Journal of Infrastructure, Policy and Development 2024, 8(8), 5714.
https://doi.org/10.24294/jipd.v8i8.5714

Article

Examining the effects of COVID-19 on GCC stock markets: A methodological analysis using event study techniques

Radwa Radwan Said[1], Khaliquzzaman Khan[2], Md Shabbir Alam[3,*], Mohammad Noor Alam[4]

[1] Department of Finance, Cracow University of Economics, Rakowicka 27, 31-510 Kraków, Poland
[2] School of Business, American University in Dubai, Dubai 28282, United Arab Emirates
[3] Department of Economics and Finance, College of Business Administration, University of Bahrain, Sakhir 3203, Bahrain
[4] Department of Accounting, College of Business Administration, University of Bahrain, Sakhir 3203, Bahrain
*** Corresponding author**: Md Shabbir Alam, mdshabbir@uob.edu.bh, shabbir.alam28@gmail.com

CITATION

Said RR, Khan K, Alam MS. Alam MN. (2024). Examining the effects of COVID-19 on GCC stock markets: A methodological analysis using event study techniques. Journal of Infrastructure, Policy and Development. 8(8): 5714. https://doi.org/10.24294/jipd.v8i8.5714

ARTICLE INFO

Received: 8 April 2024
Accepted: 13 May 2024
Available online: 15 August 2024

Abstract: The study examines the impact of COVID-19 on the economies of Gulf Corporation Council (GCC) member states. The event study methodology was used to analyze Cumulative Abnormal Return (CAR) of GCC member states' stock indexes: Kuwait Stock Exchange Index (KSE), Dubai Financial Market Index (DFM), Saudi Arabia Tadawul Index (TASI), Qatar Exchange Index (QE), Bahrain All Share Index (BHB), Oman's Muscat Stock Exchange Index (MSM), Abu Dhabi Stock Exchange Index (ADX) while the S&P GCC Composite Index was used as a reference. Data obtained from 28 July 2019 to 27 July 2020, and 1 March 2020, designated as the event day, abnormal returns (AR) and cumulative average abnormal returns (CAARs) were examined across various time intervals. The findings reveal significant market reactions to the pandemic, characterized by fluctuations in abnormal returns and CAARs. Statistically significant abnormal returns and CAARs during certain time periods underscore the dynamic nature of market responses to the COVID-19 event. These results provide valuable insights for policymakers and market participants seeking to understand and navigate the economic implications of the pandemic on GCC economies. The study recommends that other GCC states, particularly Oman, consider the policies undertaken by Qatar, UAE, and Saudi Arabia, to avoid a long economic crisis.

Keywords: COVID-19; stock market; event study methodology; CAR; GCC countries
JEL Classification: G1; G14; C58

1. Introduction

The coronavirus outbreak has caused an epidemic of the respiratory illness (COVID-19) for which vaccines and targeted therapeutics for treatment are unavailable. The epidemic also caused a significant public health concern. The first detected cases of the virus were in Wuhan, China. Associated with pneumonia, they were first reported to the World Health Organization (WHO) on 31 December 2019. It was officially designated by WHO as a deadly virus on 11 February 2020, and on 11 March, it declared COVID-19 a pandemic, which identified more than 118,000 cases of the coronavirus in 110 countries and territories worldwide, and, therefore, continued the threat of further global spread (Alam et al., 2020).

COVID-19 has a significant impact on real economic activity, although the exact extent is unknown. The COVID-19 epidemic is an unprecedented global catastrophic economic situation that could have far-reaching effects on the stock market, including the banking and financial sectors, and is a promising region for future research (Ashraf, 2020).

Our main objective of this study is to find out the impact of COVID-19 on the stock markets across the GCC countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). This paper uses an event study methodology to show how the GCC stock markets responded to the pandemic and explain how markets have reacted to lockdowns and economic policies across the GCC. The direct impact of the pandemic on GCC countries' financial markets, economies, and investor behavior became more pronounced from March onwards. This was when these countries started implementing significant measures such as lockdowns, travel restrictions, and business closures to contain the spread of the virus. These actions had an immediate and observable effect on market dynamics, asset prices, and investor sentiment within the region. While news of the coronavirus began spreading globally in January, financial markets often take time to fully absorb and react to such information. Markets may initially exhibit resilience or even optimism in the face of emerging threats, as seen in the early stages of the pandemic. It's typically when the severity and widespread impact of an event become clearer that markets undergo more substantial adjustments. March marked a pivotal moment when the realization of the pandemic's gravity became widespread, leading to sharper market reactions. The study selected the event window from 1 March allows for a more focused and manageable analysis period. It captures the period when the pandemic's effects on GCC markets were most acute, facilitating a more targeted examination of market dynamics and investor behavior during this critical phase.

The eventual impact on stock markets is explained using two time windows divided into:

1) The post-event window, which is the time of the event (1 March 2020) until the end of the data collection period, which is 27 July 2020.
2) The estimation window is taken from the date before the first case was recorded in the GCC.

COVID-19 and GCC stock market

COVID-19 has caused unprecedented levels of volatility on the World stock market. Ubhar Capital (2020) reported that the market has reacted to the pandemic with large drops and lost $9.2 trillion in capitalization since the Coronavirus cases were reported, compared with gains of $17.35 trillion in 2019. Likewise, another report of Kuwait Financial Centre Markaz, highlighted that 2020 had been a challenging year for the GCC stock market and financial and real estate sector companies due to COVID-19. The worst-hit GCC companies were in energy, finance, real estate, industry, etc. Other sectors affected include banks, non-banking financial institutions (NBFCs), and investment companies that lack transportation, resulting in a drop in oil prices.

The companies least affected by the pandemic are in essential sectors such as consumer non-cyclical, utilities, healthcare, and telecom. Huaxia (2020), pointed out that many companies in these sectors witnessed an increase in their revenues and net income in the first quarter of this year compared to the same period last year, adding that there are consumer requirements in all sectors characterized by flexibility and lack of dependence.

Also, companies in the food, retail, communications, and telecommunications sectors in the lockdown in GCC countries triggered their increased revenue and, as a result, investors turned to stocks in those regions.

