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An Economic Study of the Role of Financing and Investment Policies in Supporting the Iraqi Agricultural Sector

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Abstract: This study aims to analyze the role of agricultural investment and agricultural loans in supporting agricultural output in Iraq during the period (2005–2022). Despite Iraq possessing significant agricultural resources, the sector's contribution to the Gross Domestic Product (GDP) remains low (approximately 1.64%), a situation attributed to weak agricultural investment and deficiencies in agricultural financing systems. The research employs both descriptive and econometric methodologies, utilizing the **Autoregressive Distributed Lag (ARDL)** model to analyze the relationships between variables. The results indicate that agricultural output is characterized by relative stability compared to the overall growth of GDP, reflecting the sector's poor performance. Furthermore, the findings reveal that the ratio of agricultural investment to total investment is low (averaging about 3%), as are agricultural loans, which do not exceed 1.89% of the agricultural output. The econometric results confirm a significant positive relationship between both agricultural investment and loans on one hand, and agricultural output on the other; a 1% increase in investment leads to an approximately 2.48% increase in agricultural output, while a 1% increase in loans results in a 2.72% increase in output. The study concludes by emphasizing the necessity of enhancing agricultural financing and increasing the volume of investment in the sector. These measures are vital for boosting productivity, achieving food security, and supporting sustainable agricultural development in Iraq. Additionally, the study highlights the importance of adopting clear credit policies and effective strategic plans to revitalize the agricultural sector.

Key words: Agricultural Investment, Agricultural Loans, Agricultural Output, ARDL Model.

1. Introduction

The agricultural sector is a cornerstone of the Iraqi economy, playing a vital role in achieving food security, diversifying national income sources, and creating employment opportunities, particularly given the economic challenges the country faces due to fluctuating oil prices (**Ali & Hussain, 2023)**. Despite Iraq possessing significant agricultural resources, such as fertile land and water, the agricultural sector's contribution to the GDP has remained below expectations in recent

years, with agricultural output reaching approximately [amount missing].6.68 billion Dollars represent approximately1.64% of the national product and the adult is about286.84one billion dollars. This may be due to weak agricultural investments, which amounted to approximately107,19 One million dollars, despite its importance and what it represents (**Salman & Al-Saeedi, 2023**). It plays a pivotal role in increasing agricultural productivity, whether through the introduction of modern technologies, improved resource management, or increased efficiency of supply chains, as well as the shortcomings of agricultural financing systems, where the value of agricultural loans amounts to approximately125.991 million in 2022 Credit is no longer merely a means of supporting agricultural production, but has become a fundamental pillar in providing capital for various agricultural development projects, given the limited capital and weak savings capacity of most farmers. Therefore, agricultural loans enhance the capabilities of farmers, especially small farmers, to obtain agricultural production inputs at the appropriate times. Hence, the importance of agricultural investment and agricultural loans in supporting the agricultural sector, achieving food security, diversifying national income sources, providing job opportunities, and raising the general standard of living for farmers becomes clear. This is one of the main objectives of the economic policies pursued by the state through creating economic development in various economic sectors, especially the agricultural sector, which is one of the important economic sectors that contribute to achieving the 2030 strategy.

1.1. Research Problem

Despite the importance of the agricultural sector and its vital role in providing food, there has been a noticeable lack of a strategic plan to increase agricultural output growth rates. Recently, agricultural investment has declined to about $107.19 million, representing about 1.07% of total investment, as has the value of agricultural loans, which amounted to about $125.99 million, representing about 1.89% of the value of agricultural output. This has had negative effects on the growth rate of agricultural output in recent years and reduced its relative importance to about 1.64% of the GDP, which hinders the achievement of agricultural development goals.

1.1. Research methodology and data sources

EDepend Search in achieving its goals, it relies on published and unpublished secondary data from official sources., Including the Ministry of Agriculture, Ministry of Planning and Central Bureau of Statistics and data Food and Agriculture Organization of the United Nations (FAO)FAO), World Bank Data Websites on the Internet were also used, in addition to various books and scientific references related to the subject of the study.

In pursuit of goals Search It has been Accreditation The inductive method in economic analysis was used to identify and collect the various variables related to the subject of the study, and the deductive method was used to determine the status of production and economic indicators. Accreditation Ali tools and methods Descriptive analysis, represented by percentages and arithmetic means, and account Some economic indicators, as has been Accreditation on The standard statistical analysis method, represented by the ordinary least squares method, is used to estimate the general time trend equations in the different forms of the economic variables under study and to select the best one according to the value of the coefficient of determination and the significance of the test.(t, F), and the Autoregressive Distributed Lag (ARDL) model was also used. To estimate the impact of agricultural investment and the value of agricultural loans on agricultural output.

First - The current situation of the agricultural sector Iraqi

1- GDP and agricultural output

A study of the development of the gross domestic product (GDP) shows in Table No. (1) that its value ranged from a minimum of about 43, $57 billion in 2005, with a maximum of approximately $286 billion., $64 billion in 2022, with an average of approximately 171, $64 billion. By estimating the general time trend equation for GDP as shown in Table No. (2), it was found that it took a general increasing trend with a statistically significant annual growth rate estimated at about 8.7%. The value of the coefficient of determination, which was estimated at about 0.632, indicated that about 63.2% of the changes in GDP are due to factors whose effects are reflected by the element of time.

Table (1). Value of GDP and agricultural output during the period 2005-2023

Years	Gross Domestic Product	agricultural output	% of agricultural output of the local market
2005	43.57	2.61	6.00
2006	52.74	3.06	5.80
2007	85.92	4.21	4.90
2008	130.75	4.79	3.66
2009	119.09	5.24	4.40
2010	136.11	7.15	5.25
2011	181.41	7.53	4.15
2012	218.03	8.92	4.09
2013	234.64	9.21	3.93
2014	224.19	11.05	4.93
2015	163.60	6.86	4.19
2016	171.32	6.41	3.74
2017	186.27	5.25	2.82
2018	225.98	6.07	2.69
2019	235.10	8.47	3.60
2020	186.15	5.19	2.79
2021	208.05	6.36	3.06
2022	286.64	6.68	1.64
Average	171.64	6.39	3.98
Minimum	43.57	2.61	1.64
Maximum	286.64	11.05	6.00

Source: Data from the Central Organization for Statistics.

