Article

Global Investing Sentiment and Social Interaction During COVID Outbreak

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Abstract

The outbreak of COVID-19 was an extreme event that created panic among the people, disrupted normal functioning and adversely affected the economy. The stock market fell due to the uncertainty that ensued, and it continues to do so as new variants are being discovered. The study explores the impact of the outbreak of a new variant of COVID-19 on the stock market and analyses investor sentiment towards investing and global investing through sentiment analysis using QSR NVivo software. The results contribute to the extant literature that the investors' sentiment is positive towards global investing despite the adverse conditions. Investors need to choose those stocks that are internationally diversified with sound fundamentals. The study reveals that markets bounce after a significant cooling period, and investment managers should encourage the investors to hold their portfolios. The study also identifies the important themes and social networking of investors from India with the world through the NodeXL. The study identified major themes such as alerts, timing, investors and investing, which shows that the people mainly focus on stocks, its alert and timing for making investment decisions.

Keywords

Stock market crash, COVID-19 pandemic, sentiment analysis, social network analysis, thematic analysis

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Introduction

The COVID-19 outbreak, which originated in December 2019 in Wuhan (China), impacted the entire world severely, has infected more than 280 million people and caused 5.41 million deaths worldwide as of December 2021 (data from, as on 14 October 2021, https://COVID19.who.int/). It resulted in changes in policies and regulations for trade, governance for foreign trade and ultimate lockdown, leading to a mandatory closure of the economy. The continuous injection of pandemic-related news resulted in the stock market crash (Baig et al., 2021). A stock market crash is defined as a significant decrease in stock prices in a minimal time, which is extreme in the given condition (Huang et al., 2020). The sentiments have caused fear among the investors as social media plays a prominent role in disseminating information and decides the market's mood (Hatefi Ghahfarrokhi & Shamsfard, 2020).

Recent studies reveal that the fluctuations caused by the COVID-19 outbreak in the stock market, oil prices, cryptos and gold were evident and caused a disruption like never before (Bai et al., 2020; Huang et al., 2020; Salisu et al., 2020; Selmi et al., 2021). The world has faced several waves; however, India has witnessed two waves of COVID-19 already, and the outbreak of the new variant 'Omicron' has aroused apprehensions among Indians for a third wave and ensuing lockdown. The reaction of investors is visible in the stock market as well. These events provide a chance to learn about investor psychology and human behaviour. Individual investors seem to have started speculating on the stock market's movement on specific dates or on what others would anticipate on the market's attention on particular days, events and so on (Wagner, 2020). The fear of lockdown and stock market crash in history gripped the investors for the shortfall in prices once again. COVID-19 is a terrifying and novel threat that sparked a frenzy among investors. Fair economic assumptions underpinned individual company stock price fluctuations despite the volatility and panic. Consequently, investors developed a greater understanding of the nature of the challenge they were dealing with in these difficult times. To avert future adverse outcomes and amplification of the COVID-19 shock, broad efforts, including fiscal policy interventions, are needed, according to stock price reactions (Okorie & Lin, 2021).

Presently, social media platforms reflect people's opinion and public sentiment about current events (Pagolu et al., 2017). Microblogging websites such as Twitter and Facebook have become a valuable source for people's sentiments because of the ease of use and accessibility, as they use these platforms to express their views on current events (Pak & Paroubek, 2010). Twitter is considered one of the major social media networks for expressing opinions and disseminating information (Pak & Paroubek, 2010). The study aims to explore the impact of the outbreak of a new variant of COVID-19 on the stock market and analyse the significant themes of investor sentiment towards investing and global investing, considering the social networking of Indian investors with the world.

The following sections of the paper deal with the literature review and the research framework, followed by data analysis and discussion of results, conclusions, implications and future scope for research.

Literature Review

The COVID-19 pandemic caused a nationwide lockdown leading to economic and social disruption. There onwards, many variants of the virus were detected. Since people had already survived two waves, getting the news of a new variant, 'Omicron', a fear of third wave engulfed them. Stock markets across the globe saw a rapid decline, resulting in a crash. Many studies have been conducted to capture the effect of virus and lockdown over the stock market and on the economy (Alam et al., 2020), the spread of the virus and the contagion effect (Okorie & Lin, 2021), the impact of COVID-19 on oil prices, gold and other commodities (Salisu et al., 2020) and also on the stock market prediction (Salisu & Vo, 2020). Studies also try to compare COVID-19 with other pandemics (Bai et al., 2020) in terms of volatility in the stock market.

