

The effects of COVID-19 and the impact of sudden shocks on the various industry indices

Ehsan Raygan^{1*}, Elaheh Sefidbakht², Hooman Khosravi¹

¹Department of Accounting, Razi University, Kermanshah, Iran. ²Department of Accounting and Finance, Shahre Ghods branch, Islamic Azad University, Iran.

Correspondence: Ehsan Raygan, Department of Accounting, Razi University, Kermanshah, Iran. e.raygan@razi.ac.ir

ABSTRACT

The rapid spread of Coronavirus (COVID-19) consist of significant influence on the financial markets all over the globe. This has created unimaginable risk and caused investors to suffer considerable losses in a short time. While the global economy's exact effects are unclear, financial markets have reacted to these impressive developments. Financial markets have responded to these impressive developments, even though the precise repercussions on the global economy remain uncertain. According to the Statistics Center of Iran, Iran's economy is facing a COVID-19 problem, while macroeconomic variables do not reflect the right situation. This study aims at investigating the volatility of stock market indices from COVID-19 using the assistance of daily data from the GARCH-BEKK test. The findings of this literature presents that among the indicators of industry, banking, metal products, petroleum products, and food, the overflow of COVID-19 fluctuations affects the indicators of the metal products, petroleum products, and food. But the overflow of COVID-19 fluctuations does not affect bank indices.

Keywords: COVID-19, Overflow fluctuations, Financial crisis, Stock market indexes, Financial markets

Introduction

The World Health Organization (WHO) formally acknowledged the start of a global COVID-19 epidemic on March 11, 2020. Over 170 countries were affected on March 27, 2020, with more than 500,000 people, and gradually, the United States confirmed the most cases. The outbreak consisted a considerable economic effects. In the short term, several nations have adopted strict quarantine guidelines, and their activities have been considerably curtailed. The short-term consequences of this all-encompassing disease may be widespread unemployment and failure in business. Some industries, such as tourism and aviation, will certainly face problems [1].

Financial markets have responded to these impressive developments, even though the precise repercussions on the global economy remain uncertain. The US Stock Exchange touched the periodicity four times in ten days in March 2020. The break has only happened once since it began in 1987—in 1997. On March 12, 2020, the ETSE, or Main Stock Index of Britain, decreased 10%. It's the worst day since 1987, to be exact. In December 2019, when it reached its peak, the Japanese stock market had a 20% decline [2]. The government and central bank moved rapidly and flooded the market with their policy tools. For instance, the Federal Reserve (FED) announced a policy of zero interest rates and at least \$ 700 billion for some relief on March 15, 2020. The FED announced eight bad days of the unlimited quantitative easing policy after the market responded negatively to this policy. Even if several stock markets have lately started to rebound, there are still many uncertainties [1].

There is a need to analyze the spread of turmoil among markets in recent decades, the complex environment of financial and economic markets, the close relationship between these markets, and the vital need to anticipate the future financial and economic scenario. This has led financial researchers to discover and

Access this article online

Website: www.japer.in

E-ISSN: 2249-3379

How to cite this article: Raygan E, Sefidbakht E, Khosravi H. The effects of COVID-19 and the impact of sudden shocks on the various industry indices. J Adv Pharm Educ Res. 2022;12(4):114-22. <https://doi.org/10.51847/SXbVO6EgFZ>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

analyze these inter-market connections, and they can take an effective and forward-looking step to research these goals.

Given the importance of analyzing the viability of turbulence among markets and the devastating effects of Coronavirus on the lives and occupations of people around the world, the study aims to examine the effects of COVID-19 and its sudden shocks on the index of different industries.

Background and hypothesis development

With the outbreak of the Coronavirus and people's worries about entering public places such as; stores, service centers, etc., many businesses have faced declining demand and sales of their goods and services. The service sector and its sub-sectors seem to suffer the most in comparison with other sectors and the urban economy compared to the rural economy and workers compared to employers and vulnerable groups working in the informal urban sector. The employees will suffer in comparison to other households. Any policy implemented to control the spread of COVID-19 must simultaneously test its economic implications, and policies supporting businesses and the people involved must be considered simultaneously. Focus on implementing policies to help control the spread of COVID-19. Maximum reduction in unnecessary social interactions will be a key condition for controlling corona prevalence. This requires closing many unnecessary economic activities, imposing economic costs on different strata. In this regard, it should be noted that the continuation of these off days (closure of economic enterprises and offices) can have serious economic consequences after the first half of April, but using the opportunity of the Nowruz holiday can reduce this cost to some extent. The same thing happened in China. The two-week stay in many cities and the New Year holidays have somewhat reduced the economic cost of quarantine. Therefore, the Nowruz holiday will help control Corona, but at the same time, policies must be implemented to compensate for the reduced income and stimulate demand. COVID-19 shock is a shock to labor supply (due to home quarantine policies necessary to control the spread of the disease) and a shock to the demand for goods and services (both to reduce aggregate demand and to delay unnecessary purchases). It is also considered to be the demand for activities in different industries. The most important issue in the shock of the supply side is the prevention of supply chain disruption, which requires policies to provide working capital and organize labor. On the other hand, the best way to prevent the decline in total demand is on the one hand to prevent the unemployment of workers and to motivate them to pay their monthly salaries, and on the other hand to create an umbrella to support the poor [3].

