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**Article**

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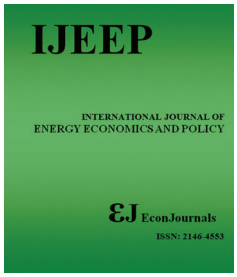

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# Oil Price, Gold Price, Exchange Rate and Stock Market in Iraq Pre-During COVID19 Outbreak: An ARDL Approach

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**ABSTRACT**

This study used the econometrics methods to identify the interactions among oil price, gold price, exchange rate, and stock price which represented by the (ISX60) index under the Iraq stock exchange pre-during global pandemic of COVID19. The analysis employed daily data which categorized into three time periods: full sample pre-during COVID19 from 24 December 2018 to 3 September 2020, the pre-COVID19 period from 31 December 2018 to 30 December 2019, as well as during-COVID19 from 27 December 2019 to 3 September 2020 in order to measure the interactions between the variables for each period. To accomplish that the study used the correlation matrix, unit root test to assure the stationary for the ARDL model and the granger causality test. The correlation output showed different results between the variables based on the period division. Furthermore, the study results accepted the null hypothesis of no cointegration exists between the variables respectively for the (Full sample Pre-during and pre-COVID19) period, and no decision could be made about the long-run relationship amongst the variables for the (during-COVID19) period, while the results of the causal short-run model showed that effect of oil price, gold price and exchange rate insignificant with Iraq stock exchange.

**Keywords:** COVID19 Outbreak, Oil Price, Gold Price, Exchange Rate, Stock Market
**JEL Classifications:** F31, C01, G12, G15

## 1. INTRODUCTION

According to World Health Organization, many countries responded to the infected and deaths from COVID19 by locking down people's movement and economic activity, imposing travel bans and implementing incentive packages to cushion the unprecedented slowdown in economic activity and jobs crisis (Phan and Narayan, 2020).

The oil price is volatile due to disruptions caused by the COVID19 outbreak (Prabheesh et al., 2020), there is a consensus in the literature that an increase in oil price rise stock prices in oil-exporting economies mainly due to higher income from oil exports (Kilian and Park, 2009). The Iraqi economy is dominated and depends heavily on crude oil exports (Asaad and Marane, 2020), in Iraq the oil is the only way to gain foreign exchange to the country since (2003) and more than (90%) of total government revenues come from crude oil export revenue (International Monetary Fund). Iraq coming after Saudi Arabia as the largest crude oil manufacture in the Organization of the Petroleum Exporting Countries, with proved crude oil reserves of about (145) billion barrels representing (8%) of proved oil reserves in the world with (4.4) million barrels per day as averaged oil production during the first half of (2020). Both the COVID19 outbreak and oil price declines with Iraq voluntarily detracted crude oil output in (2020) following the OPEC+ agreement including Federal Iraq and semi-autonomous northeast region in Iraq governed by the Kurdistan Regional Government are the two main reasons to exacerbated Iraq's economic problems, whereas in April 2021 the Iraq Health Ministry reported that the epidemic situation has dramatically deteriorated when the total number of people diagnosed with the COVID19 has surpassed one million.

Furthermore, Iraq classified one of the worst states in the corruption perception index ranking since (2003) based on the report issued by Berlin-based Transparency International, and Iraq remains one of the top five countries most affected by terrorism and suffered the highest levels of violent activities according to report published annually by the Institute for Economics and Peace (IEP) especially after ISIS emergence in (2014). Therefore, Iraq struggling to face many challenges such as oil price volatility, COVID19 pandemic, the monetary policy of using currency auction as a gate to corruption, terrorism, local conflict, and political instability. All these factors constitute a major obstacle to economic development and a major cause of crises and problems in the business environment in Iraq. The interaction between oil price, gold price, exchange rates, and stock markets have extensively been studied in the developed state but the same interference is less investigated in developing and emerging economies (Ali et al., 2020; Bouri et al., 2017). The limit study focused in Arab region markets (Mustafa, 2020, Marane, 2015), also researcher has been paid less attention to Middle East region which distinguished with fast economic growth compared to other emerging markets (Parsva and Lean, 2017).

Before COVID19 outbreak, several studies results found in one way or another that the stock market development affected by changing of oil price (Asaad et al., 2020a; Nguyen et al., 2020; Asaad, 2017; Echchabi and Azouzi, 2017; Hammoudeh and Li, 2015; Gokmenoglu and Fazlollahi, 2015; Creti et al., 2013; Berk and Aydogan, 2012; Eryigit, 2009; Bjornland, 2009), gold price (Abdul Kareem et al., 2020; Ali et al., 2020; Selvan and G2, 2020; Shabbir et al., 2020; Utama and Puryandani, 2020; Al-Ameer et al., 2018; Bhuyan and Dash, 2018; Kumar, 2017; Arouri et al., 2015; Gokmenoglu and Fazlollahi, 2015; Mulyadi and Anwar, 2010), and exchange rate (Ali et al., 2020; Mustafa, 2020; Utama and Puryandani, 2020; Parsva and Lean, 2017; Lee and Zhao, 2014), at the same time the study variables relationship recently inclusively and heavily becomes under the investigation in literature review after outbreak of COVID19 in the world since (2019) particularly the pandemic is still existing to the first half of (2021), and future researches are likely to predict different asset prices in light of COVID19 outbreak due to new studies have shown that COVID19 has influenced the entire financial and economic system (Devpura, 2021), while some studies results found in one way or another that the stock market development affected by fluctuation of oil price, gold price and exchange during COVID19 (Chien et al., 2021; Devpura, 2021; Kyriazis, 2021; Al-Awadhi et al., 2020; Syahri and Robiyanto; 2020; Prabheesh et al., 2020). Based on the previous studies results on this potential linkage between the variables still appearing inconsistency whether before or during the COVID19 pandemic period, hence this study distinguishes from previous studies due to rare studies done during the pandemic period in developing countries or oil-exporting countries like Iraq.

