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Panic News and media Hype Effects on Stock Market Returns and Volatility amid Infectious Diseases Turmoil

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Abstract
This study investigates the effect of fake news, panic news, and media hype on stock market returns amid COVID-19 in Pakistan. It also scrutinizes the asymmetric effect of bad and good news on stock market volatility. For empirical analysis, data of six indicators related to news collected from Ravenpack. The data is ranged from the date of first COVID-19 case recognition dated February 26, 2020, to October 26, 2020. This time span consist on the 166 working days in which stock market remains open. The estimates of the Multivariate EGARCH model revealed that fake news and media hype is negatively associated with the stock market returns. The negative effect of media hype is greater than fake news. The aftermath of variance equation suggests that media hype, infodemic, and panic new increase the stock market volatility. The findings of the study suggests that strong co-ordination among NCOC and Information ministry may result in stabilizing the stock market return by enhancing the investors' confidence and reducing the panic.
Keywords: News, COVID-19, Stock returns, Volatility

1. Introduction

The eruption of COVID-19 has had a profound economic impact, inducing fear and uncertainty on a global scale. This pandemic has led to the deepest worldwide recession in recent history, causing severe economic damages and external shocks. The economic toll of COVID-19 continues to mount as it takes a toll on human lives, foreign investments, productivity, and profitability, with developing countries experiencing more pronounced effects. During this crisis, both the general public and investors are closely monitoring media coverage related to COVID-19. News about new outbreaks, epidemics, and pandemics of infectious diseases has significant economic repercussions. Throughout history, infectious diseases such as plague, malaria, HIV, tuberculosis, influenza, and Ebola have posed dangerous threats to the global economy, resulting in significant economic damages (Bloom & Cadarette, 2019).

The COVID-19 pandemic in the recent past serves as a stark reminder of the far-reaching economic consequences of infectious diseases, highlighting the need for robust public health measures and international cooperation to mitigate their impact on global economies. During the pandemic, many economies have shifted towards digitalization, and the use of social media has surged. However, the rapid spread of false information and social media hype has had significant disastrous consequences on economic indicators (Barua et al., 2020). While social media has democratized access to information, it also raises concerns about the challenges people face in discerning between truth and falsehood (Jones et al., 2013). Fake news typically exhibits characteristics such as intent to deceive and lack of authenticity (Shu et al., 2017).

The phenomenon of social media hype and fake news is not new (Zhou & Zafarani, 2018; Zafarani et al., 2019; Zhou et al., 2019). However, its diffusion during the novel wave of COVID-19 disease is particularly worrisome (Yang, Zhou, & Zafarani, 2020). The uncontrollable spread of fake news through features like "like, share, and retweet" has made social media an influential platform for disseminating false and panic-inducing information (Talwar et al., 2020; Barua et al., 2020). There is evidence in the literature indicating that social media serves as a significant source of unfiltered news, exacerbating panic perceptions and turning them into reality (Lazer et al., 2018; Ireton & Posetti, 2018; Apuke & Omar, 2020).

It has become evident that individuals and government officials alike have resorted to spreading fake news to their respective audiences in pursuit of their objectives (Gans, 2003; Calvert & Vining, 2017; Hartley & Vu, 2020; Ali et al., 2021; Audi et al., 2023). Fake news is utilized for various purposes, such as developing personality profiles, manipulating emotions, and diverting public attention from specific issues (Wasserman & Madrid-Morales, 2019), including during the pandemic (Hou et al., 2020). An expanding body of literature focuses on evaluating the effects of social media on stock market returns. Theoretical and empirical studies have sought to understand whether stock prices fluctuate in financial markets due to information spread through social media concerning political and economic news (Campbell & Hentschel, 1992; Koutmos & Booth, 1995; Smales, 2014; Wu, Hou, & Lin, 2019; Broadstock and Zhang, 2019; Shi and Ho, 2020; Sulehri & Ali, 2020; Audi et al., 2022; Audi et al., 2023; Shair et al., 2023). Pioneering studies like Almond (2006) and Myers et al. (2014) have shed light on the economic and social costs of viral diseases, highlighting the high risk of death and mortality rates associated with them. These costs are intricately linked to economic activity and can have lasting effects on economic growth.

