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Contemporary research on spillover effects of COVID-19 in stock markets. A systematic and bibliometric review.

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Abstract

Introduction

The spread of novel coronavirus (COVID-19) has significantly impacted the global financial markets over a relatively short period. The COVID pandemic's strong spillover effect on stock markets gained the attention of policymakers and academicians worldwide. The extant research has examined the influence of the COVID-19 pandemic on stock markets response in different contexts and yield mixed evidence. This research aims to synthesize the findings of the studies that have explored the impact of the COVID-19 pandemic on stock markets to identify the research progress and the research trends in this contemporary literature through a bibliometric and systematic review.

Methods

We have searched contemporary literature on spillover effects of COVID-19 on stock markets from Scopus databases. We have finalized 69 studies. We conducted the bibliometric analysis through bibliomatrix R package and systematic review by following PRISMA guidelines.

Findings

The most common keywords are COVID-19, coronavirus, pandemic, stock market, event study, stock market volatility, lockdowns, google trends. The finance research letter is the key journal in which 17 out of 69 papers have been published. Chinese researchers make the highest contributions with 17 publications out of 69. We have identified five research trends: 1) fear of COVID-19 enhanced stock market volatility and reduced efficiency; 2) COVID-19 events analysis; 3) Investors sentiments analysis based on google trends during COVID-19; 4) sector-wise impact of COVID-19 in stock markets; 5) consequences of government response strategies on stock markets.

Conclusion and implications

Our study highlights the research progress on the spillover effects of COVID-19 on stock markets. Few studies have focused on negative news biasness in the stock market during the crisis period precisely. Thus, we suggest upcoming studies contribute to this issue empirically. We have observed a lack of research on the post-pandemic effects of COVID-19 on stock markets. Therefore, we suggest that upcoming studies explore the post-pandemic strategies' effects on stock markets. Our research also suggests that policymakers and researchers design preventive strategies for stock markets to avoid the detrimental effects of future infectious diseases and pandemics. Finally, we recommend that

regulators must focus on small equity investors and small firms with high debt and working capital requirements in stimulus packages during the crisis period and provide awareness against panic selling and herding.

Keywords: COVID-19; Stock market; Bibliometric; Systematic review

1. Introduction

The spread of novel coronavirus (COVID-19) has significantly impacted the global financial markets over a relatively short span of time. The COVID-19 pandemic resulted in fragile stock markets and concluded that financial markets are greatly influenced by health crisis as no previous infectious diseases like H1N1, Ebola, polio virus and Zika virus has had such impact over stock markets [1].Specifically the stock markets around the world have responded to COVID-19 with strong negative returns and unprecedented volatility [2-5]. The COVID pandemic strong detrimental effect gained the attention of policy makers and academicians around the globe.

The aim of this research is to synthesize the findings of the studies that have explored the impact of COVID-19 pandemic on stock markets in order to identify the research progress and the research trends in this contemporary literature through bibliometric and systematic review. With this, there has been increased focus in analyzing the impact of COVID-19 on the stock market performance.

In order to investigate the literature on COVID-19 and stock market, we rely on bibliometric analysis to analyze 69 articles published during 2020, as published work on COVID-19 is of 2020 only. Current research attempt attempts to explore: (1) key research streams in the existing literature on COVID-19 and stock market. (2) Most influential aspects of current literature i.e., authors, countries, institutions, journals (3) future policy implications for policy makers. Through quantitative and qualitative literature review, we have identified five research clusters and have summarized key papers, research methodologies and data sources. Furthermore, key research areas, authors, institutions, countries and academic journals have also been identified.

Rest of the study as follows, section 2 presents the methods, section 3 provides the results of the study, and section 4 provides the discussion and concludes the study

2. Methods

We rely on bibliometric analytical approach to empirically analyze existing literature. Haddow [6] strongly advocated that bibliometric studies primarily rely on publication trend and citation analysis within the carefully selected scientific studies, where published research articles are the primary dataset. He further stated that bibliometric analysis identifies research domains' sub-fields, scientific terms and topics in a given field. Furthermore, citation, co-citation and author's networks are other analytical tools are also available during the data and research trend analysis.

To begin with, we used Web of Science to filter out recent publications [7]. For article selection, we used "COVID" and "stock market" in the search box: where Web of Science generated 128 research publications on November 28, 2020. To arrive at relevant sample size, we checked for duplicates; and kept the sample size as there were no duplicates in the selected studies. Next, we searched "COVID" in the title and abstract of the manuscripts. After second round, we kept the 160 research publications in 2020. In total 167 authors have contributed COVID-19 and Stock market publications in 39 research journals. These authors belong to 76 universities and research institutions from 17 countries.

