



# WHEN PANDEMIC STRIKES IN WAVES- COVID-19'S IMPACT ON STOCK EXCHANGE OF PAKISTAN (COMPARISON BETWEEN FIRST AND SECOND WAVE)

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## **Abstract**

*This paper aims to explore the impact of pandemic on stock market when it strikes in waves. Here, the research focuses on a case study of Pakistan. In order to better understand the possible outcomes, this research seeks to understand how the stock market of Pakistan behaved during the first and second wave of COVID-19. Results obtained with the help of Statistical Analysis uses the daily data of COVID-19 related positive cases, deaths and closing prices of stock market for 120 days of each wave. Despite the index went below 30,000 points, the findings of study suggest that during the first wave there is no evidence that number of confirmed cases and fatalities negatively affected PSX-100 index while during the second wave there is significant negative relationship exist between daily cases and index (PSX 100) and significant positive relationship exist between daily fatalities and stock index.*

*Keywords: COVID-19, Wave, Statistical Analysis, Pandemic, Stock Index*

## **INTRODUCTION**

The Corona Virus (COVID-19) caused by SARS CoV-2, is one of emerging and transmissible disease in recent years with significant social, well being and economic impacts. The disease was traced when a man of aged 55 years old was reported to have contacted the Novel Corona virus in Hubei City of China. It was March 11, 2020 when World Health Organization (WHO) declared COVID-19 as a Pandemic, where as grim milestone has reached worldwide as on 15.02.2021 - affecting over 109 million people almost in every country/region/ area, with over



2.418 million deaths worldwide (John Hopkins). Globally countries still witnessing its prevalence, most of them are suffered badly; not only they have lost the live of their country people but also derailed economically.

It was February 26, 2020 when the first confirmed COVID-19 case was appeared in Pakistan. The virus continued to hit the well being of people gradually. In response to this the Country's authorities feared more and came in action by putting restrictions from March 23 to curb the prevalence of virus. These included selective quarantines, travel restrictions (international as well as domestic), closure of borders with neighboring nations, closure of all education institutes and libraries, banning of public gatherings, and different levels of closures across the country. Nevertheless, disease took a driving seat and continued to spread dramatically and reaches the all time high in the mid of the June, 2020 i.e. 6200 daily cases, where as substantial drop was seen later to this month and onward. In August, much declining impact of virus was seen where daily new confirmed cases consistently went below 1,000 as compared to the mid of June, because of this daily death rate was also reduced where it went below two percent. The outbreak hit badly to the country's economic indicators due to which economic growth remained negative in decades. A prospectus recovery is possible in FY 2021 as the economy re-opens (IMF)

Since mid-April, the authorities realized the importance of shut down of businesses and gradually lifted the restrictions from core businesses including small retail shops and industries associated lesser risk to re-open under defined Standard Operating Procedures (SOPs). Furthermore, restrictions on travel (international and domestic) movement were eased. More restrictions were removed across the country especially economic sectors from the month of August. Schools, Universities, public libraries institutes, recreational places, malls, restaurants as well as retail outlets have re-opened starting from mid of September, 2020. In fear of second wave, some new restrictions and measures were implemented from the month of October, 2020 till February 2021. This time instead of national lockdown, partial or selected lock down policy was adopted and also rules were toughened for passengers travelling abroad from countries with high prevalence of pandemic.

A number of vaccines have been approved by well known companies (i) Pfizer-Biotec (ii) Oxford University-AstraZeneca (iii) Sinopharm (iv) Sputnik-V (v) Casino Bio (vi) Moderna COVID-19 vaccine. While many are in the race to get approval once their final trial comes to an end. It is lot more challenging when it comes to distribute and supply to every corner of the world.

This research contributes to the literature in two ways; firstly, we explore the stock market response to different disaster and pandemics. For example, (Becchetti and Ciciretti

2011) investigated the reaction of stock market to the global financial crisis of 2007-2009. Financial crises reduce the price of stock but have no significant impact on price volatility (Adeyeye et al., 2018). A thorough investigation was made by (Jyoti & Sardana 2017) and concluded that the stocks are actually not priced fairly and this provides an opportunity for traders to collect and use the appropriate information to make strategies accordingly, through which abnormal returns of the stock can be earned.

