Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

ANALYSIS OF THE IMPACT OF THE GREEN ECONOMY ON SUSTAINABLE AGRICULTURAL DEVELOPMENT IN IRAQ FOR THE PERIOD (2003-2022)

Lina Kadhim Sfayyih *[1], Ali. S. Shukr [2]
*[1]Department of Agricultural Economics, College of Agricultural Engineering Sciences, University of Baghdad, Baghdad, Iraq.

ABSTRACT

The research aims to study the impact of the green economy on achieving sustainable agricultural development in Iraq for the period (2003-2022). The research used quantitative methods in analyzing GDP, green GDP, investment allocations for the agricultural sector, environmental allocations, cultivated areas and water imports of the Tigris and Euphrates rivers to distinguish the impact of these variables on agricultural GDP. The parameters were estimated using the Autoregressive Distributed Lag-ARDL framework. The results found that each of the green GDP, investment allocations, and environmental allocations came positive and consistent with the logic of the economic theory, while cultivated areas came positive but not significant. Rivers water flow had a negative signal due to the significant decline during the study period. The research found that the green GDP has the largest effect in agricultural GDP, and its impact is clear in advancing the development process. The research recommended the need to follow scientific methods and modern methods to reduce toxic and greenhouse gas emissions, which greatly affect pollution and agricultural production.

Key words: Investment allocations, Environmental allocations, Green GDP
***part of M.S.C. thesis of the 1st authore.**

Received: 3/1/2024, Accepted: 31/3/2024, Published: 28/02/2026

INTRODUCTION

The concept of green economy is one of the modern concepts in the economic and environmental literature. It consists of improving the relationship between natural ecosystems from one hand and human economies on the other hand through the sustainability of natural and human resources, the imposition of climate improvement considerations and the efficiency of the exploitation of these resources with the least possible damage to the environment from waste and carbon emissions (Loiseau, 2016) (Georgeson, 2017). The green economy is not equal to sustainable development(Sulich, 2020), but it is an entrance and a mean to achieve it. As well as, it is not the only way to achieve this end (Zhang,et al,2022) (Nandy,et al ,2022), there are other concepts in separate contexts aimed at sustainable development. But the green economy in general is the environmental gateway to access it. It is a long-term process whereby radical changes are made in production (Ikram, 2022), consumption, and investment patterns. It requires the adaptation of projects and new green supply chains, with the characteristics and applications of industrial networks with the modernisation of technological and administrative applications used in production (Sukr,et al ,2021). The green economy leads to the fluctuations of the economy at the global level because it emphasises the efficient use and distribution of natural resources to diversify the economic base. Some Arab countries, including Iraq, are still adopting development strategies dominated by investments in export-oriented extractive commodity products such as (oil derivatives) which have led to the weakening of the structures of Arab economies as they adopt dependence on single sources of income. Some Arab countries, including Iraq, still have the prevailing economic planning focused on GDP growth on the short-term level (Al-Maliki,2017) and neglects investment for the rest of the sectors, including the agricultural sector, which is one of the important sectors in

Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

Iraq, and suffers from a decreasing percentage of its contribution to GDP (Mohammad,et al,2023). Although the agricultural sector is one of the important sectors, it did not gain the leadership in the formation of GDP due to the increase in the contribution of the oil sector (Ahmed, 2024). Especially since the oil sector is dramatically affected by global events, so we must focus on development of foreign agricultural trade and the agricultural sector as a whole (Muhyaddin, 2023). Production Agricultural in Iraq suffers from decrease at the level of productivity, it is an indication of reduced investment share and government spending for the agricultural sector. Especially since these investment allocations insufficient and unstable depend on the peasant lending which does not meet the actual need of the agricultural sector and is limited to contributing to the financing of small agricultural projects only and that this decline in allocations due to a lack of planning in general and a significant weakness in agricultural policies (Muhammad,2020). Agricultural GDP in Iraq suffers from decline in the production of major crops in a way that led to an increase imports for these crops, which negatively affected the state budget (Ewaid, et al,2020) , Iraq is unable to increase its domestic production and meet the needs of consumers (Al-Ansari,et al,2021) due to poor resource distribution and high costs of local agricultural production (Abbas,et al,2018). Iraq is characterized by a desert climate covering 70% of its land (Salman,et al,2019), with a total area of 438,320 km2 (Othman,et al,2019). Total cultivated area in Iraq constitutes about 16% of the total area of Iraq which about 117.6 million donum (Tao,et al,2023), and Iraq loses arable land annually by 5%, which led to increased desertification in Iraqi territory. As the percentage of desertified areas in Iraq 38.10% that's about 166.687 km^2 (Hussein, 2017) , Especially since many farmers refuse to farm in an environment that carries a high degree of risk and uncertainty (Awf, et al,2024) ،as a result of which migration increased and decreased ratio of agricultural employment to 18.7% due to lack of government support (Hussein, et al, 2020). Since the agricultural sector is one of the important sectors for development economic for the country so this requires achieving the highest degree of efficiency in use agricultural resources, especially human resources (agricultural labor) (Hassan,2025)(Ali, 2027) , It also entails raising marketing efficiency and developing infrastructure, based on the use of improved agricultural technology to increase agricultural productivity and achieve food security (Kareem,2023), which leads to improving the quality of agricultural products and increasing the productivity of the land area unit at the lowest cost (Neda, 2025), as well as the use of modern and advanced irrigation technologies to provide fresh water and achieve food security (Mohammed,2023). This highlights the need to transform the Iraqi economy towards a sustainable green economy as it reduces dependence on traditional energy sources and faces those problems that delay the process of sustainable development, as it suffers from the problems of pollution, deterioration of water management, desertification and neglect innovation scientific research and the absence of social awareness and the deterioration of infrastructure, which is one of the basics of sustainable development. Green economy is an important part, so it was necessary to accelerate the transition towards a sustainable green economy in order to catch up with the development the developed world at the present time, as it works to meet the challenges economic it is a sustainable, low-carbon economy that protects the rights of both present and future generations (Janabi,2022) , The fact that carbon dioxide CO_2 is the main cause of the degradation of the natural environment and climatic changes.

