Linkages Between Brent Oil Price And Iran Stock Market: New Evidence From The Corona Pandemic

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Research

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Abstract

This article reviews the relationship between the oil market and the stock market during the Corona outbreak. This study aims to analyze the stock market and the effect of oil prices on this market during the corona pandemic. The hypothesis of this paper is whether while oil prices shocks happen due to business cycle fluctuations and some other reasons like political reasons, occur; The correlations between changes in Brent oil prices and stock market indices tend to be affected by named corona indexes. Forecasting the stock market in each period has been difficult and the value of stock index has been affected by various factors. Among these factors has been the oil and gas sector, especially in countries dependent on the revenue from their sales. On the other hand, the outbreak of Covid-19 pandemic has led to profound changes in both areas. This study examines relationship between Brent oil price and Iran stock market Index during the outbreak of corona pandemic. Research method is, vector autoregression model (VAR) which using daily data covering the period from February 20, 2020 to August 21,2020. The findings of this study suggest that a negative causal effect from Brent oil price changes to the Iran stock market Index. Also, the results of impulse response functions and variance decompositions showed that some corona pandemic indicators have significant effects on the stock index.

JEL Classification: I18, E44, Q4, C5

Introduction

In late 2019 and early 2020, the world faced a new wave of crisis called the Corona Pandemic. The global pandemic of the Corona pandemic is one of the greatest social and economic crises in human history. It is predicted that with the outbreak of this pandemic, global GDP will decrease by 4.6% in 2020 [1]. Furthermore the COVID-19 pandemic has made over 4.3 million confirmed cases. This has raised concerns about an impending economic crisis and recession. Social distance, personal isolation and travel restrictions have reduced work in all sectors of the economics [2].

While there is limited previous literature on how pandemics affect financial markets, its effects can be seen in parallel with the effects of other forms of natural disasters. These studies would seem to suggest that the that the effect of pandemic outbreaks on different economic sectors of countries has been through different channels. One obvious way that pandemics like the corona can affect financial systems is their huge economic costs [3]. Governments use a variety of financing methods to meet these costs. The Corona pandemic has also affected businesses and organizations, affecting financial markets and the global economy in a chain reaction. Meanwhile, unusual reactions from governments have led to disruptions in the supply chain [4]. Under these circumstances, oil-dependent countries are facing financing problem and Economic uncertainty has increased in these countries; Therefore, in these crises, the stock market can be considered as one of the financing centers for the government. Due to the outbreak of COVID-19[3] in the Middle East and North Africa, oil prices fell sharply. As a result, trade around the world locked in and restrictions on transportation led to negative oil demand [5].

In previous studies, the relationship between the stock market and oil prices has been extensively analyzed. In different time periods, the study of these two sections will be important and different crises have had different effects on this relationship in different countries. Among these crises have been crises such as the outbreak of corona heart disease. Recent studies have shown that during the 22 trading days (February 24 to March 24), 18 stock market jumps were recorded, 16 to 18 of which were in response to "bad news" about corona pandemic. Therefore, corona pandemic is a source of systematic risk and there is a need for further research on the financial effects of corona pandemic development [2]. This article deals specifically with the relationship between oil prices and the Iranian stock market due to the prevalence of the corona pandemic.

In addition, the role of stock markets in developing economies has become more important since the global crises, and their economies are becoming more involved in the international oil market [6]. The last decade has seen dramatic changes in crude oil prices. One of the most important is the sharp drop in prices in 2008. Resumption of the upward trend after the financial crisis due to oversupply and declining global demand for energy goods. [7]. Ferreira and et al [8] found that stock markets are now more exposed to oil price fluctuation than before the 2008 financial crisis.

To review the relationship between oil prices and the stock market index with the outbreak of the corona pandemic, this article uses data from February 19, 2020 to August 21, 2020. The data are Brent oil prices, the Iranian stock index and some indicators related to the corona pandemic news and the method used in this research is vector autoregression regression.

The rest of the paper is arranged as follows. Section 2 reviews related works with most focus on the research for COVID-19 and relationship between stock market and oil price. Section 3 discusses in details about methodology and used data. Section 4 describes the results of some tests and impulse response functions and variance decompositions. Section 5 evolves this work with a brief of key findings.

[3] Coronavirus disease 2019

Literature Review

Oil price shocks and the reaction of monetary policy by the oil producer have been an important topic of theory in modern literature.