Secondly, this study is related to an emerging literature which shows connection between stock market and disease. COVID-19 is one of the most catastrophic economic collapses in recent times and has affected almost every country around the world which in turn affected the investment in stock market. Stock market is a combination of biggest and largest companies; it is not going to represent the whole economy (Banerji 2020). Furthermore, she mentioned that there are number of reasons due to which stock rebound occur. Stock market of USA dropped due to lock down and loss of economic activities. However, the amount of money available to central banks is also the cause to come out of stock exchange panic by injecting money (Sundar 2020).

(Anh & Gan 2020) studied the stock market of Vietnam and found that as the number of confirmed cases increased the stock market performed negatively. He also observed the fact that stock market was behaving in completely opposite direction before and during lockdown. However, stock market's reaction was very strong during the early days of pandemic especially first 40 to 60 days after the confirmation of initial cases (Ashraf 2020). Stock market movement is caused directly by COVID-19 related news such as direct fiscal support, decrease in interest rate. For instance; increase in money supply could help to increase stock market as a response to increase liquidity by US Fed Reserve (Sundar 2020).

Pandemic causes unexpected changes in stock market; which they explained further that COVID-19 confirmed cases curve are key to determine the returns of the US stock market (alfaro et al., 2018). Furthermore, risk factors in context of financial markets and COVID-19 was studied by (Schoenfeld 2020). In his studies he transpired that the managers underrate the outbreak-related risk weigh up to the SEC-mandated risk factors. Subsequently, there is a dip in the firm's value.

The COVID-19 pandemic has increased the fiscal stimulus initiatives from the authorities as stimulus policy responses globally (Jorge et al., 2020). They investigated that market reacted negatively when these fiscal stimulus was withdrawn; policy makers have to take this risk into the account while devising the existing strategy to fight the crises. The government income support has debt relief measure has a positive significant impact of the stock market (Ashraf, 2020). However, some other measure by government in the form of reduced interest rate

(expansionary monetary policy) at the time of crises appeared to have positive impact on share growth (Zhao, 2020).

Since the onset of pandemic world has suffered worst economic crises since the great depression (Bénassy-Quéré and Weder di Mauro 2020, Baldwin and Weder di Mauro 2020), the pattern of stock market raises serious concern. (Krugman,2020) in his influential column from new York times said that we need to remember three rules; first, the stock exchange is not the economy of a country. In rule number 2 and 3 he repeated the rule number 1. The performance of stock market – mainly driven by the vibration between greed and fear – and real growth of economy has always been somewhere between loose and hypothetical. The movement of stock market is not completely accidental rather it reacted on the way governments implemented policies to control the infectious disease and macroeconomic policies to support the economy/ firms (Blancard and Desroziers, 2020).

In depth study was conducted, where the impact of world and national stock market reaction to COVID-19 was seen, where the significant and negative reaction exist to pandemic (Khanthavit 2020). Another study was made from China to see the impact of COVID-19 on country's stock market; result suggested that pandemic had shown significant negative effect on stock market. Study further confirmed that the effect of pandemic was heterogeneous, i.e. some companies lost the share price while others such as chemical and pharmaceutical industries benefited from it. Secondly fear sentiment was also there which directly caused the stock index to fall (Liu et al., 2020). Another study from six different stock market of world was conducted where it has been found that in short term COVID-19 affected countries stock index went down but there is no evidence that COVID-19 negatively impacted stock market more than its global average (Qing et al., 2020)

(Coccia 2020) studied that COVID-19 diffused very fast in areas where there is air pollution, low intensity average wind and low temperature which ultimately affect the human health. He also explored that countries with shorter lockdown have more number of confirmed but less fatalities as compared to longer lockdown countries. In addition to it, those countries that imposed long term lockdown have serious consequences on the economy.

It is pertinent to mention that studies are computer based on models that give rise to simulation with experiments to forecast ultimate real effect of pandemic, where available current data is being used to explain how the country's index market performs when pandemic strikes in waves especially the comparison between them and to blueprint the strategies in order to avoid the futuristic calamity caused by same type of pathogens.

