

---

# Stock Market Volatility during COVID-19 Pandemic

Anum Zahra<sup>1</sup>, Malik Ghadeer UI Hassan<sup>2</sup>

[anum.zahra@sd.taylors.edu.my](mailto:anum.zahra@sd.taylors.edu.my)<sup>1</sup>, [ghadeer.ul.hassan@gmail.com](mailto:ghadeer.ul.hassan@gmail.com)<sup>2</sup>

<sup>1</sup>Taylor's Business School, Taylor's University Lakeside Campus Malaysia<sup>1</sup>  
<sup>2</sup>Business School, Bahria University, Islamabad Campus, Pakistan<sup>2</sup>

## To cite this document :

Anum Zahra, & Malik Ghadeer UI Hassan. (2021). Stock Market Volatility during COVID-19 Pandemic. *Conference Series*, 3(2), 406–418. <https://doi.org/10.34306/conferenceseries.v3i2.608>

## Abstract

*The study investigates the response of the stock market to the coronavirus pandemic. The economic consequences of the coronavirus (COVID-19) for the stock market are considerable for a developing country, like Pakistan, which was amongst the list of fifteen countries with the highest number of coronavirus cases in May 2020. The present study is aimed at finding the effect of an increase in the number of confirmed cases of coronavirus on the stock returns in the Pakistan stock market. Additionally, the study investigates the effect of an increase in the number of deaths on stock returns. The results show that an increase in the number of confirmed cases has a significant negative effect on the stock returns. While the increase in the number of deaths does not have a significant effect on the stock returns. The results are in line with the results of Ashraf (2020). The findings are important for the policymakers in formulating policies to safeguard the investors in the stock market during this uncertain time.*

*Keywords: Coronavirus, COVID-19, pandemic, stock market, Pakistan.*

## I. INTRODUCTION

The world has been hit hard by a novel coronavirus (COVID-19) which started from Wuhan, China in late December 2019. The virus is being considered a “once in a century” pathogen. The virus was first considered as an outbreak but later it turned into a pandemic (WHO, March 12, 2020). In the first half of 2020, around nine million people have been infected with the virus and approximately four hundred thousand people have lost their lives around the world (World Health Organization, 2020).

The very first cases of humans getting infected with this virus came from a seafood market in the capital city (Wuhan) of Hubei province of China in December 2019. The first human death due to the novel virus was recorded on 9th January 2020. The virus was first assumed to be contained in China, however, within a week after observing the first death from coronavirus, a case outside China was confirmed in Thailand on January 13, 2020. The virus spread quickly in a very short period and the issue got the attention of the public eye by the end of the month. China

---

and South Korea were amongst the worst-affected countries at that time. Soon, the virus spread to Europe. Eighteen countries outside China reported positive cases of the virus in January. The virus outbreak could not be controlled and by the start of March many countries across the world entered an accelerated phase of the “epidemiological curve”.

COVID-19 is a novel form of a family of coronavirus which was not known to the world before its outbreak. The virus spread in the air and is highly infectious. Therefore, it quickly spread across the globe and almost all countries of the world got affected by the virus in varying intensity. The countries which significantly reduced the number of infections by adopting movement restrictions and other health measures are still facing the danger of subsequent waves.

The virus, which was considered a Chinese problem initially, has become everybody's problem by now. The present pandemic has hit countries irrespective of their economic status or region. The reason for the global spread of the virus is its highly contagious nature. The virus can stay alive in the air, on many surfaces and objects for a few hours. The virus symptoms do not appear instantly, and it can take up to fourteen days to know if a person is infected or not. Therefore, it is highly likely that an infected person does not know if s/he is infected, and s/he can transmit the virus to others. The spread of the virus can be contained by adopting social distancing policies. Therefore, countries are adopting social distancing measures like imposing travel restrictions, movement restrictions and closure of institutions, ban on public gatherings, safe distancing, and placing infected persons in quarantines.

