The effect of public saving on agricultural and fishing investments for the government and private sectors in Iraq for the period 2005-2021

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Abstract

The target of the manuscript is to quantify and examine the effects of public saving on agricultural and fishing investments for the government and private sectors and economic growth in Iraq for the period 2005-2021. Econometric tools were used to clarify the impact (autoregressive model with distributed lag periods). The findings show that there is cointegration relationship between public saving (S) independent variable, government investments in agriculture, and fishing (GI) dependent variable, private sector investments in agriculture, fishing (PI) dependent variable, and economic growth (GDP) dependent variable, Moreover the value of the error correction parameter significant Generally speaking at the degree of negative (1%) and (5%) for all variables. The results indicated that there was a significant and positive short-term relationship between (S) and (GI) at a significance level (5%), in addition to the absence of a lengthy effect between the two elements that during the study period. There is also no substantial impact of public saving on private investment in agriculture, forestry, and hunting during the research period, neither in the short term nor in the long term. The results also showed that there is a significant and positive short-term relationship between (S) and (GDP), and the presence of a long-term favorable impact at a substantial degree (5%), which means that increasing public saving by one unit results in a rise in GDP of (0.001577). Conversely, a decrease in public saving by one unit leads to a decrease in GDP by the same amount, assuming other factors remain constant. This report suggests that the Iraqi government be given more authority through its economic policies in driving savings and employing it towards investment in the agriculture industry to boost and diversify agricultural output.

Keywords: Public saving, government agricultural investment, private agricultural investment, GDP.

Introduction

The relationship between saving and investment is important at the level of theoretical and applied economics. The relationship between them is dual, being a financing relationship, as saving finances investment operations, and investment transforms the saved money from cash capital into in-kind (real) capital. The success of any investment policy It relies on efficient savings policies (8). The way to dispose of income is that part of it goes to consumption, and if part of it remains, it goes to saving. This means that saving is only that part of income that is not consumed. Therefore, it can be said that saving depends on income, meaning that it is a function of income (2). Government investment represents what the state or any entity with a governmental nature does by establishing or financing these investments (construction of buildings, agricultural production, industrial production, machinery, and equipment), and this financing is from surplus revenues, loans, or aid that the state obtains. As for private investment, this type of investment is carried out by individuals, a company, or a private entity (6).

All ancient and modern theories and economic proposals agreed on the existence of a direct relationship between saving and investment, but it remains a matter of research and study into who influences the other, and in the people who save and invest. The economist Keynes believes that investment generates incomes that lead to the process of saving, while the new moderns say that it is not necessary for people who save to be the ones who invest, and that a portion of surplus income increases go to areas other than saving, such as hoarding, for example. The new moderns see that Saving precedes investment (15).

Agricultural investment is a group of expenditures that lead to an increase in capital assets, and these expenditures are allocated to the purchase of new lands, machinery and equipment, irrigation networks, or the purchase of modern technology and other multiple areas of investment, whether in plant or animal production projects, which is every positive economic action that results in increasing production capacity. And productive energy in agriculture (1). Investment in agriculture, forestry, and hunting includes all available assets (trees and animals that are used repeatedly and continuously to produce products such as fruits, rubber, milk, fishing, strategic food crops, and major land improvements). Agricultural investment for agriculture, forestry, and hunting is classified according to the type of assets and economic activity, for both the public and private sectors, into commodity, distribution, and service activities. Economic literature and international experiences indicate that saving is a reason for achieving agricultural and economic development and helps develop the economy. Saving awareness is a basis and source for financing agricultural investments that help increase and diversify production. To achieve this

goal, economic policy makers must adopt well-studied plans that lead to the exploitation of all means. Which helps increase savings, because obtaining stable financial resources is important for achieving agricultural economic development[9].

The importance of agricultural investment in Iraq comes from the economy's need to increase what percentage of the GDP comes from the agricultural sector, if the contribution of this sector decreases despite the opportunities and possibilities available to advance production, if the contribution of agriculture, forestry and fishing to the gross domestic product reached 3.8%, as well as the trade balance deficit of the agricultural sector reached About $5 billion for 2021, which is a very low percentage (4). Increasing investments in the agricultural sector leads to the growth of the field of agriculture and provides the state with several things, including meeting the needs of the industrial sector for industrial crops such as vegetable oils, sugar factories, dairy and canning factories, and various textile factories, achieving food security, working to bridge the production gap, as well as using fertilizer more efficiently and raising productivity. Water, reducing food waste, and working to shift from import to export. In addition, agriculture plays a major role in creating balances in the economic structure and providing job opportunities (1).

Public savings made by the government and the private sector support investments in the field of agriculture, forestry and fishing, which are represented in the following: plant production (cereal and fodder crops, olive and fiber production trees, potato, sugar beet and vegetable crops, fruit orchards, ornamental plants and cut flowers, palm and date groves), And animal production (animal breeding and fattening stations for sheep, calves and goats, poultry projects for eggs and meat, fish projects in lakes and aquatic farms, stations for raising ostriches, ducks, quail and turkeys, honey beekeeping), and agricultural industries (chemical fertilizers and agricultural pesticides, agricultural machinery and tools, pumps and modern irrigation systems, manufactured agricultural equipment such as plastic covers, poultry industry equipment, fish and cow breeding equipment, requirements for the production of milk, butter, cheese and oils, date manufacturing such as presses, packaging and storage, organic fertilizer production, fodder production, Production of genetically engineered seeds.

The source of savings in the Iraqi economy is through the government and the private sector, and there are different forms of financing government savings, which are: oil sector revenues, tax revenues, local government borrowing, cash issuance (inflationary financing), social contribution revenues, grants and aid, selling non-profit assets. Finance . The sources of financing private sector savings are: pension payments (salaries, insurance), debt repayment in exchange for previous obligations, the increase in cash assets of individuals

who hold them in the form of current or term deposits in stock market companies and banks, the return on direct investment in purchasing lands and buildings. Housing, return on investment in farms and rural areas (7).

