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Measuring and analyzing the impact of oil shocks on the gross domestic product in Iraq For the period(1970-2020)

Nabil Mahdi Al-Janabi
Ghada Saleh Abboud
Al-Qadisiyah University - College of Administration and Economics

rresponding Author: Ghada Saleh Abboud

Abstract : The research aims to measure and analyze the impact of oil shocks on the GDP of the second largest oil economy in OPEC, in the short and long terms. The period (1970-2020)covered all the positive and negative oil shocks to which the global economy was exposed. And by describing a standard model of the oil shock and measuring its impact on IRAQI GDP, using the methodology of boundary testing and the ARDEL model, after testing the time-series free from the unit root, as well as analyzing the oil shocks through the Impulse Responsible Function. The results contradict the hypothesis of the existence of a positive relationship to oil shocks on the gross domestic product and the explanation for the fact that the impact of negative shocks is greater than positive shocks, as well as wars, international sanctions, and internal shocks that the economy was exposed to during the research period.
Key words: oil shocks, gross domestic product, limits test, impulse response function

Introduction: Fluctuations in oil prices and oil shocks significantly affect business and macroeconomic performance indicators in both oil-exporting and oil-importing countries as a result of the globalization of the world economy and the increasing integration of global financial markets. The occurrence of positive or negative oil shocks has implications for macroeconomic policies and on the economic activity of oil producing and exporting countries. The research analyzes the impact of oil shocks and fluctuations in international oil prices on the economic performance of one of the largest producers and exporters of oil in OPEC: Iraq, which depends largely on oil revenues. It should be noted that the mechanisms of shock transmission in oil-exporting countries differ from those of importing countries. and come

The importance of the research:

It presents an important and sensitive topic, which is the analysis of oil shocks on the size of the Iraqi GDP, that is, their impact on the level of economic activity in Iraq and the impact of the degree of economic diversification for it and its importance in absorbing the effects of the shock, whether positive or negative

Research problem:

The research problem stems from the following questions

1- The fragility of the economy and its dependence on oil rents makes it vulnerable to shocks and exposure to their negative effects on the level of economic activity?

2- Was Iraq able to adapt its economy to mitigate the severity and strength of oil shocks?

Research hypothesis:

The research stems from the hypothesis that "since the Iraqi economy depends heavily on the rentier source, what is the impact of oil shocks on its gross domestic product for the period (1970-2020) and the period includes all the oil shocks that the global economy was exposed to from the seventies of the last century For another double shock of 2020.

First: Theoretical framework and applied studies.

1- Conceptual and epistemological framework for shock:

Conceptual and epistemological framework of shock: Shock can be defined as a sudden and uncontrollable event that has a major impact on the economy, and it is an expression of unwanted disturbances in the economy that affect the behavior of projects and returns [1,] as in the oil price boom, the collapse of financial markets, and shocks that hit the head Money is internationally reflected in disruptions in short-term financing, and the end result is affected by the gross domestic product. Both Bastianin and Manera defined the oil shock as a decrease in crude oil production due to political turmoil in the Middle East. While Nyangarika mentioned that it is a sharp change in oil prices, which greatly affects the level of production and standard of living of the population, Nordhaus sees the oil shock as an internal shift in the supply curve of crude oil resulting from political events outside the oil market and the overall economy. The first challenge is to understand why oil price shocks reduce real production in

the first place. Oil shocks can be classified according to the type of impact into two shocks: the positive oil shock, which is a sudden increase in oil export prices, and the total impact of that shock varies according to the relative weight of oil exports in the national income, and this type of shock has a role through the entry of shocks. The economy is in the expansion phase (recovery) of the economic cycle. The positive effect on government consumption increases public spending, especially if the state relies on the export sector as a main source of financing its public spending, and this is naturally reflected in some macroeconomic variables such as domestic production and aggregate demand. The shock experienced by many developing oil-exporting countries, which reflected positively on their economies in the seventies, when oil prices witnessed a rise in the balance of payments of those countries and an increase in their revenues. Of exported oil commodities, and that this has an impact on the volume of export revenues will subsequently affect the reduction of investment opportunities on the state's agreement plans, and the general agreement will decrease, accompanied by a decrease in overall demand, Production decreases, along with usage levels.

