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Najlaa Salah Mdloul[1] *
Jadoa Shehab Ahmed[1]
Ahmad Hussein Battal[2]

1Tikrit University/College of Agriculture/Department of Economics and Agricultural Extension

2University of Anbar/College of Administration and Economics/Department of Economics

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Using time series methods to predict the value of agricultural output and some financial indicators affecting it in Iraq for the period (2021q1-2025q4)

ABSTRACT

The aim of the research is to predict the value of agricultural output and some fiscal policy variables using quarterly data from the first quarter of 2021 until the fourth quarter of 2025, through the application of different time series methods (random behavior, general trend, moving averages, simple exponential smoothing, Brown's method In the exponential smoothing, ARIMA models) on each of the following variables (value of agricultural output, oil prices, government spending, GDP, agricultural investment, agricultural imports), and the results showed that ARIMA (1,0,1) model is the best A model for forecasting oil prices until the fourth quarter of 2025, and the results indicated that the general trend model is the best model for predicting the government spending variable until the fourth quarter of 2025, while the ARIMA (1,1,1) model was the model chosen to predict the variable GDP until the fourth quarter of 2025, as well as it became clear from the results that the best model used for prediction agricultural investment is the exponential smoothing model, while the ARIMA (2,0,4) model was the best model for forecasting agricultural imports until the fourth quarter of In 2025, the results also indicated that the best model that can be employed to predict the variable value of agricultural output is the quadratic trend model according to the predictive ability tests of different models..

INTRODUCTION

The time series analysis method is one of the statistical methods worthy of attention, which has developed a lot and can be used for the purpose of future forecasting of macroeconomic variables. It appeared in the time series and on the pattern of growth in values. It is distinguished from the traditional method, which calculates the value difference between only two times of the series and builds the future forecast on its basis without taking into account the general pattern of the series or the rise or fall that occurs to the values of the series, meaning that the past and present are read and analyzed to elicit the future, and draw a vision for fiscal and monetary policies on their impact.

Predicting the total variables contributes in one way or another to understanding the behavior of economic variables in the future and then knowing their trends, whether they are increasing or decreasing, and this will contribute to the development of economic policies that address the expected imbalances through the use of financial and monetary policy tools and other policies that can employ To address the disturbances in the macroeconomic variables, because in fact, it is not possible to achieve real economic stability if there is no harmony or harmony between the monetary side with the real side, as any imbalance in the monetary side will be reflected in one way or another in the real side of the economy, so it is unavoidable to make predictions that appear The future behavior of economic variables by employing time series methods to understand the

* *Corresponding author: E-mail*: najlaasalah88@tu.edu.iq

behavior of economic phenomena for which limited data or few observations are available, as in the case of the Iraqi economy, as most of the data available for forecasting start from 2004 due to the initiation after this year to adopt economic policies and procedures that work in The framework of the capitalist economy, including Law of the Central Bank of Iraq No. 56 of 2004 and other laws that changed the tracks of the indicators The basic economic situation in Iraq.

Research problem

The start of implementing economic reform measures in Iraq after 2004, represented by the lifting of economic sanctions on Iraq, and the rise in Iraqi oil exports, led in one way and another to bring about changes in the paths of macroeconomic variables, especially in the financial aspect, as the financial indicators highlight the importance of addressing the issue of building models A statistic that contributes to explaining the behavior of future macroeconomic variables for the Iraqi economy.

Research Hypothesis

The use of different time series methods contributes to understanding the future behavior of macroeconomic variables in Iraq and thus contributes to addressing the instability that may occur in the future in these variables.

research aims

The research aims to forecasting using different time-series methods of financial indicators in the Iraqi economy until 2025, and then choosing the best method from among the different time-series forecasting methods through predictive ability criteria and its adoption in forecasting for the period (2021q1-2025q4).

Research Methodology

In order to achieve the objectives of the research and its hypothesis, the quantitative statistical method was relied on by adopting different time series prediction methods, and the statistical program Statagraphics ver.17 was presented.

Theoretical framework for forecasting macroeconomic variables

The importance of prediction Forecasting is defined as planning and making assumptions about future events using special techniques across different time periods, and therefore it is the process that decision-makers rely on in developing assumptions about future conditions (Ramo, Al-Watar, 2010: 15), and it is also known as the process of anticipating what will happen in the future. For a phenomenon depending on the trend of the phenomenon in the past using one of the well-known prediction models, that is, knowing the behavior of a phenomenon in the future based on its behavior in the past period, and taking the appropriate decision in light of this behavior by imposing the stability of the variables affecting the phenomenon, but if something else happened, the process must be corrected Forecasting to reflect this effect, negatively or positively, meaning that the prediction can give us a future picture of the phenomenon in the light of the results of the prediction (Al-Obaid, 2003: 2).

Prediction properties

Forecasting methods differ according to the situation and the studied situation, for example, the forecasting methods used in the field of marketing differ from the predictive methods used in the field of production, financial or human resources. But the prediction process, whatever its kind, must have the following characteristics (Al-Obaid, 2003: 6):

1- Attention to the future: The main goal of prediction is to know what will happen in the future, whether it is near or far.

2- Uncertainty: All predictions, no matter how accurate they are, remain uncertain and it is possible that the opposite of what is expected will happen.

