Does COVID-19 Affect Stock Market Volatility

Arshad iqbal[1], Muhammad Azam[2], Naveed Azeem[3]

ABSTRACT

This study was conducted to measure the effect of the Covid-19 pandemic in the form of confirmed cases and death rate on stock volatility during the period from 25 February 2020 to 12 June 2021 by applying regression, Autoregressive Conditional heteroscedasticity (ARCH), and Generalized Autoregressive Conditional Heteroscedasticity (GARCH) using daily time-series data from two South Asian countries that are Pakistan and India. The variables were chosen for measuring the results which are confirmed cases and death rates as independent variables and stock volatility as a dependent variable. Results found that the Covid-19 Confirmed Cases and Death Rates have significant effects on stock volatility between Pakistan and India.

INTRODUCTION

Today a world faced a dramatic disease in the form of (Covid-19) affects all economic units in the world and creates uncertainties by facing new layers of (Covid-19) and increasing death rates make life difficult to survive. The (Covid-19) first report in December 2019 and officially declared by Chinese authorities as a novel coronavirus in the city of Wuhan and spread in the whole world causing a pandemic. This virus affects the whole world's businesses because of the lockdown and creates fears in people around the world. According to a world health organization report on 27 April 2021, there have been 147,539,302 confirmed cases of Covid-19, including 3,116,444 deaths cased reported.

Pakistan now facing the third layer of Covid-19 and increased the number of registered cases daily affects the overall economy. The stock market of Pakistan represents a pillar of the economy of Pakistan. The purpose of this paper is to measure the effect of Covid-19 on stock market performance in two developing countries namely Pakistan and India. As a report in April 2021, the total confirmed cases in Pakistan was 804,939 and death rate was 17329 and India report the total confirmed was 17,988,637 and death rate was 201,165 but increasing drastically day by day in the current situation reported by the world health organization.

Current studies have shown that the Covid-19 epidemic has severely affected the global economy. The

[1] Ph.D. scholar Department Of Management Sciences Iqra National University, Peshawar, Pakistan

[2] Lecturer In Finance Department Of Management Sciences National University Of Modern Languages, Peshawar, Pakistan

[3] Lecturer, Iqra National University, Peshawar, Pakistan.

Covid-19 affect capital market and almost all countries markets transaction globally. (Machmuddah, Z. et al, 2020). According to the research of Sha & Sharma (2020), the Covid-19 pandemic is the biggest and most disturbing shock to the global economic system, so it is important to understand whether the cause of the country's stock market volatility is important. It is important to measure the regional stock market volatility. For the five developed economies in Asia, the overall volatility of the regional market has a significant impact on the volatility of the country's market (Sharma, S. S. 2020). According to (Mazur, M. (2021) found that natural gas, food, healthcare, and software stocks earn high positive returns, whereas equity values in petroleum, real estate, entertainment, and hospitality sectors fall dramatically. The results, based on data up to 9 April 2020 and GARCH models, suggest that changes in the number of cases and deaths in the US and other countries majorly affected by the Covid-19 crisis in the first three months of 2020 (China, Italy, Spain, the UK, Iran, and France) do not have an impact on the US stock market returns. (Onali, E. (2020). According to (Xu, L. (2021). There was a negative impact of uncertainty related to asymmetry about the Covid-19 pandemic on the Canadian stock market. But in the US stock market, the magnitude of the stock was small and returns were adversely affected by uncertainty. The research found evidence that Covid -19 harmed major stock indexes for specific countries studied in this paper. The results of Pooled OLS, which represent the country in this study, show that the growth rate of new cases next week greatly reduces weekly earnings. (khan k et al, 2020)

This paper attempts to measure the situation about the stock price volatility under the coronavirus pandemic faced by the country and also the implication of stock price volatility and firms' Responses to Covid-19. For this purpose, we select two south Asian countries namely Pakistan and India stock markets have been chosen for the period from March 2020 to April 2021. Data were collected daily for both Covid-19 cases and stock returns.

LITERATURE REVIEW

Khan, k. et al. (2020), investigated the impact of the Covid-19 epidemic on the stock markets of 16 economies. Through efficient market theory and inter-temporal asset price theory, we use Pooled OLS, t-test, and Mann-Whitney test to test the impact of the Covid-19 epidemic on weekly and daily stock price indicators. The main stock index of the country represented in this study showed that Covid-19 negatively affects the stock indices. The results of Pooled OLS show that the growth rate of new cases next week significantly reduces weekly earnings.

