Bulletin of Business and Economics
ISSN - 2409 - 9368
http://rfh.org.pk/jur/magazine-category/bbe

NEXUS OF COVID-19 NEWS WITH STOCK MARKET RETURNS AND VOLATILITY IN PAKISTAN

WAQAS SHAIR[1], SUNDAS NAEEM[2], FARHAT RASUL[3]

ABSTRACT

This study scrutinized the effect of fatality announcement and news of COVID-19 on stock market returns and volatility in Pakistan. The estimates of the EGARCH model unveiled that bad news related to COVID-19 news and fatality announcement decrease the stock returns. The findings specified that fatality ratio is associated with a decrease in stock market return and its one-day lag effect is stronger than the current day. Additionally, the bad news of the current day has a more negative effect on stock returns than its lag effect. The findings of the study confirm the presence of the leverage effect in the variance of stock returns. The further findings of the study divulged that the stock market of Pakistan is more volatile amid the period of the global pandemic to the recognition of the first case in Pakistan. The analysis confirmed that stock market of Pakistan is less volatile amid COVID-19 in Pakistan as it was before the global pandemic. The paper suggests that COVID-19 related news is an influential cognitive factor in describing the stock market returns and volatility. The proper disaster management can stable the position of the stock market and may provide better opportunities for investors to diversify financial risk.

Keywords: COVID-19, EGARCH model, Financial markets, Leverage effect, Stock returns
JEL Codes: G01, G11, G14, G15

I. INTRODUCTION

The outbreak of coronavirus (COVID-19) in central China at the end of December has spread to 218 countries, regions, or territories, resulting in more than 19.4 million confirmed cases and more than 722,285 deaths as of 9 August; 2020 (Culp, 2020). This panic led to the temporary closure of companies in most economies, which affects the performance of companies in these countries and the dynamics of their stock markets. The prior literature evidenced that the news of any event occurred around the world can predict the economic & financial variables (Narayan, 2019). Considerate the nexus among the news and the stock market reaction, the time period is central for motivation. The study employed the different phases to ascertain the effect of the news on stock return (Ramelli & Wagner, 2020). Because the decisions of buying and selling an investor be contingent on the prevailing news through social media platforms (Breitmayer et al., 2019). The study further focused on how certain news – worst or good (negative or positive) – affects financial variable, exclusively stock returns. The principle of bad news claims that the only bad news is important in making investment decisions. On the contrary, some authors argue that worst and good news influence investment decisions mutually (Narayan, 2019; Narayan & Bannigidadmath, 2015).

The COVID-19 epidemic triggered the global financial crisis. The prevention of this disease i.e. quarantine, and restrictions on labor mobility which ultimately slows down the economy globally. The business and consumer confidence is now undermining due to disrupted supply chain globally and it shrinking the demand, dampen the investment, and upsurge risk aversion (OECD, 2020). The stock markets at the global level continue to decline because of the absence of well-timed policy implementation. The major stock markets i.e. S&P 500 Index, STOXX Europe 600, Shanghai SE Composite Index, and Nikkie 225 Index from the period of 2- January to 2- March 2020 fall by -10.70%, -19.29%, -1.75%, and -16.17% respectively (Lee Yen Nee, 2020). While the Pakistan stock exchange showing the floating effect in stock prices by 0.057% (January to March ,2020) (Pakistan Stock Market (KSE100),

[1] Lecturer, School of Economics and Finance, Minhaj University Lahore, Pakistan
[2] PHD Scholar, University of Bradford, Bradford, West Yorkshire, England
[3] Assistant Professor, University of Management and Technology, Lahore, Pakistan

2020). The growing uncertainty in the market with limitless boundaries, resulting in increased uncertainty of making investment decisions.

