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COVID-19 and the Economy: Summary of research and future directions

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ABSTRACT

This article presents a literature review of the 81 articles accepted in the Finance Research Letters Special Issue titled “COVID-19 and the Economy”. The articles are classified into five broad areas (investments and asset pricing, the macroeconomy and banking, commodities, corporate finance, and other topics). We summarize the key findings of the articles by area and highlight the influence of the articles as measured by Google Scholar citations. We conclude by presenting directions for future research.

1. Introduction

The world has solemnly faced and realized the impact of COVID-19 on people’s lives and healthcare systems. The impact of the COVID crisis may have caused a more severe impact than the global financial crisis (Choi, 2020). Researchers predict that the recovery will be slow (De Backer et al., 2021). At the time of writing this article, the world was limping back to normal from variants such as Delta and Omicron. According to the John Hopkins COVID-19 Dashboard, as of March 6, 2022 there have been a total of 445,521,862 cases and 5997,344 deaths from the virus. The ultimate damage wreaked by known variants and variants yet to come is still unknown.

The COVID crisis has impacted all facets of the economy as shown by articles in this special issue. This is a virtual special issue (SI) and each article was also published in a volume as they were accepted, to get the research findings disseminated as soon as possible. In this article, we (the guest editors) summarize the key findings of the 81 articles that were accepted and categorize them into five broad areas: (1) Investments and Asset Pricing, (2) Macroeconomy and Banking, (3) Commodities, (4) Corporate Finance, and (5) Other Topics. We also include the Google Scholar citations to the articles to gain insights into the research impact and influence. As of March 1, 2022, the 81 articles in the special issue have received a total of 2079 citations, an average of 25.7 citations per article. These are excellent citations over such a short period.

We proceed as follows. In the next section, we provide an overview of the SI articles and present the top 10 articles and their influence as measured by citations. In the subsequent section, we summarize key findings in each of the five areas. In the last section, we conclude and suggest areas for future research.
2. Overview of research published in the special issue

Table 1 summarizes the number of articles in the SI by area, along with the Google Scholar citations and average citations per article. The citations are as of March 1, 2022. As shown, the most popular areas of research on COVID-19 fall in the areas of investments and asset pricing (39 articles; 1423 citations), followed by macroeconomy and banking (10 articles, 207 citations), commodities (7 articles, 135 citations), and corporate finance (7 articles, 76 citations). The most influential area, measured as average citations per article (36.5), is investments and asset pricing, followed by macroeconomy and banking (20.7), and commodities (19.3). Articles that were published the earliest in this SI such as in 2020, have had significantly more time to accumulate more citations, on average. Most articles are still receiving additional citations each month.

Table 2 lists the top 10 cited articles in the SI, ranked by Google Scholar citations. The most highly cited article is “The impact of COVID-19 on emerging stock markets” by Topeu and Gulal (2020) and it has received 326 citations. The next most highly cited article is “COVID-19 and stock market volatility: An industry level analysis” by Baek et al. (2020) with 186 citations. Seven of the top 10 articles are in the investments and asset pricing areas. The remaining three articles fall in three different areas: One article each in banking, macroeconomy, and other (behavioral finance). The top 10 articles have a total of 1168 citations (56.2% of total citations).

3. Summary of research findings by area

In this section, we summarize the research published in this SI by areas and highlight key findings Table 3. lists the articles and article highlights by area of research. Article highlights have been edited for some articles for brevity. Citations provided are based on Google Scholar citations as of March 1, 2022.

Not all articles fall neatly into a given topic area. For example, Omane-Adjepong and Alagidede (2021) investigate commodity safe havens for Africa’s stock markets. We choose to classify this article in the commodities area given the major contributions it makes analyzing Bitcoin, gold, and palladium as safe haven commodities. Furthermore, all article classifications are based on our best judgements.

3.1. Investments and asset pricing

The 39 articles published in the investments and asset pricing areas include studies of U.S. stock markets (9 articles), global stock markets (16 articles), bond markets (7 articles), and asset pricing (7 articles). Asset pricing areas include studies investigating market microstructure aspects, market information efficiency, and volatility/liquidity linkages. We highlight some of the main findings next.

During the earlier phases of the COVID-19 pandemic, most governments imposed lockdowns, restrictions on travel and business activity (Just and Echaust, 2020). The result of restrictions on business activity was catastrophic, which naturally results in adverse stock and bond market reactions (Maheu et al., 2021), and possible revision in market risk premiums (Aggarwal et al., 2021). Adverse market reactions are always associated with volatility spikes, and this crisis was not any different from past ones with increases in volatility (Baek et al., 2020; Vera-Valdes, 2022; Dima et al., 2021).

The pandemic did not affect all firms alike. Firms with better brand recognition, higher cash balances, higher market-to-book ratios, and strong corporate social responsibility scores were impacted less, and firms with high leverage were adversely affected (Huang et al., 2021b; Carter et al., 2022). Industries with low stock liquidity inter-connectedness and co-movement were safer investments during the crisis (Farzami et al., 2021), which also suggests that cross-market integration reduces the efficacy of hedging and exacerbates the effects of the crisis (Davdovic, 2021). Timely government intervention and assistance can mitigate some of the effects of adverse market reactions (Fendel et al., 2021; Chen and Yeh, 2021; Pham et al., 2021; Doruk et al., 2021). In addition to institutional intervention, investor sentiments and social networking impacted stock returns during the crisis period (Al Guindy, 2021; Pagano et al., 2021; Sun et al., 2021) Heo et al. (2021), and Ortmann et al. (2020) find that significantly altered investor behaviors could also have contributed to stock markets reactions during the crisis. Investor panic could have led to higher trading volumes (Chiah and Zhong, 2020) and higher Google search volumes (Lyo et al., 2020; Costola et al., 2021), which could in-turn be used as a useful predictive tool. Investors homed in on corporate fundamentals, causing money to flow away from portfolios that focused on the MSCI EAFE index towards portfolios that focused on ESG indices (Singh, 2020). This proves that investors focused on good governance and preferred firms with higher ESG scores, for example, clean energy firms (Diaz et al., 2021; Wan et al., 2021).

Table 1

Articles in the special issue classified by research areas along with Google Scholar citations.