The social distancing approach to contain the spread of coronavirus has proved to be effective in lowering the number of cases. However, these approaches result in a slowing down of the world economy.

The slowing down of the economy was inevitable because the pandemic has badly affected various aspects of normal life. People entered a digital world of the internet and moved from physical presence to virtual presence. The world economy entered in recession because of the slowing down of economic activity. The coronavirus which came as a shock to healthcare has become a shock to the economic system as well. The economic implications of the pandemic are severe. There is a huge rise in unemployment figures and job cuts. Many sectors of the economy are badly affected in a global context. These sectors include travel, tourism, and hospitality while a slump in oil prices is also adding to the severity of the present economic situation across the globe. Governments of different countries are adopting measures to support their economies. Economic stimulus packages are being provided to support the economy, interest rates are being lowered by central banks of many countries to make borrowing cheaper, some governments are giving rent relief to the retailers, but the future of the global economy is uncertain as the pandemic is still going on. A source from International Monetary Fund (IMF) stated that by the end of March 2020, eighty countries have submitted a request for economic support to help them against economic disruptions caused by the COVID-19.

---

The present pandemic has brought world economies to the verge of an economic and financial crisis. The slowed economic activity and reduction in output brought GDP losses. GDP loss from baselines for China and USA were 6.2 and 8.4 percent, respectively. The pandemic has not ended. There is a situation of uncertainty and a forecast of further losses. That uncertainty would result in a decline in expected cash flows, a rise in real and anticipated risks, and a fall in stock prices.

Financial markets including stock markets being an integral part of the economic system responded to the present pandemic with dramatic movements. Economic consequences of COVID-19 are translated to losses in financial markets (Ramelli & Wagner, 2020). The stock markets in Europe and USA showed a strong response when China imposed a lockdown on January 23, 2020. Dow Jones (US), S&P 500, and NASDAQ have recorded an all-time high in February 2020. However, when the virus spread to Italy and Iran, and the World Health Organization declared it a “pandemic”, the markets responded with declining trends. Huge falls were observed in stock markets due to the pandemic. With the adoption of travel bans, huge falls were observed in stock markets. American stock market hit circuit breaker mechanism, and FTSE (UK) observed sharp one-day declines since the year 1987. The stock markets in Europe and Asia were down by the start of March 2020.

The markets are more volatile and uncertain due to the outbreak of the coronavirus. Winner and loser stocks are shifting which are causing investors to suffer huge losses in a short time. There is fear among investors about the pandemic and their trust in the government to handle the pandemic has been shattered. Monetary authorities have adopted intensive short-term policies to lessen the investors’ fear but those short-term measures can hurt the long-term investment expectations of the investors.

World history has witnessed that how past plagues and pandemics wreaked havoc not only by increasing mortalities and illnesses but also by destroying economies and changing the course of human history. The present pandemic which is being considered as one of the worst pandemics like the Spanish Flu of 1918-1920, has already hit economies across the world. When a country that is already facing economic turmoil becomes the center of the pandemic, the situation becomes grave as the country has to fight on economic and health war-fronts at the same time. All the developed and under developing economies are under crisis because of corona and they are fighting against it with all their strength. Because of this fight with corona, developing countries are running out of resources, and on the other hand developed countries are facing the limitation of resources. The countries with the most number of COVID-19 cases in May 2020 include the USA, Brazil, Russia, India, UK, Spain, Peru, Chile, Italy, Iran, Germany, Turkey, Mexico and Pakistan, and Saudi Arabia.

---

Amongst the list of these countries, the case of Pakistan requires due attention as the first case was reported by the end of February and within a matter of weeks, Pakistan was amongst the list of the countries with the most reported cases

On February 26, 2020, the first two cases of Covid-19 were reported in Pakistan. By the end of May, thousands of cases were reported in all big cities of Pakistan. The statistics of death from the contagious virus (COVID-19) also showed an alarming situation for Pakistan. The first death was confirmed on March 18, 2020, and soon by May 2020, Pakistan reported nearly 67000 deaths.

