AJSS

Abasyn Journal of Social Sciences
Vol (16), Issue (1), 2023.

Open Access
DOI:
10.34091/AJSS.16.1.10

Performance Evaluation of Pharmaceutical Industry During COVID-19: An Analysis of Return & Company Fundamentals

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Abstract

The study examines the impact of covid-19 on the stock return of 12 pharmaceutical companies listed at Pakistan stock exchange known as KSE-100 index. This study collects stock prices data from December 31, 2018 to March 31, 2020. For data analysis, event study methodology has been employed. It is concluded that the average abnormal returns of the pharmaceutical companies are insignificant because market was already at its lowest point at 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 accumulativeabnormal returns for all the companies are found significant. This study 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.

Keywords: COVID-19, epidemic, event study, pharmaceutical stock

The 2019 coronavirus infections, also known as COVID-19, originated in Wuhan, a Chinese city, and spread rapidly to other parts of the world. According to information, the COVID-19 infected more over 1 million individuals on March 11, 2020, with thousands of deaths (Albulescu, 2021). The novel corona virus was deemed a "global pandemic" by the World Health Organization (WHO) for this reason. Additionally, COVID-19 is still spreading, and as of Dec, 10, 2022, 653,060,117 individuals were sick, with 6,657,369 of those deaths being attributable to COVID-19[1]. And also, the number of Recovered patients is 628,777,989. The global pandemic has not only resulted in a large number of diseases and fatalities, but it has also produced enormous fear and terror among people all across the world. It has prompted a sense of urgency and broad anxiety that is spreading more quickly than the virus itself (Aslam, Awan, Syed, Kashif and Parveen, 2020).

The COVID-19 has not only had an impact on the global social system as a whole but has also shaken up economics and enterprises around the world (Laing, 2020). The COVID-19 epidemic has a substantial impact on global markets and many industries, including tourism, which has seen serious risks to its commercial operations because of the strict lockdown measures taken by governments around the world (Zhang, Hu and Ji, 2020). The possibility that the coronavirus pandemic may affect industries including tourism, show business, aviation, and hotels has been documented in the many papers.

According to Kamal, Chowdhury, and Hosain's (2021) analysis of US maritime transport stocks listed on the NYSE, these stocks responded poorly to COVID-19. Sharma, Thomas, and Paul (2021) investigated how the tourism sector's stock prices responded negatively to COVID-19. However, due to the increased demand for transportation and cargo services for the delivery of requirements and medications during the COVID-19 pandemic, the pharmaceutical and transportation industries can play a significant role. A striking finding from recent studies is that, especially in the case of Pakistan, researchers paid little attention to the pharmaceutical sector during the COVID-19 pandemic. We conducted study on the pharmaceutical firms that are listed on the Pakistan Stock Exchange as a result of the COVID-19's impact on the pharmaceutical industry's ability to comprehend the gap. The stock index of Pakistan, the KSC100 index, although, appears to

[1] https://www.worldometers.info/coronavirus/

be stable or good since the Chinese financial downturn is likely to assist domestic industry, as COVID-19 was announced at the end of December in the Chinese city of Wuhan. Since December 2019, this pandemic has expanded to every nation on earth, even Pakistan. As the number of COVID-19 positive samples in Pakistan significantly climbed, the PSX progressively started to decline.

The theoretical Model Efficient Market Hypotheses put forward by Fama (1970) serve as the foundation for this investigation. This theory contends that information about the market is crucial in determining how to invest. Additionally, he reiterates that investors respond to both positive and negative shocks since markets are efficient and rational. This allows us to divide two investment strategies into two categories: contrarian approach and momentum strategy. When using a critical strategy, traders will rush to the news, however when using a momentum strategy, investors will respond to market news gradually. In other terms, a momentum strategy is one in which investors move in accordance with the broader market trend. Contrarian investors, in contrast, will act in direct opposition to market trends. This theoretical premise rests on the need to investigate how investor sentiment may change as a result of the COVID-19 epidemic. Using the model put out by the examiner, the mathematical analysis of the study was conducted (Aravind, 2016). Donadelli, Kizys, and Riedel (2017) investigated how US pharmaceutical corporations responded to infectious illness notifications and discovered that larger pharmaceutical firms were less influenced than smaller enterprises. The overall study contributes to the present literature in many ways; first the study in new terms incorporating the pharmaceutical sectors during Covid-19 pandemic. Second in the pandemic period this study compares sectors performance of pharmaceutical companies. Pre Covid and During Covid pandemic period and phase. Third, with regard to market index (KSE 100) the study also compares performance sectors. The study main objective is to investigate the impact of COVID 19 on pharmaceutical companies which are listed in Pakistan stock exchange, and the study also determine the returned trends selected 12 sectors compared with market index.