The current study fills the gap in the literature by exploring the short-run and long-run relationship between the movement of oil price, gold price, exchange rate, and stock exchange in Iraq measured by general index derived from sixty companies (ISX60) as imperative in light of the ongoing COVID19 pandemic. As an economy heavily depends on exporting oil due to less attention has been done to the Iraqi and Palestinian stock markets and take as a limitation to the studies in Middle East region to understand the relationships between the variables. Thus, the goal is analyzed by using quantitative techniques and different econometric techniques such as correlation matrix, the Augmented Dicky Fuller unit root test, autoregressive distributed lag (ARDL) bounds approach to cointegration test. Moreover, the stability and predictive efficiency of the model is tested by using various diagnostic tests for instance serial correlation test, cumulative sum, and squares of recursive residuals test (CUSUM, CUSUMQ).

The novel feature of this study is concentrates on the stock markets reactions of oil-exporting economies for the different period's pre and during the COVID19 outbreak from (24 December 2018 to 3 September 2020). This study makes a good contribution to the existing literature on the spillover effects of the COVID19 outbreak due to its effects on the financial and economic system by considering the oil price, gold price, exchange rate, and stock market nexus during the pandemic. The rest of the study is divided as follows: the reviews of selected empirical past studies present in the literature review section. The methodology section presents the data and model specification, whereas the discussion of the results exhibits an analysis of the finding section, while the conclusion and further studies come to light in the last section of the study.

## 2. LITERATURE REVIEW AND HYPOTHESES

The stock market reacts to various major events, such as pandemic diseases (Devpura, 2021; Kyriazis, 2021; Al-Awadhi et al., 2020; Syahri and Robiyanto; 2020), political events, terrorism activities, and war (Asaad et al., 2020), also the stock market responds to the movement of oil price, gold price, exchange rate have been studied and detected inconsistent results and ambiguous findings (Asaad, 2014). Plenty of studies focused on the relationship between oil price, gold price, and macroeconomic factors but on the contrary, only a few studies have dedicated themselves to investigating the relationship between oil price, gold price, and stock markets (Gokmenoglu and Fazlollahi, 2015), especially in developing or emerging countries like Iraq during pandemic diseases of COVID19. After ISIS launched an offensive on the region in June (2014) and occupied a large part of Iraq and Syria, hereinafter, the prices of oil severely declined in the global markets (Asaad and Marane, 2020; Asaad et al., 2020), furthermore, these events cause light more attention on the economic cost of changing oil price, gold price and exchange rate on the stock market. The Arbitrage Pricing Theory (APT) indicated that not only one factor but there are many factors that influence the stock market (Mustafa, 2020; Asaad, 2017), based on that many studies done on the determinants of stock market development (Cherif and Gazdar, 2010).

### 2.1. Pre-COVID19

The oil price has a crucial place for the oil-exporting countries economy whether countries member in OPEC such Iraq or other oil exporters (Marane, 2015), and any fluctuation in oil price leads to change in stock prices (Hamilton, 1983; Gokmenoglu and Fazlollahi, 2015). The increasing of oil prices leads to

increase shares return, and the economy responds to oil price rises by increasing total wealth and demand in exporting countries (Bjornland, 2009).

The disagreement results in literature depend if the country is an consumer or producer of crude oil (Asaad and Marane, 2020), and some recent studies focused on the role of oil price on the stock market in exporting countries (Echchabi and Azouzi, 2017; Mustafa, 2020). Hammoudeh and Li (2005) investigated the oil sensitivity of four international capital markets for the period (1986-2003) on the daily stock return and found the stock return of oil-exporting countries and US industries derived by the growth of oil prices with more sensitivity to the oil sector in the US. While, Creti et al. (2013) has come out that the interaction between oil prices and the stock market is less in oil importing compared to the oil exporting countries for the period (2000-2010).

According to Asaad et al. (2020) which indicated that the stock price affected by the oil price change in Iraq, this finding is to be in harmony with another study done by Mustafa (2020) for the period 2005 to 2018. A study done by Berk and Aydogan (2012) for the period 1990 to 2011 found that there was a weak influence of oil price change on the Istanbul stock market, the results of this study were similar to the findings of another study conducted by Gokmenoglu and Fazlollahi (2015), but Eryigit (2009) discovered the positive influence of oil prices on some sectors in the same context, whereas Nguyen et al. (2020) also found a positive influence of oil price using Brent and WTI on the stock market in Vietnam for the period (2000-2019) in contrast of study done by Mustafa (2020) which found this interaction in negative effect.

Gold is considered one of the most valuable and common investment. In fact, gold had a vital place during the ancient period and played an essential role in the human community by using gold in the barter system for efficient exchange, then exist of the gold standard system which takes a position as a valuable item like money in the economy (Al-Ameer et al., 2018). A study reported that the investment in gold is more beneficial than investing in stock (Mulyadi and Anwar, 2010). Some studies found that there is no correlation between gold and stock returns due to that gold is independent and can be associated with the stock returns based on macroeconomic factors. The lack of any substantial relationship between gold and stocks and bonds raises the question of whether gold price movements can be used as a predictor for stocks and bond prices (Al-Ameer et al., 2018) or the gold prices are another predictor of the stock market returns (Kumar, 2017).

Many studies have received attention to the interaction between the gold price and stock markets (Ali et al., 2020; Utama and Puryandani, 2020; Al-Ameer et al., 2018), and contradictory results found of a relationship between the gold price and the stock market. Gokmenoglu and Fazlollahi (2015) represented that gold has important implications for investors and the influence of gold price is higher on the stock price. So investors consider gold as a very well substitution for stock and can use gold as a hedge against inflation. Al-Ameer et al. (2018) confirmed the mixed results of positive and negative correlation between gold and the stock market in the long and short-run based on pre, during, and post to financial crisis from August 2004 to September 2016. Utama and Puryandani (2020) verified that the gold price does not have a significant effect on the Indonesia stock exchange for the period from January to December 2018 for 23 companies. Arouri et al. (2015) concluded the significant influence of gold price change on stock return in China for the period of 2004-2011.