The target of the manuscript is to quantify and examine the effect of public saving on agricultural and fishing investments for the government and private sectors and Iraq's GDP for the specified time period 2005-2021, and to shed light on the nature of the theoretical and quantitative relationship between saving and agricultural investments, and to analyze the developments of the study variables by reviewing the time series of data.

Many studies have addressed the relationship between saving and investment, including a study (Farih), in which he explained the existence of a causal relationship between the two variables in one direction from saving to investment, which means that stimulating saving leads to investment growth (5). While (Messaget) identified the factors affecting local saving, namely the rate of inflation, consumption, and interest rates, which had a significant impact on the local saving variable, the researcher recommended the necessity of rationalizing consumption as well as raising awareness and instilling confidence in the banking system (9).

As for (Rashid), he determined that a long-term equilibrium connection exists between income and saving and also suggested the necessity of rationalizing consumption and alerting to the importance of saving because of its importance in the process of capital accumulation (13). (Mahmoud) also found that there is a link of long-term balance between domestic saving as a proportion of GDP and gross domestic investment as a proportion of GDP in Egypt, and also found that there is a link of long-term balance between gross domestic saving as a proportion of GDP and domestic investment. Total as a percentage of GDP in East Asian countries (8).

As for (Ali), he determined that a lengthy-term balanced ties between the dependent variable represented by total agricultural investments and the independent variables represented by the agricultural labor force, the average per capita share of domestic product, capital accumulation, and investment allocations (1).

(Carmouche) concluded that gas and oil revenues had a positive impact on raising savings rates, because it contributes to boosting local economic production and efficiency, which in turn raises the amount of local savings. As for inflation and the volume of national spending, they had a negative impact. When the general level of prices rises, power will decrease. Buying money causes savings to decrease in value over time, and high government spending lowers the amount of domestic savings in Iraq by making credit for private investment less accessible (3). Jawad's research sought to ascertain how well government savings contributed to Iraq's economic growth between 2000

and 2012. The findings of the descriptive analytical technique were obtained, and it was discovered that Iraq's government savings improved after 2003 as a result of the start of oil exports. The high price of crude oil resulted in a notable rise in government revenue. Owing to the government's unilateral revenue gains, strategies for improving the effectiveness of the tax and accounting systems were researched in an effort to boost revenue (7).

Material and Methods

The impact of public saving on agricultural, forestry, and fishing investments for the government sector and the private sector in the economics of Iraq will be tested. The time period 2005-2021 is covered. Data were gathered from other sources, including the Ministry of Planning in Iraq (Directorate of National Accounts), the World Bank (national accounts data), the Organization for Economic Cooperation and Development (national accounts data). Table 1 shows total saving, its percentage of GDP, government investment for agriculture, forestry, and hunting, private investment for agriculture, forestry, and hunting, and the percentage of this investment of total public investment and GDP in the economy.

Table 1. Public savings and investments in agriculture, and fishing for the government sector and the private sector at current prices in Iraq during the time 2005-2021 (million dinars)

Year	Public saving	Public saving ratio of GDP	Government investment for agriculture and fishing	Private investment for agriculture and fishing	Percentage of government and private agricultural investment out of public investment	Percentage of government and private agricultural investment in GDP
2005	29356175000	39.9	230331100	48355	1.9	0.2
2006	39196340226	41	786940300	48483	4.4	0.7
2007	43296217162	38.8	17591619	47393	0.2	0.01
2008	82450682608	52.5	50174500	45190	0.2	0.04
2009	36152317954	27.6	11559200	44774	0.09	0.09
2010	58308000800	35.9	383453610	8579330	1.4	0.3
2011	92903002400	42.7	570456657	32116	2	0.4
2012	106040858125	41.7	1142152444	165211737	3.7	0.8
2013	113225523322	41.3	148301217	580449896	1.4	0.4
2014	101141521600	37.9	421296997	184424857	1.1	0.3
2015	48809515129	25	46431845	138837562	0.4	0.1
2016	48136490000	24.4	144915223	137742428	1	0.1
2017	71159415500	32.1	117780073	658676867	2.4	0.4
2018	108322962000	40.2	234838784	50575501	0.8	0.1

2019	103145371100	37.3	649971444	29130908	1.3	0.3
2020	51360664000	23.8	140956917	38474071	1.2	0.09
2021	120281849000	39.9	176883132	67170183	1.4	0.1

Source:

-World Bank (2005-2021) National Accounts Data (16).

-OECD (2005-2021) National Accounts Data (12).

- Ministry of Planning (2005-2021), Directorate of National Accounts, Iraq (10).

As may be seen from the table, the average percentage of public saving during the investigation period as a percentage of the gross domestic product represents about 36.6%, which is a high percentage if compared to another developing economy, and this saving can be used and directed towards agricultural investment. The table also shows the significant decline in the volume of financial support for fishing, forestry, and agriculture for the government and private sectors combined, as the average contribution of the two sectors' investments to public investment for the duration of the investigation came to about 1.5%, and the percentage of these investments did not exceed 1% throughout the study period.

One of the reasons for the decline in the volume of financial contributions to forestry, fisheries, and agriculture for both the government and private sectors is the result of the lack of political and economic stability, weak infrastructure, and shoddy economic policy formation on the one side, and the nation's economy's pervasive financial and administrative corruption on the other. Due to mismanagement, a lackluster tax collecting system, high rates of inflation, and inaccurate estimates of revenues and expenses, Iraq's economy is continuously squandered through governmental budgets. Iraq is at the top of the list of nations with high levels of corruption. According to Transparency International's corruption ranking, Iraq was placed highly among the nations (11).

