Measurement of the impact of fiscal and monetary policies on the performance of Agricultural output in Iraq for the period(2004-2023)

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Abstract:

The aimed of This study the impact of fiscal policies (government expenditures and tax receipts) and monetary policies (money supply, inflation, exchange rate, and interest rate) on the percentage contribution of the agricultural sector to the Gross Domestic Product of Iraq between 2004 and 2023. Short-run and long-run impacts are differentiated, and weaknesses in the implementation of economic policies are estimated.The research utilizes a quantitative method using annual data gathered from the Ministry of Planning and the Central Bank of Iraq, basing its analysis on the Autoregressive Distributed Lag (ARDL) model to analyze the relationship between variables. EViews 12 software was used in conducting the stationarity and cointegration tests.The evidence showed that both monetary policy and fiscal policy all have a huge impact on the contribution of agriculture towards GDP. They have been hindered, however, by inefficient planning as well as the overwhelming predominance of the petroleum industry from functioning in general. Moreover, some of the instruments such as money supply and exchange rate showed a favorable short-run impact, which faded in the long run due to the absence of long-lasting developmental policies.Against this background, the research recommends redirecting government spending toward long-term strategic farm development programs, expanding agricultural finance programs via concessional loans, and utilizing monetary policy tools to channel liquidity into productive activities. It also recommends using exchange rate volatility to enhance the competitiveness of local products, and adopting long-term farm schemes that foster reducing oil dependency, improving food security, and sustainable growth.

Keywords: Fiscal Policy, Monetary Policy, Agricultural Output

Introduction

The Iraqi economy faced severe challenges during the period (2004–2023) as a result of the domination of oil revenues over economic activity and the neglect of productive sectors, foremost among which is the agricultural sector. The agricultural sector is a strategic sector because of its strong link to achieving food security, sustainable development, and diversification of income sources. But its contribution to the Gross Domestic Product (GDP) has remained low. It is therefore necessary to examine the contribution of fiscal and monetary policies in enhancing or eroding the contribution of the agricultural sector to GDP, with a view to establishing the level of their coordination with development objectives.

Research Problem

The issue of the study is the continued decline in the role of the agricultural sector in Iraq's Gross Domestic Product despite elevated government expenditure and the

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employment of all fiscal and monetary policy tools. This reveals a gap between theoretical underpinnings that emphasize the function of these policies in stimulating productive sectors and the real-world fact of their minimal effect in supporting agriculture. Therefore, the main research question is: To what extent have monetary and fiscal policies affected the percentage contribution of the agricultural sector to Iraq's Gross Domestic Product over the years (2004–2023)?

Research Significance:

1. To highlight the crucial position of the agricultural sector in the realization of food security and the reduction of dependence on oil revenues.

2. To contribute towards making Iraqi economic literature richer through the vehicle of a latest analytical and econometric analysis spanning a relatively long time interval (2004–2023).

Research Objectives

1. To reflect the impact of fiscal policies (governmet expenditure and tax income) and monetary policies (supply of money,inflation ,exchange rate,and interest rate)on the performance of the agricultural sector.

2. To provide policymakers with quantitative estimates that are reliable in constructing plans to rejuvenate the agricultural sector.

3. To estimate the effect of government expenditure and tax receipts on the share contribution of the agricultural output to Gross Domestic Product.

4. To analyze the impact of money supply, inflation rate, exchange rate, and interest rate on agriculture.

5. To distinguish between the short-run and long-run influence of fiscal and monetary policy on agriculture.

6. To provide practical recommendations which can help in promoting the contribution of the agricultural sector to the Gross Domestic Product.

Research Methodology and work procedure

1-The study employs a quantitative analytical approach using annual data of Iraq for the period (2004–2023) obtained from the Ministry of Planning and the Central Bank of Iraq.

$$Y = f(X_1 , X_2 , X_3 , X_4 , X_5 , X_6)$$

Expressing the above function in econometric form, the model becomes:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + u_i$$

Where:

Y=Percentage contribution of agricultural production to the Gross Domestic Product (GDP) (%)

X_1 =Government expenditure (million IQD)

X_2 = Tax revenues (million IQD)

X_3 = Broad money supply (million IQD)

X_4 = Inflation rate (%)

X_5 = Exchange rate (%)

X_6 = Interest rate (%)

2-Dependent variable: Contribution of the Agriculture sector as a percentage to the Gross Domestic Product.

3-Independent variables: Government expenditure, tax revenue, money supply, inflation rate, exchange rate, and interest rate.

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4-The Autoregressive Distributed Lag (ARDL) cointegration model was utilized to estimate the short- and long-run relationships, as well as carry out stationarity and cointegration tests. The tests were carried out using the EViews 12 software.

Theoretical framework:

First: The Concept of Fiscal Policy

Fiscal policy is defined as the sequence of goals, directions, routines, and measures followed by the state with the goal of influencing the national economy in a manner to ensure its overall stability, encourage its growth, address its issues, and address prevailing environments and trends [12].

1. Types of Fiscal Policy

There are two main types of fiscal policy that may be utilized depending on the economic scenario prevalent [5].

1.1.Expansionary Fiscal Policy.

It is applied to stimulate the economy and is most commonly utilized when there is recession or high levels of unemployment. It is done through reducing taxation and increasing government spending.

1.2 Contractionary Fiscal Policy.

This policy comes into play where there is a perceptible increase in economic activity, with the aim of slowing down the growth within the economy and stifling inflation. It is also utilised in the case of excess inflation, as its main focus is to reduce public expenditure, rise in tax levels, and drain consumers' excess liquidity.

2. Instruments of Fiscal Policy.

Fiscal policy is the governmental plan that implements a series of important activities. The first one is the allocation function, whose aim is to provide significant social goods and services. The second one is the distribution function, by which the government acts in order to have an equilibrated distribution of income and wealth among the society members. The third one is the function of stabilization, whose aim is to achieve economic stability by using the budget to influence the variables related to this stability.

All these activities and actions are initiated by the instruments of fiscal policy, i.e., public expenditure, public receipts, and the consolidated budget [11].

The most direct and strongest instruments of fiscal policy are the following:

2.1 Government (Public) Expenditure

Government spending is seen as the most powerful instrument of fiscal policy that policymakers employ to influence economic activity by improving the degree of aggregate demand in the domestic economy. When government tries to address either an inflation or deflation gap, public expenditure policy is employed to increase or reduce the degree of aggregate demand depending on whether it has an inflation or deflation gap. Through this mechanism, government spending is a strong tool to manipulate the aggregate level of economic activity—either expanding or reducing it—depending on the prevailing circumstances of the national economy.

In liberal economies, government social and economic expenditure is usually lower because the private sector is given tremendous latitude to cover needs that individuals may have paid for themselves without government expenditure on consumption or investment. Such a funding approach usually leads to an increase in effective aggregate demand, provided the government spends it on a broad scale so that it does not lead to a

decrease in individual consumption or investment expenditure.