Facts about coronavirus pandemic

The COVID-19 outbreak in January 2020 drew attention from all across the world. The Chinese government reacted quickly in light of the virus' quick spread and rising number of verified cases. On January 23, 2020, the entire city of Wuhan was placed under quarantine, shocking the entire world. It was later

discovered that this was an effective Chinese government policy. The illness epidemic in China was deemed a global concern for the Public Health Emergency Service by the World Trade Organization after one week (PHEIC). Only 83 of the 18 countries outside of China had any confirmed cases over that time span, totaling 7711 cases [4].

Iran was the next country to be affected by the unintended spread of COVID-19 after South Korea. Out of 31, South Korea required a week to reach over 1,000, while Iran needed 12 days to go from 0 to over 1,000. In March, China and South Korea finally seized power, but the center has since shifted to Europe and the US. Italy has the most casualties, followed by the United States.

Following the formal declaration of a global epidemic by the World Health Organization, financial markets around the world have been inactive. Take the S&P 500 index as an example. It reached its peak on February 19, 2020 (3389.15), then dropped more than 30% in a single month to 2237.40 on March 22, 2020. In February, the daily return's standard deviation was 0.0069. In March, that figure increased to 0.0268. SARS, or acute respiratory syndrome, was estimated to have cost the world anything from \$30 billion to \$100 billion in 2003 [5]. While the COVID-19 epidemic has spread globally and is acting like a "pathogen once a century," Sars was primarily in China [6]. It is anticipated to have a significant influence on the economy.

Globally, the COVID-19 epidemic has caused a large number of deaths. It has also increased worries about a coming recession and economic calamity. In many economic sectors, labor has been cut, and many jobs have been lost as a result of social distance, isolation, and travel limitations²¹. Due to the closure of the schools, fewer commodities and products are needed. In contrast, there is a far greater need for medical supplies. Due to extensive purchases and storage of food supplies, the food sector has also seen increased demand [7].

Effects of coronavirus outbreak on economic sectors

1. Iran's economy is facing a COVID-19 problem, while macroeconomic variables do not reflect the right situation. According to the Statistics Center of Iran, economic growth in the first nine months of 1398 was about -7.6 percent, and economic growth without oil was almost zero. Also, the point-to-point inflation rate at the end of February was 25 percent. On the other hand, the government lacks supply in terms of resources, and the government's budget deficit is one of the major problems of the Iranian economy for the year 1399. In these conditions, the COVID-19 epidemic's costs and the sharp drop in production could result in higher inflation and slower economic growth. On the other hand, some other professions will expand at this time, including the manufacture of sanitary products and related industries.
2. The shock caused by the Corona confronts the economy with both a supply shock and a demand shock. On the one hand, the labor supply has decreased, and on the other hand, there have been problems in the supply of raw materials for

production (supply shock). The supply shock will bring the demand shock. Closing businesses will reduce the workforce, and a decrease in household income will lead to a decrease in demand. On the other hand, uncertainty about the future encourages the family to save more and postpone purchasing unnecessary items. This will reduce the total demand.

3. It is therefore expected that the economic downturn caused by the currency shock and sanctions will intensify. Therefore it is necessary to pursue supportive policies for both households and businesses. As the government faces financial difficulties and, in addition to declining revenues from sanctions and declining oil and oil prices, is facing rising health and medical costs due to Corona, resources for supportive policies are dramatically limited.
4. It is very important to adopt optimal support policies and avoid implementing blind support policies (such as allocating preferential currency to some goods) because, most likely, these resources are provided at the expense of inflation. Accordingly, policies to increase total demand by preventing the reduction of employment and household income should be given priority [8].

