The Impact of Oil Price Shocks on Economic Growth - Iraq A Case Study for The Period (1968 - 2019) Using Symmetric and Asymmetric Co-Integration Analysis

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ABSTRACT

This study investigates the symmetry and asymmetry impact of oil price shocks on economic growth for the Iraqi economy during 1968-2019. For this purpose, we utilizing Linear Autoregressive Distributed Lag (ARDL) and Nonlinear Autoregressive Distributed Lag (NARDL). The linear and nonlinear ARDL found that oil price shocks have a positive long-run impact on economic growth, as the F statistics are greater than the critical upper bound in all models. Moreover, the results of NARDL estimators show the asymmetry evidence: the oil price increases(LROILP+) have a greater and significant positive impact on real GDP per

capita, While oil Price decrease coefficients(LROILP-) are insignificant and smaller than the oil price increase(LROILP+). That means an increase in oil price leads to raises in real GDP per capita. Consequently, the Iraqi economy and its Standard of living in terms of GDP per capita are sensitively affected by oil price changes due to the strong tide with world oil price changes. Then, diversify of the Iraqi economy, only the best choice in front of policymakers.

1. Introduction

Since the 1970s, the oil sector has played a significant role in the Iraqi economy. According to recent data from (Opec, 2015), Iraq has the fifth-largest proven oil reserves in the world. At the same time, the Iraqi oil sector considers the lowest exploration costs in the region (Opec, 2015). The question is raised here: why has oil revenue fluctuated during the last five decades, and when oil revenue became an essential factor in the Iraqi economy? Hence, the Iraqi economy is divided into four different periods. During the last five decades, the Iraqi economy went through two different types of economic situations. The first is called the booming period, while the second is called the slumping period (low oil revenue). During 1968-1981 and 1997-2014 is considered a booming period, since the oil revenue was high, while during 1982-1996 and 2015 to 2020 recognized a slumping period since the oil revenue was relatively low. Therefore, to a large extent, the Iraqi economy is driven by the oil sector. The effects of the oil-driven state development, unstable in terms of securities, conflicts, economic sanctions, and delayed reforms have significantly shaped Iraq's economy.(Al-Chalab, 2007).

First of all, the booming period during 1968-1981 will be analyzed. From mid-1960, the Iraqi government requested international oil companies to increase Iraqi oil revenue(Styan,2006). . Although Iraqi oil revenue increased, the oil revenue was still low compared to the income that international oil companies gained. Therefore, due to the conflict between the government and foreign oil companies, a low growth rate was achieved during 1968-1972. On the other hand, due to the spark of

world oil prices, the Iraqi economy witness high economic growth from 1973-1981. (Alnasrawi, 1994).

The first booming period started in 1972 when the Iraqi government nationalized the Iraqi oil sector (Jaffe,2007). An increased oil price during the 1970s is a main reason that pushed international oil companies to increase their investment and production volume. These factors led to increased Iraqi oil revenue. In addition, GDP grew at 7.8 percent per year during 1971-1981. The growth rate of manufacturing increased annually by 10.0 percent; this is one of the highest growth rates in developing countries(Kenneth,2003) The increase in the manufacturing rate of growth in the manufacturing sector was attributed to the development plan which the Iraqi government introduced during the booming era. Enlarging oil revenue was one of the main factors that the Iraqi government used to support development plans(Brown, 1979).The relationship between oil revenue shocks and Iraq's economic growth performance is presented in figure (1). Figure 1 shows the co-movement relationship between real GDP and oil revenue for different Sub periods. The Iraqi economy achieved a high growth rate during the booming period (oil boom) after 1973. Also, figure (2) shows the direction of oil price and oil revenue in the same way. In other words, they have a positive relationship with each other.

Due to the Iraq-Iran war and the fall of the oil prices, the total oil export and oil revenue decreased due to the Iraq-Iran war and the fall of the international oil prices during 1982 - 1996. (See figure 1and 2). Although the level of oil production and exports increased during 1987-1990, which led to increased oil revenue, in 1990, the situation changed to discourage increasing oil production after the invasion of Kuwait by Iraqi military forces in 1990. That invasion severely affected the Iraqi economy; the United Nations Security Council imposed an embargo on the Iraqi economy and was harmful to oil export as a key-driven economic growth for Iraq. (Boone, Gazdar, & Hussain, 1997). Therefore, post-war (after 1991), oil production was held near the level of domestic consumption. In general, from the beginning of 1981 to 1996 can be called a slump period (see figure 1and 2). Thus, during this period, the rate of economic growth was mainly at the least rate.
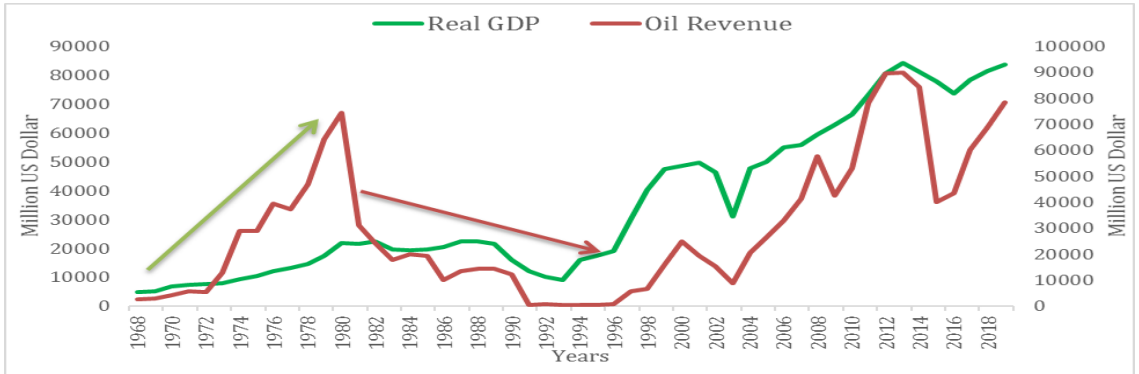
Figure (1): Real GDP and Oil Revenues (Constant; 2010 / Million US Dollar)
Source: Central Bank of Iraq, Statistic Department, various issues.
Ministry of Finance, Budget Department, various issues.
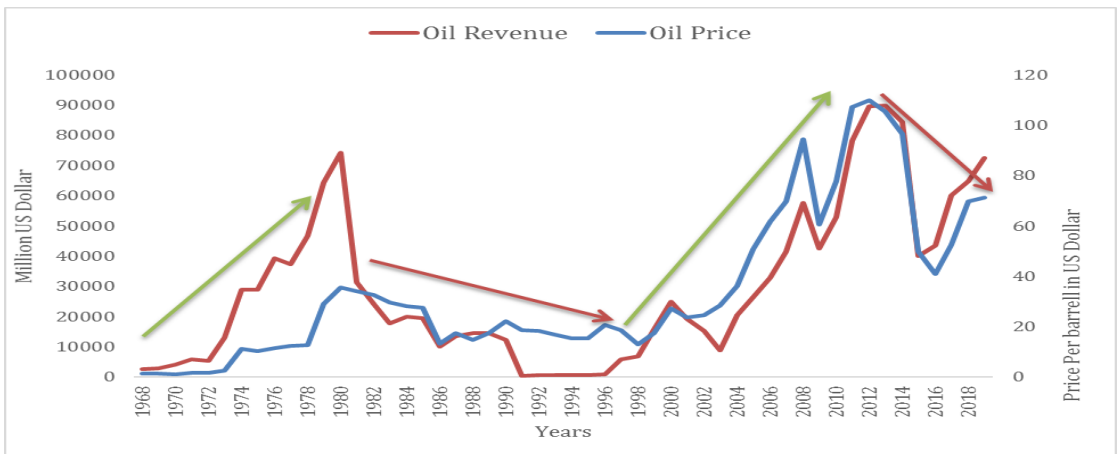