The proliferation of fake news has emerged as a significant global problem, particularly during the pandemic of 2019. The spread of false and panic-inducing information amid COVID-19 has given rise to various economic challenges, impacting critical areas such as employment, exchange rates, interest rates, and stock market returns. This upheaval resulted in the global stock market experiencing its most devastating crash since 1929, specifically during the period from February to April 2020, as a direct consequence of the new wave of the Coronavirus disease. As a response to the shattered investor confidence worldwide, governments introduced stimulus packages to mitigate the economic damages caused by the pandemic. Although some stock indexes showed signs of partial recovery by mid-April 2020, the lingering financial uncertainty continues to persist, keeping the global economy in a fragile state.

Figure 1 shows the stock returns exhibited higher volatility from mid-February 2020 to the end of April 2020. During this period, the stock returns experienced a decline of eight percent. Notably, the frequency of negative returns was more significant compared to positive returns during this timeframe.

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However, starting from May 2020 to October 2020, the stock returns began to stabilize, showing relatively lower volatility. The market conditions during this period were comparatively more favorable, leading to a more steady performance of stock returns.

This research paper aims to examine the effects of fake news, panic news, and media hype on stock market returns amid COVID-19 in Pakistan. Additionally, it will explore the asymmetric impact of bad and good news on stock market volatility, utilizing data from the Ravenpacks dataset, covering the period from February 26, 2020 (the date of the first recognized COVID-19 case) to October 26, 2020. The empirical analysis will employ the Multivariate EGARCH model as the chosen econometric technique to conduct the investigation.

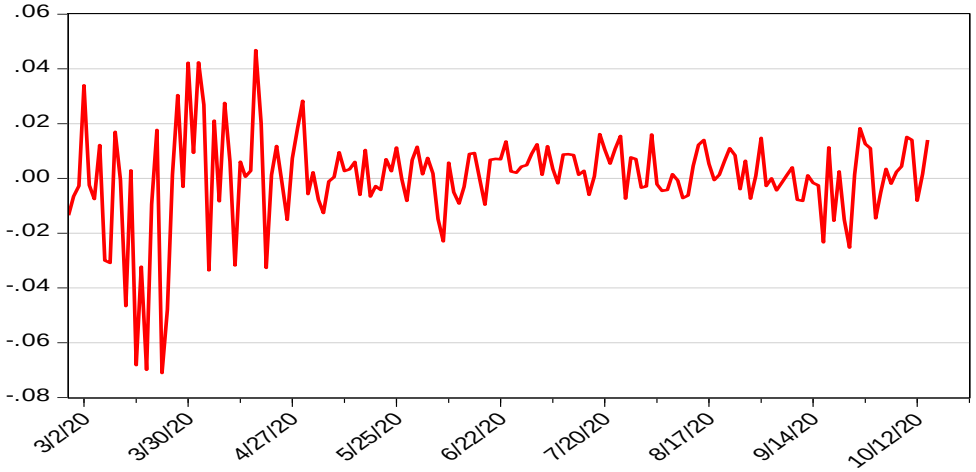

Figure 1 Stock market returns amid COVID-19

2. Literature Review

A limited number of studies have investigated the link between the COVID-19 epidemic and financial markets, offering some valuable insights. Some of these studies, such as Akhtaruzzaman et al. (2020) and Okorie and Lin (2020), have shown a positive relationship between COVID-19 news and stock market returns. Conversely, Barua et al. (2020) and Corbet et al. (2020) have identified a negative impact of the coronavirus on certain companies. Similarly, Salisu and Vo (2020) conducted a study exploring the relationship between health news (deaths and new cases of COVID-19) and stock market volatility in the top 20 affected economies. In these studies, a negative and statistically significant relationship was found, indicating that stock market returns declined as more information and news about the pandemic outbreak were disseminated. Moreover, when comparing COVID-19 with the Global Financial Crisis (GFC), Shehzad, Xiaoxing, and Kazouz (2020) found that the COVID-19 health crisis has significantly surpassed the impact of the GFC in 2008, underscoring its severity and far-reaching consequences on the global financial landscape.

Smales (2014) observed a negative association between sentiment news and an implied volatility index, also noting an asymmetric relationship when negative news emerges. Cepoi (2020) indicated asymmetric dependencies of good and bad news on stock market returns, highlighting the disruptive impact of fake news on financial markets. Additionally, Topcu and Gulal (2020), Shair et al. (2021) discovered that the stock market's decline began to improve when media hype regarding the COVID-19 disease reduced in emerging markets by mid-April 2020.

