



Research article

Impact of the novel coronavirus on stock market returns: evidence from GCC countries

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Abstract: The novel coronavirus (COVID-19) is not only an unprecedented human and health crisis, but it is expected to become one of the most economically costly pandemics in recent history. Latest financial reports indicate that the COVID-19 outbreak is severely disrupting the global economy and financial markets. Many equity markets around the world have endured heavy declines since the pandemic's outbreak. To provide an understanding of the effects of the novel coronavirus pandemic on stock markets, we investigate in this paper the impact of the COVID-19 confirmed cases and deaths on the daily returns of the major stock market indices in the Gulf Cooperation Council (GCC) countries over the period from April 1, 2020 to June 26, 2020. Using a panel data regression analysis, we find that stock markets in the GCC countries responded negatively and with a great degree to new and total COVID-19 confirmed deaths, while response to the number of COVID-19 confirmed cases is not significant. Therefore, during the COVID-19 outbreak daily returns of the major stock market indices in the GCC countries declined as the number of confirmed deaths increased. Further analysis suggests that GCC stock markets are impacted positively by the crude oil price (WTI) and negatively by the variation of the implied volatility in the global oil market and the global stock markets.

Keywords: coronavirus; COVID-19 outbreak; stock market returns; GCC; panel data model; stock market indices; confirmed cases; confirmed deaths; crude oil price; implied volatility

JEL Codes: G10, C33, I15

1. Introduction

The novel coronavirus, named by the WHO “coronavirus disease 2019 (COVID-19)”, is the infectious disease caused by the most recently discovered coronavirus. It was first discovered at the end of December 2019 in Hubei Province in central China. WHO says that COVID-19 belongs to a large family of coronaviruses known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS).

COVID-19 is considered by many studies to be particularly very contagious, which explains why it has quickly spread through human-to-human transmission to many countries around the world (Ahmad et al., 2020; Arshad Ali et al., 2020; Harapan et al., 2020). On 30 January 2020, the scale and trajectory of the coronavirus outbreak have led the WHO to officially declare the COVID-19 epidemic as a public health emergency of international concern. On 11th March, COVID-19 was transformed to a pandemic. It is now affecting 213 countries and territories around the world and has infected over 16 million people and caused more than 650,000 deaths¹.

In the purpose of containing the COVID-19 pandemic, many countries around the world have adopted several drastic measures such as imposing social distancing, avoiding unnecessary travel, and a ban on congregations. By the end of March 2020, more than 100 countries around the world had already undertaken several lockdown restrictions impacting negatively their social and economic activities (Nicola et al., 2020).

The COVID-19 rapid outbreak and the rigorous containment measures implemented worldwide have severely affected the level of global economic activities. The International Monetary Fund’s April 2020 World Economic Outlook (WEO) projects the global economy to contract sharply by –3 percent in 2020, much worse than during the 2008–2009 financial crisis. Growth in the Middle East and Central Asia region is projected to fall from 1.2 percent in 2019 to –2.8 percent in 2020, lower than the growth rates during the 2008 global financial crisis and the 2015 oil price shock. IMF forecasts reveals also that GDP growth will be severely affected in 2020 for Middle East and North Africa (MENA) region. It might fall to –4.2% for oil exporting countries and –0.7% for oil importing countries in 2020. (The IMF’s Regional Economic Outlook, April 2020)².

In addition, the novel coronavirus has particularly affected financial markets all over the world. It created an unprecedented level of risk, causing investors to suffer significant losses in a few days. In March 2020, the US stock market hit the circuit breaker mechanism four times in ten days. The main stock markets indexes in the USA such as the Dow Jones Industrial Average (DJIA) and Standard & Poor’s 500 Index (S&P500) have dropped significantly (Wagner, 2020). Many equity markets around the world experienced their fastest price drop in history. Stock markets in Europe, Africa and Asia have also plunged (Ashraf, 2020; Ozili, 2020; Zhang et al., 2020). Given the dramatic movements observed recently in several financial markets around the world, many recent studies have employed several empirical approaches to investigate the eventual effects of COVID-19 pandemic on stock market returns and risks in several affected countries such as China, the USA, Japan, Korea, Singapore, Germany, Italy, and the UK etc. (Ali et al., 2020; Sharif et al., 2020; Liu et al., 2020; Zhang et al., 2020, etc.).