2. Review of literature

There is consensus in the literature that stock market returns respond to major events. Previous studies examined how several major events affected the returns of the global stock markets. The results of these studies vary from one country to another due to differences in methodologies and time outlines, as well as the variables captured in the models. Considering the different macroeconomic pre-existent analyses of the consequences of disease and illness in global economies, this study aims to analyze the impact of COVID-19 on stock market returns in the GCC economies. Looking across the existing literature concerning the consequences of disease: Kim et al. (2020) investigated the specific effects of epidemics of infectious and macroscopic illnesses on the overall financial performance of the hotel industry. To examine the data, the author used the Mann-Whitney test and the event study approach. The study acknowledged hazardous justification elements and confirmed the detrimental effects of pandemic sickness outbreaks on the café industry. Examining how COVID-19 affected the firm's foreign trade and financial practices, Ramelli and Wagner (2020) discovered that US enterprises with a concentration on overseas markets—particularly those with exposure to China—were negatively impacted. As the virus spread throughout Europe and the US, markets moved erratically. According to the author's conclusion, the economic crisis that spread via many financial channels was a direct result of the health crisis. Bash (2020) examined the influence of COVID-19 on stock exchange earnings using event research analysis, and the results showed that stock exchange profits will experience a down pattern and significant unfavourable earnings following a COVID-19 breakout. Bash and Alsaifi (2019) studied whether uncertain events influence stock market outcomes. To conduct an all-natural test, they assess the impact of the undefined event related to Jamal Khashoggi's disappearance on the individual Saudi stock market. They all employed traditional event-study procedures to assess the data. The downward trend in total irregular profits across virtually all enterprises implies a negative effect from uncertainty regarding share earnings.

Pinglin et al. (2020) used a celebration research method to examine the stock prices of different sectors of China empirically. The analysis discovered which way of travel, exploration, electrical power, heating system, and surroundings the typical outbreak badly influences industrial sectors. He found out that the manufacturing industry, IT sector, education, and healthcare sector are robust even after the outbreak.

Liu et al. (2020) typically examined the interim influence within the coronavirus break out in twenty-one major currency markets directories within big afflicted nations, including Japan, Korea, Italy, Singapore, Germany, UK, and the USA. The outcomes associated with the contagious disorder are usually sizeable and immediately influence share market segments worldwide. The event study method and the effects reveal that share marketplace throughout major impacted nations, and even locations dropped swiftly following the herpes simplex virus episode. Nations within South America encountered considerably more destructive irregular profits in comparison with other

nations around the world. Rabhi (2020) and Yan et al. (2020) investigated the effects of the coronavirus "COVID-19" and discovered that markets can react unfavourably to particular events throughout the growth phase to be able to operate this sort of marketplace. Furthermore, they will offer to brief industrial sectors that are immediately infected with herpes during the growth process to eventually identify potential areas where fantastic money may be generated.

Onali (2020) researched the effect associated with COVID-19 circumstances plus connected demise for the individuals' Wall Street game (Dow Jones and S&P500 indices), enabling adjustments inside buying and selling quantity and movements targets addition to day-of-the-week results. Then, centered the GARCH (1, 1) design plus info through 8 April 2019, to 9 April 2020, claim that modifications then our number of instances in addition to fatalities in the USA and even six different nations extremely afflicted with the particular COVID-19 turmoil do not have a direct effect relating to the US all stock exchange profits, in addition to the amount of described notations to get Chinese suppliers. VAR model reveals that the amount of claimed fatalities within Croatia and Portugal possess a destructive effect that reveals exchange earnings and an impact in the particular VIX results. Lastly, Markov-Switching products claim that in late January 2020, typically, the value from VIX's destructive influence upon stock exchange revenue elevated threefold. Heyden and Heyden (2020) examine the short-term stock market reaction beginning to the end of the COVID-19 pandemic. They use the event study method and found that futures behave significantly badly for the statement of your first loss of life within an offered nation. Although the outcomes advised that bulletins involving country-specific financial insurance plan steps adversely influence financial results, personal insurance policy actions have the prospect of relaxing market segments. He et al. (2020) attempted to discover the particular immediate results plus spill-overs associated with COVID-19 upon share marketplace using standard *t*-tests plus non-parametric Mann-Whitney assessments, all of us empirically evaluate everyday come back information through inventory marketplaces within the People's Republic regarding the Far East, South Korea, and Italy. The country of Spain, the Philippines, Asia, as well as the United States. Their scientific outcomes demonstrated COVID-19 includes an unfavorable yet immediate state on share market segments involving impacted nations and (ii) COVID-19 upon share marketplaces offers bidirectional spill-over outcomes, among parts of Asia. Nevertheless, there is no proof that COVID-19 adversely impacts a lot more than it can a global regular. The outcomes further offered the foundation for evaluating worldwide share marketplaces' styles once the scenario is relieved globally.

Al-Awadhi et al. (2020) employed a panel regression approach to investigate the relationship between COVID-19 cases and stock returns in China. Their findings revealed a significant negative correlation, suggesting that rising case numbers coincided with declines in stock market performance. Similarly, Liu et al. (2020) utilized event study techniques to analyze the impact on major stock indices worldwide. They observed a negative impact across all affected countries and areas, with Asian markets experiencing steeper declines compared to others. Zhang et al. (2020) further explored the relationship between stock market risks and the COVID-19 outbreak, highlighting the pandemic's disruptive influence on global financial markets . While the initial focus was on immediate market reactions, studies by Baker

et al. (2020) provided valuable insights into the early market responses to COVID-19. Furthermore, research by Jung (2024) investigates the impact of the COVID-19 outbreak on connectivity in Korean stock markets. The study finds increased linkage and information flow between markets, resulting in synchronization of indices. Liu et al. (2023) finds COVID-19 adversely affects transportation, mining, electricity & heating, and environment sectors in the Chinese stock market, while manufacturing, information technology, education, and health-care sectors remain resilient. These studies collectively demonstrate the widespread effect of COVID-19 on various financial instruments and markets globally.

Several studies have investigated the impact of COVID-19 on GCC stock markets given the region's dependence on hydrocarbon revenues and the volatility of its stock markets. Al-Kandari et al. (2022) examined the influence of COVID-19 on GCC stock market indices, confirming a negative impact. However, their research also suggests that the effect varied across countries and over time. Similarly, Salman and Ali (2024) employed event study methodology to analyze the impact on GCC markets, finding a short-term negative effect. Interestingly, some studies propose a potentially mitigating effect of the GCC's reliance on oil revenue. Hassan et al. (2021) suggests that GCC markets might have been less impacted compared to others due to this buffer during the initial stages of the pandemic. Al-Hashemi and Guo (2020) further explored this concept by conducting a comparative analysis of stock market reactions across GCC countries, highlighting potential variations based on individual economic structures.