3- Historical data: Scientific prediction methods depend on the past of the phenomenon, that is, on historical data.

The importance of forecasting macroeconomic indicators

The macroeconomic variables have a significant and clear role on the financial system through the transition between activities and financial institutions, so the occurrence of a crisis in the economy may sooner or later reflect the occurrence of crises in the economic system as a whole,

so we see a clear interest by previous researchers in it, to the need to predict indicators Macroeconomic prudence (Abdul Qadir, 2010: 339) will be predicted in this research (oil prices OP, government spending PEX, gross domestic product (GDP), agricultural investment I, agricultural imports M, value of agricultural output Y)

Time series methods

Time series is defined as a set of observations of a phenomenon that has been measured at regular times. Applied economics depends on the analysis of time series to show knowledge of the phenomenon's behavior in the past, which may help in understanding its future behavior, that is, we assume that the past will repeat itself, and that the general trend observed in the previous period It will continue in the coming period (Hassan, 2013: 104), and among the most famous methods of time series analysis that employ economic forecasting of limited data are the following:

1- Random Behavior
2- General Trend
3- Moving Averages
4- Simple Exponential Boot
5- Brown's Exponential Smoothing Method

These results can be reviewed according to the following (Batal, Al-Obaidi, 2018: 221):

First, the random behavior method

The method of random behavior with a direction is based on the following formula:

$$Y_t = B_0 + BY_{t-1} + e_t$$

B_1 :It represents a trend, and a phenomenon follows random behavior around a general trend.

Second: The general linear trend method:

The equation for this model is as follows:

$$Y_{t=} B_0 + B_1 \mathrm{t} + e_t$$

Where Y_t is the predicted observations, B_0 represents the regression constant, B_{1t} represents the slope of the regression line, e_t is an estimate of the error, and this model is suitable for time series with a linear trend, whether the trend is increasing or decreasing.

A: Quadratic trend model:

And the equation of this form is the quadratic function:

$$Y_t = B_0 + B_1 t + B_2 (t)^2 + e_t$$

This model fits with time series with a curved trend, whether concave or convex.

B: the exponential trend model

The equation of this form is the following exponential function:

$$Y_{t=} B_0 . B_1^t + e_t$$

This model is compatible with time series that are characterized by acceleration of growth or acceleration of decay, meaning that the acceleration starts weak and then increases strongly over time, whether upward or downward.

A: The cubic function model:

The equation for this model is:

$$Y_{t=} B_0 + B_1 t + B_2 (t)^2 + B_3 (t)^3 + e_t$$

They are proportional to s-shaped double-curvature time series and plotting the series is the first step in analyzing any time series.

Third: the moving averages method

Its general form is as follows:

$$Y_t = \frac{(y_t + y_{t-1} + y_{t-2} + \cdots + y_{t-n+1})}{n}$$

Fourth: the exponential boot method

A - simple exponential preamble

Its mathematical formula is as follows:

$$Y_{t+1} = a y_t + (1 - a) y_{t-1}$$
$$0 < a < 1$$

where Y_(t+1) is the estimated viewing value in the subsequent perioda

It represents a constant that is automatically estimated at the expense of the predictive error and its value ranges between zero and one.

y_t represents the value of the phenomenon in the current period.

y_{t-1} The value of the phenomenon in the previous period.

Prediction model accuracy tests

There are several tests that depend on evaluating the predicted models, including: (Keller and Worrack, 1997:923, Anderson et al, 2001:173, Harnett and Horriel, 1998:368).

a- Mean absolute error

It can be found in the following form:

$$MAE = \sum |et|/n$$

$$e_t = y_t - F_t$$

Where: e_t represents the error or residuals

y_t represents the real values of the variable

$F_t$represents the predicted values of the variabley_t

a- The absolute squared error

It is calculated as follows:

$$RMSE = \sqrt{\sum |et2|/n}$$

This formula is used to compare several predictive models and is a percentage.

b-Akaile information criteria

It is calculated as follows:

$$AIC(m) = logde_t\left(\sum_{k}^{\sim}(m) + (\frac{2}{r})\right)mk^2$$

The concept of scenario also refers to the image placed that expresses a phenomenon, a sequence of events, or a situation, based on some assumptions and factors (variables) chosen by the creator, and used in estimating the potential effects of a variable or group of variables, and it is an integral part of situation analysis and long planning. Term (Business Dictionary nd), as the concept of the scenario refers to a possible, possible or hypothetical future situation, with clarification of the paths leading to it based on the current situation or from an assumed initial situation, and although the scenarios have a specific method of construction, they are in the same Time can be built in other ways based on science fiction and the futuristic vision of events with an indication of their expected results (Al-Azim 2018, 183).

Hence, the final purpose of the scenarios lies in the formation of a set of expected future cases that have an equal possibility of occurrence and answer the following questions: What will happen in the future? How does it happen? What are the factors causing this to happen? (Saad Al-Enezi, 2014, 2), So, “The scenario plays a key role in strategic planning, setting future plans, directing plans and programs, and foreseeing the future reality. On the future paths of the studied variables, which will be positively reflected in the development of plans and policy formulation.

