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Economic and agricultural variables governing agricultural production in Iraq: An analytical econometric study

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Abstract

This study aimed to determine the impact of economic and agricultural variables governing agricultural production in Iraq, namely (agricultural worker productivity, net agricultural trade exchange rates, agricultural subsidies, agricultural loans, agricultural labor force, cultivated land, and the rate of agricultural trade openness), on agricultural output in Iraq. Data were collected from various secondary sources for the period 1990-2025. The extended Dickey-Fuller time series stationary test was performed to estimate the model parameters using a specific model. ARDL This was done to determine the impact of the aforementioned economic variables on agricultural output. The study revealed that net terms of trade have an inverse relationship with agricultural output, while agricultural labor productivity, agricultural subsidies, agricultural loans, and the agricultural workforce all had a direct relationship with agricultural output. The variables of cultivated land and agricultural trade openness were excluded due to their negative impact on the estimated model. The research recommended...usually Restructuring agricultural credit policy and shifting from cash loans to in-kind financing

directed towards modern technologies (such as smart irrigation systems and agriculture the Smart Agriculture and Preservation To ensure that loans are not diverted for personal consumption and Adopting policies Smart protection (Smart Protectionism) such as seasonal tariffs to protect local crops during harvest seasons.

Key words: Net agricultural trade exchange rates – agricultural labor productivity – agricultural loans – model ARDL.

Introduction

Undoubtedly, there are economic and agricultural variables and factors that affect agricultural production more than others, especially in light of the free trade policies advocated by the World Trade Organization.(2) Agriculture plays a vital role in providing food, creating jobs, and achieving high levels of food security and sustainability, especially given the significant impact of agricultural trade on Agricultural growth(17Agriculture needs sustainability to meet the growing demand for basic food commodities and changes in stockpiles, especially with population growth, rising incomes, and urbanization.(7)(14) &Foreign trade encourages technology transfer and the application of new methods in both production and consumption, however The sector Agriculture in many countries, especially those with rentier economies It witnessed a significant decline due to several factors, including Economic and political transformations Demographics and weak government support(5).One of the most prominent factors that control Agricultural sector performance she Agricultural labor productivity and net agricultural trade exchange rates Net Barter Terms of Trade and support policies Governmental, Agricultural loans, the size of the agricultural workforce, and the area of cultivated land. and degree Agricultural trade liberalization The productivity of agricultural labor is an important indicator of the efficiency and level of development of the agricultural sector in any country. The rate at Exchange Commercial agricultural

The pure one is considered index Important ATo determine the extent in put agricultural sector in foreign trade Its competitiveness, its commercial standing among countries, and its export capacity The decline in this rate negatively impacts farmers' income. Awareness of the level of agricultural exports, and Government support is an important tool for encouraging local production and reducing input costs. Agricultural assistance, which consists of financial or in-kind aid provided by the government to achieve economic stability, promote social justice, and achieve agricultural growth.(4)&(13).As for agricultural trade liberalization It is an indicator of Product competitiveness agriculture al Local Its ability to flow to and from abroad, freeing it from all restrictions and obstacles, and maintaining its prices as much as possible in light of high inflation rates.(8).The importance of Research from the role that game The agricultural sector in achieving Sustainability Food security in Iraq, Where research contributes in Analyzing the impact of the most influential variables on the performance of the agricultural sector and clarifying The relationship between The most important of these variables is the net agricultural trade exchange rate. And Government support and trade liberalization agriculture al and between Sector performance agricultural. Presentation A scientific vision that helps in adopting economic and agricultural policies and commercial More effective Contributes in growth Local production, and reducing dependence on imports To improve agricultural output in Iraq. The agricultural sector in Iraq He faces Challenges These include a decline in net agricultural trade rates and weakness and few Support Governmental, The impact of trade liberalization on the competitiveness of local products Which sometimes reaches the point of drowning. That Research problem Looking in The governing power of certain economic and agricultural variables, particularly net agricultural trade exchange rates, government subsidies, and agricultural trade liberalization. The performance of the agricultural sector in Iraq, and how

to improve economic policies to boost local production.. This research aims to study the impact of several key factors on the agricultural sector in Iraq, including agricultural labor productivity, net agricultural trade, government subsidies, and agricultural trade liberalization. It also seeks to develop recommendations for improving the efficiency of the agricultural sector by integrating government subsidy policies with agricultural foreign trade policies. The research is based on the hypothesis that a relationship exists between these factors. Positive correlation exists between agricultural worker productivity, net agricultural trade exchange rates, agricultural subsidy amounts, agricultural loans, agricultural workforce, cultivated land, and the rate of agricultural trade openness with agricultural output in Iraq.

