

The Impact of Covid-19 on the Macro Indicators: A Comparative Analysis for Oil, Gold, Exchange Rates and Wheat

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ABSTRACT

COVID-19, which occurred in Wuhan, China at the end of December 2019 and have affected the whole world, appears to have drastic effects on human health and economic stability. Economic activities related to global trade decreased with the spread of the epidemic and caused crisis both economically and financially. This virus, which is also a health crisis, has affected human life greatly due to uncertainty in the protection and treatment processes. Increasing numbers of cases and deaths negatively affect the economic progress globally and show that countries with intense epidemic are vulnerable. Not knowing how long the pandemic will last and how long economic activities will be restricted requires an economic precaution. If the pandemic is brought under control quickly, the return to normal economic life will happen quickly and thus all economic sectors, especially service sectors, will recover in a short time. If the process of controlling the pandemic is long, the destruction on economic growth and employment will be at higher levels. With the vaccine found, it is predicted that the normalization process will accelerate and the economy may recover. Increased studies examining the impact of the COVID-19 pandemic on financial markets and commodity markets will make it easier for both economists and financial actors in the future. In this study, the relationship between the daily number of cases of COVID-19 and Brent oil, gold, EUR / USD and wheat prices were examined. After the natural logarithm of our variables was applied, it was determined whether they were static or not. ARDL test, Impact-Response Analysis and Variance Decomposition were performed according to the determined lag lengths. According to the results, ARDL test was performed because our data was not stationary according to the ADF test and cointegration was not found among the data. As a result of impact response analysis, shocks lose their effect in a short time.

Keywords: COVID 19, Pandemic, Economic and Financial Effects, ARDL Test.

INTRODUCTION

In December 2019, the global pandemic, which appeared in Wuhan, Republic of China, as a result of lung infection patients applying to health institutions and affected the whole world in a short time, caused damage in the world economy with the deaths it brought. This virus, called the new coronavirus, is actually from the same family as the virus that caused severe acute respiratory syndrome (SARS) in November 2002-July 2003 and Middle East Respiratory Syndrome (MERS) in 2012 (Çöl ve Güneş, 2020, s.1). According to SARS and MERS, although the

mortality rate of COVID-19 is low, the rapid increase in the total number of cases and the high number of total deceased people have caused it to be declared a pandemic worldwide.

In order to control the rapidly increasing spread of the virus, almost all countries in the world, whether developed or emerged, have had to take a series of protective measures. From banning travel, closing businesses, social isolation to lockdown, these strict measures have brought most sectors of the economy to a standstill and even caused a standstill in some. All sectors, mainly domestic and international flights, transportation services, rail services, sports, education, trade and service organizations, are adversely affected by the COVID-19 pandemic (Duran ve Acar, 2020: 57).

COVID-19 continues to spread rapidly in dozens of countries. As of January 31, 2021, there were more than 103 million confirmed cases of COVID-19 and 2,231,285 deaths in more than 220 countries. As of this date, the top ten countries most affected by COVID-19 are the United States, India, Brazil, Russia, the United Kingdom, France, Spain, Italy, Turkey, and Germany, respectively. According to this ranking of the world's largest economies, the macroeconomic effects of COVID-19 are thought to be significant. It is estimated that the economic problems will increase with the increasing number of cases and deaths. People who are in a life-threatening condition due to COVID-19 also face economic problems.

Human behavior is the most important factor in financial markets, economics and politics. Due to the uncertainties of Covid 19, people do not know how to react financially. It should not be ignored that the COVID-19 pandemic will cause not only a health problem, but also financial problems. Therefore, people who are effective in the financial markets, investors try to make the right decisions by looking at the indicators affecting the financial system. These indicators include the stock market, commodity market, exchange rates and so on.

Gold, oil and foreign exchange prices, which are known to have a worldwide financial impact, have high liquidity. These investment instruments act similarly in the financial markets. In times of financial crisis from past to today, gold has been seen as a safe harbour by financial actors and has profited its investors. During the COVID-19 pandemic period, there were significant changes in the EUR / USD exchange rate, gold and oil prices. In addition to all these financial indicators, it is thought that the effect on cereals such as wheat and barley will be quite high due to the idea that people will suffer from lack of basic foods due to the epidemic.

This study is to show the effect of COVID-19 epidemic on Eur/Usd, Wheat, gold and oil prices between 31 December 2019 and 04 September 2020 by ARDL Border Test method. The study first includes a literature review covering studies examining other pandemics around the world and the economic effects of the COVID-19 pandemic. In the ongoing section, the method and data set were introduced, the results of the analysis were shared and the findings were interpreted, and in the result section, the study was summarized and certain recommendations were presented.

ECONOMIC AND FINANCIAL EFFECTS OF COVID-19

While the Covid-19 outbreak causes worrying health problems and deaths, the measures taken to control the epidemic change the normal course of life for almost everyone in the world. While

the negative effects of the pandemic on the country's economies are increasing day by day, it is stated that the real terrifying view will emerge in the coming years.