Scenarios can be divided into two parts: the reconnaissance scenario and the targeting scenario. When we study a possible or likely future situation, the scenario is exploratory. We start from the facts and general trends that already exist, and try to explore what events or possible actions may lead to in future developments. Without committing to a predetermined picture or set goals, which allows for many possibilities and raises discussions and controversy. As for the other scenario, the targeted scenario represents the desired scenarios and the starting point is specific goals set that should be achieved in the future and translated into a consistent future image (Al-Azeem 2018, 184).

The process of describing the general trends of the main variables and analyzing the path of future variables is one of the most important steps adopted in drawing and analyzing scenarios, as well as choosing the best paths that reflect the actual reality and drawing conclusions for them.

Analyzing forecast results and drawing future scenarios for the variables of the fiscal policy model

1- Variable oil prices

Table (1) shows the different models that were estimated to predict oil prices until the first quarter of 2025, and the results show that the model that was chosen is the one that achieved the best criteria for predictive ability, as this model showed the lowest values.

Table (1) Results of estimating forecast models for different oil prices for the period (2021q1-2025q4)

(B) Constant mean = 70.6612
(C) Linear trend = 73.4575 + -0.0111631 t
(D) Quadratic trend = -3482.95 + 28.5587 t + -0.0570258 t^2
(E) Exponential trend = exp(3.90943 + 0.00106914 t)
(F) S-curve trend = exp(4.71815 + -134.66 /t)
(I) Brown's linear exp. smoothing with alpha = 0.9998
(J) Holt's linear exp. smoothing with alpha = 0.9999 and beta = 0.0326
(K) Brown's quadratic exp. smoothing with alpha = 0.4006
(M) ARIMA(1,0,1) with constant
(N) ARIMA(0,1,1)
(O) ARIMA(2,1,0)
(P) ARIMA(0,1,2)
(Q) ARIMA(2,0,0) with constant

Source: Program Output Statgraphics Ver.17

Table (2) also shows the results of the parameters of the chosen model ARIMA(1,0,1), and it is clear that this model includes a moving average of rank (1) and an autoregressive rank.(1)

Table (2) Results of the estimation of the ARIMA(1,0,1) model for the variable oil prices (OP)

Parameter	*Estimate*	*Stnd. Error*	*T*	*P-value*
AR(1)	0.842442	0.0646548	13.0298	0.000000
MA(1)	-0.397589	0.120174	-3.30844	0.001532
Mean	69.2074	11.3757	6.08378	0.000000
Constant	10.9042			

Based on the forecast results shown in Annex (2), three future scenarios for oil prices can be developed, namely:

The base scenario: that oil prices remain stable at the level of $68 per barrel in 2025.

The first optimistic scenario

Here, there will be a complete agreement between the oil-producing countries within OPEC to maintain production levels, and accordingly oil prices will gradually rise to reach more than 114 dollars per barrel in 2025.

The second pessimistic scenario

where there is a state of disagreement among the oil-producing countries within OPEC in maintaining production levels, and accordingly, supply will rise and oil prices will gradually decline to reach $22 per barrel in 2025.

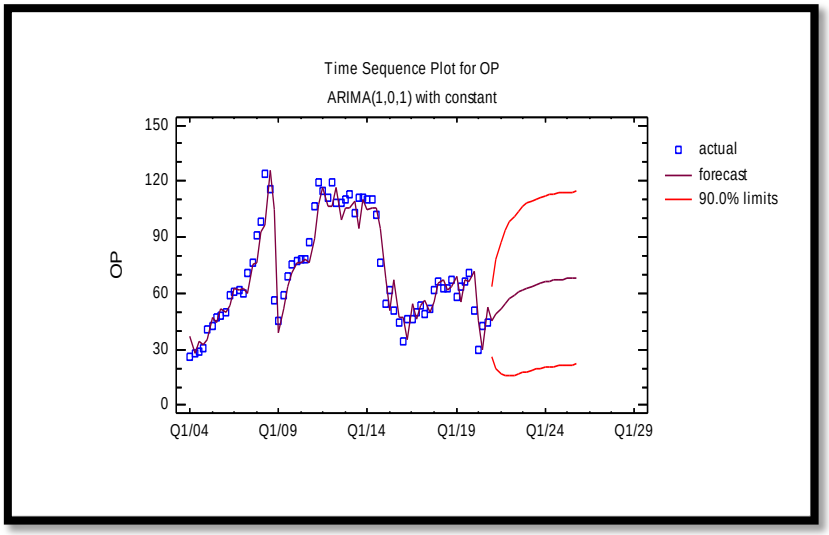


Figure (1) Drawing the predicted future scenarios for oil prices
Source: Program Output Statgraphics Ver.17

2- Variable government spending

The results of the estimation show as in Table (3) that the best model that can be employed to predict the government spending variable is the general linear trend model according to the predictive ability tests of the different models (see the appendix), as the AIC value showed the lowest value according to this indicator.