This table summarizes the number of articles, Google Scholar citations (as of March 1, 2022), and average citations per paper, categorized by the five main research areas.

| Research Area               | Number of Articles | Google Scholar Citations | Average Citations per Article |
|-----------------------------|--------------------|--------------------------|------------------------------|
| Investments and Asset Pricing | 39                 | 1423                     | 36.5                         |
| Macroeconomy and Banking    | 10                 | 207                      | 20.7                         |
| Commodities                | 7                  | 135                      | 19.3                         |
| Corporate Finance          | 7                  | 76                       | 10.9                         |
| Other Topics                | 18                 | 238                      | 13.2                         |
| Total                       | 81                 | 2079                     | 25.7                         |
Table 2
Top 10 articles in the special issue ranked by Google Scholar citations.
This table listed the top 10 cited articles, along with the area of research and Google Scholar citations (as of March 1, 2022).

| Rank | Article Title                                                   | Author(s), Year (Volume) | Area                                      | Google Scholar Citations |
|------|----------------------------------------------------------------|--------------------------|-------------------------------------------|--------------------------|
| 1    | The impact of COVID-19 on emerging stock markets                | Topcu and Gulal (2020)   | Investments (global stock markets)        | 326                      |
| 2    | COVID-19 and stock market volatility: An industry level analysis| Baek et al. (2020)       | Asset Pricing                             | 186                      |
| 3    | Freedom and stock market performance during COVID-19 Outbreak   | Erdem (2020)             | Investments (global stock markets)        | 126                      |
| 4    | Systemic risk: The impact of COVID-19                          | Rizwan et al. (2020)     | Banking                                   | 103                      |
| 5    | Fear of the coronavirus and the stock markets                  | Lyuorsa et al. (2020)    | Investments (global stock markets)        | 102                      |
| 6    | COVID-19 and investor behavior                                 | Ortmann et al. (2020)    | Other (behavioral finance)                | 77                       |
| 7    | Stock return and the COVID-19 pandemic: Evidence from Canada and the U. S. | Xu (2021)                | Investments (global stock markets)        | 66                       |
| 8    | Trust and stock market volatility during the COVID-19 crisis    | Engelhardt et al. (2021) | Investments (global stock markets)        | 63                       |
| 9    | Stock market returns, volatility, correlation and liquidity during the COVID-19 crisis: Evidence from the Markov switching approach | Just and Exadoust (2020) | Investments (U.S. stock markets)          | 61                       |
| 10   | Industry volatility and economic uncertainty due to the COVID-19 pandemic: Evidence from wavelet coherence analysis | Choi (2020)              | Macroeconomy                              | 58                       |

Initial reactions in the global financial markets to the pandemic were negative but there was asymmetry in many parts of the world. Many moderating factors such as government interventions, deathrate, and market development, trust, and freedom (Erdem, 2020; Chiah and Zhong, 2020; Engelhardt et al., 2021) affected the magnitude of the negative returns. Research poured in from many parts of the world Szczypieński et al. (2021), find that Asian markets were more resilient as volatility quickly dissipated. Using exchange rates, oil prices, and COVID-19 infections Topcu and Gulal (2020) find that Asian stock markets were affected more severely than other markets.

Using data from 76 countries and the novel Barro Misery Index (BMI) as a proxy for healthcare pandemics, Sergi et al. (2021) find that increased healthcare risks adversely affected stock returns and increased volatility. They also corroborate the asymmetric nature of the stock market reactions by finding that emerging markets suffered more than developed markets. Using data from Canada and the U.S., Xu (2021) finds that the stock market reactions were asymmetric to the rise and fall in the number of COVID-19 cases. Countries in the Gulf Cooperation Council (GCC) are highly exposed to the price of oil. During the COVID crisis, Brent crude oil dropped from $62 to about $25 per barrel Al Refai (2022), find that GCC countries were able to manage any revenue shortfalls due to the drop in oil prices and emphasized the diversification of revenue sources. Scherf et al. (2022) used data from OECD and BRICS countries and find the markets underwent episodes of over and under reactions, which was directly related to the imposition of lockdown restrictions.

In reviewing the articles, we find that researchers routinely combined data based on geographic proximity. The co-movement and inter-connectedness effects addressed earlier for different industries were also prevalent in the global inter-country stock market performances Anselmi et al. (2022). uses data from 14 European countries and finds that market fragmentation decreases and that traders banded together to concentrate their order flows for stocks experiencing high volatility. Traders also tend to flock to highly transparent stocks to avoid trading with informed investors. Similarly, Bissoondoyal-Bheenick et al. (2021) find that stock return and volatility connectedness increased during the COVID-19 crisis. However, they find that co-movement is less in countries that were exposed to 2003 SARS crisis Karamti and Belhassine, 2022, also corroborate the finding of co-movement during the first and second waves of the pandemic, and they also confirm spillover effects from mature markets such as the U.S. to other countries (Liu et al., 2021b; Huynh et al., 2022) Banerjee (2021), finds evidence of financial contagion in most emerging markets and developed markets that do business with China. Loss of industry level heterogeneity and rise of industry level risk contagion was prevalent during the pandemic (Li et al., 2021). If co-movements and interconnectedness effects are stronger during pandemics, then diversification into other asset classes (Omane-Adjepong and Alagidede, 2021) may not provide any cushion from market downturns.

Investors find safe havens in the bond markets when crises roll stock markets Zaremba et al. (2022), find that term spreads of sovereign bond yields widened as the crisis continued to grow. As in the stock market, the impact on the bond markets was also not one directional. Emerging market bonds issued by the financial sector were more resilient to the shocks than their corporate and sovereign counterparts (Gubareva, 2021). Using emerging market sovereign bonds, Janus (2021) finds that investors discriminate emerging market sovereign bonds by gross domestic product (GDP) fundamentals, and sensitivity of bond yields to volatility index (VIX). In the Euro zone, Fendel et al. (2021) find that yields of bonds issued by stable countries declined and the yields of unstable countries increased, due to the fact that stable countries are expected to shoulder most of the load for monetary and fiscal stimuli. Green bond issuers with superior governance quality and lower information issued a faster recovery in their bond performances than other competitors (Yi et al., 2021) Yarovaya et al. (2021), find that Islamic bonds offered safe havens in the bond markets and that spillovers effects between conventional and Islamic bond markets became intense during the pandemic. In the corporate bond markets, Arnold and Rhodes (2021) find that bond investors discriminate based on operating fundamentals such as operating leverage.
Table 3: Highlights of articles in the special issue classified by area of research.