And The data was used from its secondary sources, namely the Ministry of Planning – Central Agency For statistics, see the website of the Food and Agriculture Organization of the United Nations (FAO) and the website of the World Trade Organization.(WTO)As for The analysis method used The two descriptive styles Quantitative analysis using statistical software E-views 12and use A model slope with Distributed deceleration ARDL.

The model used:

LY=F (LX1, LX2, LX3, LX4, LX5, LX6, LX7)

LY: natural logarithm of GDP Agricultural.

LX1LogarithmNatural to agricultural labor productivity.

LX2:natural logarithm net agricultural trade exchange rates NBTT.

LX3: Natural logarithm For government support amounts.

LX4:natural logarithm For agricultural loan amounts.

LX5:natural logarithm For the number of agricultural workers.

LX6:natural logarithm For cultivated land areas.

LX7:natural logarithm For agricultural trade liberalization.

Reference review

- Al-Atabi's study (2022) on measuring and analyzing the relationship between net trade exchange rates and agricultural output in Iraq for the period (1990-2019).,The study attempted to answer the following question: Is there an impact of net external trade exchange rates on agricultural indicators, most importantly agricultural growth represented by agricultural GDP in Iraq?
- Ibrahim's study (2022) on agricultural trade exchange rates and their determinants in Iraq for the period (2000-2020),The study identified the factors affecting net agricultural trade exchange rates in Iraq, which are (the quantity of agricultural exports, the quantity of agricultural imports, the exchange rate of the Iraqi dinar against the US dollar, the inflation rate, and national income).
- Al-Sumaida' i's study (2022) on the factors affecting the demand for agricultural loans and the impact of agricultural loans on the growth and improvement of agricultural output in Iraq, with a focus on the causal relationship between agricultural loans and agricultural output.
- Al-Safari's study (2023) on the impact of trade liberalization on economic growth in Iraq, The study aimed to measure and analyze the impact of trade liberalization on economic growth for the period (2004-2021). The study concluded that the trade liberalization policy followed led to varying levels of impact on the economic growth rate.
- The study by Muhanna and Al-Badri (2026) on the relationship between agricultural trade liberalization and agricultural growth in Iraq for the period (1990-2021). The research was based on an analysis of the Iraqi case as a country opening up to the global market.

Table (1) Dependent variable and independent variables used in the study in Iraq for the period (1990-2025)