Figure (2): Total Oil Revenue (Constant; 2005 / Million US) and Oil Price in US Dollar Per Barrell).
Source: Central Bank of Iraq, Statistic Department, various issues.
Ministry of Finance, Budget Department, various issues.

The third period is considered as a booming period, starting from 1997 to 2014. After imposing economic sanctions in 1990 and banning Iraqi oil export by the United Nations Security Council, in 1997, the UN introduced a new program called Oil for Food Program (OFFP)) (Boone, et al,1997). According to this program, the UN

permitted the Iraqi government to export limited oil to importing foods and prescription. During the OFFP (1997-2003), the Iraqi government gained a limited amount of oil revenue, and the whole Iraqi economy moved toward a booming period (see figure 2). In 2003, however, the economic sanction was removed, the oil production increased gradually, and the international oil price increased. The raised oil prices and oil export increased oil revenue sharply, and the Iraqi economy moved to the booming period until 2014. After 2014, the Iraqi economy again went back to the slumping period because of two reasons. The first was related to intense political and military instability (primarily associated with ISIS). At the same time, the international price of oil declined sharply due to the oversupply of crude oil by oil-exporting countries. Eventually, OPEC and Non-OPEC countries decided to reduce the production level to encourage the price of oil to a higher level.

Problem Statement

The oil price increase considers good news for the Iraqi economy as an oil-exporting country, while oil price decrease considers bad news. After oil price shocks since 1973, Iraq, as an oil-rich economy, faced a boomed period followed by the collapse period. Hence, oil price fluctuations dramatically affect economic growth for oil-exporting countries, including the Iraqi economy. Besides political instability (wars, International economic sanctions, and internal conflicts), the sharp fluctuation of oil revenue during the last five decades makes economic growth unstable. Therefore, the Iraqi economic growth and oil price shocks will be the understudy.

Objectives of the Study

The main objective of this study is to examine the effect of oil price shocks on the economic growth of the Iraqi economy from (1968-2019). Also, this study has some specific objectives:

1- to investigate the effect of the oil price increase on economic growth.

2- to examine the effect of the oil price decrease on economic growth.

Hypotheses of the Study.

1-   It is hypothesized that increasing oil price leads to an increase in the economic growth rate.

Null hypotheses: there is no relationship between oil price increase and economic growth.

Alternative hypotheses: there is a strong relationship between oil price increase and economic growth in Iraq.

$H_0: \alpha_t = 0$ Null hypothesis

$H_1: \alpha_t \neq 0$ Alternative hypothesis

2-   It is hypothesized that a decrease in oil price leads to a slow or drop in the economic growth rate.

Null hypotheses: there is no relationship between oil price decrease and economic growth.

Alternative hypotheses: there is a strong relationship between oil price decrease and economic growth in Iraq.

$H_0: \alpha_t = 0$ Null hypothesis

$H_1: \alpha_t \neq 0$ Alternative hypothesis

Significance of the Study

Oil price and oil exports play a central role in the Iraqi economy, then fluctuations in oil price may significantly affect macroeconomic variables. In this context, how to deal with the oil price changes are have significant importance. Therefore, the finding of this study is essential not only to contribute to the existing literature but also to support Iraqi policymakers to diversify their economies and escape from Dutch diseases.

2. Theoretical Review of the effect of Oil price shocks on economic growth

Since first oil price shocks during in the early of 1970s, there is an extensive empirical work that concentrates on the oil price-GDP relationship.(Pierce and and Enzler, 1974; Rasche & Tatom, 1977; Mork & Hall, 1980; Darby, 1982; Hamilton, 1983) are considered the earlier studies that well documented and clarified the

adverse impact of oil price increase on economic growth. However this concept is undermined by the later studies, Hooker (2002) and (Bernanke, Gertler, & Watson, 1997), they have conducted that the change in oil price is not the important part of inflicting the economic growth, but the effect is tightening in monetary policy.

Oil price-GDP relationship have been studied in deferent angles such as short term and long term concentrate, through his seminal work (Hamilton, 1983) have been found that oil price Granger-cause the aggregate economic activities of U.S that was molded in its GDP.(Jiménez-Rodríguez & Sanchez, 2005) were found the similar outcome for deferent developed OECD economies such as Japan, Germany, France, Canada, Norway, and the United Kingdom. While the works as mentioned above studied the short-run oil price-GDP relationship, some other researchers concentrated on the long-term relationship between these two variables, such as (Lardic & Mignon, 2006) and Lardic and Mignon (2008) that expose a substantial evidence of co-integration between oil price and GDP for US, G7 and Europe countries..

Hamilton (1983)highlighted that the increasing in crude oil price was the main cause of the seven of the eight recession in the United States during the period of 1948-1972. Hamilton (2009) conclude that if the oil price shocks do not happen, U.S GDP would have grown instead of fallen. Mork (1989) extended Hamilton's work (1983) and suggested an asymmetric specification of oil price and distinguishes between the effect of oil price increase and oil price decrease on US economic activities. His finding shows evidence of asymmetry which is the effect of positive oil price changes were different from the effect of negative oil price changes, and the later were not statistically significant. The response of GDP to the oil prices shocks basically depend on the stability of the oil price environment. This means the effect of oil price shock on economic growth in a stable environment is greater than in the volatile environment. (Kiseok Lee, Shawn Ni & Ratti, 1995), argue this fact in their paper and based on that presented a new nonlinear specification of measuring the oil price using GRACH model "volatility adjusted series of oil price." They find asymmetry for positive and negative oil price shocks. Hamilton (1996 propose a different form of asymmetric oil price pass-through named as net oil price increase (NOPI).

2.1 Transmission mechanisms

Oil price literature has been proposed several different channels which identify the adverse effect of oil price shocks pass through the aggregate economic activities (especially in developed economies such as U.S and European countries). More specifically six movement channels have been introduced includes, the supply-side effect, wealth transfer effect, inflation effect, real balance effect, sector adjustment effect and the unexpected effect. (Brown & Yucel, 2002).

