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Standard analysis of factors affecting oil prices in the world market under the theory of rational expectations

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Abstract

The study targets to determine the factors affecting the world oil markets and describes the significant changes in oil prices in the short and long term predict the optimal price within and outside the sample limits until 2025 by using the data of the study variables for the years (1970-2020) through reconciling the equation of decline in price and factors influencing price determination by the Committee of Oil and Energy Experts has been estimated model using the single equation, The dual logarithm formats, it is more appropriate to describe the large fluctuations in world oil prices and under the assumptions of rational expectations theory and (ARD) methodology, this model has tested according to the standard specifications where the study found that the estimates of the parameters of the model with model constraints coincided with the limitations of the model to have an impact on those factors in the short and long term of factors affecting the determination of world oil prices, as well as the model appropriate data for predicting and estimate the economic policies and the accuracy of oil and energy experts. Determining crude oil prices according to changes in the specific factors of those prices leads us to accept the hypothesis of rational expectations and its significant role in explaining changes in oil prices.

Keywords: oil prices, rational expectations theory, world market

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1. Introduction

Oil prices are one of the factors affecting to performance of the world economy and, therefore the volatility and crises to which the world oil markets are exposed have significant effects on the economies of both developed and developing countries, especially those countries that rely on crude oil as a significant supplier of financing the state budget, where oil revenues are directly affected by these fluctuations, of financing the state budget, where oil revenues are directly affected by these fluctuations, which affects the response of their development needs, and these fluctuations are the result of a set of factors that contribute in one way or another in its changes such as supply and demand forces and political and climatic factors.

These fluctuations in prices have generated a desire to study and identify factors affecting crude oil prices in the world market and under the theory of rational expectations that the environment is changing rapidly and there is an urgent need to know how oil and energy experts deal and how they determine crude oil prices under these conditions and fluctuations and then predict optimal oil prices, which requires the use of rational models with more acceptable results than other models.

This is why the importance of the study comes from the importance of crude oil in the present and future of developed and developing producing, exporting and importing countries because most studies confirm the world's dependence on crude oil as a major energy supplier, as well as the need to find a logical and rational explanation of what is happening in the oil market, which has become controlled by major global companies that are working hard to achieve their interests, and then deal with crises and fluctuations in order to find solutions to them or minimize their effects, so the goal of these The study is a modest attempt to identify factors affecting oil prices using rational expectations theory in order to predict the optimal oil prices because of the importance they represent for the economies of developing oil-producing countries, which suffer from structural imbalances in most of their economic sectors, which make them more vulnerable to random fluctuations and changes than developed countries, as well as the novelty of the subject of the study and the scarcity of writings in it.

The study was divided into three investigations, the first of which dealt with the concept of rational expectations and their importance, assumptions, characteristics and criticisms, while the second examined the identification of factors affecting the world oil markets that cause fluctuations in these prices, while the third was to measure and analyse the function of the world price of oil using data for a time series of years (1970-2020) based on the data of the Organization of Petroleum Exporting Countries and world bank data under the theory of rational expectations and then predict the optimal price. Until 2025 according to the best model obtained.

2. The first topic: the concept and assumptions of rational expectations and their advantages

"Expectations" in the economics, are the expectations or opinions adopted by decision-makers to determine future prices, sales, income, taxes, or other key variables, as the importance of expectations is often due to their significant impact on current choices for companies and families, and therefore on current prices and the overall level of economic activity [8].

2.1. Rational expectations theory

Rational Expectations Theory The theory of mental expectations has introduced by economist John F. Muth, a professor at the University of Indiana, in 1961 in his study Rational Expectations and hypothesis of Price Movement. This hypothesis is due to the formulation of the theories in their well-known form [9] and that this hypothesis was the result of overcoming the disadvantages of the theories of adaptive expectations [13] and [3] That has led us to the formulation of rational expectations, which mean that they are expectations based on the efficient use of all available information related to the phenomenon studied that does not mean individuals have full insight and may even make mistakes and may be significant, but they are not systematic mistakes and that improvements in their expectations cannot be made based on the information available to them [1].

The factors that helped to spread the theory significantly were the focus of this theory on the negatives related to the formulation of expectations in the economic models at the time, as well as the inappropriate performance of demand management policies in controlling unemployment and inflation, and the failure of the concept of a (Phelps) curve in its traditional form in the 1970s when levels of unemployment and inflation rose together, In addition to the widespread hypothesis of the neutrality of the economic policy of neoclassical thought and the critical acceptance of monetary thought [4]. Rational expectations assumed that the actual convictions of individuals should be identical or consistent with the future state of the economy, taking into account the impact of government policies on their decisions [5].

2.2. Rational expectation hypothesis

The rational expectations emphasize finding a way to estimate future incidents using all available information efficiently, so that forecast errors are not consecutive (regular).

As a result, the rational expectations are what must be predicted, if these projections are correctly depend on the same content as the economic theory about determining the course of that variable, it cannot be assumed that the forecasters of this variable are unaware of the economic forces that control that variable to be predicted.

This leads us to the fact that rational expectations are based on intuition, but this intuition (prediction) be rational because of it based on assumptions that should not be violated, so one of the conditions for achieving rationality is the availability of the following assumptions and taking them. Rational expectations can be summed up as follows:

1. Do not ignore economic units (whether consumed, productive or invested) for any opportunity that can generate a profit without exploiting them and benefiting from them, thus describing their behaviour as optimal and maximizes benefit, which in turn is a reason for the superiority over rational expectations over other expectations.

2. Do not repeat mistakes by economic units when predicting that they collect the necessary information and use it efficiently to avoid making mistakes, and if there are errors in expectation should not take a regular form, i.e. the random (remaining) limit of the model of the standard economy is not characterized by a particular pattern then the behaviour of economic events is described as rational, which explains the regularity of mistakes and this is contrary to two approaches: **Rationality methodology:** If mistakes are regular from previous incidents so far, it is assumed that economic units had been alerted to them and included in their information that they use efficiently to avoid them.

   Standard methodology: The linear model that makes its estimates efficient and reliable requires that the random error be distributed naturally with an average of zero and a variation equal to σ^2, so when you break this imposition, we will face measurement problems.

3. Economic units take into account all available information in addition to previous experience, latest developments, developments, news of the hour and even statements by officials such as OPEC statements and analysts' opinions, so that rational expectations have empirical support,

as is now being done by accumulated information among workers in specialized financial markets [6].

2.3. Advantages of rational expectations

1. Rational expectations are words based on intuition, aimed at maximizing benefit and profits.

2. Rational expectations are characterized by a failure to repeat the error. That is, when economic units adopt the principle of rational expectations, they collect all information efficiently in order to avoid mistakes, and if they occur, they are atypical or irregular errors in the sense that the error limit of standard models is unregulated so that the expectations are rational.

3. The study of rational expectations is characterized by the fact that it takes into account all the developments and information surrounding in addition to the permits of officials, such as the statements of the Organization of Petroleum Exporting Countries (OPEC) regarding oil issues and its prices, this has made rational expectations enjoy great supports from specialized financial markets.