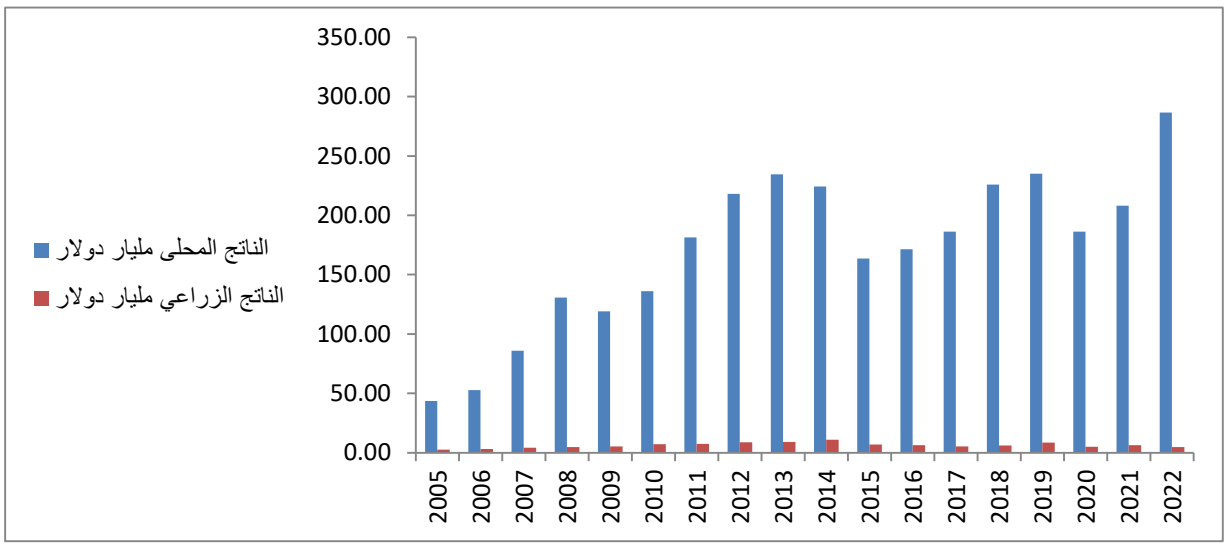
Table (2). Equations of the general time trend of the value of domestic product and agricultural output during the period (2005-2022)

The statement	The equation	F	Coefficient of determination	growth rate/ decrease %
Gross Domestic Product	$y = e^{4.300 + 0.087\ t}$ (27.87)* (5.50)*	30.19*	0.632	8.7
agricultural output	y =e 1.50 + 0.029 t (8.69)* (1.79)	3.19	0.166	-

Source: Results of the statistical analysis of the data in Table No. (1).

It was also found that the value of agricultural output ranged from a minimum of approximately2,61one billion dollar in 2005, the maximum limit reached approximately 11,05one billion dollar in 2023, the average was approximately 6,28 one billion dollars by estimating the general time trend equation for agricultural output, as shown in Table No. (2), it became clear the estimated model lacks statistical significance. The results indicate that presence of an increase in a local product Iraqi While relative stability was shown to Its agricultural counterpart, and this necessitates working to raise the performance rates of the agricultural sector. Iraqi to keep pace with the overall growth rate, given the importance of the agricultural sector to the economy. The Iraqi sector is the primary sector responsible for providing food.

And by studying the relative importance of agricultural output during the study period it turned out that they ranged between the minimum amount reached approximately1,64% general 2022 The maximum reached approximately6% general2005 with an average of about 3.98, this indicates the need to work on increasing the relative importance of the agricultural sector by developing it, given its economic importance in achieving agricultural development and reducing imports of food commodities.



Source: Data from the Central Agency for Public Mobilization and Statistics.

Figure (1). GDP and output development agricultural Iraqi During the period2005-2025

2- The distribution structure of Iraqi agricultural output

A study of the distribution structure of Iraqi agricultural output, as shown in Table No. (3), reveals that it consists of four groups: plant products, animal products, forest products, and fish products. Plant products ranked first with an average value of approximately $2,888.84 million and a relative importance of approximately 45.46% of the total value of agricultural output. Forest products ranked second with an average value of approximately $1,804.20 million and a relative importance of approximately 27.9%.From the total value of agricultural output, And in the rank Third She came the products animal With an average value of approximately1105,58One million dollars, with a relative importance of approximately16,89% of the total value of agricultural output, And in the rank Fourth Products arrived fish With an average value of approximately597,52One million dollars, with a relative importance of approximately9,30% of the total value of agricultural output.

By studying the current state of development of agricultural output components as shown in Tables (3) and (4), the following became apparent:

The value of plant-based products has evolved

By studying development Value of plant products It turned out that it ranged from a minimum of approximately 1254,$73 million in 2005, with a maximum limit of approximately $286 million.,$64 million in 2014, with an average of approximately 2888,$84 million, based on the general time trend equation for Value of plant products It was found that it took a general upward trend with a statistically significant annual growth rate of approximately 3.2%, and the value of the coefficient of determination, which was estimated at approximately 0.238, indicated that about 23.8% of the changes in Value of plant products This is due to factors whose effects are reflected in the element of time.

The evolution of the value of animal products

By studying development Product Value The animal population showed that it ranged from a minimum of approximately 287,$54 million in 2005, with a maximum of approximately $1878,$68 billion in 2014, with an average of approximately 1105,$58 billion, based on the general time trend equation for Product Value animal It was found that it took a general upward trend with a statistically significant annual growth rate of approximately 5.3%, and the value of the coefficient of determination, which was estimated at approximately 0.386, indicated that about 38.6% of the changes in Value of animal products This is due to factors whose effects are reflected in the element of time.

The evolution of the value of forest products:

By studying development Value of forest products It turned out that it ranged from a minimum of approximately 672,$94 billion in 2006, with a maximum of approximately $3094,$29 billion in 2014, with an average of approximately 1804,$20 billion, based on the general time trend equation for Value of forest products It was found that it took a general upward trend with a statistically significant annual growth rate of approximately 4.2%, and the value of the coefficient of determination, which was estimated at approximately 0.297, indicated that about 29.7% of the changes in Forest products This is due to factors whose effects are reflected in the element of time.