Studies analyzing the impact of news on return predictability are gradually emerging during the pandemic conditions. The stock markets have asymmetric dependencies on COVID-19 related information, such as fake news and media coverage (Cepoi, 2020). Countries responded by locking in economic activity and imposing travel bans which affect the stock price (Phan & Narayan, 2020). It has also been found that infectious coronavirus has a positive significant impact on international stock market permanent volatility (Bai et al., 2020). Zhang et al. (2020) found that financial markets have moved dramatically on an unprecedented scale. Changes in the number of cases and deaths in the US and other countries (China, Italy, Spain, United Kingdom, Iran, and France) mainly have a major effect by the Covid-19 crisis in the first three months of 2020. The death reported harms stock market return increased threefold (Onali, 2020). Based on US stock market performance, it has been observed that some industries (natural gas, healthcare, and software) are earning high positive returns, while equity values in the oil, entertainment, and hotel sectors are falling dramatically (Mazur et al., 2020). Similarly, the pandemic has affected the transport, mining, electricity and environmental industries. However, the manufacturing, information technology, education, and healthcare industries have been resilient to the pandemic (He et al., 2020). Albuquerque et al. (2020) examine the impact of official COVID-19 announcements and fatality ratio on financial market volatility and suggest that the prolongation of the coronavirus pandemic is an important source of financial volatility.Topcu & Gulal (2020) found a negative and statistically significant impact of the coronavirus on emerging stock markets especially in Asian emerging markets affected the worst as compared to Europe. On the contrary, (Shehzad et al., 2020) examined that the European and the US markets get more affected by the COVID-19 as compared to Asian markets. Because of Asian markets still providing better opportunities to taper off the financial risk. Ali (2011), Ali (2015), Ali et al., (2016), Ali and Naeem (2017), Ali and Bibi (2017), Ali (2018) and Sulehri and Ali (2020) highlight the importance of fiscal policy for macroeconomic environment.

The daily increase in confirmed cases and deaths caused by COVID-19 has a significant negative impact on equity performance in all Chinese stock market companies (Al-Awadhi et al., 2020). The contagion effect in the stock market returns and volatilities as a result of the COVID-19 pandemic are short-lived (Okorie & Lin, 2020). Even it has been observed that Covid-19 had a significant negative impact on stock markets for at least 30 days (Schell et al., 2020). Although investors continued to watch the hearings of COVID-19 closely around the world, there was no panic in December 2019 in Pakistan. The stock market appeared as a bull as no case of Corona reported at that time. KSE-100 index augmented by 1362 points almost 3.59 percent (DAWN, 2019).The first case of COVID-19 was reported on 26 February 2020, in Pakistan and it spreads to 308,217 with the 6214 death cases. The fatality ratio is waning to 2.14% (WORLDOMETER, 2020). During Covid-19, Pakistan faced the edgy trend in the stock market. The stock market is starting to fall and on March 19, it will reach the lowest value in the last 5 years. The main reason for this sudden decline is the pandemic, which is forcing foreign investors to withdraw their foreign portfolio investments. The stock market has shown a blended trend in different phases of this uncertain situation and with the fatalities (Waheed et al., 2020).

Figure 1 depicts that stock market returns are more volatile in the early period of pandemic in Pakistan and less volatile later on. While Figure 2 portrays that unstable fatality ratio associated with unstable stock returns while stability in fatality ratio cause stability in stock return.

The study aimed to analyzed the role of COVID-19's news on stock market returns volatility. This motivated to answers the following superior queries: first, does news related to COVID-19 affects the return and volatility of the stock market? Second, does the fatality ratio affects the return and volatility of the stock market? Third, does the stock market has a significant leverage effect? Fourth, does stock returns more volatile amid COVID-19 than it before the pandemic? Fifth, to what extent the stock market volatile in response to global and domestic shocks? Sixth, what strategies may help in stabilizing the market volatility? This study will try to answer the aforementioned quires which help the researchers, policymakers, investors, portfolio, and financial managers in understanding the historical pattern of the stock market and predicting the future outlook of the stock market. The rest of this study is organized as follows: Section 2 summarizes the methodology of the paper, Section 3 postulates the data and descriptive statistics of the variables, Section 4 discusses the research findings of the study, and Section 5 concludes the paper.