4. Rational expectations propose decisive and one-time adjustments to address different issues to ensure good economic results, i.e., a comprehensive rather than a partial change in the systems concerned and fiscal and monetary economic policies.

5. The modelling of rational expectations changes from time to time depending on the changing economic policies of governments or the individual behaviour of human beings [5].

3. The second topic: factors affecting the global price on oil:

prices are factors affecting the global economy, and this price is subject to fluctuations and fluctuations due to a combination of factors and influences that contribute in one way or another to changing course, leaving different effects on the economies of both developing and developed countries [12].

If oil is seen as a commodity like other commodities to determine the quality of its market and prices at the international level, it is a mysterious market surrounded by circumstances so strange that the oil state producing this commodity had little role in determining the production and pricing of this commodity, so we find that the oil pricing system was not the result of real interaction between the forces of global supply and demand, but prices were determined by the interest of monopolistic oil companies, so he did not specify a single oil price, But several prices each serve a certain goal for oil companies [25].Therefore, there are several factors affecting oil prices in the world markets, which make prices characterized by volatility and thus have a clear impact on oil revenues, the most important of which are the following: [12]

1. Global oil demands Demand for oil plays a prominent role in determining its prices and the demand for oil means the amount of need in its quantitative and qualitative aspect of crude oil at a certain price over a certain period to satisfy that need, whether for production, consumption or other purposes. [2] Oil demands are divided into two types:

A. Demand consumption: Oil demands have undergone several changes in its extraction to the oil industry, where demand for oil for consumption is influenced by increased rates of global economic growth, so we note that the development, industrial and economic growth in China and India has led to increased demands and consumption of oil and thus to global oil demand [18].

B. Demand for speculative "future markets": this type has been known in the markets since the mid-1980s, when brokers and speculators entered the global markets and dealt with the sale of paper barrels for profit, and this type of demand was mainly affected by several factors of different effects, including encouraging economic growth rates. [15] In general, the demand for oil in the short term is characterized by a lack of flexibility due to the difficulty of finding an alternative to replace oil, as oil requires significant investments and these investments need a long period, which means that crude oil when changing prices does not change little or no. Unlike long-term demand, it is changing, and in general, the price of a barrel of oil is affected by global oil demand by being influenced by several factors, as follow:

- Prices of alternative energy sources: Commodities that perform the same functions as oil, such as electricity generated from several sources, solar energy, and natural gas, represent other sources, so when replacing the product affects demand positively or negatively, negatively affects when the alternative product is lower than the price of oil, and positively affects when the product is not competitive or priced more than the price of oil [11].

- Economic growth rate: One of the factors influencing the level of energy consumption of the world, as crude oil is one of the sources of energy, so demand changes as the rate of economic growth and energy consumption change if there is a rise in GDP growth rates that leads to a rise in demand for alternative energy sources and leads to increase demand and usually leads to higher energy prices and thus higher prices [12] and [10].

- Political factors: Political factors play an important and influential role in influencing the volume of demand, which has a clear impact on price changes, political unrest, conflicts and wars taking place in its production areas and refining, which affect the security of the flow of oil supply to consumers and push oil prices up, thus keeping the political factor integration and phase depending on certain political circumstances. For example (the 1973 war, the Iran-Iraq war of 1988-1981, the occupation crisis in Kuwait in 1991, the Asian crisis in 19981997, developments after 2003, the global financial crisis in 2008, the 2014 ISIS war, the Corona pandemic in 2020) which had a major impact on crude oil prices fluctuations.

- Crude oil prices: Demand for goods and services is inversely linked to the price, taking into account the impact on other factors, where crude oil and its products are one of these commodities, and its degree of flexibility is very low, so that any change in crude oil prices do not change demand in the short term. This is because it is difficult to find an alternative to oil.

- Population factor: One of the factors influencing oil demand, as the size of the population contributes to determining the overall demand for energy, including oil, steadily the impact on other factors, the greater the population, the greater the demand for energy, including crude oil.

- Climate: Climate is an important factor affecting demand and this effect is the result of the amount of change in temperatures throughout the year, whether it is rising or declining, as we note that oil demand is decreasing in summer and increasing in winter [12].

3.1. Multivariate rational expectations models

All economic and financial decisions are subject to considerable uncertainty, as the method of modeling uncertainty and expectations has been controversial, and despite much, Lucas & Sargent's pioneering contributions, rational expectations theory has dominated the economy and finance as a preferred approach to shaping expectations according to rational expectations theory, so self-characterization of uncertainty as conditional probability increases will coincide (through learning) with the objective results associated.

The theory of rational expectations is mathematically elegant and allows solutions consistent with the model, and fits well with the theory of economic balance, so that almost all models of dynamic random general balance used in macroeconomics and finance are resolved according to the theory of rational expectations, and the following cases will be addressed:

Case 1: Includes all current and previous x values

$$I_t = \{x_{1,t}, x_{2,t}, \ldots, x_{k,t}, x_{1,t-1}, x_{2,t-1}, \ldots, x_{k,t-1}, \ldots\}$$

This is the most predictable state because the information matrix is as broad as you can think of as x.

Case 2: Current and previous x values up to a certain period of time, referred to as K, include:

$$I_t = \{x_{1,t}, x_{2,t}, \ldots, x_{k,t}, x_{1,t-1}, x_{2,t-1}, \ldots, x_{k,t-1}, \ldots, x_{1,t-k}, x_{2,t-k}, \ldots, x_{k,t-k}\}$$

This case is called limited memory, so that people systematically forget data older than periods before t from a technical point of view, these specifications are less traceable than the previous ones because the sequence of information does not grow over time: I_{t+1} does not necessarily include I_t.

Case 3: Includes all previous x's

$$I_t = \{x_{1,t}, x_{2,t}, \ldots, x_{m,t}, x_{1,t-1}, x_{2,t-1}, \ldots, x_{k,t-1}, \ldots\}; m < k$$

values and current values of some x's. In this case, two categories of variables are used to build predictions, the first category starts from $x_1, \ldots, x_m$, and the second category starts from $x_{m+1}, \ldots, x_k$ and is known after only one period. This case can be converted to the first case by compensating each variable as follows:

$$u_{1,t} = x_{1,t}, u_{2,t} = x_{2,t}, u_{m,t} = x_{m,t}, u_{m+1,t-1} = x_{m+1,t-1}, u_{k,t-1} = x_{k,t-1}$$

So, we get

$$I_t = \{u_{1,t}, u_{2,t}, \ldots, u_{k,t}, u_{1,t-1}, u_{2,t-1}, \ldots, u_{k,t-1}, \ldots\}$$

All of the above-mentioned cases are those adopted in most previous studies that accept the assumption that expectations are formed stablely, meaning that at any time predictions are based on the same set of variables $x_1, \ldots, x_k$ both depending on the mechanism by which these variables enter the information matrix [24].

Therefore, in our study, we will address use the first case in the creation of the information set and we will use the (Autoregressive Distributed Lag Estimate) (ARDL) methodology, which has been selected according to preliminary results and sleep tests [3].