Next, for bibliometric analysis we rely on VOSViewer software to investigate TITLE OF THE TOPIC; co-occurrence of key terms from title and abstract were analyzed, where each circle represents each terms and corresponding label. Furthermore, distance shown in graphical representations determines association between key terms, and number of

occurrences determine the circle dimension [8]. Lastly, considering abstracts and titles avoids unnecessary recurrence of terms in rest of the research publications; we selected co-authorship, citation analysis, and co-citation to determine the research trends [8]. Based on empirical methodology by van Eck and Waltman [8], every cluster generated by the VOSViewer is represented by a different color in graphical representations. Finally, despite only selecting 69 number of papers from 128 research publications, research approach by current study will be a useful addition towards quantitative analysis of existing literature review

3. Results

3.1. Influential Aspects of literature

3.1.1. Key journals distribution and networks

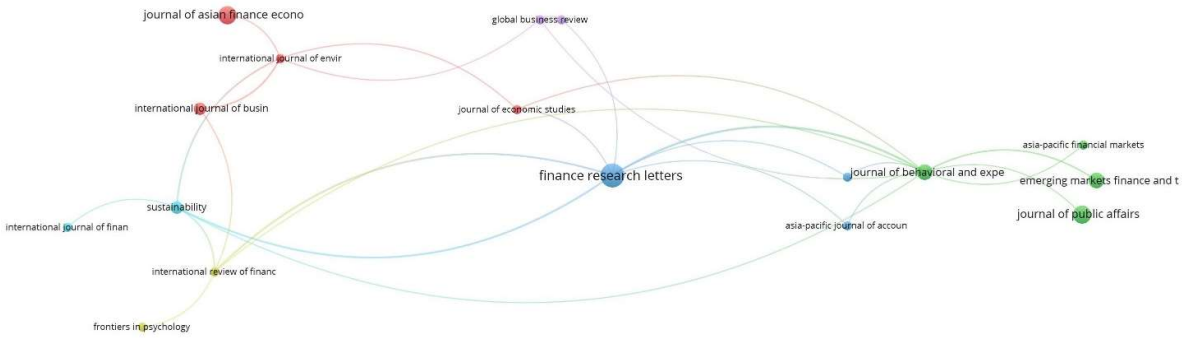

Figure 1. influential journals identified by VOS viewer software.

Journal distribution and networks are developed by BiblioShiny and VOSviewer to identify top journals on the topic based on following criterion. First criterion is the journal in which highest number of research papers published on the topic. Second criterion is the journals whose papers are mostly cited in the literature. As we can see from the fig 1 that most of the journals are purely from finance, economics, business and environment. It seems that this COVID and stock markets working during the pandemic is a phenomenon of behavioral science and psychology as well with finance and economics domain. Finance research letters is the most influential journal both in number of published papers on the topic and number of citations.