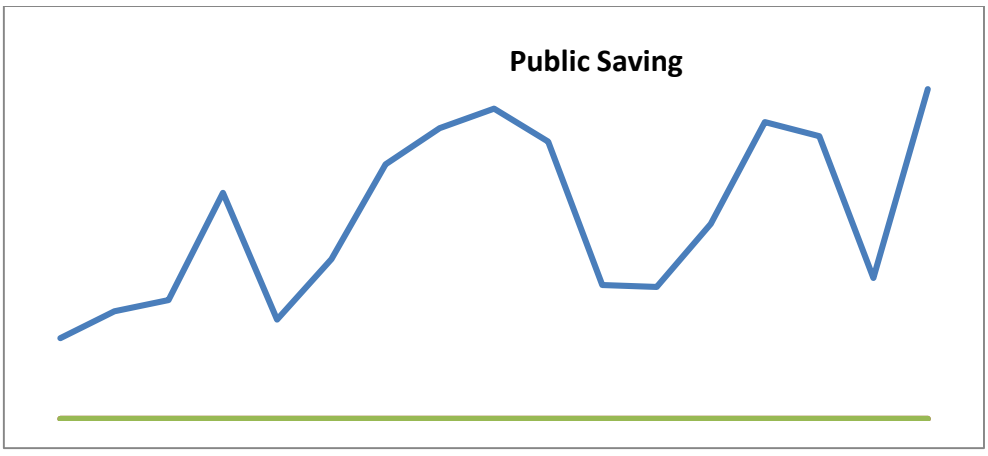

Figure 1. Public savings rates for the period 2005-2021.

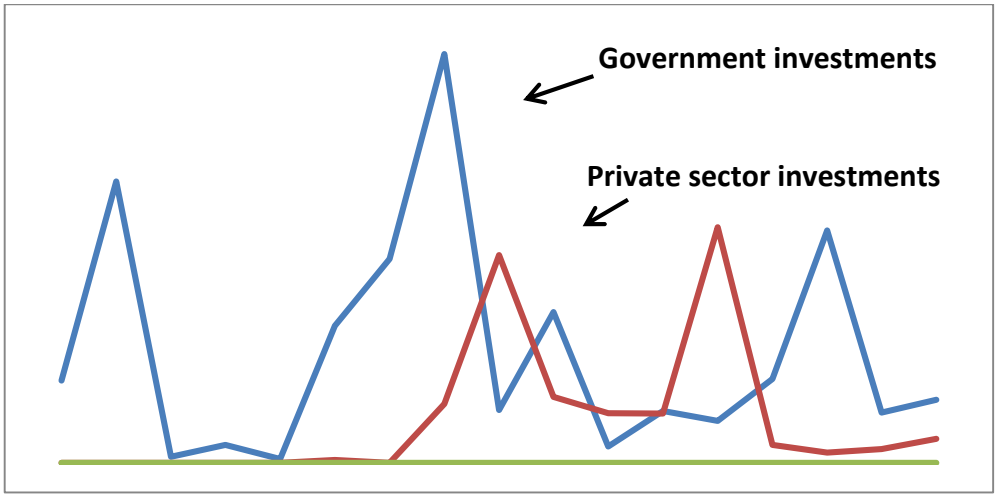

Figure 2. Rates of financial contributions to forestry, fisheries, and agriculture for the government and the private sector for the period 2005-2021.

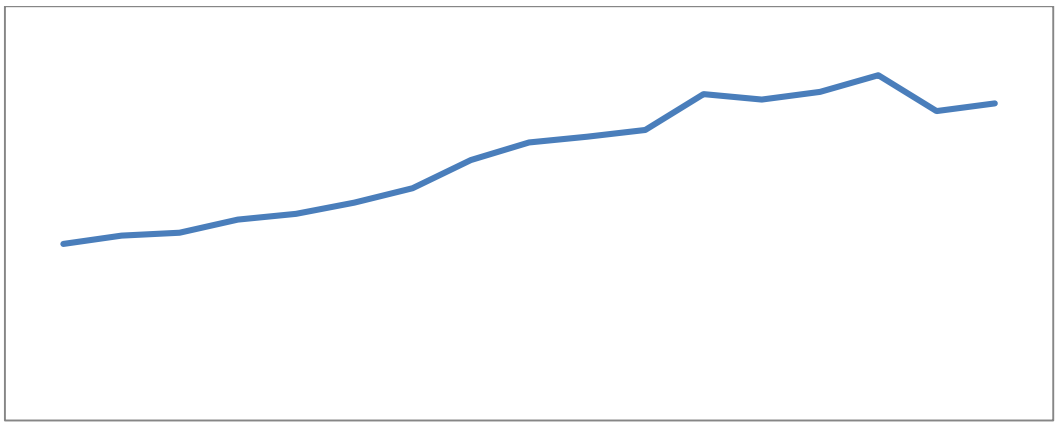

Figure 3. Time series of GDP 2005-2021.

Experimental model

To ascertain the influence of public saving on agricultural, forestry and fishing investments for the government and the private sector and the Iraqi economy's gross domestic product, transformed yearly time series data into semi-annual information to use the conventional model (ARDL), which helps in arriving at how certain of them are affected by economic factors. Which gives more accuracy in the analysis (14).

The impact of public saving (S) on both government investments in agriculture, and fishing (GI) and private sector investments in agriculture, and fishing (PI), as well as gross domestic product (GDP), was

studied in three separate models, as follows:

$$GI_{1t} = \beta_0 + \beta_1 S_{1t} + u_t \dots\dots\dots\dots (1)$$

$$PI_{2t} = \beta_0 + \beta_2 S_{2t} + u_t \dots\dots\dots (2)$$

$$GDP_{3t} = \beta_0 + \beta_3 S_{3t} + u_t \dots\dots\dots (3)$$

In order the econometric model's application steps, Initially we determine the time series' consistency using the tests for the unit root, the expanded Dickey-Fuller test (ADF). Then determine the ideal lag time frame for the latter time frames, perform the bounds test for relationships (F), and estimate the term parameters. Error correction, both in the short and long terms parameters.