3.1.1. Entrance to the self-deprecating model of distributed time slowing (ARDL)

Sometimes in time series models, there is a relatively long period for economic decision-making variables and the ultimate impact on the policy variable, meaning that the adjustment in the Y variable due to the change in the interpreted variable (X) is widely distributed over time.

If the duration of response and impact is relatively long, slow independent variables must be included in the model and be one of the ways to build a dynamic response model by including time-slowing interpreted variables as interpreted variables. This means that the ARDL model becomes a mixture of two models: distributed lag Model slowing and autoregressive model, meaning that the effect of the interpreted variable is not only for the current period (t) but extends over multiple previous periods ($t - r$) [22].

3.1.2. Characteristics of the self-regression methodology of distributed time gaps (ARDL)

This methodology is used in many standard studies aimed at studying the relationship between variables due to their ease of application, as this methodology differs from other methodologies of the standard economy in many characteristics that distinguish it from other models, such as:

1. This methodology does not require all variables used in the study to have the same degree of stability, but they can all be either stable at a level $I(0)$ or stable at the first difference $I(1)$ or a mixture between them, but provided they do not exceed that [16].

2. The results of the application of this methodology are good if the sample size is small between (30-80) views, unlike most co-integration tests requiring a large sample size to obtain highly efficient results.

3. Helps to estimate the long-term and short-term relationship together in one and with one equation [20].

4. The use of this methodology helps to eliminate problems related to serial self-association and deleted variables [7].

5. Gives unbiased capabilities and efficiency.

6. ARDL applies a year-to-private modelling framework by taking enough slow periods to obtain data generation so that $K(P+1)$ estimates slopes to obtain the optimal slowing period of each variable, representing (P) Maximum slowing period can be used, and (k) represents the number of variables entering the equation and the optimal model is selected based on statistical criteria Akaike Information Criterion (AIC), Hannan-Quinn (HQC) or Schwarz Information Criterion (SIC).

7. (ARDL) can distinguish between dependent and interpretive variables other than other traditional models of co-integration tests and thus eliminate problems that may arise as a result of internal correlation and growth [19, 14].

3.1.3. Distribute self-regression arrangement models (p, q) ARDL

$$y_t + \lambda_1 y_{t-1} + \lambda_2 y_{t-2}, \dots, \lambda_p y_{t-p} = \alpha + \beta_0 x_t + \beta_1 x_{t-1} + \dots + \beta_q x_{t-q} + u_t \dots \tag{3.1}$$

Or write in another form as follows:

$$\lambda(L) y_t = \alpha + \beta(L) x_t + u_t \dots \tag{3.2}$$

The logical distributed delay form specified by (2) can also be written in the form of ARDL (p,q) with moving average errors, namely,

$$\lambda(L) y_t = \alpha\lambda(1) + \beta(L) x_t + v_t \dots \tag{3.3}$$

It is similar to the equation 3.2 except the error limit obtained through compensation for $u_t = \lambda(L)v_t$ which represents the moving average error model. We note that he prefers (ARDL) (p, q) methodology in the study of time series for two reasons:

1. It is easily used analytically compared to rational distributed delay models.

2. By selecting the values (p) and (q) to be large enough to enable the researcher to provide almost reasonable specifications for logical distributed delay if necessary.

3.2. Estimation of ARDL models

The ARDL model (p, q) can be estimated from equation 3.1 by applying the OLS method. Specifically, let it be.

$\theta = (-\lambda_1, -\lambda_2, \ldots, -\lambda_p, \alpha, \beta_0, \beta_1, \ldots, \beta_q)' \& z_t = (y_{t-1}, y_{t-2}, \ldots, y_{t-p}, 1, x_t, x_{t-1}, x_{t-2}, \ldots, x_{t-q})'$ Per $t = 1, 2, \ldots, T$, the OLS estimate for ϕ is

$$\hat{\theta} = \left(\sum_{t=1}^{T} z_t z_t' \right)^{-1} \sum_{t=1}^{T} z_t y_t$$

sufficient conditions for $\hat{\theta}$ to be consistent estimate for $\hat{\theta}$ is:

1. $T^{-1} \sum_{t=1}^{T} z_t z_t'$ Converging with a specific non-random positive matrix where $T \to \infty$.
2. $T^{-1} \sum_{t=1}^{T} z_t u_t$ converging on a zero vectored where $T \to \infty$.

The first requirement is met if z_t constant variations are followed. This will be the case if all the roots of the p-level multi-border equation $\phi(z)$ fell outside the unit circle, and x_t and u_t are fixed processes with absolute automatic variations that can be collected, as defined by:

$$x_t = \sum_{i=0}^{\infty} a_i v_{t-i}, u_t = \sum_{i=0}^{\infty} b_i \epsilon_{t-i}$$

Where $\sum_{i=0}^{\infty} |a_i| < k < \infty, \sum_{i=0}^{\infty} |b_i| < k < \infty$ and v_t and ϵ_t standard white noise processes, as condition 1 alone does not guarantee consistency of OLS capabilities alone and must be accompanied by condition 2.

To determine the delay score (p, q), one possibility is to estimate the form of by OLS for all possible values of $p = 0, 1, 2, \ldots, m$ and $q = 0, 1, 2, \ldots, m$, where m represents the maximum delay, and $t = m+1, m+2, \ldots, T$. Thus, one of the estimated models with better statistical indicators than the rest can be selected in data representation, which has the highest values of the $(\overline{R^2}, R^2)$ models, and the lowest value of the Akaike standard, the Schwarz Bayesian standard and the Hannan-Quinn critter standard.

The usual F statistic is then calculated to test the zero hypothesis by comparing the upper (FU) and lower FL limits) scheduled by Pesaran, Shin and Smith (2001) as following:

The relationship of common integration is tested by the following two hypotheses:

- The hypothesis of nothingness (H_0): indicates that there is no common integration relationship, i.e., the lack of a long-term balance between variables.

$$H_0 : \delta_1 = \delta_2 = \delta_3 = \cdots = \delta_p = 0$$

- The alternative hypothesis (H_1): It indicates the existence of co-integration, meaning that there is a long-term equilibrium relationship between the variables.

$$H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq \ldots \neq \delta_p \neq 0$$

- So, if the value of $F > FU$. We reject the premise of nothingness and conclude that there is a long-term relationship between y_t and $x' s_t$.
- but if it is $F < FL$, we conclude that there is no long-term relationship between variables.

- If the $FL < F < FU$ value, the conclusion is inconclusive.

If its calculated F counts falls beyond critical value limits, we will get a final decision on having to know the order for integration of the underlying variables. Once it is established that the linear relationship between variables is not "false", we can estimate long-term relationship transactions using a methodology ARDL [23].

3.3. Model rational expectations with future expectations

The first case will be used to find the information matrix according to the Autoregressive Distributed Lag Estimate (ARDL) and this methodology will be selected according to the preliminary results and the static test [3].