Abdul Kareem et al. (2020) discovered the negative relationship between the gold price and the stock market in Malaysia from January 2006 to May 2017 period. The results of Ali et al. (2020) show the negative impact of gold price volatility on the stock market in Pakistan for daily and monthly data of both sample period based on global financial crises 2001–2007 and 2008–2018 respectively it was considered the gold price changes as a reacts negatively and an adverse indicator. Also, this finding was similar to the outputs of another study conducted in Pakistan for the period 1991–2016 by Shabbir et al. (2020) which highlighted that better for investors to use diversification in gold, oil, and the stock market. Bhuyan and Dash (2018) provided evidence of the long-run relationship but no causal relation between the gold price and the stock return in India from the period January 2001 to December 2017. This result confirmed by another study conducted by Selvan and G2 (2020) which founds a long-run equilibrium relationship and unidirectional relationship exists in between gold price and stock returns from the period January 2000 to November 2019 and indicated that can predict gold price by using stock price in India.

The fluctuation spillovers from the exchange rate to the stock market is still limited (Ali et al., 2020), previous studies have addressed different results regarding the causal relationships between exchange rate and stock prices in various countries (Lee and Zhao, 2014). Utama and Puryandani (2020) discovered the USD to IDR exchange rate has a significant negative effect on Indonesia's stock returns. The results of Ali et al. (2020) showed the negative impact of exchange rate volatility on the stock market in Pakistan for daily and monthly data of both sample period based on global financial crises (2001–2007) and (2008–2018) respectively considered the exchange rate changes as a reacts negatively and an adverse indicator. Lee and Zhao (2014) found a long-run causality from exchange rates to Chinese stock prices and short-run causality from Japanese and Korean currency exchange rates to Shanghai stock exchange strongly prevails whereas weakly prevails in the Shenzhen Stock Exchange from the period January 2002 to December 2012, also the impact of the global financial crisis from 2007 to 2009 was insignificant on stock markets in China.

The study findings of Parsva and Lean (2017) for six countries (Egypt, Iran, Jordan, Kuwait, Oman, and Saudi Arabia) for the pre-global financial crises 2007 from January 2004 to September 2007, and for post-crisis from October 2007 to September 2015. The results showed the bidirectional causality on post-crisis but not the pre-crisis period for Jordan, Kuwait and Saudi Arabia on the contrary for Iran and bidirectional causality between the variables for both periods for Oman. This study results indicated that fluctuations in foreign exchange markets can significantly affect Middle East stock markets.

### 2.2. During-COVID19

Several studies have been done during COVID19 such as Phan and Narayan (2020) which mentioned that how the majority of active financial indicator such as the stock price reacted in real-time and government responses to different stages in COVID19's up growth for the top (25) countries most affected by the pandemic in terms of infected cases and deaths using daily data. The study observed most countries stock price negatively reacted to the COVID19 outbreak during the early stages. After that, the reaction of half countries stock market was positive especially after the announcement of the day stimulus package, proposing a likelihood of market correction, also found that the effect of lockdowns was positive on eight stock market. But the case of travel bans is not effective like lockdowns. Devpura (2021) noted that oil price has influenced the exchange rate but the evidence is very limited from the period of 1 July 2019 to 30 November 2020 and this relationship vanished when controlling the effect of COVID19 by using a predictive regression model.

Syahri and Robiyanto (2020) results showed that gold prices movements have a significant effect on stock price volatility, and referred to the presence of a negative dynamic correlation between exchange rates and stock price, and a positive dynamic correlation between the gold price and stock market using a GARCH model for the daily period from January 2020 to June 2020 during the COVID19 pandemic. Also the finding may be used as a reference for investors by looking at the study variables relationship. Kyriazis (2021) study results revealed that the European stock indices modestly to strongly positively correlated with gold and this avoid them from abrupt falls during the COVID19 outbreak but weakly positively correlated with oil. Nevertheless, the most important sectors are affected by gold and oil price, while major European markets affected indirectly by the COVID19 deaths from the period 22 January 2020 to 10 July 2020 utilizing the dynamic conditional correlations methods. Meanwhile, Nwosa (2021) covered for the daily time series period from 1 December 2019 to 31 May 2020 using descriptive and causality techniques that the oil price, exchange rate, and the stock market performance had affected adversely by the COVID19 outbreak even more than the global recessions during 2009-2016 which had implications for TNCs and FDI inflow in Nigeria, oil price and exchange rate influence on Nigerian stock market performance as well.

Prabheesh et al. (2020) provided evidence of a positive Joint movement between oil price and stock price returns for four major oil-importing Asian economy as China, India, Japan, and Korea during the COVID19 outbreak from 1 January 2020 to 8 June 2020 period implementing the DCC-GARCH model, and concluded that declining oil prices describe as a negative signal for the stock exchange. Whilst another study sample from USA, Europe, and China which is done by Chien et al. (2021) for the daily data of COVID19 period from 31 December 2019 to 1 August 2020 and find out the negative link between industrial productivity, oil demand, stock market, GDP growth, and electricity demand with the pandemic's severeness index.

Based on the reviewing upper studies discussion, in spite of the high growth of Middle East economics and some countries in this region occupied oil market globally (Asaad, 2014), still less attention has been paid by studies to the market in this region compared with other emerging markets (Parsva and Lean, 2017). Especially we can conclude that the Iraq state still is not under attention by researchers despite considering it as an essential player in the oil market map (Marane and Asaad, 2014). This country challenges many problems such as economic issue including decreasing oil price, high inflation, oil export decline, trade deficit and devaluation of Iraqi currency against US dollar in 2021, political instability, high corruption with various violence activities especially after emerging of ISIS, particularly after the international coalition invasion of Iraq in (2003) (Asaad, 2014). Furthermore, the big issue is that still not clear the verity and vague results of studies about this relationship between dominant factors (oil, gold, exchange rate, and stocks), and it has been noticed that there is a lack of studies available in the literature review regarding this relationship in developing countries (Al-Ameer et al., 2018; Parsva and Lean, 2017; Asaad and Marane, 2020, Asaad et al., 2020; Mustafa, 2020).