Shaik (2021) examines COVID-19's impact on Saudi Arabia's stock market returns, revealing significant negative effects, including negative Abnormal Returns (AR) on the event date and persistently negative Cumulative Abnormal Returns (CAR) across multiple event windows. Khan et al. (2021) investigate the impact of COVID-19 on Islamic stock market behavior and volatility persistence. Their findings suggest varying short-term reactions among Islamic stock indices, with heightened volatility persisting post-pandemic declaration by the WHO. Irfan et al. (2020) analyzes the impact of COVID-19 on Islamic stock markets, revealing divergent reactions, with the BSE Shariah Index showing a negative response and the Jakarta Islamic Index (JII) exhibiting a positive reaction. Bahrini and Filfilan (2020) observe that GCC stock markets responded negatively to COVID-19 deaths but not cases, with returns declining as deaths increased, while also noting the influence of crude oil prices and global market volatility.

Following this, to investigate this epidemic event's effect, we employ an event approach in this paper to demonstrate how the GCC market reacts to COVID-19. For this, we use the event study methodology adapted to analyse the cumulative abnormal return (CAR) of GCC countries' stock indexes.

3. Data and methodology

This research uses an event study methodology to explain the economic impact of COVID-19 on GCC stock markets. The collected data used in this research are daily closing stock prices of these 8 indexes: the Kuwait Stock Exchange Index (KSE), Dubai Financial Market Index (DFM), Saudi Arabia Tadawul Index (TASI), Qatar

Exchange Index (QE), Bahrain All Share Index (BHB), Oman's Muscat Stock Exchange Index (MSM), Abu Dhabi Stock Exchange Index (ADX) and the S&P GCC Composite Index as a reference. The estimation window interval is 250 days (1 year), widely used in the event study approach (MacKinlay, 1997). The event window from March 1 allows for a more focused and manageable analysis period. It captures the period when the pandemic's effects on GCC markets were most acute, facilitating a more targeted examination of market dynamics and investor behavior during this critical phase. Data were taken from 28 July 2019 to 27 July 2020, and (1 March 2020) is the event day in the time window because based on data in Alandijany et al. (2020), it was stated that the average lockdown policy and handling of the coronavirus were taken in March 2020 as the following data presented in **Figure 1**.

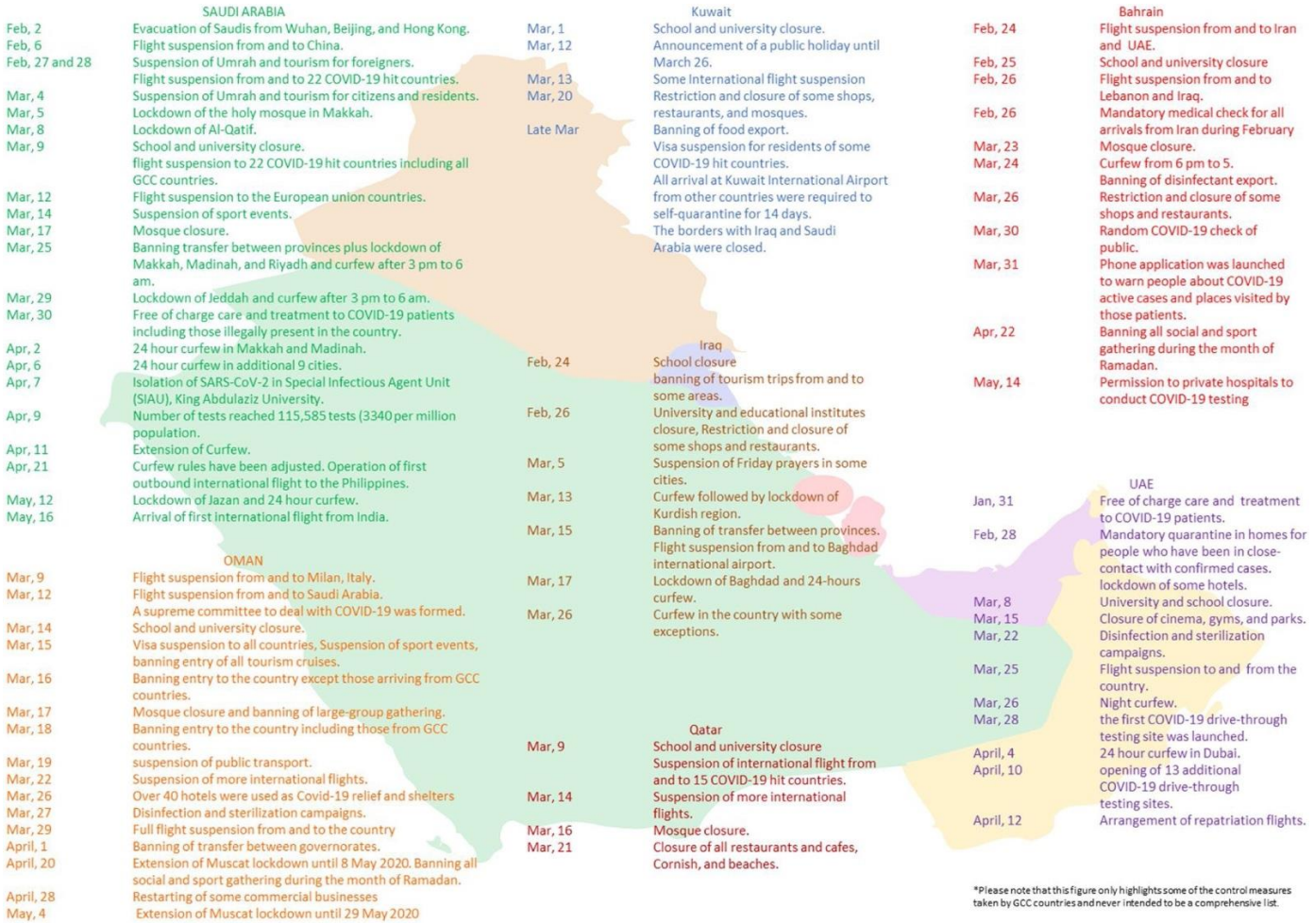

Figure 1. Control, policy, and management practices by GCC Countries Government during COVID-19 outbreak (Alandijany et al., 2020).