Pakistan Stock Exchange took a major hit on 26th February 2020, following the confirmation of two coronavirus cases in the country. Investors resorted to panic selling which led to the KSE-100 Index falling below the 37,000 points mark intraday. Shedding 1,420.11 points in the opening two hours of the session, the KSE-100 Index recorded its intraday low at 36,918.22. However, it managed to recover most of its losses by the end and settled at 38,087.32 (- 251.01 points). Among other indices, the KMI-30 Index lost 575.80 points to close at 59,544.08, while KSE-All Share Index ended 290.99 points lower at 26,396.96. The benchmark of Pakistan stock exchange KSE-100 index declined about 8% or 2557 points closing at 28110 points. The domestic capital market was also at the lowest level during the last week of March in the last six years. The government of Pakistan offered relief package and interest cuts to recover the losses.

The situation of Pakistan due to the rise in infected cases and the dramatic movement of the stock exchange call for special attention. It would be pertinent to find out if the returns of the stock market are affected by the rise in cases and deaths due to COVID-19. Previous researchers show that events like pandemics negatively affect investors' sentiments which eventually affect their investment decisions. It has been established in the literature that stock returns of the stock market respond to major happenings in the world. Previous researchers identified that any major event in the world, for example, Kowalewski and Śpiewanowski ((2020) showed that stock market returns responded to natural disasters and accidents. Similarly, some researchers proved that stock returns responded to virus outbreaks. Chen, Chen, Tang, and Huang (2009) found out that Taiwanese stock returns responded to SARS (Severe Acute Respiratory Syndrome) outbreak in 2003. Similarly, stock markets react to the Ebola outbreak as documented by Ichev and Marinc (2018). Even though a large number of studies are carried out which study previous pandemics, there is a scarcity of literature that investigates how stock markets respond to pandemics. The recent pandemic of COVID-19 is unique because live data is available which is being updated in real-time due to advanced machine learning and data analytics. The pandemic is also an issue that is being faced by almost all of the countries of the world. The economic and financial implications of the pandemic are spread across the globe. Some studies are conducted that studied the reaction of the stock market to COVID-19. However, these studies investigated stock market reactions of China, South Korea, the USA, Italy, the UK, France, Japan, Germany, Spain,

---

the Netherland, and Singapore (Zhang, Hu & Ji, 2020). The reaction of the Pakistan stock market to the present pandemic is largely ignored by the researchers because Pakistan appeared in the list of most affected countries much later than other nations, therefore, there is a gap exist in the literature to investigate whether the huge rise in infections and mortalities due to COVID-19 affected stock market returns in Pakistan.

The world is facing a pandemic since the outbreak of a novel virus. The virus has become a global issue that has affected all countries in varying intensities. The coronavirus (COVID-19) is proved to be a highly infectious virus. It has been anticipated that the virus can infect billions of the human population and subsequently kill millions if its spread is not intervened. Therefore, countries across the world are adopting protective measures like social distancing which have slowed down economies. The anticipated shifts from globalization to localization, the rise of healthcare costs, and the protective policies of containment have badly hit economies. The economies of the less developed countries have become more fragile. The losses in economies are shifting to financial markets including stock markets. The uncertainty of the situation and the prevalence of fear among investors is also affecting stock markets. When the economic implications of the pandemic for a country that is amongst the top fifteen nations with most cases of the COVID-19 become graver if the country is facing economic turmoil. Pakistan is such an example. Therefore, research is needed to find out the reaction of the stock markets to the rise of COVID-19 cases and deaths in Pakistan. The findings of the study would be helpful for policymakers in formulating measures to support the investors in stock markets from realizing huge losses due to the pandemic.