Studies illustrate the different channels of oil price movements in Macroeconomic variables, such as first Supply -side shock. (Rasche & Tatom, 1977; Brown & Yucel, 2002) and second Wealth or income transfer(Hamilton,2008;Lee and Ni, 2002; Elwood, 2001).

2.2 Review of Empirical literature

As we mentioned in previous sections, oil price shocks and its impacts on the global economy has attracted a great deal of attention among politicians and economists. Researchers have concentrated on developed and developing net oil exporting countries in their researches. Thus, few of studies focused on Iraq as major oil exporting economies. in the following section some selected studies on developed and developing oil exporting economies will be studied.

2.2.1 Developed net oil exportng countries

Some developed countries such as Norway and Canada are net oil exporting countries .therefore The direction and magnitude of the effect of oil price fluctuations on economic growth for these kind of countries are difference from the rest of developed net oil importing economies Moshiri (2015) Examine the role of oil price fluctuation on economic growth in oil exporting countries, both developing and developed , including Norway , UK and Canada. Contrast to developing oil exporting countries, oil price shocks, whether positive or negative, do not have a significant effect on their economic growth, because of the fact that the economic structure of these countries are well diversified, especially Norway and Canada well managed their oil revenue and successfully avoided the negative impact of oil volatility on economic business cycle by establishing oil –specific fund. The main

purpose of this funds is to limit the effect of oil price shocks and the depletion of the resource in the future. Thus these funds help the economy to create a proper fiscal and monetary policy.

El Anshasy and Bradley (2012) Examine the fiscal policy reacts to the positive and negative oil prices in 16 oil exporting countries including Norway as the developed oil exporting economy, they found that positive oil price changes in these countries induce the GDP and current Government expenditure .In addition, this effect is magnified when government expenditures are large relative to GDP. For example, if we calibrate the model for Norway, it predicts that Norway "saves" virtually all of the additional revenue generated by a positive oil price shock, which is entirely consistent with its "bird-in-the-hand" approach to sustainability. Similar results for Norway conducted by Jiménez-Rodríguez and Sanchez (2005) which is the oil price increases have a positive impact on real GDP. However, oil price increases have a negative impact on real GDP for United Kingdom. That means the result for the UK showed a surprising outcome and behavior, while it is expected that the GDP growth in the developed net oil exporting countries affected by oil price shocks positively, an oil price increase of 100% actually leads to a loss of British GDP growth rate of about 2%. An extensive literature has highlighted that this unexpected result has explained with the fact that oil price hikes led to a large real exchange rate appreciation of the pound (Dutch disease Phenomena). See (Corden and Neary 1982) and (Ismail, 2010).

2.2.2 Developing net oil exporting countries

Since 1970s researchers mainly focused on developed and net oil importing economies in their studies. However, in the past two decades some studies have investigated the impact of oil price fluctuations on economic activities in oil exporting and developing economies. Below, developing- net oil exporting countries are the center of interest.

Oludiran, Akinleye, and Ekpo, (2013) examined the symmetric and asymmetric oil price shocks impact on Nigeria's economic activities. The results indicated that the real government expenditure had affected by the positive and negative oil price shocks in the long –run. While positive and negative oil price shocks to external

reserve cause stronger implication for expenditure in the long term. Additionally, real GDP had affected by positive and negative oil price shocks in the short and long term. Isah, Dikko, and Chinyere (2015) investigated the crude oil price shocks effect on some key macroeconomic variables in Nigeria such as GDP, inflation, international trade, money supply, exchange rate and external reserve. The results showed that crude oil price shocks improve the level of GDP. ThankGod and Maxwell (2013) also found a unidirectional causal relationship between the exchange rate, interest rate, and oil price while there was no evidence of a significant association between oil price and GDP as a proxy for an aggregate economy activity for Nigeria. (Iwayemi & Fowowe, 2011) mentioned that Oil price shocks did not have a significant impact on most of the macroeconomic variables in Nigeria.

In the case of Iran, empirical results of the study Farzanegan and Markwardt (2009)suggested a strong positive relationship between positive oil price and industrial output growth while the impact of oil price shocks on government expenditure were marginal. In the SVAR model specification, Emami and Adibpour (2012) examined the impact of oil revenue shocks on Iran's output growth over the period 1959-2008. The results indicated that the output growth positively affected by the positive oil revenue shocks while negative one decrease the output growth and the impact of negative oil revenue on output growth were greater than the positive one, that is mean the country suffer from Dutch Disease phenomena. Yazdan, Ehsan, and Hossein, 2012) display that there is co-integration between oil price and real GDP per capita.

Significant long-run relationship between oil revenue and total government expenditure and economic growth have been exposed by Hamdi and Sbia, 2013) for Bahrain economy .In the VAR specification ,Ahmad and Masan (2015) analysis the long run and short run relationship between oil revenue, economic growth and government expenditure for period 1980-2013.Positive co-integration among the variables implies that the Oman as oil exporting countries does not suffer from recourse curse. In the case of Saudi Arabia Alkhathlan (2013) used ARDL model to examine the short run and long run relationship between real GDP per capita and oil

revenue .Oil revenue strongly and positively impacts on real GDP per capita in both short and long run for all different specification. More additionally, Nusair (2016) Using Nonlinear ARDL approach to Study the impact of oil price shocks on the real GDP of the Gulf Cooperation Council GCC. The result shows clear evidence of asymmetric in all cases. He found that positive oil price changes significantly impact on real GDP of GCC's economies, while the negative oil price significant only in the case of Kuwait and Qatar. Additional analysis, shows that positive oil price lead to increase real GDP and negative oil price change decrease real GDP. However, the positive change has more impact than a negative one.

The results of Mehrara and Sarem (2009) implies that oil price fluctuations have asymmetric co- integration on industrial value added for Iran and Saudi Arabia. However, there was no evidence of a long-run relationship between two variables for Indonesia. Mehrara & Mohaghegh (2011) found that oil shocks were not the main source of inflation. However, the money supply and aggregate demand shocks were the main source of domestic price variation. Even though oil price shocks considerably driven by its own shocks, it had significantly effect on economic growth and money supply. Moshiri (2015) examined the role of oil price shocks on economic growth in both developing and developed oil exporting countries, The result of VAR model implies that the positive and negative oil price volatility produce an asymmetric and heterogeneous effect on economic growth across most of developing countries. Berument and Basak, 2010) exhibited that the oil price increases have a significant positive impact on output for Algeria, Iran, Iraq, and Kuwait. Libya, Oman, Qatar, Syria, and Unite Arab Emirate while the oil price increase did not significant effect on output for Bahrain, Djibouti, Egypt, Israel. Jorden, Morocco and Tunisia. Recently(Abdlaziz, 2019) examined the impact of oil revenue on economic growth for 25 developing oil-exporting countries (both major and minor oil exporting countries) conditional to the different level of the real effective exchange rate. The results show that the long-run effect of oil revenue on economic growth found to be significant only for full sample while the effect is highly positive and significant in the short run for all groups.