## METHODOLOGY

This research is a case study exclusively from Pakistan to experience a rise in COVID-19 infections and fatality for first and second wave from 01<sup>st</sup> April, 2020 and 22<sup>nd</sup> October respectively. This study provides absolute focuses on study of country's stock market (PSX) for 120 days after the onset of each wave: First wave of COVID-19 from 01<sup>st</sup> April, 2020 considering N=120 days; Second wave of COVID-19 from 22<sup>nd</sup> October, 2020 onwards, also considering N=120 days.

So the model of research under study can be given as under;

$$\text{Index}_{it} = \alpha + \beta_1 \text{Cases}_{it} + \beta_2 \text{Deaths}_{it} + \varepsilon_i$$

Whereas:

Index<sub>it</sub>= Daily closing price of PXS-100 Index

Cases<sub>it</sub>= Daily number of confirmed infections/cases

Deaths<sub>it</sub>= Daily number of causalities/ deaths

The PSX-100 index is dependent variable while the number of daily infections and daily causalities are independent variables. It is relevant to mention that model would be the same during both waves but only the period of variables change.

The variety of different sources and websites has been used to seek out the available data. Mainly data has been taken from the PSX (Pakistan Stock Exchange) data portals and official portal of COVID-19 which was based on day end.

## RESULTS

The motive of this research is to explore that which wave of current pandemic (1<sup>st</sup> or 2<sup>nd</sup>) has hit hard to the stock market (PSX) of Pakistan. It is assumed that because of these pandemic stocks, markets around the world are highly susceptible. In order to see the accurate picture from Pakistan, widely known data analysis tools such descriptive statistics, correlation and regression analysis have been used.

### Descriptive Statistics

It can be observed from the (Table-1) that during the first wave of COVID-19 shown from 1<sup>st</sup> April, 2020 onward for 120 days, average confirmed cases were about 2284.75 per day. The average numbers of daily deaths were 48.88 and average daily closing value of Index (PSX-100) has remained 34,150 points. During the 1<sup>st</sup> wave, maximum index price was 38,836 points where the minimum index price was 29,505. The peak of positive cases is 6825 and that of fatal cases 153 where the minimum number is 70 and 1 respectively. This scrutiny is drawn on the basis of 120 days of observations.

Likewise, details of second wave can also be sought out from same table starting from 22<sup>nd</sup> October, 2020. It can be transpired that daily average positive cases and daily deaths were 2025 and 46 respectively, which are more or less same as that of 1<sup>st</sup> wave the major difference was only seen in stock price index where average has risen upward by 27%. This is mainly due to the former was forced to strict lock down and the fear of COVID-19 pandemic in the beginning.

Table 1. Descriptive Statistics (comparing 1<sup>st</sup> and 2<sup>nd</sup> wave)

Descriptive Statistics	No. of Daily Confirmed Cases		No. of Daily Death		PSX-100 Index (Daily Closing)	
	1 W	2 W	1 W	2 W	1 W	2 W
Mean	2284.75	2025.22	48.88	46.19	34150.22	43408.25
Standard Error	157.79	67.81	3.30	1.96	167.74	220.29
Skewness	0.7659	0.112	0.799	0.289	0.411	-0.0008
Minimum	70	707	1	3	29505	39112
Maximum	6825	3795	153	111	38836	46933
Count	120	120	120	120	120	120

The Figure 1 shows trend of 120 days of 1<sup>st</sup> and 2<sup>nd</sup> wave of pandemic's confirmed positive cases whereas, the first strike of pandemic has peaked in the mid of June, 2020 despite strict measure by authorities such as lockdown (full/ partial) and quarantine but after that when the summer season (hot temperature) grasped, steady retrogression in pandemic was seen with natural limiting of transmission to another person. However, for the same number of days figure also depicts that second wave in terms of confirmed cases is lower as compared to first one.