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3 Bastianin , A & Manera, M. ,(2015) How does stock market volatility react to oil shocks ?

1 Nordhaus, W. D. (2007) , Who's afraid of a big bad oil shock? Brookings papers on Economic Activity, p 219-238

2- The relationship between oil shocks and GDP

The most common theoretical explanation for this relationship is the so-called Dutch[6] disease theory, which aims to explain the effects of high oil prices on GDP growth. In oil-exporting countries, some economists argue that the asymmetric effects of oil price shocks on economic growth in oil-exporting countries result from changing revenues from the oil industry. The decrease in revenues leads to a deficit in the budget due to changes in oil prices. Therefore the rise in the price of oil leads to GDP growth, and lower oil prices lead to a decrease in GDP and fiscal deficit, and there are a large number of studies that dealt with the excessive effects of fluctuations in global oil prices. These studies usually focus on examining the impact of the oil shock on oil-exporting and importing countries. At the same time, some researchers argue that the oil price shock has a fundamental effect on the economy. Some say that this effect of oil prices depends on various factors, including economic development, economic weakness, Economic openness, and structural characteristics (structural economic characteristics). There is no shared vision of the effect of oil prices on macroeconomic variables. Yet, most economists agree that oil prices affect the economy through both the supply and demand sides. As for opinions about the impact of global oil price shocks on the economic growth of oil-exporting countries, the mechanism by which oil price movements affect production in oil producing countries [7] has sparked widespread controversy over the years. Based on the rate of decline or rise plus periods during which oil prices change (1984), Vahid and Stauffer (1997), Majid (2006), and Amuzegar (2001, Jabber) argued that the effect of positive oil price shocks on the production performance of oil producing economies usually causes a currency appreciation motivated by foreign

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[1] Mohsen Fardmanesh, (1991) , Dutch disease economics and oil syndrome: An empirical study, journal of World Development , Volume 19, Issue 6, June, P: 711-717

[1] Eltony, M. N. and M. Al-Awadi (2001): Oil price fluctuations and their impact on the macroeconomic variables of Kuwait: a case study using a VAR model, [1] Olomola, P. A. and A. V. Adejumo (2006): Oil Price Shock and Macroeconomic Activities in Nigeria, International Research Journal of Finance and Economics 3, p: 28-34.

International Journal of Energy Research 25(11), p: 939-959.

Currency accumulation. Exchange profits and, consequently, an expansion of production. The three studies also showed that the opposite tends to be when there is a negative oil price shock. Some studies argue that the situation described above may not be available to an oil-producing country due to some factors that could prevent the chain reaction from occurring (see Kilian 2012 & Wall Owyang Engelmann 2008). Some of these factors are the availability of local refining capacity, the nature of the change in oil prices and the level of economic diversification, among other things (see Hamilton, 1983, 1996, 2003, 2008; Kilian 2009 Kim & Roubini, 2000), these studies confirm that the oil-producing country has a narrow economic base and lack of domestic refining capacity. It may not enjoy an increase in production after the favorable oil price shock. The exchange rate may not rise due to the country's massive import of refined petroleum products and other commodities. Hamilton (1983, 1996,2003, 2008), Killian (2008), and Kim and Robbeni (2000) further indicate that production may not necessarily decline in the event of an adverse oil price shock if the oil producing country is widely diversified and has sufficient capacity domestic refining. This will alleviate the pressure on imports, which may prevent the currency from depreciating. It has also been suggested that the reference to the

adverse response to a positive shock, such as a negative shock, may not be correct in most cases due to uncertainty at the macroeconomic level and external cyclical changes that can cause distortions in the reactions of macroeconomic variables to external shocks. According to this school of thought, sharp drops in oil prices affect oil-producing countries more than unexpected increases in oil prices; the former causes a devaluation of the currency and a subsequent decline in production. It is clear from the previous discussion that there is our argument back and forth indicating a lack of consensus about the nature of the effects of oil price shocks on production performance in oil-producing countries[9].

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8 Olomola, P. A. and A. V. Adejumo (2006): Oil Price Shock and Macroeconomic Activities in Nigeria, International Research Journal of Finance and Economics 3, p: 28-34.

9 Hamilton, J. D.(1966) (2002) , opcit

[1] Cunado, J., (2003). 'Do oil price shocks matter? ….Op cit , pp. 137–154.

