG	0.02%	3876.549	SIG
OTSU	Pre-announcement 1/1/2020 -31/1/2020	-0.01%	-1.35148	INSIG	-0.12002%	-32.4354	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	1.033046	INSIG	0.20%	43.38794	SIG
WYTH	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.358255	INSIG	0.033679%	8.598114	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	0.536857	INSIG	0.15%	22.548	SIG

The results reported in Table 4.5 suggest that results of all companies, except ABBT, SAPL & MACT, for pre- and post-announcement are insignificant, which means there is no significant difference in the average daily returns of estimation period i.e., 31st December 2018 to 31st December 2019. However, the Cumulative average returns for all the companies are significantly different in both pre- and post-announcement period.

Table 4.1.6 The results for AAR and CAR estimated through the mean adjusted model are reported below.

Table 4.6 Average Abnormal Returns by using Mean adjusted model

		Avg. Abnormal Return	t-stat	results	CAR	t-stat	Results
ABBT	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-1.37386	INSIG	-0.0789%	-32.9726	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	-1.05891	INSIG	-0.2061%	-44.4742	SIG
GLAX	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.807131	INSIG	0.092944%	19.37113	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	-0.59999	INSIG	-0.1241%	-25.1995	SIG
SEAR	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.189937	INSIG	0.01895%	4.558485	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	-0.60798	INSIG	-0.15075%	-25.5351	SIG
GLAO	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.36081	INSIG	-0.04188%	-8.65933	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	-0.89462	INSIG	-0.18745%	-37.5739	SIG
AGPL	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.105335	INSIG	0.011279%	2.528041	SIG
	Post-announcement 1/2/2020 -31/3/2020	-0.01%	-1.01173	INSIG	-0.23825%	-42.4926	SIG
HINL	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.77005	INSIG	-0.05729%	-18.4813	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	-0.93575	INSIG	-0.17929%	-39.3016	SIG
FERO	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.133981	INSIG	0.015357%	3.215545	SIG
	Post-announcement 1/2/2020 -31/3/2020	-0.01%	-1.07758	INSIG	-0.29041%	-45.2584	SIG

SAPL	Pre-announcement 1/1/2020 -31/1/2020	-0.01%	-2.51419	SIG	-0.22475%	-60.3406	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	-0.02161	INSIG	-0.00492%	-0.90781	INSIG
IBLH	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.79363	INSIG	-0.09774%	-19.0472	SIG
	Post-announcement 1/2/2020 -31/3/2020	-0.01%	-1.98079	SIG	-0.53162%	-83.1931	SIG
MACT	Pre-announcement 1/1/2020 -31/1/2020	0.00%	0.7235	INSIG	0.062001%	17.36401	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	365.6837	SIG	0.060167%	15358.72	SIG
OTSU	Pre-announcement 1/1/2020 -31/1/2020	0.00%	1.001483	INSIG	0.088935%	24.0356	SIG
	Post-announcement 1/2/2020 -31/3/2020	-0.01%	-1.31387	INSIG	-0.25447%	-55.1826	SIG
WYTH	Pre-announcement 1/1/2020 -31/1/2020	0.00%	-0.08761	INSIG	-0.00824%	-2.10264	SIG
	Post-announcement 1/2/2020 -31/3/2020	0.00%	-0.38106	INSIG	-0.10891%	-16.0046	SIG

The results reported in Table 4.6 suggest that results of all companies except MACT, IBHL, SAPL, for pre- and post-announcement are insignificant, which means there is no significant difference in the average daily returns of estimation period i.e., 31st December 2018 to 31st December 2019. However, the Cumulative average returns for all the companies are significantly different in both pre- and post-announcement period except SAPL. The cumulative abnormal return of SAPL is found significantly lower for post announcement period. Overall results indicate that in general covid-19 has significantly negative impact on pharmaceutical sector and all financial indices.
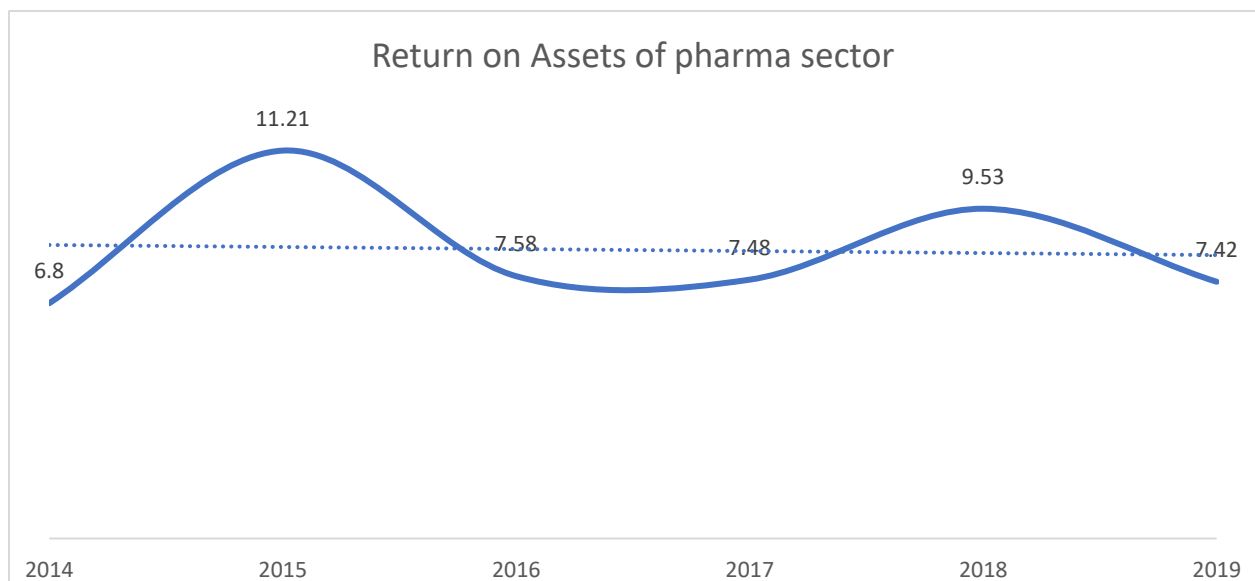
4.2 Overall sector performance:

This portion of study exposes the financial ratios of over-all pharmaceutical sector in pakistan.This sector includes Chemicals, Chemical Products & Pharmaceuticals. To take the concise and brief overview of the overall sector, the following ratios are calculeted.

1. Return on Assets (RoA)
2. Return on Equity (RoE)
3. Financial leverage
4. Asset turnover
5. Net profit to sales
6. Earnings per share. (EPS)

4.2.1 Return on Assets:

The overall Return on Assets of pharmaceutical sector from 2014 to 2019 is given below.

Return on Assets of pharma sector

The graph shows minimum volatility during the 5 years excluding 2015.The sector performance was at peak during 2015.Remaining years shows the average return on assets in this sector.

4.2.2 Cash Return on Equity:

The overall Cash return on equity of pharmaceutical sector is from 2014 to 2019 is given below.

Return on equity of pharma sector

2014	2015	2016	2017	2018	2019

Data points: 18.03, 28.4, 18.58, 18.25, 23.6, 19.25
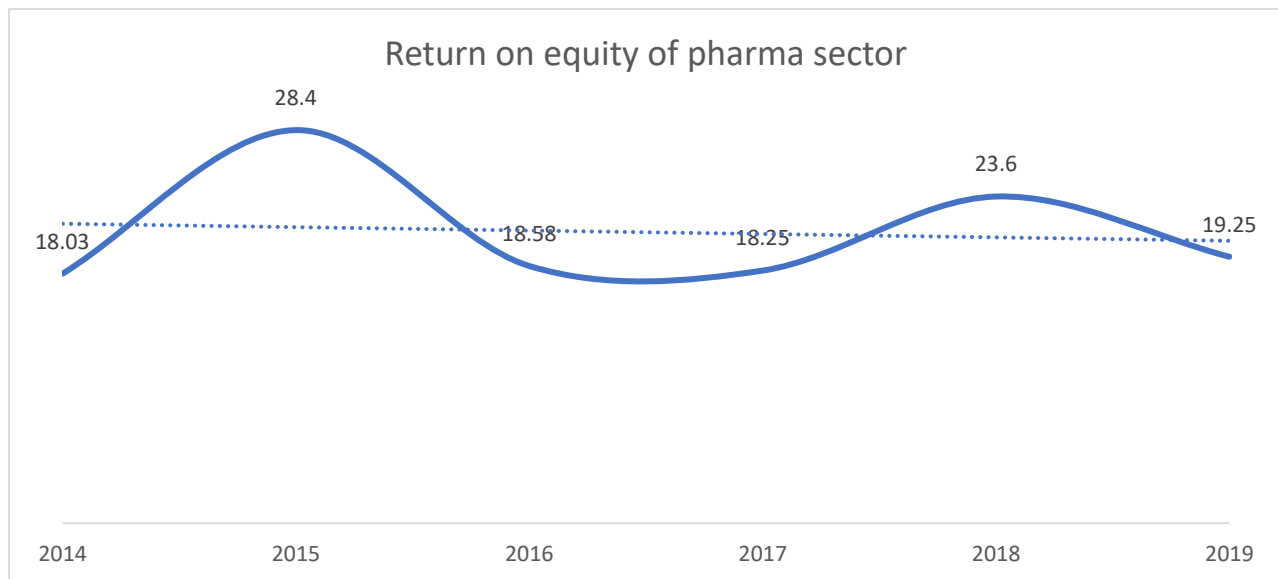
. This ratio shows a slight downward trend during the 5 years. It means that the cash return in terms of operating cash flow remained slightly low but during the 2019, it has started bullish trend.

4.2.3 Financial leverage:

The Financial leverage of pharmaceutical sector from 2014 to 2019 is mentioned in below figures:

Financial leverage of pharma sector

2.65

2.59

2.53

2.48

2.45

2.44

2014 2015 2016 2017 2018 2019
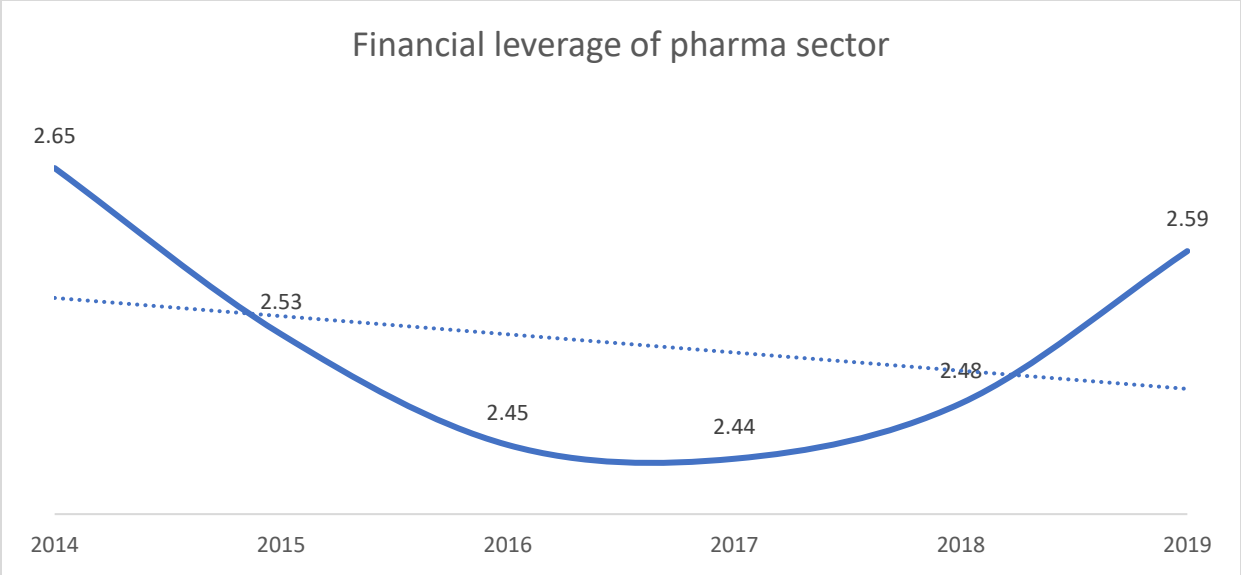
It indicates average downward trend in terms of financial leverage but during the 2019, the financial leverage graph goes up and teach 2.59 figure. In general, it is better to have a low equity multiplier because that means a company is not incurring excessive debt to finance its assets.

4.2.4 Asset Turnover Ratio:

The overall Asset turnover ratio of pharmaceutical sector from 2014 to 2019 is as below:

Asset turnover of pharma sector

0.87

0.86

0.81

0.79

0.75

0.75

2014 2015 2016 2017 2018 2019
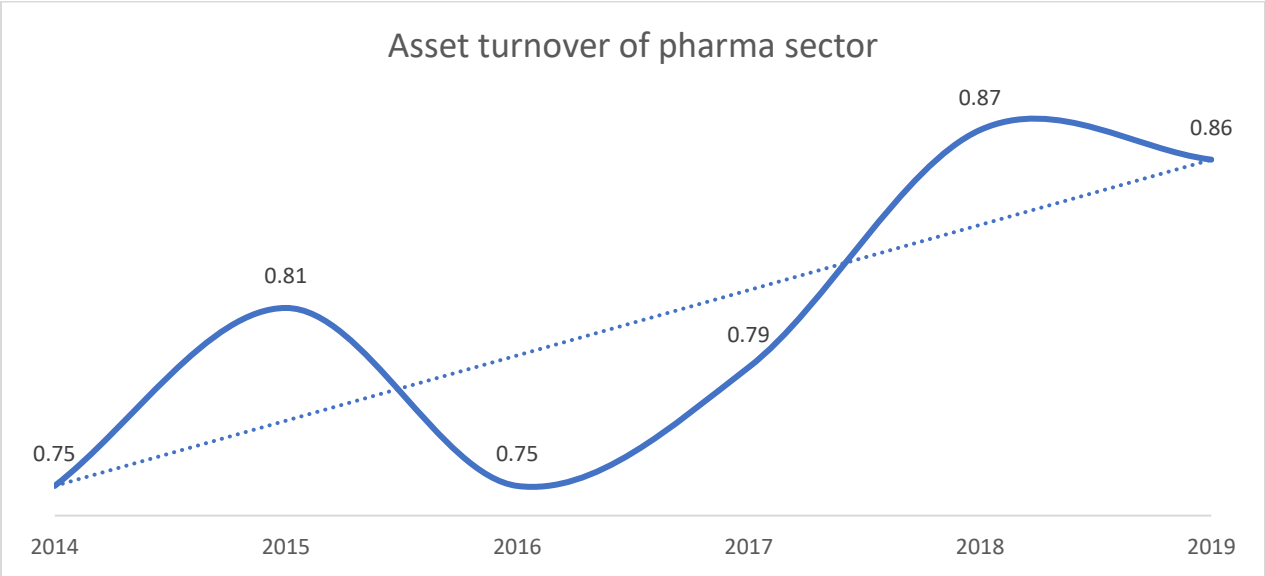
The pharmaceutical sector remains lucky to have the positive trend in terms of asset turnover. This graph indicates that sector has utilized it assets to produce the pharma products and has sale the major portion of the inventory.