### 2.3. Hypothesis

As a whole, the increase in oil prices will have an affirmative effect on the domestic economy of Iraq as one of the oil-exporting countries. The devaluation of Iraqi currency against the US dollar in 2021 in order to fund the deficit in the state budget leads to make the value of foreign currency exchange rates higher against the Iraqi dinar then decline the company's profit and stock return. All these conditions led to the study and test the effect of changing oil price, gold price and exchange rate on the stock market in Iraq as a developing country will contribute massively to the body of knowledge. To take up this case, the study hypothesis arranged from the above argument as it follows:

$H_0$: There is no significant relationship between the oil price, gold price, exchange rate, and stock price in Iraq pre and during the COVID19 outbreak period.

$H_1$: There is a significant relationship between the oil price, gold price, exchange rate, and stock price in Iraq pre and during the COVID19 outbreak period.

## 3. METHODOLOGY

### 3.1. Data and Design

The secondary data has been used in this study for the three-period: full sample pre-during COVID19 from 24 December 2018 to 3 September 2020 with (329) observation, the pre-COVID19 period from 31 December 2018 to 30 December 2019 with (219) observation, as well as during-COVID19 from 27 December 2019 to 3 September 2020 with (108) observation.

In order to examine the relationship between the variables, the dependent variable is stock price proxy variable is the closing price of the general index of Iraq stock exchange (LCLOSE) which obtained from the Iraq Stock Exchange Annual Report, and the Iraq Stock Exchange Index (ISX60) is derived from selected sixty companies of the entire companies listed in Iraq

stock exchange, and the index (ISX60) replaced to the general index of ISX (Asaad and Marane, 2020; Mustafa, 2020), whereas the independent variables are oil price (LOP) proxy is WTI crude oil price per barrel which collected from U.S Energy Information Administration Database (Prabheesh et al., 2020; Asaad, 2014), gold price (LGP) obtained from Bloomberg and exchange rate (LEX) refer to the Iraqi dinar against the US dollar which collected from Central Bank of Iraq.

### 3.2. Study Objective

The general objective of the study is to examine the long-run and short-run relationship between the oil price, gold price, exchange rate, and stock price in Iraq pre and during the COVID19 outbreak period.

### 3.3. Analysis Techniques

The study analyzed the time series data by employing quantitative techniques and econometrics methods begin with the statistical descriptive of data, correlation matrix, the Augmented Dicky Fuller unit root test of the series to assure if the series is stationary and recognize the order of integration, as well the Autoregressive Distributed Lag ARDL bounds estimation cointegration test is used to understand the relationships of the variables for the different period. Also, various diagnostic tests have been applied to test the validity and stability of the model such as serial correlation test, the cumulative sum of recursive residuals, and cumulative sum of squares of recursive residuals test (CUSUM, CUSUMQ).

### 3.4. Model Specification

The study is an attempt to examine the effect of oil price, gold price, and exchange rate on stock price in Iraq, and there are many other factors that can affect the performance of the stock market besides the study variables such as political events, disasters, and terrorism activities, therefore the model used to explore the behavior of the stock market in Iraq as follows:

The general model is CLOSE = f (OP, GP, EX)

The model rearranged in natural logarithm LCLOSEt = β0+β1 LOPt+β2 LGPt+β3 LEXt+μt

Where the dependent variable denotes the natural logarithm of the daily closing price of the general index of the Iraq stock exchange (ISX60) which is defined as the (LCLOSEt), β0 is the intercept of the model. Oil price (LOPt) denotes the natural logarithm of daily oil price per barrel, the natural logarithm of the daily gold price (LGPt), and the natural logarithm of the exchange rate of the Iraqi dinar against US dollar (LEXt) are the independent variables. β1, β2, β3, and β4 are the parameters in the model and the μt is the error term disturbances. The model of Autoregressive Distributed Lag (ARDL) is an ordinary least square (OLS) model consisting of lags both dependent and independent variables:

$$ARDL(p,q): Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i Y_{t-i} + \sum_{i=1}^{q} \delta_i X_{t-i} + \varepsilon_t \quad (1)$$

Short-run model specification: if there is no cointegration, the short-run ARDL (P, q1, q2, q3) model is specified as:

$$\Delta Lclose_t = a_{01} + \sum_{i=1}^{p} a_{1i}\Delta close_{t-i} + \sum_{i=1}^{q} a_{2i}\Delta LOP_{t-1} + \sum_{i=1}^{q} a_{3i}\Delta LGP_{t-1} + \sum_{i=1}^{q} a_{4i}\Delta LEX_{t-1} + e_{1t} \quad (2)$$

Long-run model specification: if there is cointegration, the error correction model (ECM) representing is specified as:

$$Lclose_t = a_{01} + b_{11}\, Lclose_{t-i} + b_{21}\, LOP_{t-i} + b_{31}\, LGP_{t-i} + b_{41}\, LEX_{t-i} + e_{1t} \quad (3)$$

Error correction model specification:

$$\Delta Lclose_t = a_0 + \sum_{i=1}^{p} a_{1i}\Delta close_{t-i} + \sum_{i=1}^{q} a_{2i}\Delta LOP_{t-i} + \sum_{i=1}^{q} a_{3i}\Delta LGP_{t-i} + \sum_{i=1}^{q} a_{4i}\Delta LEX_{t-i} + \lambda ECT_{t-1} + e_t \quad (4)$$

bound test based on the above equation where Δ is the first difference, $q$ is the optimum lag length, $\beta_1$ to $\beta_4$ are short-run dynamics of the model, $e$ is the error term. The bound test result is if the value of calculated F statistics is bigger than the upper bound I(1), meaning the exists of cointegration and the study further proceeds for error correction model, and If F statistics is less than the lower bound I(0) no need for further step and only run ARDL short run which is based on OLS method. Where q1 to q4 is the optimal lag length and λ is the speed of adjustment parameter and ECT represents the error correction term derived from the long-run relationship.