Stock market volatility is a random, dynamic and non-linear function which makes it very difficult to forecast, and mainly the studies are concerned with the quantitative methods primarily based on random walk theory or efficient market hypothesis (Huang & Liu, 2020). Forecasting and volatility have been captured through GARCH and ARIMA modelling (Almasarweh & Wadi, 2018; Gaire, 2017; Katoch & Sidhu, 2021; Mustapa & Ismail, 2019; Pandey & Bajpai, 2019; Sunarya, 2019; Susruth, 2017). Investing decisions are the result of news and the sentiment of people, which sets the mood for investing (Sun et al., 2020). Study of public sentiment has been an extended area of research, and various developments happened over time for predicting stock market movement (Anand et al., 2021; Goel & Mittal, 2012; Hatefi Ghahfarrokhi & Shamsfard, 2020; Sun et al., 2020; Zhang et al., 2021), effect of pandemic news over the stock market (Ahmed & Lugovic, 2019; Baig et al., 2021; Shaikh, 2021), and conducted over the other major topics such as policies of the government, for political parties, #Metoo movement, and new educational policy (Bai et al., 2020; Nguyen & Shirai, 2015; Schmidt et al., 2020; Sharma & Gupta, 2021). These social media platforms influence investment decisions and people's opinions during such pandemic, which creates a havoc in the market; hence sentiment analysis for this period becomes critical to evaluate and understand the gravity of the situation.

Thematic study is another critical approach for identifying, analysing, organising and reporting the significant themes, which helps understand the people's overall mood (Sharma & Gupta, 2021). Thematic study can assist with trustworthy and helpful insights (Nowell et al., 2017). Thematic studies were conducted to interview Twitter data (Jugder, 2016), which is used to identify themes during pandemics such as H1N1, SARs, COVID (Ahmed et al., 2019).

Social network analysis (SNA) is a research method that involves a pattern of human-to-human and group-to-group interactions, such as organisations and individuals. In general, SNA examines individual behaviour at the micro-level and relationship patterns and networks at the macro level, and interactions between the two (Ahmed & Lugovic, 2019). The SNA in investing exhibits similar feelings of one individual to another and shows the association (Bozkurt, 2020).

The analysis might be focused on differences in centrality, the exploration of closely connected clusters, structurally equivalent places in networks or unique positions, depending on what creates variations in opportunity structures. The large datasets of Twitter aid in forming connections among users is in a way shown in SNA, which aids in discovering and obtaining clusters of people with the same opinion.

Anand et al. (2021), in their study, show that investor sentiment has a significant influence over the stock market returns, and positive and negative views have a strong correlation for the stock price determination (Smailović et al., 2013). In their study, Thelwall and Thelwall (2020) show the thematic analysis for Twitter data to identify the major themes during the earlier period of COVID-19 for dissemination of information. The research focuses on examining investor sentiment towards investing and global investing during this period, based on existing literature that shows that social media sentiment information affects stock market movement, and that thematic analysis is used to identify the major themes of the tweets data. There has been no study done to the best of the researchers' knowledge on the relationship between global investment and sentiment analysis, theme analysis for tweets and SNA of Indian investors concerning the rest of the globe.

Objectives

Following are some of the research objectives:

1. Exploring the impact of the outbreak of the new variants of COVID-19 on the stock market.
2. Analysing the investor sentiment towards investing and global investing.
3. Identifying significant themes and social networking of Indian investors with the world.

Research Framework

The study first collects the data 'to explore the impact of the outbreak of the new variant of COVID-19 on stock exchange'. The information collected from www.yahoofinance.com, and the period of 24 November 2021–24 December 2021, is taken for the study, and significant stock exchanges across the world (India, USA, China, South Africa and Japan) have been considered.