3.3.1. The model

$$\begin{aligned} lny_t = f(&lny_{t-1}, \ldots, lny_{t-n}, lnx_1, lnx_{1,t-1}, \ldots, lnx_{1,t-n}), lnx_2, lnx_{2,t-1}, \ldots, lnx_{2,t-n}), \\ &lnx_3, lnx_{3,t-1}, \ldots, lnx_{3,t-n}), lnx_4, lnx_{4,t-1}, \ldots, lnx_{4,t-n}), lnx_5, lnx_{5,t-1}, \ldots, lnx_{5,t-n}) \end{aligned}$$

Where they represent:

LnYt: World Oil Price, LnX1: world Oil Demand, LnX2: world GDP, LnX3: World Oil Reserve, LnX4: world Oil Supply, LnX5: world Oil Consumption.

3.3.2. Test the stability of the model's time series

Before starting to estimate the model and use it in analysis and forecasting, it is necessary to ensure the stability of the time series of data onto variables used in the study as logarithmic, to ascertain their levels as this is a prerequisite for the validity of the analysis or the progression and expectation so all levels of the time series and all variables should be at the same level [17].

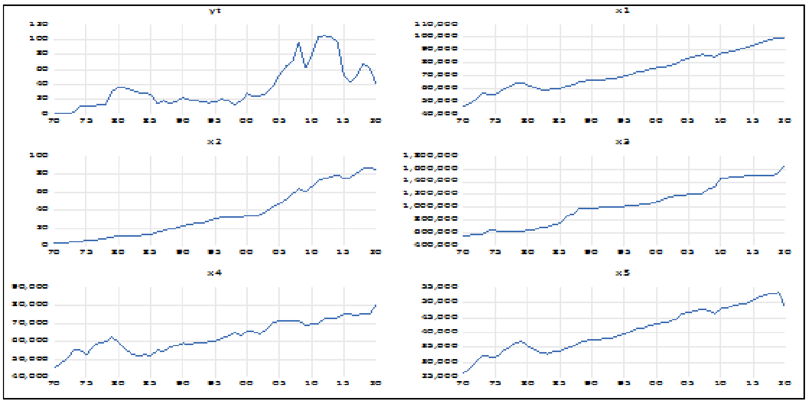


Figure 1: Shows the chart of the series of variables included in the study.
Source: From EViews 12. output

The graph shows the instability of this data and therefore the problem of instability of time chains must be addressed by taking differences as the results of the unit root tests (ADF and PP) revealed that all chains to contain the root of the unit and therefore the chains are unstable for years (1970-2020) at the level where the absolute values of the estimated statistics were below critical values at 5%, which means accepting the zero hypotheses and after taking the first difference the chains for all variables stabilized at a significant level of 5% as shown in the Table 1.

Table 1: Chain stability test

variables	Ln(yt)	Ln(x1)	Ln(x2)	Ln(x3)	Ln(x4)	Ln(x5)
level	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)

Source: From EViews 12. output

4. The third topic: Measuring and analysing the global price function of crude oil for the years (1970-2020)

we will discuss in this research the use of standard methods to verify the harmony and stability between world oil prices and factors affecting world oil prices (using a rational model) where this study assumes that oil prices are determined by several factors, the most important of which are (global demand, global oil supply, global inflation rate, global GDP, exchange rate in US dollars, world oil reserves and the total number of oils). The population and global growth rate, global oil consumption, and shocks), but through our study, we will address the most important factors including (global oil demand, global oil supply, global GDP, global oil reserves, global oil consumption, and shocks), the researcher adopted the use of the first case model of multiple linear regression and using the ARDL methodology, which was formulated as follows:

$$Y_i = b_0 + b_1 X_{1i} + b_2 X_{2i} + b_3 X_{3i} + b_4 X_{4i} + b_5 X_{5i} + U_i$$

where to:

Y_i: Approved variable

X_i : independent variables $i = 1, 2, \ldots, n$.

b_0 : fixed limit.

$b_1, b_2, \ldots, b_5$: parameters to be appreciated.

U_i : error limit.

The price forecast series was obtained by estimating the self-regression model of slowly distributed time gaps (ARDL) and the best path among 20 models was ARDL $(2, 1, 2, 0, 0, 0)$, see annex table No. 1.

The model has been confirmed to be free of standard problems of diagnostic tests, which are divided into two types:

A. Residuals diagnostics tests:

It is represented by (normality test natural distribution test, autocorrelation non-link testing, and Heterogeneity contrast instability test). The results were as follows:

Table 2: Summary of the results of the detection of the quality of the estimated model

<table>
<tr><th colspan="3">Tests</th><th>Stat-Value</th><th>Prob</th></tr>
<tr><td colspan="3">Normality test (Jarque bera)
Null hypothesis: Residual are normally Distributed</td><td>0.282970</td><td>0.868068</td></tr>
<tr><td colspan="2" rowspan="2">Breusch-Godfrey serial correlation LM test
Null hypothesis: no serial correlation at up to 2 lags</td><td>F-Statistic</td><td>1.299311</td><td>0.2852</td></tr>
<tr><td>Obs*R-Square</td><td>3.298886</td><td>0.1922</td></tr>
<tr><td rowspan="5">Heteroskedasticity Test
Null hypothesis: Heteroskedasticity</td><td rowspan="3">Breusch-Pagan-Godfrey</td><td>F-Statistic</td><td>1.104892</td><td>0.3835</td></tr>
<tr><td>Obs*R-Square</td><td>11.03790</td><td>0.3546</td></tr>
<tr><td>Scaled explained SS</td><td>5.640962</td><td>0.8445</td></tr>
<tr><td rowspan="2">ARCH</td><td>F-Statistic</td><td>0.619356</td><td>0.4353</td></tr>
<tr><td>Obs*R-Square</td><td>0.637698</td><td>0.4245</td></tr>
</table>

Source: From EViews 12. output

B. Model structure stability tests:

To ensure the stability and durability of the model structure, some tests must be carried out, such as the Ramsey Reset Test for the mathematical characterization of the model and the Cusum and Cusum of squares tests, and it has been shown that the model does not suffer from problems of mischaracterization The athlete estimated the probability value of F-statistic and t-statistic b (0.8487) and is insignificant at 5%, which supports the acceptance of the hypothesis of nothingness, see Annex (2) and Annex No. (1).

The terms of the equation have tested then they were found in the F-statistic value, which was bigger than the maximum critical value at a significant level of 5%, Thus the hypothesis of nothingness will be rejected and acceptance of the alternative hypothesis that shows the existence balance relationship for a long-term. See Annex (3).