Second: Estimation methodology: To show the impact of oil shocks on the Iraqi GDP, we use the ARDEL model and through the following equation:

$$\Delta gdpi_t = a_0 + \sum_{i=0}^{r} a_{1i}\,\Delta gdpi_{t-1} + \sum_{i=0}^{r} a_{2i}\,\Delta oshock_{t-i} + \sum_{i=0}^{r} a_{3i}\,\Delta infi_{t-i} + \sum_{i=0}^{r} a_{4i}\,\Delta tti_{t-i} + \beta_1 gdpi_{t-1} + \beta_2 oshock_{t-1} + \beta_3 infi_{t-1} + \beta_4 tti_{t-1} + \varepsilon t \ldots\ldots\ldots\ldots (1$$

Gdpi = Saudi GDP. Oshok - Oil Shock. Icons, Inff, tts = total trade and inflation rate in Saudi Arabia, which are two estimative variables that support the model[10]

Δ=the first difference for the values of the variable= .a_0 constant limit= r number of the ideal time slowdown period .3،2،1 =short-term transactions of the dynamic relationship .β3، β2، β1 = = long-term transactions through which to know the possibility of co-integration. t time, ct = random error limit. According to the above equation, if the possibility of a common complementarity between the variables under study according to the boundary test, the short-term relationship will be estimated using the error correction model as follows :

$$\Delta gdpi_t = a_0 + \sum_{i=0}^{r} a_{1i}\,\Delta gdpi_{t-1} + \sum_{i=0}^{r} a_{2i}\,\Delta oilshock_{t-i} + \sum_{i=0}^{r} a_{3i}\,\Delta infi_{t-i} + \sum_{i=0}^{r} a_{4i}\,\Delta tti_{t-i} + yECT_{t-1} + \varepsilon t \ldots..(2)$$

The description of changes in oil prices based on the Hamilton study 1983 as follows:

- (Positive shock) O_t> 0 O_t if other than 0
- (Negative shock) O_t<0 O_t if other than 0

The oil shock was estimated by: the random variable (residual) (resident) through the self-correlation function. Global oil prices: After assessing and extracting the residual values, a regression made between the residuals with their slowing values, and the resulting residues represents the oil shock. Annual data is prepared (Table 1), collected from international sources (the World Bank, International Trade Statistics, and the International Monetary Fund). Figure (1) shows the time trend for the model variables for the annual data period (20302020). It is noted that the time course of some variables is not stable in its general direction.

1- Unit root test: A stability selection is made for the time series of the variables GDPs, shock, infs, tits concerning the existence of the unit root, by applying the tests of Dick Fuller - Advanced - Extended - (ADF) »and Philips - Perron (P.P.), at the level (level) And at the first difference (Differences1) and under hypotheses without a definite, interrupting, interrupting and temporal direction.

The results were the stability of the model variables as shown in table (2) at the first level.

2-Test of joint integration using the boundary approach: When the variables of the model: gdps tts are integrated of the first degree and, shock, infs are integrated from the falconry degree, i.e. not combined by the level transfer, then it cannot be applied Integration test. The subscriber is using the Johanssen method, and therefore we use the (ARDL) model. It can be seen from table () that the value of the calculated F statistic was more significant than the value of the upper bound of the limits (Bounds test) as defined by Pesaran in the case of a fixed term for the function. Therefore we reject the null hypothesis and accept the alternative assumption that the variables are complementary together and achieve a long-term equilibrium relationship. The level of significance is 1%, 3.5%, 5%, and 10%. And since there is a co-complementarity relationship between the variables, the long-term relationship is estimated, so the long-term coefficients represent the elasticities. In light of this, the ideal model that gives the lowest value of the AIC standard is the ARDL (2,6,4,5) model for estimating the equilibrium relationship in the

long term, as shown in Figure 2. Several tests are conducted on the model used to measure Long-term elasticity's:

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1 Cunado, J., (2003). 'Do oil price shocks matter? ….Op cit , pp. 137–154.

A-Test of heterogeneity of variance: Table (4) indicates that the model is free from the problem of heterogeneity of variance and the calculated F value is not significant with a probability greater than 5%, and that the Chi-square parameter is not essential with a possibility of (0.2) and (0.3) .