Agricultural trade liberalization (%) **X7** **(8)**	cultivated land (One million dunams) **X6** **(7)**	agricultural workforce (One thousand workers) **X5** **(6)**	Agricultural loans (One million dinars) **X4** **(5)**	Government support amounts (One million dinars) **X3** **(4)**	Net agricultural trade exchange rates (%) **X2** **(3)**	Agricultural worker productivity (Dinar) **X1** **(2)**	agricultural output (One million dinars) Y (1)	**Year**
11.7	14.5	895	319823.5	177500.1	113.2	995312.3	4613.3	1990
0.89	21.8	896	212678.2	178444.9	204.5	988765.5	6629.1	1991
0.27	28.3	907	296542.2	166235.1	170.5	1023465.8	22872.7	1992
0.59	13.8	917	338871.5	176453.0	151.9	1289768.9	49864.0	1993
0.06	13.1	930	401256.8	142361.7	101.8	1455672.1	333524.2	1994
0.02	13.0	943	434486.8	157631.8	58.2	1671239.2	1378274.3	1995
0.01	12.7	961	521765.8	112761.6	60.9	1865111.4	1208982.3	1996
0.01	12.9	977	564328.9	101203.1	85.4	1943198.3	1276367.1	1997
0.003	14.1	1000	588976.2	104675.9	100.0	2034527.6	1868397.8	1998
0.004	13.6	1015	611245.8	102888.4	124.5	2165487.0	2482616.5	1999
0.004	14.5	1015	652143.7	107859.0	109.3	2292883.3	2327277.2	2000
0.003	14.0	1078	811220.2	206491.5	151.2	2656303.3	2863495.0	2001
0.003	13.5	1116	959631.0	244070.0	60.0	3147543.0	3512658.6	2002
0.009	12.7	1193	722265.8	322356.0	68.8	2084539.0	2486865.5	2003
0.008	13.7	1229	734626.3	187334.0	60.9	3005506.9	3693768.0	2004
0.004	14.7	1266	1243804.2	154133.4	74.5	4000124.8	5064158.0	2005
0.06	14.1	1304	2353682.7	289472.0	127.7	4270694.0	5568985.7	2006
9.22	14.3	1343	3002137.9	392636.0	77.0	4090999.3	5494212.4	2007
1.80	14.2	1443	4587454.0	1059680.0	57.0	4187122.0	6042017.7	2008
8.60	13.0	1452	51761907.0	864529.0	74.0	4705614.3	6832552.1	2009
4.19	12.0	1476	51512441.0	1361003.0	69.7	5668178.9	8366232.4	2010
15.10	13.0	1461	59376537.0	917714.0	84.2	6788717.3	9918316.8	2011
51.30	12.7	1504	72612878.0	1120608.0	81.5	697439.5	10484949.3	2012
23.60	14.5	1558	83619037.0	1566785.0	103.7	8373463.4	13045856.4	2013
14.60	15.5	1583	85031460.0	1551216.0	108.0	8293507.3	13128622.6	2014
8.60	13.0	1623	75277.8	1148708.0	95.1	5028200.2	8160769.9	2015
36.99	11.9	1637	51997.8	279641.0	96.9	4784389.7	7832046.9	2016
184.10	12.6	1645	4954.5	447061.8	135.6	4011175.7	6598384.8	2017
227.70	11.21	1721	5760.5	451748.8	91.8	4399921.6	6322747.2	2018
153.10	15.6	1801	10210.6	451748.8	119.2	5780774.0	8766710.8	2019
10.90	14.6	1786	4315.0	451748.8	101.7	7352142.8	8395649.3	2020
80.50	12.5	1660	350.4	263231.0	122.4	7176396.4	9197513.9	2021
9.90	11.2	1200	377.6	263231.0	98.9	9102323.3	10922787.9	2022
33.90	12.7	1548	2769.4	1000000.0	94.1	7744731.3	11349847.5	2023
41.44	13.2	1467	17823.4	284596.7	112.7	8237612.4	12765490.4	2024
39.89	12.9	1511	16596.8	298846.5	122.2	7864902.0	12498476.7	2025

And the Source: The columns (1)(2)(4),(5),(6),(7) Ministry Planning /Central Statistical Organization-National Accounts Directorate Directorate of Agricultural Statistics.

Agricultural imports × 100From the researcher's Agricultural exports /Price index Net = Price index ltural trade Column (3) Rateatagricu account.

Agricultural ×100 from the Imports(agricultural)Output Agricultural exports +value Agricultural = (value Column(8)trade openness researcher's account.

Materials and working methods

Firstly:-Agricultural labor productivity

The labor element is one of the important elements that affect agricultural production and is the biggest influence on the productivity of agricultural labor. This influence takes two sides, either a negative influence or a positive influence. The nature of the workforce and their numbers follow the development of the country. In developed countries, we find that the workforce is smaller than the workforce in developing countries, but it is more productive due to the reliance of developed countries on modern technologies in agriculture compared to developing countries. However, in recent years, the number of workers in developing countries has begun to decrease due to the weak financial return provided by the agricultural sector compared to other sectors.

NBTT II: - Net agricultural trade terms

This is a standard used to assess the impact of agricultural foreign trade on the performance and growth of the agricultural sector. It is a dynamic indicator reflecting the competitiveness of a country's agricultural foreign trade and is defined as the ratio of agricultural export prices to agricultural import prices multiplied by 100 for a given year. It reflects the agricultural sector's ability to generate gains and benefit from foreign trade. When the ratio is greater than 100, it means that the agricultural export price index is higher than the agricultural import price index, thus benefiting farmers and the agricultural sector from foreign trade. Conversely, a ratio below 100 indicates that agricultural import prices are higher than agricultural export prices, suggesting a decline in the agricultural sector's competitiveness, increased burdens on the sector, and potential losses in trade. In Iraq, the agricultural sector faces a deteriorating net agricultural trade ratio due to high domestic production costs.

Third:- Government support

The support Government He is one The most important tools adopted by the state to advance the sector agricultural, Government support In shapes Including support Direct financial support to farmers For strategic crop prices Subsidizing agricultural input prices and providing agricultural and extension services. And marketing, Agricultural business companies, as well as providing modern agricultural technologies in their various forms. empiricism. From Yes, increase Login and Management Supply agricultural commodities and the impact on Its cost, This support aims to stimulate production. local agriculture Reducing production costs and achieving self-sufficiency and security Food from Agricultural commodities, raising farmers' income levels, stabilizing prices in the local market, and protecting local products from competition. foreign, However, the effectiveness of support depends on its efficiency and fairness in distribution. and its continuity(6) & (10).