Table (3) Different forecast models for government spending for the period (2021q1-2025q4)

Models
(B) Constant mean = 1.76207E7
(C) Linear trend = -7.54712E7 + 371624. t
(D) Quadratic trend = -1.4672E8 + 943988. t + -1142.44 t^2
(E) Exponential trend = exp(9.28932 + 0.0285495 t)
(F) S-curve trend = exp(23.6085 + -1784.38 /t)
(I) Brown's linear exp. smoothing with alpha = 0.9998
(J) Holt's linear exp. smoothing with alpha = 0.9999 and beta = 0.0326
(K) Brown's quadratic exp. smoothing with alpha = 0.0962
(M) ARIMA(0,1,1) with constant
(N) ARIMA(2,1,2)
(O) ARIMA(2,1,2) with constant
(P) ARIMA(0,1,1)
(Q) ARIMA(0,1,2) with constant

Source: Program Output Statgraphics Ver.17

Figure (2) shows the expected future behavior (future scenarios) of government spending at current prices, as it is expected to reach about 37,502 billion dinars in 2025.

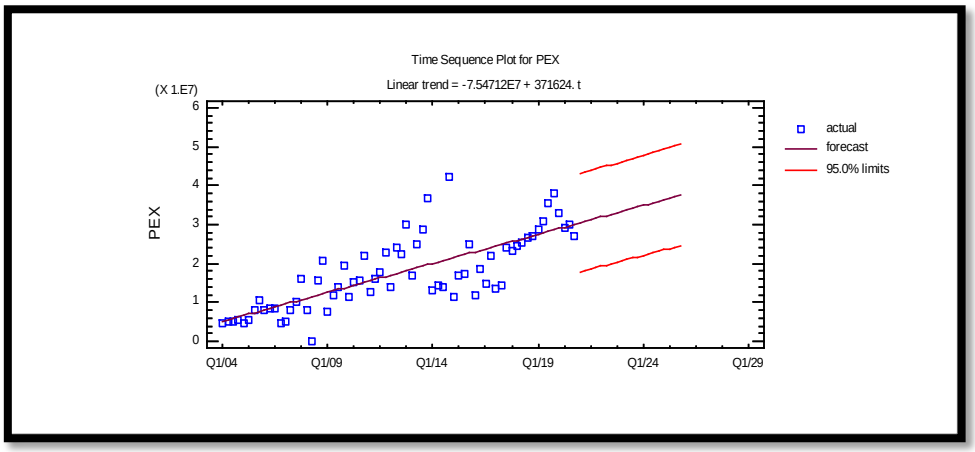


Figure (2) Drawing the future scenarios of government spending until 2025 according to the general trend model
Source: Program Output Statgraphics Ver.17

Depending on the forecast results shown in Annex (3), three future scenarios for government spending can be developed, namely:

The base scenario: where the oil price is stable at the level of 68 dollars per barrel, and accordingly government spending begins to stabilize gradually with slight increases until it reaches 37,502 billion dinars in the fourth quarter of 2025.

Which means that there is almost stability in public expenditures depending on the stability of oil prices, and therefore the financial policy or the economic situation in general suggests that there is no improvement in the economic reality, and that the budget remains an operational budget at the expense of investment, and that the drawn plans, policies and visions will not achieve any future for Iraq.

The first optimistic scenario: according to which oil prices will gradually rise until they reach the price of 114 dollars per barrel. It is noted that the volume of public expenditures will also rise from 26,959 billion dinars in the fourth quarter of 2020 to 37,502 billion dinars in the fourth quarter of 2025.

The second pessimistic scenario: whereby oil prices will drop to 22 countries per barrel. It is noted that the volume of public expenditures will decrease to 24,519 billion dinars in the fourth quarter of 2025. This scenario gives a picture of the size of the deficit that can be achieved in the future, and therefore it must be taken Under consideration.

3-Variable GDP

Table (4) shows the various models that were estimated to predict the GDP until the first quarter of 2025, and the results show that the chosen model was the one that achieved the best criteria for predictive ability, as this model showed the lowest values.

Table (4) the results of estimating the different GDP forecast models for the period (2021q1-2025q4)

Models
(B) Constant mean = 3.87623E7
(C) Linear trend = -1.28393E8 + 667287. t
(D) Quadratic trend = -4.12278E8 + 2.94784E6 t + -4552.0 t^2
(E) Exponential trend = exp (12.4538 + 0.0197242 t)
(F) S-curve trend = exp (22.3974 + -1245.44 /t)
(I) Brown's linear exp. smoothing with alpha = 0.9998
(J) Holt's linear exp. smoothing with alpha = 0.9999 and beta = 0.0326
(K) Brown's quadratic exp. smoothing with alpha = 0.2042
(M) ARIMA(1,1,1) with constant
(N) ARIMA(2,1,2) with constant
(O) ARIMA(2,1,1) with constant
(P) ARIMA(0,1,1)
(Q) ARIMA(1,1,0)

Source: Program Output Statgraphics Ver.17

Table (5) also shows the results of the parameters of the chosen model ARIMA(1,1,1), and it is clear that this model includes a moving average of rank (1) and an autoregressive rank (1) with taking the difference.(1)

Table (5) results of the estimation of the ARIMA(1,1,1) model for a variable of the gross domestic product (GDP)

Parameter	*Estimate*	*Stnd. Error*	*T*	*P-value*
AR(1)	0.489706	0.113191	4.32637	0.000054
MA(1)	0.967314	0.0227481	42.5228	0.000000
Mean	655821.	80934.2	8.10314	0.000000
Constant	334662.			