Few studies investigated relationship between oil price shocks and economic growth of the Iraqi economy.(AKTUĞ. Mehmet & STAR, 2019) using simple technique of

Pearson Correlation to examine the effects of oil price and oil revenue on economic growth. the results found that oil price and oil revenue have positive and significant effect on economic growth. More recently (Al-shammari, Al-bakri, & Sinan, 2020) using VAR model to investigate the impact of oil price shocks on major macroeconomic variables for Iraqi economy during 1990-2018. The results showed that oil price slightly source of GDP changes. The present study tries to investigated the impact of oil price shocks on Iraqi Economic growth during 1968-2019, using linear and non-linear Autoregressive Dependent Lags (ARDL and NARDL). NARDL is the novel and new econometric technique that proposed by Shin et al (2014) which is allows to represent the asymmetric relationship between variables. That means the present study tries to display the impact of oil price increase and oil price decrease on economic growth. Furthermore, Iraqi economies pass through different kind of conflicts and wars during the period of the study, then beside the effect of oil price shocks, various dummy variables are used to capture the effect of these conflicts.

3. Source of Data and Model Specification

The study's objective is to analyze the effect of real oil price on economic growth in the Iraqi economies. For this purpose, the data on real oil price and GDP per capita during (1968-2019) obtained from the British Petroleum (BP) database and World Bank Indicators WBI (2020), respectively. Symmetric and asymmetric co-integration models will be applied. In symmetric analysis, to expose the linear relationship between real oil price and real GDP, the study uses the ARDL model proposed by Pesaran et al. (2001). However, the NARDL model proposed by Shin et al (2014) will be applied to show the asymmetric relationship between two variables.

The study tries to present the final specification of the leaner and non-leaner ARDL due to saving space. Several studies exhibit the advantages of applying ARDL and NARDL over other models in their empirical studies.(Abdlaziz, Rahim, & Adamu, 2016; Hassani & Nojoomi, 2010; Ibrahim, 2015; Nusair, 2016), for more details, readers can return to them.

$$\Delta LY_t = \delta + \gamma_0 LY_{t-1} + \gamma_1 POPG_{I-1} + \gamma_2 LROILP_{t-1} + \sum_{i=1}^{p} \omega_i \Delta LY_{t-i} +$$
$$\sum_{i=0}^{q} \varphi_i \Delta POPG_{t-i} + \sum_{i=0}^{s} (\vartheta_i \Delta LROILP_{t-i}) + v_t + DUM1, DUM2, DUM3 \quad (1)$$

Equation 1 presents the final specification of the ARDL model, which is presented the short and long-run co-integration.

Which is LY is a real GDP per capita.

POPG is a population growth, which is used as a control variable.

LROILP is a real oil price.

DUM1 represented the Iraq-Iran war during 1980-1988, while DUM2 stated the international economy blocked during 1990-1996.

DUM3 has stated the Iraqi fights on terrorist groups such as Islamic State in Iraq and Syria (ISIS) during 2014-2019.

In the case of NARDL, to display the effect of the oil price increase and oil price decrease on economic growth, we decomposed the real oil price into positive and negative oil prices, as shown in the following equation.

$$LY_t = \alpha_0 + \alpha_1 POPG_t + \alpha_2^+ LROILP_t^+ + \alpha_3^- LROILP_t^- + \mu_t$$
(2)

Where LY is the natural logarithm of real GDP per Capita, POPG is the population growth; LROILP+ is the natural logarithm of real oil price increase while LROILP- is the natural logarithm of real oil price decrease. And $\alpha = (\alpha_0, \alpha_1, \alpha_2, \alpha_3)$ are the long run coefficients that will be estimated.

Positive $LROilP_t^+$ and negative oil prices $LROILR_t^-$ will be captured as follows:

$$LROILP^+ = \sum_{i=1}^{t} \Delta LROILR^+ = \sum_{i=1}^{t} \max(\Delta LROILP_i^+, 0) \quad (3)$$

$$LROILP^- = \sum_{i=1}^{t} \Delta LROILP^- = \sum_{i=1}^{t} \min(\Delta LROILP_i^-, 0) \quad (4)$$

As Shin et al., (2014) illustrated, we can extend the concept of partial asymmetric for long and short run to obtain the following asymmetric error correction model:

$$\Delta LY_t = a + \beta_0 LY_{t-1} + \beta_1 POPG_{I-1} + \beta_2^+ LROILP_{t-1}^+ + \beta_3^- LROILP_{t-1}^- +$$
$$\sum_{i=1}^{p} \pi_i \Delta LY_{t-i} + \sum_{i=0}^{q} \varnothing_i \Delta POPG_{t-i} + \sum_{i=0}^{s}(\theta_i^+ \Delta LROILP_{t-i}^+ +$$
$$\theta_i^- \Delta LROILP_{t-i}^-) + \mu_t +$$
$$DUM1, DUM2, DUM3 \tag{5}$$

Where P and s are lag order and a2 = -β2/β0, a3=-β3/β0, are long run effect of oil price increase and oil price decrease respectively on economic growth. $\sum_{i=0}^{s} \theta_i^+$ And $\sum_{i=0}^{s} \theta_i^-$ measure the short run impact of oil price (increase and decrease) on real GDP per capita respectively .

Additionally, to examine the property of the data before the estimation of the dynamic model in equation (5), some tests are necessary. The current study applied the stationary of data tested using the well-known augmented Dickey Fuller (ADF) and (PP) unit root tests. Moreover, the conventional co-integration approach is also based on linear ARDL (Pesaran et al., 1999). Besides, the general to specific approach used to obtain the final specification of NARDL model by removing the insignificant lags. Then the study used the bound test approach of Shin et al. (2014) to examine long run co-integration among included variables and tested the null hypotheses of β0=β1 =β2=β3=0 jointly.

In the final step, the Wald test is used to examine the long run and short run asymmetry between oil prices and economic growth. The NARDL approach established based on two null hypotheses: First, the long run relationship is symmetric, $\alpha^+ = \alpha^-$ and the second, the short run relationship is symmetric, $\theta_i^+ = \theta_i^-$. Then, these two hypotheses can be tested by jointly using the Wald test, if the null hypotheses cannot be rejected, the NARDL model is modified to the simple ARDL (Pesaran et al., 2001).

4. Results and Discussion

4.1 Unit Root test

In the more than four last decades, Iraqi economy witnessed different kind of economic and political instabilities, such as the first great oil price shocks during

1970s, Iraq-Iran wars, Iraqi attacks on Kuwait in 1990, the international economic blocked during 1990-1996, and political and security un stabilities after 2003. Based on the above facts, instead of using traditional such as the Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) tests, the present study using structural break of Unit Root test. This new test can capture different shocks and breaks in the series. In other words, the traditional unit root may fail to reject the null hypothesis in the case of having the break in the series (Zivot & Andrews, 1992).