**4.2.5 Gross Profit Margin / Gross Profit to Sales:**

The Gross profit margin of pharmaceutical sector from 2014 to 2019 is stated below:
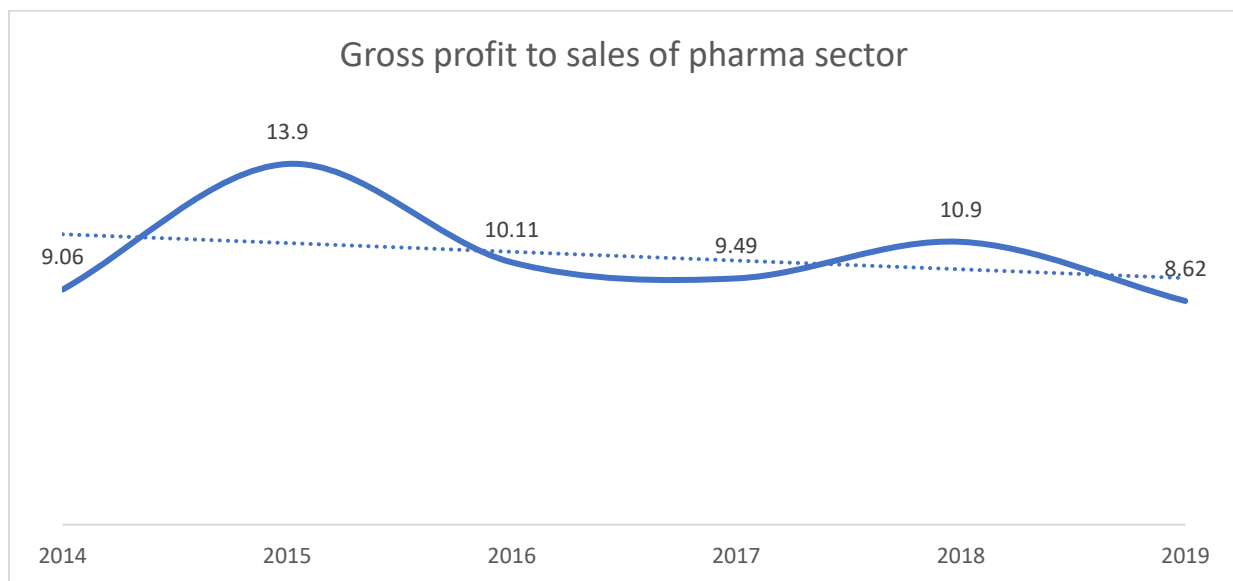
This graph depicts a minimum amount of downward trend that means the gross profit in this sector has decreasing trend over the time for 5 years. Although, it is not an alarming, but it is a serious concern with reference to the stockholders.

4.2.6 Basic earnings per share:

The overall Basic earnings per share of pharmaceutical sector from 2014 to 2019 is given below:

Earnings per share of pharma sector

| 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |

4.44   7.03   5.02   5.22   7.11   6.38
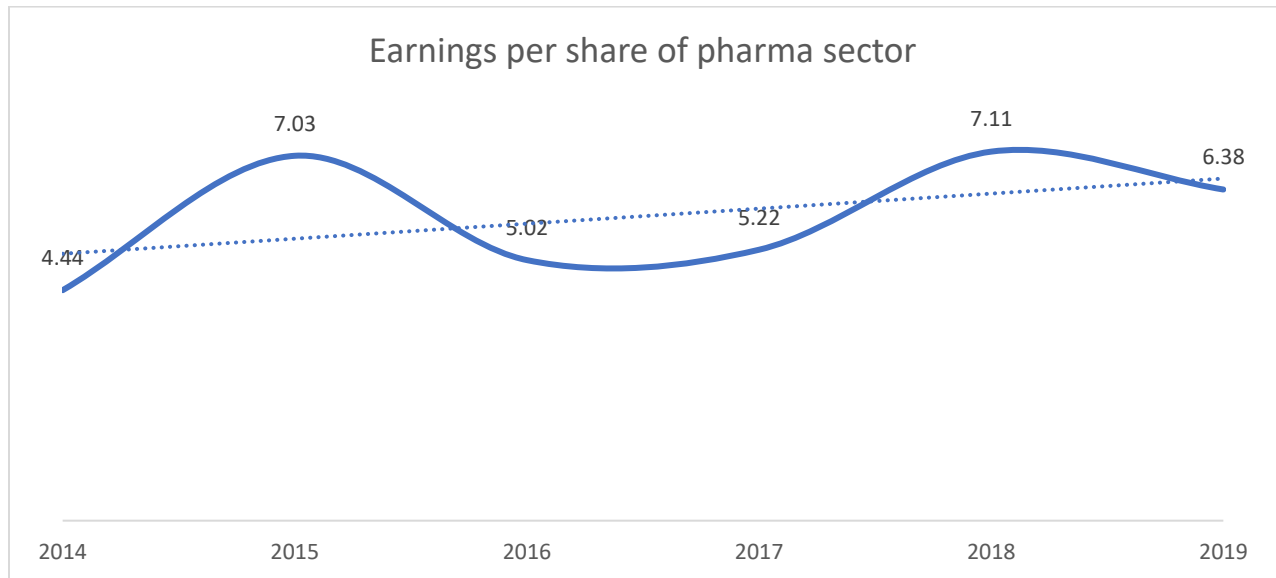
The graph shows a positive EPS for this sector.it is a good indicator for the shareholders that the main concern of the shareholder attached to the earning per share. Because the announcement of dividend depends upon EPS.
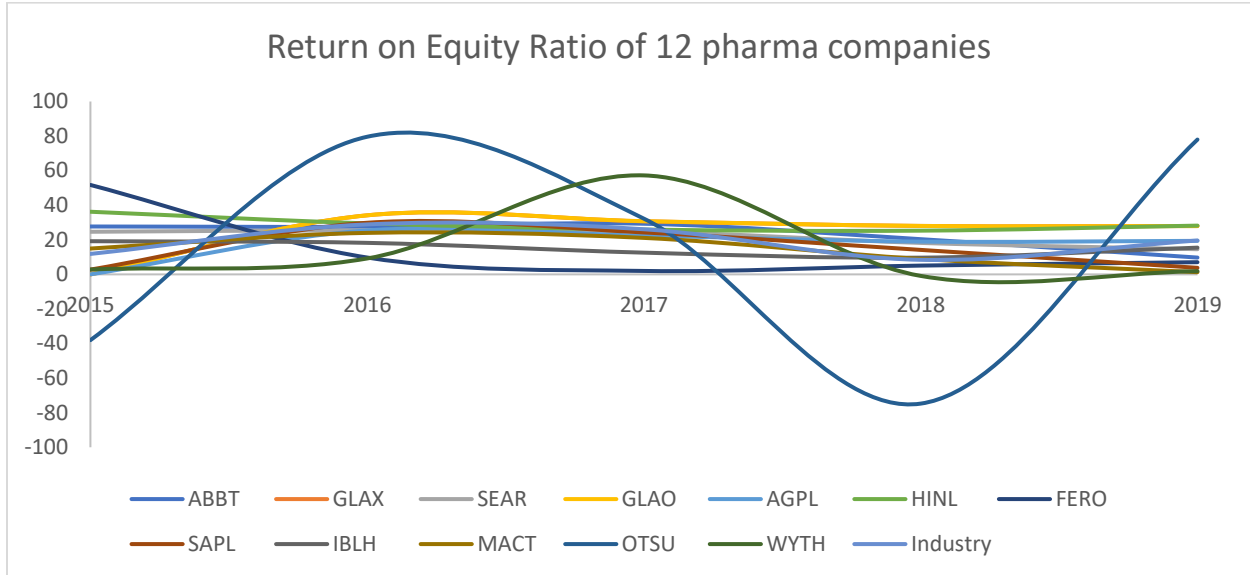
RATIO ANALYSIS:

The following ratio analysis covers the period from 2015 to 2019.

4.3 Companie's fundamentals:

This portion of study exposes the financial ratios of 12 listed companies of pharmaceutical sector in pakistan.To take the concise and brief overview of the profitability, valuation, capital structure, liquidity and efficency of the companies, the following ratios are calculeted.

1) Return on Equity Ratio(profitability)

2) Payout Ratio(Investor)

3) Earning Per Share(Valuation)

4) Equity to Assets(Capital Structure)

5) Current Ratio(Liquidity)

6) Quick Ratio(Liquidity)

7) Total asset Turnover(Efficency)

4.3.1 Return on Equity Ratio:

Return on Equity Ratio of 12 pharma companies

Legend: ABBT, GLAX, SEAR, GLAO, AGPL, HINL, FERO, SAPL, IBLH, MACT, OTSU, WYTH, Industry

It shows the percentage of profit generated through each repee invested by equity holder in the companies.this pictorial presents slight upward trends during the covid period that indicates the profit generation by the operations of the companies during the pendamics.this also shows that there are no effects of covid-19 on the pharamceutical sector in pakistan.

4.3.2 Payout Ratio:

Payout Ratio of 12 pharma companies
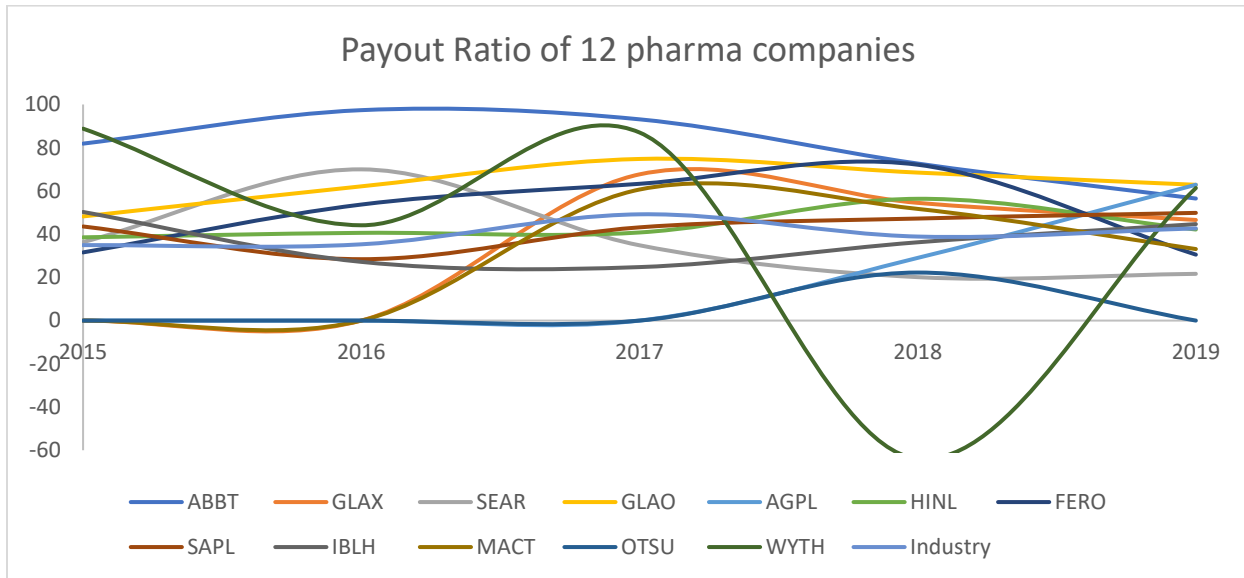
The ratio measure the portion of profit that are dustributed amoung the share holders of common stocks.