Fourth:-Agricultural loans

Agricultural loans are a means of advancing the agricultural sector and are crucial to its growth. They serve as a tool used by the government to guide development policies for the sector. Furthermore, agricultural loans are granted to farmers to assist them in their farming activities. These loans are provided from numerous and diverse sources, and their impact on agricultural investments, agricultural labor productivity, and overall agricultural output has been proven.

Fifth:-agricultural workforce

These are all categories that contribute to agricultural production, including independent farmers (landowners), wage laborers, family workers, seasonal workers, and migrant workers. Agricultural labor is characterized by a number of structural features, including high seasonality, reliance on inherited knowledge, sensitivity to climate change, low wages, and limited social protection.(12).

Sixth:-cultivated land

Agriculture is a crucial productive force, as agricultural output can

increase through both horizontal and vertical expansion of cultivated land. Understanding cultivated land is not only important for highlighting its significance and impact on the agricultural sector, but also for identifying the obstacles it faces. Cultivated land in Iraq has been subjected to numerous problems that have led to its shrinkage. Among the most significant of these problems is water scarcity. The water crisis has triggered a series of issues, beginning with financial losses for farmers and extending to rural areas. Furthermore, it has led to the fragmentation of landholdings into small, stunted plots. The most significant problem, however, is urbanization and the encroachment of urban development onto these lands.

Seventh: Agricultural trade liberalization

Agricultural trade liberalization means removing customs restrictions from agricultural trade.(Definitions)Customs and quotas Import Allowing the easy entry and exit of agricultural goods across borders. Trade liberalization is a double-edged sword; on the one hand, it contributes to diversifying sources of agricultural goods and improving production efficiency, but on the other hand, it can lead to increased foreign competition and weakened competitiveness of domestic products if appropriate internal support and reforms are not implemented. Especially in the face of dumping policies. In Iraq, the trade liberalization after 2003 clearly affected agricultural markets, leading to an increase in agricultural imports The decline in prices of some local crops is due to policy dumping, This negatively affected farmers' income and production. Local (18).

Results and discussion

It was completed Model estimation for Follow the steps The following: test My stability؛Time series(Unit Root Test)(Augmented Dickey Fuller): He threatens This test To measure the stability of time series As shown in the table (2),And Between the test

variables The model is not Stable at the level Original but It settled after taking the difference The first and most suitable model is (9)ARDL.

Table (2) Results of the extended Dickey-Fuller test Stability of variables In the model

variables test	sig.	ly	lx1	lx2	lx3	lx4	lx5
at level							
With constant	t-statistic	-5.358225	-5.221683	-5.361280	-0.313154	-2.680434	-2.218815
	prob.	0.0002	0.0002	0.0001	0.9121	0.0884	0.2045
		***	***	***	no	*	No
With constant & trend	t-statistic	-2.844706	-3.143543	-3.131696	-2.562902	-2.789458	-1.047460
	prob.	0.1963	0.1138	0.1164	0.2984	0.2111	0.9225
		no	No	No	no	No	No
none	t-statistic	-0.623217	2.144833	2.027847	0.929451	-0.388838	0.844380
	prob.	0.4392	0.9908	0.9880	0.9020	0.5357	0.8882
		no	No	No	no	No	No
at first difference							
with constant	t-statistic	-2.929381	-2.967688	-3.029605	-5.973257	-3.426509	-6.961541
	prob.	0.0534	0.0492	0.0431	0.0000	0.0181	0.0000
		**	**	**	***	**	***
with constant & trend	t-statistic	-3.186389	-3.857987	-3.976429	-5.837005	-3.860574	-9.715836
	prob.	0.0356	0.0265	0.0204	0.0002	0.0273	0.0000
		**	**	**	***	**	***
none	t-statistic	-3.130540	-2.693774	-2.739772	-5.595787	-3.314510	-6.380524
	prob.	0.0028	0.0088	0.0078	0.0000	0.0018	0.0000
		**	*	*	***	**	***

Source: Outputs of the statistical programEviews12)).

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level, No: Non-material.