Table -1- demonstrates three different models; model (α) allows for a one-time change in the intercept. Model (T & α) allows one-time change in both intercept and trend, and model (T) allows one-time change in the trend only. The null hypothesis of the unit root is tested against the alternative of no unit root in the level and the first difference for each variable. As reported in Table -1-, the results expose that the variables are stationary in the I(0) and I(1). That means no variables are integrated in order of I (2). Then we can apply linear ARDL and nonlinear ARDL to investigate the symmetric and asymmetric relationship between oil price shocks and economic growth

Table (1): Unit Root Test

Level								
LY			**POPG**			**LROILP**		
α	T & α	T	α	T & α	T	α	T & α	T
-7.82***	-7.37***	-4.009	-6.30***	-6.39***	-6.43***	-2.97	-3.04	-2.46
(8)	(8)	(0)	(10)	(10)	(10)	(0)	(0)	(0)
[1990]	[1990]	[1979]	[2006]	[2007]	[1990]	[1985]	[1982]	[1975]
First difference								
-11.3***	-11.1***	-9.64***	-5.44***	-4.55	-3.94	-7.58***	-7.52***	-6.69***
(0)	(0)	(0)	(6)	(6)	(10)	(0)	(0)	(0)
[1991]	[1991]	[1992]	[2003]	[2003]	[2010]	[1974]	[1974]	[1986]

Note: number in square brackets are the structural break dates. Number of lags in parentheses AIC. LY, POPG and LROILP are the logarithms of real GDP per capita in USD, population growth, and real oil price respectively. ***, **, * indicate significant at the 1%, 5% and 10% level of significant. "Source: Research findings**"**

Table -2- demonists the results of optimal lag selection criteria. We follow the Schwarz information criterion SC for optimal lags due to its superior properties. The

results show that one lag is appropriate for the sample period. The results of other criteria show two lags as optimal lag selection.

Table (2): Lag Order Selection Criteria Results

Lag	FPE	AIC	SC	HQ
0	0.218849	4.156371	4.234337	4.185834
1	0.009117	0.977865	**1.211765***	1.066256
2	**0.007922***	**0.836155***	1.225989	**0.983474***
3	0.008640	0.920180	1.465947	1.126426
4	0.009694	1.030560	1.732261	1.295734

Notes: * indicates lag order selected by the criterion, FPE: Final prediction error. AIC: Akaike information criterion. SC: Schwarz information criterionHQ: Hannan–Quinn information criterion, **Source**: Author's calculations.
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4.2. Linear ARDL results

Table (3) provides the four different models of the effect of oil price shocks on economic growth for the Iraqi economy during 1968-2019. Model 1 displays the effect of oil price on GDP per capita without dummy variables, while models 2,3, and 4 explained the effects with different dummy variables where explained in equation 1. Table 3 displays the short-run dynamics of linear ARDL and some diagnostic tests. As shown in the tables, oil prices in all models have positive and significant effects on economic growth. In model 1, without dummy variables, if oil price increase 1 percent leads to an increase in GDP per capita by 12 percent. Therefore, the effect is reduced in model 2, which is an increase in the oil price causes to raise economic growth by 0.09 percent. An unexpected Iraqi-Iran war has large positive and significant effects on economic growth. One possible explanation for this result is that during 1980-1988, some neighboring Arabic countries, such as Gulf Council countries, financially support the Iraqi side. In early 1981, Saudi Arabia offered the Iraqi government about 10 billion USD. Kuwait gave about four billion USD to Iraq as loans during 1980-1981. The UAE financially supported the Iraqi economy by 1–3 billion, and Qatar nearly 1 billion USD in the same period.

(.Nonneman, 2004). Furthermore, the Iraqi government had received remarkable financial aids in term of foreign debt from the western countries.

In models 3, and 4 oil price shocks produced a positive effect on economic growth. In contrast, the international economic block on the Iraqi economy holds a negative and significant impact on economic growth. Various diagnostic tests are used to check the adequacy of the dynamic model. LM test indicates the absence of serial correlation problem for all models. Furthermore, the ARCH test shows the absence of autoregressive conditional heteroskedastic in the residuals for all models. Jarque-Bera statistic indicates the normality problem. The purpose of this estimation is to establish the long-run relationship between the selected variables. The bound test approach proposed by Pesaran et al. (2001) is used to test the hypotheses for no co-integration between oil price shocks and economic growth against alternative hypotheses of co-integration between them. F-statistics bound test. As shown in table -3-, results suggest a long-run relationship between oil price shocks and economic growth in all cases because F-statistics bound test is greater than the lower and upper bound test.

Table -4- demonstrates the long-run relationship between oil prices and GDP per capita as a proxy of economic growth. The results expose the positive and significant effect of oil prices on economic growth. However, the magnitude of the impact reduced from 21 percent from model 1 to 14 percent and 15 percent in models 2and 3, respectively. These results confirmed the size of adverse effects of the Iran-Iraq war and the international economic block on the Iraqi economy.

Table (4) Long run ARDL estimation results

	Model 1	Model 2	Model 3	Model 4
Trend	0.02^{***} (7.30)	0.025^{***} (8.22)	0.23^{***}(9.22)	0.02^{***}(5.51)
POPG	0.01 (0.147)	0.05 (0.66)	0 .004 (0.06)	0.001(0.02)
OILP	0.21^{**} (2.56)	0.14^{*}(1.74)	0.15^{**} (2.18)	0.21^{**} (2.55)

Note: number in parentheses are t values. ***, **, * indicate significant at the 1%, 5% and 10% level of significant "**Source**: Research findings

Table (3): Short run linear ARDL estimation results

	Model 1	Model 2	Model3	Model4
Constant	3.90^{***} (4.21)	4.54^{***} (4.63)	4.80^{***} (4.95)	3.98^{***}(4.11)

Trend	0.013^{***} (3.77)	0.017^{***} (4.12)	0.16^{***}(4.5)	0.012^{***} (3.53)
DUM		0.50^{*} (1.71)	-0.176^{**} (2.30)	0.031 (0.32)
LY (-1)	-0.59^{***} (4.50)	-0.316^{**}(2.26)	-0.70^{***}(5.21)	-0.60^{***}(4.45)
POPG	0.007(0.14)	0.034(0.66)	0.002(0.06)	0.001 (0.01)
LOILP	0.126^{**} (2.30)	0.095^{*} (1.69)	0.11^{**} (2.04)	0.13^{**}(2.30)
Adj. R^2	0.84	0.85	0.86	0.84
F-stat	5.18^{**}	6.13^{**}	6.90^{***}	5.08^{**}
ECM	-0.59 (4.69) ***	-0.68^{***} (5.11)	-0.70^{***}(5.42)	-0.69^{***} (4.65)
J-B	235.25 [0.000]	168 (0.00)	82(000)	223[0.000]
LM	0.221 [0.64]	0.01 (0.92)	2.15 (0.15)	0.082(0.92)
ARCH (2)	2.06 [0.15]	2.70 (0.08)	5.70 (0.006)	2.18(0.14)
RESET test	0.53 [0.48]	0.116 (0.90)	1.76 (0.084)	1.07 (0.20)
F-test bounds critical values				
	10%		5%	1%
Lower Bound	3.57		4.22	5.80
Upper. Bound	4.28		5.03	6.79