Capital market area

In general, the effects of Coronavirus on the capital market can be considered in two dimensions. One is the dimension that affects the economic and financial parameters of firms in the stock market; Such as sales, production, and profitability of enterprises; and another is the dimensions of corporate stock trading in the capital market. In order to carefully examine the effects of Coronavirus on the capital market, it is necessary to pay attention to the extent to which the virus persists in the country and neighboring countries. If the virus persists for a short time, the financial and economic effects can be seen as an economic shock or risk that will last a short time in the capital market. In other words, the effect of this virus on the capital market includes the second dimension of the effects, which is the emotional or emotional trading of individuals, which will temporarily reduce the index.

It is predicted that by overcoming this virus, the market will be able to follow its natural way. If this virus has a long shelf life in the country, it affects, in addition to the second dimension, the first dimension is also included. In other words, with the stability of the Coronavirus, the main parameters for determining the value of stock prices, which is the future cash flow of firms and their profitability, are impacted.

The first dimension includes the following:

1. Reducing and stopping the export of products due to the closure of borders or the ban on imports from other countries, which leads to a decrease in production, sales, and income;
2. Decreasing production due to reduced supply of raw materials from other companies.
3. Decreasing production due to the reduced workforce (reduced shifts or temporary closures of factories).

The above phenomena can lead to a decrease in production, income, and corporate profits and ultimately to a decrease in the value of stock prices in the market and a decrease in the capital market index. Of course, the spread of the virus will have different effects on the pharmaceutical and food industries, which are important industries in the capital market. For example, in pharmaceutical companies, which are important industries in the capital market, the increase in product sales will be due to increasing market demand, leading to increased revenue and profitability. There will also be an increase in product demand in food companies for three reasons:

1. There is a popular belief that factory products are cleaner than bulk and non-standard products;
2. Some people have impressed because they are afraid of the spread of the disease that cities will be quarantined and access to and supply of products will be disrupted.
3. There is a perception among some people that in order to prevent the spread of the disease, factories and companies are reducing work shifts, which will lead to a reduction in the production of healthy products and their scarcity. Thus, it can be expected that the growth of the pharmaceutical and food industries in the capital market can compensate for some decreases in the market index [8].

The field of micro and tourism businesses

1. Reduce people's purchases of small businesses, including manufacturing and services, especially during the Nowruz shopping season, on which the lives of four million trade unions and hundreds of thousands of small production units depend on them. As this process continues and labor contracts are suspended, many businesses, especially small businesses, may be closed, and unemployment will rise even more.
2. Businesses in domestic and foreign tourism (inbound tourism), one of the engines of employment and growth during the sanctions era, have virtually shut down. The wheel of the job-creating industry has come to a standstill. Many units and activities in their dependent chain (including hotels, transportation, upstream and downstream of the food industry, etc.) are harmed, and their employees may lose their jobs.
3. In the Iranian bazaar tradition, March is both a time of sale and a settlement of checks. Given the prevalence of the disease and the need to tighten traffic and travel restrictions, it is anticipated that a chain of non-passing checks will be created, and many traders and business owners will have acute problems.

Preventing the unemployment of workers and creating a protective umbrella for the poor is the best way to reduce demand. The most important issue in supply-side shock is to prevent supply chain disruption, which requires policies to provide working capital and reorganize the labor force. The best policy to prevent the decrease in total demand is to prevent unemployment and motivate them to receive their monthly

salary. On the other hand, it creates an umbrella to support the weak. The report of the Deputy Minister of Economic Research briefly examines the economic effects of the outbreak of the Coronavirus. It provides some strategies for managing economic effects and supporting damaged businesses. The recommendations presented in this report should be considered with the following two points:

1. In business support proposals, priority is given to support that leads to the retention of the workforce and their non-dismissal or adjustment; and
2. In proposing the protection of the poor, priority is given to the support that, while controlling the prevalence of Corona, leads to a steady income and stimulates total demand [8].

Financial industry

COVID-19 has impacted communities, businesses, and organizations worldwide and has unintentionally affected global financial markets and economies. Government responses and lack of coordinated cohesion caused a disturbed supply and demand chain. In China, traffic restrictions initially means an abrupt deterioration in goods made in Chinese factories. Policies of self-isolation and quarantine simultaneously reduced the use, demand, and consumption of goods and services. China is functioning better than any other country in the face of the global expansion of COVID-19, strengthening its position in trade negotiations with the United States. Actually, Chinese companies rely heavily on the stock market and will inevitably be well positioned to reach affected Western companies⁶.