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 industry 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 industry. 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.

Research Question 1: How does the financial performance of pharmaceutical sector at the time of covid-19 outbreak?

Research Objective 1: To investigate financial performance of pharmaceutical industry during the covid-19 outbreak.

Research Question 2: What is the impact of Covid 19 outbreak announcement on the stocks of pharmaceutical companies?

Research Objective 2: To examine the impact of Covid-19 outbreak announcement on the stocks of pharmaceutical Industry.

The plan of the study is designed as below. The following section deals with the data and methodology. Section 3 refers to results and discussions and last section contains on conclusion and policy implications.

Literature Review and Hypothesis Development

The coronavirus was initially discovered in China in December 2019 and was believed to spread from animals to people (Kothai & Arul, 2020). For the treatment of Covid-19 infection, there are currently no antiviral medications available (Yethindra, 2020). According to Pant & Pande (2017), Pakistan's pharmaceutical industry imported 450 million USD from China in 2012, making China a key supplier of the raw ingredients and semi-finished items needed to make pharmaceuticals. The pharmaceutical

sector is extremely facing in explosion of supply due to Impact of COVID 19 (Daily Times Dec, 3, 2020)[2] . Due to COVID 19's impact, the pharmaceutical industry is severely dealing with an increase of supplies (Daily Times Dec. 3, 2020). Pakistan acquires pharmaceutical raw ingredients from China, South Korea, and India (Dawn, Nov. 3, 2020). On February 26, 2020, the first coronavirus case in Pakistan was reported in Karachi. Additionally, according to Abid, Bari, Younas, Tahir Javaid, and Imran (2020), WHO declared the coronavirus pandemic on March 11, 2020. It is clear that the market is very empathetic and that new knowledge has an impact on it (Fama, 1970). Assogbavi, Osagie, and Frieder examine how historical knowledge may affect trading success in the Canadian market. While according to Shin (2005), there is a lot of data that supports the momentum investment strategy, which calls for buying historically successful stocks and selling historically unsuccessful ones. In accordance with Schiereck, De Bondt, and Weber (1999), the investor's estimation of future company profits manifests in equity prices. Worldwide trade is predicted to decline by 13% to 32% in 2020 as a result of Covid-19 and the subsequent lockdown (Pal 2020).

According to Babar (2017), Pakistan's pharmaceutical business is the tenth-largest in the Asia-Pacific region and satisfies 70% of domestic demand. According to a 2017 report by the Pakistan Pharmaceutical Manufacturers Association (PPMA), the Pakistan pharmaceutical industry (PPI) produces 70% of the finished goods needed to meet domestic demand in the nation. According to PACRA, April 2020's report on Pakistan's pharmaceutical industry, PPI income for FY2019 was estimated to be 423 billion rupees, with a 13.23% annual growth rate (according to IMS). According to the PACRA report published in May 2018 on the Pakistani pharmaceutical business, exports for the year 2017 were $200 million, and the market share held by the listed companies was 25.14 percent. The pharmaceutical business, which offers both skilled and unskilled labor, is the largest employer in Pakistani industry (Ahmed, Vveinhardt, and Streimikiene 2018). According to estimates by Javed (2020), Pakistan suffered losses in several key industries during COVID-19, including commerce and services ($1.94 billion), transport ($565.6 million), manufacturing ($671 million), and agriculture and mining ($1.5 billion loss).