Broadstock and Zhang (2019) demonstrated that social media pricing factors play a crucial role in determining price dynamics, with varying effects on specific businesses and across the market. The long-lasting consequences of the COVID-19 pandemic have led to lower levels of investment, trade, industrial production, employment, and erosion of human capital (Fornaro & Wolf, 2020). The substantial loss of economic growth varies across world economies, with emerging economies facing significant vulnerabilities (Gautam et al., 2020). The intensity of these economic challenges is more pronounced in emerging economies, where the impacts of the pandemic have been particularly daunting.

Aggarwal, Nawn, and Dugar (2021) studied the distinct impacts of COVID-19 on stock market returns across twelve countries with highly liquid stock markets, uncovering the specific channels through which these effects manifest. The pandemic-induced panic is observed to negatively influence stock returns through the adjustment of market risk premium. Moreover, the severity of lockdown measures demonstrates a dual effect on stock market returns: negatively impacting returns via revised growth forecasts while also exerting a positive influence through the adjustment of market risk premium.

Dash and Maitra (2022) investigate the impact of pandemic uncertainty, measured by Google search volume index, on stock market activity across major global economies. Utilizing a time–frequency based wavelet approach, it reveals a strong correlation between pandemic uncertainty and investor sentiment, particularly during the early stages of COVID-19. The findings highlight a synchronized relationship between pandemic uncertainty and stock market fluctuations in G7 countries and the global market, emphasizing the role of such uncertainty in exacerbating market volatility and illiquidity, urging policymakers to consider this for financial market stability.

Another study of Li et al. (2023) has examined the impact of both the COVID-19 pandemic index and media hype surrounding COVID-19 on sectoral stock market returns using a non-linear ARDL model. While the direct influence of the pandemic index on stock returns is generally weak, it exhibits significance in sectors like Energy, Financials, and Health Care. In contrast, the media hype index significantly and negatively affects most sectors, displaying asymmetry in its impact. Dynamic asymmetric causality tests reinforce these findings, revealing time-varying asymmetric causality from

media hype to sectoral stock markets. These insights aid investors in navigating sector-specific stock price dynamics during the pandemic and emphasize the importance for market regulators to account for asymmetric effects over time when devising strategies and policies.

Wang, et al,. (2023) have examined the impact of the COVID-19 pandemic on tourism has received general attention in the literature, while the role of news during the pandemic has been ignored. Using a time-frequency connectedness approach, this paper focuses on the spill over effects of COVID-19-related news on the return and volatility of four regional travel and leisure (T&L) stocks. The results in the time domain reveal significant spill overs from news to T&L stocks. Specifically, in the return system, T&L stocks are mainly affected by media hype, while in the volatility system, they are mainly affected by panic sentiment. This paper also finds two risk contagion paths. The contagion index and Global T&L stock are the sources of these paths. The results in the frequency domain indicate that the shocks in the T&L industry are mainly driven by short-term fluctuations. The spill overs from news to T&L stocks and among these T&L stocks are stronger within 1 month.

This study is driven by several factors, including the significant economic uncertainty caused by the spread of Covid-19 from neighbouring China to Pakistan. The global pandemic has led to an increase in media communication, influencing people's behaviour. Consequently, the government of Pakistan has also utilized media sources to implement drastic and unprecedented measures to curb the virus's spread in society. Understanding how the flow of information and responses to this disease has impacted the stock market returns in Pakistan is a compelling area of investigation.

3. Methodology

In the empirical framework, it is essential to test the stationarity of the series to determine the order of integration, whether it is I(0) or I(d). The Augmented Dickey-Fuller (ADF) test is commonly used for this purpose. Once stationarity is confirmed, the next step is to measure volatility using the Autoregressive Conditional Heteroskedasticity (ARCH) model, proposed by Engle in 1982. However, the ARCH model lacks the ability to incorporate the lag of conditional variance, leading to the development of the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model by Bollerslev et al. in 1986.

In this study, we are interested in examining the role of news and shocks on stock market returns. To achieve this, we will utilize the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model introduced by Nelson in 1991. The EGARCH model, among the family of ARCH models, is better suited for explaining the asymmetric effect of negative and positive shocks on stock market volatility. The EGARCH model consists of two equations: the mean equation, which follows an autoregressive process of order "p" or AR(p), is defined such as:

$$r_t = \omega_0 + \omega_i \sum_{j=1}^{p} r_{t-i} + \varepsilon_t \quad (1)$$

The variance equation of the univariate EGARCH (p,q) model is defined as follows:

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

where φ, the θ, γ, and δ are parameters of variance equation. The sign of γ_j shows the asymmetric effect of good or bad innovation. However, γ_j <0 indicate that bad news allow market to be more volatile than good news.