Source: Program Output Statgraphics Ver.17

Based on the forecast results shown in Annex (4), three future scenarios for GDP can be developed, namely:

The base scenario: The gross domestic product, according to the base scenario in which the oil price is fixed at 68 dollars per barrel, will reach 73,171 billion dinars in the fourth quarter of 2025.
The first optimistic scenario: according to which oil prices will gradually rise until they reach the price of 114 dollars per barrel. It is noted that the gross domestic product will also rise from 51,799 billion dinars in the fourth quarter of the year 2020 to reach 81,578 billion dinars in the fourth quarter of 2025. These results prove The gross domestic product in Iraq may not show the reality of the Iraqi economy, as the rise in oil prices means an increase in the contribution of oil to the gross domestic product and hence the rise in the output. Required, which proves that the GDP follows a declining path and increases the contribution of oil revenues according to fluctuations in oil prices, while maintaining an almost constant growth rate.
The second pessimistic scenario: whereby oil prices will drop to 22 countries per barrel. The same is noted for the base and optimistic scenario until 2025, when the GDP will reach 64,765 billion dinars in the fourth quarter of 2025.

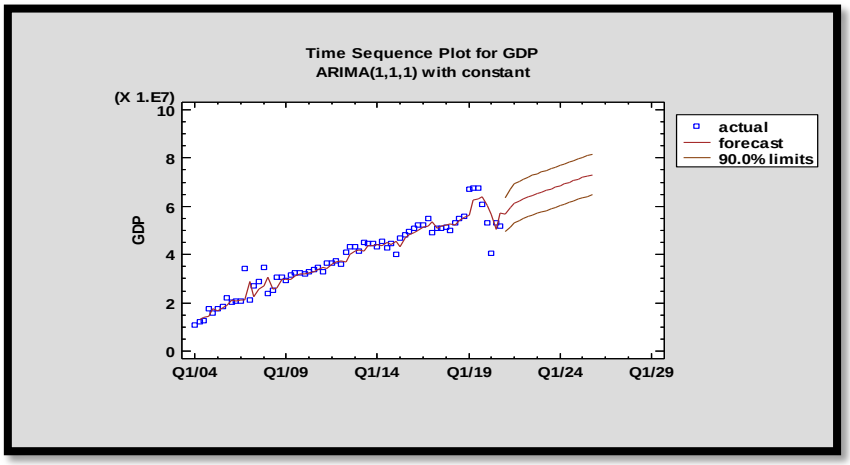


Figure (3) Drawing future scenarios of GDP until 2025
Source: Program Output Statgraphics Ver.17

Fourth: The agricultural investment variable

The results of the estimation show as in Table (6) that the best model that can be employed to predict the agricultural investment variable is the exponential smoothing model according to the tests of the predictive ability of the different models (see appendix), as the AIC value showed the lowest value according to this indicator.

Table (6) Different forecast models for agricultural investment for the period (2021q1-2025q4)

Models
(A) Random walk
(B) Constant mean = 546774.
(C) Linear trend = 837290. + -1159.74 t
(D) Quadratic trend = -5.44664E7 + 443115. t + -886.775 t^2
(E) Exponential trend = exp (13.245 + -0.00137851 t)
(F) S-curve trend = exp (13.032 + -32.9343 /t)
(G) Simple moving average of 2 terms
(H) Simple exponential smoothing with alpha = 0.9999
(I) Brown's linear exp. smoothing with alpha = 0.9998
(J) Holt's linear exp. smoothing with alpha = 0.9999 and beta = 0.0326
(K) Brown's quadratic exp. smoothing with alpha = 0.7452
(M) ARIMA (1,1,0)
(N) ARIMA (1,1,1)
(O) ARIMA (0,2,0)
(P) ARIMA (1,2,0)
(Q) ARIMA (0,2,1)

Source: Program Output Statgraphics Ver.17

Figure (4) shows the expected future behavior of agricultural investment, as it is expected to reach about one billion dinars in the fourth quarter of 2025,371,729.

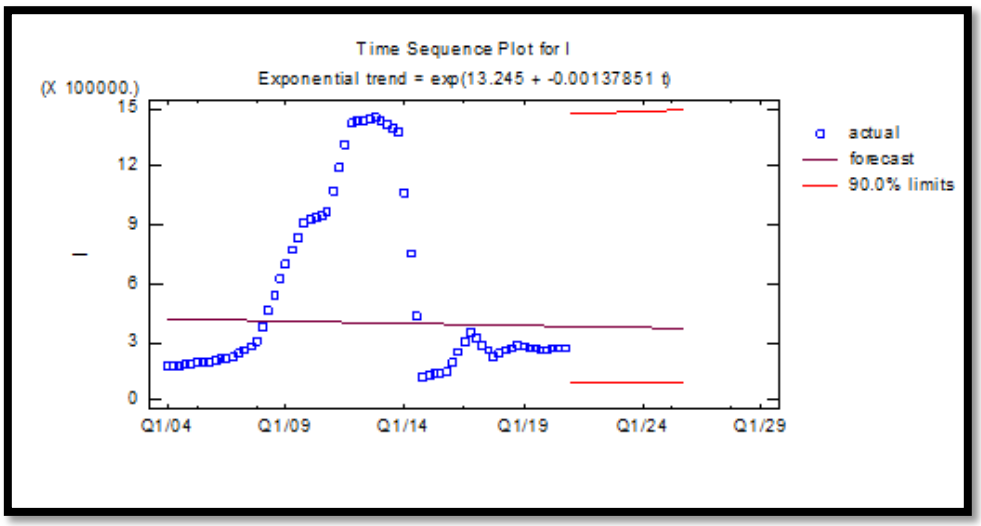


Figure (4) Drawing future scenarios of GDP until 2025
Source: Program Output Statgraphics Ver.17