## 4. DISCUSSION OF RESULTS

### 4.1. Descriptive Statistics and Correlation Matrix

A descriptive statistics and correlation matrix are used before starting the empirical analysis. Table 1 presents information of descriptive statistics of data which is divided into three-period full sample pre-during COVID19, pre-COVID19 and during-COVID19 period. The results for the first-period full sample (pre-during COVID19) are shown that the mean closing price of the general index (ISX60) of the Iraq stock exchange (LCLOSE) is 6.16 with a standard deviation of 0.03. The mean oil price per barrel (LOP) is 3.97 with a standard deviation of 0.13, and the average gold price (LGP) is 7.31 with standard deviations of 0.09. and the mean exchange rate of Iraqi Dinar (LEX) is 7.08 with standard deviations of 0.001. While the results for the second period (pre-COVID19) are shown that the mean of LCLOSE, LOP, LGP, LEX are (6.17, 4.04, 7.26, and 7.08) with standard deviations of (0.02, 0.05, 0.05, and 0.001) respectively. Whereas, the results for the third period (during-COVID19) are shown that the mean for of LCLOSE, LOP, LGP, LEX are (6.12, 3.74, 7.45, and 7.08) with standard deviations of (0.03, 0.21, 0.07, and 0.000), respectively.

Table 2 exhibits the results of the correlation matrix and displays how oil price and exchange rate have a positive correlation, and

the gold price has a negative correlation with the closing price of the general index (ISX60) of Iraq stock exchange for the first period full sample (pre-during COVID19). While the results bring out how oil price and exchange rate have a negative correlation, and the gold price has a positive correlation with the closing price of the general index (ISX60) of the Iraq stock exchange for the second period (pre-COVID19). As well, the results are shown how gold price and exchange rate have a negative correlation, and the oil price has a positive correlation with the closing price of the general index (ISX60) of the Iraq stock exchange for the third period (during-COVID19). The correlation matrix shows different findings between the variables based on the period categories.

## 4.2. Unit Root Tests and Optimum Lag Selection

The study conducted the Augmented Dickey-Fuller (ADF) unit root test to examine the null hypothesis if the series has a unit root unlike to the alternative hypothesis before using the cointegration test, the estimated results of the stationarity test are shown in Table 3, revealing that the closing price of the general index (ISX60) of Iraq stock exchange, gold price and exchange rate were stationary at the first difference I(1), while the oil price was stationary at the level I(0) for both period (full sample pre-during COVID19) and (during-COVID19). While the estimated outcomes for the period (during-COVID19) exhibit that all variables oil price, gold price, and exchange rate, stock price were stationary at the first difference I(1). Thus, the finding of the unit root tests is a mixture of I(0) and I(1).

After detecting the unit root results and knowing the order of integration which found out that the variables are having a combination and integrated of different order including both at the level I(0) and the first difference I(1), the next step is to determine the optimal lag length for the ARDL model, which is sensitive to the number of lag selection. The optimal lag length is selected by using four lags which examined statistics test like (LR, FPE, AIC, SC, and HQ) through E-views 10. The estimated results reported in Table 4 have revealed different optimal lag lengths are suggesting one lag for (Full sample Pre-during COVID19 and pre-COVID19) period and two lags for (during-COVID19) period.

## 4.3. ARDL Bounds Testing for Cointegration

Bounds test for the ARDL cointegration model applied due to that the variables are integrated of different orders as a combination with level I(0) and the first difference I(1) order of integration in order to test the null hypothesis of no cointegration exists against the cointegration as alternative hypothesis between the closing price of the general index (ISX60) of Iraq stock exchange and selected explanatory variables like oil price, gold price,

**Table 1: Descriptive statistics**

| | LCLOSE | LOP | LGP | LEX |
|---|---|---|---|---|
| Full sample pre-during COVID19 period | | | | |
| Mean | 6.161444 | 3.977622 | 7.319048 | 7.082674 |
| Median | 6.167642 | 4.023207 | 7.317677 | 7.082014 |
| Maximum | 6.205592 | 4.123450 | 7.494630 | 7.084402 |
| Minimum | 6.104393 | 3.698310 | 7.199223 | 7.079707 |
| Std. Dev. | 0.032268 | 0.135230 | 0.093041 | 0.001579 |
| Skewness | –0.401431 | –1.108631 | 0.415089 | –0.107009 |
| Kurtosis | 1.985142 | 2.956028 | 2.170604 | 1.583829 |
| Observations | 331 | 331 | 331 | 331 |
| Pre-COVID19 period | | | | |
| Mean | 6.174528 | 4.045929 | 7.266532 | 7.083328 |
| Median | 6.178131 | 4.039536 | 7.274341 | 7.084402 |
| Maximum | 6.207426 | 4.138360 | 7.340381 | 7.084402 |
| Minimum | 6.141147 | 3.963324 | 7.194152 | 7.080447 |
| Std. Dev. | 0.021369 | 0.053058 | 0.055132 | 0.001434 |
| Skewness | –0.122873 | 0.272234 | 0.025114 | –0.772201 |
| Kurtosis | 1.773758 | 2.074259 | 1.349766 | 1.942988 |
| Observations | 225 | 225 | 225 | 225 |
| During-COVID19 period | | | | |
| Mean | 6.123831 | 3.744656 | 7.456686 | 7.081322 |
| Median | 6.132117 | 3.737908 | 7.450603 | 7.081709 |
| Maximum | 6.189949 | 4.065627 | 7.575318 | 7.082108 |
| Minimum | 6.059740 | 3.330552 | 7.365648 | 7.079707 |
| Std. Dev. | 0.038858 | 0.214081 | 0.073645 | 0.000760 |
| Skewness | –0.200439 | –0.463111 | 0.322084 | –1.227565 |
| Kurtosis | 1.994870 | 2.411104 | 1.753178 | 3.083087 |
| Observations | 103 | 103 | 103 | 103 |