To analyse the investor sentiment towards investing and global investing, the data was taken from Twitter threads using hashtags #investing and #globalinvesting. Tweets were collected with the help of NCapture, a Google Chrome extension of NVivo. The captured database is imported to the NVivo software through the supported format *.ncvx. Total 17,957 tweets were collected after applying the below filters through advanced search. Before sentiment analysis, text analysis was performed through word frequency analysis (WFA), which showcases the most frequent words in tweets. Cluster analysis was performed for major

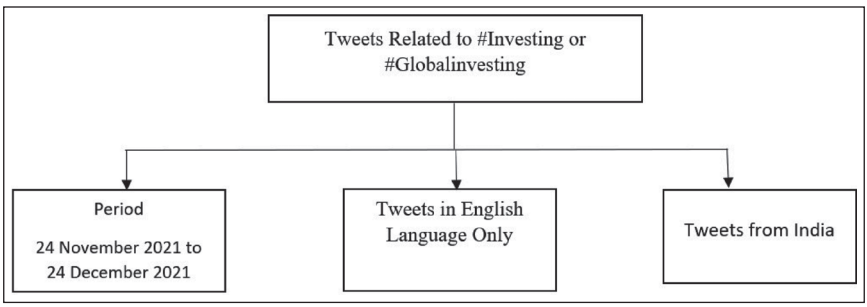

Figure 1. Steps for Filtering the Tweets

inter-related hashtags and forms a cluster show the importance of these hashtags. Sentiment analysis was performed through auto coding of the NVivo software. In this, the software looks for the person's opinion with the help of expressions in the tweets. To identify major themes of the study, automatic coding feature of NVivo has been used, which showcases/highlights major theme around which the tweets are coming.

NodeXL software works as an add-in for Microsoft Excel 2007 and provides an extendible toolkit for network overview, discovery and exploration. Microsoft Edge lists or pairs of vertices, also referred to as nodes, are used by NodeXL to depict a network. Each vertex represents one of the network's entities. Each edge or link that connects two vertices represents the relationship between them. A live or non-living entity can be a node. Ties are defined by the interactions, relationships or links between these nodes. Every network is essentially the sum of its nodes and the relationships that connect them (Bozkurt, 2020). This relationship may or may not have a direction. Some relationships are bi-directional, whereas others are one way (Hansen et al., 2011). For the social interaction mapping of Indian investors with the world, data is downloaded from Twitter using the same hashtags, that is, #inveting or #globalinvesting. This includes tweets all across the globe. Network analysis is performed with the help of the software NodeXL through which Indian investors interact with the world.

Data Analysis and Findings

Impact of Omicron Variant on Major Stock Markets

The Omicron variant of COVID was reported in South Africa in November 2021; the rest of the world has been waiting to see how the extensively mutated version affects case rates, hospitalisations and vaccination effectiveness. According to the WHO's weekly data issued on 7 December 2021, South Africa's COVID infection rate has surged, with 62,021 new cases recorded between 29 November and 5 December, up by 111% from the previous week. The detection of new variants