The research is aimed to investigate the reaction of the Pakistani stock market to the present COVID-19 pandemic. The study is significant in many aspects. First, the study is contributing towards the growing literature about the coronavirus pandemic which has become a major concern in the present world. Second, the study adds to the body of literature about the stock market's reactions to the pandemics and plagues. Third, the study is addressing the issue in the context of Pakistan which has made its spot in the list of the most affected countries in a very short time.

## II.LITERATURE REVIEW

COVID-19 pandemic has become a center of attention of researchers since it started spreading across the globe in the first quarter of 2020. The reason for the growing interest in the pandemic is that it created global health, economic, and market crisis. Apart from the medical field and healthcare-related literature on coronavirus, many researchers work on finding the economic and financial implications of the pandemic.

---

Many recent researchers are agreed that this new form of coronavirus and SARS “Severe Acute Respiratory Syndrome” share a similar family, however, the scale of epidemics is different. SARS did not spread at such a huge scale outside China like the COVID-19. Thus, many previous research studies on SARS can be referred for coronavirus. Siu and Wong (2006) studied the impact of the SARS outbreak on the economy in the context of Hong Kong. The authors found that there was a negative shock on the economy on the demand side only. Once the fear and panic feelings of the outbreak subsided, the economic situation improved.

Several previous studies surveyed some worst events in the past that changed the course of human history. For example, a study conducted by Trilla, Trilla, and Daer (2008) on the Spanish Flu (1918-1919) showed the severity of the pandemic that occurred a century ago. A group of researchers compared the COVID-19 pandemic to Spanish flu and other plagues. Ashton (2020) compared COVID-19 with the Spanish flu. The author found similarities and discussed some assumptions about the future of the pandemic based on the history of Spanish Flu.

Previous literature on pandemics and plagues that occur before coronavirus were mainly related to the illness-related costs. For example, Macciocchi, Lanini, Vairo, Zumla, Figueiredo, Lauria, and Kremsner (2016) studied the economic impact of the Zika virus outbreak on a group of countries including Brazil, Argentina, and Mexico. According to their results, excluding Brazil, the shocks from the virus were not translated to the markets in Mexico and Argentina. Ichev and Marin (2018) worked on the effects of the Ebola outbreak on the stock markets of the U.S and West African countries. According to the results, Ebola negatively affects the stock prices of the stock market and industries which are located near the birthplace of Ebola.

Several research studies investigated how the stock returns reacted to the pandemics and some other major happenings in the past. For example, the impact of SARS on Taiwanese hotel stock returns was studied by Chen, Jang, and Kim (2007). The impact of Ebola on stock returns was studied by Ichev and Marinc (2018). Some of the previous studies adopted the event study approach while others adopted regression analysis to study the impact of virus outbreaks on stock returns.

The present pandemic of COVID-19 is anticipated to have severe implications for the world economies. That is why studies are being carried out to find the economic consequences of the COVID-19 pandemic. Gormsen and Koijen (2020) found out that investors’ expectations about the economy change continuously due to the spread of coronavirus and the resultant government responses. Siche (2020) discussed the effect of COVID-19 on agriculture. The author highlighted that coronavirus badly affected the supply and demand of food. Researchers like Abodunrin, Oloye, and Adesola (2020), Fernandes (2020), and Chuhan (2020) studied the global economic repercussions of COVID-19. Several studies reported that stock markets of many countries were badly affected by the COVID-19 pandemic (Zhang, Hu & Ji, 2020; Liu, Manzoor, Wang, Zhang & Manzoor, 2020; McKibbin & Fernando, 2020; Ru, Yang, & Zou, 2020; Mamaysky,

---

2020; Nguyen, 2020; Alfaro, Chari, Greenland & Schott, 2020; Al-Awadhia, Al-saifi, Al-Awadhib & Alhammadi, 2020; Zeren & Hizarci, 2020.)

