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Measuring and Analysing the Impact of Macroeconomic Shocks in the Iraq Agricultural Sector for the Period 2004-2021.

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ABSTRACT

The study aims to measure the impact of macro shocks (internal & external) on the Iraqi economy in general and on the agricultural sector in particular, by measuring the impact of some macro variables on the gross domestic product and then the agricultural output through the use of two-stage least squares, as the results of estimating the relationship showed In the long term, all economic variables addressed in this research have significant effects on the gross domestic product through joint integration. The most influential of these variables is government spending, , then the exchange rate taxes, and finally the inflation rate, and when the economic variables deviate in the long term Short from their long-run equilibrium values by one unit for each, 67% of this deviation is corrected per year, meaning that the GDP will take approximately a year and a half to return to its equilibrium value, as the response impulse function analysis showed that when Shocks in some economic variables, their impact appears significantly in the long term, and the study recommends paying attention to the international economic transformations affecting the agricultural sector, through adopting appropriate agricultural policies, and employing the achievements of science and technology in order to use modern agricultural techniques locally, in addition to transferring and settling them, as well as reducing Inflation rates are at low and acceptable levels, The researcher also recommends intensifying studies and scientific research on the agricultural sector to delve deeper into the problems that this sector suffers from and find appropriate solutions to them.

***Keywords*:** Macro policies, Agricultural Output, Internal Shocks, External Shocks, Money Supply.

INTRODUCTION

Both developed and developing countries of the world are often exposed to internal and external shocks. These shocks may have positive or negative effects, or they may be temporary or permanent. Economic policy responds in a manner that is contrary to the trend of the economic cycle in developed countries, while developing countries, in particular, the problem of the study centers on the impact of shocks, which will be reflected in the irregularity of both financial and monetary policies in those countries, which often leads to an increase in the degree of frequency of shocks resulting from fluctuations in those countries. policies and thus lead to their instability, as well as the instability of economic activity. The hypothesis is that the shocks occurring in some macroeconomic variables work to transfer the impact of the gross domestic product on the output of the agricultural sector. In its methodology, the study relied on two methods. The first relied on giving some Previous studies study the basic indicators of economic and internal shocks. In contrast, the second is quantitative, as it relied on quantitative statistical analysis and using statistical programs to measure the impact of overall shocks, whether internal, represented by financial and monetary policies, and external, represented by oil prices.

Economic shocks and their types:

Many countries face, from time to time, several different economic imbalances, such as fluctuations in economic growth rates, some fluctuations in demand and aggregate supply, and internal and external imbalances, to form these economic shocks that negatively or positively affect the overall economy in Iraq, especially after 2003 and the great openness to the world. Economic shocks are known as Sudden changes that occur in an economy and economic shocks can be summarized as follows:

1- Internal shocks:

These are the shocks that the national economy is exposed to due to factors from within the economic system and are associated with errors in internal economic policies, whether financial or monetary alike, as the irregularity of these policies often results in macroeconomic instability [1]. One of the most important sources of internal shocks is the fluctuation in the gross domestic product (the real shock), which occurs as a result of the lack of proper employment of resources, a decline in exports, and a decline in agricultural production, which negatively affects the domestic product, as well as unexpected changes in fiscal policy represented by taxes, government spending, and cash (a shock Cash) represented by sudden changes in the exchange rate, interest rate, or changes in the money supply.

2- External shocks:

These are sudden “positive or negative” external events that the economy is exposed to without those in charge of it having the effective ability to predict, such as changes in oil prices and sharp fluctuations in the terms of trade resulting

from the decline in global economic growth rates due to the economic crises that are ravaging the global economy, Such as a decline in global demand, a change in the value of foreign aid, and a change in the level of foreign investment

3-Aggregate demand and supply shocks:

The exposure of the national economy to one of the global economic shocks, whether external or internal shocks, would leave wide-spectrum effects, so to speak, on aggregate demand or aggregate supply, causing what is known as a demand shock or supply shock [2]. The following are some previous studies that were covered in the study, where [3] published a study on monetary economic shocks in the Iraqi economy for the period from 1980 to 2005. The study showed that Iraq was exposed to multiple monetary shocks and that the country had gone through difficult and unstable conditions, which caused... Many shocks, including the dollarization process and changes in exchange rates. The researcher recommended to the government to stabilize exchange rates through the work of the central bank, which is primarily responsible for it, in order to combat the inflation process and other harmful policies. [4] present a study on the impact of shocks on the Iraqi macroeconomy. The study concluded that the Iraqi economy was exposed to an external shock in 1990 through oil prices after it stopped exporting due to the war on Iraq in that period, as well as the occurrence of episodes of major inflation. In the 1990s, the economic policies followed in that period were on the demand side. Accordingly, the study recommended increasing the contribution of non-agricultural sectors, diversifying sources of income such as the agricultural sector, and not relying on oil imports to meet needs. [5] also presents a study entitled Analyzing and measuring the impact of economic shocks on economic growth. The study aimed to measure the impact of the variables of trade openness, the amount of exchange therein, index prices, inflation, and foreign debt on Iraq's economic growth for the period 2004 - 2018, The researchers recommended the need to spend some oil revenues on creating infrastructure, especially renewable energies. [6] also presented a study on shocks and their impact on the Iraqi labor market for the period between 2004-2017, as the study aimed to know the impact of these imbalances and control them. This is done through knowledge of financial policies and trends, as well as knowledge of changes in the effects of oil prices. Researchers recommended following an integrated system of economic policies and reducing dependence on oil imports.