MATERIALS AND METHODS

The following variables were used in the formulation of the model:

$$Y_i = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + E_i$$

Y_i = Agricultural GDP (million dinars)

X_1 = GDP (million dinars)

X_2 = Green GDP (million dinars)

X_3 = Investment allocations to the agricultural sector (million dinars)

Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

X_4 = Environmental allocations (million dinars)
X_5 = Cultivated area (million donums)
X_6 = Water flow from the Tigris and Euphrates rivers (billion m3)
The variable (X1) expressing GDP was raised due to the strong correlation between it and (X2) (green GDP), which arises from the Great Convergence of the values of the variables (X1) and (X2), so the variable (X1) was raised to avoid the problem of high correlation.

RESULTS AND DISCUSSION

Time series stationary test

The economic variables, in general, are usually characterized by instability due to their economic nature and this is confirmed by most studies and research, and there are several methods to detect the stability of time series and the most important of these methods is through the graph of time series for each variable as well as Dickey-Fuller (ADF) and Phillips-Perron (PP) tests has been testing the stability of the variables included in the model after taking the logarithmic formula to reduce variance and enable variables.

Unit root test

We used augmented ADF tests to ensure that the time series of the study variables are stable at level I(0) and the first difference I(1) with a constant, constant and trend and without any of them. Through the tests, it was found that all the variables did not stabilize at the level due to the nature of economic variables that are characterized by instability, and they stabilized at the first difference (at the constant and at the trend).

Table 1. Results of unit root test (ADF)

UNIT ROOT TEST TABLE (ADF								
	<u>At Level</u>							
		LY	LX1	LX2	LX3	LX4	LX5	LX6
With Constant	t-Statistic	-2.1472	-3.5715	-3.5756	-1.4345	-2.4296	-2.2213	1.6532
	Prob.	0.2302	0.0171	0.0169	0.5437	0.1474	0.2056	0.9989
		n0	**	**	n0	n0	n0	n0
With Constant & Trend	t-Statistic	-2.4076	-3.4110	-3.4145	-1.2484	-2.9725	-5.3184	0.6880
	Prob.	0.3636	0.0796	0.0791	0.8695	0.1644	0.0033	0.9989
		n0	*	*	n0	n0	***	n0
Without Constant & Trend	t-Statistic	1.5905	2.5478	2.5475	0.0671	-0.3477	-1.1509	-1.5937
	Prob.	0.9674	0.9954	0.9954	0.6921	0.5461	0.2159	0.1024
		n0	n0	n0	n0	n0	n0	n0
	<u>At First Difference</u>							
		d(LY)	d(LX1)	d(LX2)	d(LX3)	d(LX4)	d(LX5)	d(LX6)
With Constant	t-Statistic	-2.9421	-3.8110	-3.8111	-3.8254	-4.7529	-4.1844	-6.7056
	Prob.	0.0601	0.0110	0.0110	0.0107	0.0016	0.0066	0.0000
		*	**	**	**	***	***	***
With Constant & Trend	t-Statistic	-2.9370	-3.6285	-3.6279	-4.3385	-4.6052	-3.9857	-7.2332
	Prob.	0.1749	0.0558	0.0559	0.0154	0.0094	0.0345	0.0001
		n0	*	*	**	***	**	***
Without Constant & Trend	t-Statistic	-2.9981	-3.3480	-3.3487	-3.9446	-4.9104	-3.9772	-6.1855
	Prob.	0.0050	0.0022	0.0022	0.0005	0.0001	0.0006	0.0000
		***	***	***	***	***	***	***
Notes: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant								

Source: Eviews 12 software output

Vector autoregressive restricted – var

Before starting the model test, the duration of the deceleration must be determined and according to the most accurate criteria used by (Table 2), shows that the appropriate lag duration for the model is one period based on the five criteria: LR, FPE, AIC, SC, HQ.

Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

Table 2. Determining the optimal lag period

VAR Lag Order Selection Criteria
Endogenous variables: LY LX1 LX2 LX3 LX4 LX5 LX6
Exogenous variables: C
Date: 01/10/26 Time: 04:10
Sample: 2003 2022
Included observations: 19

Lag	LogL	LR	FPE	AIC	SC	HQ
0	90.98579	NA	3.42e-13	-8.840610	-8.492658	-8.781722
1	202.2430	128.8242*	7.19e-16*	-15.39400*	-12.61039*	-14.92291*

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

Source: Eviews 12 software output

The ARDL Model :(Table 3) shows that the value of the coefficient of determination R^2 (the estimated power of the model) amounted to 0.99, and this means that the independent or illustrative variables were able to explain 99% of the fluctuations or changes in the dependent factor, while the remaining 1% of the fluctuations in the dependent factor are due to other independent factors that were not included in the estimated model and their effect was absorbed by the random variable. It is also noted from the table that the calculated *F* value is high, as it reached 41.99 which indicates the significance of the model as a whole at level of 1%.

Table 3. Autoregressive Distributed Lag-ARDL Model

Dependent Variable: LY
Method: ARDL
Date: 01/10/26 Time: 02:17
Sample (adjusted): 2007 2022
Included observations: 16 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): LX2 LX3 LX4 LX5 LX6
Fixed regressors: C
Number of models evalulated: 4
Selected Model: ARDL(4, 1, 0, 0, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LY(-1)	-0.149317	0.175562	-0.850507	0.4575
LY(-2)	0.911429	0.246996	3.690055	0.0345
LY(-3)	-1.080255	0.172430	-6.264904	0.0082
LY(-4)	0.756003	0.149612	5.053080	0.0150
LX2	0.031958	0.135312	0.236183	0.8285
LX2(-1)	0.290064	0.128411	2.258872	0.1090
LX3	0.097101	0.061329	1.583286	0.2115
LX4	0.010701	0.026061	0.410627	0.7089
LX5	0.771419	0.129602	5.952204	0.0095
LX5(-1)	-0.242713	0.098110	-2.473896	0.0898
LX6	-0.173596	0.113209	-1.533411	0.2227
LX6(-1)	0.096581	0.098278	0.982738	0.3982
C	-6.766581	3.956080	-1.710426	0.1857

R-squared	0.994082	Mean dependent var	16.01495
Adjusted R-squared	0.970408	S.D. dependent var	0.286561
S.E. of regression	0.049295	Akaike info criterion	-3.230962
Sum squared resid	0.007290	Schwarz criterion	-2.603234
Log likelihood	38.84770	Hannan-Quinn criter.	-3.198818
F-statistic	0.005247	Durbin-Watson stat	3.139728
Prob(F-statistic)			

Source: Eviews 12 software output

Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

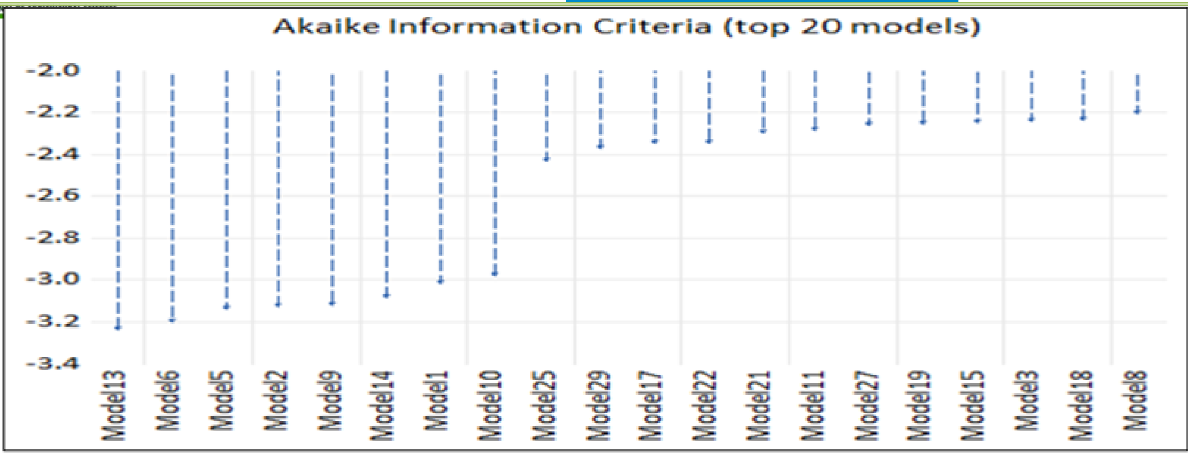

Figure 1. Choosing the best model according to the Akaike criteria
Source: Eviews 12 software output