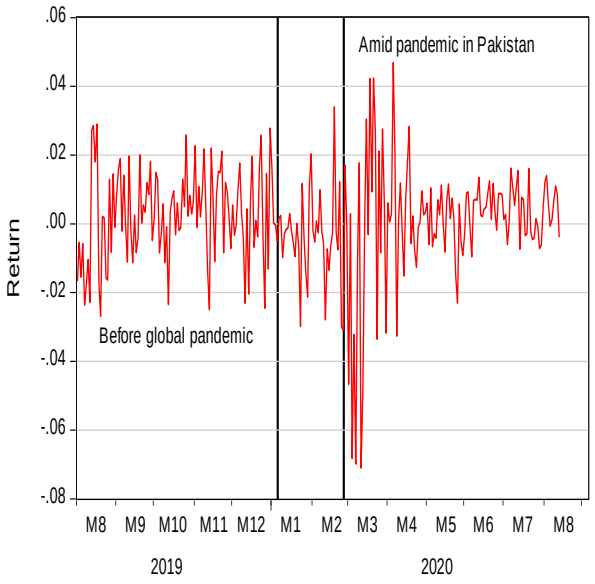


Figure 1: Stock market return before and after pandemic

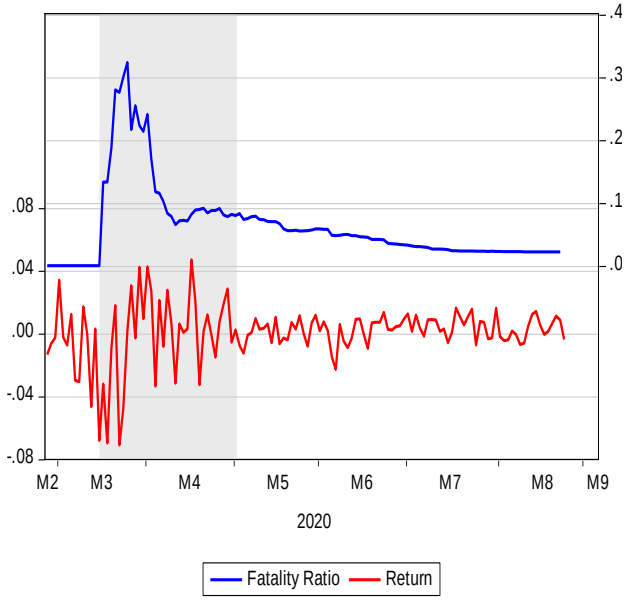


Figure 2: Stock market return and fatality ratio in Pakistan

II. METHODOLOGY

In order to capture the asymmetric effect of announcement of fatality and news of COVID-19 on stock market return, this study employed exponential GARCH (EGARCH) model proposed by (Nelson, 1991). The EGARCH model has two steps, the first step deals with means equation with autoregressive process "p" order. The AR(p) process is defined such as:

$$r_t = \varphi_0 + \varphi_i \sum_{j=1}^{p} r_{t-i} + \varepsilon_t \quad (1)$$

The second step deals with the variance equation and the EGARCH (p,q) model is defined as:

$$\log(\sigma_t^2) = \omega + \sum_{j=1}^{q} \alpha_j \left|\frac{\varepsilon_{t-j}}{\sigma_{t-j}}\right| + \sum_{j=1}^{q} \gamma_j \frac{\varepsilon_{t-j}}{\sigma_{t-j}} + \sum_{i=1}^{p} \delta_i \log(\sigma_{t-1}^2) \quad (2)$$

where ω, the α, γ, and δ are parameters of variance equation. The left-hand side of the aforementioned equation is a log of variance series which makes it exponential and guaranteed the estimates of the lag of variance non-negative. The non-zero γ_j confirm the presence of an asymmetric effect. However, $\gamma_j < 0$ indicate that bad news has larger effects on the volatility of the series than good news.

After confirming the presence of the ARCH effect in the series, next to determine the factors affecting the volatility of the series. For this purpose, we added the fatality ratio and dummy variable (coded 1 for bad news day, otherwise zero) in the mean and variance equation. The specification of the EGARCH model with adding the explanatory variables are defined as follows:

$$r_t = \lambda_0 + \lambda_1 r_{t-1} + \lambda_2 D_t + \lambda_3 FAT_t + \varepsilon_t \quad (3)$$

$$\log(\sigma_t^2) = \omega + \alpha \left|\frac{\varepsilon_{t-j}}{\sigma_{t-j}}\right| + \gamma \frac{\varepsilon_{t-j}}{\sigma_{t-j}} + \delta \log(\sigma_{t-1}^2) + \psi D_t + \pi FAT_t \quad (4)$$