The news of the coronavirus began to surface in January, but the financial markets often require some time to fully digest and react to new information. Initial market reactions can be resilient or even optimistic when new threats surface, as was the case during the pandemic's early stages. The understanding by the public in March of the pandemic's gravity was a turning point that led to sharper market reactions. The time window in this study is divided into the post-event window and the estimation window; the post-event window is the time of the event (1 March 2020) until the end

of the data collection period, which is 27 July 2020. The estimation window in this study is taken from the date before the first case was found. COVID-19 in GCC countries was recorded on 29 January 2020 (Alandijany et al., 2020) until the initial data collection period, 28 July 2019. So that the overall timeline in this study can be summarized as shown in **Figure 2**.

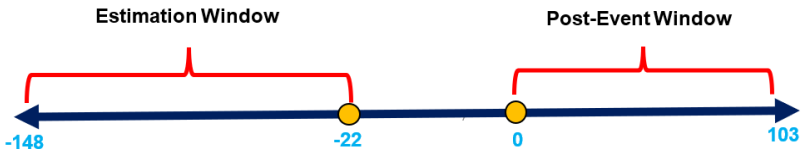

Figure 2. Event timeline.

In this study, the event study methodology research employed two methods, namely: 1) mean adjusted return; and 2) market model. Both methodologies are used to calculate the cumulative abnormal returns ($CAR_{i,(t1,t2)}$) and daily abnormal returns (AR_{it}) of every stock on each day in the time window, including event day (1 March 2020).

3.1. Standard mean-adjusted returns

Standard mean-adjusted return is the original event methodology described by Brown and Warner (1985). The standard mean-adjusted return is calculated by looking at the difference between the stock return on each GCC country's stock index on each day in the timeline event with the average return of stock (i) daily return during the estimation period. Based on the equations adopted by Brown and Warner's (1985), the mean-adjusted return is written in Equation (1) below:

$$AR_{it} = R_{it} - \overline{R_i} \quad (1)$$

while R_{it} is any GCC member stock index return on a specific (t) day, and $\overline{R_i}$ is the average of any GCC member stock index daily stock return during the estimation period (−148, −22).

3.2. Market model abnormal returns

Researchers more often use the market model expected return model than standard mean-adjusted return as the origin event methodology approach. The market model for each stock market index of GCC countries member can be written as Equation (2) below:

$$R_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} + \varepsilon_{it} \quad (2)$$

while i on R_{it} start from 1 to 7, which refers to the number of the stock index that used in this study on a certain t day which is the part of an estimation window. $\hat{\alpha}_i$ and $\hat{\beta}_i$ were estimated from an ordinary least squares (OLS), which are the market model parameters. R_{mt} is the S&P GCC Composite Index return on (t) day in the same period. Equation (3) determine the expected return ($E(R_{it})$) as follows:

$$E(R_{it}) = \hat{\alpha}_i + \hat{\beta}_i R_{mt} \quad (3)$$

where:

$$AR_{it} = R_{it} - E(R_{it}) \quad (4)$$

AR_{it} refers to the abnormal return on certain GCC stock index during event period t. For measuring event's total impact to any particular period (in the term of "event window"), an individual abnormal return added to calculate the cumulative abnormal return (CAR) for [−22, 22], [0.30], [0.60] and [0.103] event windows as Equation (5) below:

$$CAR_{i,(t1,t2)} = \sum_{t=t_1}^{t_2} AR_{it} \quad (5)$$

while t_1 is the start of the event window, and t_2 is the end of the event window.

When abnormal return and cumulative abnormal return data are obtained from the calculation results for each stock index in GCC countries over the entire time window, both will be tested to determine whether there are differences in abnormal returns and cumulative abnormal returns between before handling COVID-19 (lockdown and other policies to deal with the COVID-19 outbreak) and before handling COVID-19 by the GCC countries government. When individual and cumulative abnormal return data are found to be normally distributed, parametric statistical testing is performed; if neither is found to be normally distributed, non-parametric statistical testing is utilized. A parametric test that may be used to compare before and after the COVID-19 epidemic is the paired t-test, whereas the Wilcoxon-test was used as a non-parametric statistic.

4. Results and discussion

The study's initial exploration of abnormal returns on the event day amidst the COVID-19 pandemic is summarized in **Table 1**. The table provides insights into the varied impacts observed across Gulf Cooperation Council (GCC) member states' stock indexes. Notably, it highlights significant negative abnormal returns for the Bahrain All Share Index (BHB) and Abu Dhabi Stock Exchange Index (ADX), indicative of pronounced market reactions. Conversely, the Qatar Exchange Index (QE) exhibited a positive abnormal return, while the Kuwait Stock Exchange Index (KSE) displayed a substantial positive abnormal return, albeit statistically insignificant. Conversely, the Saudi Arabia Tadawul Index (TASI) and Dubai Financial Market Index (DFM) registered significant negative abnormal returns.

Table 1. Abnormal returns on the event day.

	AR	***t*-statistics**
PHB	−21.8627	−2.3793**
ADX	−16.1467	−3.3529***
MSM	15.5211	0.4208
QE	4.9216	2.1746***
TASI	−10.1468	−2.5676***
KSE	170.5641	1.5186
DFM	−7.0522	−2.5336***

Notes: *t*-statistics are given in parenthesis. ***, **, * indicates the level of significance at 1%, 5% and 10% respectively.

Table 2 presents the cumulative abnormal returns (CAR) for various Gulf Cooperation Council (GCC) member states' stock indexes over a series of trading days

following the COVID-19 event. Noteworthy observations include a consistent negative trend in the Bahrain All Share Index (BHB), accentuated by significant negative CAR values across multiple time intervals. Conversely, the Abu Dhabi Stock Exchange Index (ADX) exhibits a mixed pattern with both positive and negative CAR values, albeit without statistical significance. The Muscat Stock Exchange Index (MSM) experiences fluctuations in CAR, occasionally displaying positive values but overall failing to demonstrate a significant trend. Similarly, the Qatar Exchange Index (QE) fluctuates with sporadic positive CAR values, indicating varying market responses. The Saudi Arabia Tadawul Index (TASI) reveals a declining trend, marked by consistently negative CAR values, particularly in the latter trading days. Conversely, the Kuwait Stock Exchange Index (KSE) exhibits a generally positive CAR trend, albeit with occasional dips, suggesting a relatively resilient market performance. The Dubai Financial Market Index (DFM) reflects a similar pattern to TASI, with a downward trend in CAR, indicative of market distress.

Table 2. Cumulative abnormal returns (CAR).