MATERIALS AND METHODS

Model description is one of the most important and difficult steps to estimate any economic model, especially in an important topic such as economic shocks. Below is a detailed description of the economic model used.

The first model: GDP

This model shows the impact of the GDP on some macroeconomic variables, which include fiscal policy variables (government spending, taxes) and monetary policy variables (money supply, exchange rate, inflation rate) in addition to the oil price, as follows:

$$\mathbf{LnGDP_t=\beta_0+\beta_1 LnOPR_t+\beta_2 LnGSP_t+\beta_3 LnTAX_t+\beta_4 LnMSU_t+\beta_5 LnINF_t+U_t} \quad \ldots\ldots(1)$$

$\boldsymbol{Where\ it\ represents\ }_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ The elasticities of the independent variables are sequential.

The logarithmic function was used by doing the natural logarithmic transformation (Ln) of the dependent variable and the independent variables for several reasons, including that it is the best function that reflects the effect of economic variables affecting the GDP compared to other types of functions, and also to ensure that the distribution of the GDP data is approximated to the natural distribution. To avoid the problem of heterogeneity of variance in errors or residuals of the estimated model, as well as the possibility of achieving stillness or stability in the time series to ensure the conditions for using ARDL models are provided [7].

The second model: agricultural output

This model shows the extent of the impact of the GDP estimated from the first model, GDP̂_t, on agricultural output APR_t, i.e.:

$$\mathbf{APR_t=\alpha_0+\alpha_1 \hat{GDP}_t+V_t} \quad \ldots\ldots(2)$$

Static analysis will be used to estimate the second model using the ordinary least squares (OLS) method. Research data were obtained through the Central Bank of Iraq [8], the General Directorate of Statistics and Research, the Ministry of Planning and Security Cooperation [9], the Central Statistical Organization, in addition to the World Bank [10].The reality of the economic indicators involved and influencing economic shocks in the Iraqi economy for the period 2021-2044

It is clear from Table (1) of some of the variables investigated during the period (2004-2021), which are the most important economic indicators affecting internal and external economic shocks, that there is fluctuation in these variables as a result of the economic imbalances occurring in the Iraqi economy during the period of the study, as shown in the table below.

Table (1): Some descriptive statistical measures of variables involved and influencing economic shocks in the Iraqi economy for the period 2044-2021

year	**(%)**INF	Exchange rate (dinar per dollar) EXC	Cash Offer ($Million) MSU	Taxes ($Million) TAX	Government spending ($ million)GSP	Price of a barrel of oil ($)OPR
2004	17.3	1453	9582	863.79	22.81	36
2005	35.9	1472	12216	1172.85	28.72	51
2006	23.1	1393	17542	1596.44	34.44	61
2007	14.4	1216	22433	4952.82	5088	69

2008	30.2	1180	29052	5938.87	63.06	94
2009	19.5	1185	37796	12283.4	81.86	61
2010	16.6	1185	50241	28979.6	87.77	77
2011	24.7	1218	60056	15034.5	101.72	107
2012	2.7	1222	62780	14080.8	123.02	109
2013	2.1	1222	72939	23111.1	131.61	106
2014	2.8	1205	75472	25186.3	137.61	96
2015	30.2	1216	70439	18917.3	137.21	50
2016	11.1	1182	75389	20177.2	123.99	41
2017	14.7	1184	77381	38928.6	125.32	53
2018	18.2	1182	79492	62982.7	126.86	70
2019	2.5	1183	86201	56862.1	135.11	64
2020	15.2	1190	99922	40145.3	145.51	41
2021	9.6	1470	116572	53330.1	148.66	67
Min	2.10	1180.00	9582.00	863.79	22.81	36.00
Max	35.90	1472.00	116572.0	62982.70	148.66	109.00
Mean	16.16	1253.22	58639.17	23585.77	100.34	69.61
STD	10.12	108.77	31130.62	19660.41	43.07	23.74

Source: Eviews-10 program outputs based on data from the Iraqi Ministry of Planning and Development Cooperation and World Bank data

Figure (1) shows that there is a fluctuating increase during the period (2004-2021) in both the oil price and the money supply, while there is a fluctuating decrease in both the exchange rate and the inflation rate.