Disruptions to the capital market sector have occurred in addition to those to the supply chain. Until the US government promised economic assistance and coronavirus relief, the S&P 500, an index of the US stock market that tracks the performance of 500 significant US corporations, plummeted precipitously on the Dow Jones and NASDAQ industrial averages. The indexes were raised, respectively, by 7.3% [9], 7.73% [10], and 7.33% [11, 12], as a result of the security law. US 10-year bond yields also decreased, reaching 0.67% [13, 14] reaching 0.67%. In Asian markets, the Shanghai Composite, Hong Kong's Stock Market Index, and South Korea's KOSPI all exhibit a similar pattern of early decline. Nikkei has risen 2.01% since the Japanese government backed the stock [15]. European bond yields have declined sharply and, like the euro's crisis from 2011 to 2012, have seen psychological pressure [16]. Germany's Dax, Britain's FTSE 100, and Euro Stoxx 50 fell on March 23 but rose sharply after the EU's bailout deal. Gold fell 0.65% against the dollar [17].

A crucial level of liquidity has been reached in an environment that is unstable due to the collapse of global stock markets. Global central banks have stepped in to maintain liquidity and lessen economic shock in an effort to counteract these impacts, and some leaders have adopted an "anything that lasts" strategy [18, 19]. David Miles, a professor of financial economics at Imperial College London, compared such government expenditure to the public sector debt boom that followed Napoleon I and II and led to World War II. He explained that

when large-scale government bonds are issued, bond markets may be challenging to manage and that central banks may interfere by purchasing these bonds on an unprecedented scale [20].

Overflow fluctuations in markets

Today, each and every experience in one market has an impact on all other markets. This led the researchers to concentrate on understanding how to transfer shocks and overflows from one market to the other [21]. However, structural setbacks in fluctuations may have an impact on the magnitude and direction of fluctuations as well as overflow fluctuations. Usually, the occurrence or presence of a shock in one market has an impact on other markets. Additionally, it made researchers more cognizant of the variations in market-to-market shocks and spills. Generally speaking, it is clear from a comprehensive examination of time series that these time series are impacted by domestic, international, and global economic events such as crises. Sharp fluctuations can be caused by sudden changes in exchange rate policy, war, political unrest, or financial oil shocks. As a result, the aforementioned events affected markets for a longer period of time. Investors reevaluate and modify their portfolios, as well as alter the asset mix in their portfolios, in response to market fluctuations. By spreading volatility and shocks from crisis markets to other markets, this exacerbates the unrest there. Based on these justifications, it is crucial to accurately assess financial assets, comprehend their volatility behavior, enhance future price prediction, manage resources effectively, and choose the best asset portfolios. Therefore, in this section, the theoretical underpinnings relating to the variables will be discussed, followed by a discussion of the relevant historical context [22].

Research background

Numerous studies have been conducted on the Overflow fluctuations and fluctuations between markets, but so far, there has been no study of the effect of Coronavirus and its global crisis on the index of various industries. Here's a look at some of the research that has been done on Coronavirus.

Zhang *et al.*'s (2020) goal is to elaborate on the nation's specific risk patterns and systemic risks in global financial markets, as well as the likely effects of policy interventions, such as the United States' decision to implement zero interest rates and unrestricted Quantitative Easing (QE) [1]. The results of their research demonstrate just how much more uncertainty these measures can bring about in the world's financial markets. Given the spread and prevalence of Corona over the world, unemployment and closure of schools, industries, and other occupations, as well as changes in consumer consumption, Nicolas *et al.* (2020) studied the economic and social consequences of COVID-19 on the various parts of the global economy [7]. In an article, Goodell (2020) evaluated the huge economic and social effects of COVID-19 according to the articles that anticipated the impact of other epidemics, their prevalence, and their economic consequences on a large scale

[23]. Examining the features of COVID-19, together with what this study presents, is about the same impact of previous events as COVID-19 and is amenable to further study.

Materials and Methods

The current study is a descriptive correlational study, but because it justifies using its findings, it has been turned into applied research. Data used in the current study includes daily data from December 30, 2019, to June 3, 2020, to examine Iranian stock market industry indicators, daily Brent crude oil prices, daily gold prices, and daily exchange rates from www.tse.ir and investing.com. The World Health Organization website was used to find out more details regarding the spread of the coronavirus.

The research for the library studies is related to library research and data mining using trustworthy databases, data collection techniques, and information. This is done by using reliable, authoritative, and scientific papers and research. Excel software was utilized to organize and categorize the research data before analysis. We then evaluate the data and put the hypotheses to the test using the Eviews 10 program. First, the characteristics of the variables under study were displayed using statistical indicators. We assess the data and test the hypotheses to see if they support the research. To begin with, the variables under examination were described using statistical indicators. We check the study's descriptive statistics and the data's normality before testing the study's main claim.