The rapid spread of the pandemic in Europe and the United States has significantly affected economic activity around the world. Lockdown were imposed, schools closed, many large industrial organizations broken down production, restaurants, hotels, cinemas closed, sports organizations were postponed, borders were closed, land, air, sea and rail transportation stopped. The world economy suddenly came to a nearly stagnation point.

The crisis deepened in airline companies due to travel restrictions, the worldwide tourism industry suffered from a very serious hit, the wave of sales in financial markets cannot be prevented due to uncertainty, fear and panic, gold and dollars, which are seen as safe harbors, gained value against other currencies, and oil prices were has fallen by more than 50 percent since (DOVIZ, 2020).

Companies operating in the retail (excluding food and online sales), transportation, travel and tourism, production and construction sectors have had serious difficulties in stopping their activities, and significant decreases in the growth rate of the world countries, especially the effects of the tourism sector (ISM MMO, 2020).

COVID-19 has brought about significant changes in economic and social life. Production has been broken down in many countries, especially industrial production. Service businesses such as restaurants, cafeterias and hotels have been closed for a certain period of time in many countries. Therefore, the service sector was the most affected by Covid 19. While the service sector was the most negatively affected by the epidemic, all sectors except the food sector shrunk. Manufacturing PMI indices, new orders and supply indicators indicate the beginning of a rapid shrinkage in economic activity (EULERHERMES, 2020).

Due to the interdependence of the economies of all countries, the economic and financial consequences of the epidemic are so serious. In modern economies, the production process of a product and the supply of materials and materials used in production are carried out in more than one country. Therefore, disruptions began to occur in the production and supply chain.

The world has previously experienced economic crisis of 1929, global financial crisis of 2008, Asian crisis of 1997 and country crises such as Russia, Mexico, Brazil, Argentina, Turkey (Senol, 2020:158). The year 2020 encountered the economic and financial crisis caused by the COVID-19 epidemic. The most important reason that distinguishes the COVID-19 crisis from other crises is that this crisis is caused by an epidemic. During the emerging country crises, especially the 1997 Asian crisis, countries had high debt stocks and current account deficit problems. While the 2008 global crisis was caused by risks due to high leverage rates for high levels of profitability, the main cause of the COVID-19 economic crisis is the health problem.

In 2019, the year before the epidemic, global economic growth was 2.9 percent. The IMF predicted that global economic growth would be 3.3 percent by the beginning of January 2020. With the emergence of the Covid-19 pandemic and becoming widespread around the world, international financial institutions and banks have lowered their forecasts for global economic growth for 2020. The OECD's March 2020 report showed that it has decreased its

forecast for global economic growth from 2.9 percent to 2.4 percent. The report showed that China's 2020 growth forecast was reduced from 5.7 percent to 4.9 percent, with the highest decline occurring in china and Japan's economic growth data. In this context, the 10 percent decline of manufacturing activities in China, the world's manufacturing center, in the last two months is one of the biggest factors in slowing global economic growth. The macroeconomic data described shows that the economic shrinking caused by the Covid-19 pandemic affects the whole world, especially China. Slowdown in production, contraction in consumption expenditures and demand, shrinkage in the service sector and increase in unemployment are the main economic effects caused by the corona virus outbreak worldwide (DOVIZ, 2020).

Capital outflows from developing countries occurred due to increased uncertainties, decreased global risk appetite, emerging economy pressure on exchange rates, weak health systems in these economies, and limited financial opportunities to support financial structures (Gopinath, 2020). Volatility is increasing due to uncertainty and panic in the financial markets, and not knowing when the outbreak will end causes fluctuations in the stock markets. The measures implemented to prevent the epidemic have a major impact on the economies of the country. It is seen that the measures and restrictions taken affect all sectors and that the service sector, especially tourism and transportation in Europe and America, is in great trouble. The expectation of a decline in company profitability causes investors to exit the stock markets quickly. The decline in oil prices exceeding 50 percent due to the decrease in demand causes a significant decrease in the oil revenues of oil producing countries, especially the USA. Iran, which is particularly struggling with US sanctions and the coronavirus pandemic, is one of the countries most affected (DOVIZ, 2020).

With the COVID-19 crisis, economic shrinking is expected worldwide. Different assessments are made about when the economic contraction will end and what the recovery process will be like. When the recession ends and how the economic recovery will be mostly depends on the developments related to the COVID-19 pandemic. Failure to manage the process well causes the epidemic anxiety in people to turn into financial anxiety after a while. It is important for central banks to continue their support for maintaining market demand, to increase market confidence by facilitating financial conditions, to provide credit flow to the real economy (Georgieva, 2020b).

LITERATURE REVIEW

With the spread of COVID-19 disease, which appeared at the end of 2019 and called a pandemic by the World Health Organization, has started to be researched in many areas such as medicine, biology, economy and finance. In particular, it has become very important to observe, analyze and determine the cause of this virus on the world financial markets and economy. In this section, studies on the effects of the epidemic on the economic and financial markets, first of all, from other epidemics in the world and then during the COVID-19 epidemic are given below.