1 <https://www.worldometers.info/coronavirus/>.

2 <https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020>.

To provide an understanding of how the coronavirus health crisis has affected the stock markets, this study investigates the impact of the COVID-19 outbreak on the daily returns of the major stock market indices in the GCC countries over the period from April 1, 2020 to June 26, 2020.

We particularly focus on the GCC financial markets for at least three reasons. First, we believe that early studies have focused mainly on East Asia, the USA and Europe. Therefore, there is a need for further research on the financial effects of coronavirus outbreak in other regions of the world. Second, GCC countries are currently facing a dual shock from the COVID-19 pandemic and a collapse in oil prices. GCC economies are still dependent on oil as their main export and source of revenues, despite the considerable diversification efforts deployed in the recent years. The high degree of dependence of the GCC countries on oil revenues makes them particularly very sensitive to external shocks (Al-Maadid et al., 2020; Azar and Chopurian, 2018; Mohanty et al., 2011). Third, the GCC stock markets have very different characteristics compared to other stock markets, which means that they could respond differently to the COVID-19 pandemic and oil price shocks. Unlike the stock markets in western economies and other emerging countries, in the GCC countries stock markets are mostly dominated by domestic investors, a significant share of the financial contracts is based on the principle of profit and loss sharing and the opportunity of investment in derivatives is very limited (Istiak and Alam, 2020). It seems to be very interesting for policymakers in the GCC countries to examine the impact of COVID-19 pandemic on stock returns in a period characterized by a fall in oil prices and the implementation of containment measures and restrictions imposing serious effects on their economic sectors. The rest of this paper is organized as follows: Section 2 briefly reviews the existing literature about the impact of COVID-19 pandemic on stock returns. Section 3 describes the methodology applied and the data used. Section 4 reports and discusses the empirical findings, while Section 5 concludes the study.

2. Literature review

Since its start from the Chinese city of Wuhan in early 2020, the COVID-19 is causing huge impact on the financial markets around the world. Dramatic reactions to the pandemic were observed during the virus outbreak.

Financial reports show spectacular losses recorded by major stock market indices in the world due to the COVID-19 pandemic sweeping across the globe. Statistics show that MSCI World index, which includes stocks from 23 developed countries and 24 emerging markets lost 10.7 percent of its value between January 23 to March 6, 2020. In the same period, STOXX Europe 600 index, which includes stocks of 600 companies from 17 European countries, fell by more than 12 percent. Approximately the same drop was recorded by the CSI 300 Index, which includes the 300 largest stocks in the Chinese Class-A share market, in the same period³.

In the United States, recent volatility levels rival or surpass those last seen in October 1987 and December 2008 and, before that, in late 1929 and the early 1930s (Baker et al., 2020). On March 18, the S&P500 index was off 27% for the year to date, Germany's DAX was down 38%, and Japan's Nikkei was off 29%⁴. By the end of February 2020, GCC stock markets have seen their biggest monthly decline in four years due to rising coronavirus cases in the region. The MSCI GCC index declined by 7.3%

3 <https://www.statista.com/statistics/1105021/coronavirus-outbreak-stock-market-change/>.

4 <https://www.bloomberg.com/news/articles/2020-03-19/the-great-coronavirus-crash-of-2020-is-different>.

during the month, the biggest decline since January 2016. Qatar's QE index (-9.1%) witnessed the biggest decline during the month, followed by Saudi Arabia's Tadawul (-7.5%) and UAE's Dubai Financial Market (DFM) index (-4.9%) (GCC Markets Monthly Report, February 2020). GCC stock market situation worsened further in March due to the increase in COVID-19 cases coupled with the 25% decline in oil prices, the biggest single day drop since the 1991 Gulf war. The MSCI GCC Index declined by 8.9% and the aggregate GCC market-capitalization declined by US\$162 Billion on March 9, 2020 (GCC Equity Market Outlook, March 2020).

In the next time period, stock markets in many regions are moving up and down with the news of COVID-19 and related control measures or stimulus packages implemented by government, such as direct fiscal support or decrease in interest rates, among others (Ashraf, 2020). These dramatic changes have triggered the interest of many researchers around the world. Therefore, an increasing number of studies have been conducted recently to study the effects of COVID-19 outbreak on different financial markets around the world.