Research model

In the current study, we want first to show the association between the risk characteristics of various industries in the stock market and the incidence of COVID-19, and so the daily information on the incidence of Coronavirus in Iran and the indicators of industry, petroleum products, Banks, Metal products and Foodstuffs. We examine the impact of overflow fluctuations between indicators gained by conditional covariance matrices. Consequently, we employ a simple methodology for the conditional average equation, except for foreign variables that which can be considered in the volatility of exchange rate bond yields, as follows:

$$H_t = \hat{C} + A\hat{\varepsilon}'_{t-1}\varepsilon_{t-1}A + \hat{B}H_{t-1}B \quad (1)$$

H_t The variance-conditional matrix of conditioned $N \times N$ time t and B , A , C are the matrices of $N \times N$. The non-volatile elements of matrices A and B show the fluctuations between markets to transfer impulses and overflow, respectively. Significant testing of non-destructive elements of matrices A and B is the criterion for judging the transfer of shocks and the overflow of fluctuations between markets. In the case of the two-variable generalized conditional variance inequality, H_t has a positive 2×2 matrix as follows:

$$\begin{aligned} & \begin{bmatrix} h_{11,t} & h_{12,t} \\ h_{21,t} & h_{22,t} \end{bmatrix} \\ & = \hat{w}w \\ & + \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} \varepsilon_{1,t-1}^2 & \varepsilon_{1,t-1}\varepsilon_{2,t-1} \\ \varepsilon_{1,t-1}\varepsilon_{2,t-1} & \varepsilon_{2,t-1}^2 \end{bmatrix} \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \\ & + \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} \begin{bmatrix} h_{11,t-1} & h_{12,t-1} \\ h_{21,t-1} & h_{22,t-1} \end{bmatrix} \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} \end{aligned} \quad (2)$$

H_t is a conditional matrix 2×2 variance-covariance matrix at time t and C is a low triangular matrix of 2×2 constants with 4 parameters. A is a 2×2 square matrix of parameters, giving the correlation between past errors and conditional deviations (in other words, the effects of impulses or unforeseen events on fluctuations). The Qatari elements of Matrix A represent the effect of their Arch (meaning that conditional variances are affected by the error of past errors). In addition, B is a 2×2 square matrix of parameters and shows how much the current levels of conditional variances are correlated with past conditional variances. The diameter elements in matrix B show their GARCH effect (the significance of the variance with interruptions b_{12} and b_{21} means that the current conditional variance is influenced by the aforementioned conditional variance) and the non-concentric elements of matrices A and B , i.e., a_{12} , a_{21} , b_{12} and b_{21} show how shocks and fluctuations are transmitted among markets over time. For e , g error statements a_{12} , a_{21} indicate shocks and news, while covariance statements b_{12} and b_{21} indicate fluctuations [24].

Research variables

The variables of this current literature involves daily information on Coronavirus individuals in Iran and indicators of various industries, including petroleum products, banks, metal products, and foodstuffs, which have been in the country since the outbreak of Corona until 03/ 04/2020.

Research hypotheses

According to the present study, its hypotheses are as follows:

1. The prevalence and spread of Coronavirus in Iran have caused changes in the industry index in this country;
2. The prevalence and spread of Coronavirus in Iran have caused changes in the banking index in this country;
3. The prevalence and spread of Coronavirus in Iran have caused changes in the index of metal products in this country;
4. The spread and spread of Coronavirus in Iran has caused changes in the index of petroleum products in this country;
5. The spread of Coronavirus in Iran has caused changes in the food index in this country;

Results and Discussion

Descriptive statistics

Descriptive statistics for industry indicators, petroleum products, banks, metal products, and foodstuffs used in this study are summarized in **Table 1**. Given in this table are the median,

mean, maximum, minimum, standard deviations, elongation, skewness, statistics, and the Jarque-Bera Test, respectively.