After establishing the univariate EGARCH model, the next step is to extend it to a multivariate EGARCH model. This extension will enable us to examine the factors influencing stock returns and volatility simultaneously. In our analysis, we will incorporate news-related variables, and the specification of these variables will be as follows:

$$r_t = \alpha_0 + \alpha_1 r_{t-1} + \alpha_2 MCI_t + \alpha_3 FNI_t + \alpha_4 MHI_t + \alpha_5 INFDI_t + \alpha_6 PI_t + \alpha_7 CSI_t + \varepsilon_t \quad (3)$$

$$\log(\sigma_t^2) = \omega + \alpha \left|\frac{\varepsilon_{t-j}}{\sigma_{t-j}}\right| + \gamma \frac{\varepsilon_{t-j}}{\sigma_{t-j}} + \delta \log(\sigma_{t-1}^2) + \beta_1 MCI_t + \beta_2 FNI_t + \beta_3 MHI_t + \beta_4 INFDI_t + \beta_5 PI_t + \beta_6 CSI_t + \varepsilon_t \quad (4)$$

Figure 3 illustrates the relationship between stock market returns and various news indexes, showing the co-movement of these indexes with stock returns. During the period from March 2020 to April 2020, there was a notable increase in media coverage, panic news, media hype, and fake news, which coincided with greater fluctuations in the stock market returns. However, in the later period, from May 2020 to October 2020, the stock market returns showed minimal fluctuations.

Moreover, during the later period of May 2020 to October 2020, there was also a co-movement of stock returns with media hype and fake news. This indicates that these news indexes had an impact on the stock market returns during that time frame as well. Overall, the figure highlights the dynamics between news indexes and stock market returns, demonstrating their relationship and potential influence on market movements.

4. Data and Descriptive Statistics

The empirical analysis is based on data collected from Ravenpack, which includes six indicators related to news indexes tracking important themes tied to COVID-19, such as panic, media hype, and fake news. The data for stock market returns is collected from the *Karachi Stock Exchange (KSE). The time period covered in the analysis ranges from February 26, 2020 (the date of the first recognized COVID-19 case) to October 26, 2020, encompassing 166 working days when the stock market remained open.

Table 1 provides definitions for the variables used in the analysis, clarifying their meanings and significance in the study. These variables will be used to examine the relationship between news indexes and stock market returns during the specified time frame, shedding light on the impact of different themes related to COVID-19 on the market movements.

Table 2 provides the summary statistics, offering valuable insights into the stock market returns and news indexes during the period of COVID-19 in Pakistan. The average returns during this time are positive, indicating an overall positive trend in the stock market amid the pandemic.