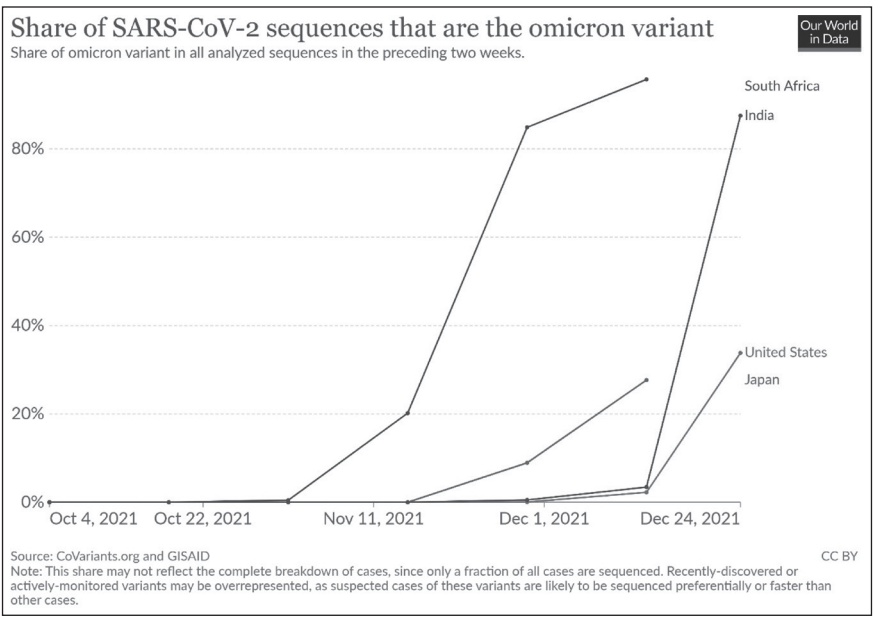

Figure 2. Omicron Variant Cases During October–December 2021

and the sudden surge in cases and hospitalisation rates created chaos among the investors. Within a few weeks after the first case was detected in South Africa, the variant seems to have spread widely throughout the world. Figure 2 presents increase in cases internationally due to the Omicron variant.

The effect of this variant was visible on the stock market as well because of the spreading rate. Major stock indices worldwide saw a sudden decline due to fear in the investors owing to their previous experiences. Figure 3 shows the decline of the primary index of China, India, the USA, Japan and South Africa. All the indices are falling due to the fear of lockdown and disbalance created by the detection of the new variant. Only the index of South Africa shows some upward trend because of the cooling period.

Figure 4 shows the return graph of these stock indices, representing the mixed return for the period and mainly showing the negative return for the definite period. In India, the significant decline is visible on 26 November 2021, 6 December 2021 and 20 December 2021 because of the first detection and rapid increase in Omicron cases.

Figure 5 shows the location from where the tweets have been posted. Figure 6 shows the cluster of the most frequently used hashtags during these tweets in the dataset. The core cluster is formed with the hashtags of the stock market, investing and other indices. The following significant collection is related to the cryptos investment, which shows that the investors consider the stock market as their first avenue and are inclined to invest in the crypto market.