3.1.2. Influential authors, their countries of origin, institution affiliations, and networks

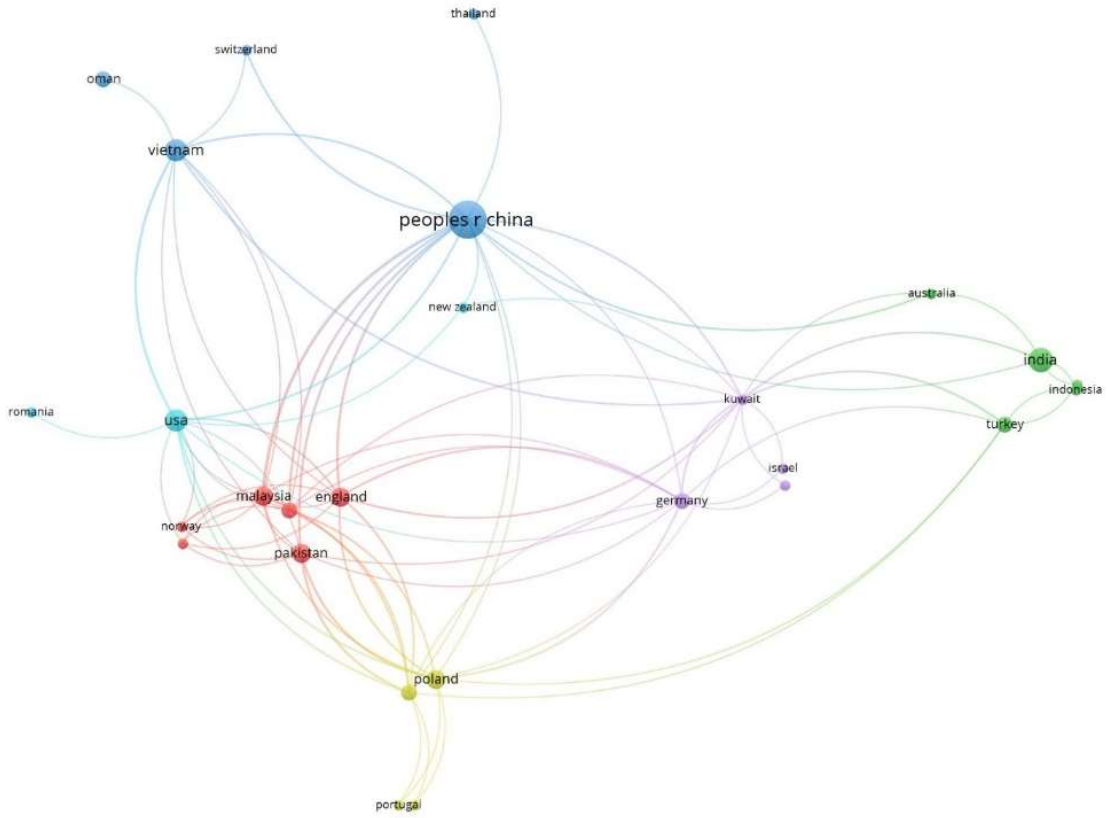

Figure 2. Citation network among author's countries of origin. The VOSviewer software is used create network.

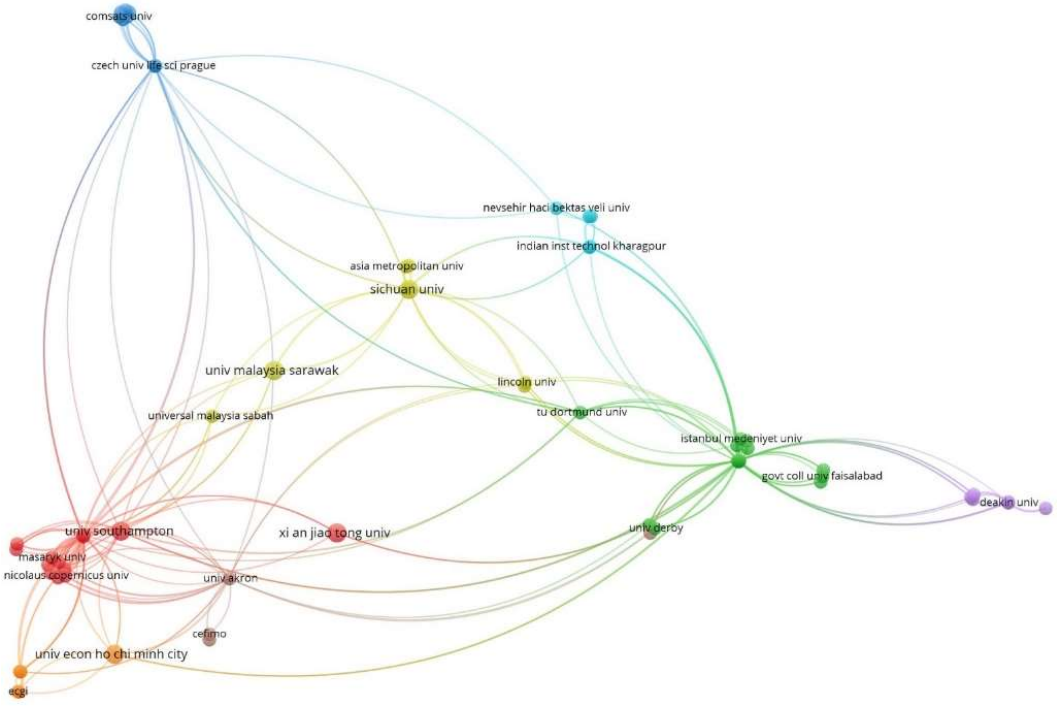

Figure 3. Citation network among author's institutional affiliations.

Authors are most integral part of this whole analysis. We used BiblioShiny and VOSviewer software to create networks among these authors on the basis of their country of origin and affiliation with their institutes and present these networks in fig 2 and Fig 3. Chinese authors are the most influential authors then Asian authors come in the list with European at third spot and American authors at the fourth spot in the list of influential authors. Same is the case with the sequence of influential author's institutions affiliations.

3.1.3. Keyword network: analysis for identifying research areas

Keyword network from figure 4 explains that COVID-19, returns, stock market, event study, overreaction, crisis, SARS, volatility and risk are words repeated a lot in the literature.