Based on the forecast results shown in Annex (5), three future scenarios for agricultural investment can be developed:

Base scenario: Agricultural investment, according to the base scenario in which the oil price is fixed at $68 per barrel, will reach 371,729 thousand dinars in the fourth quarter of 2025.

The first optimistic scenario: according to which oil prices will gradually rise until they reach a price of 114 dollars per barrel. It is noted that agricultural investment will also rise from 273,722 thousand dinars in the fourth quarter of 2020 to 1,487 million dinars in the fourth quarter of 2025.

The second pessimistic scenario: whereby oil prices will drop to 22 countries per barrel, and the same is noted for the base and optimistic scenario until 2025, when the volume of agricultural investment will reach 92,872 thousand dinars in the fourth quarter of 2025.

Fifth: The variable of agricultural imports

Table (7) shows the different models that were estimated to predict the variable of agricultural imports until 2025, and the results show that the chosen model was the one that achieved the best criteria for predictive ability, as this model showed the lowest values as in Appendix.(6)

Table (7) different forecast models for agricultural imports for the period (2021q1-2025q4)

Models
(A) Random walk
(B) Constant mean = 3533.28
(C) Linear trend = 5006.56 + -5.88134 t
(D) Quadratic trend = -115984. + 966.08 t + -1.94004 t^2
(E) Exponential trend = exp (8.36452 + -0.00107242 t)
(H) Simple exponential smoothing with alpha = 0.9999
(I) Brown's linear exp. smoothing with alpha = 0.9998
(J) Holt's linear exp. smoothing with alpha = 0.9999 and beta = 0.0326
(K) Brown's quadratic exp. smoothing with alpha = 0.7648
(M) ARIMA (2,0,4) with constant
(N) ARIMA (4,1,3)
(O) ARIMA (4,1,4)
(P) ARIMA (4,1,3) with constant
(Q) ARIMA (3,0,4) with constant

Source: Program Output Statgraphics Ver.17

Table (8) also shows the results of the parameters of the chosen model (2,0,4) ARIMA, and it is clear that this model includes a moving average of rank (4) and an autoregression of rank (2) with the series remaining at the level.(0)

Table (8): Model Estimation Results (2,0,4) ARIMA

Parameter	*Estimate*	*Stnd. Error*	*T*	*P-value*
AR(1)	1.29717	0.108491	11.9565	0.000000
AR(2)	-0.517978	0.0993609	-5.2131	0.000003
MA(1)	-0.694938	0.0457848	-15.1784	0.000000
MA(2)	-0.674722	0.0877084	-7.69279	0.000000
MA(3)	-0.783161	0.0667726	-11.7288	0.000000
MA(4)	0.43962	0.0709363	6.19739	0.000000
Mean	3006.56	0.876166	3431.5	0.000000
Constant	663.876			

Source: Program Output Statgraphics Ver.17

Based on the forecast results shown in Annex (6), three future scenarios for agricultural imports can be developed: Base scenario: Agricultural imports, according to the base scenario in which the oil price is fixed at $68 per barrel, will reach 3,006 million dinars in the fourth quarter of 2025. The first optimistic scenario: according to which oil prices will gradually rise until they reach a price of 114 dollars per barrel. It is noted that agricultural imports will also rise from 3,009 million dinars in the fourth quarter of 2020 to 5,699 million dinars in the fourth quarter of 2025. The second pessimistic scenario : As oil prices will drop to 22 countries per barrel, the same is noted for the base and optimistic scenario until 2025, when the volume of agricultural imports will reach 4,671 million dinars in the fourth quarter of 2025.

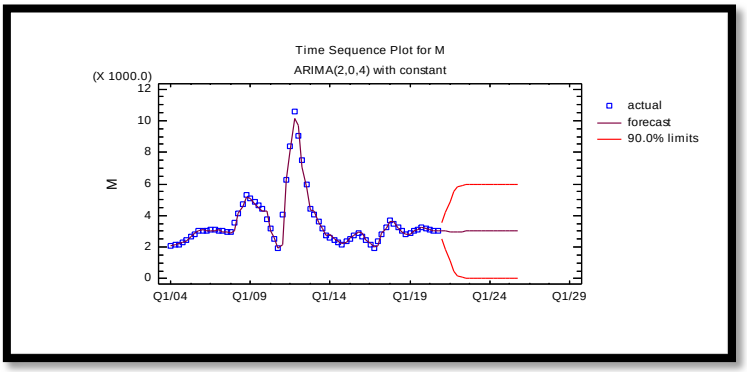
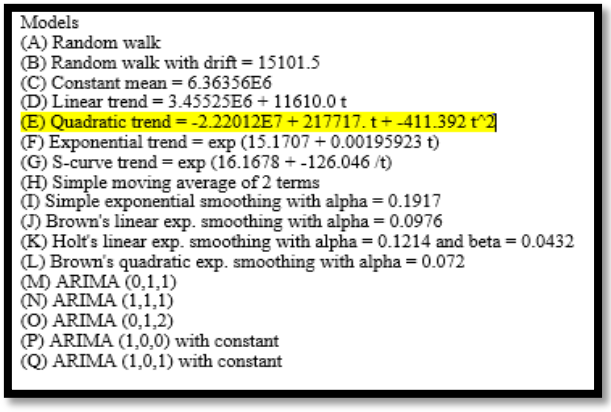