Note: number in parentheses are t values. ***, **, * indicate significant at the 1%, 5% and 10% level of significant

"Source: Research findings

Due to check the structural stability in the models, the study used Cumulative sum (CUSUM) and CUSUM of squares (CUSUMSQ) tests. As illustrated in Figure 4, all models passed the cumulative sum (CUSUM) test, while all models except Model 4 failed to pass CUSUM of squares (CUSUMSQ) tests. That means the structural stability in the model 1,2, and 3 have some degree of problems. In this case, Nonlinear ARDL will be applied for an asymmetric relationship between two variables.
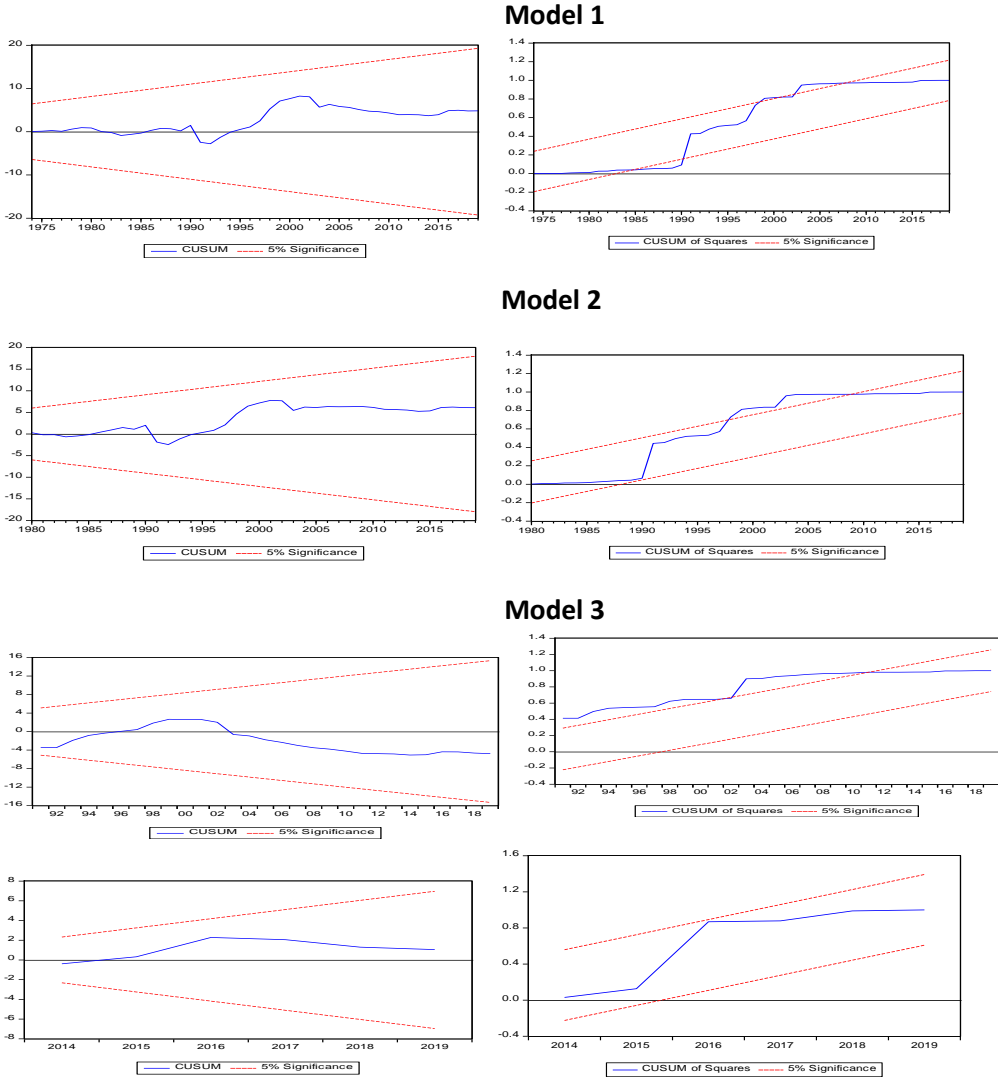
Model 1

Model 2

Model 3

Figure -4- Cumulative sum (CUSUM) and CUSUM square test for stability, for all Linear ARDL models

4.3 Nonlinear ARDL results

Since most linear ARDL models failed to pass the stability test, the study tries to apply the nonlinear ARDL technique to overcome the problem of stability and investigate the possibility of an asymmetric relationship between oil price shocks and economic growth.

Table -5- exhibits the results of a dynamic short run of NARD, and the long run results of NARDL of the oil price increase and decrease exposes in table-6-. The diagnostic checks, the F-bound test, and the Wald test for the short and long run asymmetry are reported in the lower panel of Table 5. As shown in the table, except for the normality, all models passed the diagnostic checks such as autocorrelation and heteroskedastic. The F-bound test indicated that oil price and GDP per capita are co-integrated, because the F- statistics is greater than critical upper bound for all models. Thus, we can reject the null hypothesis of no-co-integration between variables understudies and accept the alternative hypotheses of co-integration between them. The use for the short and long run asymmetry F-statistics are reported in the lower panel of Table 5. The results of the Wald test suggest long run asymmetry relationship for all models. That means oil price increase and decrease have a different effect on economic growth in Iraqi economy during the period of the study. finally, Cumulative sum (CUSUM) and CUSUM of squares (CUSUMSQ) teste indicate that all models are stable, as shown in Figure -5-.

As observed, oil price increases have a positive and significant impact on economic growth in all cases. However, oil price decreases are not significant in all cases. Also, noted a large and adverse effect of the international economic sanction on the Iraqi economy, which an increase of economic sanction leads to diminishing GDP per capita by 18 percent. Therefore, the magnitude of the oil price increase's effect will also reduce in the same period.