The balance was then tested in the short and long term of the equation, see Annex (4) and (5) respectively. The time series was then predicted using ARDL methodology to obtain the global oil price forecast series. See table annex No. (6)

4.1. Estimate of the global price equation

4.1.1. Model

The model of the global price equation will be estimated by variables (global demand and supply, global GDP, world oil reserves and global oil consumption) in addition to oil prices are affected by other special factors such as political turmoil, economic stagnation, wars and crises, so the imaginary variable (dummy variable) will be added to show the impact of these fluctuations on the oil price while adding the variable rational expectations, which represents the expectations of economists and fuels. Energy in determining the price and then conducting the necessary tests with a view to knowing the optimal price of world oil and the factors influencing its determination in the short and long term.

$$lny_t|I_t = f(lnE(lny_t), lnx_1, lnx_2, lnx_3, lnx_4, lnx_5)$$

4.1.2. Time series stability tests

The stability of time series data was tested for the beginning of the research and we found that all chains stabilized after taking the first difference and the stability of the added variable of expert expectations $E(lny_{t+1})$ will be conducted as follows:

- **Series Chart:**

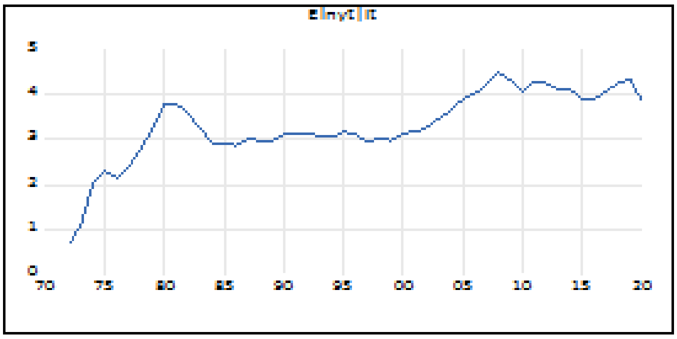


Figure 2: Predictability series chart
Source: From EViews 12. output

- **Unit root tests:**

Table 3: Unit root test

variable	$E(lny_{t+1})$
level	I (1)

Source: From EViews 12. output

Note that the chain stabilized when taking the first difference.

4.1.3. The initially estimate of the price equation

The price equation model will be initially estimated after adding the variable that represents price expectation at two delays, as it is recommended to use two delay periods as the maximum in annual data [21]. as follows:

Through table 4, we have the significant and quality of the model estimated, noting that the value of the selection factor of 0.92%) is high, the value (F) of 44.24022) and the value (Prob. F-statistic) was (0.000,0000) indicating the statistically significant of the estimated model.

4.1.4. Model quality tests

have been used in the usual micro-box method of estimation, which assumes that the errors of the model follow the natural distribution, are impartial, independent and have the least variations, and it is assumed that the estimated ARDL model meets the requirements of this method by conducting a set of diagnostic tests where these tests are divided into two types: residuals Diagnostics Tests:

A. Residuals Diagnostics Tests:

Table 5 shows the results of the series tests of serial link LM test, Normality Test natural distribution test, and Heterogeneity Test contrast Heterogeneity Test.

After determining the results of the quality of the model estimated in table 5, we note that:

Table 4: Results of the initial estimate of the model

Dependent Variable: LNYT
Method: ARDL
Sample (adjusted): 1972 2020
Included observations: 49 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LNYTF LNX1 LNX2 LNX3 LNX4 LNX5
Fixed regressors: DUMMY C
Number of models evaluated: 1458
Selected Model: ARDL (1, 0, 0, 0, 0, 1, 0)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNYT (-1)	0.276855	0.102990	2.688183	0.0105
LNYTF	1.104821	0.166320	6.642723	0.0000
LNX1	-1.448394	2.065693	-0.701166	0.4874
LNX2	-0.899299	0.339737	-2.647043	0.0117
LNX3	1.258151	0.706073	1.781900	0.0826
LNX4	2.836276	1.623346	1.747178	0.0885
LNX4(-1)	-3.245606	1.415136	-2.293494	0.0273
LNX5	2.848189	1.857835	1.533069	0.1333
DUMMY	-0.183061	0.068362	-2.677818	0.0108
C	-25.13114	11.68739	-2.150278	0.0378
R-squared	0.956090	Mean dependent var		3.316998
Adjusted R-squared	0.945957	S.D. dependent var		0.850966
S.E. of regression	0.197825	Akaike info criterion		-0.222966
Sum squared reside	1.526251	Schwarz criterion		0.163120
Log likelihood	15.46266	Hannan-Quinn critter.		-0.076485
F-statistic	94.35411	Durbin-Watson stat		1.992486
Prob(F-statistic)	0.000000			

Source: From EViews 12. output

- normality test natural distribution test has been shown that the trumpet chain follows the natural distribution, where the probability value of the Jarque Bera statistic was estimated at 0.296525 and is insignificant at the level of 5%, and this is evidence of acceptance of the hypothesis of nothingness which provides for the absence of the trumpet from the problem of natural distribution, which means that the trumpets follow the natural distribution.

- Through the Serial Link LM Test, the series of trumpets do not suffer from the problem of self-association, as the P-value statistics of the BG LM test indicate that the F value statistic is greater than 0.05 and from which we accept the imposition of nothingness, which states that there is no sequential self-association between the trumpets for the model.

- Test Heterogeneity test, through the Breusch-Pagan-Godfrey and ARCH statistics, respectively shows that the probability value of two F- statistics is greater than the critical value at a significant level of 0.05 and, therefore we accept the imposition of nothingness, the stability of

Table 5: Summary of results of the estimated model quality detection

<table>
<tr><th colspan="3">Tests</th><th>Stat-Value</th><th>Prob</th></tr>
<tr><td colspan="3">Normality test (Jarque bera)
Null hypothesis: Residual are normally Distributed</td><td>0.296525</td><td>0.862205</td></tr>
<tr><td colspan="2" rowspan="2">Breusch-Godfrey serial correlation LM test
Null hypothesis: no serial correlation at up to 2 lags</td><td>F-Statistic</td><td>0.164031</td><td>0.8493</td></tr>
<tr><td>Obs*R-Square</td><td>0.430641</td><td>0.8063</td></tr>
<tr><td rowspan="5">Heteroskedasticity Test
Null hypothesis: Heteroskedasticity</td><td rowspan="3">Breusch-Pagan-Godfrey</td><td>F-Statistic</td><td>0.376053</td><td>0.9396</td></tr>
<tr><td>Obs*R-Square</td><td>3.912743</td><td>0.9171</td></tr>
<tr><td>Scaled explained SS</td><td>2.147443</td><td>0.9889</td></tr>
<tr><td rowspan="2">ARCH</td><td>F-Statistic</td><td>0.237560</td><td>0.6283</td></tr>
<tr><td>Obs*R-Square</td><td>0.246615</td><td>0.6195</td></tr>
</table>

Source: From EViews 12. output

the contrast for all model variables.

B. Model Stability Test:

To ensure that the data used is free of any structural changes, some tests, such as the Ramsey Reset Test for the mathematical characterization of the model, the cumulative total of cumulative tubers cumulative sum of Recursive Residual (CUSUM), and the cumulative total of box testing, must be carried out Cumulative Sum of Square Recursive Residual (CUSUMSQ) where Pesaran and Pesaran (1997) conducted a test in which the structural stability of model transactions in the short and long term is tested, where The structural stability of the estimated ARDL transactions if the cumulative total of cumulative tubal testing (CUSUMSQ) is signed within critical limits at the significant level of 5%, we reject the zero hypothesis that parameters are unstable and accept the alternative hypothesis of stability during the study years.