Bloom and Mahal (1997) examined the claim that the AIDS epidemic will slow down the economic growth rate in their study. They empirically checked at the change in the prevalence of AIDS and the GDP growth rate per capita in 51 developing and industrial countries. They found that the AIDS epidemic had an insignificant effect on the growth rate of per capita income without evidence of reverse causality.

McKibbin and Sidorenko (2006), in their study examining the effects of a pandemic epidemic for the USA, concluded that a pandemic to occur will cause a decrease in the US GDP at the lowest -0.6% and a maximum of -5.5%.

Brown and Smith (2008) conducted a retrospective analysis of the macroeconomic impact of the 2003 SARS epidemic in their study. In their analysis, they showed that the scale of SARS impact on affected economies was much smaller than suggested by contemporary media reports and model estimates. They suggested that more work is needed to develop a comprehensive macroeconomic model that can more accurately estimate the relative cost and impact of a global response to outbreaks of international concern.

Beutels et al. (2009) documented the impact of the severe acute respiratory syndrome (SARS) epidemic in Beijing on social and economic activity indicators. The relationships between time series of deaths of daily and monthly SARS cases in Beijing and suburban train, aircraft and freight transport, tourism, household consumption habits and gross domestic product growth were examined using the cross-correlation function. Especially free time activities, local and international transportation and tourism were most affected by SARS in May 2003. However, losses in the tourism sector only were reported to be approximately \$ 1.4 billion in treatment costs or 300 times the cost of treatment for SARS cases in Beijing.

Al-Awadhi et al. (2020) investigated the impact of Covid-19 on the Chinese Stock Exchange. The data used in the study are the stock market closing price, stock market capitalization rate, market value / book value and the total number of deaths and cases of Covid-19. According to the results; Covid-19 has been found to negatively affect oil prices.

Baker et al. (2020); Analysis has been carried out on how all global pandemics such as SARS, MERS, Ebola, Spanish flu affect stock markets. As a result of the research, they found that the uncertainty caused by the epidemic environment negatively affected investors, limiting the ability to forecast and this limitation had a negative impact on the stock markets.

Conlon and McGee (2020) examined how Bitcoin is perceived as an investment tool in terms of investors during the epidemic process. In the study, S&P500 data and Bitcoin prices were evaluated through Covid-19 in modelling with daily data between 2010 and 2020. In the said period, it was observed that the low risk of Bitcoin moved in the direction of increasing.

Corbet et al. (2020); Chinese Stock Exchange interaction with cryptocurrencies before and after Covid-19 has been examined. This review was conducted using the GARCH model. As a result of the research, it was found that crypto currencies are not yet seen as a safe port by investors in times of crisis because they are not trusted by investors.

Jabotinsky and Sarel (2020); The impact of Covid-19 on gold markets and cryptocurrencies around the world has been examined. According to the results, it has been determined that gold is both a low-risk and reliable investment tool for investors.

Jana and Das (2020) decided on whether investors should invest bitcoin and gold due to the impact of Covid-19 through an empirical analysis. According to the findings, bitcoin has been

found to be an investment tool for investors that is not yet sufficiently informed and has low reliability, while gold is both strong and reliable.

Luo and Tsang (2020) predicted the impact of Covid-19 on production loss in China. They emphasized that China suffered a 4% loss of production due to labour and therefore the world's production volume decreased by 1% in periods. In addition, it has been stated that this effect is not entirely due to China, approximately 40% of it is due to national and international supply shortages.

Mckibbin and Fernando (2020) stated that the macroeconomic uncertainty that resulting from the COVID-19 outbreak necessitates coordinated policy implementation for public health systems' lack of infrastructure and household financing needs. Especially the integration of monetary and fiscal policies has gained much more importance in this process. It was emphasized that the emerging macroeconomic uncertainty may lead to a structurally slowing process for the future economies. It was emphasized that financing the deficit with helicopter money would be an innovative solution.

Zhang et al. (2020) measured the stock market risk of 12 developed countries which are England, Italy, China, Spain, Germany, France, Switzerland, United States of America (USA), South Korea, Netherlands, Japan and Singapore stock markets from Covid-19. Measurements were made for the period between 29.02.2020-27.03.2020. As a result of the research, it was determined that the global epidemic negatively affected the stock markets.

Zeren and Hızarcı (2020) investigated whether the Covid-19 outbreak had an impact on selected Stock Exchange indices. Taking into account the stock market indices, Covid-19 case and death numbers, unit root tests with structural break and Maki cointegration analysis were performed. Accordingly, cointegration between stock market indices and cases in selected countries has been determined. However, it has been observed that investors in Italy, Germany and France are not affected by Covid-19 cases in terms of investment behaviour.

DATA AND METHODOLOGY

The purpose of this study is to see the relationship between Covid 19 case numbers and macro indicators in financial markets. Since COVID-19 is a global pandemic, the total number of cases worldwide worldometer.com daily data from the website. The daily data of 31 December 2019 - 04 September 2020 gold prices, oil prices, Eur / Usd and Wheat prices were taken from investing.com and Nasdaq.com.