	BHB	**ADX**	**MSM**	**QE**	**TASI**	**KSE**	**DFM**
t + 20	−4.2135 (−0.4586)	101.8114*** (21.1418)	34.4374 (0.9337)	−43.9415*** (−19.4160)	−17.7377*** (4.4885)	122.4442 (1.0902)	39.0592*** (14.0324)
t + 19	−9.6125 (−0.5876)	35.2092*** (−11.8343)	81.5142 (1.2764)	−61.2047*** (−7.6279)	−31.3268*** (−3.4387)	252.1640 (1.1550)	44.2263 (1.8564)
t + 18	−16.3756 (−0.7360)	107.8176*** (16.4820)	104.9435 (0.6352)	−74.5836*** (−5.9116)	−13.9558*** (4.3957)	362.8818 (0.9858)	7.2000*** (13.3021)
t + 17	−20.3387 (−0.4313)	45.3909*** (−12.1404)	134.2048 (0.7933)	−84.6095*** (−4.4300)	−18.6902 (−1.1980)	472.2009 (0.9733)	36.1725*** (10.4087)
t + 16	−29.1155 (−0.9552)	53.2073*** (3.4457)	168.3902 (0.9268)	−62.3795*** (9.8225)	70.0972*** (22.4675)	592.8285 (1.0740)	8.7049*** (−9.8680)
t + 15	−33.8146 (−0.5114)	−15.2754*** (−13.2451)	229.9993* (1.6704)	−33.8788*** (12.5934)	118.4923*** (12.2463)	714.9220 (1.0871)	−12.8890*** (−7.7578)
t + 14	−31.4348 (0.2590)	−7.6204 (1.0954)	288.3595 (1.5823)	−23.1988*** (4.7191)	97.1097*** (−5.4108)	836.0421 (1.0784)	−29.9789*** (−6.1397)
t + 13	−36.7728 (−0.5809)	−29.9766*** (−3.5339)	317.6259 (0.7935)	−34.7235*** (−5.0923)	29.7602*** (17.0427)	951.9598 (1.0321)	−56.7838*** (−9.6300)
t + 12	−44.0238 (−0.7891)	−31.8560 (1.1154)	360.9320 (1.1741)	−57.3332*** (−9.9904)	34.1948 (1.1222)	1070.239 (1.0531)	−69.7516*** (−4.6588)
t + 11	−45.9016 (−0.2044)	−76.3752*** (−8.8548)	450.7362** (2.4348)	−57.6938 (−0.1593)	22.9532*** (−2.8447)	1181.5860 (0.9914)	−100.726*** (11.1281)
t + 10	43.1042*** (9.6866)	27.3221*** (3.0508)	487.9444 (1.0088)	−66.0267*** (−3.6820)	6.2030*** (−4.2386)	1302.804 (1.0793)	−68.6687*** (11.5172)
t + 9	0.3836*** (−4.6493)	1.1123*** (3.4286)	511.5794 (0.6043)	−88.7941*** (−3.6151)	−30.6212*** (−3.3461)	1435.830 (1.1844)	−64.0560 (1.7026)
t + 8	−0.9690 (−0.1472)	−28.6892*** (−7.7998)	549.7468 (−0.6577)	−86.3571 (2.2386)	−28.9498*** (−3.3256)	1544.057 (0.9636)	−76.9385*** (−5.3842)
t + 7	3.6286 (0.5004)	−30.5008*** (4.2074)	584.0353 (−1.1335)	−85.0775 (0.8341)	10.9211*** (−4.7757)	1663.053 (1.0595)	−79.1107*** (−7.2454)
t + 6	16.1043 (1.3577)	−50.7895*** (2.2798)	−886.9464*** (−0.4921)	−85.1312 (5.2175)	6.3949*** (−6.2705)	1781.714 (1.0565)	−111.776*** (−9.2219)
t + 5	339.5173*** (35.1974)	244.5257*** (10.0135)	−945.9803 (−1.3087)	−102.505*** (−2.2711)	−1.6156*** (−4.7762)	1904.142 (1.0900)	−132.153*** (10.2005)

Table 2. (*Continued*).