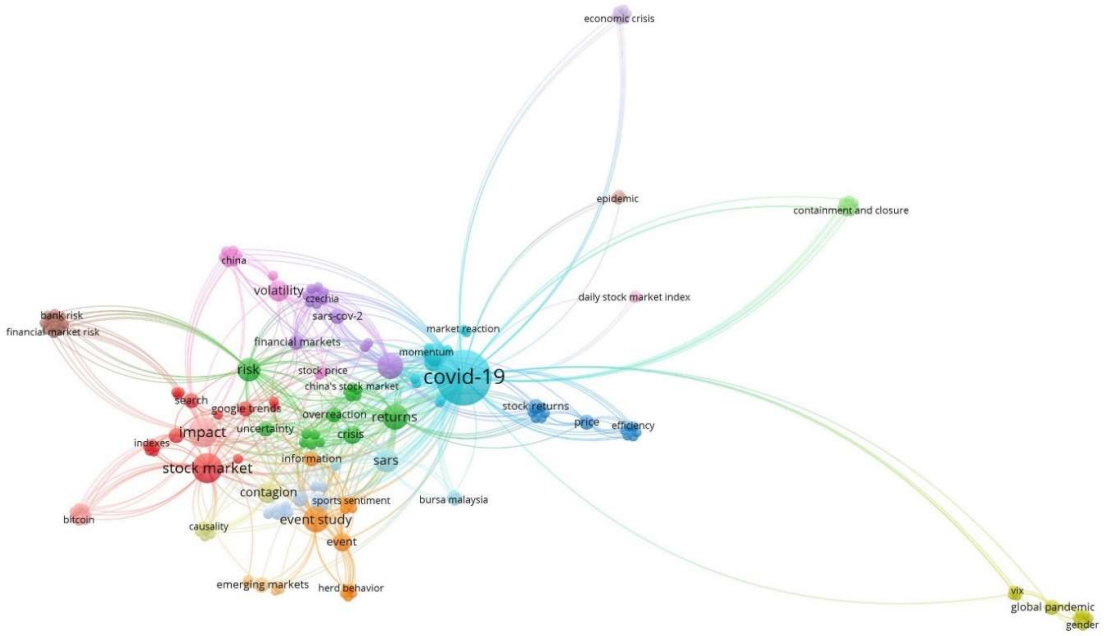

Figure 4. Keywords network analysis. The VOSviewer software is used create network.

3.2. Systematic review

The research trends in selected studies are identified through systematic review. Through close reading we have finalized the research trends based in similar research areas.

3.2.1. Fear of COVID-19 enhanced stock market volatility and reduced efficiency

Most prominent area in our selected studies (16/69 articles) is the influence of COVID-19 on stock market volatility. The nexus between stock market volatility and COVID-19 pandemic was explored using the following methods GARCH models (8 studies), Panel regression models (5 studies), Wavelet analysis (2 studies) and VECM (1 study). Thus, the most common method used is GARCH models. We have observed that these studies documented that COVID-19 pandemic enhanced stock market volatilities. The insights from highly cited studies are as follows. Sharif *et al.* [9], is the most cited study in this area (with 37 citations) that has examined the relationship between the spread of COVID-19 and stock market volatility considering the role of oil prices variations and economic uncertainty in the USA. Their findings indicate that COVID-19 has enhanced

economic uncertainty, with more volatile stock markets and the oil price slump magnified the negative impact of COVID-19 on US economy [9].

Lahmiri *et al.* [10] document that several markets such as crypto currency, energy and precious metals are not integrated to equity markets in pre-pandemic phase due to totally different dynamics of these markets, however, during COVID-19 volatilities of crypto currency and energy market with equity markets reached at its peak. Baek *et al.* [11] investigated the COVID-19's impact on 30 US industries to find out that negative news regarding COVID-19 has more impact on stock market in the USA as compared to positive news i.e., increase in deaths has double negative impact on stock market as compared to recoveries (negativity biased).

As volatilities in stock markets surged universally during COVID-19, David *et al.*[12] investigated the response of stock markets towards recent pandemics and suggest that stock markets recovered quickly from recent pandemics but in case of COVID-19, the recovery of stock markets is expected to be slow due to higher market volatility.

Zaremba *et al.* [13] is the second highly cited study (with 18 citations) which investigated the impact of policy response to COVID-19 pandemic and stock market volatility in 67 countries and documented that COVID-19 related restrictions enhanced volatilities in the financial markets, which further induced panic in all financial markets leading to stock markets crashes. Chiah *et al.* [14] argued about the perception of equity investors regarding stock markets during COVID-19 as casinos. Because of huge volatilities, risk levels surpassed aversion sentiment and trading in the specific situation become an alternative to gambling.