This table lists the articles and article highlights in the special issue classified by area of research. Article highlights are edited to fit in the table. Google Scholar citations are as of March 1, 2022.

| Article Title | Authors (Year) | Article Highlights (Citations) |
|---------------|----------------|-------------------------------|
| **Investments and Asset Pricing (39 articles)** | | |
| COVID-19 and stock market volatility: An industry level analysis | Baek et al. (2020) | * Authors analyze effects of COVID-19 on U.S. stock market volatility at the industry level. * Petroleum and natural gas, restaurants, hotels and lodgings industries exhibit large increases in risk. * Machine learning feature selection methods used to identify influential economic indicators. * Changes in volatility found to be more sensitive to COVID-19 news than economic indicators. (184) |
| The role of the IDEMV in predicting European stock market volatility during the COVID-19 pandemic | Li et al. (2020) | * Predictive power of IDEMV and VIX for the European stock indices volatilities during the COVID-19 pandemic is investigated. * IDEMV has stronger predictive power for the France and UK stock markets volatilities during the COVID-19 pandemic. * VIX has superior predictive ability for three European stock markets during the COVID-19 pandemic. (29) |
| From pandemic to financial contagion: High-frequency risk metrics and Bayesian volatility analysis | Davidovic (2021) | * Stock markets were sensitive to the initial crisis wave, but less volatile afterwards due to heavy government interventions. * Cryptocurrency market exhibits a prolonged period of instability. * The markets became increasingly procyclical and cross-integrated, which makes financial contagion more likely to occur. * The imminent crisis requires a carefully designed macroprudential and regulatory agenda to deal with the pandemic-induced market disturbances. (3) |
| COVID-19 and the liquidity network | Farzami et al. (2021) | * Liquidity is significantly and unevenly interconnected between US industry groups. * COVID-19 has led to increased connectivity. * The utilities industry group is affected the most. (4) |
| The examination of Fama-French model during the COVID-19 | Horváth and Wang (2021) | * Examine the R2 of a Fama-French five-factor model and represent a robustness test using GMM in the selected crises including COVID-19. * The R2 of growth portfolios decreases rapidly during the Financial crisis of 2008. * The COVID-19 outbreak has led to a substantial drop in the R2 during this event. * All of the beta model parameters are insignificant in the GMM model. (18) |
| Bull and bear markets during the COVID-19 Pandemic | Maheu et al. (2021) | * The authors identify and date bull and bear markets including bull corrections and bear rallies during the COVID-19 pandemic. * The state-specific distributions provide useful information - for example, risk assessments associated with different states. * Model forecasts that use that information outperform a buy and hold strategy during the pandemic, both in terms of returns and Sharpe ratios. (1) |
| The persistence of financial volatility after COVID-19 | Vera-Valdes (2022) | * Financial volatility measures increased in persistence following COVID-19. * Tests for change of persistence reject the null of no change. * Most volatility measures became nonstationary after the emergence of COVID-19. * Results suggest that the pandemic affects the financial sector even in the long run. (8) |
| Stock market returns, volatility, correlation and liquidity during the COVID-19 Crisis: Evidence from the Markov switching approach | Just and Echaust (2020) | * First work which focuses on three indicators of the financial market during the COVID-19 crisis. * Detect a structural break in the relationship between stock returns. * Italy is recognized as the only one country transmitting fears from the data of COVID-19 cases to global fear gauges related to volatility and correlation. * Stock market illiquidity does not depend on any COVID-19 official announcements of cases and deaths. (61) |
| Trading from home: The impact of COVID-19 on trading volume around the world | Chiah and Zhong (2020) | * Study examines the impact of COVID-19 on trading volume in stock markets around the world. * A large spike in trading volume is found in 37 international equity markets. * The surge in trading volume is related to the national culture and institutional environment of individual countries. * The intensity of trading is also associated with gambling opportunities of individual countries. (53) |
| Freedom and stock market performance during COVID-19 outbreak | Erdem (2020) | * The number of COVID-19 pandemic cases per million has significant negative effects on global financial markets. * The adverse effects of the coronavirus on the stock markets are less in freer countries. * For every increase in the growth of number of COVID-19 cases per million, the stock market (continued on next page)
| Article Title | Authors (Year) | Article Highlights (Citations) |
|---------------|---------------|--------------------------------|
| Fear of the coronavirus and the stock markets | Lyócsa et al. (2020) | Returns in freer countries are associated with less return decreases. * Growth of the number of COVID-19 cases per million increases the volatility in less-free countries. (126) |
| COVID-19 and safer investment bets | Singh (2020) | * Study examines the return spillover effects across the three different long-short portfolio indices during pandemic. * Investors become more attentive to corporate fundamentals – causing capital flowing away from the defensive and EAFE portfolios to the ESG portfolio during crisis periods. * Investors find refuge in the ESG approach. * Partly explains why the ESG approach outperforms during an uncertain environment. (41) |
| The impact of COVID-19 on emerging stock markets | Topcu and Gulal (2020) | Impact of COVID-19 on emerging stock markets is examined. * The negative impact has gradually fallen and begun to taper off by mid-April. * The highest impact is in Asian and the lowest in European emerging markets. * Response time and the size of stimulus package matter. (324) |
| Information sensitivity of corporate bonds: Evidence from the COVID-19 crisis | Arnold and Rhodes (2021) | * Explore changes in corporate bond sensitivity to firm operating leverage throughout the COVID-19 crisis. * Operating leverage measures firm exhibit to adjust operating inputs given a change in sales. * Investors appear to reassess firm risk using operating leverage information. * Announcements of Fed interventions in corporate debt markets seem to mitigate bond sensitivity to operating leverage information. (5) |