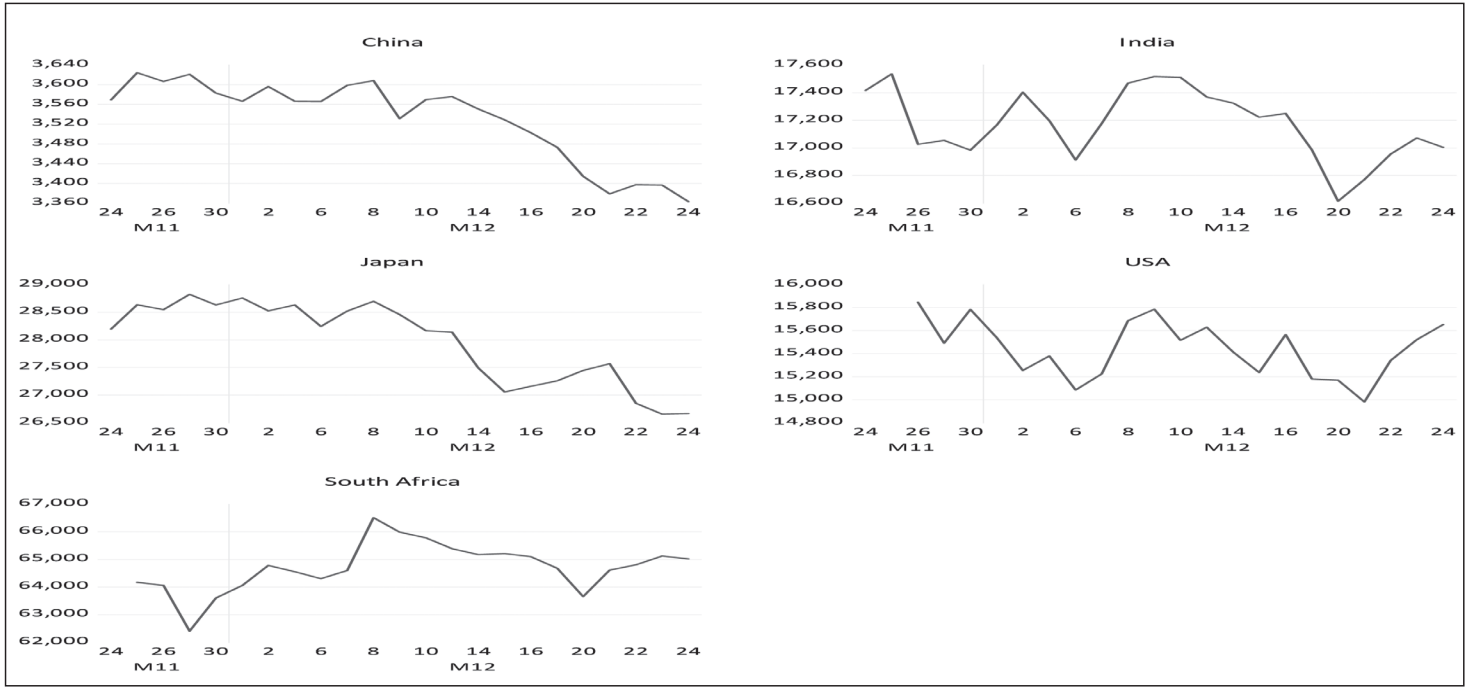

Figure 3. Stock Market Price Movement

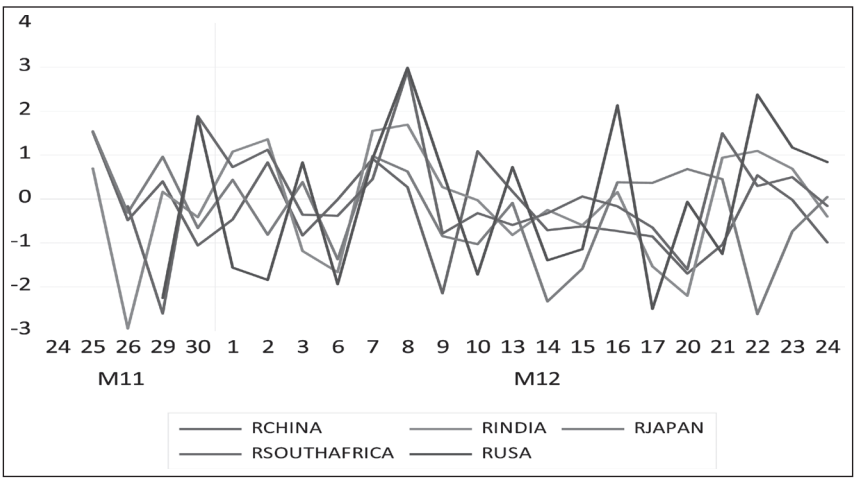

Figure 4. Performance of Stock Market

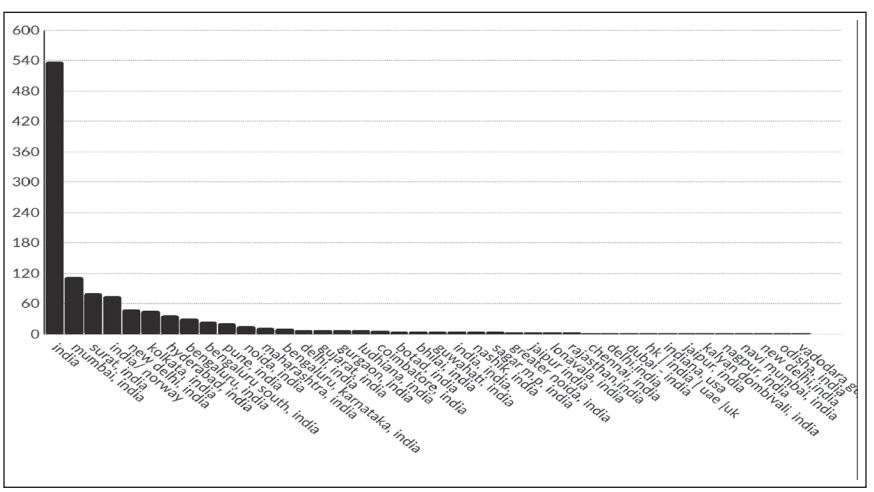

Figure 5. Tweets Posted from Different Locations of India

Textual Analysis

Word frequency analysis is performed through NVivo to check the dataset's most frequently used words. WFA gives the word cloud as an output in decreasing order of usage, which is depicted in Figure 7. For word cloud, 100 stemming words of a minimum of 5 letters were taken for the study.