Subsidies are considered to be one form of public expenditure. Subsidies are money allocations provided by the government in order to support producers or production sectors that are low-profit, such as food industry subsidies or subsidies provided to exporters in an attempt to raise the national export level or make national exports competitive in foreign markets. Industrial localization can be encouraged in underdeveloped regions by offering subsidies. They also reduce the final cost to consumers or backing up producers, eventually resulting in increased production [16].

2.2 Taxes

A tax is a payment by the state to the taxpayers in a clear and compulsory manner, without an immediate compensation, with the aim of funding public expenditure and fulfilling economic objectives [14]. Taxes are defined as one of the chief instruments of fiscal policy, imposed on taxpayers for the achievement of social objectives that lead to income distribution and equity support in society. Hence, taxation is not merely a method of financing state expenditure, but also a process through which the state endeavors to attain social as well as economic goals.

In other words, a tax is a mandatory money contribution placed on activity, expenditure, work, or incomes—either business or individual-owned [19]. Taxes are also a financial payment, as mandated by law, needed to be remitted by government departments to various sectors, of which are business activity such as goods and services. Taxes are most commonly expressed as a proportion of money, as set in legislation.

Taxes are divided into direct taxes, such as income tax and capital tax, and indirect taxes, such as sales tax, excise tax, and value-added tax (VAT). Taxation raises or reduces the level of economic activity depending on the circumstances of the national economy that exist [14].

Secondly – The Meaning of Monetary Policy

Monetary policy has been described as a set of laws and actions on the part of the monetary authorities (the central bank) to control the money supply in a way that is in harmony with the desired level of economic activity, with a view to achieving a set of economic objectives. The monetary policy is implemented by the central bank through a set of tools that are either quantitative or qualitative in nature. There are also direct tools that are implemented by the central bank in special cases to regulate the money supply [21].

Types of Monetary Policy

There are two broad types of monetary policy that the monetary authority pursues depending on the state of the economy. These can be described as follows [7].

1.1 Expansionary Monetary Policy

The monetary authority employs an expansionary policy when the economy is experiencing recession or stagnation due to declining demand for goods and services and the inability of demand to catch up with supply. The purpose of this policy is to increase the money supply and cash reserves either by employing quantitative measures—e.g., lowering the legal reserve ratio and conducting open market purchases—or by utilizing optional measures to encourage banks to increase lending further. The subsequent money supply expansion leads to a drop in interest rates, stimulates investment and production, and hence increases aggregate demand.

1.2 Contractionary Monetary Policy

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This is the second type of monetary policy that is adopted by the monetary authority during inflation. It is the opposite of expansionary policy, attempting—through quantitative methods such as raising the legal reserve ratio or selling in open market operations, and through optional methods encouraging banks to reduce their lending—to shrink the money supply. This shrinking raises interest rates, reduces investment and output, and results in a decline in aggregate demand.

2. Instruments of Monetary Policy

Instruments of monetary policy are described as a set of tools and mechanisms that are used by the central bank to regulate and direct credit according to the monetary conditions. Using these instruments, the central bank regulates the volume of liquidity extended to commercial banks and thereby their ability to extend credit in relation to economic policy objectives that it wishes to achieve [9].Monetary policy instruments are of two types:

2.1 Indirect Instruments (Quantitative Tools)

They consist of three main tools: the discount rate, open market operations, and the required reserve policy. They are the tools by which the central bank controls the size of the money supply and directs and supervises the volume and cost of bank credit. On the basis of monetary and credit policy objectives, these tools enable the central bank to influence the overall stock of money circulating in the economy [4].

2-1-1. The Discount Rate

The discount rate represents the amount charged by the central bank to member banks for borrowing money through its discount window. It refers to the rate of interest that the central bank collects from commercial banks in return for rediscounting commercial papers and treasury bills held by them, or for providing them with advances and loans. The discount rate is considered one of the oldest instruments employed by central banks. By raising the rate, the central bank restricts the borrowing capacity of banks, thereby reducing liquidity and slowing down economic activity. Conversely, lowering the discount rate encourages borrowing, increases liquidity, and stimulates growth [20].

It also denotes the interest rate received by the central bank for rediscounting financial commercial papers (such as bills of exchange) submitted by commercial banks when they require liquidity and are unable to obtain it from other sources. When the central bank raises the discount rate, this implicitly increases the cost for banks to obtain funds. Consequently, commercial banks raise their lending interest rates to their clients, which indicates the adoption of a contractionary monetary policy. On the other hand, when the central bank adopts an expansionary monetary policy, it lowers the discount rate to encourage banks to reduce their lending rates to customers. Therefore, the discount rate serves as one of the fundamental mechanisms through which the central bank can influence the general interest rate level—that is, both the cost of borrowing and the return on deposits [18].

In implementing this policy, the central bank primarily seeks to affect commercial banks through the cost of obtaining additional monetary resources that it provides, and consequently through the cost of credit extended by these banks to their non-bank economic clients. Depending on the economic conditions, the need for liquidity, and the capacity to meet such demand, the central bank acts accordingly. If it believes that the money supply in the economy has reached an

excessive level, it applies a contractionary monetary policy to reduce the volume of money in circulation by raising the discount rate. As a result, borrowing costs increase, commercial banks' reserves decline, and they raise lending interest rates. Consequently, fewer individuals borrow funds since the return on investment from borrowed money decreases, which reduces spending and mitigates inflationary pressures, thereby lowering the money supply.

Conversely, if the central bank perceives that the money supply has fallen to an unfavorable level, it adopts an expansionary monetary policy by lowering the discount rate for commercial banks. This encourages them to increase their demand for liquidity by converting part of their financial assets into legal tender, as the cost of obtaining such funds becomes lower. This process raises commercial banks' reserves and enhances their capacity to create credit, leading to an expansion in the money supply, higher income and output, and greater overall economic activity [17].

2.1.2 Legal Reserve Ratio

Legal reserve ratio is the proportion of bank deposits that have to be kept by commercial banks in their central bank accounts and cannot be used to make investments or lend. Based on the monetary policy objectives, the central bank operates this instrument in two opposite directions.

The first course of action involves increasing the reserve ratio, where the central bank seeks to restrict the amount of money in circulation by restraining the ability of banks to lend money and invest. This approach is also known as the contractionary or restrictive policy, which is typically utilized to counter inflationary pressures. A rise in the reserve ratio on deposits means that commercial banks' lending ability decreases, thereby reducing the money supply in general.