Jammazi et al [9] showed significant bidirectional causal relations between oil and stock markets at the different time horizons for France, Germany, Italy, Spain, the UK and the US. Xu and et al [10] showed that strong evidence of asymmetries in volatility shocks between the oil and stock markets due to bad volatility. Also, Bahmani et al. [11] studied asymmetric causality not only from oil price to stock returns but also from stock returns to oil price. They found that an increase in oil price causes returns of three sectors of the U.S. economy, while a decrease in oil price causes returns of four sectors of the U.S. economy, all in the short run.

Delpachitra et al [12] examined the economic outcomes of oil price shocks and supply of oil while allowing for interaction between domestic and foreign monetary policy. They concluded that domestic monetary policy is a important channel that computes for over 40% of discounted variation in domestic output across a 4-year horizon after an oil shock. In contrast, US monetary policy is less important in transmitting oil price shocks to the oil-exporting economy through the international channel. Also, Köse and Ünal [13] studied the impact of oil price shocks on the stock exchanges of three countries in the Caspian Basin – Iran, Kazakhstan and Russia. The results showed, in these three countries, the impact of negative oil price shocks on the stock market was greater than the positive shocks. The response of the stock exchanges in the three countries to negative oil shocks was highly significant. Bakas and Triantafyllou [14] showed the impact of economic uncertainty about global pandemics on the volatility of the broad commodity price index also on the sub-indexes of crude oil and gold. The conclusion of their study showed that uncertainty related to pandemics have a negative impact on the volatility of commodity markets and especially on crude oil market, while the effect on gold market is positive but less significant.

Mokni [15] studied the dynamic reaction of a set of oil-related countries' stock markets to oil price shocks. He found that the stock returns react more to supply shocks than supply shocks. In addition, the impact of supply shocks on stock returns is generally limited and negative, while aggregate demand shocks have a positive effect on almost all stock returns. Oil demand shocks have positive effects on oil exporter stock returns and negative effects on oil-importing countries, except the Chinese market. Engelhardt et al [16] showed while the covid-19 was driven by news attention or rational expectations about the pandemic's economic impact. Using a sample of 64 national stock markets, which account for 94% of the world's gross domestic product, they present that the fall in stock markets is largely accompanied by more attention to news and less than reasonable expectations. Basher et al [17] concluded the effect that oil market shocks have on stock prices in the fall of the oil exporter is for both domestic and international investors. They studied the nonlinear relationship of oil price shocks with stock market returns in major oil-exporting countries in a multi-factor Markov-switching framework. A portfolio that uses the possibility of Markov switching to move between low-volatility stocks and volatile T-banknotes works better than a buy-and-hold strategy for some countries.

Salisu and et al [18] found the impact of own and cross oil price and stock prices shocks during the post-announcement of COVID-19 to be more pronounced for oil and stocks albeit with a larger impact for the former. Azimli [19] investigated the impact of the corona pandemic on the degree and structure of risk-return dependence in the US. Following the COVID-19 outbreak, degree of dependence among returns and market portfolio have increased in the higher quantiles.

Lyócsa and Molnár [20] use a nonlinear autoregressive model to show that abnormal Google searches related to COVID-19. Al-Awadhi et al [21] studied whether contagious infectious diseases have effect on stock market outcomes. They examined the effect of the COVID-19 virus by using panel data analysis on the Chinese stock market. They concluded that both the daily growth in total confirmed cases and in total cases of death caused by COVID-19 have strong negative effects on stock returns across all companies. He et al. [22] showed the impact of the corona pandemic on the stock prices of some Chinese industries. They concluded that the pandemic negatively impacted stock prices on the Shanghai Stock Exchange, whiles it positively effected the stock prices on the Shenzhen Stock Exchange.