Previous studies have shown how pandemics affect several business sectors, including the pharmaceutical and transportation industries. In the modern, integrated, and globally connected world, transportation's significance has greatly expanded. The transportation industry was significantly impacted by the SARS pandemic in 2003. According to Loh (2006), airline stocks are more volatile because they are more susceptible to SARS-related news than other equities listed on the equity markets of China, Hong Kong, Thailand, and Singapore. Harbison (2003) recognized during the peak times of SARS in March 2003, which the total number of passengers declined by 5.6%, that’s why to minimize the cost they convincing several airlines in the Asia Pacific

region to postpone, delay orders, and downsize their staffBeijing's transportation systems, including those for foreign travel by air, buses, subways, and cargo, were severely impacted by the SARS outbreak in 2003 (Beutels et al., 2009). Similarly, Sobieralski (2020) discovered that the COVID-19 epidemic led to nations enforcing stringent lockdown and travel restrictions, which had a detrimental effect on the worldwide transportation sector.

In general, during public health emergencies like pandemics and epidemics, demand for medical products and supplies rises. According to Chen, Chen, Tang, and Huang (2009), the sale of medical and healthcare supplies grew dramatically during the SARS pandemic. As a result, these pharmaceutical companies' share prices rise. Additionally, Jingwen (2005) discovered in their research that there is a strong positive correlation between the SARS outbreak disclosure information and China's pharmaceutical business. Furthermore, the empirical studies by Smith, Yago, Millar, and Coast (2005) revealed that the outbreak of SARS had a more significant effect on non-health economic sectors than on pharmaceutical industry equities. Moreover, during the COVID-19

[2] https://dailytimes.com.pk/699999/

pandemic, pharmaceuticals and technology sectors outperformed other equity sectors in China (Al-Awadhi, Alsaifi, Al-Awadhi, & Alhammadi, 2020).

Pharmaceutical stocks, according to Lynch, Page, Panariello, Tzitzouris Jr., and Giroux (2019), are significant causes of stock market instability. According to Pandya (2017), taking a contrarian stance can benefit investors more in the long and short terms. According to Aravind's (2016) research, while a contrarian strategy might be appropriate for pharmaceutical stocks based on long-term data, a momentum strategy can produce greater short-term returns for investors. Using pharmaceutical equities traded on the NYSE, Morrin et al.'s empirical findings demonstrated that there are fewer momentum investors than contrarian investors. Strong herding behavior, according to Firoozabadi and Rastegar Sorkheh (2019), had a detrimental impact on the pharmaceutical industry's returns in all but the bust periods. According to the study's fictitious postulation, the news may have a short-term impact on the movement of pharmaceutical business shares, according to research by Ellison and Mullin (2001). By using the example of the removal of a common medication from the product line, Schumaker and Maida (2018) likewise reached the same conclusion. This can lead to a decline in the share price of pharmaceutical businesses.

Hwang (2013) claims that abnormal returns resulting from unfavorable events are larger in scope and last longer than those resulting from pleasant experiences. In the framework of our investigation, the unfavorable COVID-19 news may have a positive impact on pharmaceutical stock prices. In a different study, Kebriaeezadeh, Zartab, Fatemi, and Radmanesh (2013) investigated how a variety of variables, including the rate of inflation, net return, net working capital, operational cycle, and others, affect the return on pharmaceutical stocks. According to a study by Masoumi, Azar, RezaPour, and Mehrara (2019) the growth of the money supply and the GDP can both positively impact the profitability of pharmaceutical enterprises. Kim (2014) found that efficient R&D programs that result in cutting-edge goods and never stop developing new ones are essential for the pharmaceutical industry's viability. For the pharmaceutical business to expand, sound policy recommendations, quick change, and appropriate production adjustments are required (Banerjee & Thakurta, 2015). In their study of the short- and long-term effects of COVID-19 on the pharmaceutical industry, Ayati, Saiyarsarai, and Nikfar (2020) came to the conclusion that COVID-19 poses a significant crisis in the health sector, including the pharmaceutical industry. When Arellana, Márquez, and Cantillo (2020) evaluated the COVID-19's impacts on the Colombian transportation sector, the study's findings revealed that the country's national regulations had reduced both air and road transportation, with air freight only operating for essentials like food and medicine.