| Reactions of Euro area government yields to COVID-19 related policy measure announcements by the European Commission and the European Central Bank | Fendel et al. (2021) | * Article evaluates the impact of announcements of COVID-19 related monetary and fiscal policy measures by the European Central Bank and the European Commission. * Find announcements predominantly affect the government bond yields of more solvent countries. * Conclude that the investors are primarily concerned about the future fiscal burden that has to be shouldered by those solvent countries within the Euro area. (9) |
| The Impact of COVID-19 on liquidity of emerging market bonds | Gubareva (2021) | * Author studies impacts of the COVID-19 panic on liquidity of emerging market (EM) bonds. * Analyze the bid/offer spread dynamics for investment grade and high yield debt. * Find that the bottom of liquidity crisis was reached in the second half of March. * The pre-crisis levels have not been yet reached. * EM financials are more resilient to liquidity shocks than corporates and sovereigns. * Post-Covid credit spreads recover rather slowly because of default risk repricing. |
| The COVID-19 shock and long-term interest rates in emerging market economies | Janus (2021) | * The impact of COVID-19 on sovereign bonds in emerging economies was divergent. * Low pre-crisis GDP growth led to a stronger reaction in long-term interest rates. * Cross-country differences also stem from past sensitivity of yields to global factors. * Growth fundamentals and market differentiation by international investors matter. (13) |
| Economic uncertainty: A key factor to understanding idiosyncratic volatility puzzle | Z.F. Li, et al. (2021) | * Idiosyncratic volatility carries information related to economic uncertainty. * Uncertainty-averse trading contributes to the idiosyncratic volatility puzzle. * Return spreads between stocks with high idiosyncratic volatility and those with low idiosyncratic volatility are negatively related to the change of economic uncertainty. * No robust and significant idiosyncratic volatility puzzle exists after controlling for stock exposure to economic uncertainty. (2) |
| The impacts of the COVID-19 pandemic on China’s green bond market | Yi et al. (2021) | * Impacts of COVID-19 on China’s green bond market investigated. * COVID-19 has significant impacts on the market and increases the cumulative abnormal return (CAR). * The extent of negative impacts depends on issuers’ governance capacity (emp), information asymmetry (InfoAsym) and debt-paying ability (debt-paying). * The impacts of emp, InfoAsym and debt-paying on the CAR are heterogeneous. (16) |
| Global financial crisis and COVID-19: Industrial reactions | Chen and Yeh (2021) | (continued on next page) |
| Article Title | Authors (Year) | Article Highlights (Citations) |
|---------------|----------------|--------------------------------|
| Brand equity and the COVID-19 stock market crash: Evidence from U.S. listed firms | Huang et al. (2021) | * Most industries suffered from both the global financial crisis of 2008 and the COVID-19 pandemic. * The stock performance of most industries recovered following quantitative easing. * Quantitative easing is effective in boosting investor confidence. (29) |
| COVID-19: Fear of pandemic and short-term IPO performance | Mazumder and Saha (2021) | * Fear of pandemic can explain the initial IPO returns. * The association is stronger when considering the propensity score-matched adjusted returns. * Analysis of post-IPO date performance suggests that the performance of IPO firms are more sensitive to the fear of pandemic than that of existing firms. (18) |
| How did retail investors respond to the COVID-19 pandemic? The effect of Robinhood brokerage customers on market quality | Pagano et al. (2021) | * Using data from Robinhood user activity, authors document that these retail investors are actively engaged in both momentum and contrarian trading strategies. * Find that retail investors reduced momentum trading and increased contrarian trading activity during the initial phase of the COVID-19 crisis. * Also find that the impact of Robinhood investors on several measures of market quality varied depending on market conditions. (24) |
| State-level COVID-19 outbreak and stock returns | Pham et al. (2021) | * Authors use state-level data to evaluate the relation between outbreaks of COVID-19 and stock returns. * Daily increases in the number of infected cases, hospitalized cases, and deaths are negatively associated with next day stock returns of firms headquartered in the same state. * The association is less pronounced among states with high levels of medical resources and states that are likely to get support from the federal government. (3) |
| What caused global stock market meltdown during the COVID pandemic - Lockdown stringency or investor panic? | Aggarwal et al. (2021) | * Different effects of COVID-19 on the stock markets are identified. Stock market return is partitioned into returns from two different channels; returns due to expected growth and returns due to updation of market risk premium. * Panic is found to impact the stock market returns through the market risk premium updation channel. * Lockdown stringency is found to have a two-way effect on stock market returns. (23) |
| Learning from SARS: Return and volatility connectedness in COVID-19 | Bissoondoyal-Bheenick et al. (2021) | * Authors examine the impact of COVID-19 on stock return and volatility connectedness. * Assess if connectedness measures behave differently for countries with SARS 2003 experience. * Both stock return and volatility connectedness increase across the phases of the COVID-19. * Both connectedness is more pronounced as the severity of the pandemic builds up. * The degree of connectedness is lower in countries with SARS 2003 death experience. (21) |
| Google search volumes and the financial markets during the COVID-19 outbreak | Costola et al. (2021) | * Authors measure public concern during the COVID outbreak with Google Trends (GT-COVID-19). * They consider the six most impacted countries, as of May 1 2020. * The GT-COVID-19 indexes are related to the financial markets returns. * The Italian GT-COVID-19 is a key explanatory variable in all the considered markets. * The greatest impacts on the markets are synchronized with the Italian lockdowns. (16) |
| Trust and stock market volatility during the COVID-19 crisis | Engelhardt et al. (2021) | * The increasing number of COVID-19 case announcements led to higher volatility on global financial markets. * Stock markets’ volatility in reaction to case announcements is significantly lower in high-trust countries. * Both societal trust and trust in the country’s government are associated with lower market volatility. (63) |
| Do stock markets love misery? Evidence from the COVID-19 | Sergi et al. (2021) | * Barro Misery Index (BMI) adversely affects stock returns and increase market volatility. * BMI and cases of COVID-19 adversely affect stock returns and increases volatility. * Real GDP, unemployment, and interest rate drive the BMI -in (continued on next page)
Table 3 (continued)