A section of recent academic research on emerging markets discussed impact of COVID-19 on stock markets liquidity indicates that the relationship between low numbers of coronavirus cases with high government intervention in emerging markets (those are not geographically connected with Asian emerging markets) resulted in high liquidity in emerging stock markets [15]. These results are consistent with previous studies like [16,17] and states that equity investors move to safer assets like gold and other metals during uncertain times resulted in reduced liquidity in stock markets while reduced number of coronavirus cases and deaths shows reduced uncertainty resulted in improved liquidity in the market. Same is the case with the Vietnam market where number of confirmed cases adversely affected stock returns and their volatilities [18]. Coronavirus spread adversely impacted stock markets in emerging markets and as the number of coronavirus cases increase in any emerging economy it resulted in stock market crash of that economy with huge volatility in the stock market of that economy [19]. Author suggest that stock returns will recover with the availability of vaccine and herd immunity.

Efficiency and herding in stock markets during COVID-19

In this portion of first cluster a part of literature focuses efficient market hypothesis and herding in stock markets which are spillover effect of volatility. Reflection of new available information into stocks prices of any stock market is the efficiency of that stock market and efficiency of financial markets are very important in long run and specifically during any crisis because market efficiency will let society for proper resource allocation and capital formation which is a key to economic development and crisis management [20]. WHO declared Public Health Emergency of International Concern (PHEIC) regarding COVID-19 on January 30, 2020 and a pandemic on 11 March. US stock markets response was too slow during PHEIC and pandemic announcement whereas it was totally rational that the virus having contagion nature, can affect US market as well because of no of large metropolitan cities and millions of travelers from all over the globe [21]. COVID-19 information was a public information and according to Fama [22] if stock market is efficient then all public information must reflect in prices of stocks which S&P 500, NYSE and NASDAQ did not reflect timely.

Chang [23] employ herding concept to verify efficiency of stock markets during COVID-19. Efficiency of stock market is based on investor's investment on the basis of fundamentals but when investors are following other investor's investment decisions then

fundamentals take back seat and Christie and Huang, [24] identified this psychological phenomenon as herding in stock market. Global financial crisis of 2007-2009 has made investors more vulnerable during any global crisis and in that situation investors show strong herding behaviour [23] which totally disturbed identification of mispriced securities by analysts who were following asset pricing theories and fundamental analysis. COVID-19 which was declared a pandemic by WHO has created panic in alternative energy investors from USA, Europe and Asia and they have shown strong herding during COVID-19 when oil prices were also at extreme low level.

At this point some propositions can be summarized from the cluster 1:

- COVID related restrictions created panic at national level in most of the countries influenced equity investors to quit quickly and move their finances to safe heaven like Gold resulted in huge volatilities in financial markets globally.
- Stock markets sensitivity is biased towards negative news, like growth in no of new cases as compared to positive news like growth in recoveries.
- Huge volatilities resulted in gigantic risk which attracted gamblers in equity markets because of appropriate appetite in developed nations.
- Emerging stock markets faced liquidity crunch during this crisis which vanished with government interventions and monitory policy relaxations.
- Investors vulnerability during COVID-19 resulted in herding behaviour verified in US and European stock markets concluded that stock markets in developed countries are also not efficient all the times.

3.2.2. COVID-19 events analysis

The second cluster is composed of 16 articles encompassing several issues pertaining to abnormal returns either negative or positive resulted in COVID-19. Papers combined in this cluster has taken COVID-19 and spillover steps like lock downs, travel bans, closure of public places as events and analyzed the response of stock markets with respect to different events. Events have integral role in stock market indexes movement in both directions all over the world.

The most cited paper (with 43 citations in such a short span of time) is by Ahundjanov *et al.* [25] which focuses on whether COVID-19 has any impact in Chinese stock markets and concluded that significant negative abnormal return were figured during the period of analysis and these abnormal returns are negatively related to growth in total confirmed cases and no of deaths caused by COVID-19. Liu *et al.* [26] analyze the role of COVID-19 in regional context and identified that COVID-19 has same significant negative impact on major stock markets but it was interesting to note that Asian stock markets respond quickly to this pandemic with more lethal impact and also recovered earlier. Schell *et al.* [27] has analyzed COVID-19 impact on stock markets in context of Public Health Emergency of International Concern (PHEIC) announcements by WHO and the consequent impact on stock markets in history from 2005 onward. WHO has declared Public Health Emergency of International Concern (PHEIC) six times: H1N1 in 2009, Ebola and polio virus in 2014, Zika virus in 2016, again Ebola in 2019 and then COVID-19 in 2020 after 2005 to get internationally coordinated response from member countries. Only Ebola (PHEIC) announcement in 2014 has impact like COVID-19 at announcement date and in the adjacent event windows because 11 indices exhibits significant negative abnormal returns at announcement date whereas other (PHEIC) announcements like H1N1 in 2009, polio virus in 2014, Zika virus in 2016, Ebola in 2019 were totally ignored by analysts and investors.