	BHB	ADX	MSM	QE	TASI	KSE	DFM
$t+4$	211.6810*** (−13.9126)	147.6404*** (−6.5397)	−895.1605 (−2.5557)	−122.4552*** (−2.1841)	−50.3796*** (−6.6791)	2044.814 (1.2525)	−98.2665*** (7.0283)
$t+3$	248.7295*** (4.0320)	183.0712 (1.1704)	−841.1671 (−2.7970)	−128.3378*** (2.0739)	−79.1486*** (−5.6819)	2170.606 (1.1200)	−97.6774*** (−9.6106)
$t+2$	216.2737*** (−3.5322)	127.9393*** (−4.6350)	−839.9305 (−0.4171)	−119.3251*** (−2.1607)	−44.4433*** (−3.7176)	2259.397 (0.7906)	−115.450*** (−9.1512)
$t+1$	177.2579*** (−4.2461)	84.8778 (−3.0334)	−796.6790 (−1.1065)	−133.9767*** (−0.2019)***	−56.9376*** (−1.9407)	2381.498 (1.0871)	−118.965*** (−9.0693)
t	155.3951** (−2.3793)	46.8684*** (−1.2111)	−781.1579 (−0.4204)	−129.0551** (2.4293)	−67.0844** (−1.1719)	2552.062 (1.5186)	−126.017*** (−8.7552)
$t-1$	136.5209** (−2.0541)	21.9220 (−0.2333)	−765.1155 (0.0946)	−110.9250*** (−3.5910)	−84.6035*** (0.9389)	2414.7698 (−1.2224)	−128.057*** (−9.3872)
$t-2$	121.2826* (−1.6584)	29.0452*** (−1.3186)	−735.4664 (−1.0742)	−99.2860*** (−0.9434)	−76.0576 (0.4542)	−2073.6*** (−39.9632)	−117.250*** (−8.2146)
$t-3$	140.7568** (2.1194)	43.4709 (−0.1269)	−700.1971 (−1.6067)	−98.4224*** (3.0183)	−72.4691 (1.1833)	−2063.233 (0.0929)	−115.567*** (−7.5932)
$t-4$	127.1278 (−1.4833)	26.1007 (−1.1760)	−664.0619 (−0.7743)	−93.1170** (−1.7397)	−65.1694 (0.4368)	−2039.653 (0.2099)	−116.386*** (−8.1318)
$t-5$	118.7737 (−0.9092)	35.1737*** (−0.9315)	−626.2887 (−0.6832)	−91.5350 (1.1745)	−69.0316 (−1.2947)	−1967.703 (0.6406)	−110.427*** (−7.3775)
$t-6$	98.7080** (−2.1838)	39.2060*** (−0.9461)	−593.0197 (−0.3164)	−98.9102*** (−0.3041)	−76.5572 (−0.2547)	−1850.888 (1.0401)	−93.7335*** (−5.2857)
$t-7$	108.6992 (1.0874)	41.0368* (0.6480)	−567.3743 (−0.2996)	−90.8279*** (0.7803)	−64.7181 (0.1602)	−1729.570 (1.0802)	−89.8813*** (−6.5785)
$t-8$	103.3025 (−0.5873)	48.2728*** (1.6008)	−532.3512 (−0.1192)	−76.4999*** (1.0704)	−62.8015 (1.2806)	−1635.154 (0.8406)	−81.4794*** (−4.6106)
$t-9$	86.4191* (−0.6785)	24.0266 (−0.2939)	−498.2596 (−0.2184)	−78.7390 (−0.2918)	−54.9789 (1.1819)	−1532.661 (0.7027)	−80.5543*** (−5.3371)
$t-10$	78.1243 (−0.8940)	17.3587 (−0.4549)	−466.0794 (−0.2483)	−76.4884 (0.1881)	−50.9604 (1.1609)	−1414.455 (0.6936)	−76.7470*** (−4.3459)
$t-11$	70.8318 (−1.0321)	13.7232 (−0.6343)	−434.7858 (−0.3922)	−80.535 (−0.0316)	−50.0338 (0.2141)	−1301.116 (0.6439)	−76.1864*** (−4.1759)
$t-12$	61.4197 (−1.0809)	8.3008 (−0.8031)	−397.9579 (−0.2804)	−80.0019 (0.4687)	−40.5878 (0.6120)	−1170.707 (0.7621)	−70.3655*** (−3.9076)
$t-13$	50.9787 (−1.1476)	−4.8978 (−1.2839)	−357.5557 (−0.1865)	−79.0495 (0.4025)	−35.2603 (0.6223)	−1052.162 (0.8204)	−68.7676*** (−3.6268)
$t-14$	43.1473 (−1.2025)	−5.2876 (−1.4119)	−320.8326 (−0.1567)	−57.9334 (1.0580)	−20.7033 (0.6904)	−917.240 (0.7996)	−62.1320*** (−2.9293)
$t-15$	32.9009 (−1.2302)	4.3265*** (−1.2574)	−272.7314 (−0.1132)	−54.3021 (0.8170)	−19.3963 (0.2287)	−789.493 (0.5674)	−47.4585*** (−2.0789)
$t-16$	27.9402 (−1.2972)	−2.8126 (−1.3895)	−232.1819 (−0.0792)	−34.0068 (1.0415)	−9.4406 (0.1074)	−678.807 (0.3394)	−43.8077 (−1.4473)
$t-17$	13.9185 (−1.2172)	10.9133*** (−1.1937)	−191.0600 (−0.0652)	−13.4730 (0.5372)	3.0339 (0.1105)	−575.888 (0.1699)	−31.6678 (−1.1198)
$t-18$	15.2555 (−0.9389)	24.8054*** (−0.9410)	−141.6865 (−0.0484)	−9.5406 (0.1609)	5.3390 (0.1831)	−459.177 (0.2177)	−17.1523 (−0.5925)
$t-19$	9.1757 (−0.7004)	14.7615 (−0.3561)	−90.0253 (−0.0273)	−6.2868 (0.0875)	7.0952 (−0.0638)	−337.2719 (−0.1049)	−14.1302 (−0.3285)
$t-20$	−0.3449 (−0.0847)	13.3073* (−0.3284)	−53.8672 (−0.0188)	−9.7971 (0.0677)	−3.2461 (0.0143)	−228.0434 (−0.0379)	−2.2866 (−0.0352)

Notes: *t*-statistics are given in parenthesis. ***, **, * indicates the level of significance at 1%, 5% and 10% respectively.

Table 3. Aggregate ARR & CAARs.

	Average abnormal returns	***t*-stats (ARR)**	**Cumulative average abnormal returns**	***t*-stats (CAARs)**
t + 20	33.12277	1.97728**	27.54289	0.75150
t + 19	12.67470	0.75662	38.10621	1.03972
t + 18	24.81731	1.48148	67.24684	1.83481*
t + 17	12.90944	0.77064	75.45120	2.05866**
t + 16	35.16843	2.09940**	113.28973	3.09107***
t + 15	24.36027	1.45420	140.06354	3.82159***
t + 14	22.76327	1.35887	165.60819	4.51856***
t + 13	2.44981	0.14624	171.12471	4.66908***
t + 12	18.36614	1.09638	190.30754	5.19248***
t + 11	16.29354	0.97265	210.75783	5.75045***
t + 10	38.44271	2.29486**	257.33594	7.02132***
t + 9	10.78178	0.64362	261.35582	7.13100***
t + 8	15.40263	0.91947	278.40558	7.59620***
t + 7	27.20735	1.62416	306.58003	8.36493***
t + 6	−201.40786	−12.02320***	111.62097	3.04554***
t + 5	44.70664	2.66879***	205.44051	5.60537***
t + 4	8.54005	0.50980	190.87718	5.20802***
t + 3	25.87917	1.54487	221.96483	6.05623***
t + 2	8.69163	0.51885	228.55885	6.23615***
t + 1	13.08993	0.78141	236.57726	6.45493***
t	19.39977	1.15808	253.86124	6.92652***
t − 1	−21.08942	−1.25894	230.36696	6.28548***
t − 2	−631.52397	−37.69920***	−404.87783	−11.04700***
t − 3	9.46553	0.56505	−392.87057	−10.71930***
t − 4	7.73297	0.46162	−386.96762	−10.55830***
t − 5	17.49644	1.04446	−371.51598	−10.13670***
t − 6	22.27292	1.32959	−354.49443	−9.67226***
t − 7	24.65245	1.47164	−328.96497	−8.97569***
t − 8	23.04599	1.37574	−307.89022	−8.40068***
t − 9	16.97812	1.01352	−293.45617	−8.00685***
t − 10	21.97071	1.31155	−273.21434	−7.45456***
t − 11	19.77679	1.18059	−254.55942	−6.94557***
t − 12	25.37352	1.51469	−231.36203	−6.31263***
t − 13	21.94666	1.31012	−211.13521	−5.76075***
t − 14	30.50901	1.82125*	−182.69292	−4.98471***
t − 15	29.29635	1.74886*	−156.95655	−4.28250***
t − 16	25.42837	1.51796	−132.75840	−3.62227***
t − 17	28.98784	1.73045*	−107.50793	−2.93332***
t − 18	28.67564	1.71181*	−80.71494	−2.20228**
t − 19	24.50783	1.46301	−57.50738	−1.56907
t − 20	20.27491	1.21032	−40.28450	−1.09915

Notes: *t*-statistics are given in parenthesis. ***, **, * indicates the level of significance at 1%, 5% and 10% respectively.