| Article Title                                                                 | Authors (Year)                              | Article Highlights (Citations)                                                                 |
|------------------------------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------|
| The only certainty is uncertainty: An analysis of the impact of COVID-19 uncertainty on regional stock markets | Szczysielski et al. (2021)                  | * Authors investigate the impact of COVID-19 related uncertainty on regional index returns and volatility. Google Trends search data is used as a proxy for COVID-19 related uncertainty. * All regions are negatively impacted by COVID-19 related uncertainty. * Asian markets are more resilient than others. * Volatility in several regions initially increased but dissipated as the crisis has evolved. (27) |
| Stock Return and the COVID-19 pandemic: Evidence from Canada and the U.S.     | Xu (2021)                                   | * Daily data is used to study the stock market’s dynamic responses to COVID-19 shock for Canada and the US. * COVID-19 uncertainty adversely affects the stock markets. * The stock market responses are asymmetric in the increase and decrease in the cases in Canada. (66) |
| Term spreads and the COVID-19 Pandemic: Evidence from international sovereign bond markets | Zaremba et al. (2022)                       | * Authors explore the relationship between COVID-19 and sovereign term spreads in global markets. * The evolution of the pandemic significantly affects sovereign bond markets. * Growth in the number of confirmed cases increases the government term spreads. * Effect is independent of government policy and monetary responses to COVID-19. (25) |
| Fear and hope in financial social networks: Evidence from COVID-19.           | Al Guindy (2021)                            | * Using 45 million financial tweets about all firms listed in the major US exchanges, author studies the diffusion of COVID-19 news on social media. * An increased intensity of news about COVID-19 correspond to negative market returns, whereas an increased intensity about news related to the treatment program correspond to positive returns. * The greater the proliferation of news, the greater and more pronounced the relationship. (3) |
| The stock price reaction of the COVID-19 pandemic on the airline, hotel, and tourism industries | Carter et al. (2022)                        | * Larger firms with greater cash reserves and higher market-to-book ratios were impacted less under COVID-19. * Rational pricing existed for the stocks of airline and hospitality firms during the emergence of COVID-19. * Investors particularly valued cash reserves under COVID-19 for the hotel industry. * Firms in the airline, hotel, and tourism industries with greater leverage were impacted more under COVID-19. (20) |
| ESG ETFs and the COVID-19 stock market crash of 2020: Did clean funds fare better? | Pavlova and de Boyrie (2022)                | * Authors examine the risk-adjusted returns of ESG ETFs before and during the COVID-19 market crash of 2020. * ESG ETFs did not underperform the market during the crash. * Clean ESG ETFs have positive and significant alphas in the pre-COVID market crash period. (11) |
| Impact of global health crisis and oil price shocks on stock markets in the GCC | Al Refai et al. (2022)                      | * Impact of global COVID-19 cases and oil price shocks on the stock markets in the GCC is examined. * Find that the GCC stock markets are sensitive to oil price shocks before and during the pandemic, with higher impacts since March 11, 2020. * Find that the spread of global COVID-19 cases had in itself no meaningful impact on the stock markets in the GCC. (3) |
| Order flow fragmentation and flight-to-transparency during stressed market conditions: Evidence from COVID-19 | Anselmi et al. (2022)                       | * Authors study the composition of order flow during stressed market conditions based on the COVID-19 outbreak. * Find that fragmentation strongly decreases when markets are under stress. This means that traders concentrate their order flow in fewer venues in times of market stress. * Find a migration of order flow from dark to lit venues when markets are under stress. Authors call this evidence ‘flight-to-transparency’. (1) |
| COVID-19 pandemic waves and global financial markets: Evidence from wavelet coherence analysis | Karamti and Belhassine (2022)               | * Impact of COVID-19 outbreak on the international financial markets is examined in the time and frequency domains. * Wavelet coherence analysis unveils perceptual differences between the short-term and longer-term markets’ reactions to the pandemic waves. * COVID-19 fear is leading the equity markets at low and high frequencies throughout the observation period. * Oil, gold and SSE are the safest assets. (7) |
| Stock market reactions to COVID-19 lockdown: A global analysis               | Scherf et al. (2022)                        | * Event study to analyze stock market reactions to COVID-19 lockdown restrictions. * Multi-country analysis for OECD and BRICS countries. * Negative stock market reactions to lockdown restrictions with under/overreaction pattern. * (continued on next page) |
| Article Title                                                                 | Authors (Year)                          | Article Highlights (Citations)                                                                 |
|-------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------|
| *Macroeconomy and Banking (10 articles)*                                     |                                         | Stock markets are not efficient, but some learning effect detectable in the second half of our time series. (10) |
| Systemic risk: The impact of COVID-19                                         | Rizwan et al. (2020)                    | * COVID-19 poses an unprecedented challenge to financial systems. * Study estimates the systemic risk in eight of the most COVID-19 affected countries. * Results show a sharp increase in the systemic risk during the pandemic, however, stagnancy is observed at elevated levels. * They also identify Systemically Important Financial Institutions for each of the eight countries. (103) |
| The effect of revenue diversification on bank profitability and risk during the COVID-19 pandemic | Z.F. Li et al. (2021)                   | * COVID-19 pandemic affected bank performance. * Noninterest revenue sources are positively related to performance. * Noninterest revenue sources are inversely related to risk. * Fintech may be a driver in risk and return relation for noninterest income. (21) |
| Dynamic network analysis of North American financial institutions              | Liu et al. (2021)                       | * Authors propose a state space model for dynamic network. * They recover the dynamic network among North America financial institutions. * Network strength and spillover increase during the subprime crisis and Covid pandemic. * Detect time-varying communities matching financial subsectors. (5) |
| Once bitten, twice bold? Early-life tragedy and central bankers’ reaction to COVID-19 | Aslam and Farvaque (2021)               | * Hypothesis of “impressionable years” is tested for the policy reactions to the COVID-19. * Central bankers who have been confronted with epidemics in their early life react more strongly and faster than their counterparts. * The results stand for the sample of 19 developing countries. * The effect is policy relevant, and favors the adoption of more expansive policies. (0) |
| Does diversification protect European banks’ market valuations in a pandemic? | Simoens and Vennet (2022)               | * COVID-19 pandemic as exogenous shock to European bank valuations. * Functional diversification is a meaningful shock absorber. * The effect of loan portfolio diversification is smaller. * Geographical diversification is not a significant shock absorber. * Investors value liquidity buffers more than capital buffers. (3) |
| Industry volatility and economic uncertainty due to the COVID-19 pandemic: Evidence from wavelet coherence analysis | Choi (2020)                             | * Author investigates the impact of economic uncertainty due to the COVID-19 pandemic on the industrial economy in the US. * Apply wavelet coherence analysis to economic policy uncertainty data and monthly sector volatility of the S&P 500 index. * Analysis indicates that COVID-19 has had a substantial impact on all sectors of the stock market. * Influence of the pandemic on the industrial economy is larger than that of the global financial crisis for all sectors. (58) |
| The COVID-19 pandemic haunting the transmission of the quantitative easing to the exchange rate | Alosi (2021)                            | * COVID-19 pandemic has altered investors’ behavior in the currency market. * The exchange rate is non-linearly related to European Central Bank’s quantitative easing (QE). * COVID-19 pandemic has distorted the expected transmission of the QE to the exchange rate. (5) |
| Macrofinancial information on the post-COVID-19 economic recovery: Will it be V, U or L-shaped? | De Backer, et al. (2021)                | * Forward-looking financial market variables and euro area economic activity indicators are found to help forecasting country-specific GDP. * Medium-scale macrofinancial no-arbitrage term structure models are adapted to the context of the COVID-19 crisis to generate plausible conditional forecasts. * Forecasts suggest that the shape of the recovery will most likely be between a U and an L, in most euro area countries considered, with substantial persistent losses. (3) |
| The trilemma of expansionary monetary policy in the Euro area during the COVID-19 crisis | Lang and Schadner (2021)                | * ECBs monetary policy and emergency measures are one of the main public supporting instruments during the COVID-19 crisis. * The trilemma is that upholding free capital mobility and stabilizing the monetary union are compatible only as long as no or very limited reduction of expansionary monetary policies occurs. * Further progress is needed in reducing and sharing risks in the Euro area. (5) |
| COVID-19 and monetary policy with zero bounds: A cross-country investigation  | Yilmazkuday (2022)                      | * Author investigates the monetary policy reaction function of central banks during COVID-19 outbreak. Results show that emerging markets or countries without a zero bound on their interest rates were able to reduce interest rates as a reaction to reduced economic activity and to the volatility in their exchange rates, whereas advanced economies or |