Ashraf [23] examined the stock markets' response to the COVID-19 pandemic. He showed that stock markets response more proactively to the growth in number of COVID-19 confirmed cases as compared to the growth in number of deaths. He also shows negative market response was strong during early days of confirmed cases. He also finds that stock markets quickly react to COVID-19 pandemic and this reaction is different over time depending on the phase of outbreak. Liu et al. [24] examined the short-term effects of the corona pandemics on 21 major stock indices. Using the study event method, they concluded that these indices fell rapidly after the corona outbreak. Indices of Asian countries experienced lower negative returns compared to other countries. Topcua and Gulalb [25] studied the impact of COVID-19 on emerging stock markets. The findings display that the negative impact of pandemic on emerging stock markets has piecemeal fallen and then begun to pull in. The outbreak effects the highest in Asian emerging markets whereas emerging markets in Europe have experienced the lowest. Khantavit [26] performed the stock market response test to COVID-19 using the event study method. The results of this study showed that the stock returns of the world, France, Germany, Italy, Spain, the United States, China, the Philippines and Thailand to the Covid-19 pandemic have been significant and negative. In these countries, reactions to the widespread media coverage of the COVID-19 have been greater than the events and situations taking place. In other words, the markets' reaction to the old news was greater than the new news. Hanke et al. [27] using the risk-neutral densities of six world-famous stock indexes to assess the stock market's preparation for economic shocks, concluded that financial markets had failed to mitigate the major economic effects of COVID-19 predict until late February. This behavior in the market lasts until about mid-March, but from mid-March onwards, market behavior changes. They found that stock markets in countries with lower mortality (Japan, Germany, and the US) are more optimistically than those with higher mortality (France, Italy). Ali et al. [28] investigated the impact of COVID-19 on different financial securities and compared the situation of China and other countries but paid less attention to industry heterogeneity. Qin et al. [29] investigated the impact of the pandemic on oil markets. Liu et al. [30] studied the impact of COVID-19 on crude oil prices and stock prices in the US.

According to the above literature, the prevalence of corona pandemic has undoubtedly overshadowed the relationships of economic variables. Therefore, it seems necessary to study its effects on various economic relations. This study is the first comprehensive study on the effects of the corona pandemic on the relationship between oil prices and the stock market in Iran. Using the daily statistics of the variables used, the results of the VAR model estimation are examined in the next section.

Data And Methodology

The main purpose of this article is to investigate the effect of the corona pandemic on the relationship between oil prices and the total Iranian stock index. The sample period of February 20, 2020 to August 21,2020. The reasons for choosing this period are, firstly, the existence of daily required data in statistical centers, secondly, the existence of oil price shock in this period and thirdly, the outbreak of corona pandemic in the sample selected period. Also, daily data show the relationship between the independent variable and the dependent variable due to the high frequency. Daily data have also been used in the studies of

Cepoi [31], Kocaarslan and Soytas [32] and Mensi et al. [33] who have done a topic related to the subject of the present study. Model variables with the following symbols and definitions are included in the model:

Table 1- **Variables introduction**

Variable	Statement	Resource
Tepix	Tehran stock Index	www.tse.ir
BOP	Brent oil price	www.eia.gov
Covid	Total Corona confirmed cases	www.behdasht.gov.ir
Gold	World gold price	www.federalreserve.gov
MHI[4]	This Index showes the percentage of news talking about the novel coronavirus. Values range between 0 and 100	coronavirus.ravenpack.com
Panic[5]	This Index showes the level of news chatter that makes reference to panic or hysteria and coronavirus. Values range between 0 and 100.	coronavirus.ravenpack.com
Fake_news	This Index showes the level of media chatter about the novel virus that makes reference to misinformation or fake news alongside COVID-19. Values range between 0 and 100	coronavirus.ravenpack.com
Mediaco[6]	This Index showes the percentage of all news sources covering the topic of the novel coronavirus. Values range between 0 and 100	coronavirus.ravenpack.com
Sentim[7]	This Index showes the level of sentiment across all entities mentioned in the news alongside the coronavirus. The index ranges between -100 and 100	coronavirus.ravenpack.com
Info[8]	This Index shows the percentage of all entities (places, companies, etc.) that are somehow linked to COVID-19. Values range between 0 and 100	coronavirus.ravenpack.com

In this paper, Vector Autoregressive (VAR) model is used to analyze the relationship between variables. Vector autoregression model is one of the successful and flexible models in multivariate time series analysis. In this model, the effect of unexpected shocks is also investigated. This effect is usually determined by examining the impulse response functions and analysis of variance. To estimate the model to achieve the results, it is necessary to go through several steps in all research. There are some tests to examine the model. The following sections include these tests.

Empirical Results

To examine the stationary of the variables, some unit root tests, augmented dickey fuller, Phillips-perron and breakpoint were used. The results of the unit root test of variables are shown in Table 2.