Serrano and Kazda (2020) assert that COVID-19 has had a detrimental effect on the transportation sector, particularly air travel. When compared to April 2019, about 80% of airlines are down. In Europe, COVID-19 has a serious impact on air travel, but the pandemic is unaffected by cargo, according to (Nieti'c, 2020). In addition, Pagano, Sedunov, and Velthuis (2021) found that clients of Robin Hood use both momentum and contrarian strategies. The results also imply that in the early stages of COVID-19, momentum effect for the US stock market decreases while contrarian effect rises. After evaluating the majority of the prior research, this study is the first of its kind to determine how COVID-19 has affected the stock returns of the pharmaceutical industry listed on the Pakistan Stock Exchange. Also, to study the Performance evaluation of pharmaceutical industry during Covid-19: An analysis of return & company fundamentals.

Research Methodology

This study includes the daily closing price of 12 companies, these 12 are companies listed in Pakistan Stock Exchange (PSE) for Pakistan, for the time period of 31-Dec-2018 to 31-Mar-2020. Market index return of each of the market is used as return of the market portfolio. The main focus of this study is to determine the Performance evaluation of pharmaceutical industry during Covid-19: An analysis of return & company fundamentals. In this study we will use event study approach. In the Event Study theory (EST) introduced by Ball and Brown in 1968 it is mentioned that there is a basic idea is to find the abnormal return attributable to event being studied by adjusting for the return that seems from the price fluctuation of the market as whole.

The expected returns (ER) have been calculated by using three commonly used methods

Market model (MM), Mean adjusted return model (MAM) and Market Mean Adjusted model (MMAM) to estimate the abnormal return (AR) and cumulative abnormal returns (CARs) of stocks facing the impact of the epidemic outbreaks. The difference between ER and actual returns is termed as AR and the sum of AR over the window is called CAR.

The MM for estimation of returns is developed by Sharp (1963) on the assumption of the linear relationship between individual stock and market portfolio for comparison period from 31st December 2018 to 31st December 2019. In MM, pharmaceutical stock return is regressed with market portfolio. It is commonly used by risk adverse investor based on mean and variance return distribution for single period investment with an expectation of maximum expected utility of terminal value (Dyckman and Morse, 1986). This model also addresses the small variances of abnormal returns in comparison to raw value of returns (Strong & Accounting, 1992).

Research Model

The measure the ARs of Pharmaceutical stocks, we need to estimate the expected returns (ER) of pharmaceutical stocks. First of all, based on the so-called market model (MM), we regressed the pharmaceutical stock return against return of the market index to control for overall market effects.

The regression is given as

$$R_{j,t} = \alpha_j + \beta_j R_{m,t} + \varepsilon_{j,t} \quad (1)$$

Where $R_{j,t}$ is daily return of Pharmaceutical stock j at time t

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

Where $P_{j,t}$ 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

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

Where MP_t is daily closing price of market portfolio TWII on time t and MP_{t-1} is daily closing price of market portfolio on time t-1: α_j and β_j are the parameters and ε_{jt} is random error term for pharmaceutical stock j at day t.

$$AR_{j,t} = R_{j,t} - ER_{j,t} \quad (4)$$

$$ER_{j,t} = \hat{\alpha}_j + \hat{\beta}_j R_{m,t} \quad (5)$$

$$CAR_{it} = \sum_{t=0}^{n} AR_{jt} \quad (6)$$

Where $AR_{j,t}$ is abnormal return for Pharmaceutical companies j at day t, $R_{j,t}$ is actual return for Pharmaceutical companies j at day t and $ER_{j,t}$ is expected return for Pharmaceutical stock j at day t: $\hat{\alpha}_j$ and $\hat{\beta}_j$ 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 average return of pharmaceutical companies for the comparison period from 31st December 2018 to 31st December 2019. For mean return adjusted model, the representation of AR and CAR is formulated below

$$AR_{j,t} = R_{j,t} - ER_{j,t} \quad (7)$$

$$CAR_{it} = \sum_{t=0}^{n} AR_{jt} \quad (8)$$

Where $AR_{j,t}$ is abnormal return for Pharmaceutical companies j at day t, $R_{j,t}$ is actual return for Pharmaceutical companies j at day t and $ER_{j,t}$ is the average return of Pharmaceutical companies j over the estimation window period t