Sharma, S. S. (2020), examine whether aggregate regional level market volatility has a significant effect on country-level market volatility in the case of five developed Asian economies. The proposed model employed in this paper was the time series regression model using daily data, which found that there are significant differences and correlations between the volatility of the Asian regional stock market and the country-level stock market volatility.

Balli.F. (2015), the purpose of this article is to study the integration dynamics of emerging stock markets in Asian and MENA markets and selected developed countries. The results show that, according to our

model, the impact of large developed markets is controversial to emerging markets, and the severity of the impact varies widely across the country. The results show that bilateral trade, foreign portfolio investment, domestic market value, past colonial relations, and distance from emerging countries play a key role in explaining this rise and fall.

Onali, E. (2020), examined the impact of Covid-19 cases and related deaths on the US stock market. The results, based GARCH models According to the survey results, the research model shows that in the first three months of 2020, the U.S. and other countries that are most affected by the Covid-19 crisis (China, Italy, Spain, the U.K., Iran, and France) will not affect the returns of the U.S. stock market. the evidence report that the impact of Covid-19 on Dow Jones conditional Heteroscedasticity and S&P indices have positive but VAR model the impact of death rates in Italy and France was negative on Dow Jones returns.

Baek, S et al. (2020), this study analysed Covid-19 and stock market volatility at the industry level. The results show that volatility is affected by specific economic indicators and is sensitive to Covid-19 news. Both negative and positive Covid-19 information is very important, although negative news has a greater impact, which indicates that there is a negative impact. In all industries, total risks and idiosyncratic risks have increased significantly, while changes in systemic risks across the industry are different. Results also showed that Covid-19 news creates more sensitivity than other economic indicators. Compare to positive news the negative news has twice the impact on the market creates negativity bias. The market's response to the Covid-19 news shows positive and negative asymmetry.

Mazur, M. (2021), this paper investigates the US stock market performance during the crash of March 2020 triggered by Covid-19. The stock price collapse in March 2020 was one of the largest stock market crashes in history. According to the Dow Jones Industrial Average (DJIA) measurement, the market fell by 26% in four days. The market crash was caused by the Covid-19 epidemic and reaction from the Government. According to the latest data, US GDP fell by 4.8% in the first quarter of 2020, and the unemployment rate raised by more than 20%.

Zhang, W. (2021), analysed the return and volatility spill over between the Covid-19 pandemic in 2020, the crude oil market, and the stock market by employing two empirical methods for connectedness. In this study, the increase in returns and volatility of the crude oil market and the stock market, and the time-domain method (DY12) were adopted in the United States, Japan, and Germany in 2020. Frequency dynamics (BK18)) was based on methods. From a time-domain perspective, total volatility spillover (39.75%) was stronger than total returns spill over (27.509%), and in the frequency dynamics-based method. Results showed that returns spillover mainly occurs in the short term and observed that the impact of COVID-19 on oil and stock market volatility far exceeds that of the 2008 global financial crisis.

Machmuddah, Z. et al (2020), investigate Stock Market Reaction to Covid-19: Evidence in Customer Goods Sector with the Implication for Open Innovation. 90 days data of daily stock prices and stock trading volume was used for analyzing the result. Results found that the output-related closing stock

prices and stock trading volume were significantly different before and after Covid-19 emergence. In practice, when making decisions regarding investment, the results show that investors should pay attention to Non-economic factors. Investors select good company's products which are highly demanded by customers in the market.

Theoretical Framework
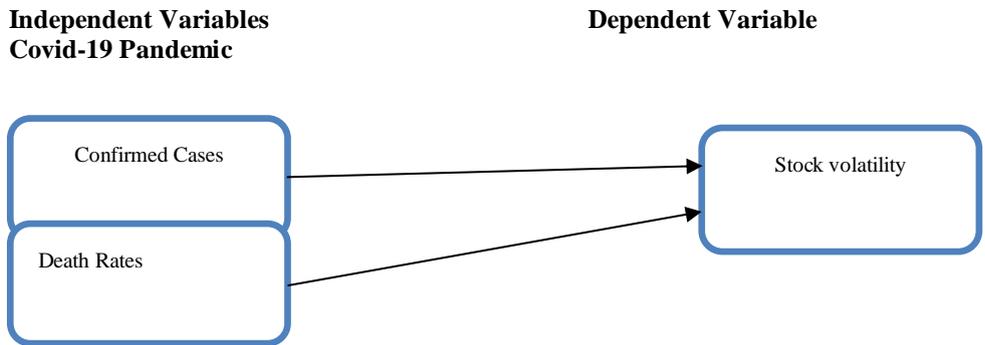
RESEARCH METHODOLOGY