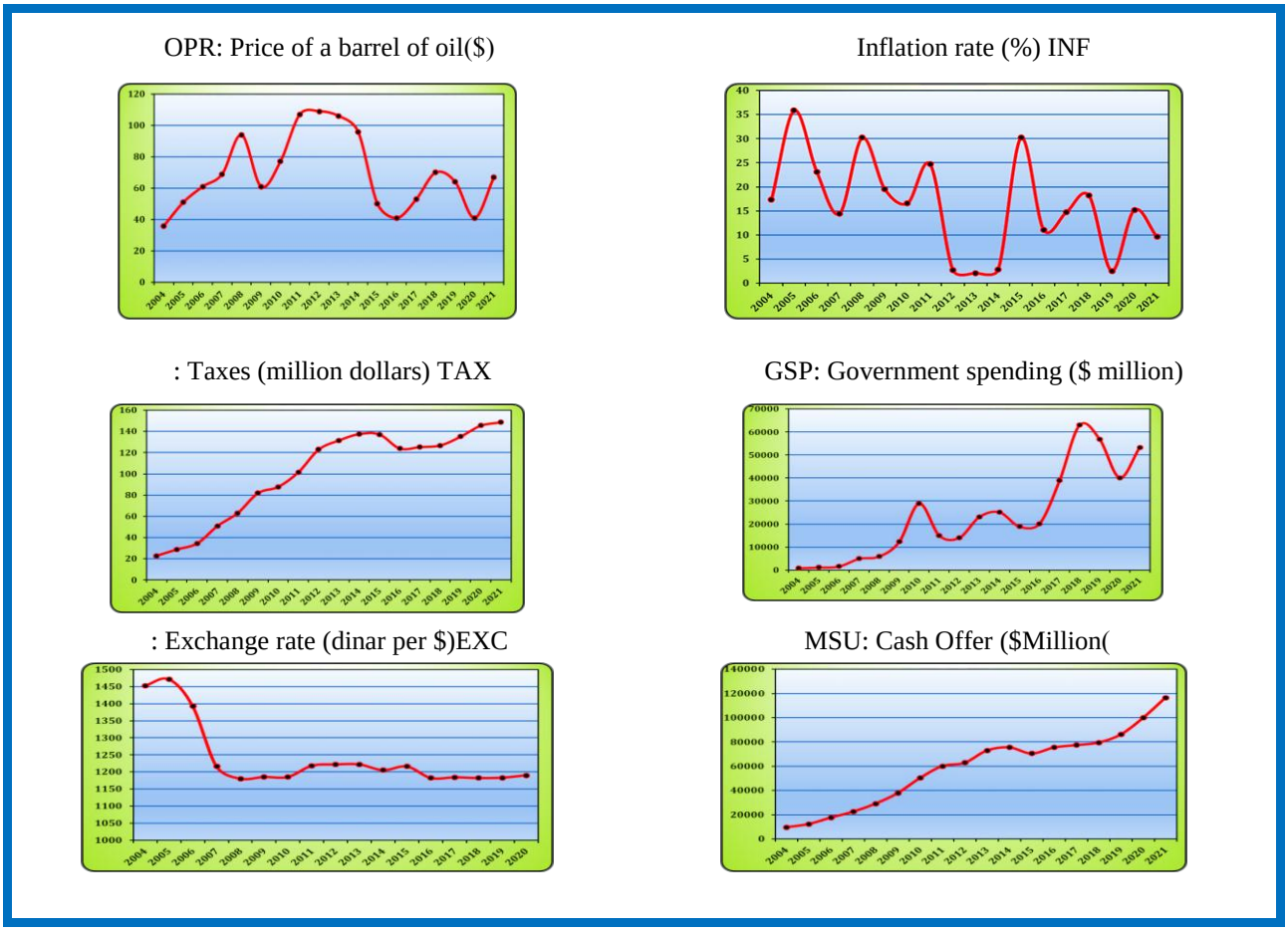

Figure (1): Time series of some macro shock variables during the period (2004-2021)

The work of Granger and New bold (1974) emphasized that the presence of autocorrelation in time series data can make the coefficient of determination R^2 unreliable and lead to spurious regression. To overcome this problem, unit root tests were used as a precondition for co-movement of the time series in the model [11]. The Phillips-Perron (PP) test is considered one of the common tests, and a correction to the Augmented Dickey-Fuller (ADF) test is considered to be one of the most common tests. The heterogeneity of the error variance is considered when testing autocorrelation [12]. The table (2) that all the research variables include the unit root and are therefore not stationary at the level, but at the first difference of each of them they become stationary, meaning that the degree of integration of each of them is one I (1), which makes it possible to find the co-integration equation between the research variables. By estimating autoregressive

distributed lag model

Table (2): Results of the (PP) test for the stability of the research variables during the period (2004-2021)

the Variable	level		First difference		decision
	section and direction	Section	section and direction	Section	
LnGDP	1.8785$^{n.s}$	-5.0418***	-5.2553***	-3.3895*	I(1)
LnOPR	-2.6574$^{n.s}$	-2.6342$^{n.s}$	-3.3757*	-3.6939**	I(1)
LnGSP	-1.8497$^{n.s}$	-4.9691***	-16.4575***	-3.4305**	I(1)
LnTAX	-1.8618$^{n.s}$	-4.5551***	-5.8894***	-3.5265**	I(1)
LnMSU	-2.0919$^{n.s}$	-4.2317***	-3.3464*	-3.3853*	I(1)
LnEXC	-2.6574$^{n.s}$	-2.6342$^{n.s}$	-3.3757*	-3.6939**	I(1)
LnINF	0.1352$^{n.s}$	-1.8313$^{n.s}$	-5.0059***	-2.8235*	I(1)
LnAPR	-3.2231$^{n.s}$	-2.9512*	-3.3667***	-2.8235***	I(1)

* Significant at 10% level ** Significant at 5% level *** Significant at 1% level n.s Insignificant

Source: Eviews-10 program outputs.

Estimation and analysis of the first model

Boundary testing:

Pesaran et. al., proposed autoregressive distributed lag (ARDL) models as a suitable estimation for mixed time series variables (some variables are integrated with degree I(0) and others are integrated with degree I(1)) [13]. This is due to the fact that other cointegration methods only focus on time series of type I(1), and in addition, the use of ARDL models does not produce any negative effect while using small sample sizes [14]. Meanwhile, the Akaike Information Criteria (AIC) is used to select appropriate lag gaps for small samples [15]. In order to reduce autocorrelation in errors, it is better to determine the optimal lag length and thus determine the rank of the model [16]. To test the existence of a cointegration relationship between the variables of the model in the long run, the Bounds Test is used, which depends on calculating the (F) statistic, where the null hypothesis states that there is no co-integration relationship between
The variables of the model against F. The alternative hypothesis that indicates otherwise, i.e :

$$H_o: \gamma = \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$$
$$H_1: \gamma \neq \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0$$

Where (γ) represents the long-run coefficient for the dependent variable, while (λ _1 " ," λ_2 " ," λ_3 ", " λ 4 ", " λ_5 ", " λ_6) represents the long-run coefficients for the independent variables. [13] proposed a table of critical values for testing co-integration consisting of two terms.