The value of fish products has evolved

By studying development Product Value, the fish were found to have ranged from a minimum of approximately 259, $63 billion in 2020, with a maximum of approximately $1105, $10 billion in 2014, with an average of approximately 597, $52 billion, based on the general time trend equation for Product Value Fish The estimated model was found to be statistically insignificant.

Table (3). The relative importance of the components of Iraqi agricultural output during the period 2005-2022 one million dollars

% of total agricultural output	Fish products	% of total agricultural output	Value of forest products	% of total agricultural output	Value of animal products	% of total agricultural output	Value of plant products	Years
14.00	365.96	27	705.79	11	287.54	48	1254.73	2005
14.00	428.23	22	672.94	16	489.41	48	1468.23	2006
11.00	463.10	26	1094.60	16	673.60	47	1978.71	2007
10.00	479.13	29	1389.47	15	718.69	46	2203.99	2008
9.00	471.69	29	1519.90	17	890.97	45	2358.46	2009
9.00	643.54	29	2073.62	17	1215.57	45	3217.69	2010
11.00	828.10	27	2032.62	17	1279.79	45	3387.69	2011
10.00	892.28	28	2498.39	17	1516.88	45	4015.27	2012
10.00	921.27	28	2579.55	17	1566.16	45	4145.71	2013
10.00	1105.10	28	3094.29	17	1878.68	45	4972.96	2014
10.00	685.78	28	1920.18	17	1165.82	45	3086.01	2015
10.00	641.12	28	1795.15	17	1089.91	45	2885.06	2016
10.00	525.02	28	1470.05	17	892.53	45	2362.57	2017
9.00	546.12	29	1759.72	18	1092.24	45	2730.59	2018
8.00	678.00	31	2627.24	19	1610.24	42	3559.49	2019
5.00	259.63	30	1557.76	20	1038.51	45	2336.64	2020
6.00	381.56	27	1717.00	19	1208.26	48	3052.44	2021
6.59	439.73	29	1967.33	19	1285.67	45	2982.86	2022
9.30	597.52	27.90	1804.20	16.89	1105.58	45.46	2888.84	**Average**
5.00	259.63	22.00	672.94	11.00	287.54	42.00	1254.73	**Minimum**
14.00	1105.10	31.00	3094.29	20.00	1878.68	48.00	4972.96	**Maximum**

Source: Data from the Central Organization for Statistics.

Table (4). Equations trend Time General development of agricultural output components during period (2005-2022)

The statement	The equation	F	Coefficient of determination	growth rate %
Value of plant products	y = e 7.61 + 0.032 t (48.28)* (2.23)**	4.99**	0.238	3.2
Value of animal products	y = e 6.41 + 0.053 t (35.16)* (3.17)*	10.40*	0.386	5.3
Value of forest products	y = e 7.03 + 0.042 t (40.12)* (2.60)*	6.75*	0.297	4.2
Value of fish products	y = e 5.96 - 0.004 t (33.95)* (-0.256)	0.066	0.004	---

Source: Results of the statistical analysis of the data in Table No. (3).

From the above, it is clear that all agricultural sectors have achieved growth rates except for the fish production sector, which necessitates the state's support for this sector due to its importance in providing food.

Second - The current situation of agricultural financing and support

1- Total investment and agricultural investment

A study of the development of national and agricultural investment during the period 2005-2022 shows in Table No. (5) that total investment ranged between a minimum of approximately $2,714.81 million in 2020 and a maximum of approximately34631.86 Million dollars in 2013, with an average of approximately14638,83One million dollars, and by estimating the general time trend equation for national investment as shown in Table No. (6), it became clear that the statistical significance of the estimated model was not established.

A study of the evolution of agricultural investment value during the period 2005-2022 showed that it ranged between a minimum of approximately $77.90 million in 2009 and a maximum of approximately 1266,65 One million dollars in 2008, with an average of approximately508,16One million dollars, and by estimating the general time trend equation as shown in Table No. (6), it became clear The estimated model lacks statistical significance **(Urooj, 2015).**

By studying the relative importance of the value of agricultural investment in relation to the total investment value, as shown in the data in Table No. (6) It turned out that they ranged from a minimum of approximately 0,87 %In 2009, the maximum limit reached approximately % In 2008, the average was approximately2,97 %.

By studying the relative importance of the value of agricultural investment in relation to the value agricultural output as shown in the data in Table No. (6), it ranged between a minimum of about 1.49% in 2019 and a maximum of about 26.44% in 2005, with an average of about 5.73%.

This necessitates working to increase the percentage of spending on agricultural investment from the total investment expenditure,(**Hussein & Al-Khafaji, 2025**) as it has become clear that it did not exceed about 3% as an average during the study period, so that it can be increased, and then agricultural output with significant growth rates, and then to achieve the goals of sustainable agricultural development, as it has become clear that the statistical significance of the estimated growth model for each of them has not been proven.

Table (5). Development of the value of total and agricultural investment during the period 2005-2022 Value: million dollar

Years	Investment spending in the agricultural sector is in millions of dollars	Total investment million	Investment spending in the agricultural sector as a percentage of total investment	Investment spending in the agricultural sector as a percentage of agricultural output
2005	134.94	3112.33	4.34	5.16
2006	152.62	4108.85	3.71	4.99
2007	240.50	6153.82	3.91	5.71
2008	1266.65	9958.65	12.72	26.44
2009	77.90	8985.82	0.87	1.49
2010	739.03	16642.74	4.44	10.34
2011	1216.46	15241.12	7.98	16.16
2012	1241.89	25172.34	4.93	13.92
2013	1178.56	34631.86	3.40	12.79
2014	824.50	32620.12	2.53	7.46
2015	400.99	23342.09	1.72	5.85
2016	299.15	15469.11	1.93	4.67
2017	347.03	13835.68	2.51	6.61
2018	188.54	11613.73	1.62	3.11
2019	299.68	20662.09	1.45	3.54
2020	114.84	2714.81	4.23	2.21
2021	316.41	9188.07	3.44	4.98
2022	107.19	10045.67	1.07	1.61
Average	508.16	14638.83	2.97	5.73
Minimum	77.90	2714.81	0.87	1.49
Maximum	1266.65	34631.86	12.72	26.44

Source: Data from the Central Organization for Statistics.