III. DATA AND DESCRIPTIVE STATISTICS

This investigation utilized daily data on new cases, recovered cases, and fatality from the period of February 26, 2020, to September 4, 2020 which retrieved from the Worldometers[4]. The fatality ratio, computed as a ratio between the number of daily reported deaths and the total infection cases. Further, this study incorporates the dummy of good news and bad news amid COVID-19 by considering good news when per day recovered cases are more than active cases because it makes the people comfort psychologically and reduce panic level. However, the dummy variable coed 1 for bad news, otherwise zero. This project is different from previous studies because we scrutinize the effect of COVID-19 uncertainty (allied with new infection and recovered cases, fatality reported in Pakistan) on financial market volatility.

[4] https://www.worldometers.info/coronavirus/country/pakistan/

The data of financial market returns were collected from the Karachi stock exchange[5]. It consists of the closing value of the KSE-100 index. However, the daily return generated from the closing value of KSE-100 as follows:

$r_t = \ln\left(\frac{KSE_t}{KSE_{t-1}}\right)$

where r_t is the return on KSE, while KSE_t and KSE_{t-1} represents the closing value of KSE indexes in period t and t-1 respectively.

The summary statistics in Table 1 depicted three types of returns distinct on the basis of time period. The return_1 is before the global pandemic (from August 1, 2019, to February 24, 2020), return_2 is the time from first case recognition of global pandemic to the spread of the pandemic in Pakistan (January 6, 2020, to February 25, 2020), and return_3 is amid pandemic in Pakistan (February 26, 2020, to September 4, 2020). The stock market return has positive mean returns before the global pandemic and amid the pandemic in Pakistan. While negative mean returns in the period global pandemic recognition to the first case in Pakistan. Moreover, the stock market exposed negative skewness for all the returns, and high kurtosis only for return_3 indicates the presence of high losses amid pandemic. The fatality ratio is positively skewed with high kurtosis indicates extreme values on the right side.

Table 1: Summary statistics

	New cases	Death	Recover	Fatality ratio	Dummy	Return_1	Return_2	Return_3
Mean	1545.54	33.57	1318.132	6.207	0.6846	0.0025	-0.0024	0.0006
Median	800.00	19.000	581.000	4.610	1.000	0.0024	-0.0022	0.0025
Maximum	5985.00	148.000	8929.000	32.350	1.000	0.0290	0.02779	0.0468
Minimum	0.00	0.000	0.000	0.000	0.000	-0.0268	-0.0298	-0.0710
Std. Dev.	1652.65	36.268	1753.541	6.450	0.467	0.0132	0.01238	0.0184
Skewness	1.096	1.228	2.037	2.180		-0.1588	-0.0226	-1.3399
Kurtosis	3.040	3.730	7.655	7.803		2.5000	3.4801	7.2606
Jarque-Bera	25.85	35.303	205.705	226.195		1.5348	0.3488	136.17
Probability	0.000	0.000	0.000	0.000		0.4642	0.8399	0.0000
Sum	199375	4330	170039	800	89	0.2679	-0.08541	0.0822
Observations	130	130	130	130	130	105	36	130

IV. RESULTS AND DISCUSSION

The summary of the pre-estimation test in Table 2 showed that returns are normally distributed and reject the null hypothesis of series are not normally distributed. The results of the Augmented Dickey-Fuller (ADF) test depicted series are stationary at I(0). Moreover, applied the Autoregressive (AR (1)) model to confirm the presence of the ARCH effect in the series. The result of the ARCH-LM test revealed the robust evidence on the presence of ARCH effect in the series.