The second direction involves reducing the legal reserve ratio, which is adopted by the central bank to raise the amount of money in circulation. Reduction of reserve requirements leads to reducing the interest rate, stimulates investment, increases aggregate demand, and increases national income. This direction is known as the expansionary direction and is adopted in general to close the recessionary gap. H.ence, as the required reserve ratio is lower, commercial banks have an enhanced capability to lend, resulting in a higher supply of money and better economic activity overall [3]

2.1.3 Open Market Operations

Open market operations are among the most significant tools used by the central bank to change the amount of monetary reserves held by commercial banks, and in turn the volume of credit and loans extended to the economy. By doing so, the central bank steps into financial markets as a buyer or seller of securities in order to change the volume of bank reserves and consequently influence credit generation based on existing economic conditions—recessionary or inflationary.For this purpose, the central bank typically maintains an appropriate portfolio of government securities for intervention. Open market operations are considered one of the most effective monetary instruments, particularly in developed nations with sound and developed financial markets [13].

2.2 The Discount Rate Policy

Besides its importance as an instrument of monetary policy, nevertheless, developing nations have not yet eliminated all obstacles to utilizing the discount rate. The majority of them do not even deal in commercial papers, treasury bills, or

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promissory notes. Foreign bank branches also find their place in the financial systems of a number of other nations, reducing their reliance on borrowing from the central bank since they maintain huge reserves and, apart from that, borrow predominantly from foreign financial markets.

In addition, there remains a large proportion of commercial papers in circulation among individuals rather than entering the formal banking system, weakening the potency of this tool. Finally, developing countries have low elasticity of credit demand to an interest rate change. Therefore, when a central bank attempts to restrain the credit- facilitating function of commercial banks during inflation by changing the discount rate, its impacts are certain to be feeble and limited. This is because the monetary and financial systems are underdeveloped, money and capital markets do not function well, and the banking system has structural inefficiencies.

Thus, these institutional and structural vulnerabilities characteristic of the emerging economies' banking systems inordinately constrain the effectiveness of the discount rate tool in influencing key macroeconomic variables and aggregate economic activity [1].

2.2 Direct Money Policy Instruments (Qualitative Instruments)

With the help of these instruments, the central bank directs credit to specific segments of the economy—primarily developing countries—depending upon the weak impact and limited scope of the quantitative instruments. These instruments influence the demand for credit and, at the same time, consider the supply of credit as their final objective. The central bank is thus able to increase or decrease the magnitude of economic activity by channelling credit into particular sectors [2]. The most commonly used qualitative or direct tools may be enumerated as follows:

2.2.1 Regulation of Credit

Here, credit control relies on the purpose for which advances are granted. It is achieved through specific guidelines and rules provided by the central bank. Monetary authorities can impose upper limits on total advances granted by commercial banks—broadly as a percentage to ensure total advances remain under specific annual ranges.

Secondly, the central bank lays down guidelines and procedures related to payment duration and installment plans. In this manner, the central bank does not leave commercial banks to have full authority over extending credit but instead initiates actions that restrict their capability for lending. Commercial banks that refuse to comply with such actions are penalized, differing from one country to another.

The fundamental target of this policy is to make sure that credit is properly utilized and distributed in the most productive segments of the economy [6].

2.2.2 Direct Orders and Instructions

These consist of binding decisions and direct directives issued by the central bank to commercial banks, whose enforcement is compulsory rather than voluntary. National law in most cases grants the central bank the authority to issue direct instructions—either to all commercial banks or to a subset of them—regarding their lending policy, or even to require them to channel part of their liquidity into particular types of investments or particular sectors of the economy.

Worthy of note is the fact that these orders and instructions can be in various forms, depending on the existing economic and monetary conditions [15].

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2.2.3 Margin Requirements Required

Under direct control policies taken up by the central bank, margin requirements are used to catalyze movements in the collateral margins that are required for loans made for speculative purposes in the securities market. The central bank supervises credit extended for such purposes and adjusts these margins to stabilize the economy.Margins are raised during times of inflation to mitigate over-speculation and minimize inflationary forces, and lower margins are applied during recessions or high unemployment to encourage investment and economic activity. Borrowers must also pay part of their commitments out of their own resources, stabilizing markets and minimizing the effects of economic downturn [8].

2.2.4 Moral Suasion

Moral suasion is the effort of the central bank to influence banking institutions in general—and commercial banks in general—to pursue a particular monetary policy measure aimed at countering a particular economic situation.During recession and stagnation, the central bank encourages commercial banks to lower interest rates and expand credit, whereas during inflation it convinces them to raise interest rates and constrict credit.Moral suasion is therefore an indirect but effective monetary policy tool by which the central bank elicits an influence over credit transactions in the domestic economy. It does this by using appeals, requests, calls for cooperation, and persuasive communications—oral and written—emphasizing the potential advantage that is to be gained by both the banking sector as well as the domestic economy through adherence to the desired monetary policy [10].

Results and discussion:

Farm Product's Status and Concept and Its Contribution to the Gross Domestic Product (GDP) of Iraq during the Time Period (2004–2023)

Data shown in Table (1) depict that the mean agricultural production value in Iraq between 2004–2023 was 8,502,335 million IQD. The highest agricultural production of 13,130,927 million IQD was recorded in 2020. This great increase was mainly because of the post-liberated economic revival of those provinces that had previously been out of government control and, as a result, automatically increased agricultural productivity and raised the entire agricultural production to a historical peak level during the entire study duration.On the other hand, the lowest agricultural output was felt during the year 2004, when it plunged to 3,693,768 million IQD. This decline was reflective of the significant economic and infrastructural setbacks incurred with the outbreak of the U.S. war in Iraq, with a tremendous fall in agricultural output.These trends are proved in Figure (1).As seen in Table (1), agricultural output made contribution to Iraqi GDP differently significantly every year. In the start of the study period, that is, during 2004, the contribution of the industry to the GDP was approximately 6.94%, whereas in 2023 it fell to 2.80%. The average contribution during the entire duration was 4.47%. The highest share was realized in the year 2004 and was 6.94%, whereas the lowest share was observed in 2018 and was as low as 2.65%. Figure (2) illustrates the trend of agricultural sector contribution to national GDP over the years in study.

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Table (1): Agricultural Output and the Percentage Contribution of the Agricultural Sector to the Gross Domestic Product (GDP) in Iraq for the Period (2004–2023)

Year	Agricultural Output (Million Dinars)	Gross Domestic Product (Million Dinars)	Percentage Contribution of Agricultural Output to (%)
2004	3693768.0	53235358.7	6.9386
2005	5064158.0	73533598.6	6.8869
2006	5568985.7	95587954.8	5.8260
2007	5494212.4	111455813.4	4.9295
2008	6042017.7	157026061.6	3.8478
2009	6832552.1	130643200.4	5.2299
2010	8366232.4	162064565.5	5.1623
2011	9918316.8	217327107.4	4.5638
2012	10484949.3	254225490.7	4.1243
2013	13045856.4	273587529.2	4.7684
2014	13128622.6	266332655.1	4.9294
2015	8160769.7	194680971.8	4.1919
2016	7832046.9	196924141.7	3.9772
2017	6598384.8	221665709.5	2.9767
2018	7220904.0	272083889.0	2.6539
2019	10017410.7	279757642.6	3.5807
2020	13130927	217413594.1	6.0396
2021	9267990.8	305592415.3	3.0328
2022	10922787.7	383064152.3	2.8514
2023	9255806	330046390.6	2.8044
Average	8502335	209812412	4.465775
Highest	13130927	383064152	6.9386
Lowest	3693768	53235358.7	2.6539

Source : Ministry of planning , central statistical organization, agricultural statistics directorate , for the period (2004-2023) .