Table (6). Equations trend Time The year for the development of the value of agricultural and total investment during period (2005-2022)

The statement	The equation	F	Coefficient of determination	growth rate %
Value of agricultural investment	y = e 6.10 - 0.027 t (13.13)* (-0.638)**	4.406	0.025	---
Total investment value	y = e 9.06 + 0.031 t (44.55)* (-0.913)	0.834	0.050	---

Source: Results of the statistical analysis of the data in Table No. (5).

2- Agricultural loans

A study of loan development during the period 2005-2022, as shown in Table (7), indicates that the value of agricultural loans ranged from a minimum of approximately $17.65 million in 2018 to a maximum of approximately $475.55 million in 2013, with an average of approximately166,70One million dollars, and estimating the general time trend equation forValue of agricultural loansAs shown in Table No. (8), the statistical significance of the estimated model was not proven.

By studying the relative importance of the value of agricultural loans in relation to the value of agricultural output, as shown in the data of Table No. (7) It turned out that it ranged between a minimum of approximately 0,29% general 2018 The maximum limit reached approximately5,24% general 2012 On average, it was approximately1,89%.

From the above, it is clear that support for the agricultural sector should not be increased by working to increase the rates of loans directed to this sector and supporting agricultural projects with the aim of increasing the value of agricultural output **(Al-Taai & Al-Mahdawi, 2024**).

Table (7). Value of agricultural loansh during the period 2005-2023

Years	Agricultural loans	Agricultural loans% from agricultural output
2005	19.31	0.74
2006	71.46	2.34
2007	89.68	2.13
2008	120.12	2.51
2009	44.26	0.84
2010	177.50	2.48
2011	239.29	3.18
2012	467.64	5.24
2013	475.55	5.16
2014	286.57	2.59
2015	193.68	2.82
2016	194.62	3.04
2017	99.36	1.89
2018	17.65	0.29
2019	151.99	1.79
2020	23.05	0.44
2021	202.93	3.19
2022	125.99	1.89
Average	166.70	1.89
LimitLowest	17.65	0.29
LimitAl-Aqsa	475.55	5.24

Source: Data from the Central Organization for Statistics.

Table (8). Equations trend Time General value of domestic production and agricultural output during period (2005-2022)

The statement	The equation	F	Coefficient of determination	growth rate/ decrease %
Agricultural loans	y = e 4.58 + 0.016 t (9.07)* (0.353)	0.124	0.008	---

Source: Results of the statistical analysis of the data in Table No. (7).

The impact of agricultural loans on monetary stability

An increase in the money supply beyond actual demand leads to inflation, while an increase in actual demand beyond the supply leads to deflation. Consequently, fiscal equilibrium is not achieved in either case **(Al-Rassam & Al-Nasrawi, 2024)** To determine the relationship between the volume of agricultural lending and agricultural GDP, the monetary stability coefficient is used. If the coefficient equals one, this indicates fiscal equilibrium, i.e., complete monetary stability. However, if it exceeds one, this indicates inflation, the value of which varies according to the amount of the increase. This coefficient is a measure that reflects the degree of elasticity.

Whereas:

$$\text{Monetary Stability Coefficient} = \frac{\text{Relative change in the size of agricultural loans}}{\text{Relative change in agricultural output size}}$$

A study of the data in Table (9) reveals that the monetary stability coefficient fluctuated between negative and positive values. The years 2009, 2014, 2016, 2018, and 2022 experienced contractionary conditions, with the monetary stability coefficient estimated at -6.73, -1.99, -0.07, -5.28, and -7.64, respectively. In contrast, the years 2006, 2007, 2008, and 2010 witnessed...2011The years 2012, 2013, 2015, 2017, 2019, 2020, and 2021 were characterized by inflationary conditions, with the monetary stability coefficient estimated at approximately 15.88, 0.68, 2.46, 8.26, 6.59, 5.15, 0.52, 2.70, 19.19, 2.19, and 34.73, respectively. In order, this means there are varying inflationary effects. In general, in both cases, whether it is contraction or inflation, this means the absence of credit planning and the lack of a clear strategy that keeps pace with the national goals of the state in the field of investment and agricultural development.

Table (9). The monetary stability coefficient in the Iraqi agricultural sector during the period 2005-2020

Year	Relative rate of change of agricultural output	Relative rate of change of agricultural loans	Monetary stability coefficient
2005	-	-	-
2006	2.70	0.17	15.88
2007	0.26	0.38	0.68
2008	0.34	0.14	2.46
2009	-0.63	0.09	-6.73
2010	3.01	0.36	8.26
2011	0.35	0.05	6.59
2012	0.95	0.19	5.15
2013	0.02	0.03	0.52
2014	-0.40	0.20	-1.99
2015	-0.32	-0.38	0.85
2016	0.00	-0.07	-0.07
2017	-0.49	-0.18	2.70
2018	-0.82	0.16	-5.28
2019	7.61	0.40	19.19
2020	-0.85	-0.39	2.19
2021	7.80	0.22	34.73
2022	-0.38	0.05	-7.64

Source: collected and calculated to for the data in Table No. (1)(7).

Third - Standard Estimation The impact of agricultural investment and agricultural loans on agricultural output Using Autoregressive distributed sluggishness model (ARDL)

This part of the research deals with the study of the impact of both agricultural investment and agricultural loans on Iraqi agricultural output. Two models were formulated, the first of which deals with the study of the relationship between agricultural investment and agricultural loans, while the second model deals with the study of the relationship between agricultural loans and agricultural output and with appreciation The relationship between agricultural investment and agricultural output During the period (2005-2022) Through methodology ARDL shows A The advantage of the model the next:

$$\hat{y}t = F(X1t.)$$

where:

ŷt: agricultural output (one billion dollars).
X1t: Agricultural investment of one million dollars

To ensure the suitability of these factors as economic variables for standard estimation, the following tests were conducted to verify their applicability. They are as follows**:**

Results of time series stability test and estimated model quality

Estimating this model requires testing the stability of the time series on which this estimate is based. Forgetting a relationship Balance Between time series in the A Long gel and A Short gel as follows:

Root test Unit: To conduct a time-series stationarity test and determine the degree of integration for the study variables, the Phillips-Perron unit root test was applied **(Phillips & Perron, 1988).** The decision rule dictates that when the absolute calculated statistic is greater than its critical tabular value, we reject the null hypothesis and accept the alternative hypothesis that the series is stationary. Conversely, when the calculated value is less than the tabular value, we accept the null hypothesis that the series has a unit root and is non-stationary **(Gujarati & Porter, 2022**) As evident from the empirical results in Table (10), the value of agricultural investment, the value of agricultural loans, and the value of agricultural output were all found to be non-stationary at their level form, I(0). However, upon taking the first difference, all variables became strictly stationary and integrated of order one, I (1), at a 1% significance level. Based on this, performing a co-integration test is statistically justified for both estimated models (Model 1: Investment to Output, and Model 2: Loans to Output).