Table (3) displays the results of the cointegration test between GDP and economic variables using the bounds test. the value of (F) (11.5722) is greater than the upper limit I (1) and at all levels of significance, we must reject the null hypothesis and accept the alternative hypothesis of unequal long-term relationship coefficients and equalizing them to zero.

Table (3): Results of the cointegration test between economic variables and GDP

statistics	Test	Significance level	Minimum I(1)	Minimum I(0)
11.5722**	F	%10	2.87	1.75
6	k	%5	3.24	2.04
		%2.5	3.59	2.32

Source: Eviews-10 program outputs.

Estimating the long-run relationship:

After it has been confirmed that there is a cointegration relationship between the research variables. The Eviews-10 program estimated a number of (128) models, based on the lowest value of the Akaike criterion. Given the information (AIC) of (-4.3543), it turns out that the best model is ARDL (2,1,1,1,1,1,0). The results were as in Table (4)

Table (4): Results of estimating the long-term relationship of the ARDL model (2,1,1,1,1,1,0)

variable	Coefficient	standard error	t-test	probability value
LnOPR	-0.361103	0.135884	-2.657435$^{n.s}$	0.076
LnGSP	3.885052	0.922903	4.209601*	0.024
LnTAX	0.267010	0.065566	4.072364*	0.026

LnMSU	-2.815467	0.797511	-3.530318*	0.038
LnEXC	2.429155	0.624160	3.891878*	0.030
LnINF	-0.081589	0.020033	-4.072806*	0.026
R^2	%94			
$\bar{R}^2$	%94			
test - F	253.884**			
probability value	0.000			

* Significant at the 1% level ** Significant at the level 5 n.s Not significant

Source: Eviews-10 program outputs.

It is evident from the table above that:

Oil price elasticity (OPR): There is no significant effect of oil prices on GDP. This result is consistent with the results of some studies that showed that the impact of oil prices is ineffective on the GDP in the long term, while its positive impact appears in the short term, including a study.

 Flexibility of government spending (GSP): In the long run, at a significant level (5%), the GDP is positively affected by government spending. Every increase in government spending by (1%) is followed by an increase in the GDP by (3.88%), which is a positive relationship between the two variables, which is based in one aspect on the Keynesian hypothesis, which emphasizes the positive impact of government spending on gross domestic product, especially at an early stage of development, and is an important tool available to governments to stimulate economic activity. [17].

 Tax elasticity (TAX): In the long run and at a significant of (5%), the GDP is positively affected by taxes. Every increase in taxes by (1%) is followed by an increase in the GDP by (0.27%), which is a positive relationship between the two variables that is consistent with the logic of the theory. Economic, as taxes contribute to achieving economic growth in the long term by covering part of public expenditures, and this result is consistent with the results of some studies, such as the study [18].

 Elasticity of the money supply (MSU): In the long run, at a significant (5%), the GDP is negatively affected by the money supply. Every increase in the money supply by (1%) is followed by a decline in the GDP by (2.82%), which is a negative relationship between the two variables that contradicts Economic theory [19].

 Flexibility of the exchange rate rate EXC: In the long run, at a significant (5%), the GDP is positively affected by the exchange rate rate. Every increase in the exchange rate rate by (1%) is followed by an increase in the GDP by (2.43%), which is a positive relationship. The two variables are consistent with economic theory, as the decline in the value of the Iraqi dinar against the US dollar increases the gross domestic product due to the rentierism of the Iraqi economy, which relies heavily on oil exports (in dollars), in addition to its negative trade balance during the study period, which makes imports (in dollars) significantly exceeds exports [20].

 Elasticity of the inflation rate (INF): In the long run, at a significant level (5%), the GDP is negatively affected by the inflation rate. Every increase in the inflation rate by (1%) is followed by a decline in the GDP by (0.08%), which is a negative relationship between the two variables. This result is consistent with the logic of economic theory. When the inflation rate rises, this leads to instability in the overall economic environment, including higher production costs and higher interest rates, which subsequently lead to higher prices and a reduction in the purchasing power of consumers. Since the GDP reflects the volume of economic activities, a high rate of inflation can negatively affect the level of the gross domestic product. This means that the continued inflation of price rates in the event of an economic recession will lead to a collision with negative rates at the level of the gross domestic product, and vice versa. If there is a decrease in the inflation rate, this will contribute to improving the economy as a whole and increasing the volume of production and gross domestic product [21].

Model evaluation: The economic variables (oil price, government spending, taxes, money supply, exchange rate rate, inflation rate) have a high explanatory power in the GDP, as these variables explain 94% of the GDP, as the model is statistically significant at the (1%) level in light of the probability value of the (F) test.