Table 2: Pre-estimation test

Test	Statistics	p-value
Jarque-Bera	235.1904	0.000000
ADF unit root at level	-9.267487	0.000000
ARCH-LM	10.324531	0.000000

The aftermaths of the mean equation for stock market returns are divulged in Table 3. It outlines that returns of current periods positively associated with previous day returns. The investigation identified that on average bad news decreases the stock market returns by 0.32 percent amid COVID-19. However, the current day's returns more responsive to the bad news of the current day than a precious day. Likewise, an increase in fatality ratio by 10 percent decrease the stock market return by 0.22 percent, and its lag effect is relatively stronger. The investigation of the variance equation unveiled that negative news has significantly more effect on stock market returns comparing with positive news of similar magnitude, as γ is negative which indicates the presence of "asymmetric effect". It explicated that bad news has more effect on the volatility of stock market returns than good news. The period required for shocks to reduce to one half of the original size is approximately 7.36 days[6] which is relatively more than bad news of

[5] https://www.ksestocks.com

[6] calculated by $\ln(0.5)/\ln(\delta)$

terrorism attack as 4.37 days estimated by (Suleman, 2012). It further implies that longer-lasting persistence shocks create less volatility in conditional variance. Further, the insight of γ depicted that negative innovation increase volatility 1.09313 times[7] more than positive innovations. This study finds the feeble impact of bad news on stock market volatility while no evidence of bad news of the previous day on the current day's volatility. However, the fatality ratio has a significant effect on returns volatility while its lag effect has stronger than the current period effect.

Table 3: Results of mean and variance equation

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Intercept	0.004488 (4.083284)***	0.003520*** (3.030987)	0.004525*** (3.778835)	0.003940*** (3.545959)	0.002994** (2.312172)	0.003811*** (2.623966)
r_{t-1}	0.146019* (1.750770)	0.178185* (1.869447)	0.135387 (1.331084)	0.161643* (1.722831)	0.136526* (1.869447)	0.113154 (1.268927)
D_t	-0.003213** (1.996029)		-0.003027* (-1.818045)			
D_{t-1}				-0.002730* (-1.765090)		-0.002785* (-1.701484)
FAT_t		-0.022496* (-1.900272)	-0.001464 (-0.052654)			
FAT_{t-1}					-0.047615* (-1.736720)	0.003466 (0.136141)
Variance Equation						
ω	-0.607972** (-1.963378)	-0.019765 (-0.092126)	-0.245366 (-0.779750)	-0.518345 (-1.616189)	0.385274*** (5.145873)	0.339318*** (4.076032)
α	0.394821*** (3.025695)	0.269375** (2.326506)	0.367448*** (2.686721)	0.337367 (2.181239)**	-0.009170 (-0.103916)	0.002994 (0.031109)
γ	-0.044493** (-1.995178)	-0.021033* (-1.875210)	-0.002847 (-1.033348)	-0.069971* (-1.673569)	-0.008509** (-2.168476)	-0.052187* (-1.906105)
δ	0.910121*** (34.80671)	0.901782*** (55.03236)	0.800578*** (37.74830)	0.977166*** (36.74787)	0.903492*** (55.03237)	0.803207*** (2302.305)
D_t	0.074040* (1.736488)		0.069572 (1.302463)			
D_{t-1}				0.048152 (0.483843)		0.004724 (0.093833)
FAT_t		0.876602** (2.123127)	0.928323* (1.794610)			
FAT_{t-1}					1.299688*** (5.172330)	1.229198*** (3.092979)

*** represents significance at 99%, ** at 95% and * at 90%, z-stats in parenthesis

The summary statistics and pre-estimation test in Table 4 showed that returns are normally distributed and series are stationary at I(0). The error terms of the ARIMA (1,0,0) model confirmed the presence of a significant ARCH effect in the series. The results of the mean and variance equation for comparison of stock market returns and volatility over three distinguish period depicted in Table 5. The finding reveals that before the global pandemic, average market returns were 0.14 percent higher than the post-pandemic period. Further, the average stock returns amid the global pandemic to the recognition of the first COVID-19 case in Pakistan is 0.43 percent lower than before the pandemic and amid pandemic in Pakistan.

The estimates of the variance equation depict that amid pandemic in Pakistan, the stock returns show less variability. These findings are following the outcomes of (Shehzad et al., 2020), which concluded that Asian financial markets are relatively less volatile in response to a global pandemic. Moreover, the findings of the study reveal that amid the global pandemic to first case recognition in Pakistan, the stock market volatility was 0.026 points more than another period. The fact can be also confirmed from Figure 3 which depicts that conditional variance is relatively low before the global pandemic. However, amid COVID-19 in Pakistan, initially conditional variance is high and afterward, it

[7] calculated by $|-1+\gamma|/(1+\gamma)$

slides down. Finally, the period from the global pandemic to the recognition of the first case in Pakistan shows high conditional variance.