Table (10). It shows the results of the test (Phillips - perron) The value of agricultural investment, the value of agricultural loans, and the value of agricultural output

variable	Level			First difference		
	intercept	Trend and intercept	None	intercept	Trend and intercept	none
Value of agricultural investment	-2.369025	-2.596718	-1.435410***	-6.029929*	-6.859350*	-6.255421*
Value of agricultural loan	-2.007978	-1.888663	-0.968111	-4.250707*	-4.204251*	-4.400435*
Value of agricultural output	-2.302636	-1.998933	-0.115463	-4.828589*	-5.058823*	-4.884383*

Source: Results of statistical analysis using the programe views.
*Significant at the 1% level. **Significant at the 5% level. ***Significant at the level10%.

1- Standardized Assessment of the Impact of Agricultural Investment on Agricultural Output: The Bounds Test Methodology

This test is performed after examining the time series stability of the study variables. This is done to reveal the existence of a long-term equilibrium relationship between these variables based on valuef.

The data in Table No. (11) to the results of the bound methodology test, **Pesaran *et al.* (2001)** estimates for the existence of a long-term relationship between Agricultural investment and agricultural output in Iraq Based on the test results, the valuef-Statistics Equal4.76It is a value Greater than its value at critical limits Listed in the table, meaning Agricultural investment It greatly affects agricultural output Statistically speaking, the valuef-Statistics indicates that the relationship between agricultural investment and agricultural output is statistically significant, meaning that this relationship is not merely coincidental but a real and reliable one for analysis. Furthermore, the test results are consistent with economic theory, which asserts that there is a correlation between Agricultural Investment and between Agricultural output.

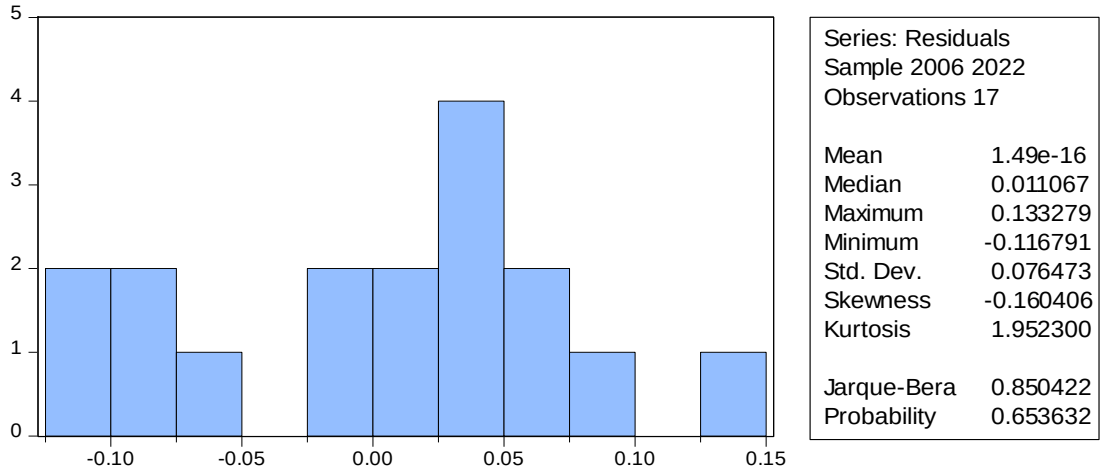
Table (11). a test Bound-test for long-term relationship the impact of agricultural investment on agricultural output

F-Statistics	4.757	
Critical boundaries		
Significance	**I(o) limitLowest**	**I (1) Limittop**
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

Source: results the analysis to Form inputs using software E views

Tests The quality of the model is estimated by:

1- a testNormality Test: Normal distribution of residues: Using Statistics Jarque-Berra, as shown in Figure No. (2Its value reached approximately0.850, which is Less than its tabulated counterpart At the same level of significance, we therefore accept the null hypothesis stating that the residuals of the model are normally distributed.



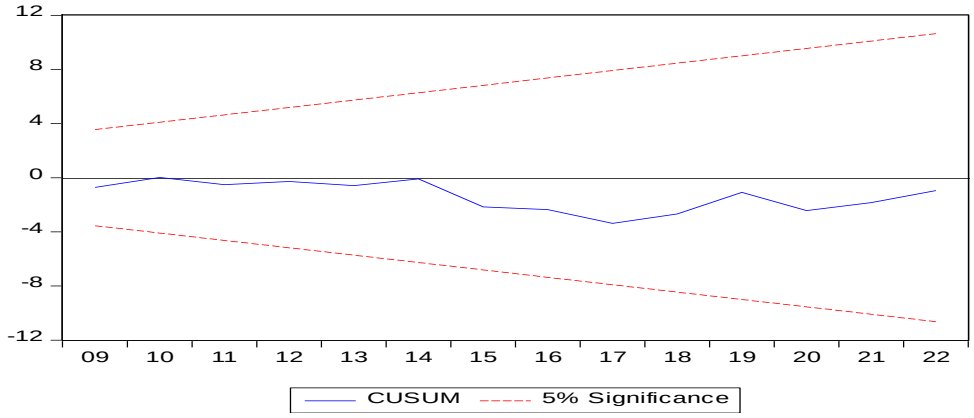
Source: Results of the model input analysis using the softwareEviews13.