Estimating the short - term relationship:

Table (5) shows the results of estimating the short-term relationship according to the ARDL (2,1,1,1,1,1,0) model for the impact of economic variables on the gross domestic product for the period (2004-2021). It is clear from the table that all economic variables It affects the GDP in the short term, and it is noted that there is a difference in the impact of some variables on the GDP between the short and long term. As for the price of oil, its positive effect appeared in the short term, and the positive effect of government spending did not change in the long and short term. As for taxes, only their effect changed from positive in the long term to negative in the short term. With regard to the money supply, its negative effect did not change in the long and short term. The effect of the exchange rate rate changed from positive in the long term to negative in the short term, and finally the effect of the inflation rate did not appear in the short term after the effect was negative in the long term.

Table (5): Results of estimating the short-term relationship of the ARDL (2,1,1,1,1,1,0) model

variable	Coefficient	standard error	t-test	probability value
$\Delta LnOPR_t$	0.525559	0.014668	35.82999**	0.000
$\Delta LnGSP_t$	1.541632	0.126663	12.17115**	0.001
$\Delta LnTAX_t$	-0.062832	0.010723	-5.859325**	0.009
$\Delta LnMSU_t$	-0.931860	0.094644	-9.845925**	0.002
$\Delta LnEXC_t$	-0.032624	0.092058	-0.354389$^{n.s}$	0.746
$CointEq_{t-1}$	-0.669890	0.042972	-15.58899**	0.000
R^2	%9**9**			
$\bar{R}^2$	%9**9**			
F -test	289**.**933**			
probability value	**0.000**			

* Significant at the 1% level ** Significant at the level 5 n.s Not significant

Source: Eviews-10 program outputs

The results of Table (5) confirm the existence of a long-term cointegration relationship, the gross domestic product and the variables of the two financial policies, as the cointegration coefficient appears with a negative and significant value at (1%), where its value is estimated at (- 0.6699) It indicates the amount of change in gross domestic product resulting from the deviation of the oil price, government spending, taxes, money supply, exchange rate rate, and inflation rate in the short run from their equilibrium values in the long run by one unit for each, and the correction rate for this The deviation is 67%, so it will take approximately one and a half years for the GDP to return to its equilibrium value in the long run after the effects of shocks in the financial and monetary policy variables because 1/0.6699=1.49 ≅1.5 year.

Diagnostic tests for the model:

Table (6) displays the results of the diagnostic tests for the GDP model. It is clear from the table that the probability value of the

Jarque-Bera test reached (0.076), which is greater than the significance level (5%), which means that the residuals (errors) generated from the estimated standard model are ARDL (2,1,1,1,1,1,0) follows a normal distribution [22]. It is also clear from the table that the residuals or errors of the estimated model are not related to each other based on the probability value of the Breusch-Godfrey test of (0.151), which is greater than (5%) [23]. There is also homogeneity (stability) in the variance of these residuals through the Autoregressive Conditional Heteroscedasticity (ARCH) test, whose probability value was (0.404) and is greater than (5%) [24]. The model was also characterized by structural stability in the form of the function based on the results of the Ramsey test, whose probability value was (0.943), which is greater than (5%) [25]. In addition, there is no problem of multicollinearity between economic variables, based on the values of the Variance Inflation Factor (VIF), which were all less than (10) [26].

Table (6): Results diagnostic tests for the estimated standard model, ARDL (2,1,1,1,1,1,0)

Problem	Test	Statistic	Result	Probability Value
Non-normal distribution of errors	Jarque-Bera	Jarque-Bera	5.15889^{ns}	0.076
Self-correlation	Breusch-Godfrey	F	5.17884^{ns}	0.151
Contrast difference	ARCH	χ^2	0.69501^{ns}	0.404
Instability of the model structure	Rasmsey	F	0.00644^{ns}	0.943
Multicollinearity	Contrast inflation factor	VIF		Probability Value
	variable LnOPR		0.007481	
	LnGSP variable		0.177863	
	LnTAX variable		0.007044	

	LnMSU variable	0.148325
	LnEXC variable	0.317225
	LnINF variable	0.001193

* Significant at the 1% level ** Significant at the level 5 n.s Not significant

Source: Eviews-10 program outputs.

Dynamic analysis of GDP:

A. Variance Decomposition:

Partitioning or decomposing the variance of the error of the dependent variable into its components is a way to describe the dynamic behavior of the model, especially in the long run, where the variance of the prediction error of the dependent variable is divided into different parts. The amount of variance of the prediction error in the variable is due to the prediction error in the variable itself, and to the error in the Prediction of independent variables. This analysis gives information about the relative importance of the effect of a sudden change or shock in each of the model's independent variables on the dependent variable. To avoid the problem of the simultaneous effect of errors in the model variables, Choleski decomposition is used, which is greatly affected by the arrangement of the variables in the model [27]. When we divide the variance of the prediction error of the crime rate into its components and to the economic variables using Cholsky partitioning, we obtain the results in Table (7), which show the percentage of the variance of the prediction error of the GDP that is explained by its own shocks and the shocks in the macroeconomic variables.

Table (7): Breakdown of the variance of the forecast error of GDP during the period (2004-2021)

year	INF	EXC	MSU	TAX	GSP	OPR	GDP	S.E.
1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	100.000	40.1945
2	0.03389	0.45306	0.01222	0.08336	0.33712	3.70284	95.3774	45.2805
3	0.09704	1.88902	0.02058	1.47927	1.80518	9.80920	84.8996	48.5943
4	0.09704	3.62933	0.11214	1.93469	2.51439	13.1284	78.5839	50.7063
5	0.09636	5.49219	1.32707	1.84497	2.52749	13.0224	75.6894	52.2274
6	0.20091	6.19675	5.52093	4.36779	2.27717	11.4177	70.0186	57.6116
7	0.37661	4.62907	10.6816	10.9577	2.62019	11.1869	59.5478	74.4388
8	0.45505	2.68060	12.9596	16.4744	3.24979	11.7368	52.4435	105.649
9	0.43910	1.51686	13.2486	19.2577	3.67627	11.7922	50.0691	147.885
10	0.38773	0.91940	12.9426	20.5124	3.90604	11.3610	49.9706	195.799

Cholesky Ordering: GDP OPR GSP TAX MSU EXC INF

Source: Eviews-10 program outputs.