The Covid -19 daily confirmed cases and death rate about Pakistan and India was collected from the website "https://ourworldindata.org". The index data of the two Asian countries were collected from (www.yahoo.finance). The Covid-19 data for Pakistan covered the period from 25 February 2020 to 12 June 2021 and for India covered the period from 30 January 2020 to 12 June 2021. *The model chosen for analysis of the data was a simple regression model to find out the relationship between Covid-19 confirmed cases and death rates that occurred daily and the stock market return and also GAARCH model used for measuring the* impact of Covid-19 confirmed cases and deaths rates are estimated by extending the common Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model by Bollerslev (1986).

$$SV = \alpha + \beta i\ CC + \beta i_2 DR + \epsilon \quad (1)$$

Where:

SV= Stock Volatility

CC= Confirmed Cases during Covid-19 pandemic.

DR = Death Rates during Covid-19 Pandemic.

α= Intercept.

ϵ = Error term.

Hypothesis:

$H0_1$: There is no significant effect of Covid-19 Confirmed Cases on Stock Volatility.

$H0_2$: There is no significant effect of Covid-19 Death Rates on Stock Volatility.

RESULTS

Table 1: Summary of the simple regression model of Pakistan

Dependent variable (Stock Price)

Variables	Observation	Coefficient	t-valve	p-valve
Confirmed cases	300	0.085***	3.58	0.000
Death rates	300	-2.752***	-2.40	0.017
Constant	300	34031.23***	137.59	0.000

R^2 = 0.74, F (2,66) = 415.51, P=valve (0.05%)

The above table 1 indicates the regression result of Covid-19 confirmed cases and death rates and stock prices in Pakistan. In this model, the dependent variable was stock volatility and the independent variable was confirmed cases and death rates. Table 1 shows that confirmed cases significantly affect the stock volatility by 0.85 while the relationship between confirmed cases and stock volatility is positive. It means that the confirmed cases of one patient have increases the stock volatility has increases by 0.85. In this table, the death rates also significantly affect the stock volatility by -2.752 which means that the death rate increase by 1 percent then the stock volatility decreases by -2.752. It shows that there is a negative relationship between stock volatility and death rates. In this model, the F valve shows that the overall model has significant because the F valve is greater than 4. The R^2 valve is 0.74 which showed that independent variables explained the dependent variable by 74%.

Table 2: Summary of the simple regression model of India

Dependent variable (Stock Price)

Variables	Observation	Coefficient	t-valve	p-valve
Confirmed cases	300	-0.0009764***	-6.44	0.000
Death rates	300	1.050516***	10.35	0.000
Constant	300	10218.09***	145.83	0.000

R^2 = 0.85, F (2,297) = 845.26, P=valve (0.05%)

The above table 2 indicates the regression result Covid-19 confirmed cases and death rates and stock prices in India. In this model, the dependent variable was stock volatility and the independent variable was confirmed cases and death rates. Table 2 shows that confirmed cases significantly affect the stock volatility by -0.00097 while the relationship between confirmed cases and stock volatility is negative. It means that the confirmed case of one patient has increases the stock volatility has decreases by -0.00097. While the death rates also significantly affect the stock volatility by 0.1051 which means that the death rate increase by 1 percent then the stock volatility increases by 0.1051. it shows that there is a positive relationship between stock volatility and death rates. In this model, the F valve shows that the overall model has significant because the F valve is greater than 4. The R^2 valve is 0.85 which showed that independent variables explained the dependent variable by 85%.

Table 3: Independent Sample t-test between two groups.