Unit Root Test Results

Since stationarity is considered a must-have prerequisite for a time series model, only after the during requirement is provided can the analysis to be used be applied. For a time series to be stationary, its mean and variance should not change over time, and the covariance between two periods should depend only on the distance between the two periods, not on the period in which this covariance is calculated (Gujarati, 2011).

Dickey-Fuller unit root test, developed by Dickey-Fuller (1979-1981), is one of the common methods used to examine whether a time series is stationary. When explaining the DF test, it is stated that the delays of the variable dependent to the right of the equation are added to solve

the autocorrelation problem and the test applied to the new model created is called an ADF test. The regression equations developed for the ADF test used to examine the stationarities of the series are as follows:

$$\Delta Y_t = \alpha_1 Y_{t-1} + \sum_{i=1}^k \beta_i \Delta Y_{t-i} + \varepsilon_i$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{i=1}^k \beta_i \Delta Y_{t-i} + \varepsilon_i$$

$$Y_t = \alpha_0 + \alpha_2 \text{trend} + \alpha_1 Y_{t-1} + \sum_{i=1}^k \beta_i \Delta Y_{t-i} + \varepsilon_i$$

The hypotheses used for ADF testing are as follows:

H0: $\rho = 0$ Series is not static. The series has a unit root.

H1: $\rho < 0$ Series is stationary. The series has no unit root.

To test zero hypothesis ($H_0: \gamma=0$) against alternative hypothesis ($H_1: \gamma \neq 0$), the DF statistics obtained as a result of these tests are compared with Mackinnon (1996) critical values. The null hypothesis; it states that the series is not stationary, that is, it has a unit root. Alternative hypothesis is; states that the series is stationary.

In order to understand stationarity, the ADF test value must be logarithmically lower than Mac Kinnon critical values at 1%, 5% and 10% significance levels, the absolute value of the ADF test must be greater than the absolute value of Mac-Kinnon critical values, and the probability value must be less than 0.05. Table 1 indicates the outputs of ADF unit root tests.

Table 1: ADF Test Results

Variables	ADF Test Statistik	Mac-Kinnon Critic Values			Level	Possibility
		1%	5%	10%		
Covid19	-5,449695	-3,469451	-2,878618	-2,575954	1st Dif.	0,0000
Eurusd	-13,68147	-3,467205	-2,877636	-2,575430	Level	0,0000
Gold	-14,04901	-3,467205	-2,877636	-2,575430	Level	0,0000
Oil	-10,71903	-3,467205	-2,877636	-2,575430	Level	0,0000
Wheat	-15,55659	-3,467205	-2,877636	-2,575430	Level	0,0000

Test statistics values in Table 1 are stationary but not the same level. That is the reason our variables which are Eur/Usd, Covid 19, Gold, Oil and Wheat follows a random walk. Hence, if the existence of a unit root for a series, H1 hypothesis, can be rejected, and H0 hypothesis can be accepted.

VAR Model and the Lag Length Criteria

VAR models are used when it is not known for certain whether the variables used in macroeconomic models are external. The VAR model developed by Sims examines all selected variables together in a system integrity. Between the variables used in the model, there is no definite distinction between internal and external variables.

It is not fully known whether any time series in the system, the trend it follows over time, is independent of the trend of another time series in the system. Multi-equation systems that contain series when such a symmetrical interaction is involved use methods called VAR (Kazdağlı, 1996: 42; Özgen / Güloğlu, 2004: 96). The model contains the lagged values of dependent variables, allowing strong predictions for the future. The VAR Model can be formulated with two variables as follows (Gujarati 2009:747):

$$y_t = \alpha + \sum_{i=1}^p \beta_i y_{t-i} + \sum_{i=1}^p \gamma_i x_{t-i} + \varepsilon_{1t} \quad x_t = \alpha' + \sum_{i=1}^p \theta_i y_{t-i} + \sum_{i=1}^p \lambda_i x_{t-i} + \varepsilon_{2t}$$

In the model, α is constant term, p is lag length, ε is error term. In the VAR model, the covariance of the error terms with their mean and lagged values are zero. Their variances are fixed and they are normally distributed and random in nature. It is based on the assumption that errors are unrelated to their lagged values. The problem of autocorrelation can be eliminated by increasing the lag length of variables. There is no relationship between error terms and variables to the right of the model.