Table (3) Test Var

VAR Lag Order Selection Criteria
Endogenous variables: LY LX5 LX4 LX3 LX2 LX1
Exogenous variables: C
Date: 23/5/26 Time: 07:41
Sample: 1990 2025
Included observations: 35

		HQ	SC	AIC	FPE	LR	LogL	Lag
0	-265.4708	NA		0.341688	18.79109	19.12113	18.89445	
1	-128.5386	198.3156		0.000880	12.72680	15.36710	13.55371	
2	-77.06023	49.70327		0.001452	12.55588	17.50643	14.10633	
3	128.2270	99.10420*		3.71e-07*	1.777445*	9.038257*	4.051441*	

*Indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

. E-views 12Source: outputs The program Statistician

Table (3) It appears that the optimal duration for slowing down is (3). LR, FPE, AIC, SC, HQ shows the slowdown duration test for the criteria

Table (4) Test Bounds Test Between independent variables and dependent variable

F-Bounds Test			Null Hypothesis: No relationship levels	
Test Statistics	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	48.44523	10%	2.08	3
K	6	5%	2.37	3.38
		2.5%	2.7	3.73
		1%	3.06	4.20
Actual Sample Size	35		Finite Sample: n=35	
		10%	2.321	3.418
		5%	2.814	4.019
		1%	3.9	5.411
			Finite Sample: n=30	
		10%	2.407	3.515
		5%	2.91	4.189
		1%	4.122	5.766

Source: Statistical program outputs (E-views 12).

Table (4) illustrates the boundary test ((Bounds Test). The F value appeared with an amount of (48.44) as shown in Table (4). When compared with the special tables prepared by the economist Pesaro, since the test contains two limits (upper and lower), the calculated F value came out greater than the upper limit of the 1% significance level of (4.20). Therefore, we reject the null hypothesis, which states that there is no long-term relationship between the independent variables and the dependent variable, and we accept the alternative hypothesis of the existence of a long-term equilibrium relationship. After passing the bounds test, the relationship is estimated in the short and long runs.

Table (5) Error Correction Modeless

ARDL Error Correction Regression
Dependent Variable: D(LY)
Selected Model: ARDL (3, 3, 3, 3, 3, 3,)
Case 1: No Constant and No Trend
Date 23/5/26 Time: 7:37
Sample: 1990-2025

Included observations: 35

Prob.	t-Statistic	Coefficient	Std. Error	Variable
0.0013	27.40166	0.018906	0.518065	D (LY (-1))
0.0105	-9.699208	0.015349	-0.148874	D (LY (-2))
0.0520	-4.725735	0.011158	0.052732	D(LX1)
0.0015	25.50016	0.011181	0.285107	D(LX1(-1))
0.2650	1.532987	0.009896	0.015170	D(LX1(-2))
0.0076	11.40267	0.040107	-0.457332	D(LX2)
0.0199	6.978770	0.054787	0.382343	D(LX2(-1))
0.0052	13.83610	0.043292	0.598991	D(LX2(-2))
0.0051	15.47824	0.008475	0.131174	D(LX3)
0.0499	-4.308796	0.011199	-0.048252	D(LX3(-1))
0.0028	18.87587	0.009893	0.188625	D(LX3(-2))
0.0012	29.27235	0.012205	0.357254	D(LX4)
0.0020	-22.18393	0.015359	-0.340733	D(LX4(-1))
0.0070	-11.89085	0.012364	-0.147019	D(LX4(-2))
0.0018	-27.21372	0.013349	0.363276	D(LX5)
0.0080	11.13972	0.016462	0.183386	D(LX5(-1))
0.0020	22.28084	0.014000	0.311930	D(LX5(-2))
0.0009	-34.56407	0.007449	-0.277478	CointEq(-1)*

0.150608	Mean dependent var	R-squared	0.988200
0.519618	var SD dependent	0.973701	Adjusted R-squared
-3.378377	Akaike info criterion	0.041240	SE of regression
-2.388266	Schwarz criterion	0.013606	Sum squared reside.
Hanna-Quinn crier.	-3.068287	65.98647	Log likelihood
Durbin-Watson stat	3.031265		

Source: Outputs The program Statistician E-views 12.