Few articles discuss the psychological impact of lockdowns and the resulted panic of investors on stock markets. The author also confirm that Conventional indexes performed better than sharia compliant indexes during COVID and no of deaths were less significant as compared to new daily no of cases in Malaysia. It was interesting to note that before movement control order all stock market indexes in Malysian economy abnormal returns

were significant and negative but these indexes turn to positive after movement control order as it seems that investors perceive MCO as governments commitment to contain Corona with stimulus package send positive signal to financial and corporate sector resulted in all index recoveries [28].

In this cluster a part of literature focuses on the Asian context with price movement of stocks on the basis of information diffusion hypothesis (IDH) and price pressure hypothesis (PPH). News with fundamental information results in permanent price change with no reversal according to IDH whereas PPH states that with new information temporary price movement occurs which ultimately revert back to security's fundamental value. Shen [29] concluded that price pressure hypothesis prevails in case of GO stock because of significant negative abnormal return at the event date (11 March 2020) with reversal pattern whereas there was no negative abnormal return found at event date in case of SAH stocks, while cumulative abnormal return continue to increase in adjacent days in Chinese's stock markets .

Visegard countries (Czechia, Hungary, Poland, and Slovakia) experienced currency depreciation with the growth of no of coronavirus cases first then stock exchange indexes downfall and increase in volatility of stock exchanges during COVID-19 [30]. Extensive media coverage to COVID-19 and movement control orders create panic at individual level resulted in the form of overreaction in short run followed price pressure hypothesis with recovery of stock markets ultimately [31].

Some propositions from cluster 2 can be drawn:

- COVID-19 initially ignored by stock markets and then markets overreacted after lock downs announced. Asian stock markets respond and recover quickly as compared to developed stock markets.
- COVID-19 and Ebola (PHEIC) announcement in 2019 and 2014 negatively affected stock markets, while other PHEICs have no effect on financial markets.
- Price pressure hypothesis prevails in case of GO stocks because of significant negative abnormal returns at event date (11 March) and revert back in coming weeks.
- COVID-19 resulted in currency depreciation and huge volatilities in stock markets globally but financial heat is felt in Asia first and then in developed economies.

3.2.3. Investor's sentiments analysis based on google trends during COVID-19

This cluster includes 10 articles that emphasize the role of COVID-19 on sentiments, measured through frequency of search terms on different search engines and quantification of the impact of these sentiments on stock index movement. Traditional researches has measured effects of unanticipated incidents on stock markets through intervention analysis [32] and event study [33]. Liu *et al.* [26] has measured market sentiments towards unexpected incidents through Google and Baidu search index and quantify the impact of these sentiments on stock prices of the affected industry. Search data on the internet is timely reflection of public perception which significantly project investor decision making.

The most cited study is Lyócsa *et al.* [34], which is motivated to gauge the fear of 'corona crash' on 10 largest stock markets consisting 80% market capitalization globally. Coronavirus fear has created panic at global level and the fear of Corona virus manifested in excess search volume at search engines and Google searches for coronavirus are not simply correlated: these searches predict variance in the future for every country mentioned above.

From 19 Feb 2020 to March 23, 2020 S&P 500 index lost 35% of its market capitalization. Magnitude of this loss in American history is comparable to 2008 American financial crisis, Black Monday 1987, and Great depression in 1929. McFall [35] identified such evaporation of wealth not only in America but in all countries were evident with dire financial and psychological consequences. Financial contagion were more rapid in stock markets of whole world when compared to pandemic nature of this virus as stock markets crashed

globally with in very short span of time [36]. Whereas Baumöhl *et al.* [37] acknowledged systematic risk in banking sector and spillover impact in other industries is denser in Corona pandemic as compared to 2008 financial crisis.

Few articles discussed technology adaptability as buffer for COVID-19 negative implication like Ding *et al.* [38] recognized that, firms with high digital transformation have shown resilience towards negative market sentiments in their stock prices whereas low digitalized firms are most affected from negative market sentiments [25]. Electronic, print and social media content is also another platform which educate people on issues and news on these platforms also affect risk perception of population at macro and investors at micro level [39]. Engelhardt *et al.* [40] claimed that rationality of investors has little contribution in tis overreaction as compared to higher news attention. US stock markets crash resulted in 3.5 trillion dollars loss whereas G8 countries also lost 200 billion dollars in stock market crashes due to COVID-19 news hype [40].