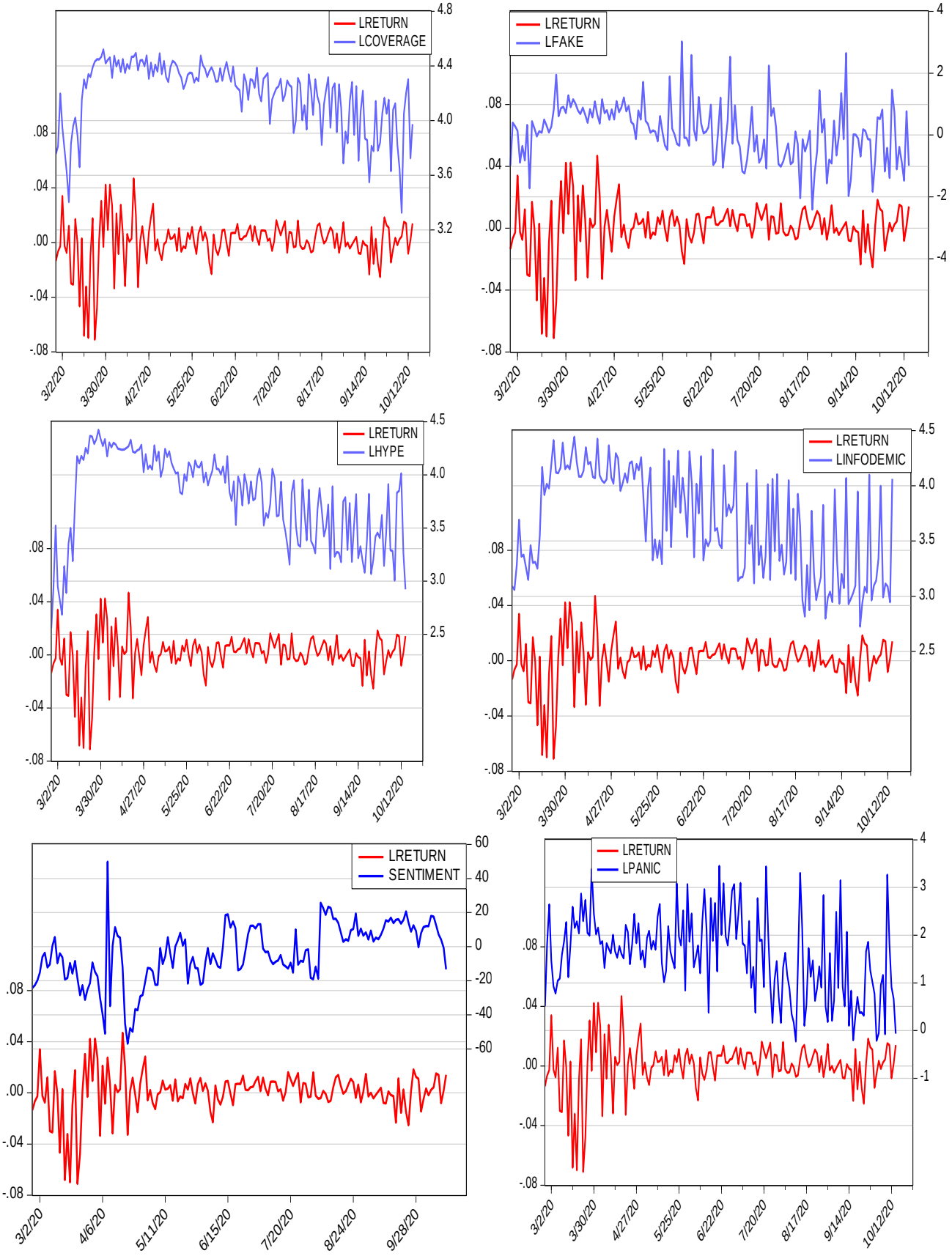

Figure 2: Stock market return and news index

The sum of returns being 7 percent further reinforces the dominance of positive returns over negative returns. However, it is important to note that the maximum slide down in returns observed is 7 percent, and the peak return is recorded at 4.6 percent. This suggests that there have been instances of significant declines in returns during the COVID-19 period. The presence of negative skewness with high kurtosis in returns indicates the existence of higher losses amid COVID-19. This implies that the stock market experienced periods of sharp declines during the pandemic. The significant p-value of the Jarque-Bera test confirms that all variables used in the analysis are normally distributed, providing confidence in the statistical validity of the results. The positive skewness of the fake news index and panic index indicates a higher reporting of fake news and panic amid COVID-19. However, it is observed that panic news were consistently more prevalent than fake news, as evident from the descriptive statistics of both indicators. The empirical attributes of the country sentiment index reveal that amid COVID-19, negative sentiments were observed from analysts about the economic outlooks. This suggests that there were concerns and pessimism among analysts about the economic conditions during the pandemic.

Table 1: Description of Variables

Variables	Definition
Stock returns (r)	The daily returns generated from the closing value of KSE-100 index 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 media coverage Index (MCI)	"It calculates the percentage of all news sources covering the topic of the novel coronavirus. Values range between 0 and 100".
The Fake News Index (FNI)	"It measures the level of media chatter about the novel virus that makes reference to misinformation or fake news alongside COVID-19. Values range between 0 and 100 where a value of 2.00 indicates that 2 percent of all news globally is talking about fake news and COVID-19".
The Media Hype Index (MHI)	"It measures the percentage of news talking about the novel coronavirus. Values range between 0 and 100".
The Coronavirus Infodemic Index (INFDI)	"The Coronavirus Infodemic Index calculates the percentage of all entities (places, companies, etc.) that are somehow linked to COVID-19. Values range between 0 and 100 where a value of 60.00 means that 60 percent of all entities covered by the media are being linked or co-mentioned with COVID-19".
The panic Index (PI)	"It measures the level of news chatter that makes reference to panic or hysteria and coronavirus. Values range between 0 and 100. The higher the index value, the more references to panic found in the media".
The Country Sentiment Index (CSI)	"It measures the level of sentiment across all entities mentioned in the news alongside the coronavirus. The index ranges between -100 (most negative) and 100 (most positive) sentiment while 0 is neutral".