Variables	Groups	Observations	Mean difference	t-valve	P-valve
Stock price	Pak/India	300	27680.76867	92.023	.000
Confirmed cases	Pak/India	300	-2193447.82667	-12.27	.000
Death rates	Pak/India	300	-35341.81000	-13.234	.000

Table (3) indicates the result of the independent sample t-test of stock prices and Covid-19 confirmed cases and death rates which are used for the mean difference of the price data between India and Pakistan. The mean difference between India and Pakistan has 27680.77. The result shows that India has a comparatively high price difference than Pakistan. The average price data of Pakistan was 39716.77 and India was 12035.99. In table 3 the confirmed cases show the mean difference between India and Pakistan has -2193447.83. The results show that India has comparatively more confirmed cases than Pakistan. The average confirmed cases of Pakistan were 206751.26 and India was 2400199.09 and the death rates show the mean difference of the death rates between India and Pakistan. The mean difference between India and Pakistan has -35341.81000. The result shows that India has comparatively more death rates than Pakistan. The average death rates of Pakistan were 4272.37 and India were 39614.18.

Table 4: GARCH volatility coefficients for stock prices for Pakistan and India.

In Pakistan	Coefficients	S.E
Panel 1 (Parameters)		
Confirmed Cases	.0007799	.0049734
Death rates	1.404447***	.2402778
Constant	32839.97***	64.7549
ARCH (L1)	.7951772***	.170118
GARCH (L1)	.2724437***	.0655603
Constant	42259.02***	18631.45

In India	Coefficients	S.E
Panel 2 (Parameters)		
Confirmed Cases	-.0007126***	.0000365
Death rates	.0877204***	.0025461
Constant	10350.78***	25.99709
ARCH (L1)	.9169713***	.2501781
GARCH (L1)	.1648726**	.0993978
Constant	7314.5***	2430.768

* denote significance at 1% level and *** denote significance at 5 % level respectively.

The results are given in table (4) about GARCH (1,1) for Pakistan and India with a log of stock prices as the dependent variable. The results show that stock returns volatility during the period is explained by approximately 27% for Pakistan and 16% percent for India. Which is comparatively significant for

Pakistan while the low for India? In Pakistan, the ARCH valve is highly significant to mean that previous days' stock information can influence today's stock volatility while the GARCH valve is also highly significant. This shows that previous days' stock volatility can influence today's stock volatility. In table 4 (panel 1) the coefficient result of confirmed cases during COVID-19 is not significant but the coefficient results of death rate show a highly significant and positive relationship between death rates and stock volatility by 1.405[***]. In the table (4) (Panel 2) the result given about stock volatility shows that arch valve is highly significant at 5% mean that previous days stock information can influence today stock volatility and GARCH value is also significant mean that previous days stock volatility can influence today's stock volatility. In panel 2 the coefficient results of confirmed cases during COVID-19 is highly significant but negative relation with stock volatility mean that one patient increase in COVID-19 cases the stock volatility decreases by -0.0007126 but the coefficient results of death rate show a highly significant and positive relationship between death rates and stock volatility by .0877204[***].

CONCLUSION

The purpose of this paper was to investigate the effects of Covid- 19 on stock price volatility during the Covid-19 period in Pakistan and India. The result is based on data from February 25, 2020, up to June 12, 2021. We have investigated that a GARCH model for daily stock price volatility and Covid-19 confirmed cases and death rates in two Asian countries that are Pakistan and India. As a result, we concluded that GARCH (1,1) model suggests that the number of Covid-19 confirmed cases and death rates in Pakistan and India have a significant effect on stock price volatility. The evidence supports that Covid-19 confirmed cases and death rates in Pakistan and India have a positive effect on stock price volatility. But in India GARCH model results that confirmed cases show negative effects on stock price volatility. Besides this regression result also shows significant and positive effects of Covid-19 confirmed cases and death rates on stock volatility in Pakistan and India. Based on results both null hypothesis has been rejected and concluded that overall the stock price volatility in both countries quickly reacts to Covid-19 confirmed cases and death rates and this reaction varies overtime depending upon the severity of corona layers in Pakistan and India.

REFERENCES

Zhang, W., & Hamori, S. (2021). Crude oil market and stock markets during the COVID-19 pandemic: Evidence from the US, Japan, and Germany. *International Review of Financial Analysis*, *74*, 101702.

Baek, S., Mohanty, S. K., & Glambosky, M. (2020). COVID-19 and stock market volatility: An industry-level analysis. *Finance Research Letters*, *37*, 101748.

Onali, E. (2020). COVID-19 and stock market volatility. *Available at SSRN 3571453*.

Sharma, S. S. (2020). A note on the Asian market volatility during the COVID-19 pandemic. *Asian Economics Letters*, *1*(2), 17661.