B- The LM Self-correlation test: Table (5) indicates that the model is devoid of serial correlation if the calculated F value is not significant with a probability greater than 5% of (0.2) 0

C- Test the distribution of random errors Figure of the statistic shows that the null hypothesis is not rejected that the random error distribution does not take the normal distribution.

3- Estimating the long and short-term parameters and the error correction parameter, the long-term relationship can be extracted from the error correction model. The relationship of variables in the level reflects this relationship and as shown in Table 6. The equation below the table is the equation of the plan correction parameter indicating the long-term relationship between the variables of the model and as follows

Gdpi=58.311-2.924 Oshock-0.199Infi+1.581TTi…….(3)

Equation 6 indicates the existence of a long-term relationship between the variables of the model. Where the Iraqi GDP is related to a negative relationship with the oil shock, increasing it by one unit leads to a reduction of the GDP by 0.0178 units, and this is consistent with the economic logic that the total impact, knowing that its great impact reflects the fragility of the Iraqi economy and its renter dependence. While an increase in the rate of inflation by 1% leads to a decrease in output by 0.836% and an increase in total foreign trade by one unit, which leads to an increase in output by 1,033 units, and this is consistent with economic logic. The final step in the ARDL model is to estimate the ECM model, which represents the relationship between the three variables in the short term, using the ARDL (3, 0, 2, 5) model.

It is evident from the table the speed of modifying the model to the equilibrium state or the parameter of significant error correction with zero probability, and it takes a negative signal as expected amounted to (-0.267226), that is, during a long season. The oil shock is linked to a short-term positive relationship with the gross domestic product, meaning that an increase in the oil shock by a dollar leads to a rise in output by (0.012) billion dollars. The existence of a short-term inverse relationship between GDP and inflation rate and positive with total foreign trade in the Saudi economy for the period (190-2020)

4- Structural stability test for the estimated ARDL model: This test reflects the short, and long term coefficients that the data used are free from the presence of any structural changes in them over time, and two tests are used for this purpose: the CUSUM test and the cumulative sum test of the consecutive residual squares CUSUMSQ and it becomes clear From Figure 4, the estimated coefficients of the ARDL model using the variables of the Saudi economy are stable and in harmony with the results of error correction in the short and long terms.

5- Impulse Response Function:

The figure below shows the pulse response function to shocks, which is derived from the vector error correction model (VECM), that the response of the Saudi GDP to an unexpected oil shock is initially significant from the second period and its negative impact continues for the rest of the periods. It turns out that the oil shocks have an essential role in explaining the two forecasts of the Iraqi GDP. As for the output response, an unexpected shock in the rate of inflation by one standard deviation is negative and insignificant, approaching zero at the beginning of the first period and the middle of the second period. Still, it gradually increases with a negative impact and slowly reaches its maximum in the sixth period. Then the decline returns, achieving a negative effect over the length of the period searched. The resulting response to unexpected shocks in the first period then fades in the second and third periods and becomes nonexistent and equal to zero. Then the improvement begins, achieving a positive effect for the rest of the period.

Conclusion:

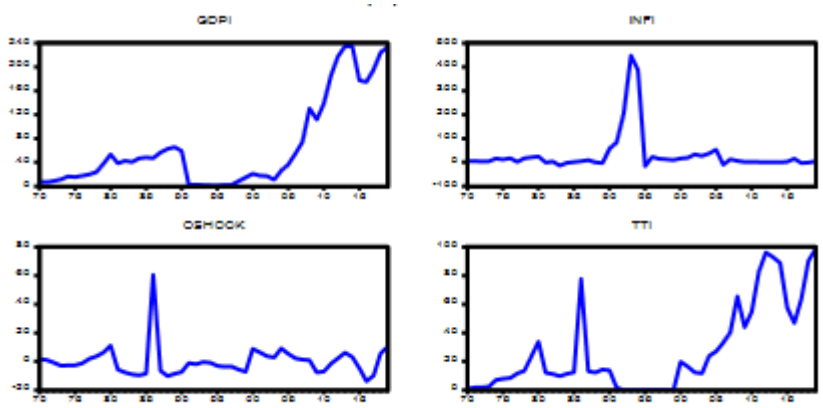
This research paper reached several conclusions based on the analysis of data and expected results. The study found that oil shocks harm the GDP in Iraq in the long term and a positive relationship between total trade and an inverse relationship with the rate of inflation through the results of the border test. In the sense that these two variables remain close to most and do not diverge, and the error correction parameter was negative and significant at the level of 5%.This reflects the time required for the imbalance in this relationship to return to the state of equilibrium. The negative impact of the oil shock on the output in the short term from the results of the wrong vector analysis. However, the effect of the oil shock, in general, is significant in the short and long terms. This gives an important conclusion that the oil shocks for the period 1990-2020 were negative in general, causing not much