**Table 2: Correlation matrix**

| | LCLOSE | LOP | LGP | LEX |
|---|---|---|---|---|
| Full sample Pre-during COVID19 period | | | | |
| LCLOSE | 1.000 | 0.587 | –0.498 | 0.110 |
| LOP | 0.587 | 1.000 | –0.790 | 0.349 |
| LGP | –0.498 | –0.790 | 1.000 | –0.561 |
| LEX | 0.110 | 0.349 | –0.561 | 1.000 |
| Pre-COVID19 period | LCLOSE | LOP | LGP | LEX |
| LCLOSE | 1.000 | –0.465 | 0.053 | –0.199 |
| LOP | –0.465 | 1.000 | –0.351 | 0.008 |
| LGP | 0.053 | –0.351 | 1.000 | –0.315 |
| LEX | –0.199 | 0.008 | –0.315 | 1.000 |
| During-COVID19 period | LCLOSE | LOP | LGP | LEX |
| LCLOSE | 1.000 | 0.748 | –0.382 | –0.379 |
| LOP | 0.748 | 1.000 | –0.381 | –0.178 |
| LGP | –0.382 | –0.381 | 1.000 | –0.351 |
| LEX | –0.379 | –0.178 | –0.351 | 1.000 |

**Table 3: Augmented Dickey-Fuller (ADF) test**

| Variable | Full sample pre-during COVID19 period | | | | Order of integration |
|---|---|---|---|---|---|
| | Level | | First difference | | |
| | C | C&T | C | C&T | |
| LCLOSE | –2.167 | –2.280 | –15.641* | –15.620* | I(1) |
| LOP | –1.24 | –3.447** | –18.499* | –18.636* | I(0), I(1) |
| LGP | 0.247 | –1.944 | –5.710* | –5.791* | I(1) |
| LEX | –0.404 | –2.082 | –6.419* | –6.479* | I(1) |
| | Pre-COVID19 period | | | | |
| | Level | | First difference | | |
| | C | C&T | C | C&T | |
| LCLOSE | –1.987 | –2.078 | –14.099* | –14.1278* | I(1) |
| LOP | –2.849 | –2.843 | –16.323* | –16.287* | I(1) |
| LGP | –0.995 | –2.040 | –12.503* | –12.479* | I(1) |
| LEX | 0.322 | –0.933 | –5.566* | –5.765* | I(1) |
| | During-COVID19 period | | | | |
| | Level | | First difference | | |
| | C | C&T | C | C&T | |
| LCLOSE | –1.439 | –1.598 | –6.282* | –6.485* | I(1) |
| LOP | –2.303 | –4.271** | –4.423** | –4.451* | I(0), I(1) |
| LGP | –0.577 | –2.841 | –8.986* | –8.942* | I(1) |
| LEX | –0.357 | –1.403 | –3.975** | –4.1347** | I(1) |

Indicates lag order selected by the criterion; LR: Sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

**Table 4: Optimum lag selection (basis on AIC criterion)**

| Full sample Pre-during COVID19 period (Observation 329) | | | | | | |
|---|---|---|---|---|---|---|
| **Lag** | **LogL** | **LR** | **FPE** | **AIC** | **SC** | **HQ** |
| 0 | 732.729 | NA | 0.00066 | –4.48449 | –4.43792 | –4.46590 |
| 1 | 1200.93 | 922.006 | 3.73e–0 | –7.35960 | –7.30139 | –7.33637 |
| 2 | 1205.89 | 9.74187* | 3.64e–0* | –7.38399* | –7.31413* | –7.35611* |
| 3 | 206.542 | 1.25992 | 3.64e–0 | –7.38180 | –7.30030 | –7.34927 |
| 4 | 1206.93 | 0.76974 | 3.66e–0 | –7.37807 | –7.28493 | –7.34090 |
| | **Pre-COVID19 period (Observation 219)** | | | | | |
| | **LogL** | **LR** | **FPE** | **AIC** | **SC** | **HQ** |
| 0 | 567.885 | NA | 0.00034 | –5.14963 | –5.08773 | –5.12463 |
| 1 | 36.1759 | 524.330* | 2.96e–0* | –7.59064* | –7.51327* | –7.55939* |
| 2 | 37.0744 | 1.74773 | 2.96e–0 | –7.58972 | –7.49686 | –7.55222 |
| 3 | 37.3368 | 0.50821 | 2.98e–0 | –7.58298 | –7.47465 | –7.53923 |
| 4 | 37.3867 | 0.09596 | 3.01e–0 | –7.57430 | –7.45050 | –7.52430 |
| | **During-COVID19 period (Observation 108)** | | | | | |
| | **LogL** | **LR** | **FPE** | **AIC** | **SC** | **HQ** |
| 0 | 245.336 | NA | 0.00051 | –4.73207 | –4.62913 | –4.69039 |
| 1 | 347.243 | 193.823* | 7.13e–0 | –6.71064 | –6.58197* | –6.65854 |
| 2 | 348.924 | 3.16495 | 7.04e–0* | –6.72401* | –6.56960 | –6.66148* |
| 3 | 349.395 | 0.87657 | 7.11e–0 | –6.71362 | –6.53348 | –6.64068 |
| 4 | 349.398 | 0.00705 | 7.25e–0 | –6.69409 | –6.48821 | –6.61072 |

Indicates lag order selected by the criterion; LR: Sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

**Table 5: ARDL bound test**

| Test statistics | Pre-during COVID19 period | Pre-COVID19 period | During-COVID19 period |
|---|---|---|---|
| Selected Model | ARDL(2, 0, 0, 0) | ARDL(2, 0, 0, 0) | ARDL(2, 0, 1, 1) |
| F-statistics | 2.404641 | 1.591747 | 4.014850 |
| K | 3 | 3 | 3 |
| Actual Sample Size | 329 | 223 | 102 |
| | No cointegration | No cointegration | Inconclusive |
| Critical bound value | Significance | I(0) Bound | I(1) Bound |
| | 10% | 2.72 | 3.77 |
| | 5% | 3.23 | 4.35 |
| | 2.5% | 3.69 | 4.89 |
| | 1% | 4.29 | 5.61 |

and exchange rate. The figure out result presented in Table 5 which has disclosed the computed F-statistic is compared with the critical values provided by Pesaran et al. (2001), and the computed F-statistic (2.40 and 1.59) is less than the lower bound (I(0)), thus accept the null hypothesis of no cointegration exists between the variables respectively for the (Full sample Pre-during COVID19 and pre-COVID19) period. Furthermore, the computed F-statistics (4.01) is higher than the lower bound I(0) of (3.23) and less than the upper bound I(1) of (4.35) and the inference is inconclusive, hence, no decision could be made about the long-run relationship amongst the variables for the (during-COVID19) period.