Sha, Y., & Sharma, S. S. (2020). Research on Pandemics Special Issue of the Journal Emerging Markets Finance and Trade. Emerging Markets Finance and Trade, 56(10), 2133–2137. https://doi.org/10.1080/1540496x.2020.1795467

Sharma, S. S. (2020). A note on the Asian market volatility during the COVID-19 pandemic. *Asian Economics Letters*, *1*(2), 17661.

Mazur, M., Dang, M., & Vega, M. (2021). COVID-19 and the march 2020 stock market crash. Evidence from S&P1500. *Finance Research Letters*, *38*, 101690.

Onali, E. (2020). COVID-19 and stock market volatility. *Available at SSRN 3571453*.

Xu, L. (2021). Stock Return and the COVID-19 pandemic: Evidence from Canada and the US. *Finance Research Letters*, *38*, 101872.

Khan, K., ZHAO, H., Zhang, H., Yang, H., Shah, M. H., & Jahanger, A. (2020). The impact of COVID-19 pandemic on stock markets: An empirical analysis of world major stock indices. *The Journal of Asian Finance, Economics, and Business*, *7*(7), 463-474.

Balli, F., Hajhoj, H. R., Basher, S. A., & Ghassan, H. B. (2015). An analysis of returns and volatility spillovers and their determinants in emerging Asian and Middle Eastern countries. *International Review of Economics & Finance*, *39*, 311-325.

Machmuddah, Z., Utomo, S. D., Suhartono, E., Ali, S., & Ali Ghulam, W. (2020). Stock Market Reaction to COVID-19: Evidence in Customer Goods Sector with the Implication for Open Innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *6*(4), 99.

Max Roser, Hannah Ritchie, Esteban Ortiz-Ospina and Joe Hasell (2020) - "Coronavirus Pandemic (COVID-19)". *Published online at OurWorldInData.org*. Retrieved from: 'https://ourworldindata.org/coronavirus'.