The review of the literature suggests that COVID-19 has resulted in a rise in financial risks. The reason is that the world is going through an uncertain period. No one knows when the pandemic will end and what would be the exact amount of economic losses due to the pandemic in the future. This situation of uncertainty made stock markets volatile and unpredictable. The government actions to level the markets and control the outbreak are mostly short-term focused like the American unlimited quantitative easing program, such policies are also increasing uncertainty in the stock market. There is a disintegration in global stock markets. It can be observed that global communities are inclined towards the trend of localization instead of globalization.

It has been argued in the literature that stock markets reactions differ in countries as per the severity of the outbreak, therefore, it is pertinent to find out that whether stock returns are linked with a rise in confirmed cases of COVID-19 in a single country context (Pakistan). The following hypotheses are proposed:

H1: Increase in the number of confirmed cases of COVID-19 has a significant effect on stock returns.

H2: Increase in the number of deaths due to COVID-19 has a significant effect on stock returns.

### III. RESEARCH METHODS

The present study is aimed at investigating the reaction of stock returns to a rise in COVID-19 cases and deaths. Specifically, it is intended to find out the effect of a rise in daily confirmed cases and daily deaths of COVID-19 on the stock returns of the Pakistan stock market.

Previous research studies which investigated the link between the stock market and COVID-19 can be classified into two groups. The first group of researchers used event study methodology in line with some previous studies that applied event study methodology to study the impact of previous virus outbreaks like SARS and Ebola on the stock market. For example, Khanthavit (2020) applied the event study technique to find how stock markets of France, Germany, Italy, Spain, the US, UK, China, Philippines, and Thailand react to coronavirus. The author found a significant negative reaction. Other studies that applied event study analysis are conducted by Aravind and Manojkrishnan (2020), Ramelli and Wagner (2020), and Ru, Yang, and Zou (2020).

The second group of researchers applied regression analysis to find the reaction of stock markets to the coronavirus outbreak. Al-Awadhi, Al-saifi, Al-Awadhi, and Alhammadi (2020) used panel data analysis to find out the stock returns reaction to the coronavirus outbreak in the Chinese stock market. The authors found that the rise in total confirmed cases and total deaths significantly negatively affect stock returns. Pavlyshenko (2020) applied a regression approach to

model the relationship between coronavirus spread and equity markets. Yilmazkuday (2020) used a regression approach to find the impact of coronavirus spread on the global economy. Zeren and Hizarci (2020) also used regression to find the impact of coronavirus on the stock market. Ashraf (2020) used regression analysis to find out whether an increase in daily confirmed cases and deaths impact stock returns of 64 countries from 22nd January to 17th April 2020. The author found a negative and significant effect of an increase in confirmed cases and stock returns. The author found that stock returns respond more to a rise in confirmed cases than a rise in deaths. In line with the studies that used regression analysis to find out the link between stock returns and growth in confirmed cases and deaths, the present study uses regression analysis. The reason for using regression analysis is that the event day cannot be considered as the day of the COVID-19 outbreak. There are a series of events that happen and are still happening as the pandemic is going on. The regression equation is estimated as follows:

$$R_t = \alpha_0 + \alpha \text{GROWTH\_IN\_CC} + \beta \text{GROWTH\_IN\_CD} + \epsilon_t \text{ (Equation 1)}$$

$R_t$  is the return of index at day  $t$  it is regressed on the first return predictor which is lag of daily growth in confirmed cases and the second return predictor which is lag of daily growth in confirmed deaths from COVID-19.  $\epsilon_t$  is the error term. The study period starts from the day when coronavirus cases were confirmed for the first time in Pakistan. Thus, the data period is from February 26, 2020, to May 31, 2020. The dependent variable is the stock returns of the Pakistan Stock market. The daily stock return of the KSE 100 index is used as a sample. There are two independent variables. The first independent variable is growth in daily confirmed cases of COVID-19 in Pakistan and the second independent variable is growth in daily deaths from COVID-19 in Pakistan. The data source is the daily statistics published by the Government of Pakistan and the World Health Organization.