Table (5) shows the short-term equation, The agricultural worker productivity indicator shows LX1 There is a positive, direct, and significant relationship between agricultural worker

productivity and agricultural GDP, and an increase in agricultural worker productivity in Iraq leads to an increase in agricultural GDP. As for the variable...LX2 The net agricultural trade exchange rate, which represents the ratio of agricultural exports to the value of -0.45, was significantly negative at the 5% level. This is a well-known phenomenon in agricultural economics, often linked to the so-called "paradox of abundance" or, in economic theory, the "Prebsch-Singer" hypothesis. An increase in agricultural output leads to an abundance of supply, and consequently, to an abundance of exports. This, in turn, leads to a decrease in the value of the numerator (agricultural export prices) compared to the denominator, causing a decline in the value of exports. NBTTAs for the variableLX3Which represents Government subsidy amounts indicate a positive, direct, and significant relationship at the (5%) level between government subsidy amounts and agricultural GDP, as increasing government subsidies directed to the agricultural sector, such as support for farmers and subsidies for agricultural production inputs, leads to a positive correlation. (Fertilizers),seeds, Pesticides and special equipment for spray irrigation lead to lower production costs, which encourages them to expand the cultivated area and thus increases the agricultural GDP. The agricultural loans teacher pointed outLX4 There is a positive, direct, and significant relationship at the (5%) level between agricultural loans and agricultural GDP. Agricultural loans, when directed appropriately, lead to increased agricultural output because they are used to improve agricultural investments. As for the agricultural workforce indicator... LX5This indicates a positive, direct, and significant relationship at the (5%) level between the agricultural workforce and the agricultural GDP, because increasing the workforce, provided it is trained, active, and does not suffer from seasonal or disguised unemployment, will lead to an increase in agricultural output.

As for the limit of error correction Error correction Term It reached (-0.27), which is negative and significant at 1%, and the necessary and sufficient conditions are met in this model. Since the value of this parameter is negative and significant, the imbalance in the short term can be corrected in the long term, meaning that the imbalance is corrected within approximately 3 months.

Long-run equation or cointegrati on within the estimated model

Table No. (6) shows the long-run equation between the independent variables and the dependent variable.

$$\boldsymbol{ly = (0.387276lx1 - 1.971071lx2 + 0.545387lx3 + 0.287814lx4 + 0.276713lx5)}$$

Table (6) Long-Term Equation Long run equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LX1	0.387276	0.014450	27.21372	0.0015
LX2	-1.971071	0.642597	-3.036231	0.0935
LX3	0.545387	0.368250	1.481046	0.2767
LX4	0.287814	0.037789	7.049503	0.0194
LX5	0.276713	0.037825	7.078503	0.0195

Source: outputs The program Statistician E-views 12.

A signal cameLx1Which represents Agricultural worker productivity The positive and significant value (0.38) is at the (5%) level. The positive sign indicates a long-term direct relationship between agricultural GDP and agricultural worker productivity, because when agricultural worker productivity increases, production efficiency improves, leading to increased agricultural output., A teacher cameLX2The ratio representing net agricultural trade came in with a significant negative sign of (-1.97). This negative sign indicates a long-term inverse relationship between net agricultural trade and agricultural GDP., The explanation is the same as that given for the short-term relationship, where the relationship continued unchanged from the short term to the long term. The teacher also cameLX3 which represent mounts government support Positive

The value of (0.54) is not statistically significant, and the positive sign indicates a long-term positive relationship between agricultural GDP and government subsidies due to improvements in agricultural infrastructure and the sustainability of the agricultural sector., Continued support helps stabilize farmers' incomes and encourages them to invest long-term in land, equipment and modern technologies, provided that this support is used efficiently and directed towards real production. The agricultural loans teacher pointed out LX4 There is a positive, direct, and significant relationship at the (5%) level between agricultural loans and agricultural GDP. Agricultural loans, when directed correctly, lead to an increase in agricultural output because they are used to improve agricultural investments. This relationship has persisted from the short term to the long term.(11) & (3)As for the agricultural workforce teacher LX5This indicates a positive, direct, and significant relationship at the (5%) level between the agricultural workforce and the agricultural GDP, because increasing the workforce, provided it is trained, active, and does not suffer from seasonal or disguised unemployment, will lead to an increase in agricultural output. This relationship has continued from the short term to the long term.

Diagnostic tests for the model

1- Correlation test Self:

That Table (7) It shows Serial autocorrelation test error limit inform, She explained Results: No correlation Self, The test results appeared(LM With a probability value of (0).28This means We We accept the null hypothesis that the model does not suffer from the autocorrelation problem, that the model is good, and that there is no sequential autocorrelation. For errors.