Table 3 presents the correlation matrix, revealing the relationships between the different news indexes and stock returns. It shows that the fake news index and the Infodemic index have a negative association with stock returns, but this association is weak, as indicated by the magnitude of the correlation coefficient. On the other hand, the other four indexes (media hype index, panic index, country sentiment index, and country relevance index) are positively associated with stock returns. Notably, the media hype index and media coverage index exhibit a strong positive association with stock returns. This can be attributed to the fact that as various media sources, such as print, broadcasting, radio, and social media, extensively cover news related to COVID-19, the increased media broadcasting on COVID-19 news positively impacts the stock returns. Overall, the correlation matrix provides valuable insights into the relationships between news indexes and stock returns during the COVID-19 period, helping to understand the dynamics of how different news themes are associated with the market movements.

Table 2: Summary Statistics

	Return	MCI	FNI	MHI	INFDI	PI	CSI
Mean	0.000447	67.91663	1.783193	47.69880	43.42578	6.961506	-3.684518
Median	0.001589	71.93000	1.125000	49.99000	40.84500	5.275000	-3.065000
Maximum	0.046840	91.86000	20.48000	83.38000	85.00000	31.61000	49.83000
Minimum	-0.071024	27.84000	0.090000	12.92000	15.26000	0.800000	-56.88000
Std. Dev.	0.016950	14.42833	2.501116	17.40243	19.27787	6.349791	17.01067
Skewness	-1.333752	-0.683384	4.574143	-0.057451	0.285433	1.881007	-0.461483
Kurtosis	7.902263	2.613344	28.08820	1.894020	1.736770	6.495407	3.552614
Jarque-Bera	215.4387	13.95478	4932.338	8.551720	13.29133	182.3968	8.004297
Probability	0.000000	0.000933	0.000000	0.013900	0.001300	0.000000	0.018276
Sum	0.074177	11274.16	296.0100	7918.000	7208.680	1155.610	-611.6300
Sum Sq. Dev.	0.047404	34349.15	1032.171	49969.37	61320.02	6652.775	47744.89
Observations	166	166	166	166	166	166	166

Table 3: Correlation matrix

	Return	MCI	FNI	MHI	INFDI	PI	CSI
Return	1.000000						
MCI	0.100539	1.000000					
FNI	-0.063676	0.238230	1.000000				
MHI	0.001369	0.897734	0.203207	1.000000			
INFDI	-0.061164	0.541333	0.084385	0.639847	1.000000		
PI	0.002306	0.387392	0.161003	0.364128	0.169380	1.000000	
CSI	0.064873	-0.434362	-0.111538	-0.470950	-0.414537	-0.170530	1.000000

5. Results and Discussion

The summary of the stationarity tests conducted on the series used is presented in Table 4. The dependent variable, which is the stock returns, is found to be normally distributed as confirmed by the significant value of the Jarque-Bera test. The stationarity of the stock returns is also confirmed by the significant values of the Augmented-DickeyFuller (ADF) and Philipe-Parren tests.

The residuals of the AR(1) process indicate that the ARCH effect is insignificant at order 1 but becomes significant at order 2, as confirmed by the LM-ARCH test. This suggests the presence of ARCH effect in the series of returns, indicating the volatility clustering phenomenon. All variables used in the analysis are in log natural form, except for the country sentiment index (SCI). This is because the SCI ranges from -100 to +100, and due to its negative values, it is not suitable to apply logarithms. Therefore, the variables are transformed into log natural form to ensure comparability and proper analysis. The summary of stationarity tests provides important insights into the properties of the series used in the analysis, ensuring that appropriate statistical techniques are applied to obtain accurate and reliable results.

Table 4: Unit root test

Variable	ADF		PP		LM ARCH (F-Statistics)	
	Level	First Diff.	Level	First Diff.	ARCH(1)	ARCH(2)
Return	-10.57509***	-11.07011***	-10.95217***	-81.64419***	0.963663	27.84420***
MCI	-1.907354	-13.04187***	-5.555219***	-31.44855***		
FNI	-10.50492***	-12.20688***	-11.02482***	-67.31958***		
MHI	-2.274415	-10.79353***	-4.494494***	-23.21132***		
INFDI	-1.415255	-15.96252***	-8.859664***	-44.69646***		
PI	-6.020017***	-10.74325***	-10.00642***	-60.42359***		
CSI	-3.893779***	-19.79944***	-5.901954***	-27.21672***		

Table 5 reveals the aftermath of the mean equation of stock market returns, providing important insights into the relationship between different news indexes and stock market performance. It indicates that fake news and media hype have a negative association with stock market returns. Specifically, a 10 percent increase in fake news is associated with a 0.015 percent decrease in stock market returns, while a similar increase in media hype is linked to a 0.17 percent decrease in stock market returns. This suggests that media hype has a greater negative effect on stock market returns compared to fake news. Investors perceive uncertainty related to COVID-19 from media coverage, and when the share of COVID-19 news in total news increases, it creates more uncertainty, leading to a decrease in stock prices. Similarly, an increase in the share of fake news in total news also contributes to uncertainty and reduces stock prices.