The MMAM assumes that the 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 average return of market portfolio for the comparison period from 31st December 2018 to 31st December 2019. This relationship means that market portfolio of risky assets is a linear combination of all securities.

$$AR_{j,t} = R_{j,t} - ER_{m,t} \quad (9)$$

$$CAR_{it} = \sum_{t=0}^{n} AR_{jt} \quad (10)$$

Where $AR_{j,t}$ is abnormal return for Pharmaceutical companies j at day t, $R_{j,t}$ is actual return for Pharmaceutical companies j at day t and $ER_{j,t}$ is the average return of market portfolio m TWII over the estimation window period t

The t-test captures the effect of average abnormal returns of COVID-19 that epidemic outbreaks positively or negatively affect the returns of pharmaceutical stocks. The event study methodologyis able to capture the abnormal changes beyond the average market returns (Lee & Connolly, 2010).

Results and Discussions

This chapter include the results of event-study methodology (ESM), that are applied to examine the pre and post period Impact of COVID-19 on return of Pharmaceutical Sector.

The study examines behavior of data to check its accuracy before applying regression test. Descriptive statistic shows the general behavior of data including all the variables. The mean value shows the average of data and standard deviation shows deviation from mean. The descriptive statistics table along with mean and standard deviation also include Skewness, kurtosis, maximum and minimum values.

Table 4.1.

Dispersion in stock returns(daily change - 1/1/2019 to 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%. While the average daily returns of GLAX for estimated period is 0.1% and the standard is 2.6 %. Similarly, the average daily returns 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 suggestthat all return series are platykurtic.it means data is not peaks than normal distribution.

Table 4.2

Dispersion in stock returns (daily change - 1/1/2020 to 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 4.2 reports the descriptive statistics for the pharmaceutical companies in Pakistan for windowperiod of 1/1/2020 -31/1/2020. Descriptive statistics shows that the average daily returns of ABBTfor window period are -0.5% and the Average standards deviation is 1.2%. While the average dailyreturns 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% re pectively. 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. Descriptive statistics results show thatall returns are positively skewed for window period except GLAX, SEAR, HINL, FERO, and SAPL. The values of the kurtosis for all return's series are less than 3 which suggest that all return seriesare platykurtic. It means data is not peaks than the normal distribution.

Table 4.3 Dispersion in stock returns as daily change of pharmaceutical Companies for theperiod of 2/2020 -13/3/2020.

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 4.3 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 ofABBT 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, and MACT. The values of the kurtosis for all return's series are less than3 which suggest that all return series are platykurtic except MACT & WYTH. It means data is notpeaks than the normal distribution.

The results for AAR and CAR estimated through the market mean adjusted model are reported intable 4.4.

Table 4.4 Average Abnormal Returns by using Market model

		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
	Post-announcement 1/2/2020 - 31/3/2020	0.01%	1.186545	INSIG	0.21%	49.83491	SIG
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 periods.

The results for AAR and CAR estimated through the market mean adjusted model are reported

inTable 4.5.

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	0.00%	0.131647	INSIG	0.013134%	3.15953	SIG
	1/1/2020 - 31/1/2020						
	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 periods.

The results for AAR and CAR estimated through the mean adjusted model are reported in Table 4.6.

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 -	0.00%	-0.89462	INSIG	-0.18745%	-37.5739	SIG

	31/3/2020						
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	0.00%	-0.79363	INSIG	-0.09774%	-19.0472	SIG

	1/1/2020 - 31/1/2020						
	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 periods 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.

Conclusion Recommendation and Future Research Directions

In this study, the effects of covid-19 on pharmaceutical sector are examined by using daily stock of 12 listed pharms 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 pharms companies are insignificant because market already was at its lowest point at of 28764.63 (100 Index) before theannouncement 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. It is recommended that investors have to take the long position in investment decisionsbecause this type of abrupt and sudden events like Covid-19 do not have the long elastic effects on the stock markets.

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.

To explore the positive or negative effects of the COVID-19 on the stocks of different sectors like hotel industry, tourism industry, transport industry or insurance industry, further studies may be conducted. As the pharmaceuticals 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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