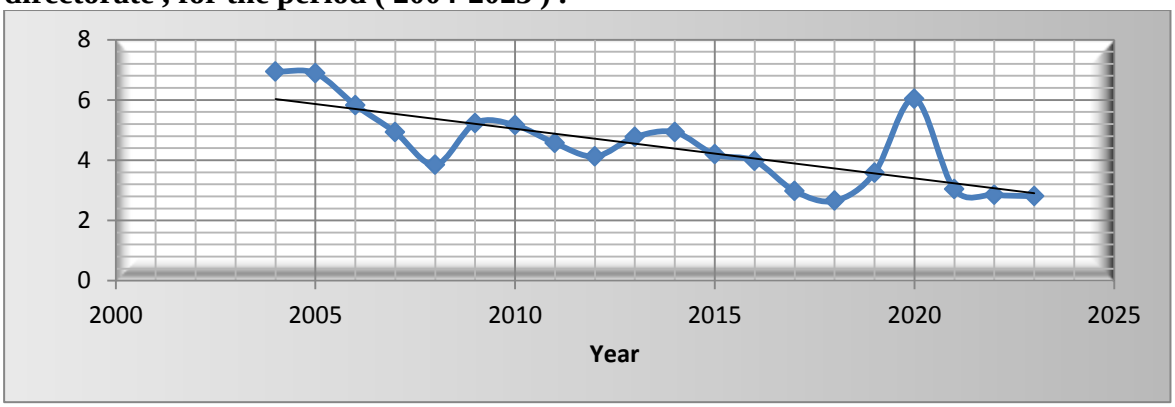

Figure (1): The general trend of agricultural output in Iraq for the period (2004 – 2023) .

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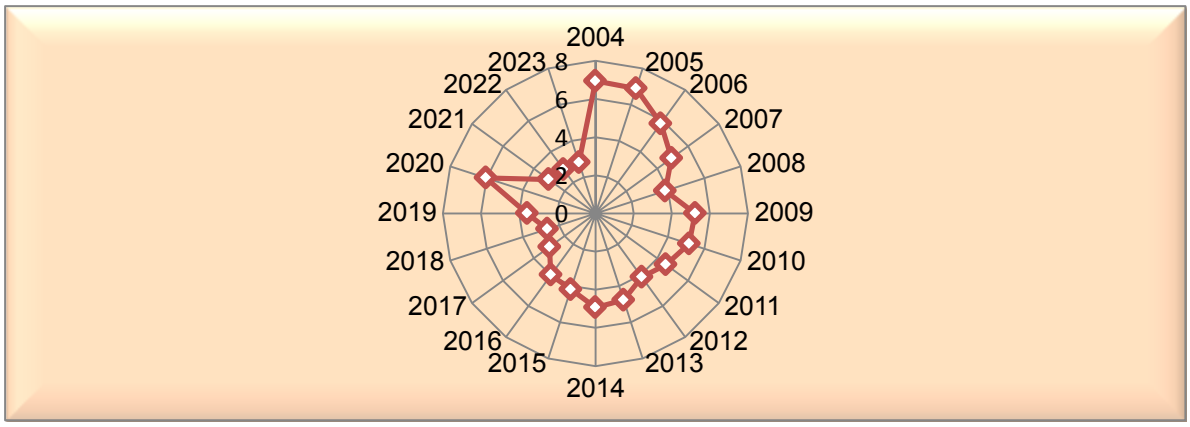

Figure (2): Percentage Contribution of Agricultural Output to the Gross Domestic Product (GDP) in Iraq during the Period (2004–2023).
Source: Assembled by the researcher based on the data in Table (1)

Estimation of the Model Specification of the Effect of Fiscal and Monetary Policies on the Percentage Contribution of Agricultural Production to the Gross Domestic Product (GDP) in Iraq over the Period (2004–2023)

First: Specification of the Link between the Variables of Fiscal and Monetary Policies and the Percentage Contribution of Agricultural Production to GDP (%)

The functional relationship may be specified as follows:

$Y = f(X_1 , X_2 , X_3 , X_4 , X_5 , X_6)$

Expressing the above function in econometric form, the model becomes:

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + u_i$

Where:

Y=Percentage contribution of agricultural production to the Gross Domestic Product (GDP) (%)

X_1 =Government expenditure (million IQD)

X_2 = Tax revenues (million IQD)

X_3 = Broad money supply (million IQD)

X_4 = Inflation rate (%)

X_5 = Exchange rate (%)

X_6 = Interest rate (%)

Second: Unit Root Test for Time Series Variable Stationarity Using the Phillips–Perron (PP) Method

The unit root test is utilized to test the time series nature of all variables included in the function in question, to ensure stationarity of the economic time series and also determine each variable's order of integration.Table (2) shows the Phillips–Perron (PP) test results for variables in the model. The results show that the time series of variables (X_2 , X_4) are stationary at level at a 5% significance level.The variables (X_1 , X_3 , X_5 , X_6 , Y), however, were stationary at the first difference I(1) at 1% and 5% significance levels.It is evident from the above that the variables differ in order of stationarity. The Ordinary Least Squares (OLS) method, therefore, cannot be employed where the variables are of varying orders of integration because OLS assumes that all variables are stationary at the same order. It could lead to spurious or erroneous conclusions if OLS is applied under such circumstances.For this limitation and in order to accommodate the various orders of integration of the variables in the model, the paper employs the Autoregressive Distributed Lag (ARDL) approach of model estimation, as it is able to accept variables with integration orders at both levels I(0) and I(1).

Table (2) : Unit root test for the stationarity of time series variables using the Philips – perron (pp) method .