Graph 1: Pakistan Covid-19 Data
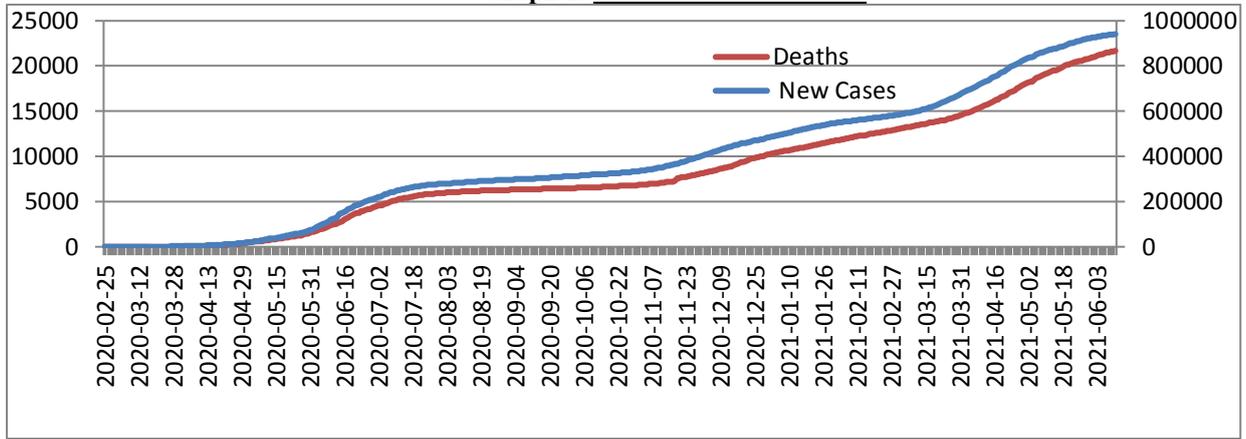
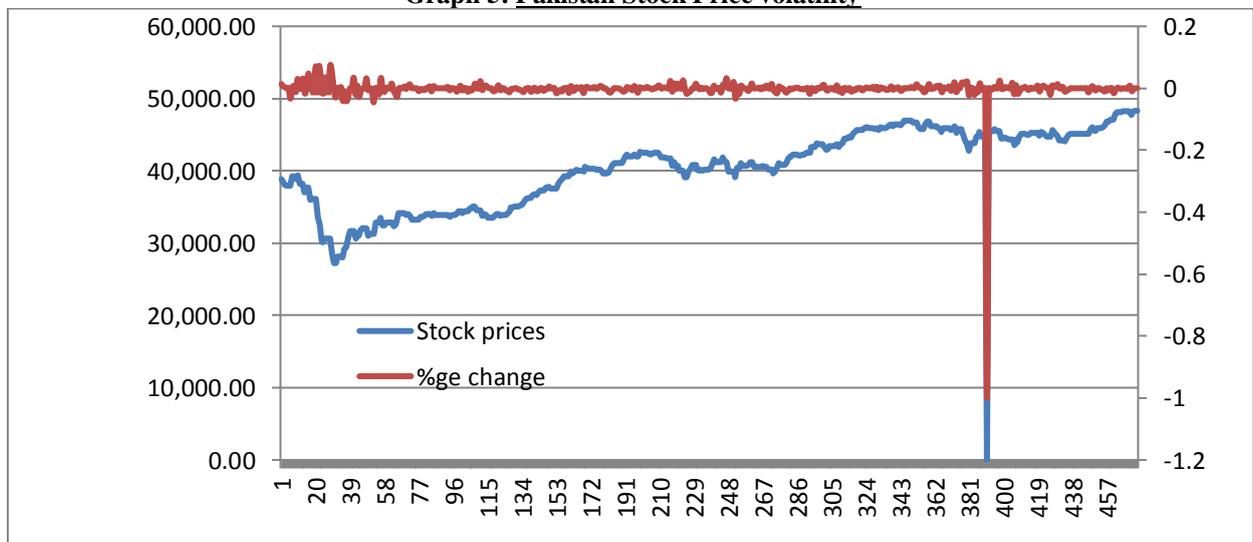**Graph 2: India Covid-19 Data:**
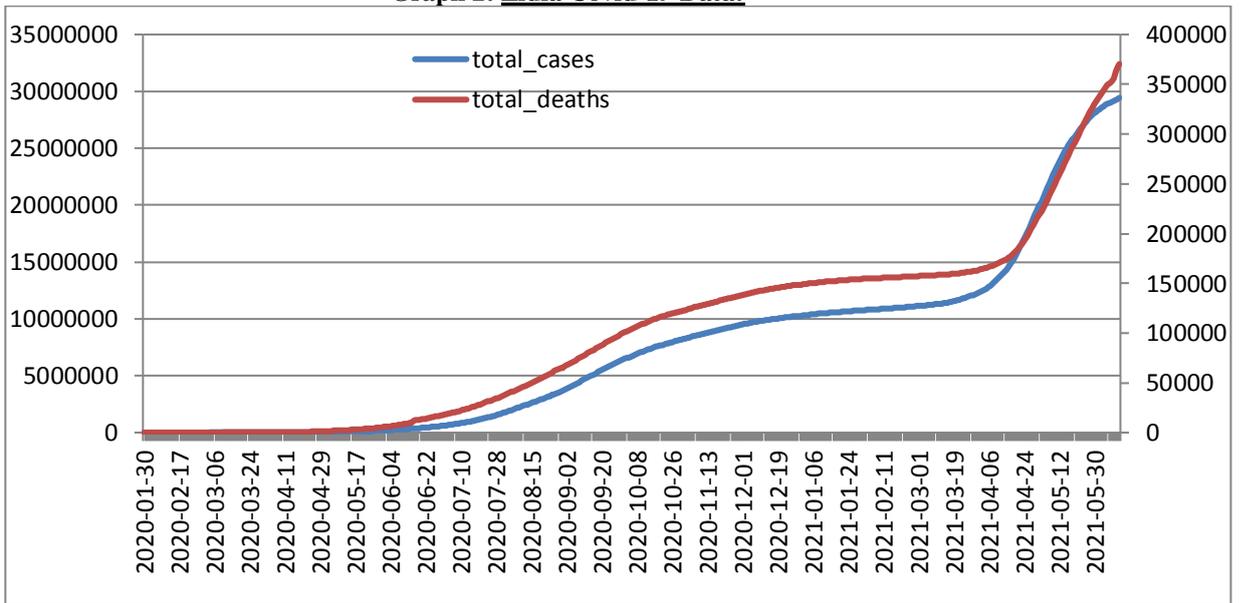
Graph 5: Pakistan Stock Price volatility

Graph 4: <u>India Stock Price volatility</u>