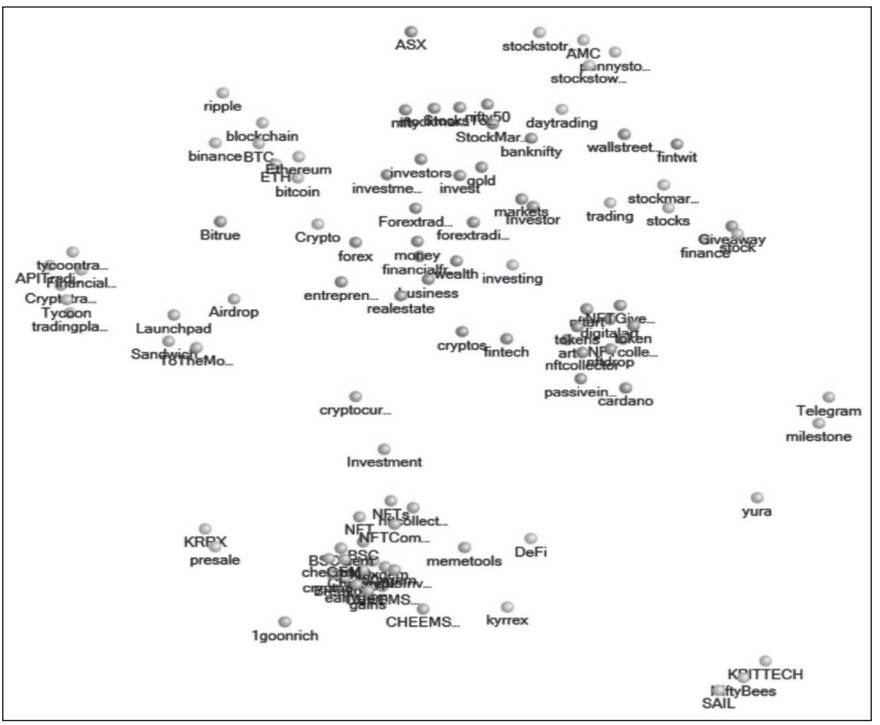

Figure 6. Most Frequently Used Words

Figure 7. Word Cloud

Sentiment Analysis

Sentiment Analysis is a field that aims to understand users' opinions through texts and categorise them as positive, negative or neutral sentiments. The majority of sentiment work has been done on review sites so far (Kamyab et al., 2018). Analysis of Twitter posts is the next important step in the field of sentiment analysis, as tweets provide a more prosperous and diverse repository of opinions and sentiments on topics ranging from the most recent phone they purchased to the most recent movie they watched, from political issues to religious beliefs, and the individual's state of mind towards investing. As a result, using Twitter as a corpus allows us to explore multiple dimensions and applications. Out of 6,804 data, 611 were very negative, 2,303 were moderately negative, 2,607 were relatively positive and 1,283 were very positive. Data that did not fall in the above category were considered neutral. Table 1 shows the percentage of these sentiments. The sentiment of 42.83% of the dataset was negative, and 57.17% was positive. This indicates that while the investors fear and negativity for selling the stock because of an outbreak, people's positive sentiment is stronger.

Table 1. Percentage of Sentiment from Sentiment Analysis

Percentage	Sentiment
8.98	Very negative
33.85	Moderately negative
38.31	Moderately positive
18.86	Very positive