Appearance (2). The normal distribution of the residuals in the regression equation for the effect Investment in agricultural output

2. a test[1]LMTest serial link: For random errors, and it is clear from the test results that the valueF reached approximately1.28It is lower than its tabular counterpart at the same significance level, therefore we accept the null hypothesis stating that the model does not suffer from a correlation problem. The self-sequential residual of the regression equation.

3. a test Heteroscedasticity The instability of the error threshold variance: By using a test[2]ARCH Test. This is evident from the results obtained from the test Constant variance under regression Self-worthf The calculated amount was approximately4.92It is less than its tabular counterpart at the same level of significance, therefore we accept the null hypothesis with the instability of the error limit variance and reject the alternative hypothesis with the existence of a problem of instability of the error limit variance.

4. a test Stability Test for Model Stability As can be seen from Figure No. (2Structural stability of the estimated formula coefficients is achieved to correct the error according to the model.ARDL, where the graph for the test ([3]CUSUM is within the critical limits at a 5% significance level. This indicates that there is stability in the model between long-term and short-term results.



Source: results Model analysis forinputsUsingprogramEviews13

Appearance (3). a test Stability of the relationship The ŝ in the estimated model

Model results ARDL Estimated long-term relationship

1. Balance in the range The long one: After it was proven The existence of a mutually complementary relationship between Imported virtual water and variables The relationship was measured in the long term During the model ARDL to assess the teachers in the fieldy The tall one. And it was possible to obtain on Estimated Equation as follows:

Table (12). Model estimates ARDL in the long term

Equation	**ŷ= α+ β1 lnX1t**			
Prob.	**t-Statistic**	**Std. Error**	**Coefficient**	**Variable**
0.0560	2.083987	0.118856	0.247694	LX1
0.5289	0.645709	0.303634	0.196059	C
R^{-2}=0.644 F = 15.47* R^2 = 0.689				

where (X1) Represents Value of agricultural investment.
Source: results analysis inputs The Model Using Program E views

- The results in Table No. (12) For the model Estimated to measure the long-term relationship between The value of agricultural investment and the value of agricultural output The estimated equation is significant at a significance level of 1%, where the value reached f Calculated approximately15.47It surpasses its tabulated counterpart at the same significance level, indicating

[1] Breusch-Godfrey Serial Correlation
[2] Autoregressive Conditional Heteroscedasticity
[3] Cumulative Sum of Recursive Residual

a genuine relationship between the dependent variable and the explanatory variables. This is evidenced by the value of the coefficient of determination ((R2 that approximately68,9% of the change in Value of agricultural output Return to Change in Value of agricultural investment, this positive and significant impact underscores the vital role of capital formation and financing in driving the growth of Iraq's agricultural sector. These empirical outcomes are highly consistent with the benchmark study by **Al-Jubouri and Al-Amiri (2022),** which utilized the ARDL framework and confirmed that directed agricultural investments in modern irrigation and mechanization yield long-term elasticity in agricultural GDP. Similarly, our results align with **Al-Shammari (2023)**, who argued that structural credit and investment are the primary catalysts for enhancing sectoral output in rentier economies, achieving an explanatory power R^2 near 70%. Consequently, these findings validate the statistical consistency of our model and emphasize that bridging the current investment deficit (1.07% of total investment) is a prerequisite for achieving sustainable agricultural development in Iraq."

- The results estimated by the model also show a significant positive correlation. Statistically at a significance level5%The value of agricultural investment Where it was found that increase it in proportion1% leads to Increase in the value of agricultural output in proportion2.48%.
- **model (ECM. ERROR CORRECTION MODEL) Error correction according to the (ARDL) model:** After establishing a long-term relationship through a model ((ARDL1, 0According to the standard (The SBC (Schwarz-Bayesian Criterion) was used to estimate the error correction model, an important tool for analyzing co-integrative relationships between time variables. It is used to measure the relationship between variables in the long run, as well as to measure the speed at which gaps between variables are corrected in the short run (**Al-Janabi & Al-Abodi, 2023**) its importance lies in the following:

- A tool for analyzing the complementary relationships between time variables.
- It is used to measure the relationship between variables in the long term, in addition to measuring How quickly the gap between variables is corrected in the short term.
- It can be used to predict the direction of variables in the future.

The estimated results were obtained as follows:

Table (13). Model Estimates ECM-ARDL in the short term

ARDL Error Correction Regression				
Dependent Variable: D(LY)				
Selected Model: ARDL(1, 0)				
Case 2: Restricted Constant and No Trend				
Date: 06/01/25 Time: 01:45				
Sample: 2005-2022				
Included observations: 17				
ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq(-1)*	-0.446416	0.110541	-4.038456	0.0012
R-squared	0.477837	Mean dependent var		0.023950
Adjusted R-squared	0.477837	SD dependent var		0.105829
SE of regression	0.076473	Akaike info criterion		-2.246729
Sum squared resid	0.093570	Schwarz criterion		-2.197717
Log likelihood	20.09720	Hannan-Quinn criter.		-2.241858
Durbin-Watson stat	2.466944			
* p-value incompatible with t-Bounds distribution.				

Source: results analysis inputs The Model Using program Eviews13

And it is H from the results of Table No. (13) the speed at which the model returns to its long-term equilibrium value, and the value of the error correction limit factor, reached approximately-0.446That is, it can be corrected44.6% from imbalances the estimated model for reaching equilibrium during2.2 years old.

2. A Standardized Assessment of the Impact of Agricultural Loans on Agricultural Output: The Bounds Test Approach This test is performed after examining the time series stability of the study variables. This is done to reveal the existence of a long-term equilibrium relationship between these variables based on valuef.

The data in Table No. (14) to the results of the boundary methodology test estimates for the existence of a long-term relationship between Agricultural loans and agricultural output in Iraq Based on the test results, the valuef-Statistics Equal5.80It is a value Greater than its value at critical limits Listed in the table, meaning at Agricultural loans Y it greatly affects agricultural output Statistically speaking, the valuef-Statistics indicates that the relationship between agricultural loans and agricultural output is statistically significant, meaning that this relationship is not merely coincidental but a real and reliable one for analysis**.(Al-Kouri & Omran, 2024)** Furthermore, the test results are consistent with economic theory, which confirms a correlation between agricultural loans and agricultural output. Agricultural output.