The pictorial representation indicates the increased profit distributions as compared to the past dividends. This is also good news for the pharmaceutical sectors, and it depicts the non-effectiveness of covid pandemics on the pharmaceutical sector in Pakistan. This is most relevant ratio to the investor because one of the major concern of stocks holder is linked with dividend that is paid to the shareholders.

4.3.3 Earnings Per Share (EPS)

Earnings Per Share of 12 pharma companies
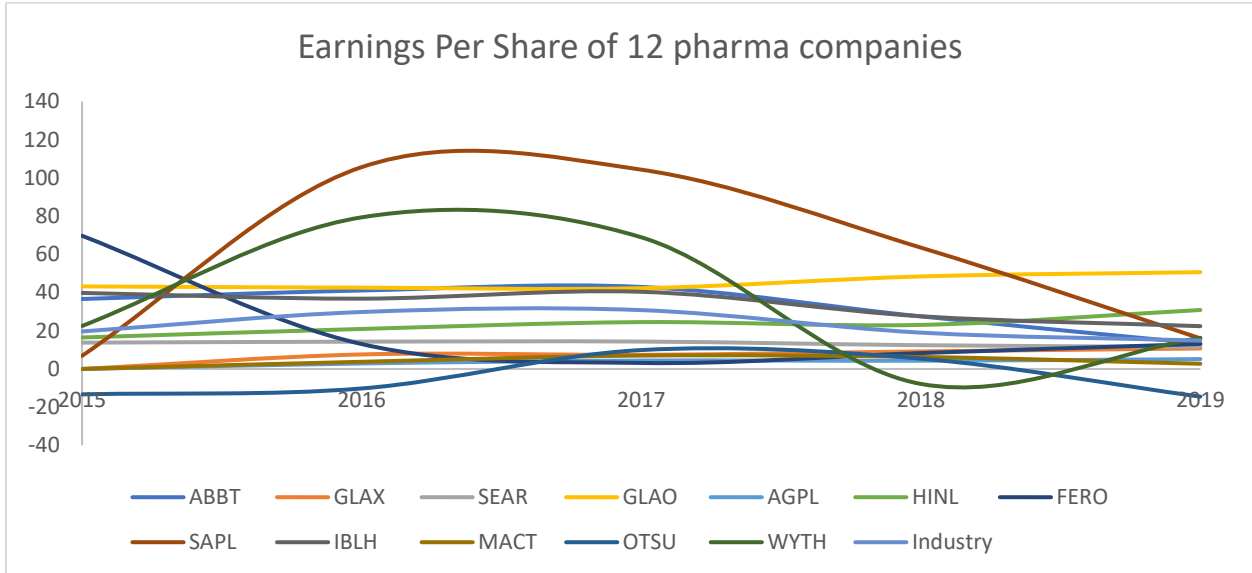
This ratio is used to determine the portion of the profit that is allocated to each share of the common stocks in the company. This figure is also used as an indication of business operations. Business with continuous operating activities brings about the higher EPS in terms of dividend. The overall EPS of the pharmaceutical sectors has been increased even during the pandemic and post pandemic period.