Figure (5) Drawing future scenarios of GDP until 2025
Source: Program Output Statgraphics Ver.17

Sixth: Variable value of agricultural output

The results of the estimation show as in Table (9) that the best model that can be employed to predict the variable value of agricultural output is the quadratic trend model according to the tests of the predictive ability of the different models (see Appendix7), as the AIC value showed the lowest value according to this indicator.

Table (9) of different forecast models the value of agricultural output for the period (2021q1-2025q4)



Source: Program Output Statgraphics Ver.17

Figure (6) shows the expected future behavior of the value of agricultural output, as it is expected to reach about 6 billion dinars in the fourth quarter of 2025.

Based on the forecast results shown in Annex (7), three future scenarios for the value of agricultural output can be developed:

Base scenario

The value of agricultural output, according to the base scenario in which the oil price is fixed at $68 per barrel, will reach 6 billion dinars in the fourth quarter of 2025.

The first optimistic scenario

Under which oil prices will rise gradually until they reach a price of $114 per barrel. It is noted that the value of agricultural output will decrease from 8 billion dinars in the fourth quarter of 2020 to 7 billion dinars in the fourth quarter of 2025.

The second pessimistic scenario

whereby oil prices will drop to 22 countries per barrel, and the same is noted for the base and optimistic scenario until 2025, when the value of agricultural output will reach 4 billion dinars in the fourth quarter of 2025.

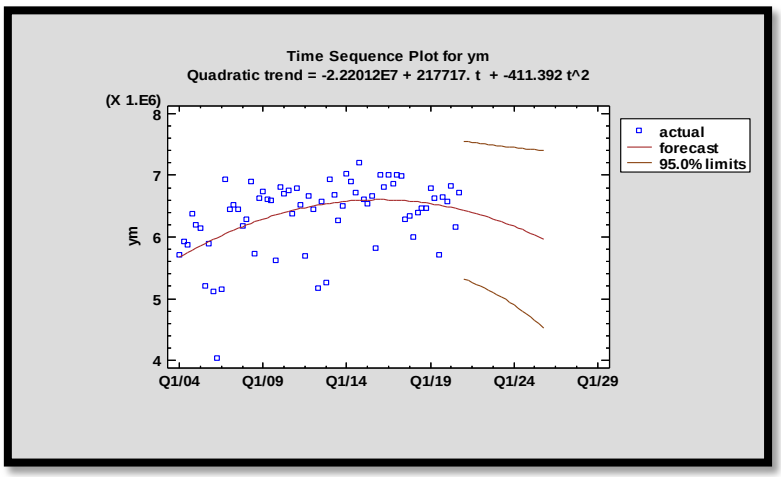


Figure (6) Drawing future scenarios of GDP until 2025
Source: Program Output Statgraphics Ver.17

CONCLUSIONS

1- The results showed that the ARIMA (1,0,1) model is the best model for forecasting oil prices until the fourth quarter of 2025.

2- The results indicated that the general trend model is the best model for predicting the variable of government spending until the fourth quarter of 2025.

3- ARIMA(1,1,1) was the model chosen to predict the GDP variable until the fourth quarter of 2025.

4- It was clear from the results that the best model used to predict agricultural investment is the exponential smoothing model.

5- ARIMA (2,0,4) model was the best model for predicting agricultural imports until the fourth quarter of 2025.

6- The results indicated that the best model that can be employed to predict the variable value of agricultural output is the quadratic trend model according to the predictive ability tests of the different models.

RECOMMENDATIONS

The research recommends the need to take advantage of the results of forecasting to develop financial policies that are compatible with future trends in order to achieve financial and economic stability in Iraq. The research also recommends conducting other studies in the field of forecasting monetary policy variables and their impact on the value of agricultural output.