benefit. Of the positive shocks due to wars and economic sanctions, and internal shocks, this result also reflects the fragility of the Iraqi economy and its large quarters for the oil commodity.

جدول (1)

TTI	SHOCK	OILP	INFI	GDPI	
1.04	1.6	1.8	4.5	7.07	1970
1.84	1.11	6.9	5.1	6.73	1971
1.88	-0.82	11.7	3.7	8.81	1972
2.37	-2.93	18.2	4.41	11.36	1973
7.03	-2.66	28.6	16.1	16.4	1974
7.88	-2.6	32.5	12.1	15.41	1975
8.43	-1.21	27.3	17.2	17.43	1976
11.6	1.95	24.2	1.9	19.84	1977
13.46	3.62	20.8	17.1	23.76	1978
23.61	6.36	31.7	20.9	37.82	1979
33.9	11.2	33.8	24.8	53.41	1980
12.14	-5.68	32.6	-0.7	38.42	1981
11.22	-7.66	31.8	3.4	42.6	1982
9.79	-9.02	33.5	-13.1	40.6	1983
11.41	-9.6	34.6	-1.5	46.8	1984
12.45	-8.48	32.7	1.5	48.28	1985
77.76	60.58	20.5	4.6	47.13	1986
13.14	-6.48	18.7	9.3	56.61	1987
12.3	-10.2	22.2	0	62.5	1988
14.41	-8.6	20.4	-3.1	65.64	1989
13.84	-7.34	22.5	57.8	59.2	1990
1.76	-1.11	21.8	83.62	2.05	1991
0	-1.93	20.5	207.69	2.73	1992
0	-0.37	21.6	448.5	1.68	1993
0	-0.82	22.2	387	1.35	1994
0.08	-2.98	21.2	-16.12	1.15	1995
0.05	-3.61	23.3	23.06	2.03	1996
0.06	-3.44	22.3	14.77	2.22	1997
0.09	-5.65	23.3	12.58	8.42	1998
0.08	-7.15	21.5	9.98	14.72	1999
19.69	8.89	27.6	16.37	20.86	2000
16.45	6.4	28.5	19.32	17.68	2001
12.39	3.78	24.3	33.62	17.07	2002
11.7	2.82	32.2	26.96	10.84	2003
23.87	9.16	36.1	36.96	26.19	2004
27.13	5.32	50.6	53.23	36.341	2005
33.13	2.26	61	-10.07	54.771	2006
40.4	1.34	69.1	12.66	74.17	2007
65.52	0.95	97.2	6.09	130.5	2008
43.99	-7.6	71.6	1.88	111.66	2009
54.591	-7.02	77.4	2.24	138.46	2010
82.48	-1.64	105.4	1.39	185.47	2011
96.17	2.32	103.8	0.51	217.81	2012
93.03	6.14	59.5	0.18	234.65	2013
88.95	3.16	55.5	0.37	234.65	2014
57.56	-4.67	35.3	2.5	177.5	2015
46.83	-13.72	32.5	15.2	174.9	2016
63.61	-9.96	55.8	-2.5	195.47	2017
90.41	5.6	63.8	-0.6	224.23	2018
98.81	10.44	65.6	4.41	234.09	2019
89.65	6.67	62.4	-5.88	212.32	2020

شكل(1)



جدول(2)