(continued on next page)
Table 3 (continued)

| Article Title | Authors (Year) | Article Highlights (Citations) |
|---------------|----------------|--------------------------------|
| **Commodities (7 articles)** | | |
| Forecasting power of infectious diseases-related uncertainty for gold realized volatility | Bouri et al. (2021) | * Authors examine the forecasting power of a daily newspaper-based index of uncertainty associated with infectious diseases for gold. * EMVID index increases realized variance at the highest level of statistical significance. * EMVID index improves the forecast accuracy of gold realized variance at short-, medium, and long-run horizons. (9) |
| Is Bitcoin really more than a diversifier? A pre- and post-COVID-19 analysis | Huang et al. (2021) | * Safe haven role of Bitcoin across economies during COVID-19 is examined. * Bayesian PVAR is employed to model the cross-border interaction and heterogeneity. * Bitcoin plays different roles for stock and bond in individually-segmented markets. * It offers diversification benefits and/or risk reductions within and across borders. (20) |
| Exploration of safe havens for Africa’s stock markets: A test case under COVID-19 crisis | Omame-Adjepong and Alagidede (2021) | * Authors explore safe havens for Africa’s equity markets. * Bitcoin and precious metals offer no sanctuary for Africa’s emerging equities. * Gold and palladium outweigh others as safe havens for small-sized equity markets. * Bitcoin acts only as complementary but not a superior safe haven substitute. (8) |
| The impact of investor attention during COVID-19 on investment in clean energy versus fossil fuel firms | Wan et al. (2021) | * Clean energy firms demonstrate better performance than fossil fuel firms before and during the pandemic. * The COVID-19 outbreak negatively impacted both clean energy and fossil fuel firms, but that the negative impact was more significant for fossil fuel firms. * Investor attention has had a positive impact on the performance of clean energy firms, but that is not the case for fossil fuel firms. (18) |
| Performance of Gold-backed cryptocurrencies during the COVID-19 crisis | Wasiuzzaman and Rahman (2021) | * Performance of Gold-backed cryptocurrencies during the COVID-19 crisis is examined. * Results show the mean returns of the three financial instruments increase during crisis periods but the increase is insignificant. PAX Gold experiences increased volatility during the COVID-19 crisis but increase insignificant. (7) |
| The gold-stock market relationship during COVID-19 | Drake (2022) | * Explore the relationship between gold and stock market returns for different recessionary periods, including COVID-19. * Relationship between gold and stock market returns is positive during COVID-19, unlike previous periods of economic stress. * The idea that gold is a hedge for stock portfolios is not supported, especially during COVID-19. (6) |
| COVID-19 pandemic improves market signals of cryptocurrencies—evidence from Bitcoin, Bitcoin Cash, Ethereum, and Litecoin | Sarkodie et al. (2022) | * COVID-19 effects on cryptocurrencies are examined. * COVID-19 shocks spur Litecoin by 3.20–3.84%, Bitcoin by 2.71–3.27%, Ethereum by 1.43–1.75%, and Bitcoin Cash by 1.34–1.62%. * Cryptocurrencies follow nonstationary process—implying its mean market price changes over time. (13) |
| **Corporate Finance (7 articles)** | | |
| The impact of the COVID-19 pandemic on dividends | Krieger et al. (2021) | * Authors examine the impact of COVID-19 on U.S. firm dividend cuts and omissions. * Proportion of firms cutting or omitting dividends was three to five times higher during the second quarter of 2020 than any other quarter since 2015. * Find evidence of increased cuts and omissions among all firms. * Firm profitability and debt are determinants of dividend cuts and omissions in all periods, but the economic magnitude is much greater during the pandemic. (23) |
| COVID-19 and women-led businesses in developing economies | Liu et al. (2021) | * Authors document that women-led businesses are subject to a higher likelihood of closure and a longer closure duration than men-led businesses during the pandemic. * Women business leaders are also more pessimistic about the future than men business leaders. * The disadvantages suffered by women-led businesses widen in high gender inequality economies and developing economies. * Study suggests that COVID-19’s policy response should not be gender-neutral. (16) |
| The impact of COVID-19 on firm innovation: Evidence from Chinese listed companies | Jin et al. (2022) | * Study examines the impact of COVID-19 on firm innovation. * At the national level, COVID-19 inhibits firm innovation in China. * At regional level, no differences found. * At firm level, COVID-19 has a greater negative effect on the (continued on next page)
Table 3 (continued)

| Article Title                                                                 | Authors (Year)                     | Article Highlights (Citations)                                                                 |
|------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------|
| The impact of COVID-19 on firms’ cost of equity capital: Early evidence from U.S. public firms | Ke (2021)                          | innovation quality of SOEs than NSOEs. Innovation in large companies is more vulnerable to COVID-19 than in SMEs. (4)
|                                                                               |                                    | * Author examines whether and how the COVID-19 pandemic affects firms’ cost of equity capital. * Find that firms experienced an increase in the cost of equity capital during the pandemic. * Cost of equity capital increased about 172 basis-points. * The negative effect is more pronounced in firms with greater COVID-19 exposure. (9)
| Firm efficiency and stock returns during the COVID-19 crisis                  | Neukirchen et al. (2022)           | * Firm efficiency has significant explanatory power for stock returns during the COVID-19 crisis. * Highly efficient firms experienced at least 9.44 percentage points higher crisis-period returns. * An investment in a long-short portfolio consisting of efficient and inefficient firms would have yielded positive excess returns. (13)
| The impact of COVID-19 on SMEs in China: Textual analysis and empirical evidence | Sun et al. (2022)                  | * Article investigates the impact of COVID-19 on SMEs in China. * Main causes of SMEs’ financial problems are postponed work resumption, declining market demand, and restrictions on logistics and crowd flow. * Empirical results also demonstrate that the negative impacts of the pandemic are reduced for value-type firms, state-owned firms, and those situated in cities with high-level digitization. (7)
| Is cash the panacea of the COVID-19 pandemic: Evidence from corporate performance | Zheng (2022)                       | * Find COVID-19 pandemic has a negative impact to corporate performance on average. * Firms with abundant cash reserve outperform firms without and the difference is both statistically and economically significant. * Findings support the precautionary motive behind corporate cash holdings. * This study also highlights the difficulty in estimating the optimal cash level when rare market condition is considered. (4)