Table 1. Descriptive statistics related to research variables

	industry	oil products	Bank Index	Metal Product Index	Food Index
Mean	625394/7	225027/8	4019/476	259547/5	49505/05
Median	542109/0	178535	3069/583	246502	47843/90
Maximum	1219299	451988	7952/640	439369/0	81160/80
Minimum	101531/0	136122/3	1724/843	119646/3	25488/83
Std. Dev.	241685/8	82819/50	1772/342	92503/89	16885/30
Skewness	0/267	0/957	0/494	0/272	0/221
Kurtosis	2/615	2/774	1/7991	1/638	1/770
Jarque-Bera	2/517	21/530	14/0105	12/462	9/885
Probability	0/284	0/000	0/000	0/001	0/007

As shown in the aforementioned table, the standard deviations given for the variables indicate that there was a large variation in these measures. Between these indicators, the highest distribution is related to the industry index, and the lowest distribution is related to the banking index. Also, in the indicators of different industries, because the elongation and skewness are not out of the normal range (+3 and -3), the normal distribution is seen in them. According to Jarque-Bera's test results for the indexes, only the industry index determines it because its probability is more than 5%. But Jarque-Bera's Test statistics reject other research variables at the 5% level as normal because the p-value is less than 0.05.

Investigating the Persistency of relationships

Since the data used in the current literature is the same series, its imperative check the data stability prior to approximating the models. In the current literature, to assess the static or persistent of the time series, the root test of the Dickey-Fuller unit has been employed, the findings of which are presented in **Table 2**.

Unit Root Dickey-Fuller test

The generalized Dickey-Fuller test has been examined in width from source to trend.

Table 2. Dickey-Fuller test

variable	State	The intercept with the trend				
		t-Statistic	Critical values			Prob.
			1%	5%	10%	
industry	Level	-0/079	-3/478	-2/882	-2/577	0/9483
	1 difference	-10/580	-3/478	-2/882	-2/578	0/000
oil products	Level	-3/540	-3/478	-2/882	-2/577	0/008
	1 difference	-1/930	-3/478	-2/882	-2/577	0/317
Bank Index	Level	-10/966	-3/478	-2/882	-2/578	0/000
	1 difference	-1/542	-3/478	-2/882	-2/577	0/5091
Metal Product Index	Level	-8/978	-3/478	-2/882	-2/578	0/000
	1 difference	-1/520	-3/478	-2/882	-2/577	-0/5204
Food Index	Level	-10/399	-3/478	-2/882	-2/578	0/000
	1 difference					

As seen in the table above, y-intercept from source to trend, the p-value of industry indices, banks, metal products, and foodstuffs in the test were more than 0.05, so the null hypothesis that the data persistent is rejected. But once their difference in p-value has reached less than 0.05, they have reached persistence. However, in the case of petroleum products indices, the value of its significant level is less than 0.05, and therefore it is at the persistence level.

Estimation of patterns and parameters

In the present study, to estimate the parameters and estimate the conditional mean, variance, and covariance of the variables of industry indicators, petroleum products, banks, metal products, and foodstuffs and to determine the effect of overflow fluctuations of Coronavirus in the country and its effect on the above indicators use GARCH (1, 1) and the Qualified BEKK model, the results of which are as follows.

In all tables presented in the GARCH model, based on the gathered findings, the coefficient M (1,1) of the first variable fluctuations (COVID-19) also its effect on itself, the coefficient M (1,2) has the effect of overflow fluctuation. Other variables

(indicators) and the coefficient M (2,2) show the fluctuations of the second variable and its effect on itself.

In the study findings associated to the influence of COVID-19 fluctuations on the industry index, since the value of the significance level pertaining to the effect of COVID-19 on the industry index is 0.026 and is less than 0.05, i.e., P -value = $0.026 < 0/05$ (Table 3). The claim that there is a relationship between these variables is confirmed. Contrary, the statistical value of Z, which is equal to 2.231, which is outside the values of ∓ 1.96 , confirms the confirmation of this claim. Hence, based on the findings of this study shown in the table above, the incidence and disperse of COVID-19 surges the trend of the industry index.

As a result of the similarity of the test on all variables, these coefficients in the association between COVID-19 on the banking industry index, since the significance level value related to the effect of prevalence and spread of COVID-19 on the banking industry index was 0.669. And is greater than 0.05, i.e., P -value = $0.669 > 0.05$ (Table 4).

Table 3. BEKK Model- With the effect of COVID-19 volatility on the industry index

	Coefficient	z-Statistic	Prob.
M(1,1)	0/586	2/597	0/009
M(1,2)	0/563	2/231	0/026
M(2,2)	0/318	2/358	0/017
A1(1,1)	0/883	8/313	0/000
A1(2,2)	0/761	7/220	0/000
B1(1,1)	0/389	8/169	0/000

Therefore this claim is rejected. While, the statistical value of Z, equal to 0.428, that is between the values of ∓ 1.96 , approve its rejection. The results of literature presents that the incidence of COVID-19 did not influence trend of the banking index.