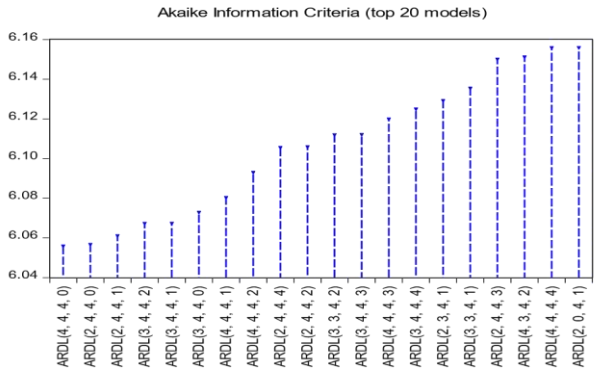
Variable	Level		1 st Difference	Critical Value			
	ADF test	Prob.	ADF test	Prob.	1%	5%	10%
gdpi	0.4622	0.983	-5.3777*	0.000	-3.5744	-2.9237	-2.5999
Oshock	-6.3962*	0.000			-3.5744	-2.9237	-2.5999
infi	-2.8580	0.05081	-4.6690*	0.000	-3.5744	-2.9237	-2.5999
tti	-1.3998	0.5749	-8.5628*	0.000	-3.5744	-2.9237	-2.5999

Variable	Level		1 st Difference	Critical Value			
	P-P test	Prob.	P-P test	Prob.	1%	5%	10%
gdpi	0.2454	0.2798	-5.3493*	0.000	-3.5332	-2.9092	-2.5906
Oshock	-9.69921*	0.000			-3.5401	-2.9092	-2.5922
infi	-3.1318**	0.0300			-3.5332	-2.9062	-2.5906
tti	-0.8681	0.7900	-9.8793*	0.000	-3.5332	-2.9062	-2.5906

جدول(3)

Null Hypothesis: No levels relationship F-Bounds Test				
I(1)	I(0)	Signif.	Value	Test Statistic
Asymptotic: n=1000				
3.2	2.37	10%	10.298	F-statistic
3.67	2.79	5%	3	k
4.08	3.15	2.5%		
4.66	3.65	1%		

شكل2



جدول 4

Heteroskedasticity Test: Breusch-Pagan-Godfrey		
0.9948	*Prob. F(20,23)*	*0.310264F-statistic*
0.9785	*Prob. Chi-Square(20)*	*9.348741Obs*R-squared*
1.0000	*Prob. Chi-Square(20)*	*3.419070Scaled explained SS*

جدول5

Breusch-Godfrey Serial Correlation LM Test:		
0.9202	*Prob. F(2,21)*	*0.083521 F-statistic*
0.8406	*Prob. Chi-Square(2)*	*0.347232 Obs*R-squared*

شكل(3)

6 جدول

Levels Equation *Case 2: Restricted Constant and No Trend*				
Prob.	*t-Statistic*	*Std. Error*	*Coefficient*	*Variable*
0.0017	*3.391306*	*0.862391*	*2.924632*	*OSHOCK*
0.0550	*-1.983678*	*0.100407*	*-0.199175*	*INFI*
0.0007	*3.710588*	*0.426092*	*1.581050*	*TTI*
0.0072	*-2.848128*	*20.47346*	*-58.31104*	*C*

*EC = GDPI - (2.9246 *OSHOCK -0.1992*INFI + 1.5811*TTI -58.3110)*

جدول 7

ARDL Error Correction Regression
Dependent Variable: D(GDPI)
Selected Model: ARDL(4, 4, 4, 0)
Case 2: Restricted Constant and No Trend
Date: 05/13/21 Time: 03:17
Sample: 1970 2019
Included observations: 46

ECM Regression
Case 2: Restricted Constant and No Trend

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.5641	-0.582144	0.116451	-0.067792	D(GDPI(-1))
0.0449	-2.077677	0.126258	-0.262324	D(GDPI(-2))
0.0015	-3.432549	0.110654	-0.379825	D(GDPI(-3))
0.0002	4.149360	0.161560	6.670371	D(Oshock)
0.0041	3.061840	0.213398	0.653391	D(Oshock(-1))
0.0000	-6.851828	0.039001	-0.267226	CointEq(-1)*

4.841957	Mean dependent var	0.714613	R-squared
19.30596	S.D. dependent var	0.678939	Adjusted R-squared
7.743688	Akaike info criterion	10.93919	S.E. of regression
7.982206	Schwarz criterion	4786.633	Sum squared resid
7.833038	Hannan-Quinn criter.	-172.1048	Log likelihood
		2.271994	Durbin-Watson stat

شكل4

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