Table 3 presents the aggregate abnormal returns (ARR) and cumulative average abnormal returns (CAARs) for the specified time intervals relative to the COVID-19 event. Notably, at $t + 20$, the aggregate ARR stands at 33.12277, indicating a statistically significant abnormal return with a *t*-statistic of 1.97728 at the 1% significance level. Similarly, the corresponding CAARs at $t + 20$ is 27.54289, also statistically significant with a *t*-statistic of 0.75150 at the 1% significance level. Throughout the subsequent time intervals, various ARR and CAAR values exhibit statistically significant trends, with *t*-statistics indicating significance levels of 1%, 5%, or 10%. Noteworthy fluctuations in ARR and CAAR values occur, suggesting varying market responses to the COVID-19 event over time. These findings underscore the dynamic nature of market behavior and the importance of analyzing aggregated abnormal returns to gauge overall market performance in response to significant events.

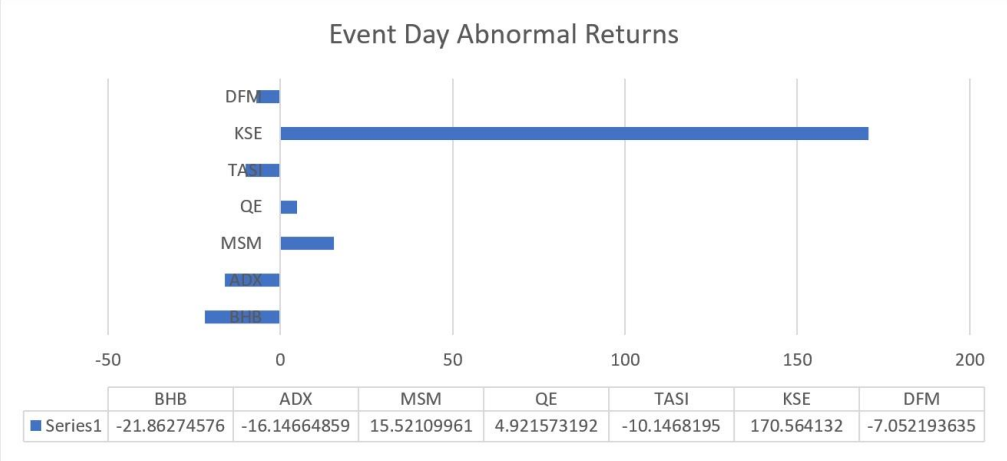

Figure 3. Event day (1 March 2020) abnormal returns.

The **Figure 3** depicting abnormal returns on the event day (*T*) reveals varied market responses within GCC member states to the COVID-19 event. While Kuwait Stock Exchange (KSE) and Dubai Financial Market (DFM) show significant negative abnormal returns, indicating a decline in stock prices, Qatar Exchange (QE) surprisingly displays a positive abnormal return, suggesting an increase in stock prices. These contrasting reactions highlight the complexity of market dynamics in response to external shocks like the COVID-19 pandemic.

In conclusion, the study has provided valuable insights into the impact of the COVID-19 pandemic on the economies of Gulf Corporation Council (GCC) member states, as evidenced by the analysis of stock market data using event study methodology. The findings reveal significant abnormal returns and cumulative average abnormal returns (CAARs) across various time intervals surrounding the COVID-19 event, indicating substantial market reactions. Notably, fluctuations in abnormal returns suggest dynamic market responses to the pandemic, with some periods witnessing statistically significant abnormal returns while others show less pronounced effects. These results underscore the importance of assessing market behavior comprehensively to understand the nuanced economic implications of major

events such as the COVID-19 pandemic. Moving forward, policymakers and market participants can use these insights to better navigate the challenges posed by the pandemic and formulate effective strategies to mitigate its impact on regional economies.

5. Implication and limitation

Future research is expected to be able to develop this research either by adding other factors that can influence the stock market exchange as a control variable or covariate in research. By adding covariates into research, model robust and unbiased results can be achieved. Factors that can be included in the model include inflation, GDP, export and import trading activity, and other macroeconomic factor. Finally, this event study lacks the moment after the COVID-19 pandemic, since this pandemic has not been resolved yet. Therefore, future researchers who want to conduct similar research can include the condition after the COVID-19 vaccine has been found or the panic of the pandemic has been encouraged.

Author contributions: Conceptualization, RRS; methodology, RRS; software, RRS; validation, RRS; formal analysis, KK; investigation, MSA; resources, MSA; data curation, KK; writing—original draft preparation, MSA; writing—review and editing, MNA; visualization, MSA; supervision, KK and MSA; project administration, KK and MNA; funding acquisition, KK. All authors have read and agreed to the published version of the manuscript.

Data availability statement: Data will be made available upon request.

Conflict of interest: The authors declare no conflict of interest.

References

Alam, M.N., Alam, M.S., Chavali, K. (2020). Stock Market Response during COVID-19 Lockdown Period in India: An Event Study. Journal of Asian Finance, Economics and Business, 7(7), 131–137. https://doi.org/10.13106/jafeb.2020.vol7.no7.131

Alandijany, T. A., Faizo, A. A., & Azhar, E. I. (2020). Coronavirus disease of 2019 (COVID-19) in the Gulf Cooperation Council (GCC) countries: Current status and management practices. Journal of Infection and Public Health, 13(6), 839–842. https://doi.org/10.1016/j.jiph.2020.05.020

Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., et al. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. Journal of Behavioral and Experimental Finance, 27, 100326. https://doi.org/10.1016/j.jbef.2020.100326

Al-Kandari, A., AlRoomy, M., & Al-Roumi, K. (2022). The Influence of the COVID-19 on the GCC Stock Markets. International Journal of Business and Management, 17(4), 42. https://doi.org/10.5539/ijbm.v17n4p42

Ashraf, B. N. (2020). Stock markets' reaction to COVID-19: Cases or fatalities? Research in International Business and Finance, 54, 101249. https://doi.org/10.1016/j.ribaf.2020.101249

Ayoub, R. (2020). Stock market vulnerability to the COVID-19 pandemic: Evidence from emerging Asian stock markets. Available online: https://mpra.ub.uni-muenchen.de/101774/ (accessed on 1 April 2024).