One of the important steps in estimates using the VAR Model is the estimate of lag length and optimal lag length is determined by different criteria. Some of these criteria include; AIC (Akaike information criterion), SC (Schwarz information criterion) FPE (Final prediction error) and HQ (Hannan Quinn information criterion). The VAR model should be decided on as the value that makes the lag length smallest. Table 2 states the result of lag length criteria

Table 2: Lag Length Criteria

Lag Length Criteria	LR	FPE	AIC	SIC	HQ
0	NA	1.734917	14.74034	14.83370	14.77823
1	141.8951	0.969648	14.15841	14.71853*	14.38575*
2	48.51975	0.959211	14.14679	15.17367	14.56358
3	27.65481	1.079616	14.26304	15.75669	14.86928
4	37.48357	1.130900	14.30571	16.26612	15.10140
5	53.58940	1.049613	14.22504	16.65222	15.21018
6	83.20618	0.774933*	13.91263*	16.80658	15.08722
7	29.45575	0.845481	13.98718	17.34789	15.35122
8	27.39534	0.933294	14.06916	17.89664	15.62265
9	23.45432	1.060091	14.17472	18.46897	15.91766
10	49.37325	0.960539	14.04849	18.80950	15.98088
11	39.98020*	0.935420	13.98771	19.21549	16.10955
12	16.55244	1.125706	14.13096	19.82550	16.44225

According to the outputs presented above in Table 2, the lag length for Eur/Usd, Wheat, Gold, Oil and Covid-19 case numbers were determined as 1. In order to interpret the statistical data of long-term relationships between variables, the series must be integrated in the same degree. However, the series to be used in the model are stationary at the level and stationary at the first difference. That is the reason, the ARDL test was performed.

Autoregressive Distributed Lag (ARDL) Boundary Test and Results

Cointegration tests are also used to examine the long-term relationship between variables. Engle-Granger (1987) and Johansen (1988) state that there may be a stationary combination of

two variables that are found to be non-stationary at the levels of cointegration tests. These tests require the variables to be integrated to the same degree. However, this restriction, which carries significant obstacles in practice, has been addressed by the ARDL approach proposed by Peseran et al. (2001), which allows the relationship between different degrees of integrated variables to be revealed. ARDL model in the literature are mentioned various advantages. One of these advantages is that the variables to be used in the model are stationary I(0) at the level or stationary I(1) at the first difference do not prevent the application of the boundary test. Another advantage of this model is that it uses the Unrestricted Error Correction Model (UECM), so it can give statistically more reliable results compared to classical cointegration tests. ARDL Boundary Test equation is as follows.

$$\Delta Y_t = a_0 + \sum_{i=1}^m a_{1i} \Delta Y_{t-i} + \sum_{i=0}^m a_{2i} \Delta M_{t-i} + \sum_{i=0}^m a_{3i} \Delta E_{t-i} + a_4 Y_{t-1} + a_5 M_{t-1} + a_6 E_{t-1} + u_t$$

The hypotheses for this test are as follows:

H₀: $\theta_1 = \theta_2 = 0$ (There is not cointegration)

H_a: $\theta_1 \neq \theta_2 \neq 0$ (There is cointegration)

- If F statistic > F table is upper bound; H₀: $\theta_1 = \theta_2 = 0$ is rejected and it is concluded that there is cointegration.
- If F statistic < F table lower limit; H₀: $\theta_1 = \theta_2 = 0$ is accepted and it is concluded that there is no cointegration.
- F table taken limit < F statistic < F if the table is upper bound; zone of indifference.

Two asymptotic critical boundaries are used in the ARDL method. If the obtained F statistical value exceeds the critical upper limit, the null hypothesis is rejected, meaning that there is a long-term relationship between variables. If the F statistic value remains below the critical lower limit, the null hypothesis cannot be rejected and it is concluded that there is no long-term relationship between the variables. If the F statistical value remains between two critical limits, there cannot be interpreted in anyway. Table 3 indicates the outputs of ARDL tests.

Table 3: ARDL Test Results

ARDL F-Bounds Test				
Test Statistic	Value	Signif.	Asymptotic: n=1000	
			I(0)	I(1)
F-statistic	2,6117134	10%	2,2	3,09
		5%	2,56	3,49
		1%	3,29	4,37
			Finite Sample: n=80	
Actual Sample Size	176	10%	2,303	3,22
		5%	2,688	3,698
		1%	3,602	4,787

According to Table 3, since the F statistic value (2.6117) calculated at the 5% and 10% significance level is between the lower limit and the upper limit values, that is, it is located in the zone of indifference, so no comment could be made. However, the H₀ hypothesis cannot be

rejected because the F statistical value (2.6117) lower limit (3.29) calculated at the %1 significance level is small, it was determined that there is no cointegration relationship between our series.

Impulse - Response Analyses

Whether any variable is effective on a macroeconomic structure is determined primarily by cointegration and causality tests. Then, whether the effective variable can be used as a policy tool or not is analyzed by impulse-response functions and the degree of influence by variance decomposition. These analysis is performed by estimating the impulse-response function, which is predicted within the framework of the VAR / VECM model and measures the impact of the shock occurring at a certain time on the future values of the variables in a dynamic system. However, in impact-response analysis, it is possible to see not only the shocks that occur in other variables, but also the effect of the shocks that occur in the variable itself. The moving average vector (VMA) representation allows the time path of the effects of shocks on the variables of the VAR system in Sims (1980) 's method. The figure 1 shows that the result of Impulse-Response Tests.