Table 4. BEKK Model - With the effect of COVID-19 volatility on the bank index

	Coefficient	z-Statistic	Prob.
M(1,1)	0/151	2/924	0/004
M(1,2)	0/113	0/428	0/669
M(2,2)	0/208	2/764	0/006
A1(1,1)	0/808	9/414	0/000
A1(2,2)	0/829	9/216	0/000
B1(1,1)	0/500	11/451	0/000

In the research findings related to the effect of COVID-19 fluctuations on the index of metal products, since the value of the significance level related to the effect of COVID-19 on this index is 0.002 and is less than 0.05, i.e., P -value = $0.002 < 0.05$ (Table 5). The claim that there is a relationship between these variables is confirmed. On the other hand, the statistical value of Z, equal to 3.38, is outside the 1.96 value, thus confirming it. Therefore, according to the research results in the table above, the prevalence and spread of COVID-19 increase the trend of the index of metal products.

Table 5. BEKK Model - With the effect of COVID-19 volatility on the Metal Product Index

	Coefficient	z-Statistic	Prob.
M(1,1)	0/222	2/872	0/004
M(1,2)	0/681	3/138	0/002
M(2,2)	0/170	2/809	0/005
A1(1,1)	0/805	9/761	0/000
A1(2,2)	0/740	8/302	0/000
B1(1,1)	0/467	11/739	0/000

The study found that the impact of COVID-19 related to 19 fluctuations affected the index of petroleum products, since the value of the significance level associated to the effect of COVID-19 on the index of petroleum products is equal to 0.000 and is less than 0.05, i.e., P -value = $0.000 < 0.05$ (Table 6). The claim that there is a relationship between these variables is confirmed. Conversely, the statistical value of Z is 4.553, outside the 1.96 value, thus confirming it. Therefore, according to the study results in the table above, the prevalence and spread of COVID-19 increase the trend of the index of petroleum products.

Table 6. BEKK Model - With the effect of COVID-19 volatility on the oil products Index

	Coefficient	z-Statistic	Prob.
M(1,1)	0/557	3/720	0/000
M(1,2)	0/908	4/553	0/000
M(2,2)	0/137	4/313	0/000
A1(1,1)	0/865	7/631	0/000
A1(2,2)	0/787	7/076	0/000
B1(1,1)	0/390	5/706	0/000

In the research findings related to the effect of COVID-19 fluctuations on the food index, since the value of the significance level related to the effect of COVID-19 on the food product index is 0.007 and is less than 0.05, i.e., P -value = $0.007 < 0.05$ (Table 7). The claim that there is a relationship between these variables is confirmed. On the other hand, the value of the Z statistic, which is equal to 2.702, which is outside the 1.96 value, confirms this claim. Therefore, according to the results of the research in the above table, the prevalence and spread of COVID-19 increase the trend of the food index.

Table 7. BEKK Model - With the effect of COVID-19 volatility on the Food Index

	Coefficient	z-Statistic	Prob.
M(1,1)	0/664	2/958	0/003
M(1,2)	0/676	2/702	0/007
M(2,2)	0/268	1/216	0/224
A1(1,1)	0/821	12/271	0/000
A1(2,2)	0/701	9/924	0/000
B1(1,1)	0/489	11/152	0/000

Conclusion

Given the prevalence and spread of Coronavirus worldwide and affecting people's lives in terms of employment, income, and living conditions, as well as the closure of many jobs and creating crises around the world, we consider that it is necessary to consider the effects of Coronavirus spread and spread in the country. Let's look at the characteristics of different industries to see which industry is most affected by these conditions and how the overflow of fluctuations and the spread of COVID-19 affect the various characteristics of the capital market. The results of this study show that among the indicators of industry, banking, metal products, petroleum products, and food the overflow of COVID-19 fluctuations on the indicators of industry, metal products, petroleum products, and food is effective. But the overflow of the COVID-19 fluctuations does not affect the bank characteristics.