On the other hand, an increase in media coverage by all sources (print, broadcasting, radio, social media, etc.) is associated with an increase in stock returns. This is because information from diverse sources helps investors gain more certainty about the current situations and future economic and financial outlooks. Interestingly, the panic index does not significantly affect stock returns negatively, suggesting that investors respond differently to stock market conditions when perceiving panic news. Overall, the results from the mean equation provide valuable insights into how different news themes influence stock market performance amid the COVID-19 pandemic, shedding light on the dynamics of investor behavior and market reactions to news dissemination.

Table 5 presents the results of the mean equation of stock market returns, and it reveals interesting findings regarding the association between different news indexes and stock market performance during the COVID-19 pandemic.

The study suggests that both fake news and media hype have a negative association with stock market returns. Specifically, a 10 percent increase in fake news is linked to a 0.015 percent decrease in stock market returns, while a similar increase in media hype is associated with a larger decrease of 0.17 percent in stock market returns. This indicates that media hype has a greater negative effect on stock market returns compared to fake news.

Investors perceive uncertainty related to COVID-19 from media coverage. When the share of COVID-19 news in total news increases, it leads to a rise in uncertainty, which subsequently decreases the price of stocks. Similarly, an increase in the share of fake news in total news also creates uncertainty and reduces stock prices.

On the other hand, an increase in media coverage from all sources, such as print, broadcasting, radio, and social media, is associated with an increase in stock returns. This is because information from diverse sources helps investors gain more certainty about the current situations and future economic and financial outlooks.

Interestingly, the study finds that the panic index does not significantly affect stock returns negatively. This suggests that investors respond differently to stock market conditions when perceiving panic news.

The study's findings shed light on how various news indexes influenced stock market returns and volatility during the COVID-19 pandemic. Media coverage had a positive impact, as investors perceived it as a valuable source of information,

leading to decreased stock return volatility. On the other hand, the presence of fake news was associated with lower stock return volatility, as risk-averse investors considered multiple sources of information to make cautious decisions. However, media hype had a negative effect on the stock market, decreasing returns and increasing volatility. Excessive coverage of COVID-19 news created uncertainty and fear among investors, impacting stock demand and prices.

Moreover, an increase in the share of COVID-19 news in total news reported had a psychological effect on investor behavior, leading to reduced stock demand and prices. Additionally, panic news and the infodemic were linked to higher stock market volatility. As the pandemic spread, media extensively covered COVID-19-related entities, creating uncertainty among investors and contributing to market volatility.

Table 5: Results of Mean and Variance Equation

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.054235	0.015588	-3.479231	0.0005
Ln[Return(-1)]	0.116675	0.079485	1.467882	0.1421
Ln(MCI)	0.029930	0.005142	5.820204	0.0000
Ln(FNI)	-0.001558	0.000741	-2.103776	0.0354
Ln(MHI)	-0.017596	0.003718	-4.732897	0.0000
Ln(INFDI)	-0.002019	0.001638	-1.232629	0.2177
Ln(PI)	0.002005	0.000940	2.133151	0.0329
Ln(CSI)	-0.0000133	0.0000493	-0.269850	0.7873
		Variance Equation		
ω	0.920630	0.344146	2.675116	0.0075
α	-0.113695	0.106101	-1.071579	0.2839
γ	-0.130636	0.060498	-2.159339	0.0308
δ	0.977435	1.7E-104	5.6E+103	0.0000
Ln(MCI)	-0.673354	1.1E-103	-6.3E+102	0.0000
Ln(FNI)	-0.178056	0.079616	-2.236443	0.0253
Ln(MHI)	0.190556	0.087189	2.185541	0.0288
Ln(INFDI)	0.289056	0.058914	4.906408	0.0000
Ln(PI)	0.017666	0.039174	0.450962	0.6520
Ln(CSI)	-0.001272	0.001977	-0.643606	0.5198

These insights can be valuable for investors, policymakers, and market analysts in making informed decisions and managing the economic implications of media information during crisis periods. Understanding the complex relationship between different news themes and their impact on the stock market is essential for navigating financial markets in uncertain times.