Table 2 **Unit root test**

variable	ADF test		BP test		PP test	
	1st difference	level	1st difference	level	1st difference	level
BOP	-13.04838	-2.77307	-14.19636	-4.898668	-13.0571	-2.836142
covid	-14.0783	-2.702396	-14.77559	-4.208126	-14.04418	-2.76927
Tepix	-10.08292	-1.614724	-11.387	-2.708662	-10.85715	-1.614724
MHI	-8.057414	-7.692997	-18.49894	-8.564565	-21.23531	-7.692997
gold	-12.74439	-1.278322	-14.0478	-3.127227	-12.79557	-1.604293
fake_news	-11.46549	-9.640716	-18.58898	-10.98816	-41.22403	-9.544499
mediaco	-10.83647	-12.85037	-33.56785	-923.601	-166.3668	-12.85037
panic	-9.371086	-10.44197	-20.76069	-17.25826	-58.60437	-10.46091
sentim	-6.324472	-3.422174	-14.75188	-4.401719	-14.27376	-3.569898
info	-9.282874	-7.925341	-20.31271	-8.799036	-24.353	-7.925341

Source: Researcher findings

Table 3 **- Final results of unit root test**

variable	ADF test		BP test		PP test	
	1st difference	level	1st difference	level	1st difference	level
BOP	stationary	nonstationary	stationary	nonstationary	stationary	nonstationary
covid	stationary	nonstationary	stationary	nonstationary	stationary	nonstationary
Tepix	stationary	nonstationary	stationary	nonstationary	stationary	nonstationary
MHI	stationary	stationary	stationary	stationary	stationary	stationary
gold	stationary	nonstationary	stationary	nonstationary	stationary	nonstationary
fake_news	stationary	stationary	stationary	stationary	stationary	stationary
mediaco	stationary	stationary	stationary	stationary	stationary	stationary
panic	stationary	stationary	stationary	stationary	stationary	stationary
sentim	stationary	nonstationary	stationary	stationary	stationary	nonstationary
info	stationary	nonstationary	stationary	stationary	stationary	stationary

Source: Researcher findings

In this paper, the optimal lag is determined by Akaike information criterion (AIC) Final prediction error (FPR) and Hannan-Quinn (HQ). According to the table below, the optimal lag for the model is lag one.

Table 4 **VAR Lag Order Selection Criteria**

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-8994.284	NA	1.79E+36	111.8545	112.0458	111.9322
1	-7717.172	2379.711	8.01e+29*	97.23195*	99.33726*	98.08679*
2	-7632.562	147.1490*	9.82E+29	97.42312	101.4423	99.05509
3	-7559.779	117.5374	1.42E+30	97.76123	103.6944	100.1703
4	-7484.862	111.6772	2.08E+30	98.07282	105.9199	101.259
5	-7415.353	94.98047	3.39E+30	98.4516	108.2126	102.4149
6	-7351.376	79.47513	6.30E+30	98.89908	110.574	103.6396
7	-7240.669	123.7719	7.09E+30	98.76607	112.3549	104.2837
8	-7134.162	105.8457	9.36E+30	98.68524	114.188	104.98

Source: Researcher findings

Cointegration test is to observe the long-term equilibrium relationship between the non-stationary variables. In this study, cointegration tests were accomplished out using the Johansen's cointegration method. Table 5 shows that there are there are at least 3 long run relationships. The trace statistic value proves it and the maximum eigenvalue that greater than the critical value.

Table 5- **Johansen cointegration test result**

Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Prob
None *	450.2339	239.2354	0
At most 1 *	329.4797	197.3709	0
At most 2 *	233.4116	159.5297	0
At most 3 *	150.0963	125.6154	0.0007
At most 4	93.14551	95.75366	0.0746
At most 5	57.98253	69.81889	0.3025
At most 6	32.22011	47.85613	0.6
At most 7	13.86497	29.79707	0.8481
At most 8	5.254209	15.49471	0.7812
At most 9	1.545217	3.841466	0.2138