UNIT ROOT TEST RESULTS TABLE (PP)								
At Level		Y	X1	X2	X3	X4	X5	X6
With Constant	t-Statistic	-2.2075	-0.862	-0.7119	-1.0886	-1.7322	-1.2882	-1.5743
	Prob.	0.2053	0.7953	0.8371	0.7168	0.4113	0.6315	0.4909
		n0	n0	n0	n0	n0	n0	n0
With Constant & Trend	t-Statistic	-3.1593	-1.5204	-3.4172	-2.016	-2.0032	-1.3883	-2.103
	Prob.	0.1003	0.8144	0.0564	0.5835	0.5904	0.8571	0.5359
		n0	n0	*	n0	n0	n0	n0
Without Constant & Trend	t-Statistic	-1.4384	-0.0241	0.638	-0.5205	-3.7181	-0.0789	-0.7175
	Prob.	0.1392	0.6717	0.852	0.4881	0.0212	0.6534	0.4028
		n0	n0	n0	n0	**	n0	n0
At First Difference		d(Y)	d(X1)	d(X2)	d(X3)	d(X4)	d(X5)	d(X6)
With Constant	t-Statistic	-8.8059	-8.8299	-8.942	-8.8085	-8.7474	-8.7181	-8.7191
	Prob.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		***	***	***	***	***	***	***
With Constant & Trend	t-Statistic	-8.7603	-8.972	-8.8944	-8.9366	-8.7147	-9.0431	-8.6641
	Prob.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		***	***	***	***	***	***	***
Without Constant & Trend	t-Statistic	-8.7750	-8.775	-8.775	-8.775	-8.775	-8.775	-8.775
	Prob.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		***	***	***	***	***	***	***
(*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant								

Source: Prepared by the researcher according to EViews 12 program outputs

Third: Econometric and Economic Estimation of the Impact of Fiscal and Monetary Policy Variables on the Percentage Agricultural Production to Gross Domestic Product (GDP) in Iraq for the Period (2004–2023)

The percentage share of agricultural production to GDP estimation model is being tested using the Error Correction Model (ECM) and Autoregressive Distributed Lag (ARDL) approach through the following steps:1. Determination of the Most Suitable Lag Lengths for the influence of study variables on agricultural production contribution percentage to Iraq's GDP for the period (2004–2023). There are several criteria used to determine the proper length of lag for use in the ARDL model, most importantly the Akaike Information Criterion (AIC), the Schwarz Criterion (SC), and the Hannan–Quinn Criterion (H-Q). From Table (3), these measures establish that the proper length of lag to be used in the Autoregressive Distributed Lag (ARDL) model is (1).

Table (3): Determining the Best Lag Lengths of the Study Variables' Impact on the Percentage Contribution of the Agricultural Output to Iraq's Gross Domestic Product (GDP) during the Years (2004–2023).

VAR Lag Order Selection Criteria						
VAR Lag Order Selection Criteria Endogenous variables: Y X1 X2 X3 X4 X5 X6 Exogenous variables: C Date: 10/04/25 Time: 21:48 Sample: 2004Q1 2023Q4 Included observations: 79						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-5561.371	NA	3.94e+52	140.9714	141.1814	141.0555
1	-5072.258	879.1653*	5.74e+47*	129.8293*	131.5089*	130.5022*

Source: Prepared by the researcher according to EViews 12 program outputs.

2. Initial Estimation of the Autoregressive Distributed Lag (ARDL) Model for the Effect of the Study Variables on the Percentage Contribution of Agricultural Output from the Gross Domestic Product (GDP) in Iraq for the Period (2004–2023).

After determining the stationarity of the time series by conducting stability tests for all the variables, the preliminary estimation of the Autoregressive Distributed Lag (ARDL) model was conducted using the EViews 12 statistical package.As shown by Table (4), the value of the Adjusted Coefficient of Determination (Adjusted R^2) is 0.92, which means that the independent variables included in the estimated model explain about 92% of the movement in the dependent variable. This implies that the explanatory variables strongly and predominantly affect the model. The remaining 8% is the unexplained portion of variation caused by external factors not accounted for by the model and represented by the stochastic error term.

Also, the computed F-statistic is 83.84with a probability value of 0.000, which is less than 0.05 and even 0.01, revealing that the estimated model is statistically significant as a whole. Therefore, it can be utilized for planning and projection in future economic research studies.

Table (4): Preliminary Estimation of the Autoregressive Distributed Lag (ARDL) Model for the Effects of the Study Variables on the Percent Contribution of Agricultural Output to the Gross Domestic Product (GDP) in Iraq for the Years (2004–2023).

Dependent Variable: Y				
Method: ARDL				
Date: 10/04/25 Time: 21:56				
Sample (adjusted): 2004Q2 2023Q4				
Included observations: 79 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lag, automatic): X1 X2 X3 X4 X5 X6				
Fixed regressors: C				
Number of models evalulated: 64				
Selected Model: ARDL(1, 1, 1, 1, 0, 1, 1)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Y(-1)	0.752597	0.077819	9.671084	0.0000
X1	-2.95E-09	9.38E-10	-3.144559	0.0025
X1(-1)	2.08E-09	1.02E-09	2.046148	0.0447
X2	-3.77E-07	5.65E-08	-6.676078	0.0000
X2(-1)	2.96E-07	6.39E-08	4.636802	0.0000
X3	1.03E-09	2.90E-10	3.556509	0.0007
X3(-1)	-7.03E-10	3.21E-10	-2.187291	0.0323
X4	0.006669	0.005671	1.176050	0.2438
X5	0.004936	0.001326	3.722320	0.0004
X5(-1)	-0.004579	0.001324	-3.459088	0.0010
X6	-0.093037	0.029919	-3.109675	0.0028
X6(-1)	0.065860	0.028471	2.313255	0.0238
C	1.170566	0.581592	2.012694	0.0482
R-squared	0.938442	Mean dependent var		4.426499
Adjusted R-squared	0.927250	S.D. dependent var		1.248374
S.E. of regression	0.336714	Akaike info criterion		0.810157
Sum squared resid	7.482854	Schwarz criterion		1.200067
Log likelihood	-19.00122	Hannan-Quinn criter.		0.966367
F-statistic	83.84686	Durbin-Watson stat		1.872793
Prob(F-statistic)	0.0000			

Source: Prepared by the researcher according to EViews 12 program outputs

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3.Test of Cointegration Using the Bounds Testing Approach for the Effect of the Study Variables on Agriculture Production Share Contribution to the Iraqi Gross Domestic Product (GDP) Throughout the Period of Time (2004–2023)

In order to ensure the existence of cointegration, which indicates a long-run equilibrium relationship among fiscal and monetary policy variables and the variable for the proportionate contribution of agricultural production to GDP, Bounds Testing was utilized.

This test relies on the F-statistic, where the null hypothesis ($H_0 : \beta = 0$) is no cointegration among the model's variables and the alternative hypothesis ($H_1 : \beta \neq 0$) indicates cointegration among the variables.As indicated in Table (5), calculated F-statistic value is 4.53, which is more than the critical F-values both at the lower and upper levels. This outcome results in the rejection of the null hypothesis ($H_0 : \beta = 0$) and the acceptance of the alternative hypothesis ($H_1 : \beta \neq 0$). Thus, it can be determined that there is a long-run equilibrium (cointegrating) relationship between the variables in consideration.There is no answer for this question

Table (5): Bounds Testing-Based Cointegration Test for the Effect of the Study Variables on the Percentage Contribution of Agricultural Output to the Gross Domestic Product (GDP) in Iraq over the Period (2004–2023).

Null Hypothesis: No levels relationship		F-Bounds Test			
Test Statistic		Value	Signif.	I(0)	I(1)
F-statistic		4.537151		Asymptotic: n=1000	
K		6	10%	1.99	2.94
			5%	2.27	3.28
			2.50%	2.55	3.61
			1%	2.88	3.99

Source: Prepared by the researcher based on the outputs of the EViews 12 program.