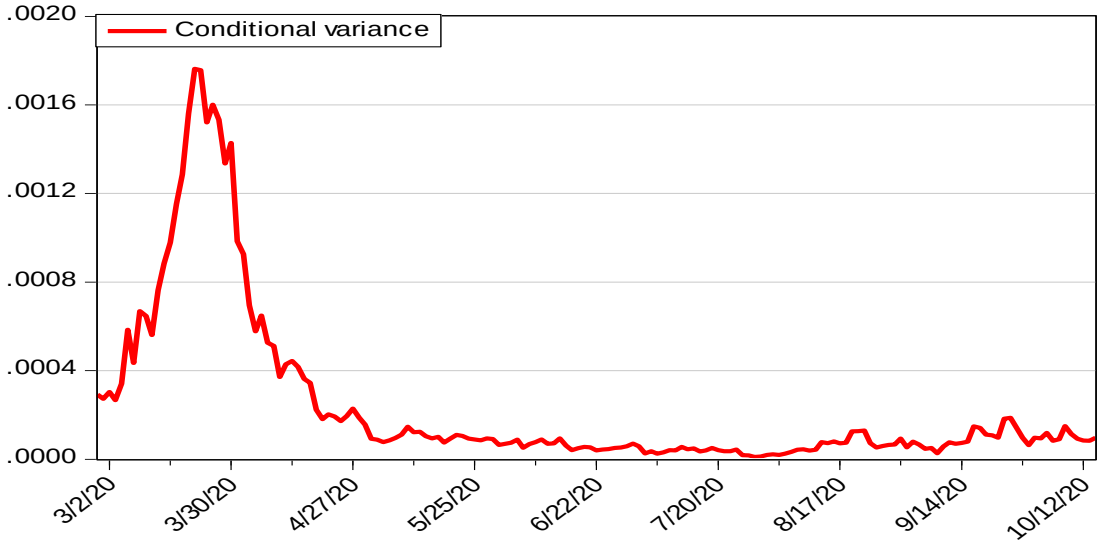

Figure 3: Conditional variance of stock market returns

The results of the multivariate EGARCH model reveal that negative innovations have a more significant effect compared to positive innovations of the same magnitude, as indicated by the estimated parameter $\gamma<0$. Furthermore, a deeper examination of γ shows that negative innovations have 1.3 times greater impact than positive innovations of the same size.

Additionally, the coefficient of the lag of GARCH (δ=0.977435) estimates the time it takes for a shock to reduce its original level by half-life (HL), which is approximately 30 days according to previous research (Fakhfekh et al., 2016). This means that shocks persist for a longer period tend to create less volatility in the conditional variance over time. This evidence is further supported by Figure 2, which illustrates the conditional variance of the error terms. In the initial period, the stock market shows higher volatility, but as time progresses, it becomes less volatile. These findings provide valuable insights into the dynamics of stock market volatility and how it is influenced by different types of innovations and shocks.

Understanding these patterns is crucial for investors and policymakers to manage market risks and make informed decisions in uncertain financial environments.

6. Conclusion

This study probes into the impact of fake news, panic news, and media hype on stock market returns during the COVID-19 pandemic in Pakistan. Using data from six news-related indicators collected from Ravenpack, the analysis spans from February 26, 2020, to October 26, 2020, covering 166 working days when the stock market was open. The results obtained through the Multivariate EGARCH model reveal that both fake news and media hype negatively affect stock market returns, with media hype having a stronger negative impact. However, an increase in media coverage across various sources is associated with higher returns. Interestingly, panic news did not lead to a decrease in stock returns, suggesting that it did not significantly influence investors' decision-making.

Furthermore, the study finds robust evidence of asymmetric effects on stock returns, indicating that bad news has a greater impact than good news on market volatility. These findings emphasize the importance of distinguishing between the effects of positive and negative news in understanding market behavior. The study concludes that having a centralized authority for announcing COVID-19-related news could help mitigate the consequences of fake news and media hype on stock market volatility. The National Command Operation Centre (NCOC) could play a crucial role in centralizing such announcements. Additionally, effective coordination between NCOC and the Information Ministry could enhance investors' confidence, reducing panic and stabilizing stock market returns during uncertain times. These insights have significant implications for policymakers and investors in managing market risks and ensuring a more stable financial environment in times of crisis.

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