Table 6: Ramsey reset test results

	Value	**Prob**
t-statistic	0.716684	0.4780
F-statistic	0.513636	0.4780

Source: From EViews 12. output

It is noticed from Table No. (6) that the estimated model is free of misspecification problems, where the probabilistic value of both t-statistic and F-statistic was estimated at 0.4780, which is not significant and is greater than the level of significance 5%, which in turn leads to the acceptance of the null hypothesis He rejected the alternative hypothesis.

Figure 3 shows that the model is structurally stable and its parameters are stable, with the curve representing the Cusum of Square and Cusum statistics between critical lines at a significant level of 5%.

Therefore, after successfully passing all quality tests, the model has become standard durability that enables us to rely on it in the process of estimating the relationship between its variables in the short and long term.

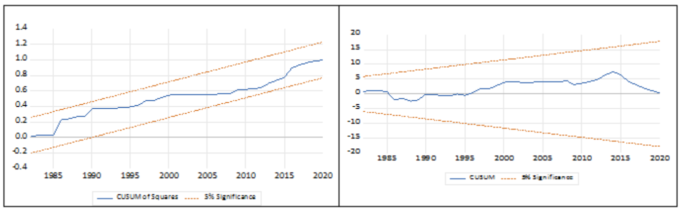


Figure 3: To test the Cumulative Sum of Recursive Residual (CUSUM) and to test Cumulative Sum of Square Recursive Residual (CUSUMSQ)

Source: From EViews 12. output

4.1.5. Bounds test

To detect a long-term relationship between variables, abound test border test is used by comparing the calculated F value of time-delayed independent variable transactions to the critical F- statistical value, depending on the limits set. Pesaran and al testing are carried out from the zero hypothesis that there is no long-term balance between variables.

Table 7: Results of the model's boundary test

Test Statistic	**Value**	
F-statistic	12.24497	
Signif	**I (0)**	**I (1)**
10%	2.17	3.22
5%	2.55	3.708
1%	3.424	4.88

Source: From EViews 12. Output

after determining the results of the model boundary test as shown in table 7, the F-statistics for models were estimated at 12.24497, which exceeds the upper limits when significant of 1% up to the value 10%, which leads to the rejection of the hypothesis of nothingness that there is no long-term relationship going from interpreted variables to the dependent variable and accepting the alternative hypothesis, that there is a long-term relationship, and this can be done by choosing the common integration of the balanced relationship in the term Long.

4.1.6. Estimate the balance between variables in the short and long term

after ensuring a long-term balance between model variables, the results of joint integration will be estimated and the short-term relationship and the form of the long-term relationship will be estimated.

4.1.6.1. The results of the estimate in the short term

note from Table 8 that the lnyt value was negative -0.723145 and significant at an estimated value of 0.000, which is less than 1%, which indicates that the long-term model corrects the errors of the short-term model in a period of more than half the year.

Table 8: Short-term estimate results

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LNYT)
Selected Model: ARDL (1, 0, 0, 0, 0, 1, 0)
Case 2: Restricted Constant and No Trend
Sample: 1970 2020
Included observations: 49

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	-25.13114	11.68739	-2.150278	0.0378
LNYT(-1)*	-0.723145	0.102990	-7.021518	0.0000
LNE(YT)**	1.104821	0.166320	6.642723	0.0000
LNX1**	-1.448394	2.065693	-0.701166	0.4874
LNX2**	-0.899299	0.339737	-2.647043	0.0117
LNX3**	1.258151	0.706073	1.781900	0.0826
LNX4(-1)	-0.409330	1.562058	-0.262046	0.7947
LNX5**	2.848189	1.857835	1.533069	0.1333
D(LNX4)	2.836276	1.623346	1.747178	0.0885
DUMMY	-0.183061	0.068362	-2.677818	0.0108

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z (-1) + D(Z).

From EViews 12. output

4.1.6.2. Short-term results analysis

Table 8 shows that most of the interpretive parameters are statistically significant at a significant level of 5% except for the global demand variable X1 and the Global Oil Reserve X3, the Global X4 supply and the global consumption of oil X5 were inconsiderable, which shows that there is a short-term relationship between the dependent variable (LNYT price) and the expert forecast variable, which is a expel live relationship, but for variables (late price, global oil demand, and shocks) it was counterproductive as:

- The LNE (YT) rational expectations variable has positively affected the LNYT short-term price variable with acceptable spirits at 0.0000, which is less than 5%, as a 1% increase in the LNE (YT) variable leads to an increase of 1.104821 in LNYT.
- The LNX1 demand variable has negatively affected the LNYT short-term price variable and has unacceptable spirits (0.4874) which are greater than 5%, as a 1% increase in the LNX1 variable leads to a decrease of 1.448394 in LNYT.
- The LNX2 GDP variable has negatively affected the LNYT short-term price variable with acceptable spirits (0.0117), which is less than 5%, as a 1% increase in the LNX2 variable leads to a decrease of 0.8992999 in the LNYT variable.
- The global oil reserves variable LNX3 has positively affected the LNYT price variable in the short term and has unacceptable morality at (0.0826), which is greater than 5%, as an increase of 1% in the variable LNX3 leads to an increase of 1.258151 in LNYT.

- The global oil reserve variable LNX3 has positively affected the LNYT price variable in the short term and has an unacceptable significance at (0.0826), which is greater than 5%, as an increase of 1% in the variable LNX3 leads to an increase of 1.258151 in LNYT.
- The global oil supply variable LNX4 has negatively affected the LNYT price variable in the short term and has unacceptable morality at (0.7947) which is greater than 5%, as an increase of 1% in the variable LNX4 leads to a decrease of 0.409330 in LNYT.
- The global oil consumption variable LNX5 has positively affected the LNYT price variable in the short term and has unacceptable significance at (0.1333) which is greater than 5%, as a 1% increase in the variable LNX5 leads to an increase of 2.848189 in LNYT.
- The dummy shocks variable has negatively affected the LNYT price variable in the short term and has acceptable significance at (0.0108), which is less than 5%, as an increase of 1% in the variable LNX10 leads to a decrease of 0.183061 in LNYT.

4.1.7. Long-term estimation results

It is evident from Table 6 that:

- The LNE (YT) rational forecast variable parameter is positive, indicating an ejection relationship between the LNYT variable and the long-term LNE (YT) variable, as a 1% increase in the LNE (YT) variable leads to an increase of 1.527801 in LNYT.
- The LNX1 variable parameter is negative and this indicates an inverse relationship between the LNYT variable and the LNX1 variable in the long term, as a 1% increase in the LNX1 variable leads to a decrease of 2.002910 in LNYT.
- The LNX2 variable parameter is negative and this is evidence of an inverse relationship between LNYT and LNX2 variable as a 1% increase in the LNX2 variable leads to a decrease of 1.243594 in LNYT.
- The LNX3 variable parameter is positive and this indicates an ejection relationship between the LNYT variable and the LNX3 variable in the long term, as a 1% increase in the LNX3 variable leads to an increase of 1.739833 in LNYT.
- The LNX4 variable parameter is long-term evidence of an inverse relationship between the LNYT variable and the LNX4 variable in the long term, as a 1% increase in the LNX4 variable leads to a decrease of 0.566042 in LNYT.
- The LNX5 variable has positively affected LNYT in the long term and has an acceptable spirit of (0.0049) which are less than 5%, as a 1% increase in the LNX5 variable leads to an increase of 3.938617 in LNYT.