In this cluster a part of literature focuses on the relationship of reliability of coronavirus data and its impact on investor's sentiments. Fang and Peress [41] argued that fake news is not affecting stock market during bullish and bearish situations whereas wider media coverage of negative news has negative effect on stock market returns, specifically during bullish markets scenarios [42]. Erdem [43] stated that societies with high personal, civil and economic freedom have strong institutions with reliable statistics and are considered more-freer countries. Lee [44] identified daily news sentiment index and google trends as effective proxies for COVID-19 pandemic sentiments with varying level of correlations in different industries. Utility sector, financial, information technology and health care sectors are identified as uncorrelated sectors with the corona sentiments whereas communication, industrial, energy and material sectors have strong correlations with the sentiments and are most affected sectors during COVID-19. Lyocsa [45] claimed that coronavirus fear resulted in huge volatility which ultimately translated into strong negative shocks and large crashes in stock markets all over the world.

At this point some propositions can be summarized from the cluster 3:

- Excess search volume of COVID-19, at Google search is timely reflection of public perception of Corona fear which can project investor decision making.
- High digital transformation of firms proved to be the buffer against negative financial implications of COVID-19.
- More-freer countries have less impact of COVID-19 cases on stock market volatilities as compared to less-freer countries with same number of COVID cases and deaths.

3.2.4. Sector-wise impact of COVID-19 in stock markets

Fourth cluster is composed of 14 articles dealing with several sectors in economies linked in a more or less direct way to firm level impact of COVID-19 on stock markets. Papers selected in this cluster on the basis of commonality of COVID-19 impact at sectorial level in different stock markets.

The most cited study is He [46], which has applied event study, January 23 as event day and selected 160 trading days before the event date as the forecast period with every five trading days around the event occurrence date as the event window period. The author conclude that transportation and tourism, mining and electricity are adversely affected industries whereas high-tech manufacturing, software development, online education and health care are positively affected industries during pandemic.

Tourism industry is the most affected sector in all economies after corona pandemic and it all started after implementation of lockdowns at mass level across the globe. Prices of tourism industry stocks has become inelastic to world daily new corona cases as it seems that before commercial availability of coronavirus vaccine nothing may be normal again globally [47]. Air travel is an important segment of whole tourism supply chain (TSC) and this sector is worst performer in Australia, Canada, UK and US after declaration

by WHO on global pandemic outbreak at 11 March [48]. Petroleum, real estate, entertainment, and hospitality sectors from S&P 1500 has shown abnormal negative returns after COVID-19 as lockdowns in US and all over the world results in low consumption of oil with huge oil inventories, and low activity in entertainment and hospitality industries. Transport, hospitality, food and beverage are most affected areas at macro level in major economies with bear stock markets accompanied by huge volatilities in uncertain environment [50].

Singh [50] and Joshi [51] argued that Asian stock markets crashed due to Corona pandemic and significant negative abnormal returns were identified in Shanghai, Shenzhen and Nikkei and MSCI all country index. Mazur [52] agrees with He *et all.* [53] and argued that pharmaceutical manufacturing is focused by investors as pharmaceutical sector has strong role in disease alleviation with IT and software companies whereas developed markets r/epresentative indexes like S&P 1500 index also identified natural gas, food, healthcare, and software stocks with positive abnormal returns during pandemic and a new scenario of "work at home", online gaming and online shopping created opportunities for different software companies and health care stocks.

Few articles identified the most affected sectors of stock markets due to COVID-19. Liu *et al.* [54] and He *et al.* [53] argued that transportation, tourism, mining, and catering companies are biggest losers during pandemic in short and long run. Whereas financial sector is the most affected sector in Veitnam while overall stock market crashed with increase in number of coronavirus cases [18]. Chaudhary *et al.*[55] stated that Auto, Bankex, Consumer Durables, Capital Goods, Fast Moving Consumer Goods, Information Technology, and Realty have shown negative abnormal returns except health care sector during post-crisis period when compared to pre-crisis period [56].

Shehzad *et al.* [57] analyzed that COVID-19 has tested the health care system of developed world and health care is choked in most developed nations. Governments has to announce lockdowns when not able to manage disease at their territories resulted in stock market crashes even in US, Itlay, Spain France and UK. Major stock markets has officially labelled as bear markets because of severe impact on listed firms in all sectors of economies.

In this cluster, a part of literature focuses behavioral finance theories and validate psychological and behavioral disturbance by natural disasters at mass level. Investor's vulnerable sentiments reflects in securities earnings and price volatilities even COVID-19 has disturbed sentiments of investors in developed and rich nations. Lima *et al.* [58] argues that COVID-19 has varying effect on different industries with different degree of responsiveness. Stocks with lower institutional ownership have strongly overreacted movement control orders from respective governments [59]. Hoshi & Kashyap [60] connoted the change in rule of game regarding stock market during national or global crisis. Herding dominates whereas fundamentals and commonsense normally erode from the stock market which results in panic from investors behaviour and psychology during investment decisions but the logic of macroeconomic indicator's superiority over company fundamentals still persists in crisis time periods.