Table (7) Lagrange Double Test LM

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	1.506541	Prob. F(2,12)	0.2879
Obs*R-squared	5344598	Prob. Chi-Square(2)	0.1465

Source: outputs The program Statistician E-views12.

2- Testing the reliability of homogeneity of variation:

Table (8)The test of homogeneity of variation demonstrates where Value obtained The calculated F, which amounts to (0).99And its meaning is (0.75),The results of the test conducted on the model also confirmed that the statistics Chi-Square reached (0.57) and it is greater From (0.05) also, and therefore accepting the hypothesis Nothingness, where there is no existence Problem of consistency and homogeneity The contrast.

Table (8) Testing the problem of heterogeneity of variance Hetero scedasticity

scedasticity Test: Breusch-Pagan-Godfrey Hetero Null hypothesis: Homoscedasticity			
F-statistic	0.990360	Prob. F(16,14)	0.7589
Obs*R-squared	16.69581	Prob. Chi-Square(16)	0.5702
Scaled explained SS	3.829175	Prob. Chi-Square(16)	0.9987

Source: The program Statistician E-views 12.

3 - Reliability test CUSUM, CUSUMSQ(Structural stability tests of the model)

The cumulative sum and cumulative sum square tests are tests of the structural stability of the model in the short and long run. The coefficients are considered

non-stationary if the graph of these tests moves outside the boundary at this level. The results showed structural stability among the study variables and consistency in the model in the short and long run. This means accepting the null hypothesis and confirms the stability of the estimated parameters in the model over time. The suitability of the regression model was assessed using two tests. Cu sum and CUSUMS Qas As shown in the two figures (1(2)

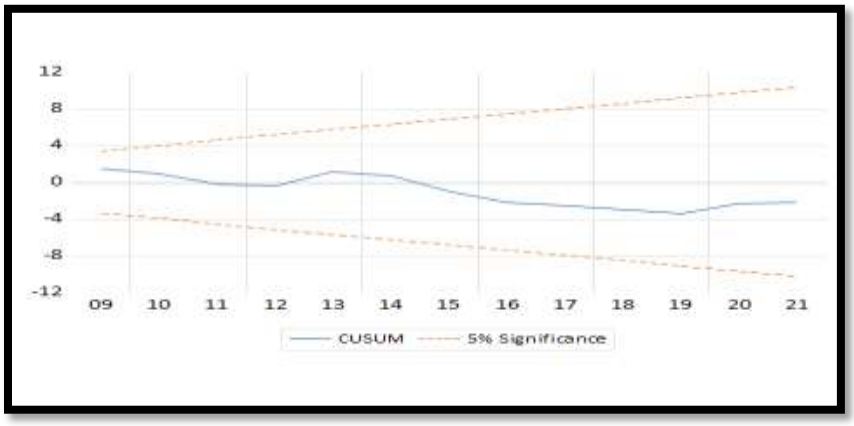


Figure (1) test CUSUM

Source: a job Researcher reliance on The program Statistician E-views 12.