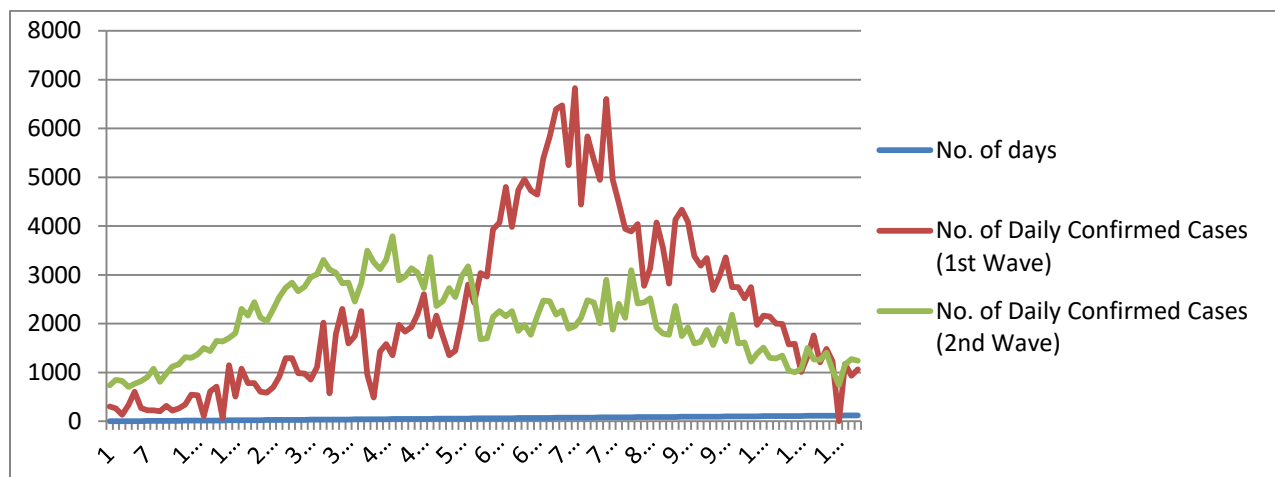


Figure 1. Confirmed cases (1<sup>st</sup> and 2<sup>nd</sup> Wave) of 120 days in Pakistan (Source: covid.gov.pk)

Figure 2 shows the daily number of deaths between first and second wave of pandemic. Likewise figure-1, this picture also reveals that daily deaths continued to rise initially but after attaining certain point of time it started to decline which may be due to moving towards summer season. In addition, figure-2 also reveals that second wave has less intensity and claimed less lives as compared to first wave in Pakistan.

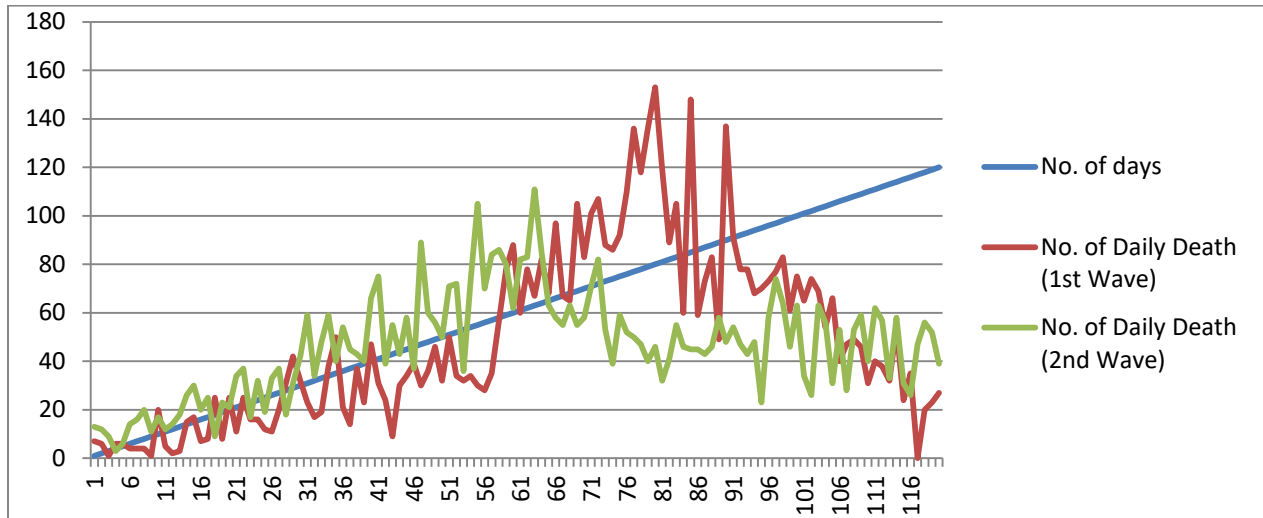


Figure 2. Daily Deaths (1<sup>st</sup> and 2<sup>nd</sup> Wave) of 120 days in Pakistan (Source: covid.gov.pk)