The soundness of the prototype is tested through the homoscedasticity of variance (ARCH) test to find out that the heterogeneity of variance problem is not present in the model, and the sequential autocorrelation (LM) test to determine whether the model is devoid of the problem of autocorrelation. As for testing the stability of the structure of the parameters of the calculated model, it is done through two tests: the (CUSUM) test and the (CUSUM OF SQUARE) test

Results and Discussions

Unit root tests

The unit root test results for variable time series at both the level of initial difference in the presence of table (2) show three things: a trend, a constant, and a constant without a trend. The test were conducted using the Augment Dickey-Fuller (ADF).

Table 2. Unit root test results according to ADF for variables for the period 2005 -2021

	At Level	S	PI	GI	GDP
With Constant	t-Statistic	-2.2564	-2.7139	-2.2875	-1.188
	Prob.	0.189	0.077	0.1791	0.6751
		n0	*	n0	n0
With Constant & Trend	t-Statistic	-2.6444	-2.7272	-2.2535	-1.3832
	Prob.	0.2628	0.2295	0.4524	0.8571
		n0	n0	n0	n0
Without Constant & Trend	t-Statistic	-0.2042	-2.2388	-1.6642	1.7259
	Prob.	0.609	0.0253	0.0905	0.9787

		n0	**	*	n0
At First Difference					
		d(S)	d(PI)	d(GI)	d(GDP)
With Constant	t-Statistic	-8.0564	-5.703	-6.8693	-8.5524
	Prob.	0	0	0	0
		***	***	***	***
With Constant & Trend	t-Statistic	-7.9931	-5.6872	-6.7866	-8.5969
	Prob.	0	0.0001	0	0
		***	***	***	***
Without Constant & Trend	t-Statistic	-8.0623	-5.751	-6.9133	-8.0623
	Prob.	0		0	0
		***	***	***	***
Notes: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant					
*MacKinnon (1996) one-sided p-values.					

Source: Preparing the researcher based on the program's outputs Eviews10.

The results of the unit root test in Table (2) for most of the variables at their initial levels confirm that the characteristic of stillness has not been attained, which leads to accepting the null hypothesis that there is a unit root in the time series data. the Augment Dickey-Fuller (ADF) test shows that saving (S), gross domestic product (GDP) were non-stationary at level , and government investment in agriculture, forestry, and fishing (GI) are stationary at level, and that private investment in agriculture, forestry, and fishing (PI) was stationary at level, the original data shows that all variables become stationary after taking their first difference. After obtaining the rest of the time series and making sure that most of the variables used in the study are still in the first difference, we can use the (ARDL) model.

Estimating the relationship between public saving and government investment for agriculture, forestry, and fishing

Initial estimation according to the (ARDL) model

Table 3. Results of the preliminary Calculating (ARDL) Model of The connection between public saving (S) and government investment in agriculture, and fishing (GI).

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GI(-1)	0.863574	0.127892	6.752348	0.0000
GI(-2)	-0.142683	0.128901	-1.10692	0.2727
S	0.00359	0.001573	2.282529	0.026
S(-1)	-0.003228	0.002177	-1.48313	0.1433
S(-2)	0.000442	0.001651	0.26746	0.79
C	23282093	71667904	0.324861	0.7464
R-squared	0.615142	Mean dependent var		3.13E+08
Adjusted R-squared	0.58307	S.D. dependent var		3.12E+08

S.E. of regression	2.01E+08	Akaike info criterion	41.16417
Sum squared resid	2.43E+18	Schwarz criterion	41.36323
Log likelihood	-1352.418	Hannan-Quinn criter.	41.24283
F-statistic	19.18032	Durbin-Watson stat	2.045353
Prob(F-statistic)	0.00000		

Source: Preparing the researcher based on the program's outputs Eviews10.

The lag order selection criteria

Table 4 displays the outcomes of testing the ideal delay period Regarding as the (ARDL) model of relationship between public saving and government investments in agriculture, forestry, and fishing.

Table 4. The results of lag order selection criteria

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
1	-642.897	41.86431	42.14185	41.95478	0.282308	ARDL(2, 2)

Source: Preparing the researcher based on the program's outputs Eviews10.

The tests which were used to identify the best slowing period for the ARDL, Table (4), revealed that this period is the first period for all explanatory variables because its value is the lowest in comparison to the other values in The first slowing period will be included in the ARDL model that will be used to reveal the direction of the relationship between the variables under study since the three tests are in accordance with what those tests require.

Bound Test of the relationship between variables

The results show that the computed value of the (F) statistic is equal to (6.254088), This is more than the critical value of the (F) statistic at its upper limit at the level of (5%), or (5.73). Consequently, we reject the null hypothesis, according to which co-integration does not exist. We concur that the alternative theory is correct, this suggests that the variables within the research period have a co-integration link. and that there is co-integration between the variables (public saving, government investment in agriculture, forestry, and fishery).

Calculating the error correction parameter and the long- and short-term parameters

The estimators for the short- and long-term parameters of the error correction parameter and the calculated model should now be derived after confirming that there is a cointegration connection between the variables, as Table (5) illustrates.

Table 5. Estimating short- and long-term parameters as well as the error correction parameter

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(GI(-1))	0.142683	0.128901	1.106924	0.2727
D(S)	0.00359	0.001573	2.282529	0.026
D(S(-1))	-0.000442	0.001651	-0.26746	0.79
CointEq(-1)	-0.279109	0.091068	-3.064849	0.0033
Cointeq = GI - (0.0029*S + 83415635.0102)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
S	0.002877	0.003259	0.882765	0.3809
C	83415635.01	255933019	0.325928	0.7456

Source: Preparing the researcher based on the program's outputs Eviews10.