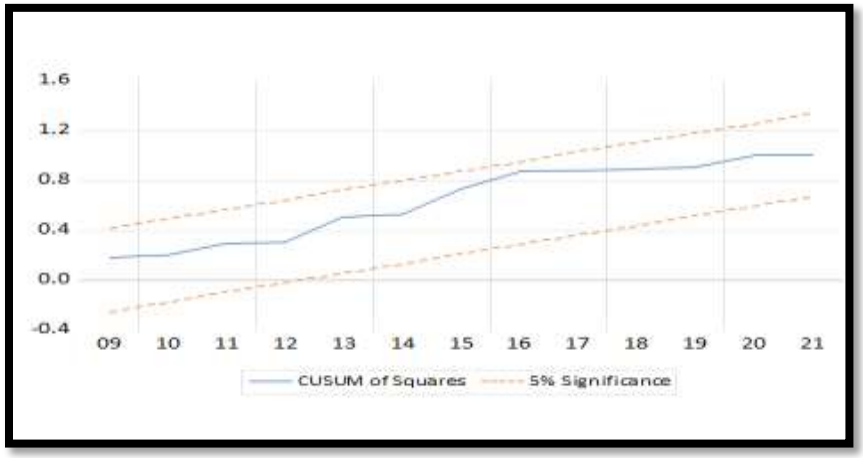
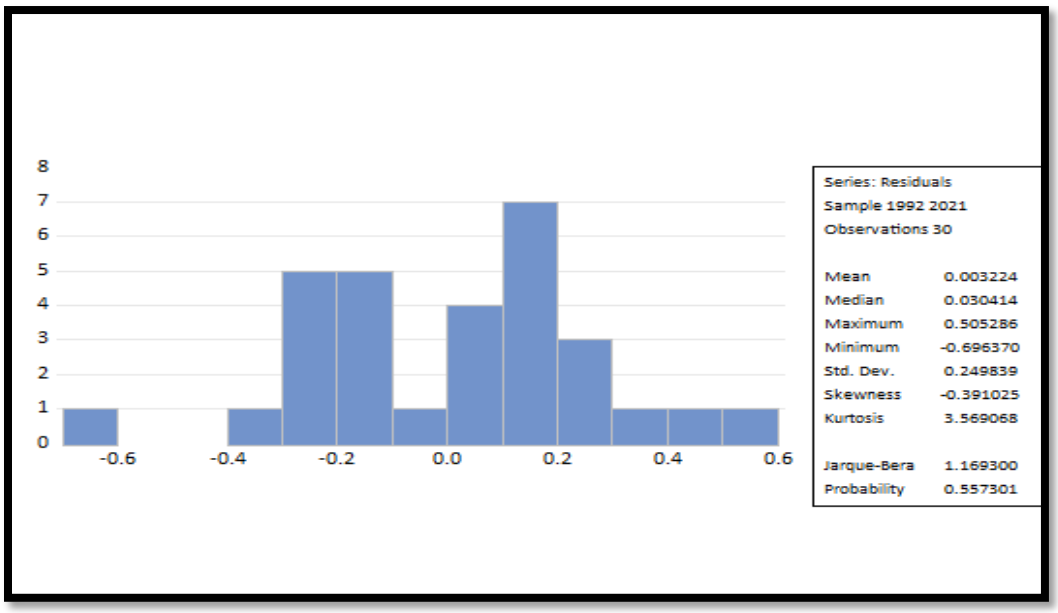


Figure (2) test CUSUMSQ

Source: a job Researcher reliance on The program Statistician E-views 12.

4-Testing the normal distribution of residues(a test power(Model): -

The figure illustrates (3Normality test and test value(Jarque-Bera)This means acceptance The null hypothesis because the value probability(0.55) greater From 5%This means that The remainder are distributed Natural.



The shape (3Testing the normal distribution of residues

Source: Outputs of the statistical program E-views 12.

The research reached a number of conclusions, which are:

1- A long-term positive relationship has emerged between agricultural worker productivity and agricultural GDP because when agricultural worker productivity increases, production efficiency improves, and agricultural output increases.

2- A long-term inverse relationship emerges between net agricultural trade terms and agricultural GDP, because an increase in agricultural output leads to an abundance of supply and consequently to exports. This, in turn, leads to a decrease in the value of the numerator (agricultural export prices) compared to the denominator, causing a decline in values. NBTT.

3- It turns out that government support plays a pivotal role And positively in growth and increase Agricultural GDP, especially when directed towards production inputs such as improved seeds, fertilizers, and irrigation technologies.

4- There is a positive, direct and significant relationship between agricultural loans and agricultural GDP, as agricultural loans, if directed correctly, lead to an increase in agricultural output due to their use in improving agricultural investments in the long term, especially in the areas of smart agriculture and advanced irrigation technologies.

5- There is a positive, direct, and significant relationship between the agricultural workforce and the agricultural GDP, because an increase in the workforce, provided that it is trained, active, and does not suffer from seasonal or disguised unemployment, will lead to an increase in agricultural output. This relationship has continued from the short term to the long term.

The research recommended a set of measures, which are:

-Restructuring agricultural credit policy, and shifting from disbursing cash loans to in-kind financing directed towards modern technologies (such as smart irrigation systems and agriculture the Smart Agriculture and Preservation) To ensure that loans are not diverted for personal consumption.

2-The recommendation is to invest in rural human capital (agricultural training) rather than focusing solely on horizontal expansion (increasing cultivated areas).

3- Adopting policies Smart protection (Smart Protectionism) such as seasonal tariffs to protect local crops during harvest seasons.
4- Imposing exposure Yiffa Customs duties on imported agricultural goods that unfairly compete with local production To protect local products from the open trade policy.
5- Encouraging agricultural industries Local and lifting Exports Agriculture and support for agricultural exporters to improve net agricultural trade exchange rates.
6- Working on The sole agricultural and trade policy By creatingA Supreme Council for Agricultural Policies oversees coordination between ministries Agriculture, trade, and finance.

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