4. Estimation and Explanation of the Short-Run and Long-Run Relationship Model Based on the Autoregressive Distributed Lag (ARDL) Approach towards the Impact of the Study Variables on the Percentage Contribution of Agriculture to the Gross Domestic Product (GDP) of Iraq between the Years (2004–2023)

Having confirmed the presence of cointegration (long-run equilibrium relationship) among the variables, the short-run and long-run relationships among them were estimated and interpreted.

From Table (6), the value of the coefficient for the independent variable government expenditure (X_1) is –2.95, indicating a negative relationship between government expenditure and the ratio of agricultural production to GDP. It means that a 1% increase in government expenditure leads to a decrease of 2.95% in the ratio of the agricultural sector to GDP. The variable is at a level of 5%. Even though this finding is in contrast with the economic theory, which holds that greater government spending—specifically on productive sectors such as agriculture—should stimulate agricultural output, it agrees with the real economic situation of Iraq. The escalation of government expenditure in Iraq has not been channeled towards supporting or developing the agriculture sector but towards continuous expenditure, such as on defense, salaries, and imports, without clear strategic plans for

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agricultural development. Also, inefficient planning in agriculture and administrative corruption further limited the sector in attaining maximum gains from such expenditure.In the long run, nonetheless, this variable proved not to be significant, or in other words, government expenditure has no fixed or stable long-run effect on agriculture. Theoretically, this result contradicts mainstream economic wisdom because long-term government expenditure is supposed to improve the performance of productive sectors, i.e., agriculture, through infrastructure, services, and technical support. However, the finding in the Iraqi context is plausible since government spending has not been directed towards long-term agricultural activities due to poor planning and a lack of or no sustainable agricultural policy—thus having minimal long-term impact.The coefficient for tax revenues (X_2) in the short run is –3.77, as presented, that there is a negative correlation between tax revenues and the agricultural sector's contribution to GDP. A rise in tax collections of 1% lowers the agricultural share of GDP by 3.77%, which is statistically significant at the 5% level. The outcome holds in accordance with economic common sense: a rise in the tax burden without sufficient support to the agricultural sector negatively affects productivity, especially with unfavorable sectoral policies, and thus reduces the share of agriculture in GDP.In the long run, the coefficient on revenues from taxation is –3.28, again suggesting a negative relationship. A rise of 1% in revenues from taxation decreases the agricultural contribution to GDP by 3.28%, significant at the 5% level. This result makes economic sense because repeated taxation with no investment in agriculture leads to declining productivity in the long run—particularly with no long-run investment and planning—thus lowering the contribution of the agricultural sector to GDP.The estimated coefficient of broad money supply (X_3) in the short run is 1.03, indicating a positive relationship between money supply and the agricultural sector's contribution to GDP. The broad money supply rises by 1% due to an increase in the share of the agricultural sector by 1.03%, which is statistically significant at the 5% level. This is economically prudent, as an increased money supply raises liquidity, accelerates economic activity—e.g., farming—through enhanced ability to finance and raise purchasing power, thereby enhancing sector performance. This was also seen to be the case with the economic reality in Iraq, where money supply has grown significantly as a result of expansionary monetary policy.But in the long run, the variable is statistically insignificant, something that can be traced to the failure of money expansion liquidity to flow appropriately to productive sectors such as agriculture. This is according to the economic composition of Iraq, whereby the country is controlled by oil and service industries to the neglect of agriculture, which remains underdeveloped and underfunded despite broader monetary expansion.The short-run inflation rate coefficient (X_4) is 0.006 but insignificant at the 5% significance level, and there is no perceivable or lasting short-run impact of inflation on agriculture's share of GDP. Iraqi inflation has moved mainly with external drivers such as oil price fluctuations, exchange rate volatility, and political stability without any direct impact on farm performance. Weak agricultural infrastructure and low price responsiveness further dampened the inflationary effect on the sector's GDP contribution.Similarly, in the long run, inflation remains insignificant, reflecting low agricultural sector responsiveness to macroeconomic shocks, making the effect of inflation weak and statistically insignificant in the long run.Coefficient of exchange rate (X_5) = 0.004, which suggests there is a positive correlation between the exchange rate and

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agricultural sector's GDP contribution. A depreciation in the Iraqi dinar by 1% (an increase in the exchange rate) will raise the share of agriculture by 0.004%, which is significant at the 5% level. This is attributed to increased competitiveness of domestic agricultural products over imports, which stimulates local consumption and drives higher agricultural production. The result is consistent with Iraq's economic situation—where it has been underindustrialized and greatly reliant on imports—where agriculture serves as a beneficial domestic substitute in the face of exchange rate instability.Long run-wise, the exchange rate variable is insignificant, i.e., its long-run effect on the performance of the agricultural sector is unstable or negligible. It is an economically reasonable result, as the adjustment of the exchange rate by itself cannot consistently boost agricultural contribution without complementary structural reforms in the form of infrastructure development, government assistance, and productivity enhancement—all which are stillIraq's weaknesses.Interest rate coefficient (X_6) is –0.093, indicating a negative interest rate–share of agriculture in GDP relationship. The increase in interest rate by 1% reduces the role of agriculture by 0.093%, which is significant at 5% level. It is an economically logical outcome because higher interest rates reduce investment scope within agriculture—specifically in the case of Iraq, where access channels are limited and agricultural credit is weak. Long-run interest rate coefficient is –0.109, which confirms a negative relationship: an increase of 1% in the interest rate leads to a fall of 0.109% in the agricultural share of GDP. This finding is consistent with economic intuition and the Iraqi reality, where costly borrowing discourages farmers from raising or sustaining investment, leading to lower agricultural activity. The lack of incentives for funding and the concentration of economic spending on areas other than agriculture also strengthen this result.

Table (6): Estimation and Interpretation of the Short-Run and Long-Run Relationship Model According to the Autoregressive Distributed Lag (ARDL) Method for the Effect of the Study Variables on the Agricultural Output Percentage Contribution to the Gross Domestic Product (GDP) of Iraq during (2004–2023).