Table 4: Summary statistics and pre-estimation test

Statistics of dependant variable return		
Mean	0.000963	
Std. Dev.	0.015822	
Skewness	-1.049971	
Kurtosis	7.052026	
Observations	271	
Test	**Statistics**	**p-value**
Jarque-Bera	235.1904	0.000000
ADF unit root at level	-13.69751	0.000000
ARCH-LM	12.080746	0.000000

Table 5: Result of mean and variance equation for a distinct period

	Model (1)	Model (2)	Model (3)	Model (4)
Intercept	0.001247 (1.366738)	0.002361** (2.902602)	0.001363 (1.164413)	0.002892** (2.218254)
r_{t-1}	0.169543** (2.557825)	0.147110** (2.256928)	0.173209** (2.629183)	0.137696** (2.068032)
D_1	0.001474** (1.982208)			
D_2		-0.004363* (-1.683897)		-0.004820* (-1.663387)
D_3			0.000733** (2.488809)	-0.000825* (-1.727955)
	Variance equation			
ω	-0.548167*** (-2.968650)	-0.578041** (-2.929998)	-0.489563** (-2.698332)	-0.559287** (-2.846786)
α	0.219816*** (3.215273)	0.245859*** (3.067589)	0.230315*** (3.330437)	0.228134*** (2.936252)
γ	-0.122796*** (-2.906995)	-0.118100** (-2.385065)	-0.103600** (-2.553657)	-0.126642*** (-2.627274)
δ	0.958401*** (50.64438)	0.957189*** (47.66442)	0.964189*** (52.05118)	0.957140*** (48.49511)
D_1	0.006528 (0.220336)			Base-category
D_2		0.026570* (1.698761)		0.017580* (1.820948)
D_3			-0.024472* (-1.899670)	-0.011444* (-1.753121)

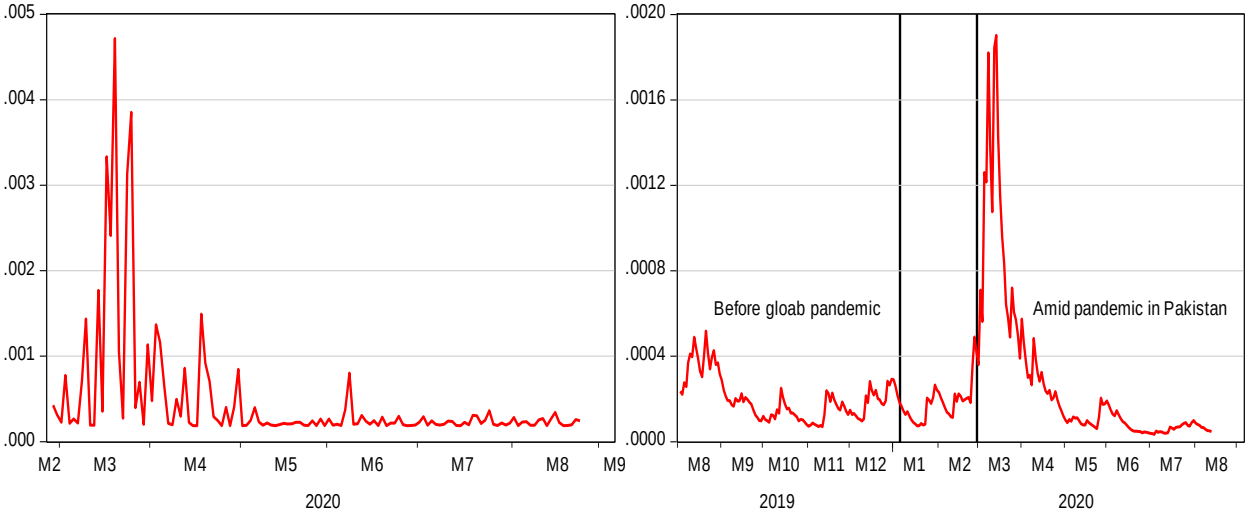
*** represents significance at 99%, ** at 95% and * at 90%. D_1=1 from August 1, 2019, to February 24, 2020. D_2=1 January 6, 2020, to February 25, 2020, otherwise zero. D_3=1 from February 26, 2020, to September 4, 2020, otherwise zero.