4.2. Global oil price forecast: Two methods will be predicted

4.2.1. Forecasting within the sample: See table annex No. (6)

4.2.2. Forecasting outside the sample

will predict the series of variables under study based on ARIMA methodology until 2025 as follows: model examination:

The best model for all model variables has been determined by comparing each variable in several models so that the best model was reached based on the outputs of EViews 12 as follows:

Table 9: Determine the best models

variable	LNYT	LNE(YT)	LNX1	LNX2	LNX3	LNX4	LNX5
ARIMA	1,1,1	0,1,1	0,1,1	1,1,0	0,1,1	1,1,0	0,1,1
Akaike info criterion	0.706241	-0.211153	-4.972801	-3.071979	-4.129655	-3.698720	-4.340915
Schwarz criterion	0.859203	-0.094203	-4.858080	-2.957257	-4.014934	-3.585083	-4.226194
Hannan-Quinn criter.	0.764490	-0.166958	-4.929115	-3.028292	-4.085968	-3.655296	-4.297229
2021	4.101192	4.115713	11.53055	4.499066	14.3579	10.83402	10.75674
2022	4.172507	4.175425	11.54603	4.564372	14.38031	10.83576	10.76797
2023	4.243813	4.235137	11.5615	4.629678	14.40272	10.83748	10.77919
2024	4.315126	4.294849	11.57697	4.694985	14.42514	10.83918	10.79042
2025	4.386433	4.354561	11.59245	4.760291	14.44755	10.84087	10.80164

Source: From EViews 12. output

The Equation:

$$LNYT|It = -34.7526 + 1.5278 * LNYTF - 2.0029 * LNX1 - 1.2436 * LNX2 + 1.7398 * LNX3 - 0.5660 * LNX4 + 3.9386 * LNX5$$

After compensating for the variable values of table 10 in the estimated long-term equation, the oil prices predicted up to 2025 were obtained as follows:

Table 10: Determine the best models

Year	2021	2022	2023	2024	2024
$E[YT\|I_t]$	57.98216	61.64383	65.53737	69.67748	74.07982

Source: From EViews 12. Output

5. Conclusion

- The model assessed fits the hypothesis of rational expectations and the expectations of oil and energy experts for crude oil prices, which means the rationality of approving the prices of crude oil announced by experts according to the variables of the study.
- The best slowing period was among the 20 equations: ARDL (1, 0, 0, 0, 1, 0).
- Through the study, we conclude that there is a common integration relationship in the sense of a long-term balance between the world price of oil and the global determinants of oil .
- The E Rational Outlook Variable (LNYT) has positively affected the LNYT price variable in the short and long term and with acceptable spirits.
- The optimal price is positively influenced by expert expectations and GDP negatively in the long term, which means that higher oil prices make countries consider reducing their crude oil consumption as much as possible and oil prices are affected by previous oil prices, expert expectations, GDP, and short-term shocks.
- The structural stability of the parameters estimated at the model is evidence of harmony and stability between the long-term and short-term results of the estimated model.

- The real prices forecast until 2025 are close to the prices predicted under the imposition of rationality.

6. Recommendations

We recommend more comprehensive studies using existing models that include the oil market, both sides of which include oil supply and demand, to compare the results that represent the optimal price of crude oil on the world market and its suitability to the expectations of fuel and energy experts.

7. Supplements

Table Annex No. (1)

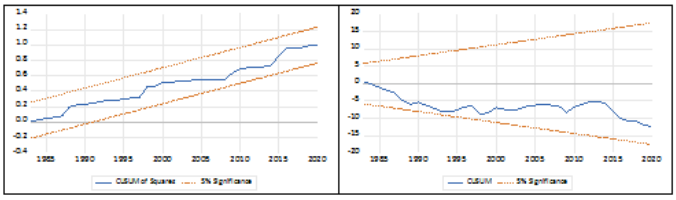
Dependent Variable: LNYT
Method: ARDL
Sample (adjusted): 1972 2020
Included observations: 49 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LNX1 LNX2 LNX3 LNX4 LNX5
Fixed regressors: C
Number of models evaluated: 486
Selected Model: ARDL (2, 1, 2, 0, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNYT (-1)	0.495490	0.145758	3.399412	0.0016
LNYT (-2)	0.229574	0.136950	1.676336	0.1019
LNX1	-9.957472	3.673022	-2.710975	
0.0100				
LNX1(-1)	8.663072	2.392555	3.620846	0.0009
LNX2	1.905748	0.928468	2.052574	0.0470
LNX2(-1)	-0.657587	1.412693	-0.465485	0.6442
LNX2(-2)	-1.447077	0.855456	-1.691585	0.0989
LNX3	-0.245520	0.778540	-0.315360	0.7542
LNX4	-0.346215	1.761579	-0.196537	0.8452
LNX5	4.412664	2.401366	1.837564	0.0740
C	-23.60786	15.41380	-1.531605	0.1339

R-squared	0.940211	Mean dependent var	3.316998
Adjusted R-squared	0.924477	S.D. dependent var	0.850966
S.E. of regression	0.233859	Akaike info criterion	0.126545
Sum squared reside	2.078213	Schwarz criterion	0.551239
Log likelihood	7.899658	Hannan-Quinn critter.	0.287673
F-statistic	59.75642	Durbin-Watson stat	1.906860
Prob(F-statistic)	0.000000		

Table Annex No. (2)

Ramsey RESET Test			
Equation: UNTITLED			
Omitted Variables: Squares of fitted values			
Specification: LNYT LNYT (-1) LNYT (-2) LNX1 LNX1(-1) LNX2 LNX2(-1) LNX2(-2) LNX3 LNX4 LNX5 C			
	Value	df	Probability
t-statistic	0.192058	37	0.8487
F-statistic	0.036886	(1, 37)	0.8487
Likelihood ratio	0.048825	1	0.8251



Annex Figure No (1)

Table Annex No. (3)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	4.784923	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
Actual Sample Size	49		Finite Sample: n=50	
		10%	2.259	3.264
		5%	2.67	3.781
		1%	3.593	4.981

Table Annex No. (4)

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LNYT)
Selected Model: ARDL (2, 1, 2, 0, 0, 0)
Case 2: Restricted Constant and No Trend
Sample: 1970 2020
Included observations: 49