While Figure 3 shows the overall trend PSX-100 Index of 120 days of first and second (W) of COVID-19 Pandemic in Pakistan, during the first wave index went below 30,000 as the number of cases started to rise and shut down of economy but as the situation gets normal it again started to gain points in index. As compared to first wave, stock outperformed during the second wave this may be due the pandemic has hit less hard as compared to first wave.

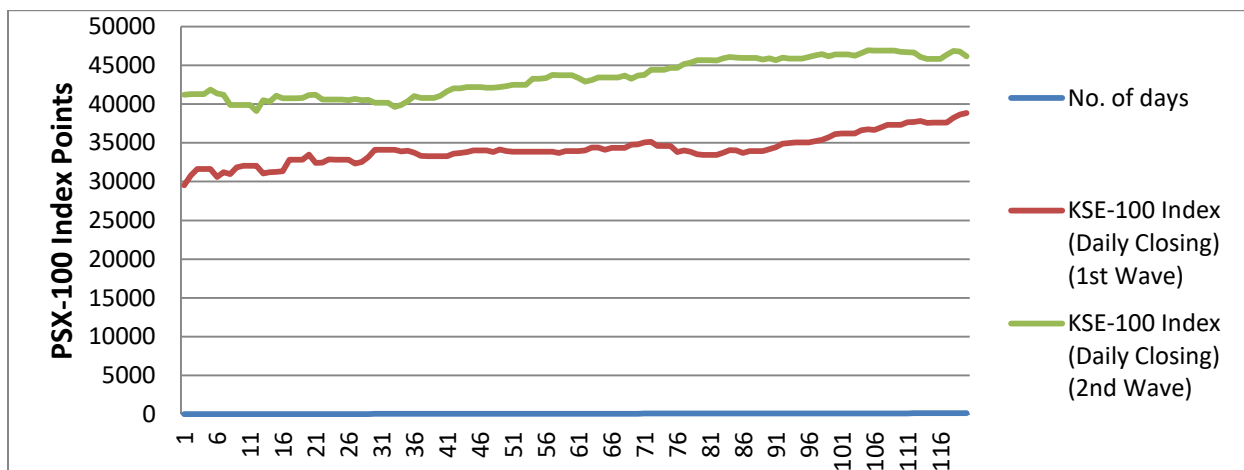


Figure 3. PSX-100 Index (1<sup>st</sup> and 2<sup>nd</sup> Wave) of 120 days in Pakistan (Source: psx.com.pk)



### Correlation Analysis

The analysis of following table 2(a) specifies that there is a positive correlation between the PSX-100 Index and the number of daily infections and casualties but association among variables are much less.

Table 2(a). Correlation Analysis

<b>Correlation Analysis During the first wave of COVID-19</b>			
	<b>PSX-100 Index (Daily Closing)</b>	<b>No. of Daily Confirmed Cases</b>	<b>No. of Daily Death</b>
<b>PSX-100 Index (Daily Closing)</b>	1		
<b>No. of Daily Confirmed Cases</b>	0.239071558	1	
<b>No. of Daily Death</b>	0.272140763	0.891668754	1

Whereas, Table 2(b) give details about the second wave, where stock index shows negative correlation with positive cases and positive with daily casualties.

Table 2(b). Correlation Analysis

<b>Correlation Analysis During the second wave of COVID-19</b>			
	<b>PSX-100 Index (Daily Closing)</b>	<b>No. of Daily Confirmed Cases</b>	<b>No. of Daily Death</b>
<b>PSX-100 Index (Daily Closing)</b>	1		
<b>No. of Daily Confirmed Cases</b>	-0.217861828	1	
<b>No. of Daily Death</b>	0.327195664	0.452382328	1

### Regression Analysis

The result from regression analysis suggests that there is no significant correlation between number of confirmed cases and PSX-100 price index during the first wave while there is significant relationship during the second wave of pandemic. Likewise, the same statistics also suggest that there is no significant relationship between number of daily deaths and PSX-100 price index during the first wave but significant with the second wave of pandemic (Table-3).