As can be seen from the above table, there is a cointegration relationship between government investment and savings for forestry, fishing, and agriculture. The error correction parameter (-0.279109), is one of the transient mistakes caused by perturbations to the independent variable, and its value was negative and statistically significant at the 5% level. In a unit of time the dependent variable can rectify it.

The short-term relationship can be explained by observing the above table's results, which demonstrate the existence of a positive, strong short-term correlation among the variables, i.e., that saving has a positive, significant impact on government spending in forestry, fisheries, and agriculture in the short-term at a significant level (5%), which means that saving increases One unit leads to a rise in government spending in agriculture through (0.026), and in contrast, a decline in saving by one unit brings about a decrease in government investment by (0.026), assuming other factors remain constant.

The results show the long-term relationship. The saving parameter is statistically insignificant, which means that there is no impact of saving on government investment in agriculture, forestry, and fishing in the long term during the study period. This is due to administrative and political problems and obstacles and the administrative and financial corruption that the Iraqi economy suffers from, which hinders the achievement of the economic goals and policies that It was designed to develop the agricultural sector and not direct public savings towards agricultural investment, and direct this savings towards investment in other economic sectors.

Tests of Econometrical Problem(Second order tests)

The tests listed below can be applied after the ARDL model tests have been estimated verify the performance quality and safety of the model against econometric problems:

"Heteroskedasticity test ARCH"

Table makes this evident (6) the model is not Heteroskedasticity is absent from the calculated model. issue due to the fact that the computed (F) value

reached (0.112055) at the level of likelihood (0.7389), that at the five percent level was not significant.

Table 6. The result of the Heteroskedasticity test (ARCH)

Heteroskedasticity Test: ARCH				
F-statistic	0.112055	Prob. F(1,63)		0.7389
Obs*R-squared	0.115407	Prob. Chi-Square(1)		0.7341

Source: Preparing the researcher based on the program's outputs Eviews10.

Autocorrelation test LM

The test findings amply demonstrated the accuracy and validity from the calculated model, as evidenced by the (F) value computed reaching (1.780294) at the level of likelihood (0.1777), which was insignificant at the (5%) level (Table 7). This suggests the approximated model does not have the autocorrelation problem.

Table 7. The result of the Autocorrelation test LM

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	1.780294	Prob. F(2,58)		0.1777
Obs*R-squared	3.817358	Prob. Chi-Square(2)		0.1483

Source: Preparing the researcher based on the program's outputs Eviews10.

Ramsey Test

Due to the fact that the computed t-statistic value of (0.754048) and its probability value (0.4538), as well as the calculated (F) value of (0.568588) and its probability value (0.4538), were not significant at the level of (5%),Table (8) unequivocally demonstrates that the estimated model's functional form is correct.

Table 8. The result of the Ramsey Test

	Value	df	Probability
t-statistic	0.754048	59	0.4538
F-statistic	0.568588	(1, 59)	0.4538

Source: Preparing the researcher based on the program's outputs Eviews10.

Verifying the predicted model parameters' structural stability

The following two tests were performed to make sure that no structural changes have occurred in the data used to estimate the model, and to evaluate the degree of stability and consistency between long-term and short-term parameter estimates:

1. Recursive residual test cumulative sum (CUSUM).

2. The CUSUM OF SQUARE.

These tests indicate that if the graph lines for the CUSUM and CUSUM OF SQUARE tests fall between the upper and lower bounds of the crucial boundaries at a level of significance of 5%, then the hypothesis is accepted and the predicted structural stability the (ARDL) model's parameters are achieved. According to the following graphic, which supports the null, all calculated parameters are structurally stable:

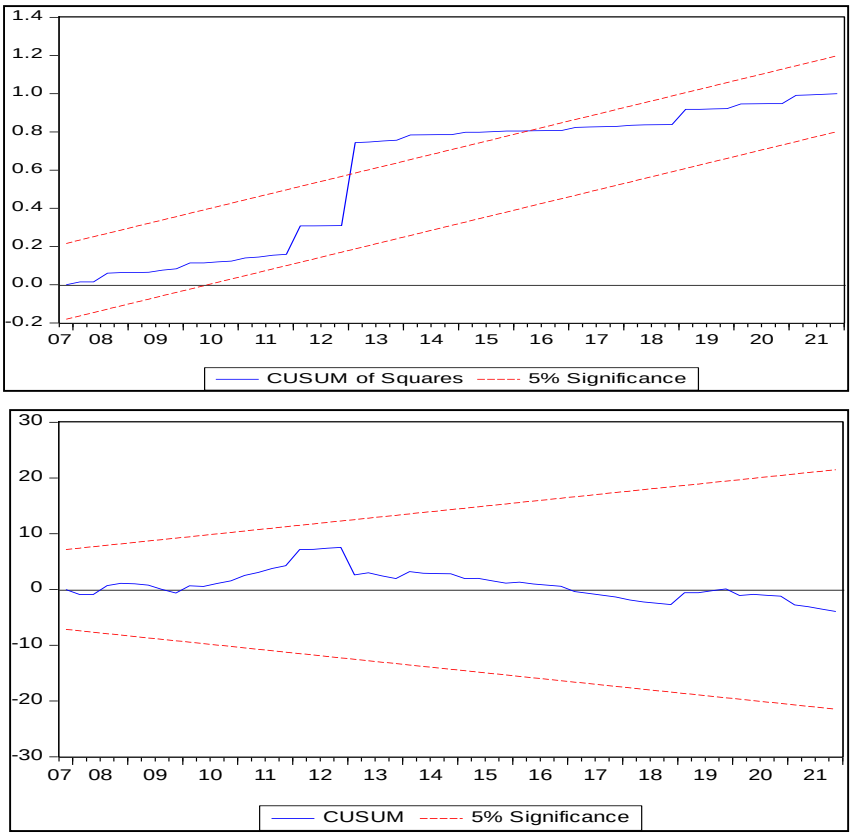

Figure 4. Structural stability test

Source: Preparing the researcher based on the program's outputs Eviews10.