Source: Researcher findings

Table 6 **Variance Decomposition of Tepix**

Period	S.E.	Tepix	sentim	panic	mediaco	MHI	info	gold	fake_news	covid	bop
1	26676.16	100	0	0	0	0	0	0	0	0	0
2	37950.51	99.42507	0.006277	0.032212	0.045005	0.124134	0.07671	0.00433	0.274387	0.010544	0.001332
3	46780.19	98.91242	0.008818	0.069344	0.033678	0.297816	0.219076	0.014669	0.401205	0.037272	0.005702
4	54354.4	98.45556	0.010914	0.104309	0.025074	0.477893	0.365123	0.028743	0.441882	0.077093	0.013413
5	61131.43	98.04455	0.01402	0.132165	0.022456	0.643872	0.498391	0.044725	0.448544	0.126725	0.024553
30	166146.4	93.86177	0.483191	0.117418	0.072221	1.122567	1.160545	0.404458	0.28934	1.480923	1.007572
31	169498.7	93.77598	0.499799	0.113831	0.072071	1.109439	1.159249	0.414137	0.286324	1.511819	1.057347
32	172824.6	93.69319	0.515611	0.110375	0.071871	1.096435	1.157698	0.423366	0.283424	1.541124	1.106902
33	176125.5	93.61329	0.530641	0.10705	0.071626	1.08359	1.15593	0.432148	0.280635	1.568913	1.156172
34	179402.8	93.53619	0.544905	0.103852	0.071343	1.07093	1.153983	0.440487	0.277951	1.59526	1.205097
35	182658	93.46179	0.558422	0.100777	0.071027	1.058478	1.151886	0.448387	0.275367	1.620238	1.253623
36	185892.3	93.39001	0.571216	0.097822	0.070683	1.04625	1.149667	0.455856	0.27288	1.643914	1.301701
37	189106.7	93.32076	0.583309	0.094983	0.070314	1.034257	1.147348	0.4629	0.270485	1.666357	1.349287
38	192302.4	93.25395	0.594729	0.092256	0.069925	1.022511	1.14495	0.46953	0.268179	1.68763	1.396342
39	195480.5	93.1895	0.605501	0.089637	0.069518	1.011016	1.142489	0.475754	0.265958	1.707794	1.442832
40	198641.7	93.12734	0.615653	0.087121	0.069096	0.999777	1.139982	0.481583	0.263819	1.726908	1.488726

Source: Researcher findings

Table7 **- Variance Decomposition of bop**

Period	S.E.	Tepix	sentim	panic	mediaco	MHI	info	gold	fake_news	covid	bop
1	4.763361	0.05428	0.347567	0.006679	0.203992	0.037375	1.707587	0.41721	0.852942	0.022763	96.34961
2	6.340502	0.039132	0.185809	0.93393	0.132232	0.71332	1.233928	0.246961	0.850452	0.036076	95.62816
3	7.287228	0.027223	0.135238	1.636722	0.187122	1.490961	0.859076	0.172015	0.97162	0.060817	94.45921
4	7.913059	0.032147	0.139379	2.189311	0.286014	2.271526	0.677511	0.171024	0.983939	0.094716	93.15443
5	8.349105	0.055375	0.183526	2.620996	0.395368	2.995302	0.611356	0.229758	0.951017	0.136136	91.82117
30	9.944225	4.717895	4.084736	3.595267	1.219549	6.502887	1.168386	7.489288	0.469627	1.841331	68.91103
31	9.950775	5.006479	4.184458	3.562898	1.220056	6.479821	1.172189	7.752679	0.464028	1.896786	68.26061
32	9.956583	5.298516	4.277519	3.531102	1.219921	6.455267	1.17543	8.004356	0.458763	1.950036	67.62909
33	9.961729	5.593633	4.36416	3.499965	1.219212	6.429499	1.178169	8.24416	0.453802	2.001089	67.01631
34	9.966286	5.891479	4.444631	3.46955	1.217994	6.402756	1.180459	8.472016	0.449121	2.049966	66.42203
35	9.970319	6.191731	4.519191	3.439902	1.216323	6.375241	1.182349	8.687929	0.444693	2.096697	65.84594
36	9.973887	6.494085	4.588106	3.411052	1.214252	6.347131	1.183881	8.891973	0.440498	2.141317	65.2877
37	9.977041	6.79826	4.651641	3.383016	1.211827	6.318577	1.185096	9.084281	0.436514	2.183871	64.74692
38	9.979828	7.103997	4.710062	3.3558	1.209088	6.289709	1.186026	9.265041	0.432724	2.224407	64.22315
39	9.982291	7.411055	4.763631	3.329403	1.206074	6.260639	1.186703	9.434482	0.42911	2.262979	63.71592
40	9.984466	7.719214	4.812605	3.303814	1.202819	6.231461	1.187155	9.592876	0.425658	2.299643	63.22476

The results of variance decompositions show that most of the changes in the variables after the shocks on them are explained by those variables themselves. Also, the change of the total stock index variable after the shock is first explained by the variable itself, then by total corona confirmed cases, oil price, Coronavirus Infodemic index, Coronavirus Media Hype Index, Coronavirus sentiment index, gold price, Coronavirus Fake_news, the Panic Index and finally Coronavirus Media Coverage Index, respectively. As it is clear from the numbers in the table above, the number of daily patients has the most explanation.