To investigate the effect of the COVID-19 pandemic on the Chinese stock market, Al-Awadhi et al. (2020) employ a panel regression approach using two measurements: (1) daily growth in total confirmed cases and (2) daily growth in total deaths. The results provide evidence of a significant negative effect of both measurements on stock returns across all companies included in the Hang Seng Index and Shanghai Stock Exchange Composite Index over the period from January 10 to March 16, 2020. Further tests suggest that some sectors performed better than others during the COVID-19 outbreak, specifically, information technology and medicine manufacturing sectors. Their findings indicate also that the returns of B-shares (designed for foreign investors) and high market capitalization stocks are more strongly affected by the COVID-19 pandemic than A-shares (mainly traded by Chinese citizens) and low market capitalization stocks.

Liu et al. (2020) analyze the immediate and the short-term impact of the COVID-19 outbreak on 21 leading stock market indices in major affected countries including Japan, Korea, Singapore, the USA, Germany, Italy, and the UK etc. They applied an event study method and used data on daily closing prices of the stock market indices from February 21, 2019 to March 18, 2020. Results suggest that the COVID-19 outbreak has impacted negatively and significantly the stock market returns of all affected countries and areas. In addition, findings indicate that COVID-19 have significant adverse effects on major stock indices performances with those in Asia suffering a greater decrease in terms of abnormal returns.

Zhang et al. (2020) employ simple statistical analysis to explore the relationship between stock market risks and the COVID-19 outbreak in global financial markets. They used stock market data of the top 10 infected countries by number of confirmed cases (together with Japan, South Korea and Singapore) up to March 27, 2020. They found that the pandemic has led to great risk and uncertainty in global financial market. The risk levels of all the countries has increased substantially between February and March 2020.

Harjoto et al. (2020) employ the event study method by using the WHO announcement on 11 March, 2020 and the Federal Reserve Bank announcement on 9 April, 2020 as two events that represent the shock and the stimulus. Results show that COVID-19 caused a negative shock to the global stock markets, especially in emerging markets and for small firms. Other findings indicate that the US stock market experienced positive abnormal returns from the Fed stimulus compared to other developed countries and emerging markets. Their study finds also that the positive abnormal returns from the stimulus were garnered by the US large firms instead of the small firms.

Cepoi (2020) investigates the impact exerted by COVID19-related news on stock market return in the top six most affected countries by the pandemic, which are the USA, the UK, Germany, France, Spain and Italy. He employs a panel quantile regression on a balanced panel over the period from February 3, 2020 to April 17, 2020. Results show that fake news influence negatively the lower and the middle quantiles throughout the distribution of returns. Other findings show that the media coverage leads to a decrease in returns across middle and upper quantiles. Moreover, the financial contagion across companies is detrimental to returns from 50th to 75th quantiles.

Ashraf (2020) employs a panel data analysis to examine the impact of growth in COVID-19 confirmed cases and deaths on the stock market returns after controlling for country characteristics and systematic risk due to international factors. He uses daily COVID-19 and stock market returns data from 64 countries over the period from January 22, 2020 to April 17, 2020. The results found show that stock markets react strongly with negative returns to growth in confirmed cases, however response to the growth in deaths is not that statistically significant. Other findings also indicate that stock markets react strongly during early days of confirmed cases and then between 40 and 60 days after the initial confirmed cases.

We contribute to this quickly growing literature on the impact of the Covid-19 on stock markets, by focusing on the GCC countries. Our study attempts to answer the following question: What is the impact of the COVID-19 outbreak on stock market returns in the GCC countries during the period from April 1, 2020 to June 26, 2020.

3. Data and methodology

3.1. Data

To study the impact of COVID-19 outbreak on stock market returns in the GCC countries, we use data collected from Worldometer⁵, which reported the number of daily Covid-19 confirmed cases and deaths over the period from April 1, 2020 to June 26, 2020. This period is chosen in such a way that all the GCC countries included in the sample have recorded in it both Covid-19 confirmed cases and deaths. Over the same period, we use daily stock market returns data of the major GCC stock market indices, which are⁶: ADSMI for Abu Dhabi (Unites Arab Emirates), BHSEASI for Bahrain, MSM30 for Oman, SASEIDX for Saudi Arabia and DSM for Qatar. This data was obtained from Bloomberg. In addition, we dropped the observations of those countries for which the daily stock market returns were not available because their stock markets were closed on weekends or national holidays. Therefore, the final dataset consists of 315 observations, which we consider adequate to produce robust estimations.