**Other Topics (18 articles)**

| Article Title                                                                 | Authors (Year)                     | Article Highlights (Citations)                                                                 |
|------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------|
| COVID-19 loses to the real estate market: An equity analysis                 | Chong and Phillips (2021)          | * Authors estimate the dollar impact of COVID-19 on the aggregate value of U.S. commercial real estate. * But for the government’s net interventions at the same time as the shutdowns, the real estate market would have experienced approximately −47% to −62% declines in value due to the COVID-19 restrictions rather than the approximately −10% to −16% returns in value actually experienced. (1)
| Reconsidering systematic factors during the COVID-19 pandemic – The rising importance of ESG | Díaz et al. (2021)                 | * ESG is indispensable to understand factor investing during uncertain times. * The ESG factor shows to significantly explain industry returns in addition to Fama-French factors. * Authors build a new ESG factor as the spread in returns between firms in the top ESG quartile and those in the bottom ESG quartile. (29)
| Short-term working allowance and firm risk in the post-COVID-19 period: Novel matching evidence from an emerging market | Doruk et al. (2021)                | * A firm can apply for short-term working allowance providing that temporary or partial cessation of its activity in COVID-19 times. * Short-term working allowance has a negative impact on firm risk relative to the peers without short-term working allowance. * Benefiting from government support is an effective tool to overcome the effect of COVID-19 on the firm risk that is based on both short- and long-term leverage. (2)
| Using soccer games as an instrument to forecast the spread of COVID-19 in Europe | Gómez and Mironov (2021)           | * Authors collect data from soccer games from all competitions. * The number of games, the accumulated game attendance, and the accumulated venue capacity for games played, have no significant effect in the increment of daily cases. * There is no evidence that soccer fans moving to other regions or people gathering in bars in the local region to watch the game have contributed significantly to the spread of the virus. (0)
| COVID-19 and housing prices: Australian evidence with daily hedonic returns  | Hu et al. (2021)                   | * Examine COVID-19’s effect on housing prices from two factors: epidemiological severity and policy interventions. * Document a negative relationship between prior COVID-19 cases and daily housing returns in Australia housing market. * Government lockdown orders do not have a significant effect on housing returns. (21)
| The impact of COVID-19 on industry-related characteristics and risk contagion | Li et al. (2021)                   | * Combined causal forest algorithm and complex network method. * Considered heterogeneous treatment effects of COVID-19 on industries. * Advised on industrial support (continued on next page)
| Article Title                                                                 | Authors (Year)                        | Article Highlights (Citations)                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Determinants of spillovers between Islamic and conventional financial markets: Exploring the safe haven assets during the COVID-19 pandemic | Yarovaya et al. (2021)                | * Authors analyze the impact of the COVID-19 pandemic on the spillover between conventional and Islamic stock and bond markets. * They further investigate determinates of the spillovers between these markets before and during the COVID-19 pandemic. * Results show that Islamic bonds (Sukuk) demonstrate safe haven properties during pandemic. * COVID-19, oil and gold are strong predictors of the conventional-Islamic markets spillovers. (27) |
| COVID-19 crisis, voters’ drivers, and financial markets consequences on U.S. presidential election and global economy | Pop (2022)                             | * Examine the 2020 US election impact on global economy under COVID-19 crisis. * Used states panel data with news-based, financial markets, and COVID-19 variables. * Biden’s voters react to jobless, healthcare news, Financial Stress Index, and CSI. * Trump’s chances grow with voters’ sentiment, COVID-19 news and populism. (0) |
| Optimal lockdown policy for vaccination during COVID-19 pandemic               | Fu et al. (2021)                       | * Easing the lockdown during vaccination is required to considering both economic and epidemiological perspectives. * Classic SIR model is extended to find optimal decision making to balance between economy and public health. * Research provides suggestion on optimal lockdown policy and vaccine value estimation during vaccination rollout. (4) |
| Capped borrower credit risk and insurer hedging during the COVID-19 outbreak | Chen et al. (2020)                     | * A life insurer capped by the borrower’s credit risk and COVID-19 outbreak is modeled. * The effect of COVID-19 outbreak on borrowing firm deteriorates insurance activities. * The COVID-19 outbreak and insurer hedging harm policyholder protection. * Stringent regulation reinforces insurance instability during COVID-19 outbreak period. (7) |
| COVID-19 and tail-event driven network risk in the Eurozone                   | Huynh et al. (2022)                    | * Tail-Event driven NETwork (TENET) model in COVID-19 pandemic used. * Interaction of the 46 largest capitalization firms in the Eurozone. * The highest connectedness in the early months of 2020, relative to previous crises. * High degree of risk transmission in industrial manufacturing and consumer product sector. (7) |
| COVID-19 and investor behavior                                               | Ortmann et al. (2020)                  | * Authors investigate trading patterns of retail investors during the outbreak of COVID-19. * Investors do the following: increase their weekly trading intensity and establish more new positions; add funds to their accounts and open more new accounts. significantly reduce usage of leverage.; and marginally increase their tendency to engage in short selling. (77) |
| Remarks on the behavior of financial market efficiency during the COVID-19 pandemic: The case of VIX | Dima et al. (2021)                     | * VIX’s efficiency response to the COVID-19 pandemic crisis is investigated. * The presence of deterministic chaos in efficiency series is explored. * No clear evidence of a substantial change in VIX’s efficiency during 2020 is found. * This change is seen in terms of both deterministic chaos and irregular dynamics. (9) |
| An evaluation of the effect of the COVID-19 pandemic on the risk tolerance of financial decision makers | Heo et al. (2021)                      | * Two clusters with low and high FRT were identified before and after pandemic. * The proportion of low FRT cluster increases after pandemic, vice-versa to high FRT cluster. * On the contrary, the pandemic moves the average FRT score across the sample higher. (6) |
| The impact of COVID-19 on the Chinese stock market: Sentimental or substantial? | Sun et al. (2021)                      | * COVID-19 outbreak causes widespread negative abnormal returns in Chinese stock market during the post-event window. * Overall individual sentiment effect during the merging window of event and post-event is positive and stronger than usual. * Stocks with high PB, PE and CMV, low institutional shareholding ratio and low net assets are found to be more sensitive to the turbulence. * Only 7 industries rebased during the merging window. (37) |
| The impact of COVID-19 on housing price: Evidence from China                | Qian et al. (2021)                     | * Authors investigate the impact of COVID-19 on housing price in China. * The housing price of the communities with confirmed COVID-19 cases would reduce by 2.47%. * Extent of the impact basically becomes greater as time goes on. * The effect only exists in regions with a higher infection level of COVID-19 or worse medical treatment conditions. (29) |
| Spillover effects of RMB exchange rate among B&R countries: Before and during COVID-19 event | Wei et al., (2020)                     | * Volatility spillover effects are examined in "The B&R" currency market. * "The B&R" system spillover index reflects volatility spill-over effect only exists in regions with a higher infection level of COVID-19 or worse medical treatment conditions. (29) |

(continued on next page)
Federal Reserve credit infusions, spreads of unstable firms with high operating leverage increased and other firms decreased. Crises offer natural experiments to test the relevance of storied models to explain financial asset behaviors. Horváth and Wang (2021) use rolling R-squared values to test the performance of the Fama-French five factor model and find that R-squared values during the COVID crisis has declined Li et al. (2020). find that the Infectious Disease Equity Market Volatility (IDEMV) tracker has better predictive ability for European stock market volatility Li et al. (2021a) examine whether a crisis is important to understand the idiosyncratic volatility puzzle. Using the fear index data (Mazumder and Saha, 2021) examine the short-run performance of IPOs during the crisis and find that initial returns of IPOs are sensitive to fear of the pandemic.

3.2. Macroeconomy and banking

The ten articles published in the Macroeconomy and Banking areas include five articles on the macroeconomy and five articles about the financial and banking areas.

The financial and banking sectors forms the backbone of the economy Rizwan et al. (2020). investigate how COVID-19 impacted the systemic risks in the banking sectors of the eight most severely affected countries. They find a significant increase in systemic risks in these countries. Financial sector diversification is a significant risk mitigator Simoens and Vennet (2022). find that functional diversification and loan portfolio diversification mitigates banks’ stock market declines by 10 percentage points and 4 percentage points, respectively. In the same vein, Li et al. (2021b) find that non-interest revenues also help to mitigate the effects of the crisis.