Bounds Test

(Table 4) shows that the value of F appeared 12.79 and when compared with the upper and lower values and the level of significance 1% of 3.06, we assume the null hypothesis Ho: B1=B2 = 0 that there is no long-term relationship between the explanatory variables and the dependent variable and accept the alternative hypothesis H1: $B1 \neq B2 \neq 0$ that there is a long-term relationship between the interpreted variables and the dependent variable.

Table 4. Co-integration Test Results Using Bounds Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	12.79438	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Eviews.12 software output

Estimating ARDL model parameters and error correction model: It is clear from (Table 5), which is the short-term equation, it was found that the parameter, which is the short-term equation, that the LX_2 parameter of the green GDP to the existence of a positive relationship, which is consistent with the economic logic, that is, by increasing the green GDP by 1%, the agricultural output will increase by 3%, because the increase in the green and environmentally friendly GDP, which takes into account the reduction of pollution and carbon emissions, which is reflected in the increase in agricultural output. LX_3 cultivated areas came with a positive sign consistent with the economic logic, which reflects an increase in the level of agricultural output and that the increase in cultivated areas by 1% will increase agricultural output by 77%, which is significant at the level of 1% as the cultivated areas have a significant impact on increasing agricultural output, especially these areas increase if they are used perfectly and combat desertified lands or threatened by desertification, while the LX_6 parameter, which is water imports, came with a negative and significant sign at the level of 1% It is contrary to the economic logic, which is attributed to the scarcity of water imports in Iraq, which greatly affected the agricultural reality. As for the error correction model, it came with a negative and significant sign at the level of 1%, which was -0.56, and this indicates that 56% of the imbalance is corrected in the long term and that the necessary and sufficient conditions are agreed in this model.

Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

Table 5. Short-term model equation

ARDL Error Correction Regression
Dependent Variable: D(LY)
Selected Model: ARDL(4, 1, 0, 0, 1, 1)
Case 2: Restricted Constant and No Trend
Date: 12/04/23 Time: 09:48
Sample: 2003 2022
Included observations: 16

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LY(-1))	-0.587177	0.058296	-10.07237	0.0021
D(LY(-2))	0.324251	0.049835	6.506487	0.0074
D(LY(-3))	-0.756003	0.048064	-15.72900	0.0006
D(LX2)	0.031958	0.039328	0.812602	0.4759
D(LX5)	0.771419	0.033492	23.03267	0.0002
D(LX6)	-0.173596	0.027464	-6.320979	0.0080
CointEq(-1)*	-0.562139	0.034295	-16.39152	0.0005

R-squared	0.987100	Mean dependent var	0.042102
Adjusted R-squared	0.978500	S.D. dependent var	0.194101
S.E. of regression	0.028461	Akaike info criterion	-3.980962
Sum squared resid	0.007290	Schwarz criterion	-3.642955
Log likelihood	38.84770	Hannan-Quinn criter.	-3.963654
Durbin-Watson stat	1.972835		

* p-value incompatible with t-Bounds distribution.

Source: Eviews.12 software output

Long-term equation or cointegration

The long-term equation or joint integration between the independent variables and the dependent variable was as follows:

$$EC = LY - (0.5729LX_2 + 0.1727LX_3 + 0.0190LX_4 + 0.9405LX_5 - 0.1370LX_6 - 12.0372)$$

The LX_2 sign, which represents the green GDP, was positive, and it refers to the long-term direct relationship between the green GDP and the agricultural output in Iraq, as shown by the LX_3 parameter, which is the investment allocations for the agricultural sector, which is positive and acknowledges the existence of a positive relationship between investment allocations and agricultural output, which is significant at the level of 0.05. The LX_4 it is the parameter of environmental allocations in Iraq, which came with a positive sign is also 0.019, which proves the direct relationship between environmental allocations and the dependent variable, while the LX_5 parameter, which is the cultivated areas, came with a positive sign with an increase in cultivated areas agricultural output increases, while the parameter of water imports to Iraq LX_6 came with a negative sign contrary and this reflects the decrease what is clear in the water imports to Iraq during the period studied due to the water crisis that Iraq suffers from, which is attributed to the decrease in water revenues for the Tigris and Euphrates rivers due to the construction of dams from upstream countries Turkey and Iran, which led to reducing water imports to the Euphrates River to more than one third, as well as the case for the Euphrates River, as its annual revenues decreased by 47% after the construction of dams, which led to a significant reduction in cultivated areas (Hussein, et al,2019).

Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

Table 6. Long-term model equation

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LX2	0.572850	0.157836	3.629400	0.0360
LX3	0.172734	0.076553	2.256388	0.0209
LX4	0.019036	0.080397	2.368157	0.0372
LX5	0.940524	0.343963	2.734377	0.1813
LX6	-0.137003	0.282206	-0.485473	0.6606
C	-12.03719	10.44192	-1.152775	0.3325
EC = LY - (0.5729*LX2 + 0.1727*LX3 + 0.0190*LX4 + 0.9405*LX5 -0.1370 *LX6 - 12.0372)				

Source: Eviews.12 software output

Diagnostic tests of the model

1. Testing the normal distribution of residuals

It is clear from (Figure 2) that the probability value of the JB test was 0.912, which is greater than 0.05, which means that the null hypothesis is accepted and that the model is good and the residuals is normally distributed.

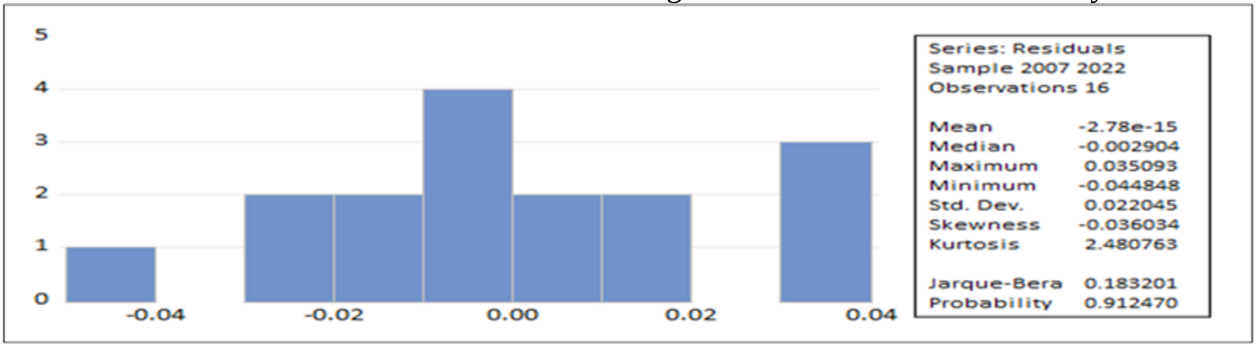

Figure 2. Normal distribution of residuals through the Jargue - Bera test

Source: Eviews.12 software output

2. Multicollinearity Test

(Table 7) that all VIF values are less than 10 and this is evidence that there is no problem of Multicollinearity between the illustrative variables and this means rejecting the alternative hypothesis and accepting the counting hypothesis that there is no problem of linear multiplicity between the illustrative variables.

Table 7. VIF test result to detect Multicollinearity

Variance Inflation Factors			
Date: 01/10/26 Time: 02:24			
Sample: 2003 2022			
Included observations: 16			
Variable	Coefficient Variance	Uncentered VIF	Centered VIF
LY(-1)	0.030822	51794.92	7.748663
LY(-2)	0.061007	101838.1	8.597121
LY(-3)	0.029732	49142.10	9.641795
LY(-4)	0.022384	36589.54	6.355435
LX2	0.018309	44430.85	8.835332
LX2(-1)	0.016489	39655.14	8.218895
LX3	0.003761	4696.606	8.290177
LX4	0.000679	368.2406	8.996056
LX5	0.016797	28992.29	6.110314
LX5(-1)	0.009626	16643.46	9.504597
LX6	0.012816	1189.885	9.181713
C	15.65057	103048.9	NA

Source: Eviews.12 software output

Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

3. Serial correlation LM test: (Table 8) shows the detection of the existence of the autocorrelation problem using the LM test, if the probability value is 0.4663, which is greater than 0.05, this means that the null hypothesis is accepted and that the model does not suffer from the existence of the autocorrelation problem.

Table 8. LM test result for autocorrelation problem

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	1.799682	Prob. F(2,1)	0.4663
Obs*R-squared	9.413289	Prob. Chi-Square(2)	0.0019

Source: Authors using Eviews.12

4. Heteroscedasticity Test

It is noted from (Table 9), shows the detection of the problem of Heteroscedasticity through the use of the Breusch-Pagan-Godfrey test, and it is noted from the table that the probability value was 0.111, which is greater than 0.05, which means that the null hypothesis is accepted and that the model is good and does not suffer from the problem of Heteroscedasticity.