3.2. Methodology

To investigate the impact of the COVID-19 outbreak on GCC stock market returns, we prefer using a panel data regression. Indeed, panel data models take into consideration time and cases simultaneously, whereas other models have the limitation of only expressing these heterogeneities

⁵ Worldometer manually analyzes, validates, and aggregates data from thousands of sources in real time and provides global COVID-19 live statistics for a wide audience of caring people around the world.

⁶ The stock market index of Kuwait (KWSEIDX) was not included in the analysis because of non-available data.

across units or over time. Moreover, panel data models are better in capturing the heterogeneity involved both in cross-section units and time dimensions, in reducing estimation bias and multicollinearity, and are better suited to study the dynamics of change and complex behavioral models (Baltagi, 2008; Gujarati, 2003; Wooldridge, 2010). Furthermore, due to the evolving nature of the COVID-19 spread over time, several earlier studies preferred using the panel data technique over the event study approach (Al-Awadhi et al., 2020; Ashraf, 2020). Specifically, we consider the following panel data model:

$$SMR_{i,t} = \alpha_0 + \alpha_1 COVID_{i,t-1} + \sum_{k=1}^k \beta_k \mathbf{X}_{i,t-1}^k + u_{i,t} \quad (1)$$

In the model of Equation (1), $SMR_{i,t}$ is the dependent variable. It indicates the stock market return in county i on day t , which is measured as the daily change in the major stock market index of the country. α_0 is a constant term. To test the impact of the COVID-19 spread on stock market returns, $COVID_{i,t-1}$ is measured by one of the four following variables: (1) TOTCC, which is the daily total confirmed cases per million of population; (2) TOTCD, which is the daily total confirmed deaths per million of population; (3) NEWCC, which is the daily new confirmed cases per million of population; and (4) NEWCD, which is the daily new confirmed deaths per million of population. $\mathbf{X}_{i,t-1}^k$ is a vector of control variables. It includes the daily oil prices, which is measured by the spot prices of West Texas Intermediate (WTI). It includes also the variation in percentage of the volatility in the oil market, which is measured by the Crude Oil Volatility Index (OVX). The OVX measures the market's expectation of 30-day volatility of crude oil prices by applying the VIX methodology to options on the United States Oil Fund (*Chicago Board Options Exchange*). These two variables are introduced to control for any significant impact of price levels and shocks in crude the oil market on the GCC stock market returns, since the GCC countries are oil-dependent economies (Alqahtani and Chevallier, 2020; Chen and Zou, 2015). $\mathbf{X}_{i,t-1}^k$ includes also two other control variables to control for global market systematic risks. The first one is Dow Jones Global Index daily returns, denoted by DJGIR. The Dow Jones Global Indexes include more than 3000 separate indexes, tracking stock prices of more than 2800 companies in 29 countries, 10 global regions and nine market sectors containing 121 industry groups (*Bloomberg*). The second one is the variation in percentage of the S&P500 volatility index (VIX). The VIX is a calculation designed to produce a measure of constant, 30-day expected volatility of the U.S. stock market, derived from real-time, mid-quote prices of S&P500 Index call and put options (*Chicago Board Options Exchange*). It was widely used as a proxy to gauge investors' fear (Liu et al., 2020). All the COVID and the control variables are included in their lagged values. $u_{i,t}$ is the error term, it can be written as:

$$u_{i,t} = \mu_i + \gamma_t + \epsilon_{i,t} \quad (2)$$

Equation (2) indicate that the error term in the panel model can be assumed to be divided into a pure disturbance term $\epsilon_{i,t}$ and an error term due to other factors. The factors other than disturbance are μ_i , which denotes unobservable individual effects and γ_t which denotes unobservable time effects. If both μ_i and γ_t are equal to zero, Equation (1) is estimated using the pooled OLS method. If not, it depends on statistical tests to know if there is individual-and/or time specific effects and therefore to choose between a fixed effect or a random effect specification of the panel model.