V. CONCLUSIONS

This study applied the EGARCH model to analyze the effect of bad news and fatality on stock market returns of Pakistan amid COVID-19. The findings specified that fatality is associated with a decrease in stock market return and its lag effect stronger than the current day. Additionally, the bad news of the current day has a more negative effect on stock returns than its lag effect. The findings of the study confirm the presence of the leverage effect in the variance of stock returns. The study confirms the presence of less volatile returns amid COVID-19 in Pakistan as compared to the period of a global pandemic to the recognition of the first case in Pakistan. It follows that the stock market of Pakistan shows more volatility to global shock than domestic shocks. The stock market of Pakistan performs better amid COVID-19 as it performing before the pandemic. However, proper disaster management can stable the position

of the stock market and may provide better opportunities for investors to diversify financial risk. Moreover, significant budget allocation to mitigate the pandemic and reduce fatality results in stabilizing the stock market volatility.

Figure 3 Conditional variance of stock market return



REFERENCES

Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., & Alhammadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioral and Experimental Finance*, *27*, 100326. https://doi.org/10.1016/j.jbef.2020.100326

Albuquerque, R. A., Koskinen, Y. J., Yang, S., & Zhang, C. (2020). Love in the Time of COVID-19: The Resiliency of Environmental and Social Stocks. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3583611

Ali, A. & Naeem, M.Z. (2017). Trade Liberalization and Fiscal Management of Pakistan: A Brief Overview. *Policy Brief-Department of Economics, PU, Lahore*. 2017 (1), 1-6.

Ali, A. (2011). Disaggregated import demand functions of Pakistan; An empirical Analysis. M-Phil Thesis, NCBA&E, Lahore, Pakistan, 1-70.

Ali, A. (2015). *The impact of macroeconomic instability on social progress: an empirical analysis of Pakistan*. (Doctoral dissertation, National College of Business Administration & Economics Lahore).

Ali, A. (2018). Issue of Income Inequality Under the Perceptive of Macroeconomic Instability: An Empirical Analysis of Pakistan. *Pakistan Economic and Social Review*, 56(1), 121-155.

Ali, A. and Bibi, C. (2017). Determinants of Social Progress and its Scenarios under the role of Macroeconomic Instability: Empirics from Pakistan. *Pakistan Economic and Social Review* 55 (2), 505-540.

Ali, A., Ahmed, F., & Rahman, F. U. (2016). Impact of Government Borrowing on Financial Development (A case study of Pakistan). *Bulletin of Business and Economics* (BBE), 5(3), 135-143.

Bai, L., Wei, Y., Wei, G., Li, X., & Zhang, S. (2020). Infectious disease pandemic and permanent volatility of international stock markets: A long-term perspective. *Finance Research Letters*, *May*, 101709. https://doi.org/10.1016/j.frl.2020.101709

Breitmayer, B., Massari, F., & Pelster, M. (2019). Swarm intelligence? Stock opinions of the crowd and stock returns. *International Review of Economics & Finance*, *64*, 443–464. https://doi.org/10.1016/j.iref.2019.08.006

Cepoi, C. O. (2020). Asymmetric dependence between stock market returns and news during COVID-19 financial turmoil. *Finance Research Letters*, *36*(June), 101658. https://doi.org/10.1016/j.frl.2020.101658

Culp, W. C. (2020). Coronavirus Disease 2019 Situation Update. *World Health Organization*, *14*(6), e01218. https://doi.org/10.1213/xaa.0000000000001218

DAWN. (2019). *Stocks continue upward journey for fifth week - Newspaper - DAWN.COM*. DAWN. https://www.dawn.com/news/1519811/stocks-continue-upward-journey-for-fifth-week

He, P., Sun, Y., Zhang, Y., & Li, T. (2020). COVID–19's Impact on Stock Prices Across Different Sectors—An Event Study Based on the Chinese Stock Market. *Emerging Markets Finance and Trade*, *56*(10), 2198–2212. https://doi.org/10.1080/1540496X.2020.1785865