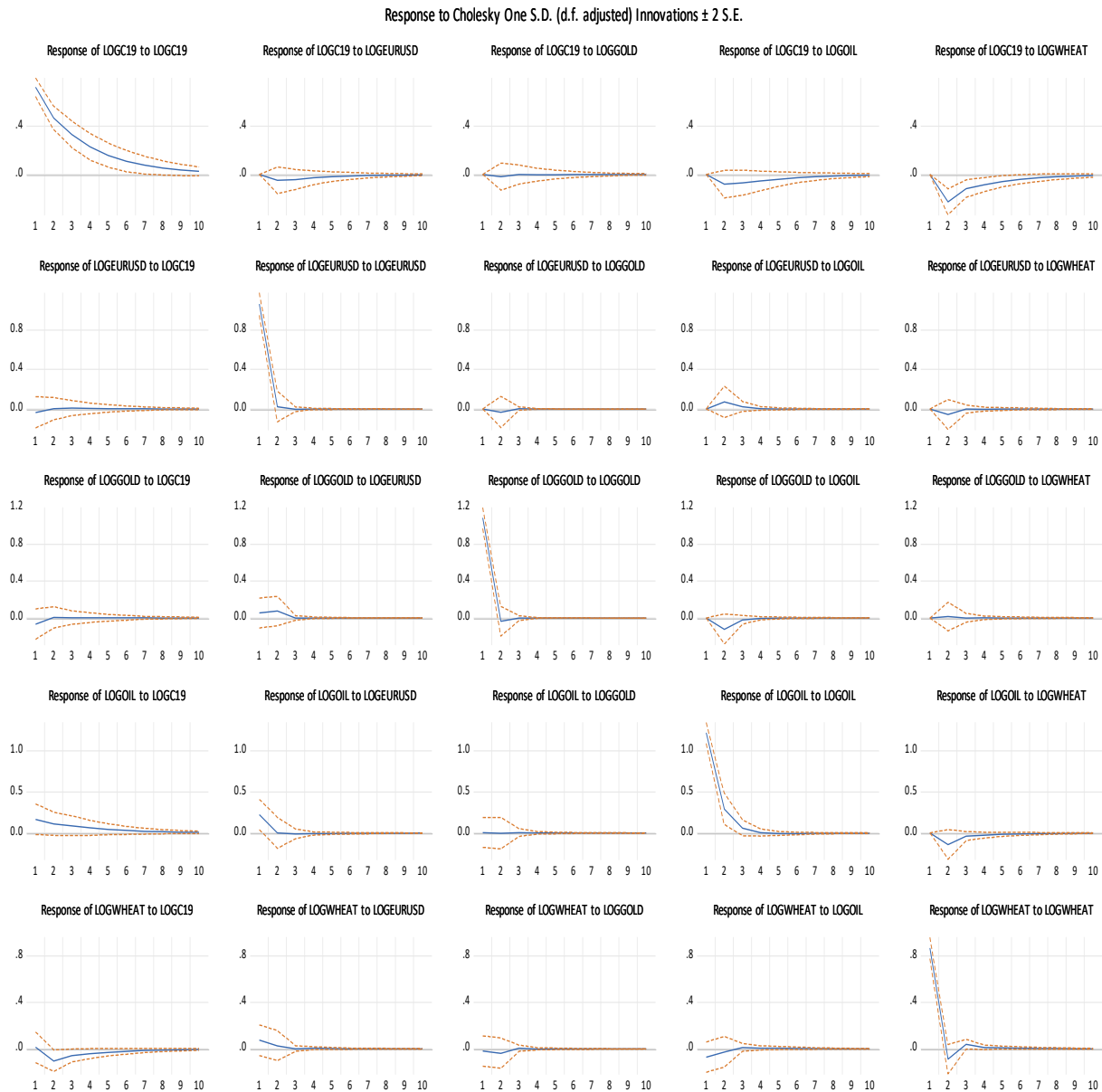


Figure 1: Impulse-Response Test Results

The lines in the charts refer to the reactions of intrinsic variables in the face of 1 standard deviation shock that occurs in the model's error term, while the horizontal axis in the charts shows the duration of the response and the vertical axis shows the size of the response. Accordingly, 1 standard deviation shocks occurring in Covid 19 Eur/ Usd, Gold and Oil density cumulatively both reducing and increasing effect is observed for the first 2 days. However, it decreases its intensity on wheat cumulatively for the first 2 days.

Chart 1 shows that the most obvious reaction to a shock occurring in Eur / Usd parity is on itself. This effect remains at 8% within 10 periods. Although it does not have much effect on Covid 19, there are 8% increase and decrease on gold, oil and wheat.

While the shocks of 1 standard deviation occurred in gold have a reducing effect on itself in the first 2 days, there is a reducing effect on oil in 2 days, respectively, while the 2-day period has both a reducing and increasing effect on wheat.

A positive shock to oil has caused a reducing effect on 2 days, while a negative shock has the same effect on eur/usd. However, it reduces its intensity on wheat cumulatively for the first 2 days.

For wheat, the most obvious reaction to a shock is both on itself and on Covid 19, and these effects remain at the level of 8% within 10 periods.