The purpose of short-run estimation is to establish the long-run relationship between the selected variables. The long-run finding of NARDL is more interesting than its short-run and linear ARDL estimation, as reported in table -6-. In model 1, the oil price increase (RLOILP+) significantly has a large positive effect on real GDP; an increase in oil price caused raise economic growth by 36 percent in the long run. In model 2, the impact of the oil price increase (RLOILP+) is positive but reduces its impact due to the effect of the Iraq-Iran war. An increase in oil price caused raise economic growth by 28 percent in the long run. Despite that, the dummy variable of the war is highly positive. In model 3, the oil price increase still has a positive effect but diminishing its effect to 27 percent. In this period, the Iraqi economy and its economic growth were significantly and negatively affected by international

economic sanctions, which caused to lessening economic growth by 24 percent in the long run. The oil price increase (RLOILP+) has a huge and statistically significant positive effect on economic growth. An increase in oil price caused raise economic growth by 37 percent in the long run.

Table (5) Short run NARDL estimation results

	Model 1	Model 2	Model 3	Model 4
Constant	4.63*** (4.11)	5.36*** (4.64)	5.40*** (4.55)	4.65*** (4.24)
DUM		0.18* (1.78)	-0.18* (1.85)	-0.093 (0.73)
LY (-1)	-0.70*** (4.47)	-0.80*** (4.93)	-0.74*** (4.68)	-0.66*** (4.53)
POPG (-1)	0.136* (1.75)	0.15 (1.96)	-0.02 (0.39)	0.05 (0.82)
LROILP+(-1)	0.253*** (3.13)	0.23*** (2.88)	0.19** (2.54)	0.23*** (3.23)
LROILP- (-1)	0.09 (1.31)	0.011 (0.14)	0.04 (0.52)	0.09 (1.48)
ΔLY(-2)				0.03 (0.25)
ΔLY(-3)	0.066 (0.37)	0.024 (0.14)	0.10 (0.60)	
ΔPOPG				-0.15 (0.26)
ΔPOPG (-2)	-0.37* (1.74)	-0.35* (1.71)	-0.10 (0.71)	
Δ LROILP+	-0.24 (1.45)	0.23 (1.45)	0.17 (1.03)	0.26* (1.70)
Δ LROILP- (-1)				-0.23* (1.36)
ΔLROILP- (-2)	-0.30 (1.07)	-0.26 (0.96)	-0.30 (1.08)	
Adj. R^2	0.24	0.24	0.25	0.23
F-stat	5.17**	6.27***	5.58**	5.39***
W_{LR}	8.08***	10.13***	8.30***	8.30***
W_{SR}	1.60	1.50	1.11	2.26
J-B	54 (0.000)	41 (0.000)	36(000)	125 (0.000)
LM (1)	0.22 (0.64)	0.14 (0.86)	0.65 (0.52)	1.26 (0.26)
ARCH (1)	2.40 (0.128)	3.12(0.055)	3.86 (0.055)	6.18 (0.017)
F-test bounds critical values				
	10%		5%	1%
Lower bound	2.72		3.23	4.29
Upper bound	3.77		4.35	5.61

Note: number in parentheses are t values. ***, **, * indicate significant at the 1%, 5% and 10% level of significant. "**Source**: Research findings.

In all models, the oil price decrease (LROILP-) is positive but statistically insignificant. AS previously mentioned, the Wald test for the short and long run asymmetry was applied. The results of the long indicated the existence of an asymmetry relationship between oil price and economic growth. That means the oil price increase (RLOILP+) and the oil price decrease (LROILP-) have a different effect on economic growth. As expected, the asymmetry relation exists between variables under the study. We

noted that the size and magnitude of the impact of oil price increase are much greater than the size and magnitude of the oil price decrease in all models. In other words, the asymmetries are existence in the magnitude, not in the sign (table 6). Finally, in the long run, population growth positively impacts economic growth in both model 1 and model 2. An increase in population leads to rising GDP per capita by 19 and 18, respectively. (Table 6).
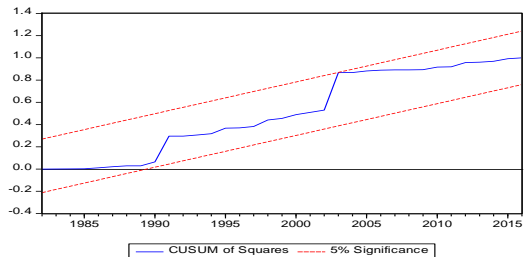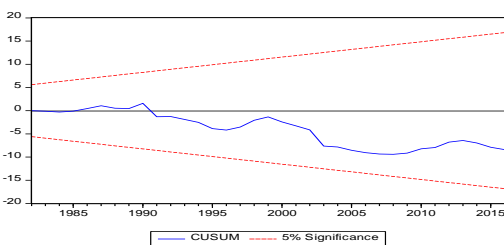
Table 6 Long run NARDL estimation results

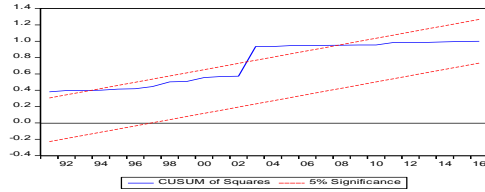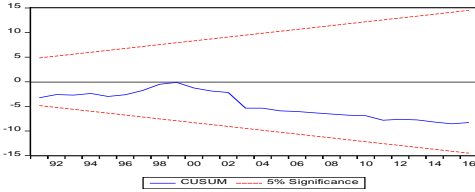|	Model 1	Model 2	Model 3	Model 4
Constant	6.67*** (17.38)	6.66*** (20.6)	7 .30*** (27.24)	7 .02*** (20.15)
Dum		0.22* (1.92)	-0.24* (1.94)	-0.14 (0.72)
POPG	0.19* (1.76)	0.18* (1.99)	0.03 (0.38)	0.08 (0.80)
OILP+	0.36*** (4.18)	0.28*** (3.44)	0.27***(3.05)	0.37*** (4.13)
OILP-	0.12 (1.36)	0.014 (0.14)	0.05 (0.53)	0.14 (1.53)

Model 1
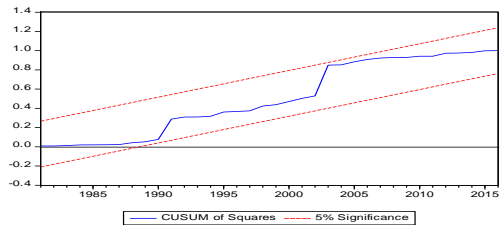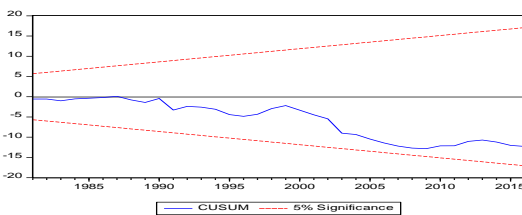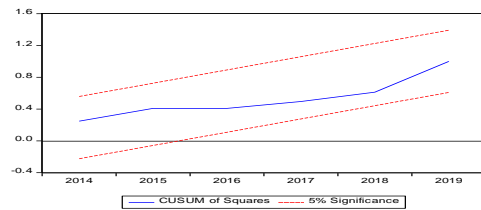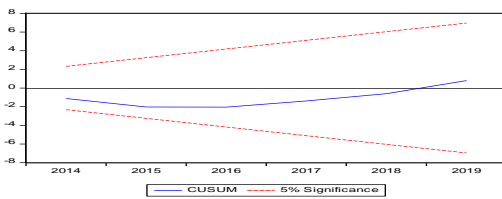

model 2

Model 3

Model 4

Figure -4- Cumulative sum (CUSUM) and CUSUM square test for stability, for all nonlinear ARDL models.