Some propositions emerged from the analysis of cluster 4:

- Tourism, transportation, petroleum, catering, auto, financial, consumer durables, electricity and mining are the most affected sectors respectively.
- Health care, pharmaceutical, online shopping, IT and online education sectors are not affected by COVID-19, infect performed better during COVID-19.
- Health disaster with contagion nature disturbed individual investors psychologically with vulnerable behavior resulted in panic selling and stock market crashes.

3.2.5. Consequences of government response strategies on stock markets

The cluster includes 9 articles that emphasize the role of stimulus package during corona crash of stock markets. Stimulus packages were the backup plans governments

announced at different stages of this pandemic. COVID-19 is the most surprised event till date in 21st century resulted in emergency actions by governments after first information came into knowledge of the world that it is a contagion disease and social distancing may be the very first proper response for this disease before any medicinal treatment and vaccination process. Social distancing is very costly in this globalized world and resulted in disturbance of supply chains, inflation, unemployment, sales reductions, lower earnings per share and ultimately lower or negative returns from companies. It all affected cash flows of companies without considering the size of firms resulted in majority red signs in stock markets which induces governments to jump in and announce some support in monitory terms. Governments have to announce stimulus packages for some backup so that business may survive and recover after lockdowns and social distancing.

The most cited paper (with 44 citations in such a short span of time) is by Goodell [61] which focuses policy steps taken by governments in response of this disease while stimulus package played integral role to support stock markets crashes. The author states that a contagion disease like COVID-19 can crash most of the stock markets all over the world, enhance budget deficits for governments irrespective of developed or developing economies, can disrupt supply chains globally without destroying physical infrastructure unlike in wars, earthquakes and floods and create huge uncertainty regarding future events globally. Governments have to jump in and must support through stimulus packages so, that investors may survive in the stock market. Whereas interestingly Phan [62] and Narayan [63] explained COVID-19 a case of learning from experience of other countries, the late it comes to any country the more information that country has for policy response and its implementation.

Few articles discuss that, social distancing, containment and health response with income support packages are the actions which different governments, whereas more awareness, testing and quarantine facilities and specifically the stimulus packages resulted in positive stock market returns [64]. Small firm's returns did not respond positively to stimulus package announced by Fed in US as compared to large firms [65]. Pakistan stock market initially dipped due to COVID-19 but after announcement of relief package by Government of Pakistan for industries and huge cut in interest rate by State Bank of Pakistan resulted in positive returns from Pakistan Stock Exchange [66]. Wagner [67] discussed the soft targets of COVID-19 in stock markets as Companies with high debts racked in their liability side of balance sheets and low cash in assets. These companies are the easiest prey of this health cum financial disaster irrespective of stimulus packages announced by governments all over the world.

- Some propositions from cluster 2 can be drawn:
- Stock markets take stimulus packages positively all over the world
- Small firms with high debts and low working capital have low financial shock absorption capacity and caught as prey of COVID-19

5. Discussion and conclusions

This study contributes to the academic literature by summarizing the contemporary research on impact of COVID-19 pandemic on stock markets. Our study provides the insights about the selected 69 studies from the influential aspects using bibliometric analysis which are as follows: the most common keywords are COVID-19, event study, coronavirus and stock markets. The most contributing journal and authors are Finance research letters and Aslam F, Ferreira P, and Narayan Pk respectively. We have identified five research trends: 1) fear of COVID-19 enhanced stock market volatility and reduced efficiency; 2) COVID-19 events analysis; 3) Investors sentiments analysis based on google trends during COVID-19; 4) sector-wise impact of COVID-19 in stock markets; 5) consequences of government response strategies on stock markets.

Our study highlights the research progress on the spillover effects of COVID-19 on stock markets. Few studies have focused on negative news biasness in the stock market

during the crisis period precisely. Thus, we suggest upcoming studies contribute to this issue empirically. We have observed a lack of research on the post-pandemic effects of COVID-19 on stock markets. Therefore, we suggest that upcoming studies explore the post-pandemic strategies' effects on stock markets. Our research also suggests that policymakers and researchers design preventive strategies for stock markets to avoid the detrimental effects of future infectious diseases and pandemics. Finally, we recommend that regulators must focus on small equity investors and small firms with high debt and working capital requirements in stimulus packages during the crisis period and provide awareness against panic selling and herding.

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