Bahrini, R., & Filfilan, A. (2020). Impact of the novel coronavirus on stock market returns: evidence from GCC countries. Quantitative Finance and Economics, 4(4), 640–652. https://doi.org/10.3934/qfe.2020029

Baker, S., Bloom, N., Davis, S., et al. (2020). The Unprecedented Stock Market Impact of COVID-19. National Bureau of Economic Research. https://doi.org/10.3386/w26945

Bash, A. (2020). International evidence of covid-19 and stock market returns: an event study analysis. International Journal of Economics and Financial Issues, 10(4), 34–38. https://doi.org/10.32479/ijefi.9941

Bash, A., & Alsaifi, K. (2019). Fear from uncertainty: An event study of Khashoggi and stock market returns. Journal of Behavioral and Experimental Finance, 23, 54–58. https://doi.org/10.1016/j.jbef.2019.05.004

Brown, S. J., & Warner, J.B. (1985) Using Daily Stock Returns The Case of Event Studies. Journal of Financial Economics, 14, 3–31. https://doi.org/10.1016/0304-405X(85)90042-X

Buigut, S., & Kapar, B. (2020). Effect of Qatar diplomatic and economic isolation on GCC stock markets: An event study approach. Finance Research Letters, 37, 101352. https://doi.org/10.1016/j.frl.2019.101352

Hasan, M. B., Mahi, M., Hassan, M. K., et al. (2021). Impact of COVID-19 pandemic on stock markets: Conventional vs. Islamic indices using wavelet-based multi-timescales analysis. The North American Journal of Economics and Finance, 58, 101504. https://doi.org/10.1016/j.najef.2021.101504

He, P., Sun, Y., Zhang, Y., et al. (2020). COVID–19's Impact on Stock Prices Across Different Sectors—An Event Study Based on the Chinese Stock Market. Emerging Markets Finance and Trade, 56(10), 2198–2212. https://doi.org/10.1080/1540496x.2020.1785865

He, Q., Liu, J., Wang, S., et al. (2020). The impact of COVID-19 on stock markets. Economic and Political Studies, 8(3), 275–288. https://doi.org/10.1080/20954816.2020.1757570

Heyden, K. J., & Heyden, T. (2020). Market Reactions to the Arrival and Containment of COVID-19: An Event Study. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3587497

Huaxia. (2020). GCC stock markets in financial, real estate sectors most impacted by COVID-19: report. Available online: http://www.xinhuanet.com/english/2020-09/01/c_139334758.htm (accessed on 1 April 2024).

Irfan, M., Kassim, S., & Dhimmar, S. (2021). Impact of COVID-19 on Islamic Stock Markets: An Investigation using Threshold Volatility and Event Study Models. International Journal of Islamic Economics and Finance (IJIEF), 4(1). https://doi.org/10.18196/ijief.v4i1.10480

Jung, D. S. (2024). The Impact of COVID-19 on Volatility Connectedness in The Korean Stock Markets: Focusing on Firm Size. Educational Administration: Theory and Practice, 30(4), 6030–6041. https://doi.org/10.53555/kuey.v30i4.2335

Khan, M. A., Saleem, Q., & Ilyas, A. (2021). The effect of COVID-19 on Stock Market Returns-Evidence from Italy and China. GISRAS Journal of Management & Islamic Finance (GJMIF), 1(4).

Kim, J., Kim, J., Lee, S. K., et al. (2020). Effects of epidemic disease outbreaks on financial performance of restaurants: Event study method approach. Journal of Hospitality and Tourism Management, 43, 32–41. https://doi.org/10.1016/j.jhtm.2020.01.015

Liu, H., Manzoor, A., Wang, C., et al. (2020). The COVID-19 Outbreak and Affected Countries Stock Markets Response. International Journal of Environmental Research and Public Health, 17(8), 2800. https://doi.org/10.3390/ijerph17082800

Liu, J., He, Q., Li, Y., et al. (2023). The change in stock-selection risk and stock market returns. International Review of Financial Analysis, 85, 102457. https://doi.org/10.1016/j.irfa.2022.102457

Liu, Z., Huynh, T. L. D., & Dai, P. F. (2021). The impact of COVID-19 on the stock market crash risk in China. Research in International Business and Finance, 57, 101419. https://doi.org/10.1016/j.ribaf.2021.101419

MacKinlay, A. C. (1997), Event Studies in Economics and Finance. Journal of Economic Literature, 35, (1), 13–39.

Onali, E. (2020). COVID-19 and Stock Market Volatility. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3571453

Parasie, N. (2020) Abu Dhabi Wealth Fund's Appetite for Private Equity Grows as Returns Slip. Available online: https://www.wsj.com/articles/abu-dhabi-wealth-funds-appetite-for-private-equity-grows-as-returns-slip-1499181230 (accessed on 1 April 2024).

Ramelli, S., & Wagner, A. F. (2020). Feverish Stock Price Reactions to the Novel Coronavirus. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3550274

Saleem, A., Bárczi, J., & Sági, J. (2021). COVID-19 and Islamic Stock Index: Evidence of Market Behavior and Volatility Persistence. Journal of Risk and Financial Management, 14(8), 389. https://doi.org/10.3390/jrfm14080389

Salman, A., & Ali, Q. (2021). COVID-19 and its impact on the stock market in GCC. Journal of Sustainable Finance & Investment, 14(1), 220–236. https://doi.org/10.1080/20430795.2021.1944036

Shaik, A. R. (2021). COVID-19 pandemic and the reaction of Asian stock markets: Empirical evidence from Saudi Arabia. Journal of Asian Finance, Economics and Business, 8(12), 1–7. https://doi.org/10.13106/jafeb.2021.vol8.no12.0001

Ubhar Capital. (2020). Periodic Reports. Available online: https://u-capital.net/periodic-reports/ (accessed on 15 January 2024).

Yan, B., Stuart, L., Tu, A., et al. (2020). Analysis of the Effect of COVID-19 on the Stock Market and Investing Strategies. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3563380

Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. Finance Research Letters, 36, 101528. https://doi.org/10.1016/j.frl.2020.101528