[4] Coronavirus Media Hype Index

[5] Coronavirus Panic Index

[6] Coronavirus Media Coverage Index

[7] Coronavirus Sentiment Index

[8] Coronavirus Infodemic Index

Discussion

The main propose of this paper is to understand the effects of Corona pandemic on the relationship between oil price and Iran stock index by some indicators, which are introduced and prepared for each country in raven pack data base and this paper has used Iran's indicators about Corona pandemic.

Finding inverse and direct relationship between stock index and the indicators of Corona pandemic, In terms of oil prices in regression, account for effect Corona pandemic in the stock market and in general the feelings of investors in stock market of Iran.

These analyzes supply strong elements to figure out how, after a health crisis as corona pandemic, it has been feasible to achieve the relationship between this crisis and the stock market of Iran.

Conclusion

The current paper investigates examines the relationship between oil prices and the Tehran stock index with the presence of the Corona pandemic. To examine the impact of Corona, the indicators have been used. These indicators include the number of total Corona confirmed cases, fake news about the corona, Coronavirus Media Coverage Index, the panic index, Coronavirus Media Hype Index, the sentiment index and the infodemic index. Descriptions related to each of these indicators are provided in the data introduction section.

While oil prices shocks happen due to business cycle fluctuations and some other reasons like political reasons, occur; The correlations between changes in Brent oil prices and stock market indices tend to be affected by named corona indexes.

Using the data of the period from February 20, 2020 to August 21,2020 and using the vector autoregression model, we came to the conclusion that first of all the variables used in the article except the variables Media Hype Index, fake_news Index, Media Coverage Index and Panic with once differentiation is sustained, the variables mentioned above are also sustained. The results of the optimal lag also suggested the optimal 1 lag. Using an optimal lag, the Johansson test also proved four significant long-run relationships between the variables.

This finding showed that the dynamics of stock markets during the outbreak of the coronavirus cannot be accidental. Capelle and Desroziers [34] research has shown that it is not the pre-crisis state of economies that causes current stock market reaction to the corona pandemic, but the adoption of some major government policies that have led to the dynamism of stock markets. He cited government health policies against the Corona pandemic and government support for companies affiliated with health products and services as examples. The results of the model indicate that the unprecedented rise in the stock market cannot be justified in the short term with the outbreak of the Corona virus.

In this study, the Corona Media Index, which due to the significant negative short-term effect it has on the value of the stock exchange, indicates the impact of the stock market on the news in the days when the Corona news was high. With the increase in the number of social and digital networks, it is possible that this index and similar indicators will have a much higher impact on the value of the stock exchange transaction. Also, over time, this connection will become more logical and transparent. The empirical results of Impulse response functions showed that the response of the stock index to the shock on the Infodemic Index and Media Hype Index is negative. Also, the response of the total index to the total Corona confirmed cases was positive. Against the Fake news Index, it tends to be positive in the short run and to a neutral value in the long run. Regarding the effect of the shock on oil prices and its effect on the total stock index, it can be said that there was a negative relationship from the beginning to the end of the period and a shock on oil prices reduces the stock index. We also found a positive correlation between the oil price response to the shock on the Sentiment Index, Tepix, the Media Coverage Index and the total Corona confirmed cases. And with a positive shock on these indicators, a positive effect on oil prices was observed. A positive shock on the Panic Index, Media Hype Index, the Infodemic Index and gold also had a negative effect on oil prices. Finally, fake news has a positive effect in the short run and a negative effect in the long run, and Media Coverage Index shows a positive effect in the short run and a neutral effect on oil prices in the long run.

This finding implies a mutual risk transmission between oil and stock markets because of the financialization of the crude oil market and the unison movement of oil and stock markets over the last few decades mainly driven by changes in global aggregate demand. The results also show that the causal interactions tend to be stronger at the coarser time scales and are particularly pronounced during periods of economic and financial turmoil such as the recent global financial crisis and European sovereign debt crisis.

Declarations

Ethics approval and consent to participate

The authors approve that they consent to participate.

Consent for publication

The authors are satisfied with the publication.

Availability of data and materials

Access to all references mentioned in the text

Competing interests

The authors declare that they have no competing interests.

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