**Table 1. Definition of variables and data sources**

Variable	Definition	Data Sources
R	KSE 100 Stock returns daily frequency	Yahoo Finance and Pakistan Stock Exchange website
Growth in CC	Daily growth in confirmed COVID-19 cases	World Health Organization and statistics published by the Government of Pakistan
Growth in CD	Daily growth in confirmed COVID-19 deaths	World Health Organization and statistics published by the Government of Pakistan

#### IV. FINDINGS AND RESULTS

##### Descriptive Statistics

Table 2 shows descriptive statistics of variables used in the regression equation. The table displays mean, standard deviations, minimum and maximum values of variables. Daily returns, daily growth in confirmed cases and daily growth in confirmed deaths are used to estimate the regression equation in a time series analysis. The highest daily growth in confirmed cases is eighteen percent. The highest daily growth in confirmed deaths is six percent while the highest daily growth in returns is approximately five percent.

**Table 2. Descriptive statistics**

Variables	Mean	Standard Deviation	Maximum	Minimum
Growth in CC	0.71794	3.152086	18.14286	-1
Growth in CD	0.395174	1.343171	6.125	-1
Returns	-0.16868	2.504735	4.795391	-6.85607

### Correlation Matrix

Table 2 shows the result of correlation matrix. Daily stock returns are negatively correlated with the daily growth in confirmed cases of coronavirus. However, daily stock returns are positively correlated with the daily growth in confirmed deaths from coronavirus, but the relationship is weak because the value is close to zero. So, it can be inferred that there is no correlation between stock returns and the increase in daily death from the coronavirus.

**Table 3. Correlation Matrix**

	Stock Return	Growth in CC	Growth in CD
Stock Returns	1		
Growth in CC	-0.39147048	1	
Growth in CD	-0.0470982	0.1585122	1

### Empirical Test

Table 4 shows the result of regression analysis. The results show that there is a significant negative effect of daily growth in confirmed cases on stock returns. Therefore, H1 is accepted. The results also show that there is a positive effect of the increase in coronavirus daily deaths on the stock returns, however, the effect is insignificant. Thus, H2 is rejected.

**Table 4. Regression Results**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.042264	0.320603	0.131825	0.8956
GROWTH_IN_CC	-0.296737	0.09805	-3.026396	0.0037
GROWTH_IN_CD	0.005294	0.230098	0.023008	0.9817
R-squared	0.139121	Mean dependent var		-
				0.168684
Adjusted R-squared	0.109436	S.D dependent var		2.504735
S.E of regression	2.363711	Akaike info criterion		4.606272
Sum squared resid	324.0534	Schwarz criterion		4.710086
Log likelihood	-137.4913	Hannan-Quinn criter		4.646958
F-statistic	4.686517	Durbin-Watson stat		1.68772
Prob(F-statistic)	0.012981			

T-stat for Growth in CC is -3.026396 which lies beyond the limit of (+,- 1.96) and is significant which means that its P-value is also less than 0.05. T-stat for Growth in CD is + 0.023008 which lies within the limit of (+,- 1.96) and is not significant which means its P-value is greater than 0.05. The goodness fit of the model or the explanatory power of independent variables suggested by R2 is 0.139121 which is not near to 1. The higher the R2, the higher will be the goodness of fit. Hence, this model has a lower goodness fit which means that error is higher and parameters are not efficient. Adjusted R2 is always lower than R2 and this project shows that too. It also adjusts the drawbacks of R2. The results also show that growth in corona cases and growth in corona deaths explain returns by 13.9121%. F-stats show the significance of the overall model, it is 4.686517 and is higher than the criteria suggested i.e. 3. Hence the overall model is significant. The Durbin-Watson test has a value of 1.68772 which shows that it has a positive autocorrelation as the value is less than 2. This means that the previous cases and deaths will have a positive correlation with future cases and deaths. Thus its shows that in the future growth of cases will have a negative impact on stock returns.