4.3.4 Equity to Assets:

Equity to Assets of 12 pharma companies
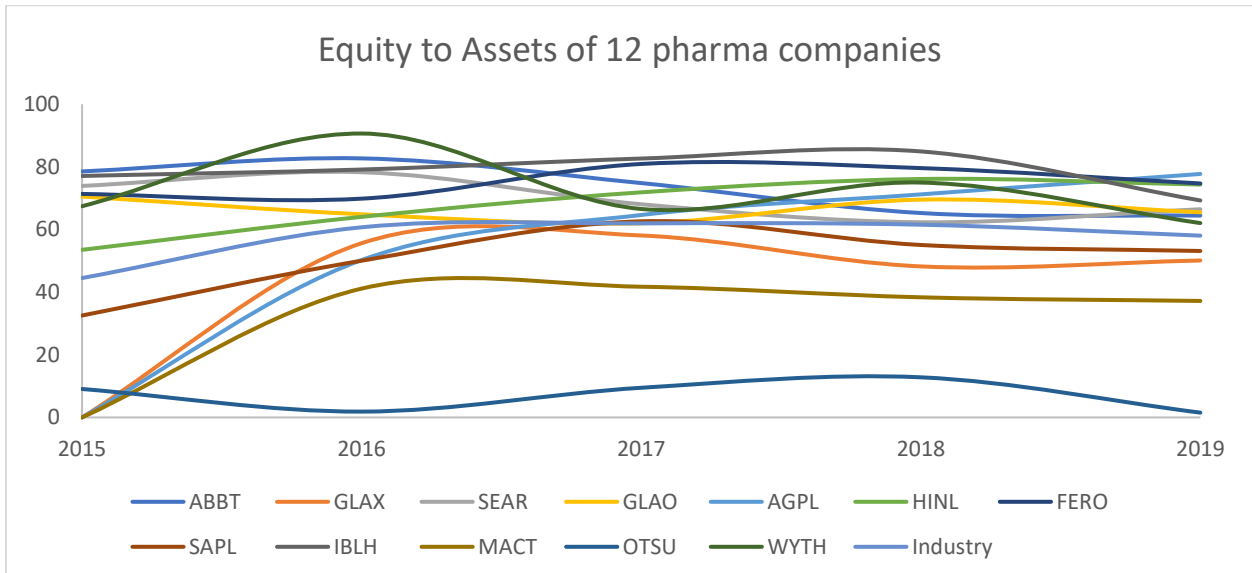
This ratio is used to measure the proportion of the assets that is financed by the equity. Basically, this is a clear and crystal indication of the capital structure of the companies. The ratio of debt and the equity is more concerned to the financial position of the companies. taking the analysis of last five years from 2015 to the date, it is measured that there is a slightly bearish trends in pharmaceutical sector regarding capital structure. The pharmaceutical sector tends to take more debt with decreasing ration of equity to assets.
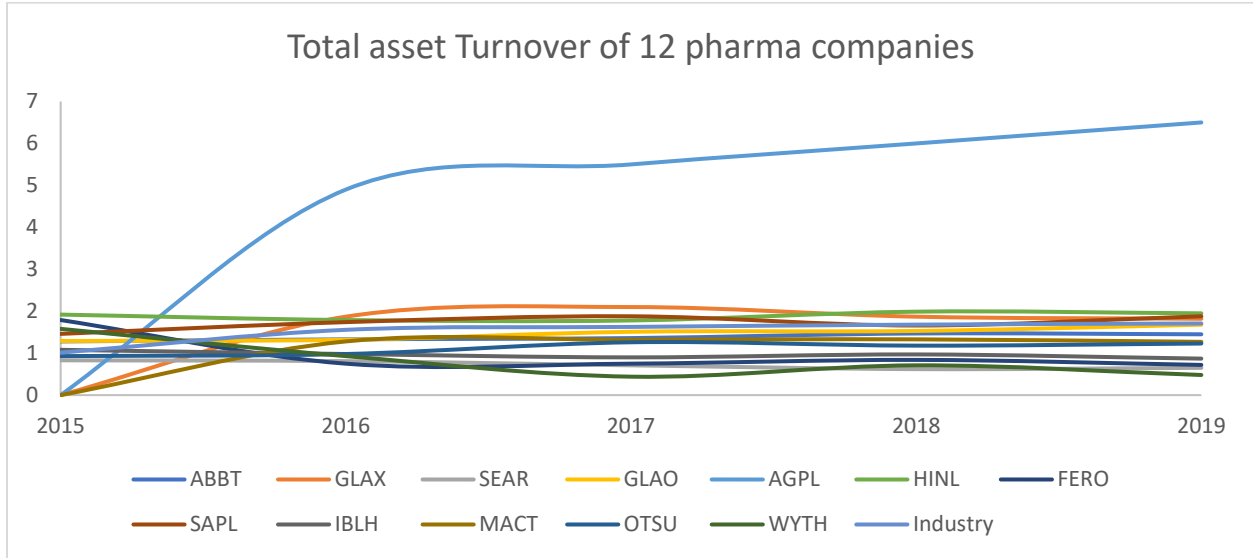
4.3.5 Current Ratio:
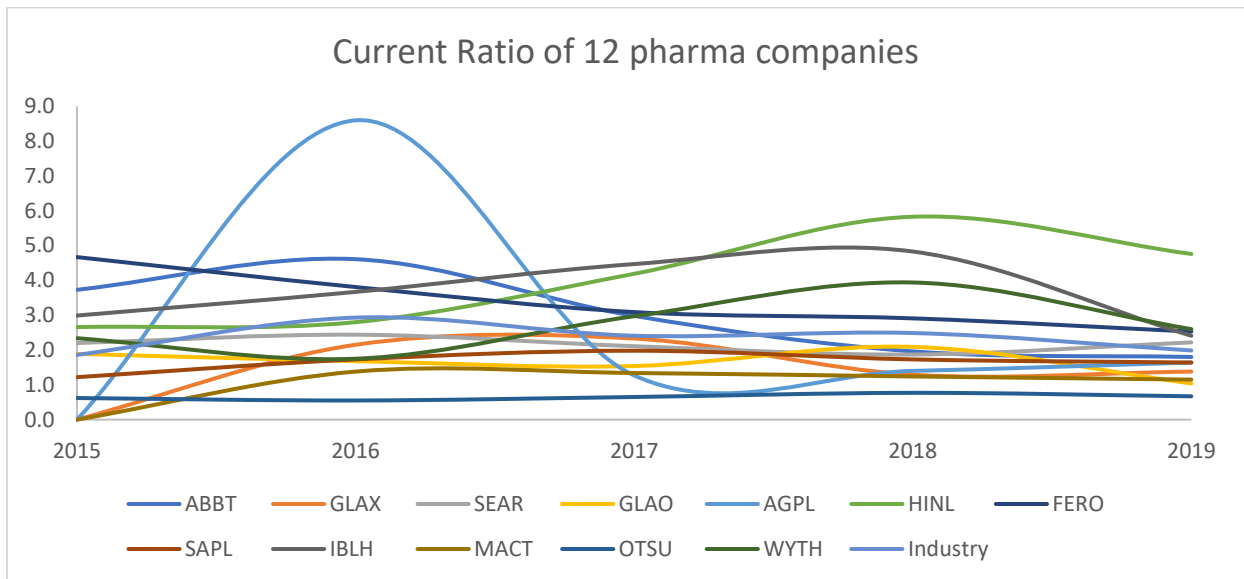
This ratio measures the ability of the company to finance its short-term liabilities through its current assets over 12 months period. This pictorial presents the positive trends in current ratio that is a tremendous and positive sign of the company.it means a lot to the company because it shows the potential to pay the liability that are due within one year.in another words, the current assets of the companies in pharmaceutical sectors have increased their current assets in this time period.