Variance Decomposition

Variance decomposition obtained from the moving averages section of the VAR model expresses the sources of the shocks occurring in the variables themselves and in other variables as a percentage. A change in variables used shows what percentage is caused by itself and what percentage is caused by other variables. If most of the changes that occur in a variable are caused by shocks in another, it shows that the variable is acting externally. Variance decomposition also provides information about the degree of causality relationships between variables (Enders, 1995:311).

In order to see the effects of all our variables on themselves and other variables, the results of the ten-period variance decomposition of the variables are given in Tables.4,5,6,7 and 8.

Table 4: Variance Decomposition Results for Covid-19

PERIOD	S.E.	COVID-19	EUR/USD	GOLD	OIL	WHEAT
1	0,722596	100,0000	0,000000	0,000000	0,000000	0,000000
2	0,895569	92,39760	0,306197	0,044012	0,827565	6,424621
3	0,965260	91,27542	0,452617	0,038096	1,234087	6,999775
4	0,997532	90,71140	0,501055	0,036565	1,457921	7,293059
5	1,012672	90,46769	0,523073	0,035823	1,563821	7,409595
6	1,019869	90,35372	0,533118	0,035494	1,614214	7,463451
7	1,023305	90,30005	0,537849	0,035338	1,638166	7,488597
8	1,024951	90,27450	0,540096	0,035265	1,649596	7,500538
9	1,025739	90,26230	0,541170	0,035230	1,655063	7,506238
10	1,026117	90,25645	0,541684	0,035213	1,657682	7,508967

According to the table, the variance of the predictive error of Covid-19 with five lags is caused by Covid-19 shocks at a rate of 90.47%. The variance of the prediction error of the five-lagged Wheat variable is 7.4% due to Covid-19 shocks. According to the overall averages of ten periods in Table 4, the impact of Covid-19 on itself is 90.26%. The impact of Covid-19 on Eur/Usd is 0.54% according to the ten-period average. The impact of Covid-19 on gold is 0.035% compared to the ten-period average, the effect on wheat is 1.66%, and the effect on wheat is 7.5%.

Table 5: Variance Decomposition Results for Eur/Usd

PERIOD	S.E.	COVID-19	EUR/USD	GOLD	OIL	WHEAT
1	1,064244	0,106857	99,89314	0,000000	0,000000	0,000000
2	1,068914	0,106729	99,07173	0,091173	0,457526	0,272843
3	1,069217	0,112509	99,01648	0,091875	0,506284	0,272851
4	1,069245	0,115106	99,01114	0,091871	0,507863	0,274024
5	1,069254	0,116497	99,00952	0,091869	0,507873	0,274242
6	1,069259	0,117172	99,00873	0,091868	0,507880	0,274345
7	1,069261	0,117500	99,00835	0,091868	0,507892	0,274390
8	1,069262	0,117657	99,00816	0,091868	0,507899	0,274412
9	1,069262	0,117733	99,00807	0,091868	0,507903	0,274422
10	1,069262	0,117769	99,00803	0,091868	0,507906	0,274427

According to the table, the variance of the prediction error of Eur / Usd with seven lags is caused by 99.0084% Eur / Usd shocks. The variance of the prediction error of the seven lagged oil variables is due to 0.51% Eur / Usd shocks. According to the ten-period general averages in Table 5, Eur / Usd the effect on itself is 99.0080%. According to the ten-term average, the effect of Eur/Usd on Covid-19 is 0.12%. The effect of Eur / Usd on gold is 0.092% compared to the ten-period average, the effect on oil is 0.51%, and the effect on wheat is 0.27%.

Table 6: Variance Decomposition Results for Gold

PERIOD	S.E.	COVID-19	EUR/USD	GOLD	OIL	WHEAT
1	1,090488	0,392995	0,237974	99,36903	0,000000	0,000000
2	1,100760	0,387674	0,691436	97,63539	1,267588	0,017912
3	1,100976	0,387780	0,691317	97,59764	1,305360	0,017905
4	1,100989	0,387863	0,691315	97,59529	1,307566	0,017963
5	1,100990	0,387889	0,691314	97,59510	1,307730	0,017964
6	1,100990	0,387901	0,691314	97,59508	1,307743	0,017964
7	1,100990	0,387907	0,691314	97,59507	1,307745	0,017965
8	1,100990	0,387909	0,691314	97,59507	1,307745	0,017965
9	1,100990	0,387910	0,691314	97,59507	1,307745	0,017965
10	1,100990	0,387911	0,691314	97,59506	1,307745	0,017965

According to the table, the variance of the prediction error of gold with six lags is 97.60% due to gold shocks. The variance of the prediction error of the six lagged oil variables is 1.31% due to shocks of gold. According to the overall averages for the ten periods in Table 6, the impact on Gold itself is 97.60%. According to the ten-term average, the effect of gold on Covid-19 is 0.39%. The impact of gold on the EUR/USD is 0.69% compared to the ten-term average, oil the effect on wheat is 1.31%, and the effect on wheat is 0.017%.