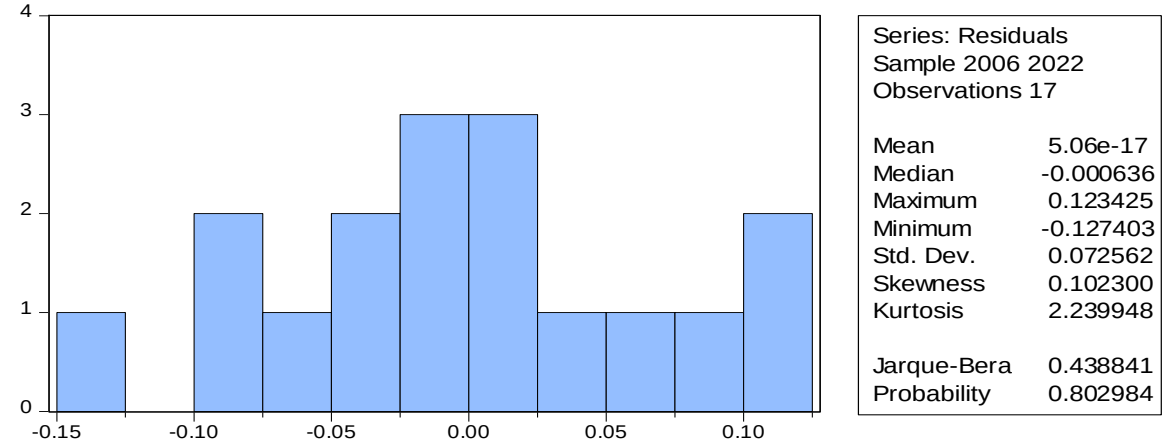
Table (14). a test Bound-test for long-term relationship Lather Agricultural loans on agricultural output

F-Statistics	5.80	
Critical boundaries		
Significance	**I(o) limitLowest**	**I (1) Limittop**
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

Source: results the analysis to Form inputs using software E views

- Tests The quality of the model is estimated by:

1- a test Normality Test: Normal distribution of residues: Using Statistics Jarque-Berra, as shown in Figure No. (2Its value reached approximately0.439, which is Less than its tabulated counterpart at the same level of significance, we therefore accept the null hypothesis stating that the residuals of the model are normally distributed.



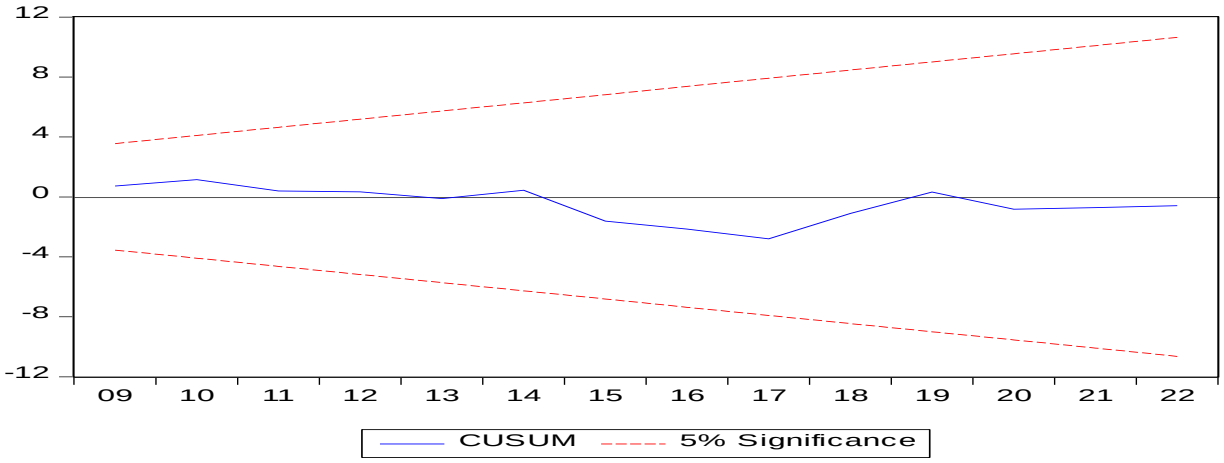
appearance (4). The normal distribution of the residuals in the regression equation for the effect Agricultural loans based on agricultural output

Source: Results of the model input analysis using the softwareEviews13.

2- a test[4]LMTest serial link: For random errors, and it is clear from the test results that the valueF reached approximately0,216It is lower than its tabular counterpart at the same significance level, therefore we accept the null hypothesis stating that the model does not suffer from a correlation problem. The self-sequential residual of the regression equation.

3- a test Heteroscedasticity the instability of the error threshold variance: By using a test[5]ARCH Test. This is evident from the results obtained from the test Constant variance under regression Self-worthf The calculated amount was approximately2.23It is less than its tabular counterpart at the same level of significance, therefore we accept the null hypothesis with the instability of the error limit variance and reject the alternative hypothesis with the existence of a problem of instability of the error limit variance.

4- a test Stability Test for Model Stability as can be seen from Figure No. (2Structural stability of the estimated formula coefficients is achieved to correct the error according to the model. ARDL, where the graph for the test [6]CUSUM is within the critical limits at a 5% significance level. This indicates that there is stability in the model between long-term and short-term results.



appearance (5). a test Stability of the relationship The in the estimated model

Source: results Model analysis forinputsUsingprogramEviews13

- Model results ARDL Estimated long-term relationship

1- Balance in the range The long one: After it was proven The existence of a mutually complementary relationship Between agricultural loans and agricultural output The relationship was measured in the long term During the model ARDL to assess the teachers in the fieldy The tall one. And it was possible to obtain on Estimated Equation as follows:

Table (15). Model estimates ARDL in the long term

Equation	**ŷ= α+ β1 lnX1t**			
Prob.	**t-Statistic**	**Std. Error**	**Coefficient**	**Variable**
0.0216	2.584930	0.105287	0.272159	LX1
0.2690	1.151124	0.221321	0.254768	C
R^{-2}=0.680 F= 17.97* R^2 = 0.719				

Source: results analysis inputs The Model Using program Eviews13
where (X1) Represents Value of agricultural loans.