However, in case of daily infections PSX-100 Index is negative significant. The coefficient of determination, during the first wave is 0.0845 which means less than 8% variation in the dependent variable is explained by independent variables. If we observe the same in second wave the value is much lesser as compared to first wave i.e. 27% variation in the dependent variable. Hence, in both cases model is not a good fit.

Table 3. Regression Analysis

Regression Statistics						
	1 W	2W				
Multiple R	0.290746588	0.524757				
R Square	0.084533578	0.275369909				
Adjusted R Square	0.06888458	0.26298307				
Standard Error	1773.104591	2071.718334				
Observations	120	120				
ANOVA						
	df	F (1W)	F (2W)	Significance F (1W)	Significance F (2W)	
Regression	2	5.40185223	22.23085	0.005702713	6.55854E-09	
Residual	117					
Total	119					
	Coefficients (1W)	Coefficients (2W)	t Stat (1W)	t Stat (2W)	P-value (1W)	P-value (2W)
Intercept	33427.6873	43656.68327	120.126	74.65380248	2.1612E-124	1.5E-100
No. of Daily Confirmed Cases (1st Wave)	-0.03919019	-1.494372617	-0.1889	-5.21306882	0.85048124	8.1E-07
No. of Daily Death (1st Wave)	16.5296639	60.14061101	1.66384	6.066144547	0.09881958	1.65E-08

## DISCUSSION AND CONCLUSIONS

The aim of research was to find out the impact of pandemic on stock market of Pakistan when it strikes in waves. The analysis shows that average daily fatality rate for first and second wave was 2.1% and 2.28% respectively. However, average confirmed cases were lesser by 11% in

second wave as compared to first wave (120 days of comparison). After a span of specified period both waves showed declining trends, however, with the COVID-19 pandemic second wave is still unfolding in Pakistan. Result of regression analysis suggests that there is no significant correlation between number of confirmed cases and PSX-100 Index during the first wave while significant and negative relationship exist during the second wave (Khanthavit 2020). Likewise, significant relationship is not associated with daily deaths and PSX-100 Index during the first wave but positive and significant relationship exists in second wave. However, level of association (coefficient of determination) during second wave was only 27%.

So why the stock market capitalization reduces and went below 30,000 points despite no significant association exists between the variable during the first wave? In fact it was reaction of pandemic (Becchetti and Ciciretti 2011) causing fear sentiments (Liu et al., 2020) due to lockdown and slowdown of economic activities (Banerji 2020). Hence, the pattern of stock market raises serious concern about its behavior because it is not the country's economy (Krugman 2020). The upward trend of Index is mainly attributes to the authorities timely response and State Bank of Pakistan (SBP)'s policies have served well and were critical in helping to navigate the COVID-19 shock. These include but not limited to health containment measures, temporary fiscal stimulus (Ashraf 2020, Sundar 2020), a huge expansion of the social safety net, reducing interest rates (Zhao, 2020) monetary policy support and targeted financial initiatives such as extended fund facility (EFF) supported program, sizeable emergency financing from the international community, including from the Fund's Rapid Financing Instrument (RFI) (Blancard and Desroziers, 2020). The diffusion of COVID-19 pandemic's first wave started to abate over the 2020 summer and the impact on the economy was significantly reduced (Coccia 2020a). It is pertinent to mention that these results are provisional because in the existence of the second and future waves of the pandemic manifold social and environmental elements play a pivotal role (Coccia 2020b) which ultimately affects the economy of a country.

To sum up all, since the virus (SARS-CoV-2) was new and scientist hardly knew anything, this virus has caused serious destruction for the economy; fear sentiment was created and directly caused the stock index to fall (Liu et al., 2020) but timely response from authorities saved the index from being worsened. At the time of uncertainty this has provided opportunity to traders to gather and use the relevant information to make trading strategies which helps them in earning abnormal returns (Jyoti & Sardana 2017), which could be seen gain in index during the first as well as second wave.

This research can be made more refined when more variables such as inflation, growth, remittance can be added. Scholars can also work on comparative study of markets globally.

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