## 4.4. Results of Causal Short Run Model

The estimated short-term results of oil price, gold price, and exchange rate with the closing price of the general index (ISX60) of the Iraq stock exchange are reported in Table 6. The estimated short-run results of the ARDL model for the (Full sample Pre-during COVID19 and pre-COVID19 period) have revealed a positive, but insignificant, the effect of oil price on the closing price of the general index (ISX60) of Iraq stock exchange in the short run. It implies that the increase in oil price is not increasing closing price of the general index (ISX60) of Iraq stock exchange. The result is in agreement with some of the past studies (Berk and Aydogan, 2012; Oskooe, 2012) but is in disagreement with some of the past studies (Asaad and Marane, 2020; Nguyen et al., 2020; Mustafa, 2020; Hammoudeh and Li, 2015; Gokmenoglu and Fazlollahi, 2015; Creti et al., 2013) in spite of oil price increase is contribute to Iraq economic growth (Asaad and Marane, 2020, Mustafa, 2020), also have revealed a negative, but insignificant, the effect of gold price on the closing price of the general index (ISX60) of Iraq stock exchange in the short run. The study results appear similar with some other studies (Utama and Puryandani, 2020; Al-Ameer et al., 2018; Bhuyan and Dash, 2018) but appear differently with some other studies (Abdul Kareem et al., 2020; Ali et al., 2020; Shabbir et al., 2020; Kumar, 2017; Gokmenoglu and Fazlollahi, 2015; Arouri et al., 2015). It implies that the changing in gold price is not changing the closing price of the general index (ISX60) of Iraq stock exchange, this insignificant gold price back to the small-capitalization volume of the market with little trading share transactions of the Iraq stock exchange and still the market is local in nature and not efficient (Asaad, 2014a). In addition, they have revealed a negative but insignificant, the effect of exchange rate on the closing price of the general index (ISX60) of Iraq stock exchange in the short run, the results have come in line with some other past studies (Devpura, 2021; Parsva and Lean, 2017) and show an inconsistent with other previous studies (Utama and Puryandani, 2020; Ali et al., 2020; Lee and Zhao, 2014). It implies that changing in the exchange rate is not changing the closing price of the general index of Iraq stock exchange, this insignificant exchange rate is due to the fact that the success of the financial policy set by the Central Bank during the period of

**Table 6: Estimate short-run causal model: closing price index (LCLOSE) as dependent variable**

| | Full sample Pre-during COVID19 period | | Pre-COVID19 period | |
|---|---|---|---|---|
| | Coefficient | Prob. | Coefficient | Prob. |
| D(LOP) | 0.016922 | 0.3358 | 0.005255 | 0.7819 |
| D(LGP) | –0.016875 | 0.5451 | –0.022302 | 0.6404 |
| D(LEX) | –0.514198 | 0.1079 | –0.276185 | 0.3702 |
| R-squared | 0.054541 | | 0.014715 | |
| Adjusted R-squared | 0.021630 | | –0.017364 | |
| F-statistic | 1.657203 | | 0.458710 | |
| Prob(F-statistic) | 0.082205 | | 0.863525 | |
| Durbin-Watson stat | 1.998031 | | 1.987589 | |
| Sample (adjusted) | 13 340 | | 12 234 | |
| Observations after adjustments | 328 | | 223 | |
| lag | 2 | | 1 | |
| During-COVID19 general period | | | Inconclusive | |

**Table 7: Breusch-Godfrey serial correlation LM test**

| | Full sample pre-during COVID19 period | Pre-COVID19 period |
|---|---|---|
| F-statistic | 1.574852 | 0.113486 |
| Obs*R-squared | 3.257462 | 0.118196 |
| Prob. F (1,326) | 0.2087 | 0.7365 |
| Prob. Chi-square (1) | 0.1962 | 0.7310 |
| During-COVID19 general period | | Inconclusive |

study in order to keep raising of Iraqi Dinar value through the currency auction to carrying out the stability of local currency (Iraqi Dinar) against the US Dollars (Akawi and Salman, 2014). Also controlling the Iraqi Dinar exchange rate and reducing the gap between the parallel price and the official rate is maybe one of the reasons behind the stability of currency price (Dagher and Mohamed, 2017).

## 4.5. Results of Diagnostic Tests

The estimated outcomes of the diagnostic test confirmed that the ARDL model is free from autocorrelation due to the level of significance is greater than (5%) for both period (Full sample pre-during COVID19 and during-COVID19) period and had no problem with a serial correlation which verified by the test of Breusch-Godfrey as exhibited in Table 7.

## 4.6. Results of the Stability Test

The outcomes of the stability test of the model as shown in Figure 1 confirmed that the empirical model has to get past the prerequisite diagnostics tests, hence the results from the cumulative sum CUSUM test point out that the line stays within a (5%) bounds of significance. Subsequently, the findings of cumulative sum CUSUM square test which also applied as shown in Figure 2, and found out that there is a little shock at some point in the model for both period (Full sample pre-during COVID19 and during-COVID19) period, and revealed that the model has become stable again which make the overall model is reliable due to stability of estimated model parameters.