It is clear from the figure above that the graph line for the first test at a significant level, stays within the critical limits (the upper and lower limits) (5%) except in some years, which reflects the presence of some shocks in the years in which the graph line departed from the critical limits. While in the second figure, the graph line fell within the critical limits, which means that the cumulative totals are centered around their arithmetic mean during the research period, and this gives a clear indication of the presence between the outcomes of the short-term parameters Given the parameters in the long run, Regarding the model estimations' consistency and stability.

Estimating the relationship between public saving and private investment in agriculture, forestry and fishing

"Initial estimation according to the (ARDL) model"

The results of the ARDL model show that preliminary assessment of the link between public saving (S) and private investment in agriculture, forestry, and fisheries (PI) are shown in Table 9.

Table 9. The result of the Initial estimation according to the (ARDL) model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
PI(-1)	1.229622	0.142698	8.616926	0.00000
PI(-2)	-0.68748	0.144056	-4.77229	0.0001
S	0.000745	0.000717	1.039654	0.3077
C	3829110	52974685	0.072282	0.9429
R-squared	0.765808	Mean dependent var		1.32E+08
Adjusted R-squared	0.739786	S.D. dependent var		1.92E+08
S.E. of regression	98096856	Akaike info criterion		39.76072
Sum squared resid	2.60E+17	Schwarz criterion		39.94575
Log likelihood	-612.291	Hannan-Quinn criter.		39.82104
F-statistic	29.42997	Durbin-Watson stat		1.234428
Prob(F-statistic)	0.0000			
*Note: p-values and any subsequent tests do not account for model selection.				

Source: Preparing the researcher based on the program's outputs Eviews10.

Test the optimal lag period

The outcomes of determining the ideal lag time for the association between public savings and private investment in forestry, fishery, and agriculture are displayed in Table 10.

Table 10. Determine the ideal lag time

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
3	-612.291	39.76072	39.94575	39.82104	0.739786	ARDL(2, 0)
2	-611.887	39.79916	40.03045	39.87456	0.736734	ARDL(2, 1)
1	-611.848	39.86114	40.13868	39.95161	0.726898	ARDL(2, 2)
6	-621.772	40.30788	40.44665	40.35312	0.537426	ARDL(1, 0)
5	-621.749	40.3709	40.55593	40.43122	0.52101	ARDL(1, 1)
4	-621.722	40.43367	40.66495	40.50906	0.503457	ARDL(1, 2)

Source: Preparing the researcher based on the program's outputs Eviews10

The findings make it evident that, in accordance with the model's requirements, the ideal lag period selected by an ARDL model is of the order (0, 2). The ideal lag time that produces the lowest result for these criteria is selected.

Bound Test of the relationship between variables

According to findings, the (F) statistic's computed value is 9.709986, which surpasses the crucial value (F) at its maximum at the (1%), or 7.84. Consequently, we reject the null hypothesis, according to which co-integration does not exist. As there is a co-integration connection between the variables during the course of the investigation, We agree with the alternative theory, according to which the variables are cointegrated.

Estimation of short-run and long-run parameters and error correction parameter

The parameters of the error correction parameter, including the short-term and long-term estimators and the calculated model should now be derived after confirming that there is a cointegration connection between the variables, as Table (11) illustrates.

Table 11. Estimating short- and long-term parameters as well as the error correction parameter

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PI(-1))	0.687478	0.144056	4.772292	0.0001
D(S)	0.000745	0.000717	1.039654	0.3077
CointEq(-1)	-0.45786	0.10948	-4.1821	0.0003
Cointeq = PI - (0.0016*S + 8363139.4930)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
S	0.001627	0.001439	1.130538	0.2682
C	8363139	1.16E+08	0.072046	0.9431

Source: Preparing the researcher based on the program's outputs Eviews10

Public saving (S) and private investment in agriculture, forestry, and fishing (PI) have a cointegration relationship, according to the results, even though the error correction parameter (-0.457856) is only temporary. This is demonstrated by the fact that the value of the parameter was at the 1% level, negative and statistically significant. brought on by shocks to the independent variable, In a unit of time, the dependent variable can rectify it.

The findings also show that, neither in the short nor long terms, public saving had any appreciable impact on private investment in forestry, fishery, and agriculture over the study period. This suggests that additional variables and factors not included in the model may be the cause of the co-integration connection that exists between them. The obstacles and problems that the agricultural sector and the Iraqi economy suffer from hinder the creation of a suitable economic

environment for the private sector that enables it to direct its savings towards investment in agriculture. Economic conditions do not encourage investment in agriculture, and make it a loss-making and high-risk investment. The government and private banking sector suffers from great neglect and is unable to formulate and implement financial policies. It ranks last compared to international banks, which are witnessing great developments that enable them to absorb savings and direct them towards investment.

estimating the relationship between public saving and GDP

"Initial estimation according to the (ARDL) model"

Table (12) "presents the results of the first estimation of the" (ARDL) model for the association between saving (S) and GDP.

Table 12. Initial estimation according to the (ARDL) model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	1.637057	0.150276	10.89364	0.0000
GDP(-2)	-0.68358	0.147099	-4.64705	0.0001
S	0.000248	6.73E-05	3.685766	0.0011
S(-1)	-0.00035	0.000117	-3.02829	0.0056
S(-2)	0.00018	7.97E-05	2.255789	0.0331
C	2938831	3407411	0.862482	0.3966
R-squared	0.990686	Mean dependent var		1.68E+08
Adjusted R-squared	0.988823	S.D. dependent var		37942065
S.E. of regression	4011210	Akaike info criterion		33.41907
Sum squared resid	4.02E+14	Schwarz criterion		33.69662
Log likelihood	-511.996	Hannan-Quinn criter.		33.50954
F-statistic	531.8368	Durbin-Watson stat		1.00853
Prob(F-statistic)	0.0000			
*Note: p-values and any subsequent tests do not account for model selection.				