4.3.6 Quick Ratio:

Quick Ratio of 12 pharma companies
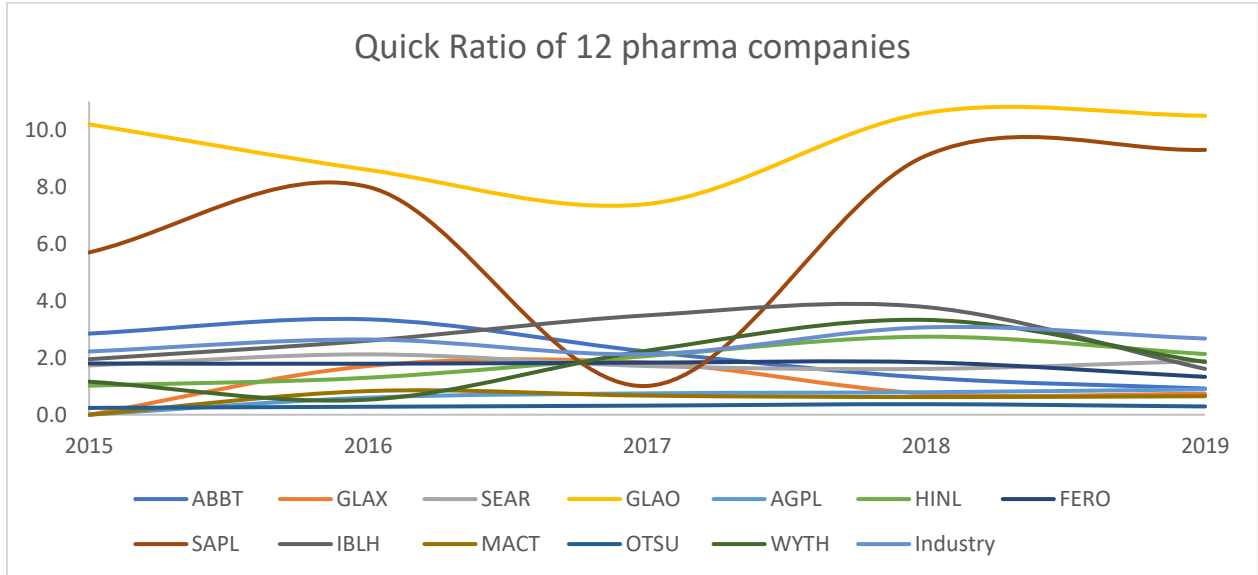
This ratio is used to measure the ability of company to finance its short-term liability by its liquid assets (cash, near to cash). this portion basically shows the cash in hand account of the company. Cash in hand is not as positive as it is considered. Because the idle money cannot add value to the profit maximization of the company. Above pictorial shows the average decline in the quick ratio of the pharmaceutical sector in Pakistan. This decline is a contingent. Because if it is used to finance the project having positive NPV, then it is a good and positive indication. But if the contrary situation exits, then, it is not a clear to say about the effects of quick ratios' decline.

4.3.7 Total asset Turnover:

Total asset Turnover of 12 pharma companies

Legend: ABBT, GLAX, SEAR, GLAO, AGPL, HINL, FERO, SAPL, IBLH, MACT, OTSU, WYTH, Industry

This ratio is used to measure the efficiency of the company's use of its assets to generate the sale revenue. Taking the 5 years figures of the pharmaceutical sector of Pakistan, the average efficiency of the pharmaceutical sector is positive. Even though, there is slightly downward trend in 2020 but the average efficiency of the pharmaceutical sector shows the positive sign.

CHAPTER 5:

CONCLUSION:

In this study, the effects of covid-19 on pharmaceutical sector are examined by using daily stock of 12 listed pharma companies. For this purpose, an event study approach is applied to get the accurate findings. It is concluded that the average abnormal returns of the pharma companies are insignificant because market already was at its lowest point at of 28764.63 (100 Index) before the announcement of covid-19. The political instability and lack of good governance are the main reasons for that decline. But the accumulative abnormal returns for all the companies are significant. The ratio analysis for the pharma companies indicates the less effects of covid-19 on the performance and the efficiency of the companies.

RECOMMENDATION:

Taking the pinpoints of this study, it is recommended that investors have to take the long position in investment decisions because this type of abrupt and sudden events like Covid-19 do not have the long elastic effects on the stock markets. If though this causes a sever volatility in the stock's prices, but it is not neglected that there is a big opportunity in every dip.

It is also recommended for policy makers that the government has to take pragmatic steps to get the market stable. It is the responsibility of government institutions to take precautionary measures to push up the investor's confidence during the outbreak. These steps bring about a continuity of economic activities and growth of businesses.

FUTURE DIRECTION FOR RESEARCH:

To explore the positive or negative effects of the novel virus on the stocks of different sectors like hotel industry, tourism industry, transport industry or insurance industry, further studies may be conducted. As the pharmaceutical sector is discussed in this study by using market models, other studies can be analyzed by using ARCH or GARCH models that can be brought about more accurate findings.

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