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.170566	0.581592	2.012694	0.0482
Y(-1)*	-0.247403	0.077819	-3.179201	0.0022
X1(-1)	-8.70E-10	6.58E-10	-1.323105	0.1904
X2(-1)	-8.11E-08	3.37E-08	-2.406356	0.0189
X3(-1)	3.29E-10	2.12E-10	1.553548	0.1251
X4**	0.006669	0.005671	1.176050	0.2438
X5(-1)	0.000357	0.000563	0.632776	0.5291
X6(-1)	-0.027177	0.014232	-1.909521	0.0605
D(X1)	-2.95E-09	9.38E-10	-3.144559	0.0025
D(X2)	-3.77E-07	5.65E-08	-6.676078	0.0000
D(X3)	1.03E-09	2.90E-10	3.556509	0.0007
D(X5)	0.004936	0.001326	3.722320	0.0004
D(X6)	-0.093037	0.029919	-3.109675	0.0028
Case 2: Restricted Constant and No Trend				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-3.52E-09	2.42E-09	-1.453442	0.1508
X2	-3.28E-07	7.80E-08	-4.202290	0.0001
X3	1.33E-09	7.95E-10	1.674568	0.0988
X4	0.026958	0.024347	1.107225	0.2722
X5	0.001441	0.002071	0.695864	0.4890
X6	-0.109848	0.050387	-2.180105	0.0328
C	4.731411	2.437054	1.941446	0.0565
EC = Y - (-0.0000*X1 -0.0000*X2 + 0.0000*X3 + 0.0270*X4 + 0.0014*X5 -0.1098*X6 + 4.7314)				

Source: Prepared by the researcher based on the outputs of the EViews 12 program

that the Error Correction Term (ECT) coefficient value stands at –0.247, significant at 1% level. This satisfies the required and adequate condition for the validity of the model, indicating towards the fact that the short-run disequilibrium in the share of agriculture production in Gross Domestic Product (GDP) can be corrected towards long-run equilibrium relationship.The value of the coefficient (ECT = –0.247) indicates that approximately 24.7% of the previous period's disequilibrium is corrected annually, i.e., approximately four years (1/0.247 ≈ 4.048 years) would be taken by the system to reach the long-run equilibrium.

Table (7): Error Correction Term (ECT) of the Autoregressive Distributed Lag (ARDL) Model for the Effect of the Study Variables on the Percentage Contribution of Agricultural Output to the Gross Domestic Product (GDP) in Iraq over the Period (2004–2023).

ARDL Error Correction Regression				
Dependent Variable: D(Y)				
Selected Model: ARDL(1, 1, 1, 1, 1, 0, 1)				
Case 2: Restricted Constant and No Trend				
Date: 10/04/25 Time: 21:58				
Sample: 2004Q1 2023Q4				
Included observations: 79				
ECM Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X1)	-2.95E-09	8.31E-10	-3.550332	0.0007
D(X2)	-3.77E-07	5.13E-08	-7.352650	0.0000
D(X3)	1.03E-09	2.59E-10	3.993858	0.0002
D(X5)	0.004936	0.001118	4.415049	0.0000
D(X6)	-0.093037	0.024202	-3.844204	0.0003
CointEq(-1)*	-0.247403	0.067083	-3.688016	0.0005
R-squared	0.656699		Mean dependent var	-0.052332
Adjusted R-squared	0.633185		S.D. dependent var	0.528626
S.E. of regression	0.320164		Akaike info criterion	0.632942
Sum squared resid	7.482854		Schwarz criterion	0.812900

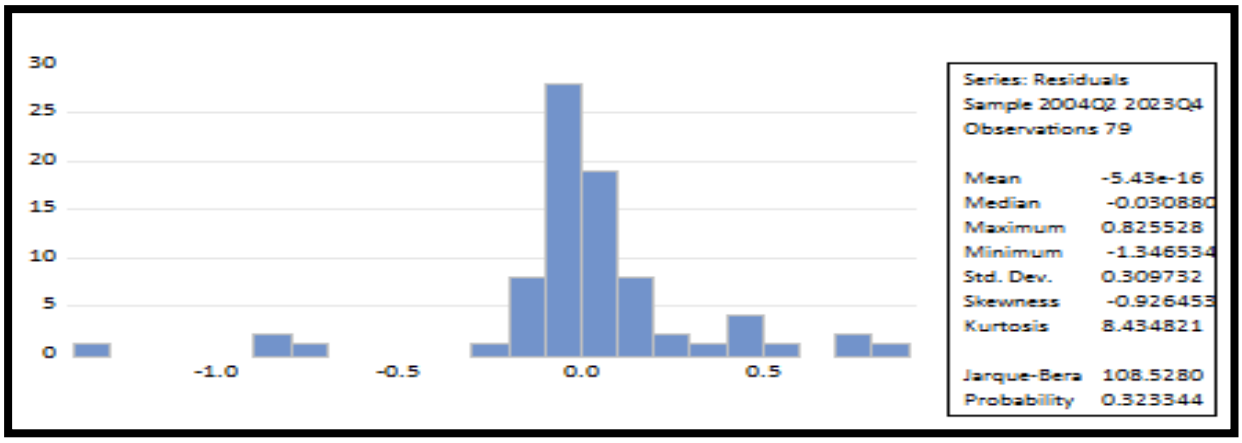
Log likelihood	-19.00122		Hannan-Quinn criter.	0.705039
Durbin-Watson stat	1.872793			

Source: Prepared by the researcher based on the outputs of the EViews 12 program

5. Diagnostic Tests of the Effect of the Study Variables on the Percentage Contribution of Agricultural Product to the Gross Domestic Product (GDP) in Iraq during the Period (2004–2023). Having made short-run and long-run estimates of the effects of study variables on the percentage contribution of agricultural production to GDP using the Autoregressive Distributed Lag (ARDL) model, the second task entails testing for the efficiency and validity of the estimated model using a series of diagnostic tests.As presented in Table (8), it is evident that the findings of the Breusch–Godfrey Serial Correlation LM Test are such that there is no serial correlation problem for the model, as the value of the F-statistic is 0.314 and the probability level is 0.731, which is larger than 5%. Thus, the null hypothesis that there is no serial correlation issue among the residuals is accepted.The ARCH (Heteroskedasticity) Test output shows that the model is homoscedastic as the value of F-statistic is 0.117 with the probability level of 0.732, which is also greater than 5%. Thus, there is no evidence to reject the null hypothesis of homoscedasticity .Ramsey RESET Test was conducted to check the validity of the functional form of the model. The F-statistic value is 0.111 and the probability value is 0.739, which is greater than 5%. This indicates that the model's functional form is good and required, and hence the null hypothesis that there is no functional form misspecification is not rejected. Finally, the Jarque–Bera (JB) Test statistic is 108.528 and probability value is 0.323, which is greater than 5%. Therefore, we do not reject the null hypothesis that the residuals of the model are normally distributed, which confirms the model in its entirety.

Table (8): Tests of Diagnostic for the Effect of the Study Variables on the Agricultural Production Percentage Share in the GDP of Iraq over the Period (2004–2023).

Breusch-Godfrey Serial Correlation LM Test:					
F-statistic		0.314458	Prob. F(2,64)		0.7313
Obs*R-squared		0.768765	Prob. Chi-Square(2)		0.6809
Heteroskedasticity Test: ARCH					
F-statistic		0.117662	Prob. F(1,76)		0.7325
Obs*R-squared		0.120572	Prob. Chi-Square(1)		0.7284
Ramsey RESET Test , Equation: UNTITLED					
	Value	df		Probability	
t-statistic	0.333797	65			0.7396
F-statistic	0.111421	(1, 65)			0.7396



Source: Prepared by the researcher based on the outputs of the EViews 12 program

6- Stability Test of the Estimated Model Using CUSUM and CUSUM of Squares Tests for the Effect of Study Variables on the Percentage Contribution of Agricultural Output to the Gross Domestic Product in Iraq (2004–2023).