Aslam and Farvaque (2021) provide an interesting spin by examining the early life of central bankers who experienced episodes of epidemics. Central bankers who were exposed to the effects of epidemics lowered interest rates faster and led to significantly lower interest rates, thereby mitigating adverse economic situations. Countries without a zero lower bound i.e., with room to lower interest rates, were able to lower their interest rates to mitigate the effects of lower economic activity Yilmazkuday (2022). Monetary stimulus at or near zero lower bound of interest is likely to weaken exchange rates, which mutes the reaction of industrial credit Aloui, 2021 Lang and Schadner (2021). find that monetary unions and countries need to build sufficient buffers and reduce exposure to bond buying to have sufficient room to enact expansionary monetary policy). The findings indicate for the future, monetary stimulus will be important when pandemics strike because the reduced economic activity cannot be solved by more money.

3.3. Commodities

The seven articles published in the commodities area cover many different commodities in including energy commodities, precious metals, and cryptocurrencies.

Investors increasingly rely on diversification into alternate asset classes such as commodity markets to hedge against downturns in the stock market. For instance, gold is considered a hedge against inflation. Gold and other precious metals retained their places as safe haven assets during the COVID-19 pandemic Omane-Adjepong and Alagidede, 2021; Wasiuzzaman and Rahman, 2021. The importance of gold and other precious metals underscores the crucial need to predict volatility in their prices Bouri et al. (2021). find that the newspaper based IDEMV tracker can predict the volatility in gold prices. However, other researchers (Drake, 2022) calls this foregone contention into question by finding that gold exhibited co-movement with financial markets during the COVID crisis. Alternate assets such as Bitcoin and other digital currencies may act as a hedge against stock market declines Huang et al. (2021a), find that Bitcoin and other digital currency investments can provide the benefits of diversification and risk mitigation in a global environment Sarkodie et al. (2022). also confirms that the prices of digital currencies such as Bitcoin, Bitcoin cash, Litecoin, and Ethereum increased during the pandemic. Overall, extant research suggests that the laurels of diversification are still valid even during periods of financial contagion.

3.4. Corporate finance

The impact of COVID on asset pricing is easier to test and to draw conclusions from. However, investigating the impacts of COVID on corporate finance, decisions-making, and outcomes is more difficult to study. For example, financial statements are released at the shortest interval of quarterly, making it challenging to gather enough to produce meaningful research. Despite these obvious data limitations, we did receive seven articles based on corporate finance that relate to topics such as cost of capital, payouts, cash holdings, firm efficiency, and innovation. For example, Ke (2021) finds that crisis-driven increases in operational and financial risk results in a higher cost of capital. Firms that try to cope with crisis situations by maintaining adequate cash reserves tend to weather crises like
COVID. Zheng (2022) finds that firms with abundant cash reserves outperform firms without enough cash reserves. Reducing payouts and investments leads to higher cash reserves during a crisis period. Using U.S. data of 1400 dividend paying firms, Krieger et al. (2021) find that 213 firms cut dividends and 93 firms omitted dividends. The extent of dividend reductions was much higher in the COVID crisis than the financial crisis of 2008. Payout reductions and cash build up are likely to signal efficiently operating firms Chen et al. (2020), find that insurance companies that practiced stringent capital regulation were able to maintain better insurance stability.

Using accounting data, Neukirchen et al. (2022) calculate the efficiency scores for U.S. firms. A long-short portfolio of highly efficient firms against low efficient firms yielded significantly positive returns. Diverse firm features such as CEO characteristics and size resulted in discriminated effects Liu et al. (2021a), document that women-led businesses were more likely to shut down during the pandemic compared to businesses led by men, which exposes the gender inequality in the treatment of firms led by women. Using Chinese data, Sun et al. (2022) document that small and medium scale firms suffered financially more than larger firms. However, Jin et al., (2022) claim that innovation did not suffer in smaller firms, whereas larger firms and state-owned firms saw their innovation prowess decline substantially.

3.5. Other topics

In this section, we review articles that addressed important topics different from the general themes that we identified and presented earlier. We classify 18 articles in the area of “Other Topics”. These topics include behavioral finance (four articles), risk management and insurance (two articles), ESG (three articles), real estate (three articles), international finance/foreign exchange markets (two articles), policy analysis (one article), and other areas (three articles).

Gómez and Mironov (2021) use soccer games as an instrument to forecast the spread of COVID-19. Daily cases of COVID infections showed a spike two-weeks post a major soccer game. During the pandemic the policies and actions of different national and local governments were fragmented without unified approaches Fu et al. (2021), find that, in addition to vaccinations, strict lockdowns are necessary in large populated areas to reduce the threat of infections. The pandemic quickly spread through heavily populated areas, which are characterized by robust housing neighborhoods and social interactions such as soccer games, elections, weddings, and other social gatherings.

The real estate markets reacted asymmetrically similar to other areas studied in the SI. Housing neighborhoods that were severely affected by the COVID crisis experienced steep declines in home values as compared to neighborhoods with fewer COVID infections. Using data from Australia, Hu et al. (2021) document a negative relationship between the daily housing price index and the number of COVID cases. However, the declines in the real estate markets were mitigated to a large extent by monetary and fiscal policy interventions Chong and Phillips, 2021). The chances of victory of potential political candidates vying for office was impacted by the COVID-19 pandemic and the handling of the crisis by the incumbents Pop (2022), finds that President Biden’s chances rose during the election cycle when news items were positive about unemployment and healthcare.

4. Conclusions and directions for future research

The COVID-19 pandemic has impacted every sphere of human activity. Healthcare pandemics are rare events. However, pandemics have become more frequent in the last three decades. Researchers whose articles we accepted in this SI offer pertinent guidance and suggestions for policy makers and for future research. Some of these findings are as follows:

- Governments acted disparately in their response to crisis, which may have caused the crisis to worsen. Researchers call for unified global regulatory approach to pandemics and their impacts on systemic risks.
- Market efficiency, benefits of diversification, and hedging were questioned due to contagion and the spillover effects into various markets. Further research is needed to examine and mitigate the impacts of market co-movement and investor irrationality that may cause such financial contagions.
- Corporate, regulatory, and analyst communications are heavily scrutinized and relied upon by investors. Future studies could analyze the positivity or negativity in communications using textual analysis. Furthermore, the confluence of corporate, regulatory communications, and social media transmission could provide useful in determining which sectors and companies were affected severely.
- The corporate response to the COVID crisis with respect to survival mode financing, investing, and payout policies is still emerging across the world. More research is needed in this area.
- Retail investor level surveys to explore their response to the COVID crisis and portfolio changes could throw light on retail investor reactions to pandemics.
- In many fields the data is still nascent. More relevant and expanded data access will surely spur additional research into the impacts and potential future responses toward major healthcare pandemics like COVID-19.

Acknowledgments

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