Table 1 below presents the summary statistics of the variables included in our study. It shows that during the period of coronavirus spread the mean value of stock market returns is 0.125 which means that on average sample GCC stock markets experienced a return close to zero percent. The mean value

of daily total confirmed cases per million of population is more than 4600 with a wide standard deviation of more than 6710, which shows the extent of the spread of the new coronavirus in the golf countries. However, it is clear from these statistics that the GCC countries have recorded during the period of study a very small number of confirmed deaths by comparison confirmed cases. This is consistent with previous studies, which demonstrate that the percentage of death among infected individuals in GCC countries remained inferior to 1% during the COVID-19 outbreak (see Alandijany et al., 2020).

Table 1 shows also that the price of WTI crude oil fluctuates severely over the period of study ranging from -37.630 to $+40.460$ dollars a barrel. This negative crude oil price recorded on April 20, 2020, was considered as an historic decline caused by the COVID19 pandemic influence on the supply and demand movements in oil markets. The wide standard deviation values of WTI and OVX reveals that there is a great instability of oil prices, which increases the risk exposure for both investors and crude oil exploration and processing industries (Chen et al., 2015).

Furthermore, the mean and standard deviation values related of the Dow Jones Global Index daily returns (DJGIR) and the variation in percentage of the S&P500 volatility index (VIX) show that there is a great fluctuation of global market systematic risks and reflects the existence of high investor's fear sentiment during the period of the coronavirus pandemic.

Table 1. Summary statistics.

Variable	Mean	Standard deviation	Minimum	Maximum	Observations
SMR	0.125	1.182	-3.830	6.380	315
TOTCC	4624.124	6710.722	37.598	31876.460	315
NEWCC	141.551	161.529	0.000	682.735	315
TOTCD	11.824	11.060	0.196	41.726	315
NEWCD	0.411	0.508	0.000	3.526	315
WTI	27.589	11.978	-37.630	40.460	315
OVX	-0.123	20.685	-46.330	135.770	315
DJGIR	0.263	1.619	-4.610	5.410	315
VIX	-0.462	9.017	-13.170	47.950	315

Note: The values of stock market returns (SMR and DJGIR) and volatility index's variations (OVX and VIX) are expressed in percentage.

4. Results and discussion

The present study investigates the impact of the COVID-19 outbreak on stock market returns in the GCC countries over the period from April 1, 2020 to June 26, 2020 by employing the panel data model described in the Equation (1) presented above. Before running the regressions, it is needed to perform a stationarity test for all the independent variables included in the model. We use the test of Levin-Lin-Chu (2002), which rejected the null hypothesis that the unit root problem is present⁷.

To measure the strength of linear association between the regression variables, we estimate the Pearson's correlation coefficients. Table 2 below reports the correlation matrix. It reveals that all the

⁷ We used the natural logarithm of the variables TOTCC, NEWCC, TOTCD and NEWCD to avoid the unit root problem.

COVID variables (TOTCC, NEWCC, TOTCD and NEWCD) and the volatility index's variations OVX and VIX are negatively correlated with GCC stock market returns (SMR).

Moreover, Table 2 reveals that all the COVID variables used in the regressions are highly cross-correlated. It reveals also that the estimated correlation coefficients between certain control variables are too high and statistically significant at 5% level. In order to avoid multicollinearity problems, we run separate regression models in each we include only one COVID variable and the control variables that do not present high cross-correlation coefficients.

It is important first of all to determine the appropriate specification of the panel models that will be used in our estimations. To do this, we run fixed effects panel regressions after adding dummy variables for each country to test for the presence of individual fixed effects. Statistical tests rejected the null hypothesis that the coefficients for all countries are jointly equal to zero, which means that individual fixed effects are existent in the models including the COVID variables: TOTCC (Model 1), TOTCD (Model 2), NEWCC (Model 3) and NEWCD (Model 4).

Table 2. Correlation matrix.

	SMR	TOTCC	TOTCD	NEWCD	NEWCC	WTI	OVX	DJGIR	VIX
SMR	1.000								
TOTCC	-0.075	1.000							
TOTCD	-0.115*	0.825*	1.000						
NEWCD	-0.096	0.643*	0.531*	1.000					
NEWCC	-0.023	0.891*	0.604*	0.702*	1.000				
WTI	0.088	0.513*	0.565*	0.381*	0.356*	1.000			
OVX	-0.139*	-0.026	-0.020	-0.058	-0.008	-0.548*	1.000		
DJGIR	0.133*	-0.049	-0.056	0.058	-0.031	0.081	-0.189*	1.000	
VIX	-0.134*	0.121*	0.132*	0.013	0.078	-0.071	0.255*	-0.642*	1.000

Note: ** denotes statistical significance at 5% level.