**Figure 1:** CUSUM test

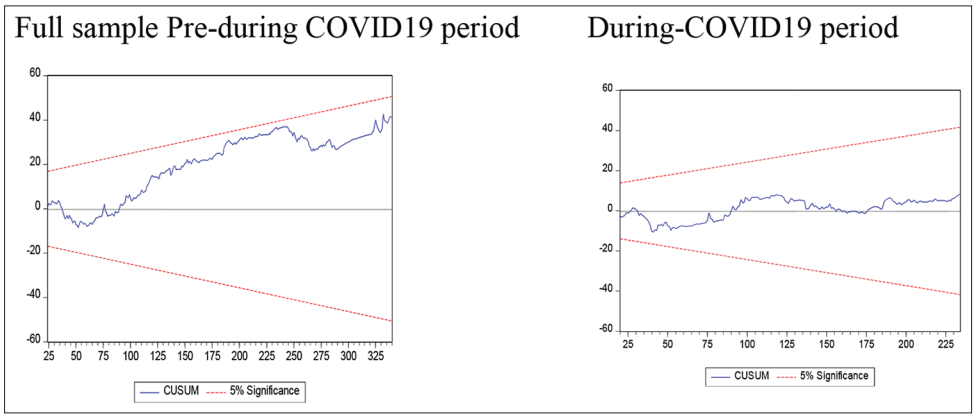
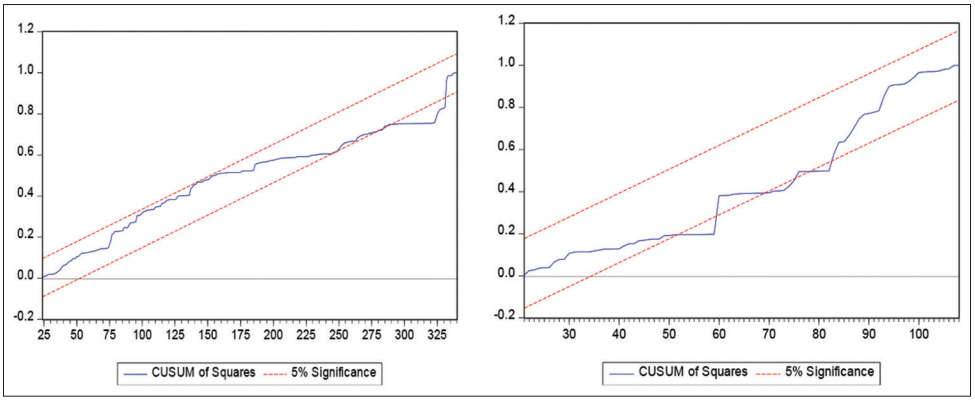



**Figure 2:** CUSUM OF square test



## 5. CONCLUSION

The current study adopted the cointegration test and ARDL model, and the data period categorized in a different period, full sample pre-during COVID19 included from 24 December 2018 to 3 September 2020, while the pre-COVID19 covered from 31 December 2018 to 30 December 2019, as well as during-COVID19 embraced from 27 December 2019 to 3 September 2020, the study empirically investigated the influence of oil price, gold price and exchange rate on the closing price of the general index (ISX60) of Iraq stock exchange. The empirical results accepted the null hypothesis of no cointegration exists between the variables respectively for the (Full sample Pre-during COVID19 and pre-COVID19) period and no decision could be made about the long-run relationship amongst the variables for the (during-COVID19 period), along with, there is a correlation between the variables whether it be negative or positive during the third different periods (full sample pre-during COVID19, pre-COVID19, and during-COVID19) period.

This study has significantly contributed to the body of knowledge by investigating the relationship between oil price, gold price, and exchange rate with the stock market in Iraq as an exporting country of oil which was weakly looked at in the existing body of literature (Ali et al., 2020; Echchabi and Azouzi, 2017; Bouri et al., 2017). The main contribution of the study is providing empirical support to the theoretical argument of the inconsistency of results of the effects of oil price, exchange rate and gold price on stock price of developing countries or oil-exporting countries (Asaad and Marane, 2020; Parsva and Lean, 2017; Mustafa, 2020). Furthermore, the findings showed the insignificant effect with different signs of oil price, gold price and exchange rate on the closing price of the general index (ISX60) of Iraq stock exchange in the short run according to the study period division. In fact, the study results showed that the impact of oil prices insignificant due to misuse of oil revenues in the economic development or the real economy in Iraq (Asaad and Marane, 2014; Marane and Asaad, 2014; Marane, 2015) and due to weaknesses of investment climate and private sector which led to fall down of productivity level and industrial performance, high corruption, sectarian conflict and terrorism activities (Asaad and Marane, 2020; Asaad et al., 2020), this result come out to be compatible with some of the previous studies in the same context (Marane and Asaad, 2015). Furthermore, the study indicated that the investors can not consider gold as a good substitution for stock and cannot use as a hedge against inflation in Iraq due to insignificant effect of gold price on stock price. Meanwhile, the study findings also revealed an insignificant impact of exchange rate on stock price due to that the controlling the exchange rate in the foreign exchange market through the foreign currency auction which applied by the Central Bank of Iraq since (2004) as important tools of achieving stability in monetary policy in the Iraqi economy (Dagher and Mohamed, 2017), and also this monetary policy used a suitable way for investment in the different real economic sectors in Iraq (Akawi and Salman, 2014).

The study suggests that private sector infrastructural development, a better banking system, attractive policies for investment environment, allocation savings efficiency are essential factors for the stock market and Iraq economic development which deserved extensive government attention. In spite of the insignificant impact of the selected variables on the stock price but still the study suggesting to policymaker and investor that they should carefully take this finding into consideration especially when making an investment decision because in some connections were move in an opposite direction regardless of period categories whether at full period pre-during COVID19, Pre- COVID19 or during-COVID19 period. This is clarified by the correlation matrix, as well as, there are some other variables which influence on the all variables under study at the same time, which need to be analyzed by policymaker and investors in the financial market.

Iraq context needs more further studies and extension to focus on the stock market performance by making time series periods longer especially after the outbreak of COVID19 including the period after the vaccine discovered at the beginning of (2021). Furthermore, future studies may give more attention to the COVID19 indicators such as confirmed cases or death ratio as measurement or proxy of pandemic effect on stock market performance especially on sectors of Iraq stock exchange or other stock markets in the region beside Iraq in order to fill the gap of knowledge which still exists in GCC, MENA, ESCWA or Arab countries in terms of the causal relation between COVID19 and stock markets.

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