-4 Breusch-Godfrey Serial Correlation
-Autoregressive Conditional Heteroscedasticity5
-Cumulative Sum of Recursive Residual6

- The results in Table No. (15) For the model Estimated to measure the long-term relationship between The value of agricultural loans and the value of agricultural output The estimated equation is significant at a significance level of 1%, where the value reached f Calculated approximately17.97It surpasses its tabulated counterpart at the same significance level, indicating a genuine relationship between the dependent variable and the explanatory variables. This is evidenced by the value of the coefficient of determination R^2 that approximately71,9% of the change in Value of agricultural output Return to Change in value Agricultural loans, the high explanatory power R^2 observed in this model confirms that agricultural credit in Iraq is not merely a financial indicator, but a structural driver of production. This outcome directly supports the conclusions of **Al-Obaidi and Al-Hadithi (2023),** who argued that institutional credit bridges the gap in modern farming inputs, thereby shifting the agricultural supply curve upward.

- The results estimated by the model also show a significant positive correlation. Statistically at a significance level1%valueAgricultural loans, where it was shown that Increase It in proportion1% leads to Increase in the value of agricultural output in proportion2.72%.

2- model (ECM. ERROR CORRECTION MODEL) Error correction according to the (ARDL) model: After establishing a long-term relationship through a model ((ARDL1, 0According to the standard (SBC. Schwarz Bayesian Criterion) where the error correction model was estimated, which is an important tool for analyzing co-integrative relationships between time variables, the estimated results were obtained as follows:

Table (16): Model Estimates ECM-ARDL in the short term

ARDL Error Correction Regression				
Dependent Variable: D(LY)				
Selected Model: ARDL(1, 0)				
Case 2: Restricted Constant and No Trend				
Date: 06/01/25 Time: 01:54				
Sample: 2005-2022				
Included observations: 17				
ECM Regression				
Case 2: Restricted Constant and No Trend				
Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0005	-4.459357	0.107703	-0.480284	CointEq(-1)*
0.023950	Mean dependent var		0.529881	R-squared
0.105829	SD dependent var		0.529881	Adjusted R-squared
-2.351723	Akaike info criterion		0.072562	SE of regression
-2.302711	Schwarz criterion		0.084244	Sum squared resid
-2.346851	Hannan-Quinn criter.		20.98965	Log likelihood
			2.015282	Durbin-Watson stat
* p-value incompatible with t-Bounds distribution.				

Source: results analysis inputs The Model Using program Eviews13

And it is H from the results of Table No. (13) the speed at which the model returns to its long-term equilibrium value, and the value of the error correction limit factor, reached approximately-0.480 that is, it can be corrected 2.1% from Imbalances the estimated model for reaching equilibrium during 2.2 years old.

Recommendations

1. There is an imperative to enhance the performance rates of the Iraqi agricultural sector to align with the general economic growth rate, given the observed increase in Iraq's overall Gross Domestic Product (GDP) in contrast to the relative stagnation of its agricultural counterpart; this structural adjustment is critical due to the vital importance of the agricultural sector to the Iraqi economy as the primary sector responsible for ensuring food security.
2. It is critical to work toward increasing the proportion of agricultural investment allocations relative to total public investment expenditure, particularly as empirical data reveals that the share of agricultural investment remained highly sub-optimal, averaging no more than approximately 3% over the study's timeframe.
3. The study strongly recommends expanding the volume of agricultural investments due to their pivotal role in supporting the agricultural sector and driving output growth, as the empirical findings demonstrate that a 1% increase in these investments yields a 2.48% expansion in the value of agricultural GDP.
4. Financial backing for the agricultural sector must be strengthened by streamlining and facilitating agricultural loans due to their critical role in financing production activities, especially since the model's results indicate that a 1% increase in agricultural credit leads to a 2.7% increase in the value of agricultural GDP.
5. There is an urgent need to establish a well-defined and comprehensive strategy that aligns with the state's national goals in the field of agricultural investment and development, particularly as the monetary stability coefficient reflects varying contractionary and inflationary shocks, signaling a clear absence of effective macroeconomic credit planning.

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دراسة اقتصادية لدور السياسات التمويلية والاستثمارية في دعم القطاع الزراعي العراقي

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الخلاصة

تهدف هذه الدراسة إلى تحليل دور الاستثمار الزراعي والقروض الزراعية في دعم الناتج الزراعي في العراق خلال المدة (2005–2022). وعلى الرغم من امتلاك العراق موارد زراعية مهمة، إلا أن مساهمة القطاع الزراعي في الناتج المحلي الإجمالي لا تزال منخفضة (حوالي 1.64%)، ويعود ذلك إلى ضعف الاستثمارات الزراعية وقصور نظم التمويل الزراعي. اعتمد البحث على الأسلوبين الوصفي والقياسي، باستخدام نموذج الانحدار الذاتي للفجوات الزمنية الموزعة (ARDL)لتحليل العلاقة بين المتغيرات. أظهرت النتائج أن الناتج الزراعي يتسم باستقرار نسبي مقارنة بالنمو العام للناتج المحلي الإجمالي، مما يعكس ضعف أداء القطاع. كما تبين أن نسبة الاستثمار الزراعي إلى إجمالي الاستثمار منخفضة (حوالي 3% كمعدل)، وكذلك القروض الزراعية التي لا تتجاوز 1.89% من الناتج الزراعي. وأكدت النتائج القياسية وجود علاقة طردية معنوية بين كل من الاستثمار الزراعي والقروض الزراعية من جهة، والناتج الزراعي من جهة أخرى، حيث أن زيادة الاستثمار بنسبة 1% تؤدي إلى زيادة الناتج الزراعي بنحو2,48 %، بينما تؤدي زيادة القروض بنسبة 1% إلى زيادة الناتج بنحو 2,72%. وتخلص الدراسة إلى ضرورة تعزيز التمويل الزراعي وزيادة حجم الاستثمارات في القطاع الزراعي لما لذلك من دور في رفع الإنتاجية وتحقيق الأمن الغذائي ودعم التنمية الزراعية المستدامة في العراق، فضلاً عن أهمية تبني سياسات ائتمانية واضحة وخطط استراتيجية فعالة للنهوض بالقطاع الزراعي.

الكلمات المفتاحية: الاستثمار الزراعي، القروض الزراعية، الناتج الزراعي، نموذج ARDL