It is noted from the results of Table (7) that the standard error (S.E.) of forecasting the GDP in the first year is equal to (40.1945), then it increases with time to reach (195.799) in the tenth year. The reason for the increase in the value of the standard error is due to the inclusion of the effects of uncertainty to predict the gross domestic product during previous years. It is noted from the previous table that in the medium term (future fifth year), (75.7%) of the variance of the forecast error of GDP is due to its own shocks, while the price of oil contributes about (13%), and government spending contributes (2.5%). Taxes contribute (1.8%), the money supply contributes (1.3%), the exchange rate rate contributes (5.5%), and the inflation rate contributes (0.1%) in explaining the variance of the forecast error of GDP. In the long run (the tenth year of the future), (50%) of the variance of the forecast error of the GDP is due to its own shocks, while the price of oil contributes about (11.4%), government spending contributes (3.9%), and taxes contribute about (3.9%). (20.5%), the money supply contributes (12.9%), the exchange rate rate contributes (0.92%), and the inflation rate contributes (0.92%) in explaining the variance of the forecast error of GDP. It is also noted from the results of Table (9) that there is consistency and stability in the contribution rates of fiscal and monetary policy variables in explaining the error variance of GDP in the long run. It is also noted that taxes are the most contributing variable in explaining the error variance of GDP in the long run. Then comes the supply variable in

the second degree, then the oil price, in the third degree. Therefore, any sudden shock in these variables will greatly affect the gross domestic product**.**

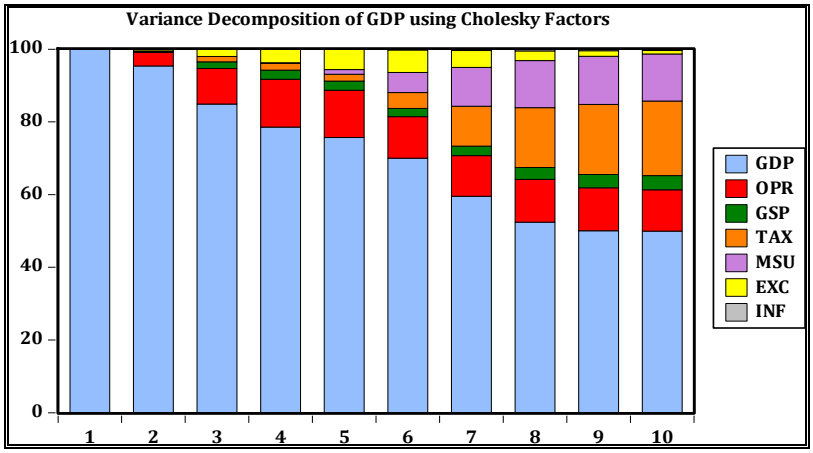

Figure (2): Components of the variance of the 10-year GDP forecast error

B. Impulse Response Function (IRF) Analysis:

The response impulse function helps study the interaction between variables in an autoregressive model. These functions represent the response of variables to shocks to which the system is exposed. This function measures the effect of a shock of one standard deviation for one of the model variables on the current and future values of the remaining variables that are calculated based on the (VAR) model. Table (8) and Figure (3) show the results of the response of GDP to shocks occurring in economic variables of one standard deviation. It is clear from the table and figure that the oil price (OPR), taxes, and money supply (MSU) are the variables that most influence the gross domestic product (GDP), as their impact was positive in the short term and then changed to negative in the long term over the forecast period. of (10) years, which is almost similar to what was previously achieved in segmenting the variance, especially with regard to the inflation rate. As for the rest of the variables, their effect on GDP was directly positive in some forecast years, and inversely in other forecast years:

Table (8): Results of the response of GDP to shocks of one standard deviation in economic variables

year	INF	EXC	MSU	TAX	GSP	OPR
1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	1.85332	-5.55277	7.13698	1.13763	-0.19836	12.1617
3	-2.80891	-8.78283	8.37865	5.40862	0.02041	15.2772
4	-1.00313	-11.0447	7.85582	4.72182	-0.57106	8.83604
5	0.81199	-12.4975	2.75078	2.44419	-0.52079	-2.34480
6	4.46824	-13.5928	-5.62664	-3.13695	-0.35313	-16.2570
7	8.37698	-14.2753	-17.3049	-10.7359	0.14984	-29.4145
8	12.1604	-14.5112	-31.0865	-19.8200	0.79982	-39.0969
9	14.9523	-14.0477	-45.6914	-29.1568	1.52774	-42.8109
10	16.1251	-12.5480	-59.3807	-37.5184	2.19545	-38.8100

Source: Eviews-10 program outputs.