Acknowledgments: None

Conflict of interest: None

Financial support: None

Ethics statement: None

References

- Zhang D, Hu M, Ji Q. Financial markets under the global pandemic of COVID-19. *Financ Res Lett.* 2020;36:101528. doi:10.1016/j.frl.2020.101528
- Douglas J. Lamdin. Lessons for and from COVID-19 for investors and their advisors. *Financial Plan Rev.* 2020;3(4):e1106.
- Nilsson NJ. Artificial intelligence, employment, and income. *AI Magazine.* 1984;5(2):5.
- WHO. Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). 2020. Available from: [https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov))
- Smith RD. Responding to global infectious disease outbreaks: lessons from SARS on the role of risk perception, communication and management. *Soc Sci Med.* 2006;63(12):3113-23.
- Gates B. Responding to Covid-19—a once-in-a-century pandemic?. *N Engl J Med.* 2020;382(18):1677-9. doi:10.1056/NEJMp2003762
- Nicola M, Alsafi Z, Sohrabi C, Kerwan A, Al-Jabir A, Iosifidis C, et al. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *Int J Surg.* 2020;78:185-93. doi:10.1016/j.ijsu.2020.04.018
- Sefidbakht E, Beytari J, Raygan E. Volatility of financial markets index affected by COVID-19. *Int J Finance Manag Account.* 2021;6(23):103-11.
- SPX. S&P 500 Index. Market Watch [Internet]. [Cited 2020 Apr 7]. Available from: <https://www.marketwatch.com/investing/index/spx>
- DJIA. Dow Jones Industrial Average. Market Watch [Internet]. [Cited 2020 Apr 7]. Available from: <https://www.marketwatch.com/investing/index/djia>
- COMP. NASDAQ Composite Index. Market Watch [Internet]. [Cited 2020 Apr 7]. Available from: <https://www.marketwatch.com/investing/index/comp>
- IB D. Dow Jones Today, Stocks Drop: Fed Stimulus; New York, California Lockdown; NYSE Floor Closes [Internet]. Invest Bus Daily. 2020[cited 2020 Mar 23]. Available from: <https://www.investors.com/market-trend/stock-market-today/dow-jones-today-futuresslide-fed-stimulus-impasse-new-york-california-lockdown-nyse-floor-closes/>
- 10 Year Treasury Rate [Internet]. Ychart. [Cited 2020 Apr 7]. Available from: https://ycharts.com/indicators/10_year_treasury_rate
- Smith YL. 10-year yield dives below 0.7% after Fed announces unlimited asset purchases. CNBC Ανακτήθηκε στις. 2020;6(5):2021. Available from: <https://www.cnbc.com/2020/03/23/treasury-yields-fall-as-coronavirus-cases-rise-relief-billstalls.html>
- ^N225 18,950.18 373.88 2.01% : Nikkei 225 - Yahoo Finance [Internet]. [Cited 2020 Apr 7]. Available from: <https://finance.yahoo.com/quote/%5EN225/?guccounter=1>
- Stocks Sink 12% amid COVID-19 Pandemic. Time [Internet]. [Cited 2020 Mar 20]. Available from: <https://time.com/5803847/coronavirus-stocks-fall/>
- XAU/USD (Gold / USD Dollar) [Internet]. [Cited 2020 Apr 7]. Available from: <https://www.fxstreet.com/rates-charts/xauusd>
- Baldwin R, di Mauro BW. Mitigating the COVID Economic Crisis: Act Fast and Do Whatever It Takes. VOX, CEPR Policy Portal [Internet]. [Cited 2020 Mar 20]. Available from: <https://voxeu.org/content/mitigating-covid-economic-crisis-act-fast-and-do-whatever-it-takes>
- Buck T, Arnold M, Chazan G, Cookson C. Coronavirus declared a pandemic as fears of economic crisis mount [Internet]. 2020 [cited 2020 Mar 19]. Available from: <https://www.ft.com/content/d72f1e54-6396-11ea-b3f3-fe4680ea68b5>
- Wilson J. The economic impact of coronavirus: analysis from Imperial experts. Imperial College London [Internet]. [Cited 2020 Apr 6]. Available from:

- <https://www.imperial.ac.uk/news/196514/the-economic-impact-coronavirus-analysis-from/>
21. Aragón-Manzana V, Fernández-Izquierdo MÁ. Influence of structural changes in transmission of information between stock markets: A European empirical study. *J Multinatl Financial Manag.* 2007;17(2):112-24.
 22. Sefidbakht E, Ranjbar MH. Overflow fluctuations between oil prices, exchange rates, gold prices and the stock market over time and structural failure: the use of the BEKK model and the ICSS algorithm. *Financ Eng Sec Manag.* 2017;8(33):51-87.
 23. Goodell JW. COVID-19 and finance: Agendas for future research. *Financ Res Lett.* 2020;35:101512. doi:10.1016/j.frl.2020.101512
 24. Kang SH, Kang SM, Yoon SM. Forecasting volatility of crude oil markets. *Energy Econ.* 2009;31(1):119-25.