Table 7: Variance Decomposition Results for Oil

PERIOD	S.E.	COVID-19	EUR/USD	GOLD	OIL	WHEAT
1	1,249770	1,776410	3,169878	0,001605	95,05211	0,000000
2	1,295547	2,374297	2,949826	0,002562	93,49898	1,174336
3	1,300633	2,818762	2,933662	0,003802	92,99001	1,253766
4	1,302423	3,038470	2,928418	0,003794	92,73561	1,293706
5	1,303283	3,146183	2,926183	0,003794	92,61537	1,308466
6	1,303705	3,198023	2,925086	0,003798	92,55785	1,315241
7	1,303909	3,222934	2,924557	0,003800	92,53031	1,318398
8	1,304007	3,234891	2,924302	0,003801	92,51710	1,319901
9	1,304055	3,240629	2,924580	0,003802	92,51077	1,320620
10	1,304077	3,243382	2,924122	0,003802	92,50773	1,320964

According to the table, the variance of the prediction error of four lagged oil is 92.74% due to oil shocks. The variance of the prediction error of the four-lag Eur / Usd variable is due to oil shocks at a rate of 2.93%. According to the overall averages of ten periods in Table 7, the effect on itself is 92.5%. According to the ten-term average, the impact of oil on Covid-19 is 3.24%. The impact of oil on the EUR/USD is 2.92% compared to the ten-period average, the effect on wheat is 0.004%, and the effect on wheat is 1.32%.

Table 8: Variance Decomposition Results for Wheat

PERIOD	S.E.	COVID-19	EUR/USD	GOLD	OIL	WHEAT
1	0,877820	0,025424	0,732497	0,040258	0,646511	98,55531
2	0,889854	1,366217	0,804556	0,215078	0,713561	96,90059
3	0,892684	1,752878	0,800113	0,219014	0,730730	96,49727
4	0,893788	1,962691	0,802183	0,218492	0,737339	96,27930
5	0,894337	2,060705	0,802624	0,218249	0,742322	96,17610
6	0,894599	2,107935	0,802889	0,218127	0,744823	96,12623
7	0,894725	2,130560	0,803011	0,218069	0,746064	96,10230
8	0,894786	2,141416	0,803070	0,218042	0,746665	96,09081
9	0,894815	2,146624	0,803098	0,218028	0,746954	96,08530
10	0,894829	2,149123	0,803112	0,218022	0,747093	96,08265

According to the table, the variance of the prediction error of wheat with five lags is due to wheat shocks at a rate of 96.18. The variance of the prediction error of the five lagged Covid 19 variables is caused by 2.061% wheat shocks. According to the general averages of ten periods in Table 8, wheat the effect on itself is 96.08%. According to the ten-period average, the effect of wheat on Covid -19 is 2.15%. The effect of wheat on Eur/USD is 0.80% compared to the ten-term average, the effect on gold is 0.74%, and the effect on gold is 0.22%.

CONCLUSION

There have been many economic and financial crises affecting all countries in the history of the world. The influence on human health and the deaths of hundreds of thousands of people distinguishes this economic and financial crisis from others. COVID-19, which began in Wuhan, China in December 2019, has spread to almost all countries around the world in a short time.

The pandemic causes to loss of life in every country and many measures have started to be taken in order to minimize these losses. Common cooperation and struggle between countries will be the most important factor in reducing the destructive effects of the pandemic for Covid-19, which is not yet known when it will end and there are multiple types of vaccines, but the results are unknown. It is thought that both the health system and the economic and financial systems of all countries will be negatively affected and these effects will become clearer in the future. It is predicted that the pandemic will cause significant damage to the world economy with its effects on human health. There have been significant declines in the stock markets of the economies that are effective in the world. In this study, the relationship between the number of cases of COVID-19 epidemic on a global scale and gold prices, oil prices, Eur / Usd and Wheat prices during the period of 31 December 2019 - 04 September 2020 was investigated.

In the analysis performed using ARDL Boundary Test, covid-19 daily case numbers and commodity market, Eur / USD parity and wheat prices were determined by ADF unit root test, where our series were not stationary at the same level before the relationship was examined. Then the ARDL boundary test was applied and no relationship between our series was determined. Whether there is a relationship between our series or not were tested by impulse-response analysis. Shocks lose their effect in 2 days on average. According to the variance decomposition, 10-period periods were examined. Wheat prices are more proportional with the number of cases during the COVID-19 pandemic.

Increasing numbers of cases and deaths negatively affect the economic progress globally and show that countries with intense epidemic are vulnerable. Not knowing how long the pandemic will last and how long economic activities will be restricted requires an economic precaution. If the pandemic is brought under control quickly, the return to normal economic life will happen quickly and thus all economic sectors, especially service sectors, will recover in a short time. If the process of controlling the pandemic is long, the destruction on economic growth and employment will be at higher levels. With the vaccine found, it is predicted that the normalization process will accelerate and the economy may recover. Increased studies examining the impact of the COVID-19 pandemic on financial markets and commodity markets will make it easier for both economists and financial actors in the future. More meaningful results can be obtained by changing the data in this study.

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