Table 9. BPG test result for the detection of variance instability problem

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoskedasticity			
F-statistic	4.810167	Prob. F(12,3)	0.1110
Obs*R-squared	15.20951	Prob. Chi-Square(12)	0.2302
Scaled explained SS	0.395889	Prob. Chi-Square(12)	1.0000

Source: Authors using Eviews.12

5. Structural stability tests

The structural stability of the ARDL model coefficients is revealed by the CUSUM and CUSUMSQ cumulative sum tests, as it can be seen from (Figure 3) that the graph line of the CUSUM cumulative sum test fell within the critical limits at the significant level 0.05, which means that the parameters are characterized by structural stability, as well as for the cumulative sum test of the squares of successive remainders CUSUMSQ, as it is noted from the figure that the graph also occurred within the critical limits at the significant level 0.05, which means that the parameters are characterized by structural stability during the duration of the study, and we conclude from these two tests the model parameters used and estimated are structurally stable and consistent as the short-term parameters are consistent with the long-term parameters in the estimated model.

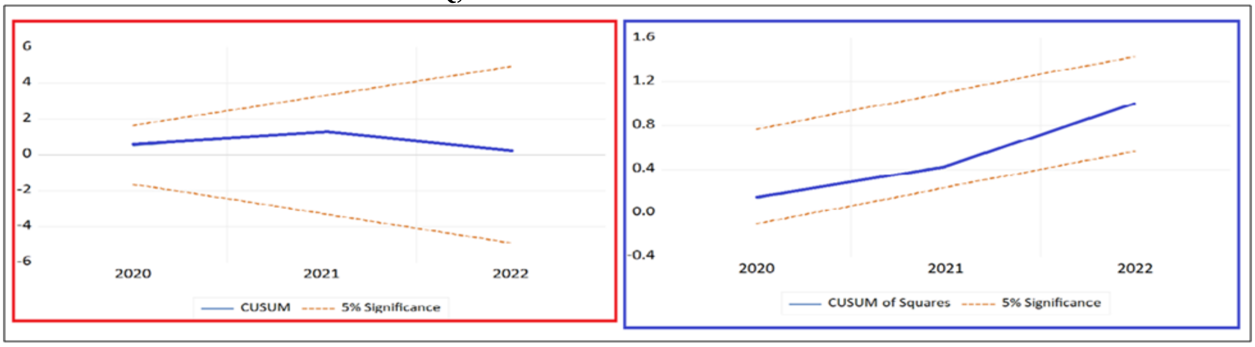

Figure 3. CUSUM and CUSUMSQ stability tests

Source: Authors using Eviews.1

CONCLUSION

The green GDP (after excluding the costs of environmental degradation from the GDP) had a great and clear role in its impact on agricultural GDP (sustainable agricultural value) because of its clear impact in pushing the development process forward by following modern methods of the environment in agriculture and reducing pollution and emissions. Also, there is a clear role for cultivated areas in which the output increases and vice versa, and this is similar to the short-term and long-term analysis in the model. There is a clear scarcity and shortage of fhows of the Tigris and Euphrates rivers in Iraq during the study period due to the policies of neighbour countries, in addition to the

Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

mismanagement of this vital file, which has a great impact on the life of the Iraqi individual and the cultivation of strategic crops in Iraq. Therefore, the researchers recommend the need to follow scientific methods and modern methods to reduce the emissions of toxic and greenhouse gases, which greatly affect pollution and agricultural production, and follow methods in reducing the use of fertilizers and unnecessary nutrients and adhere to the small percentages of them. The research recommends working to reduce desertified areas and address lands threatened by desertification to include them in good agricultural lands, which will be directly reflected in the increase in agricultural output in Iraq. As well as, encouraging the use of modern methods and methods in irrigation through fixed and pivotal systems and sprinklers to reach the optimal use of water and raise the efficiency of water use in light of the scarcity of water imports during the study period.

ACKNOWLEDGEMENT

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

DECLARATION OF FUND

The authors declare that they have not received a fund.

AUTHOR/S DECLARATION

We confirm that all Figures and Tables in the manuscript are original to us. Additionally, any Figures and images that do not belong to us have been incorporated with the required permissions for re-publication, which are included with the manuscript.

Author/s signature on Ethical Approval Statement.

Ethical Clearance and Animal welfare

Funds:

AUTHOR'S CONTRIBUTION STATEMENT

REFERENCES

Abbas, N., Wasimi, S., Al-Ansari, N., & Sultana, N. (2018). Water resources problems of Iraq: Climate change adaptation and mitigation. Journal of Environmental Hydrology, 26. https://doi.org/10.1007/978-3-031-71356-9_6.

Ahmed Younis Jabbar Al Khazraji. (2024). The impact of diversifying sources of income on achieving economic growth in Iraq for the period (2004-2022). Tikrit Journal of Administrative and Economic Sciences, 20(66, part 2), 59–80. https://doi.org/10.25130/tjaes.20.66.2.4 .