## V. DISCUSSION

The study aimed to find out the reaction of the Pakistani stock market to coronavirus disease. The research question was to find out whether there is a significant effect of the increase in the number of coronavirus-infected patients and the increase in mortalities due to the virus on the stock returns. The results of the empirical test show that the stock returns respond to the daily rise in confirmed cases of COVID-19 in Pakistan. The effect of an increase in confirmed cases translated to a decrease in stock returns. However, the increase in daily deaths due to coronavirus disease has no significant impact on the stock returns. The results of the increase in the number of cases and stock returns can be interpreted in this way that the rise in cases results in a feeling of fear and the investors become uncertain about the situation which badly affects stock returns. The results are in line with the study of Ashraf (2020).

## VI. CONCLUSION

The coronavirus outbreak has become a pandemic and it has risen concerns not only about health issues but also economic issues due to the rise in health care costs and containment policies. The fear of this contagious virus and the policies to control have resulted in shocks at the supply side of the economy. The virus is highly infectious and the protective measures require social distancing policies, movement restriction, and avoidance of gatherings. Therefore, the economic activity is slowing and it is resulting in businesses shutting down and workers being laid off. Therefore, there is a panic in financial markets including stock markets. Stock returns are representative of future earning and investors have a depressing sentiment about the future. A rational investor would be more inclined towards selling the shares. Due to the uncertainty, the stock markets are reacting to the pandemic in an unprecedented way.

The findings of the study that stock returns respond to the increase in the number of infected persons have some important policy implications that there is a need to put a collaborative effort to manage the economic and financial implications of the pandemic. Policymakers from the government, banks, and markets can come together to devise and implement plans that reduce the feeling of uncertainty and can help investors safeguard from realizing huge losses due to the stock market reaction to the pandemic.

The study is being conducted while the pandemic is still going on, therefore, the short-term reaction of the market can be captured. There is a need to study the long-term impact of the pandemic in the future once it is passed. The virus has evolving nature and there is a need for further research to study the reaction of the stock market. Future researchers can study the impact of coronavirus on the stock market from various perspectives, like how stock markets responded to the news that the pandemic is ended. Investors' sentiments, cultural and other demographic variables and stock markets integration can also be included in the framework of future studies. Moreover, an analysis could be carried out to find out how stock markets are being impacted by the COVID-19 vaccination statistics.

## REFERENCES

- [1] Abodunrin, O., Oloye, G., & Adesola, B. (2020). Coronavirus pandemic and its implication on global economy. *International journal of arts, languages and business studies*, 4.
- [2] Al-Awadhi, A. M., Al-Saifi, K., Al-Awadhi, A., & Alhamadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioral and Experimental Finance*, 100326.
- [3] Alfaro, L., Chari, A., Greenland, A. N., & Schott, P. K. (2020). Aggregate and firm-level