The response of GDP to shocks in economic variables can be observed during a 10-year forecast period as follows:

Shock in the price of oil (OPR): The shock in the price of oil leads to a slight positive increase in GDP until the fourth year, then the effect turns negative starting in the fifth year and the moral effect appears starting from the seventh year and this moral effect continues to cause the largest decline in output. The GDP in the ninth year amounted to (42.81) million dollars, then the impact decreases in the tenth year to (38.81) million dollars. Government spending shock (GSP): The shock in government spending leads to a slight negative decline in GDP until the sixth year, then the effect turns positive starting in

the seventh year and begins to gradually rise to reach ($2.19) million in the tenth year.Tax shock (TAX): The tax shock leads to a slight positive increase in GDP until the fifth year, then the effect turns negative starting in the sixth year, and the moral effect appears starting from the eighth year, and this significant effect continues to cause the largest decline in GDP. In the tenth year, $37.52 million.

Money supply shock (MSU): The money supply shock leads to a slight positive increase in GDP until the fifth year, then the effect turns negative starting in the sixth year, and the moral effect appears starting from the seventh year, and this moral effect continues to cause the largest decline in output. The gross domestic product in the tenth year amounted to $45.69 million. Shock in the exchange rate rate (EXC): The shock in the exchange rate rate leads to a negative increase in the GDP throughout the forecast period until the tenth year, and this effect begins to stabilize and stabilize from the fourth year to cause a decrease in the GDP ranging between (11-14)) Million dollars. Shock in the inflation rate (INF): The shock in the inflation rate leads to a slight positive increase in GDP to (1.85) million dollars in the second year, then the effect turns negative to cause a decrease in GDP by (2.81) million dollars in the year. Third. Then the effect of the shock turns positive starting in the fifth year and continues to increase until it causes the GDP to rise by $16.12 million in the tenth year.

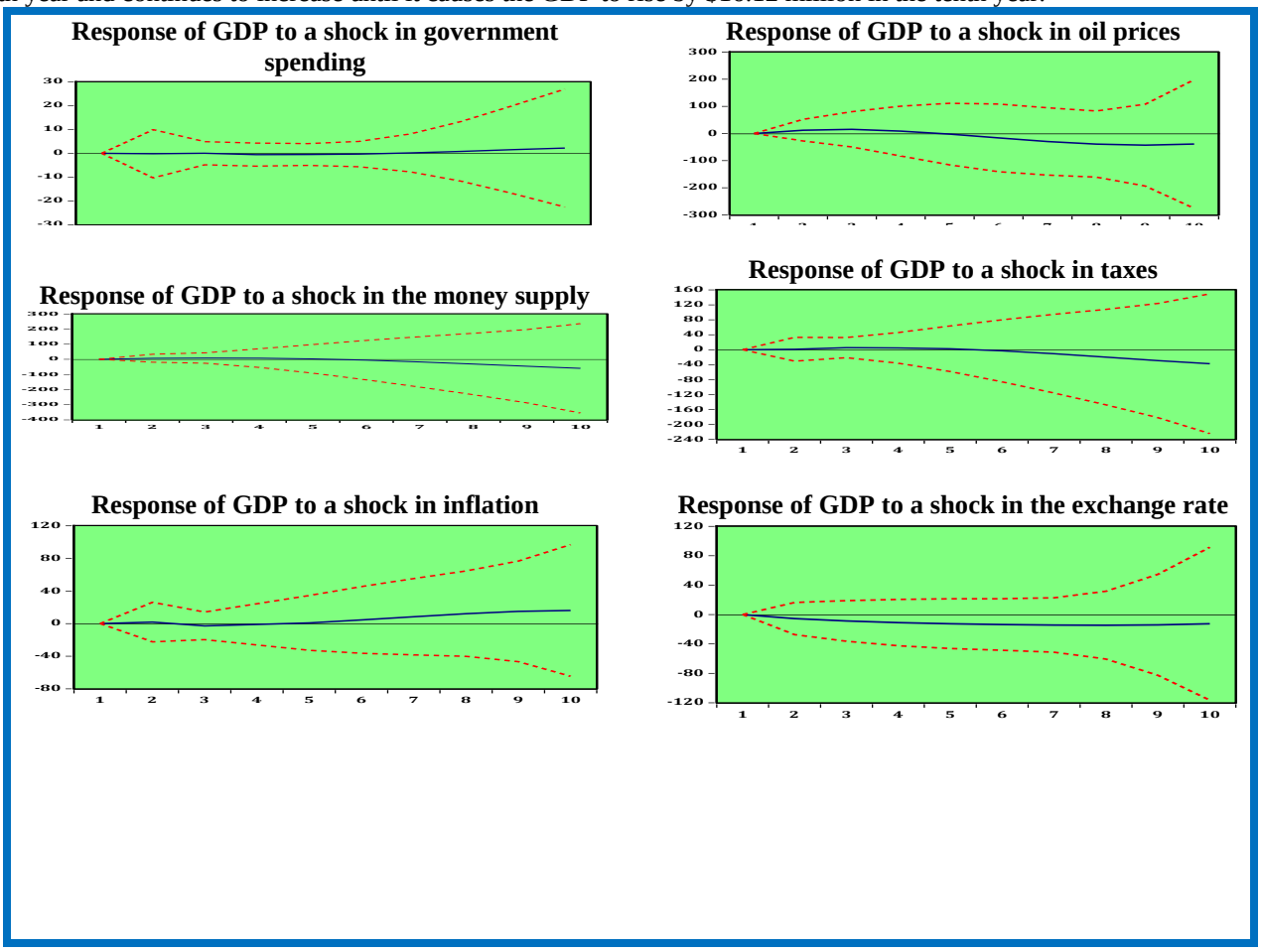

Figure (3): Results of the response of GDP to shocks of one standard deviation in fiscal and monetary policy variables