5. Conclusion:

The present study investigates the impact of oil price shocks on economic growth for the Iraqi economy during 1968-2019. For this purpose, applied the linear ARDL and nonlinear ARDL techniques. Linear ARDL is used to capture the symmetric relationship between the variables under study. In contrast, nonlinear ARDL is used to investigate the asymmetry effect of oil price on GDP per capita. NARDL model proposed by Shin et al (2014) allows for short and long-run asymmetric through decomposition of oil price as an explanatory variable to negative and positive oil price. In linear and nonlinear ARDL, the F-bound test shows the long-run relationship between oil price shocks and economic growth in all models. However, the linear ARDL failed to pass the Cumulative sum (CUSUM) and CUSUM of squares (CUSUMSQ) test for stability.

Nonlinear ARDL results exhibit a short and long-run effect of the oil price increase and oil price decrease. The results of the long run indicated the existence of an asymmetry relationship between oil price and economic growth. That means the oil

price increases (RLOILP+) statistically have a great and positive impact on economic growth in all four models. More additionally, the results of the Wald test suggest a long-run asymmetry relationship for all models. implying that increases in oil price lead to increases in real GDP.

Theses above finding confirms the Dutch disease phenomena for major oil-exporting countries (Abdlaziz,2019). Our finding are parallel with Nusair(2016).he found that the oil price increases have a positive and statistically significant effect on economic growth for five Gulf Cooperation Council (GCC) countries. That means the major oil-exporting countries and their economies are affected highly by oil price shocks. Hence, as one of the major oil-dependent economies, the Iraqi economy is sensitively affected by oil price changes. Moreover, its economic growth and Standard of living in terms of GDP per capita strongly tide with world oil price changes. Therefore, as a policy implication, Iraqi policymakers should diversify the Iraqi economy to escape the rentier economy and different degrees of the Dutch disease and resource curse phenomena. The present study can also serve as a reference for future researches to expand empirical research on the oil price– economic growth nexus for the Iraqi economy. In addition, future research can also use essential variables such as institutional quality and monetary variables such as exchange rate. Finally, the lack of monthly data considered a limitation to display the role of positive and negative oil prices separately in the different periods of the Iraqi economy. Future researches also can fill this gap.

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کاریگەری بەرزیی و نزمیی نرخی نەوت لەسەر ئابووری عێراق: چونیەکی و ناچوونیەکی بە شیکردنەوەی هاویەکخستن(co integration)

پوختە:

ئەم توێژینەوەیە لە کاریگەری چونیەکی و ناچوونیەکی شۆکەکانی نرخی نەوت لەسەر گەشەی ئابووری عێراق لە ماوەی سالانی 1968-2019 دەکۆلێتەوە. بۆ ئەم مەبەستە، تویژەرەکان هیڵی خۆکاری دابەشکراوی لاگ (ARDLو لاگی دابەشکراوی خۆکاری نا هیڵییان بەکارهێناوە (NARDL). (ARDL) هیڵی و ناهیڵی گەشت بەو ئەنجامەی کە نرخی نەوت کاریگەریی درێژخایەنی هەیە لەسەر گەشەی ئابووری، چونکە ئاماری ئێف F statistics لەهەموو مۆدێلەکان چوارچێوە یاسایی و بالاکانی تێپەراندوە. لەوەش زیاتر، ئەنجامەکانی خەملاندنی NARDL بەلگەی ناچوونیەکی نیشان دەدەن: بەرزبوونەوەی نرخی نەوت (+LROILP) کاریگەری ئەرێنیی گەورەتر و بەرچاویان هەیە لەسەر بەهای راستەقینەی GDP بۆ تاکەکان، لە کاتێکدا کە رێژەی دابەزینی نرخی نەوت (LROILP-) کاریگەر نیە و بچووکتره لە زیادکردنی نرخی نەوت (+LROILP) .ئەمە مانای ئەوەیە کە بەرزبوونەوەی نرخی نەوت دەبێتە هۆی بەرزبوونەوەی راستەقینەی GDP بۆ تاکەکان. لە ئەنجامدا , ئابووری عێراق و بژێووی ژیان لە روانگەی بەرهەمی گشتی ناوخۆی GDPوە دەکەوێتە ژێر کاریگەری جدی گۆرانکاری لە نرخی نەوتدا، ئەمەش بەهۆی کەوتنە ژێرکاریگەریەکی بەهێزی بەرزی و نزمی نرخی جیهانی نەوتەوە. بۆیە هەمەجۆرکردنی ئابووری عێراق باشترین و تاکە بژاردەی بەردەم خاوەن برِیاری سیاسی و ئابووریـیە لە عیراقدا.

اثر صدمات اسعار النفط على الاقتصادي العراقي: تحليل التماثل و عدم التماثل

الملخص:

تبحث هذه الدراسة في تاثير التماثل و عدم التماثل لصدمات اسعار النفط على النمو الاقتصادي للاقتصاد العراقي خلال المدة 1968-2019 ، لهذا الغرض اعتمدت نموذج الانحدار الذاتي الخطي-الموزعة متاخرا (ARDL) والانحدار الذاتي غير الخطي-الموزعة متاخرا (NARDL). اذ وجد من خلال النموذجين (ARDL) الخطي وغير الخطي ان صدمات اسعار النفط لها تاثير ايجابي طويل المدى على النمو الاقتصادي، اذ ان احصائية F اكبر من الحد الاعلى للقيمة الحرجة للنماذج كافة. علاوة على ذلك، اظهرت نتائج تقديرات (NARDL) دليل عدم التناسق: ان الزيادات في اسعار النفط (+LROILP) لها تاثير ايجابي اكبر وهام على نصيب الفرد من الناتج المحلي الاجمالي الحقيقي، في حين ان معاملات انخفاض اسعار النفط

(LROILP-) ضئيلة واقل من زيادة اسعارالنفط (LROILP+) ، وهذا يعني ان زيادة اسعار النفط تؤدي الى زيادة الناتج المحلي الاجمالي الحقيقي للفرد. وبالتالي فان الاقتصاد العراقي و مستوى المعيشة فيه من حيث نصيب الفرد من الناتج المحلي الاجمالي يتأثران بشكل حساس بتغيرات اسعار النفط بسبب المدِّ القوي مع تغيرات اسعار النفط العالمية. في ذلك الحين فان تنويع الاقتصاد العراقي، فقط الخيار الافضل امام صانعي السياسة.