The most significant test in this context is the structural stability test of the estimated ARDL model for the short-run and long-run relations, relying on the Cumulative Sum of Residuals (CUSUM) and the Cumulative Sum of Squares of Residuals (CUSUM of Squares) tests. These tests show two things that are required: testing if the data that is used in the study are free from any structural breaks, and checking the consistency and stability of the short-run parameters with the long-run.These tests are always used in combination with the Autoregressive Distributed Lag (ARDL) model. If the graphical plots of both tests fall within the critical bounds at the 5% significance level, it indicates that all estimated parameters are stable and that there are no structural changes. Figure (3) illustrates the Cumulative Sum of Residuals, showing that the plotted line lies within the critical bounds at the 5% significance level. This implies the absence of structural change and guarantees the consistency of the long-run parameters with the short-run ones.

It was also evident from Figure (4), which represents the Cumulative Sum of Squares (CUSUM Sq), that the parameters remained stable throughout the study period but crossed the critical limits at the 5% level in the years 2015, 2019, and 2021. This indicates the presence of structural changes in the percentage contribution of agricultural output to the gross domestic product during these years.

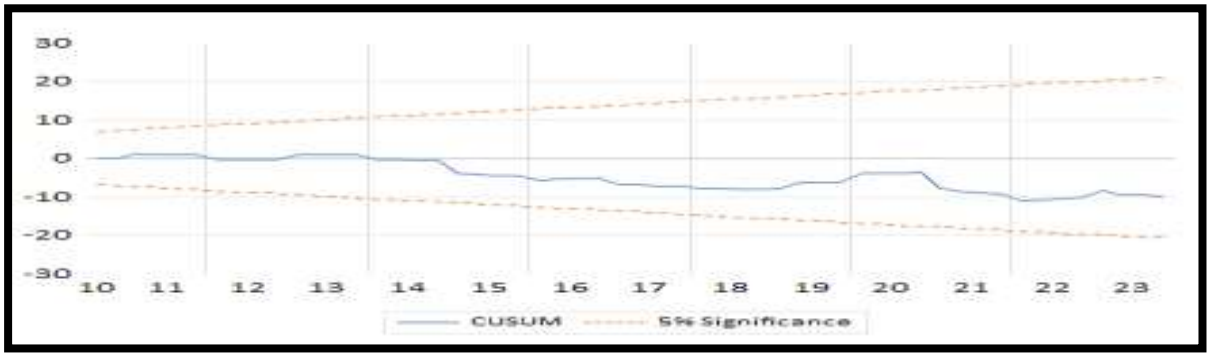


Figure (3) the stability test of the estimated model using the CUSUM test for the gross domestic product in Iraq for the period (2004 -2023) .

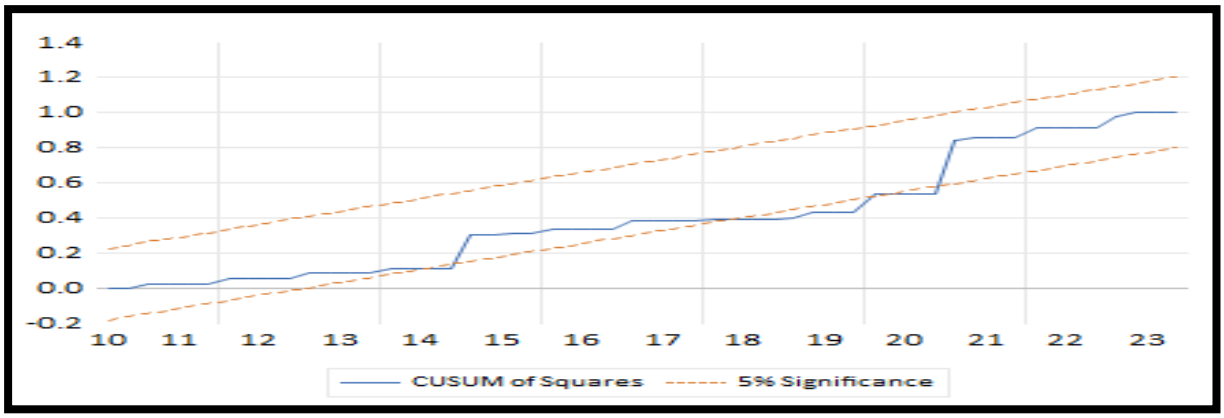


Figure (4) Test of the Estimated Model Stability Using the CUSUM of Squares Test for the Impact of Study Variables on the Percentage Contribution of Agricultural Output to the Gross Domestic Product of Iraq in the Years (2004–2023).

Source: Prepared by the researcher based on the outputs of EViews 12.

Conclusions and Recommendations.

Conclusions:

1. The results revealed that government expenditure did not assist in enhancing the percentage contribution of agriculture to the gross domestic product. It was negative in the short run and insignificantly zero in the long run, which reflects misallocation of this expenditure to inactive sectors and inadequate planning in agriculture.
2. It was also revealed that the revenues from taxes were shown to have a negative and significant effect in both the long and short runs. This confirms that an increase in the tax burden without providing an effective support system to agriculture enhances its declining productivity and contribution to the gross domestic product.
3. The results indicated that supply of broad money was having a positive and significant impact in the short run; however, the impact was not maintained in the long run because effective policies to channel liquidity into productive agricultural enterprises were absent.
4. The findings showed that the inflation rate neither had any short- nor long-term effect, which reflects the limited sensitivity of the agricultural sector towards macroeconomic variables and its greater sensitivity to external over internal variables.
5. The exchange rate emerged as a positive and significant factor in the short run due to enhanced competitiveness of local products. Its significance, however, vanished in the long run as a consequence of no structural reforms in the agricultural sector.
6. The results validated that the interest rate played a negative and significant role in the short run and long run, as higher financing costs reduce the investment capacity of the agriculture sector and limit its expansion.

Recommendations:

1. Redirect government spending to long-term strategic agricultural programs, including infrastructure construction, technical support, and scientific research.
2. Reform the taxation system and reduce farmers' burdens, combining tax collection with agricultural support and agriculture promotion.
3. Enhance agricultural financing programs and provide soft loans with low interest to encourage agricultural investment.
4. Utilize monetary policy tools to channel liquidity to productive sectors, especially agriculture.

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5. Using exchange rate volatility to enhance the competitiveness of locally produced agricultural products and encourage import substitution.
6. Adopt long-term agricultural policies in the fight against inflation and economic fluctuations and achieving greater sectoral stability.
7. Activities geared towards diversifying the Iraqi economy and oil dependence by making agriculture a leading sector in achieving food security and sustainable development.

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