We conclude here that the pooled OLS regression technique is not convenient for this dataset and therefore we move towards either fixed or random effects panel data regression. To distinguish between fixed or random effects, we use the Hausman test, which indicated that the fixed effect specification is appropriate. In addition, we apply the Lagrange multiplier (LM) test of Breusch and Pagan (1980), which failed to reject the null hypothesis that the variances across entities is zero and then show that random effects are not appropriate in all the four models. Thus, it is appropriate to estimate the Model 1 to 4 with fixed effect regression technique (Wooldridge, 2010).

Table 3 presents the fixed effect panel data regression results of Model 1 and Model 2, which includes the daily total confirmed cases (TOTCC) and confirmed deaths (TOTCD) per million of population, respectively, as measures of the COVID-19 outbreak impact on stock market returns. From this table, we can see that two different regressions were achieved for Model 1 and Model 2. In each regression we add different control variables in order to avoid collinearity problem between highly cross-correlated explanatory variables. We use robust standard errors for all the regression variables to deal with the heteroskedasticity problem that is always a concern with economic data.

Table 3. Model 1 (TOTCC) and Model 2 (TOTCD) panel data fixed effect regression results.

Variables	(Model 1)		(Model 2)	
	SMR	SMR	SMR	SMR
TOTCC	-0.1918 (0.1198)	-0.0871 (0.0643)		
TOTCD			-0.2671* (0.1373)	-0.1309 (0.1314)
WTI	0.0205*** (0.0075)		0.0231** (0.0075)	
VIX	-0.0118* (0.0060)		-0.0108* (0.0058)	
OVX		-0.0069*** (0.0016)		-0.0069** (0.0023)
DJGIR		0.0766 (0.0620)		0.0751 (0.0652)
Constant	0.9931 (0.5146)	0.7565 (0.4717)	-0.0118 (0.3326)	0.3509 (0.3523)
Prob > F	0.0012***	0.0054***	0.0007***	0.0046**
observations	315	315	315	315

Note: *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors are reported in parentheses.

Table 3 reveals that all the p-values of the F-test are less than the significance level (5%), which means that all the regression models fit the data better than models with no predictor variables. It shows that all the regression results of Model 1 confirm the absence of any statistically significant impact of TOTCC on SMR, which means that daily total confirmed cases have not affected the stock market returns in GCC countries from April 1, 2020 to June 26, 2020. This result is not consistent with the findings of Liu et al. (2020), who found that total COVID cases have significant adverse effect on major stock indices performances in the USA, many Asian and European countries from February 21, 2019 to March 18, 2020. However, the regression results of Model 2 show that TOTCD has a high negative and statistically significant coefficient (-0.2671), which indicates that daily total confirmed deaths (TOTCD) caused by the COVID-19 impact negatively the stock market returns in GCC countries in the period of study.

Results related to Model 3 and Model 4 are presented in Table 4. These two models include, respectively, the daily new confirmed cases (NEWCC) and new confirmed deaths (NEWCD) per million of population as measures of the COVID-19 outbreak impact on the stock market returns. Our findings confirm that only the estimated coefficient of daily new confirmed deaths (NEWCD) are statistically significant in all the regressions. This means that during the COVID-19 spread GCC stock markets respond negatively and remarkably to the growth in the number of confirmed deaths while do not react significantly to the number of confirmed cases. These results are partially consistent with those of Ashraf (2020) and Al-Awadhi et al. (2020) by considering only the impact of new confirmed deaths on stock market returns.

Table 4. Model 3 (NEWCC) and Model 4 (NEWCD) panel data fixed effect regression results.