Source: Preparing the researcher based on the program's outputs Eviews10

The model's explanatory capacity is demonstrated by the table, where the determination coefficient reached 98% was achieved using a coefficient of determination set at 99%.

Optimal lag period test

Table (13) makes it evident that the ARDL model's ideal lag periods are of the order (2, 2) based on the model's criteria, with the optimal lag period being selected based on the one that yields the lowest value for each of these criteria.

Table 13. Optimal lag period test

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
1	-511.996	33.41907	33.69662	33.50954	0.988823	ARDL(2, 2)

2	-514.867	33.53982	33.77111	33.61522	0.987066	ARDL(2, 1)
3	-517.682	33.65692	33.84195	33.71723	0.985065	ARDL(2, 0)
6	-522.701	33.91619	34.05497	33.96143	0.980091	ARDL(1, 0)
5	-521.72	33.91742	34.10245	33.97774	0.98062	ARDL(1, 1)
4	-521.646	33.97717	34.20846	34.05257	0.97997	ARDL(1, 2)

Source: Preparing the researcher based on the program's outputs Eviews10

Bound Test

According to findings, the (F) statistic's computed 6.698518 is the value, which surpasses (F)'s critical value at the 2.5% level, its top bound, which is equivalent to 6.68. Consequently, we reject the null hypothesis, according to which co-integration does not exist. As there is a co-integration connection over the research period between the factors, we adopt the alternative hypothesis, which claims implies the variables exhibit co-integration (public saving, gross domestic product).

Calculating the error correction parameter and the long- and short-term parameters

Table (14) illustrates how to derive the computed model parameters' short- and long-term estimators as well as the error correction parameter after confirming that there is a cointegration connection between the variables.

Table 14. Estimation of short-run and long-run parameters and error correction parameter

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	0.683577	0.147099	4.647051	0.0001
D(S)	0.000248	0.000067	3.685766	0.0011
D(S(-1))	-0.00018	0.00008	-2.25579	0.0331
CointEq(-1)	-0.04652	0.023217	-2.00369	0.0561
Cointeq = GDP - (0.0016*S + 63173685.6148)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
S	0.001577	0.000768	2.05345	0.0506
C	63173686	58537100	1.079208	0.2908

Source: Preparing the researcher based on the program's outputs Eviews10

Statistical significance was achieved at the 5% level for the negative value of the error correction parameter (-0.04652). and (0.04652) is one of the short-term inaccuracies brought on by independent variable shocks that can be corrected by the dependent variable within a unit of time. These findings suggest that public saving (S) and GDP have a cointegration relationship.

As a result, there is a positive and significant short-term relationship between the variables (S and GDP) according to the results. Specifically, public saving has a positive and significant short-term effect on GDP at

a significant level (5%), meaning that a unit increase in public saving results in a unit increase in output. The GDP (gross domestic product) increases by (0.000248), and conversely, a decrease in saving by one unit causes the gross domestic product to decline by (0.000248), assuming other factors remain constant.

According to the findings, The factors have a statistically significant positive long-term connection, meaning that public saving has a long-term positive significant effect on GDP at a significant level (5%). This means that for every unit increase in public saving, there is a corresponding increase in GDP of (0.001577). On the other hand, if all other things stay the same, a one-unit decline in public saving causes a (0.001577) drop in GDP.

Tests of econometrical problem (second order test)

Test of Heteroskedasticity ARCH

Table (15) clearly demonstrates that there are no the heteroskedasticity issue because Heteroskedasticity is absent from the calculated model issue due to the computed (F) value reaching (0.4331) at the probability level (0.4162), which at the five percent level was not significant.

Table 15. Test of Heteroskedasticity ARCH

F-statistic	0.631957	Prob. F(1,29)	0.4331
Obs*R-squared	0.661133	Prob. Chi-Square(1)	0.4162

Source: Preparing the researcher based on the program's outputs Eviews10

Autocorrelation test LM

As can be seen from Table (16), The test outcomes amply illustrated the accuracy and validity from the calculated model, as evidenced by the resultant (F) value reaching (0.5383) at the level of likelihood (0.475), which was insignificant at the (5%) level. This suggests that there isn't a problem with correlation with the estimated model.

Table 16. Autocorrelation test LM

F-statistic	0.634386	Prob. F(2,26)	0.5383
Obs*R-squared	1.488908	Prob. Chi-Square(2)	0.475

Source: Preparing the researcher based on the program's outputs Eviews10

Ramsey Test

The results of Table (17) make it evident that both the determined (F) value of (2.357409) and its probability value (0.1378), which came to (1.535386), and the computed (t) statistic's value of (1.535386), which was Not significant at the significance threshold of five percent. The functional form of the calculated model is accurate as it At the five

percent significance level, not significant.

Table 17. Ramsey test

Ramsey RESET Test			
Equation: UNTITLED			
Specification: GDP GDP(-1) GDP(-2) S S(-1) S(-2) C			
Omitted Variables: Squares of fitted values			
	Value	df	Probability
t-statistic	1.535386	24	0.1378
F-statistic	2.357409	(1, 24)	0.1378

Source: Preparing the researcher based on the program's outputs Eviews10

Verifying the predicted model parameters' structural stability

The following two tests were performed to make sure that no structural changes have occurred in the data used to estimate the model, and to evaluate the degree of stability and consistency between long-term and short-term parameter estimates:

1. Recursive residual test cumulative sum (CUSUM).

2. The CUSUM OF SQUARE .

These tests indicate that if the graph lines for the CUSUM and CUSUM OF SQUARE tests fall between the upper and lower bounds of the critical limits at a significance level of 5%, then the hypothesis is accepted Considering the predicted structural stability of the parameters of the (ARDL) model is achieved. According to the following graphic, which supports the null, all calculated parameters are structurally stable:

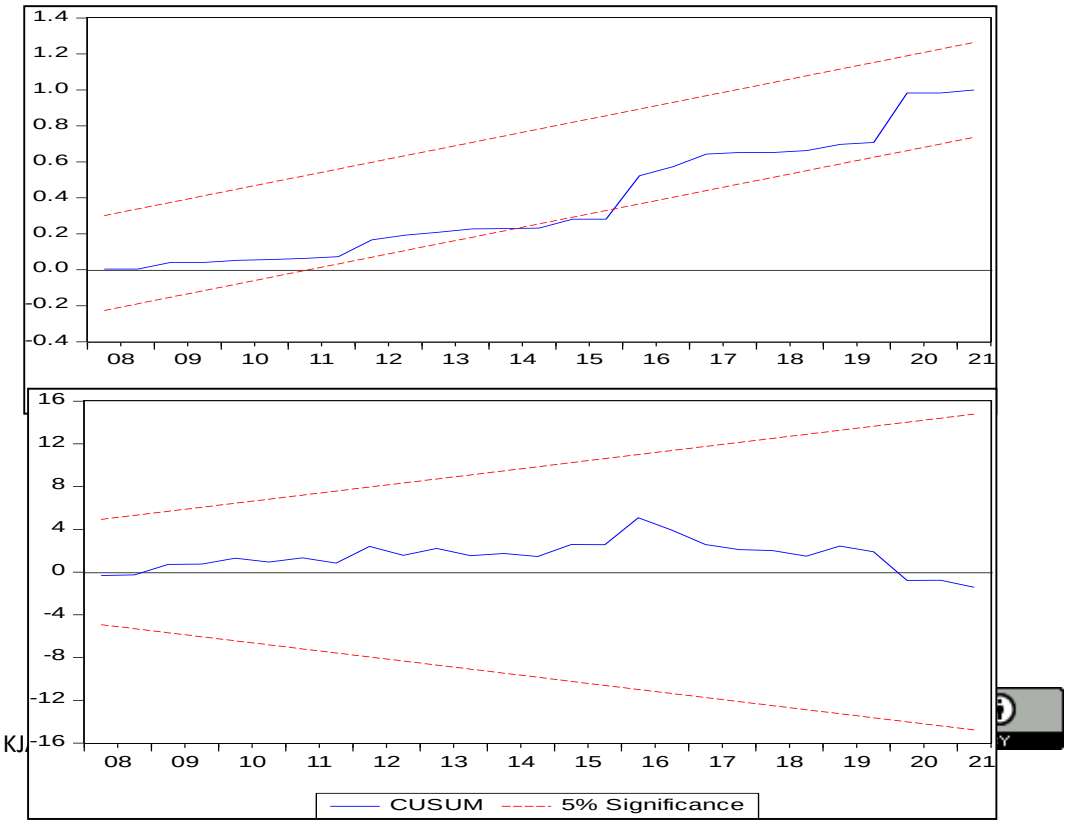

Figure 5. Structural stability testing
Source: Preparing the researcher based on the program's outputs Eviews10.

Conclusion

The average percentage of public saving during the study period as a percentage of the gross domestic product reached 36.6%, which is a high percentage when compared to another developing economy, and this saving can be employed and directed towards agricultural investment. It is noted that the volume of investment in agriculture, forestry, and fishing for the government and private sectors combined has been significantly reduced, as the average contribution of the two sectors' investments to public investment for the period of the study amounted to 1.5%, and the percentage of these investments did not exceed 1% throughout the study period. The results of measuring and analyzing the tests and standard models used (the autoregressive distributed lag period model (ARDL)) that illustrate the impact of public saving on government and private sector investments in agriculture, forestry, and fishing for the period 2005-2021 show that public saving has an impact and short-term responses on government investment. In agriculture, forestry and hunting, That is, public saving is directed towards government investments in agriculture, but this effect fades in the long term and the moral effect between them is absent. It was found that there was no significant effect in the long term and short term of public saving on private investment in agriculture, forestry and fishing during the study period, meaning that the savings owned by the government and individuals are not directed to private sector investments in the agricultural sector and are directed to other sectors. The reason for not directing these savings towards the agricultural sector is due to the high risk of investing in agriculture in terms of low profits and the failure of economic policies to provide an investment environment. There are a large number of problems and obstacles that the agricultural sector in Iraq suffers from that hinder investments.

The results indicate the existence of a positive, significant short-term relationship between public saving and GDP, that is, the existence of a positive, long-term positive association among the variables, that is, when there is a positive, significant influence of public saving on GDP, as well as the presence of a favorable, noteworthy result of public saving on GDP in the short run. In the long run at a significant level (5%), Which means that increasing public saving by one unit leads to an increase in GDP by (0.001577), and conversely, decreasing

public saving by one unit leads to a decrease in GDP by (0.001577), assuming other factors remain constant. Considering these outcomes, This report suggests that the Iraqi government be given more authority through its economic policies in driving savings and employing it towards investment in the agriculture industry to boost and diversify agricultural output. Addressing the problems facing the banking sector in Iraq so that it has the ability to implement economic policies directed at accumulating savings and directing them towards productive activities, providing modern banking services characterized by efficient financial performance and reducing risks, and taking measures aimed at speed and discipline in accumulating and converting savings into agricultural investment. Serious and continuous work to provide an acceptable investment environment that will be an incentive to attract investors in the field of agricultural production and find solutions to remove all obstacles facing the investor's work by building an integrated investment system that provides him with effort, time and security. Mobilizing government and private savings, activating the role of mediation between savers and investors, and intensifying education programs. Raising awareness among community members about the necessity of directing their savings to banks to obtain profits.

Conflict of interest

The authors have no conflict of interest.

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