- 
- stock returns during pandemics, in real time (No. w26950). National Bureau of Economic Research.
- [4] Aravind, M., & Manojkrishnan, C. G. (2020). COVID 19: Effect on leading pharmaceutical stocks listed with NSE. *International Journal of Research in Pharmaceutical Sciences*, 11(SPL1), 31-36.
- [5] Ashraf, B. N. (2020). Stock markets' reaction to COVID-19: cases or fatalities?. *Research in International Business and Finance*, 101249.
- [6] Ashton, J. (2020). COVID-19: Driving while looking in the rear-view mirror. *Journal of the Royal Society of Medicine*, 113(4), 161-162.
- [7] Chauhan, V. (2020). An Empirical Analysis into Sentiments, Media Consumption Habits, and Consumer Behaviour during the Coronavirus (COVID-19) Outbreak. *Purakala with ISSN 0971-2143 is an UGC CARE Journal*, 31(20), 353-378.
- [8] Chen, C. D., Chen, C. C., Tang, W. W., & Huang, B. Y. (2009). The positive and negative impacts of the SARS outbreak: A case of the Taiwan industries. *The Journal of Developing Areas*, 281-293.
- [9] Chen, M. H., Jang, S. S., & Kim, W. G. (2007). The impact of the SARS outbreak on Taiwanese hotel stock performance: an event-study approach. *International Journal of Hospitality Management*, 26(1), 200-212.
- [10] Fernandes, N. (2020). Economic effects of coronavirus outbreak (COVID-19) on the world economy. Available at SSRN 3557504.
- [11] Gormsen, N. J., & Koijen, R. S. (2020). Coronavirus: Impact on stock prices and growth expectations. University of Chicago, Becker Friedman Institute for Economics Working Paper, (2020-22).
- [12] Ichev, R., & Marinč, M. (2018). Stock prices and geographic proximity of information: Evidence from the Ebola outbreak. *International Review of Financial Analysis*, 56, 153-166.
- [13] Khanthavit, A. (2020). World and national stock market reactions to COVID-19. Working Paper, Thammasat University. DOI: 10.13140/RG.2.2.22792.57606.
- [14] Kowalewski, O., & Śpiewanowski, P. (2020). Stock market response to potash mine disasters. *Journal of Commodity Markets*, 100124.
- [15] Liu, H., Manzoor, A., Wang, C., Zhang, L., & Manzoor, Z. (2020). The COVID-19 outbreak and affected countries stock markets response. *International Journal of Environmental Research and Public Health*, 17(8), 2800.
- [16] Mamaysky, H. (2020). Financial Markets and News about the Coronavirus. Available at SSRN 3565597.
- [17] Macciocchi, D., Lanini, S., Vairo, F., Zumla, A., Moraes Figueiredo, L. T., Lauria, F. N., ... & Kremsner, P. (2016). Short-term economic impact of the Zika virus outbreak. *New*
-

- 
- Microbiologica, 39(4), 287-289.
- [18] McKibbin, W., & Fernando, R. (2020). The economic impact of COVID-19. *Economics in the Time of COVID-19*, 45.
- [19] Nguyen, K. (2020). A Coronavirus Outbreak and Sector Stock Returns: The Tale from The First Ten Weeks of Year 2020. Available at SSRN 3559907.
- [20] Pavlyshenko, B. M. (2020). Regression Approach for Modeling COVID-19 Spread and its Impact On Stock Market. arXiv preprint arXiv:2004.01489.
- [21]
- [22] Ramelli, S., & Wagner, A. (2020). What the stock market tells us about the consequences of COVID-19. *Mitigating the COVID Economic Crisis: Act Fast and Do Whatever*, 63.
- [23] Ru, H., Yang, E., & Zou, K. (2020). What do we learn from SARS-CoV-1 to SARS-CoV-2: Evidence from global stock markets. Available at SSRN 3569330.
- [24] Siche, R. (2020). What is the impact of COVID-19 disease on agriculture?. *Scientia Agropecuaria*, 11(1), 3-6.
- [25] Siu, A., & Wong, Y. R. (2004). Economic impact of SARS: the case of Hong Kong. *Asian Economic Papers*, 3(1), 62-83.
- [26] Trilla, A., Trilla, G., & Daer, C. (2008). The 1918 "Spanish flu" in Spain. *Clinical infectious diseases*, 47(5), 668-673.
- [27] Yilmazkuday, H. (2020). Coronavirus disease 2019 and the global economy. Available at SSRN 3554381.
- [28] Zeren, F., & Hizarci, A. (2020). The Impact of COVID-19 Coronavirus on Stock Markets: Evidence from Selected Countries. *Muhasebe ve Finans İncelemeleri Dergisi*, 3(1), 78-84.
- [29] Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters*, 101528.