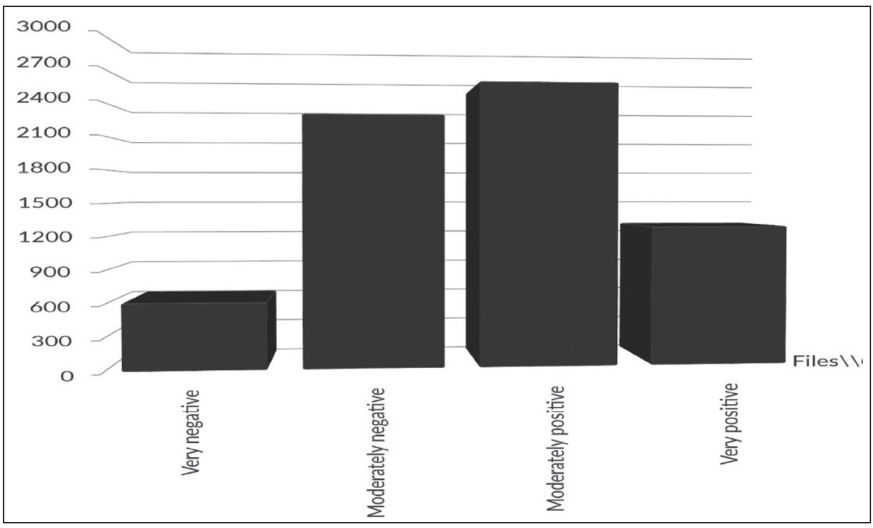

Figure 8. Summary of Results of Automatic Coding

Table 2. Excerpts from Tweets

References	Emotions
When you think you've bought the bottom, you see some profit and then your stop loss gets hit!	Very negative
Looking ominous into 2022.	Very negative
If you want high expected returns, you need to be patient and volatility tolerant.	Moderately negative
Don't get too emotional over something you can't control.	Moderately positive
My trade from Friday. 230% profit in less than 30 minutes.	Very positive

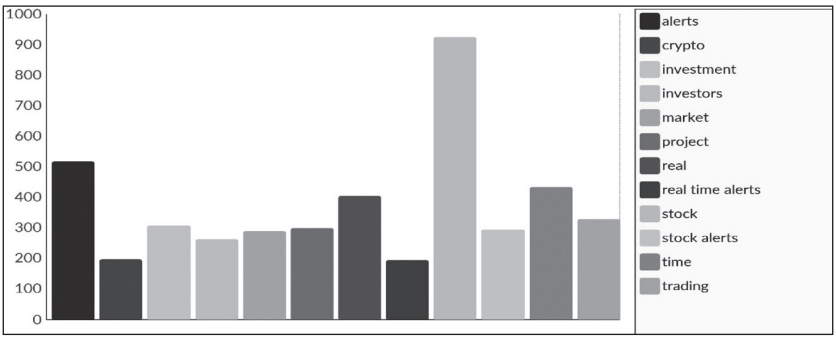

Figure 9. Analysis of the Major Themes of Tweets

Thematic Analysis

Thematic analysis of the employed data presents an effective method for diversifying and comparing the perspectives of the people employed in the Twitter posts. It highlights the parallel view and the differences among the users and reveals unexpected discoveries. Thematic analysis is really useful for summarising the large data into essential aspects. It pushes the researcher to organise the data properly, resulting in a clear and orderly final report (Ahmed et al., 2019; Jain & Singh, 2022). Figure 9 shows the major themes identified from the datasets. The themes related to stock and stock market are primarily followed by alerts and timings, which shows that the people mainly focus on stocks, its alert and timing for taking decisions related to investing.

Social Network Analysis

SNA is the scientific examination of social relationships between social actors who are either implicitly or overtly related. According to social network researchers, the world comprises entities (people, organisations, artefacts, nodes