Variables	(Model 3)		(Model 4)	
	SMR	SMR	SMR	SMR
NEWCC	-0.0966 (0.0904)	-0.0447 (0.0823)		
NEWCD			-0.2936** (0.1278)	-0.2785*** (0.0563)
WTI	0.0111** (0.0029)		0.0072 (0.0116)	
VIX	-0.0163* (0.0076)		-0.0168** (0.0068)	
OVX		-0.0066** (0.0015)		-0.0101*** (0.0011)
DJGIR		0.0785 (0.0657)		0.0343 (0.0533)
Constant	0.2281 (0.3309)	0.2970 (0.3537)	-0.2851 (0.4549)	-0.0568 (0.0438)
Prob > F	0.0107**	0.0024***	0.0406**	0.0000***
observations	315	315	315	315

Note: *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors are reported in parentheses.

Considering control variables in all the regressions related to the four models in Table 3 and Table 4, we find that the crude oil price (WTI) have a positive and highly significant impact on stock market returns in GCC countries, which indicate that GCC stock market indices increase (decrease) when the oil price rise (fall). This is consistent with earlier studies on the relation between changes in crude oil prices and equity returns in GCC countries (Al-Maadid et al., 2020; Al-Yahyaee et al., 2019; Azar and Chopurian, 2018; Mokni and Youssef, 2019; Mohanty et al., 2011).

We also find a negative relationship between GCC stock market returns and the variation in percentage of the Crude Oil Volatility Index (OVX) and the S&P500 volatility index (VIX) during the period of COVID outbreak. Indeed, there is a negative association between oil volatility and investor's fear sentiment measured by implied volatility indexes (VIX and OVX) and stock market returns in GCC countries during the COVID-19 outbreak period. These results confirm the findings of previous studies, which demonstrated that stock market falls when the change in volatility indices rises (Alqahtani and Chevallier, 2020; Liu et al., 2020; Smales, 2017).

5. Conclusion

Given the rapid and exponential spread of the COVID-19 in many regions of the world and the dramatic consequences of this unprecedented health crises on the economic activities and financial markets, a limited but growing number of studies have examined the impact of COVID-19 on the stock markets in many affected countries from the US, Europe, Asia and Africa. This study attempts to contribute to this emerging literature by focusing on the stock markets in the GCC countries.

In this study we employed a panel data regression analysis to investigate the effect of the novel coronavirus on stock market returns in the GCC countries. For this purpose, we used daily numbers of COVID-19 confirmed cases and deaths and daily returns of the major GCC stock market indices over the period from April 1, 2020 to June 26, 2020. The main results indicate that during this period of coronavirus outbreak the GCC stock markets responded negatively and in a significant manner to the

increase in COVID-19 confirmed deaths. However, we have not found any significant response of the GCC stock markets to the increase in COVID-19 confirmed cases during the same period. These findings suggest that investors in the GCC stock markets are more concerned by information about deaths caused by the COVID-19.

Considering that stock markets has been hit by two shocks—the spread of COVID-19 and the sharp decline in oil prices during the period of study, we tested the relationship between the crude oil price (WTI) and the variation in the Crude Oil Volatility Index (OVX) and the stock market returns in the GCC countries. Our results indicate that oil price affects positively the GCC stock markets returns, while these returns are negatively impacted by the implied volatility variations in the global oil market. These findings suggest that the stock markets in the GCC countries, which are still highly dependent on oil revenues, are very sensitive to the oil price and the volatility levels in the global oil market. However, it is clear from our estimation results that the adverse impact of COVID-19 on the GCC equity markets is greater than the impact of the oil price and the oil volatility.

In addition, our analysis reveals that there is a negative association between investor's fear sentiment, measured by the S&P500 volatility index (VIX), and GCC stock market returns during the COVID-19 outbreak. These results suggest that stock market returns decline in the GCC countries when the change in volatility indices rises. This implies that the investor's fear sentiment is proved to have a significant influence on the GCC stock markets in the period of COVID-19 outbreak.

This study offers an initial analysis of how stock markets react to the COVID-19 outbreak in the GCC countries. The results of our study provide useful insights to investors and policymakers and they could be helpful for financial authorities in their mission of managing the negative effects of the COVID-19 on the stock markets.

Finally, further research is needed to help understanding the adverse impact of COVID-19 on the GCC equity markets through studying the channels by which COVID-19 transmits the fear to these markets and shedding light on the conditional correlations between these markets and the volatility in the global oil market and the global equity market. In addition, further analysis is needed to investigate the effects of COVID-19 on the GCC stock markets at the firm level and to identify the sectors that are mostly affected by the pandemic.

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Conflict of interest

The authors declare no conflicts of interest in this paper.

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