Lee Yen Nee. (2020). *Coronavirus impact on global economy, financial markets in 6 charts*. CNBC. https://www.cnbc.com/2020/03/12/coronavirus-impact-on-global-economy-financial-markets-in-6-

charts.html

Mazur, M., Dang, M., & Vega, M. (2020). COVID-19 and the march 2020 stock market crash. Evidence from S&P1500. *Finance Research Letters*, *May*, 101690. https://doi.org/10.1016/j.frl.2020.101690

Narayan, P. K. (2019). Can stale oil price news predict stock returns? *Energy Economics*, *83*, 430–444. https://doi.org/https://doi.org/10.1016/j.eneco.2019.07.022

Narayan, P. K., & Bannigidadmath, D. (2015). Are Indian stock returns predictable? *Journal of Banking & Finance*, *58*, 506–531. https://doi.org/10.1016/j.jbankfin.2015.05.001

Nelson, D. B. (1991). Conditional Heteroskedasticity in Asset Returns: A New Approach. *Econometrica*, *59*(2), 347. https://doi.org/10.2307/2938260

OECD. (2020). Coronavirus: The world economy at risk. *OECD Interim Economic Assessment*, *March*, 1–15. http://www.oecd.org/berlin/publikationen/Interim-Economic-Assessment-2-March-2020.pdf

Okorie, D. I., & Lin, B. (2020). Stock markets and the COVID-19 fractal contagion effects. *Finance Research Letters*, *June*, 101640. https://doi.org/10.1016/j.frl.2020.101640

Onali, E. (2020). COVID-19 and Stock Market Volatility. *SSRN Electronic Journal*, *February*, 1–24. https://doi.org/10.2139/ssrn.3571453

Pakistan Stock Market (KSE100). (2020). *Pakistan Stock Market (KSE100) | 1994-2020 Data | 2021-2022 Forecast | Quote | Chart*. Trading Economics. https://tradingeconomics.com/pakistan/stock-market

Phan, D. H. B., & Narayan, P. K. (2020). Country Responses and the Reaction of the Stock Market to COVID-19—a Preliminary Exposition. *Emerging Markets Finance and Trade*, *56*(10), 2138–2150. https://doi.org/10.1080/1540496X.2020.1784719

Ramelli, S., & Wagner, A. F. (2020). Feverish Stock Price Reactions to the Novel Coronavirus. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3550274

Schell, D., Wang, M., & Huynh, T. L. D. (2020). This time is indeed different: A study on global market reactions to public health crisis. *Journal of Behavioral and Experimental Finance*, *27*, 100349. https://doi.org/10.1016/j.jbef.2020.100349

Shehzad, K., Xiaoxing, L., & Kazouz, H. (2020). COVID-19's disasters are perilous than Global Financial Crisis: A rumor or fact? *Finance Research Letters*, *36*(June), 101669. https://doi.org/10.1016/j.frl.2020.101669

Suleman, M. T. (2012). Stock Market Reaction to Terrorist Attacks: Empirical Evidence from a Front Line State. *Australasian Accounting, Business and Finance Journal*, *6*(1). https://ro.uow.edu.au/aabfj/vol6/iss1/15

Sulehri, F. A., & Ali, A. (2020). Impact of Political Uncertainty on Pakistan Stock Exchange: An Event Study Approach. *Journal of Advanced Studies in Finance*, 11(2), 194-207.

Topcu, M., & Gulal, O. S. (2020). The impact of COVID-19 on emerging stock markets. *Finance Research Letters*, *36*(May), 101691. https://doi.org/10.1016/j.frl.2020.101691

Waheed, R., Sarwar, S., Sarwar, S., & Khan, M. K. (2020). The impact of COVID-19 on Karachi stock exchange: Quantile-on-quantile approach using secondary and predicted data. *Journal of Public Affairs*, *May*, 1–6. https://doi.org/10.1002/pa.2290

Worldometer. (2020). *Pakistan Coronavirus: 310,841 Cases and 6,466 Deaths - Worldometer*. WORLDOMETER. https://www.worldometers.info/coronavirus/country/pakistan

Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters*, *36*(March), 101528. https://doi.org/10.1016/j.frl.2020.101528