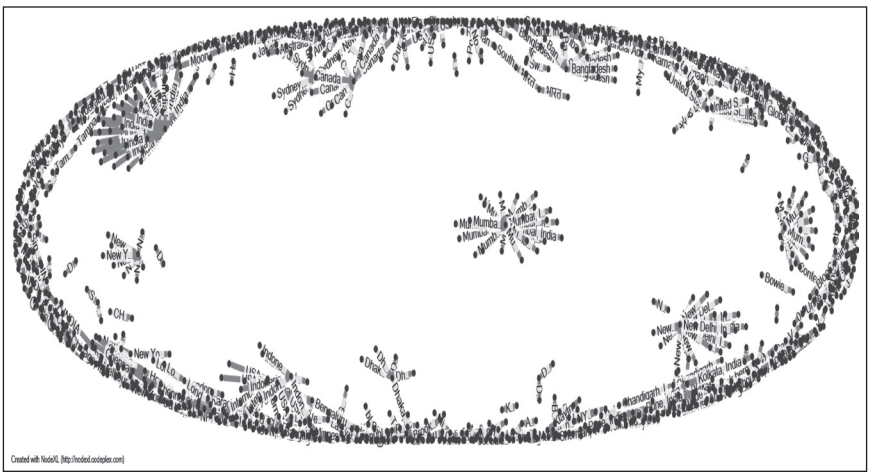

Figure 10. The Network Analysis of Tweets

and vertices) linked through relationships. In contrast to attribute data about individuals, SNA focuses on relational data about what happens between entities. Network analysts are interested in the patterns that emerge from large groups of connections. SNA is more about 'who you know' than 'what you know' or 'who you are' for individuals. In Figure 10, there are 11 clusters; the significant clusters are Mumbai, New Delhi, Canada and the United States. The dense outer portion of the cluster shows interaction, showing the same emotions between the countries.

Discussion

The study explores the impact of the outbreak of a new variant of COVID-19 on the stock market. The effect of the variant was significant on the stock market as well because of its spillover effect. Major stock indices worldwide see a sudden decline due to the fear among the investors, and it is evident that when the major crisis occurs, the stock market falls severely (Huang et al., 2020; Phan & Narayan, 2020); however, as it is seen in the cases of South African stock market, after the cooling period, the stock markets become stable and try to bounce back.

People's sentiment regarding global investing and social interaction within the network was further analysed. For this, the sentiment analysis using Twitter data was conducted to identify people's sentiment, and SNA was done to check the social interaction among the investors. It demonstrated that apart from the negative news and fall of stock markets, there was positive sentiment between the people, which aligns with the previous studies (Jain, 2021; Selmi et al., 2021; Srivastava et al., 2019). The study also identified some significant themes emerged from the thematic analysis of tweets, supporting the major themes during the outbreak related to stock and stock market are maximum followed by alerts and timing,

which shows that the people mainly focus on stocks, its alert and timing for taking decisions related to investing. Further, it was found that 11 clusters were formed among the people who share the common sentiments with the people across different geographies; the significant places identified in the study were Mumbai, New Delhi, Canada and the United States.

Implications of the Study

Investors' sentiment is one of the prominent factors in making investment decisions during the crisis period, and social media platforms, especially Twitter, direct people's moods. The study contributes to the existing portfolio theory as diversification provides an opportunity to investors for reducing losses and encourages the investors to hold the securities during the period, as the study demonstrates the positive sentiment during crises, implying that investors should avoid panicking during these times and instead strive to hold their portfolios. Investment advisors are also encouraged to help their clients to keep their nerves during a stock market collapse as the study shows that markets rebound back after a cooling period. During such a period, an institutional mechanism should be developed that should control the free float of tweets to avoid causing investors to panic about selling stocks.

Conclusions

The significant decline in index prices is visible across the major stock markets worldwide, and the volatility impact has been captured. All the indices included in the study showed declines, explaining the fear among the investors except the index of South Africa, where the first case of Omicron was found, which recovered, highlighting that after the cooling effect, the indexes will start bouncing back, which happened in the earlier period as well.

The results highlight that the investors show mixed sentiments (positive and negative) towards investing. Of the dataset, 42.83% was negative and 57.17% was positive, which shows that apart from the fall of the major indexes, the positive sentiment is positive of investors prevails out. The negative sentiment in people arose due to the fear of the third wave, lockdown 3.0 and many other factors. But the positive sentiment is more than the negative, which shows that the investors are preparing for this and hoping for the correction soon.

The study emphasises identifying the significant themes and social interaction of Indian investors with the world. The primary identified themes around the tweets are related to stock, and the stock market is primarily followed by alerts and timing, which shows that the people are mainly focusing on stocks, its alert and timing for taking decisions related to investing. The SNA revealed that the Indian investor's sentiment aligns with that of the world, forming connections with Canada, Australia, Bangladesh and the United States. In India, the primary identified clusters based on the findings of the study are Mumbai, Delhi, Tamil Naidu and Indore.

Suggestions for Future Research

The study is focused on investor sentiment and social interaction for which the qualitative data has been used. For future research, the mixed method approach using qualitative and quantitative data can be adopted to give a broader perspective of the global markets and investor's sentiment. It could be further expanded to predict the stock market volatility and spillover effect on the domestic market from the foreign market.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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