Estimation and analysis of the second model;

It is clear from Table (9) that there is a significant& positive effect of the GDP estimated from the first model on the value of agricultural output at a significance level of (1%). When the GDP increases by one million dollars, this leads to an increase in the value of agricultural output by (0.032817) million dollars, or approximately ($32,817). This result shows the direct relationship between GDP and the value of agricultural output, as increasing GDP will lead to an increase in financial allocations to the agricultural sector, which leads to an increase in the value of agricultural output:

As can be seen from the previous table, (59%) of the changes occurring in the value of agricultural output are caused by the gross domestic product,

Table (9): Results of estimating the agricultural output model

variable	Coefficient	standard error	t-test	probability value
C	2.333599	1.309835	1.781597$^{n.s}$	0.094

$G\hat{D}P$	0.032817	0.006520	5.032976**	0.000
R^2	%61			
$\bar{R}^2$	%59			
F -test	25.3308**			
probability value	**0.000**			

**Significant at the 1% level n.s. Not significant

Source: Eviews-10 program outputs

Conclusion

Despite the fluctuating increase in Iraqi agricultural output during the period (2004-2021), its values were low. Its annual rate did not exceed (8.52) million dollars during the aforementioned period, and this is not commensurate with the country's capabilities and agricultural components, fitting the autoregressive model of distributed slowdown To represent the relationship between some macroeconomic variables and GDP, the estimated model showed high significance and great explanatory power, in addition to being free of standard problems, which allows it to be used for future prediction of GDP. The estimation of the long-term relationship showed that all economic variables dealt with in this research have significant effects on the GDP. The most influential of these variables is government spending, followed by the, then the exchange rate, taxes, and finally the inflation rate. The results of the cointegration test showed the existence of a long-term equilibrium relationship between economic variables and the GDP. Suppose the economic variables deviate in the short run from their equilibrium values in the long run by one unit for each. In that case, 67% of this deviation is corrected annually, meaning that the gross domestic product will take approximately a year and a half to return to its equilibrium value. The results of estimating the relationship showed that in the short term, all economic variables addressed in this research.

have significant effects on the GDP, except for the inflation rate. The most influential of these variables is government spending, followed by the money supply, then the oil price, then taxes, and finally the exchange rate. The dynamic analysis of the GDP showed that there will be consistency and stability in the impact of economic variables in explaining variation in GDP in the long term. Taxes are considered one of the variables that contribute most to explaining the variation in GDP, followed by the money supply, and then the oil price. Therefore, any sudden shock in these variables will greatly affect the GDP, and the analysis of the response impulse function showed that when shocks occur in some variables, economically, their impact appears significantly in the long run. When a tax shock occurs, its impact on the GDP is expected to appear in the eighth year, and the impact of the shock on both the money supply and oil prices appears in the GDP starting in the seventh year. Shocks occurring in some macroeconomic variables work to transfer the positive moral effect of GDP on the value of the agricultural sector's output.

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CONFLICT OF INTEREST

Conflict of interest: The author declares that there is no conflict of interest with regard to the publication of this article.

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قياس وتحليل أثر الصدمات الاقتصادية الكلية في القطاع الزراعي العراقي للمدة (2004-2021).

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الخلاصة

تهدف الدراسة لقياس اثر الصدمات الكلية (الداخلية & الخارجية) على الاقتصاد العراقي بشكل عام وعلى القطاع الزراعي بشكل خاص وذلك من خلال قياس دراسة اثر بعض المتغيرات الكلية على الناتج المحلي الاجمالي ثم الناتج الزراعي من خلال استخدام المربعات الصغرى ذات المرحلتين ، اذ أظهرت نتائج تقدير العلاقة طويلة الأجل أن جميع المتغيرات الاقتصادية المتناولة بهذا البحث ذات آثار معنوية على الناتج المحلي الإجمالي من خلال التكامل المشترك ، أكثر هذه المتغيرات تأثيراً هو الإنفاق الحكومي، ثم معدل سعر الصرف، فالضرائب، وأخيراً معدل التضخم، وعندما تنحرف المتغيرات الاقتصادية في الأجل القصير عن قيمها التوازنية في الأجل الطويل بوحدة واحدة لكل منها، فإنه يتم تصحيح ما نسبته (67%) من هذا الانحراف في السنة، أي أن الناتج المحلي الإجمالي سيستغرق سنة ونصف تقريباً ليعود إلى قيمته التوازنية ،كما أظهر تحليل دالة نبضات الاستجابة أنه عند حصول صدمات في بعض المتغيرات الاقتصادية فإن أثرها يظهر بشكل كبير في المدى الطويل، وتوصي الدراسة الاهتمام بالتحولات الاقتصادية الدولية المؤثرة في القطاع الزراعي، من خلال اتخاذ السياسات الزراعية المناسبة، وتوظيف منجزات العلم والتقنية من أجل استخدام التقنيات الزراعية الحديثة محلياً، إلى جانب نقلها وتوطينها وكذلك تخفيض معدلات التضخم الة مستويات متدنية ومقبولة، كما يوصي الباحث بتكثيف الدراسات والأبحاث العلمية حول القطاع الزراعي للتعمق في المشكلات التي يعاني منها هذا القطاع وإيجاد الحلول المناسبة لها .

الكلمات المفتاحية: السياسات الكلية، الناتج الزراعي، الصدمات الداخلية، الصدمات الخارجية، عرض النقد.