Ali, E. (2017). Estimation the Demand on Human Labor by Using Dual Approach in Iraqi Agricultural Sector. IOSR Journal of Agriculture and Veterinary Science, 45-50.

Hassan, R. F., & Al-Badri, B. H. (2025). An economic analysis of the impact of agricultural loans and agricultural subsidies on agricultural labor productivity in Iraq for the period (2000-2023). Jornal of Al-Muthanna for Agricultural Sciences, https://doi.org/10.33095/gatvpw86 .

Al-Maliki, A. M. 2017. Shifting towards a green economy: international experiences. Arab Journal of Management, 37(4): 167-196. https://doi.org/10.21608/aja.2017.17573 .

Awf, A. A., Ali, E. H., & Shukr, A. S. (2024). Estimating off–farm labor supply and analysing relationship between risk and farm size. Iraqi journal of agricultural sciences, 55(1), 526-541. https://doi.org/10.36103/afwgrz97 .

Bina, Olivia. "The green economy and sustainable development: an uneasy balance?." Environment and Planning C: Government and Policy 31, no. 6 (2013): 1023-1047. https://doi.org/10.1068/c1310j.

Ewaid, S. H., Abed, S. A., & Al-Ansari, N. (2020). Assessment of main cereal crop trade impacts on water and land security in Iraq. Agronomy, 10(1), 98. https://doi.org/10.3390/agronomy10010098 .

Georgeson, L., Maslin, M., & Poessinouw, M. (2017). The global green economy: a review of concepts, definitions, measurement methodologies and their interactions. Geo: Geography and Environment, 4(1), e00036. https://doi.org/10.1002/geo2.36.

Hassan, R. F., & Al-Badri, B. H. (2025). An economic analysis of the impact of agricultural loans and agricultural subsidies on agricultural labor productivity in Iraq for the period (2000-2023). Jornal of Al-Muthanna for Agricultural Sciences, 12(1). 0.52113/mjas04/12.1/23 .

Hussein, I. A. 2017. Obstacles to sustainable agricultural development in Iraq - Solutions and treatments. Journal of Economic and

Administrative Sciences, 95 (23): 346-366. http://dx.doi.org/10.33095/jeas.v23i95.392 .
Hussein, M. B., K. K. Al-Kinani and R. H. Hassoun. 2019. The water crisis and its relationship to achieving sustainable agricultural development in Iraq (real causes and proposed solutions). Journal of Economic and Administrative Sciences, 25 (114): 310-332.
http://dx.doi.org/10.33095/jeas.v25i114.1738 .
Hussein, M. B., K. K. Al-Kinani and R. H. Hassoun. 2020. The reality of agricultural policies and their effectiveness in achieving sustainable agricultural development in Iraq. Journal of Economic and Administrative Sciences, 26 (117): 327-346.
http://dx.doi.org/10.33095/jeas.v26i117.1817 .
Janabi, R. A. and A. R. Al-Kalabi. 2022. Sustainable green economy in Iraq: reality and the foreseeable future. American International Journal of Humanities and Social Sciences, 17(1): 1-19.
Kareem, L. H., Al-Hiyali, A. D. K., & Hamid, M. M. (2023, December). An Economic Analysis of Indicators of Sustainable Agricultural Development in Iraq (Environmental Indicators as a case study). In IOP Conference Series: Earth and Environmental Science (Vol. 1252, No. 1, p. 012178). IOP Publishing. 10.1088/1755-1315/1252/1/012178 .
Loiseau, E., Saikku, L., Antikainen, R., Droste, N., Hansjürgens, B., Pitkänen, K., ... & Thomsen, M. (2016). Green economy and related concepts: An overview. Journal of cleaner production, 139, 361-371. https://doi.org/10.1016/j.jclepro.2016.08.024 .
Mohammad, S. L., Jassim, O. A., & Latif, B. F. (2023). The impact of some macro variables on the agricultural domestic product in Iraq for the period 1990-2020. International Journal of Agricultural & Statistical Sciences, 19. https://iopscience.iop.org/article/10.1088/1755 1315/1060/1/012146/meta#:~:text=10.1088/1755%2D1315/1060/1/012146.
Mohammed, M. K., Hameed, K. A., & Musa, A. J. (2023). Water savings, yield, and economic benefits of using SRI methods with deficit irrigation in water-scarce southern Iraq. Agronomy, 13(6), 1481.
https://doi.org/10.3390/agronomy13061481 .
Muhammad, O. H. 2020. The possibility of achieving sustainable agricultural development in Iraq. Journal of Economic and Administrative Sciences, 26 (121), 369-382. http://dx.doi.org/10.33095/jeas.v26i121.1981 .
Muhyaddin, S. (2023). Agriculture through Industry 4.0: Management, Challenges, and Opportunities in Hostile Environment: The Case of Iraq. Engineering Proceedings, 40(1), 27.
https://doi.org/10.3390/engproc2023040027 .
Mustafa, J. S. 2021. Activating the contribution of the green economy in achieving sustainable development and food security, "an applied study focusing on Egypt". Scientific Journal of Business and Environmental Studies 12(3).
https://doi.org/10.21608/jces.2021.204605 .
Nandy, S., Fortunato, E., & Martins, R. (2022). Green economy and waste management: An inevitable plan for materials science. Progress in Natural Science: Materials International, 32(1), 1-9.
https://doi.org/10.1016/j.pnsc.2022.01.001 .
Neda, R. M., & Ahmed, J. S. (2025, April). The Impact of Water Resources Use on Food Security Indicators (an Analytical Study of the Agricultural Sector in Iraq). In IOP Conference Series: Earth and Environmental Science (Vol. 1487, No. 1, p. 012223). IOP Publishing. 10.1088/1755-1315/1487/1/012223 .
Othman, A. A., Shihab, A. T., Al-Maamar, A. F., & Al-Saady, Y. I. (2019). Monitoring of the land cover changes in Iraq. In Environmental Remote Sensing and GIS in Iraq (pp. 181-203). Cham: Springer International Publishing.
https://doi.org/10.1007/978-3-030-21344-2_8 .
Salman, S. A., Shahid, S., Ismail, T., Ahmed, K., Chung, E. S., & Wang, X. J. (2019). Characteristics of annual and seasonal trends of rainfall and temperature in Iraq. Asia-Pacific Journal of Atmospheric Sciences, 55(3), 429-438.
https://doi.org/10.1007/s13143-018-0073-4 .
Sulich, A. (2020). The green economy development factors. Vision, 6861-6869. https://wir.ue.wroc.pl/info/article/WUTbbab8b7e64ee4ef49c7bcda051d28d06/ .

Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

Tao, H., Hashim, B. M., Heddam, S., Goliatt, L., Tan, M. L., Sa'adi, Z., & Yaseen, Z. M. (2023). Megacities' environmental assessment for Iraq region using satellite image and geo-spatial tools. Environmental Science and Pollution Research, 30(11), 30984-31034. https://doi.org/10.1007/s11356-022-24153-8 .

Zhang, L., Xu, M., Chen, H., Li, Y., & Chen, S. (2022). Globalization, green economy and environmental challenges: state of the art review for practical implications. Frontiers in Environmental Science, 10, 870271. https://doi.org/10.3389/fenvs.2022.870271.

Iraqi Journal of Agricultural Sciences –2026:57(2):476-487
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/sttq8376

تحليل أثر الاقتصاد الأخضر على التنمية الزراعية المستدامة في العراق للمدة (2003 – 2022)

لينا كاظم سفيح[1]، علي صلاح شكر[2]
قسم الاقتصاد الزراعي، كلية علوم الهندسة الزراعية، جامعة بغداد،العراق

المستخلص

يهدف البحث الى دراسة أثر الاقتصاد الأخضر على تحقيق التنمية الزراعية المستدامة في العراق للمدة (2003–2022)، استخدم البحث الأساليب الكمية في تحليل الناتج المحلي الإجمالي، الناتج المحلي الأخضر، التخصيصات الاستثمارية للقطاع الزراعي، التخصيصات البيئية، المساحات المزروعة والواردات المائية لنهري دجلة والفرات. لمعرفة تأثير هذه المتغيرات على الناتج المحلي الزراعي. تم تقدير المعلمات في أطار انموذج الانحدار الذاتي ذو الابطاء الموزع. توصلت النتائج الى أن كل من الناتج المحلي الإجمالي الأخضر، التخصيصات الاستثمارية للقطاع الزراعي، التخصيصات البيئية) جاءت اشارتها موجبة وكمتفقة مع منطق النظرية الاقتصادية، اما المساحات المزروعة جاءت اشارتها موجبة ألا أنها غير معنوية إحصائيا، أما بالنسبة للواردات المائية لنهري دجلة والفرات قد جاءت أشارتها سالبة ولا تتفق مع المنطق الاقتصادي بسبب الانخفاض الكبير لها خلال مدة الدراسة، وتوصل البحث الى أن الناتج المحلي الإجمالي الأخضر له الدور الأكبر على الناتج المحلي الزراعي وتأثيره واضح في دفع عملية التنمية، وأوصى البحث بضرورة اتباع الأساليب العلمية والطرق الحديثة للتقليل في انبعاثات الغازات السامة والدفيئة والتي تؤثر بشكل كبير على التلوث وعلى الإنتاج الزراعي.

الكلمات المفتاحية: التخصيصات الاستثمارية، التخصيصات البيئية، الناتج المحلي الإجمالي الاخضر.

***البحث مستل من رسالة ماجستير للباحث الأول.**