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-23.60786	15.41380	-1.531605	0.1339
LNYT (-1) *	-0.274936	0.092910	-2.959174	0.0053
LNX1(-1)	-1.294400	2.608691	-0.496188	0.6226
LNX2(-1)	-0.198915	0.394547	-0.504162	0.6171
LNX3**	-0.245520	0.778540	-0.315360	0.7542
LNX4**	-0.346215	1.761579	-0.196537	0.8452
LNX5**	4.412664	2.401366	1.837564	0.0740
D (LNYT (-1))	-0.229574	0.136950	-1.676336	0.1019
D(LNX1)	-9.957472	3.673022	-2.710975	0.0100
D(LNX2)	1.905748	0.928468	2.052574	0.0470
D(LNX2(-1))	1.447077	0.855456	1.691585	0.0989

Table Annex No. (5)

Levels Equation
Case 2: Restricted Constant and No Trend

LNX1	-4.708002	10.33031	-0.455746	0.6512
LNX2	-0.723496	1.581520	-0.457469	0.6499
LNX3	-0.893007	2.674296	-0.333922	0.7403
LNX4	-1.259254	6.293388	-0.200092	0.8425
LNX5	16.04977	11.86797	1.352361	0.1843
C	-85.86665	74.18952	-1.157396	0.2543

EC = LNYT - (-4.7080*LNX1 -0.7235*LNX2 -0.8930*LNX3 -1.2593*LNX4 +16.0498*LNX5 - 85.8666)

Data:

Table Annex No. (6)

year	LNYT	LNEYT	ELNEYT|It	year	LNYT	LNEYT	ELNEYT|It	year	LNYT	LNEYT	ELNEYT|It
1970	0.19			1987	2.90	3.01	2.85	2004	3.63	3.64	3.65
1971	0.52			1988	2.69	2.96	2.98	2005	3.98	3.89	3.99
1972	0.60	0.69	0.64	1989	2.88	2.96	3.10	2006	4.16	4.01	4.12
1973	1.03	1.13	1.00	1990	3.13	3.10	3.03	2007	4.26	4.22	4.27
1974	2.40	2.06	2.02	1991	2.96	3.12	3.07	2008	4.57	4.47	4.43
1975	2.34	2.29	2.25	1992	2.95	3.13	3.14	2009	4.12	4.30	4.37
1976	2.45	2.16	2.35	1993	2.82	3.06	3.01	2010	4.37	4.05	4.33
1977	2.53	2.41	2.63	1994	2.77	3.04	2.80	2011	4.64	4.29	4.49
1978	2.56	2.79	2.93	1995	2.84	3.16	2.98	2012	4.65	4.23	4.56
1979	3.43	3.27	3.34	1996	3.02	3.10	3.01	2013	4.65	4.10	4.31
1980	3.61	3.78	3.62	1997	2.95	2.93	2.88	2014	4.57	4.10	4.05
1981	3.57	3.78	3.78	1998	2.57	3.02	2.79	2015	3.93	3.87	3.85
1982	3.49	3.54	3.48	1999	2.89	2.98	2.71	2016	3.76	3.89	3.94
1983	3.39	3.22	3.30	2000	3.34	3.14	3.09	2017	3.97	4.06	4.08
1984	3.35	2.91	3.08	2001	3.19	3.16	3.14	2018	4.22	4.25	4.36
1985	3.30	2.92	2.97	2002	3.22	3.27	3.25	2019	4.12	4.33	4.29
1986	2.66	2.87	2.93	2003	3.36	3.47	3.47	2020	3.72	3.85	3.80

References

[1] M. Adgman, *Macroeconomic theory and politics*, Mars House. pp. 338.
[2] H. Afia, *A record study of the impact of oil price fluctuations on unemployment rates in Algeria from (1990-2016)*, 2018.
[3] A.A. Al-Atabi, *Analysis and measurement of the interactive impact of fiscal and monetary policies on economic growth in Iraq for the period (1980-2015)*, Wasit. 2018.
[4] A.F. Al-Jawarin, *The theory of rational expectations-theoretical framework*, Civilized Dialogue. 22(6) 2016.
[5] M.A. Hussain, *Rational expectations and some of its macroeconomic applications*, Iraqi J. Admin. Sci. 8(32) (2012) 83-99.
[6] D. A. Al-Anbaki, *Rational Expectations and Crises of Economic Thought between Theory and Mechanisms of Application*. 2003.
[7] W. Belmed, *Study of the relationship between education and unemployment in Algeria during the period (1980-2016) using ardl methodology*, Algerian Journal of Economic Development. 2020.
[8] H. Ferguson, *Existential Social Theory*, International Encyclopedia of the Social & Behavioral Sciences. 2002.
[9] J.S.H. Hassoun, *The Role of Rational Expectations in Macroeconomic Analysis*. 2008.
[10] A.A.A. Ibrahim, *Pricing mechanisms for crude oil exported in Iraq (a case study of SOMO)*, University of Basra College of Administration and Economics. Basra. 2018.
[11] B. Khaledia, *The Use of Oil Revenues: A Comparative Study between Algeria's experience and Norway's*, 2016.
[12] F.S.M. Kosha, *The impact of fluctuations in crude oil prices on iraq's economic development (analytical study) for the period from 2004-2016*, Basra. 2019.
[13] S.S.L, *Open -Economy Inflation target*, J. Int. Econ. 2000.
[14] M. Manaa, A.J. Obaid and M.H. Dosh, *Unsupervised approach for email spam filtering using data mining*, EAI Endorsed Transactions on Energy Web, European Union Digital Library. 21(36) (2020).
[15] E.S. Miri, *Factors that affected the volatility of world oil prices and their impact on the GCC economies during the period "2000-2014"*, 2016.
[16] J. Mohamed, *ARDL's self-regression methodology as an economic measurement application (eviews V.10 application study)*, Algeria. 2019.
[17] D.S. Mohammad, *Standard economics methods lectures and applications*, Algeria: Al-Hamid. 1 (2011).
[18] M. Murad, *The story of arab oil in the gulf and international ambition*, Political Thought Magazine. (2002).

[19] M.E. Muhammad afzal, *Openness, Inflation and growth relationships in pakistan: An Application of ARDL Bounds Testing Approach*, Department of Economics, University of the Punjab. 51(1) (2013) 13-53.

[20] P.K. Narayan, *The saving and investment nexus for China: evidence from cointegration tests*, Appl. Econom. 37(17) 2007.

[21] P.K. Narayan, *Reformulating critical values for the bounds F-statistics approach to cointegration: an application to the tourism demand model for Fiji**, Monash University, 2004.

[22] S.A. Osama, *Some economic variables affected inflation in Algeria by a standard study using the ardl self-regression model for the period 1980-2015*, Algeria 2016.

[23] M. H. Pesaran, *Time Series and Panel Data Econometrics*, O. U. Press, Ed. 2015.

[24] L.B. Szafarz, *The Econometric Analysis of Non-Uniqueness In Rational Expectations Models*, North-Holland, New York, 1991.

[25] Z. Wahiba, *The Impact of Oil Revenue Fluctuations on Macroeconomics (Economic Growth) - Case Study of Algeria*, Algeria 2018.