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APPENDIX

Appendix (1): the value of agricultural output, oil prices (dollars/barrels), oil revenues, public expenditures and GDP in Iraq for the period (2004q1-2020q4) million dinars

M	I	GDP	PEX	OP	y	YEAR
2,051	175,200	10,763,917	4634875	25.61	3,183,714	2004 Q1
2,130	179,430	12,412,922	4985211	27.54	3,297,932	2004Q2
2,188	182,203	12,732,051	4999876	28.41	3,487,421	2004Q3
2,274	186,100	17,590,349	5525138	30.22	3,693,768	2004Q4
2,466	189,132	15,768,351	4,757,612	40.33	4,036,366	2005Q1
2,658	192,165	17,509,222	5,594,697	42.26	4,378,963	2005Q2
2,850	195,197	18,630,913	7,877,442	46.88	4,721,561	2005Q3
3,042	198,229	22,002,602	10,525,949	48.01	5,064,158	2005Q4
3,053	204,647	20,394,761	8,110,930	50.22	5,190,365	2006Q1
3,064	211,065	20,692,538	8,349,056	58.83	5,316,572	2006Q2
3,074	217,482	20,806,327	8,282,648	60.91	5,442,779	2006Q3
3,085	223,900	34,173,535	4,875,166	61.44	5,568,986	2006Q4
3,052	243,381	21,288,411	4,946,238	59.89	5,550,292	2007Q1
3,018	262,861	27,168,628	8,154,802	71.3	5,531,599	2007Q2
2,985	282,342	28,727,686	10,046,946	76.75	5,512,906	2007Q3
2,951	301,822	34,776,505	15,883,246	90.72	5,494,212	2007Q4
3,540	382,714	24,100,927	7,975,770	98.67	5,631,164	2008Q1
4,128	463,607	25,196,676	14,976.25	123.55	5,768,115	2008Q2

4,717	544,499	30,763,491	15,604,954	116.1	5,905,066	2008Q3
5,305	625,391	30,428,510	20,846,402	56.08	6,042,018	2008Q4
5,078	696,894	29,411,963	7,573,558	45.45	6,239,651	2009Q1
4,851	768,397	31,411,873	11,735,440	59.37	6,437,285	2009Q2
4,623	839,900	32,352,435	13,764,581	68.66	6,634,918	2009Q3
4,396	911,403	32,280,970	19,493,446	75.17	6,832,552	2009Q4
3,780	924,718	31,835,883	11,624,023	77.01	7,215,972	2010Q1
3,164	938,033	32,892,660	15,067,579	78.57	7,599,392	2010Q2
2,547	951,348	33,887,874	15,718,958	77.89	7,982,812	2010Q3
1,931	964,663	34,820,556	21,941,424	87.55	8,366,232	2010Q4
4,087	1,079,313	32,916,942	12,735,146	106.15	8,754,254	2011Q1
6,242	1,193,964	36,401,372	16,126,013	119.7	9,142,275	2011Q2
8,398	1,308,614	36,707,043	17,892,509	114.49	9,530,296	2011Q3
10,553	1,423,264	37,541,121	22,885,855	111.24	9,918,317	1011Q4
9,027	1,429,458	35,886,072	13,879,760	119.31	10,059,975	2012Q1
7,501	1,435,651	41,178,164	24,100,018	108.59	10,201,633	2012Q2
5,974	1,441,845	43,211,458	22,560,883	107.98	10,343,291	2012Q3
4,448	1,448,038	43,237,596	29,834,122	110.22	10,484,949	2012Q4
4,027	1,429,579	41,394,273	16,788,178	113.36	11,125,176	2013Q1
3,605	1,411,121	45,228,837	24,898,864	102.62	11,765,403	2013Q2
3,184	1,392,662	44,545,189	28,538,087	110.79	12,405,630	2013Q3
2,762	1,374,203	44,515,082	36,647,898	110.99	13,045,856	2103Q4
2,618	1,062,299	43,045,711	13,035,950	109.81	13,066,548	2014Q1
2,474	750,395	45,401,277	14,566,763	110.37	13,087,240	2014Q2
2,329	438,491	42,942,137	13,871,694	101.57	13,107,931	2014Q3
2,185	126,587	44,476,051	42,081,819	76.71	13,128,623	2014Q4
2,366	132,006	39,907,330	11,237,128	54.33	11,886,659	2015Q1
2,546	137,424	46,723,877	16,949,341	61.87	10,644,696	2015Q2
2,727	142,843	48,420,380	17,249,375	50.63	9,402,733	2015Q3
2,907	148,261	49,445,988	24,961,671	44.47	8,160,770	2015Q4
2,662	200,192	50,802,434	11,687,629	34.65	8,078,589	2016Q1
2,416	252,123	52,055,921	18,640,959	46.35	7,996,408	2016Q2
2,171	304,053	52,184,541	14,870,313	46.25	7,914,228	2016Q3
1,925	355,984	54,943,473	21,868,536	49.58	7,832,047	2016Q4
2,359	323,079	49,211,698	13,496,166	53.77	7,523,631	2017Q1
2,793	290,174	50,955,056	14,428,742	49.23	7,215,216	2017Q2
3,226	257,269	50,939,825	24,301,510	51.87	6,906,800	2017Q3
3,660	224,364	51,491,592	23,263,697	61.93	6,598,385	2017Q4
3,443	240,817	49,870,350	24,634,812	66.1	6,173,186	2018Q1
3,227	257,269	53,049,492	25,524,966	62.3	5,747,987	2018Q2
3,010	273,722	54,821,051	26,754,933	62.3	5,322,789	2018Q3
2,793	290,174	55,873,298	27,243,289	67.1	4,897,590	2018Q4
2,901	281,948	67,185,361	28,853,987	58.2	5,864,870	2019Q1
3,010	273,722	67,413,326	30,874,328	63.3	6,832,150	2019Q2
3,118	265,495	67,727,061	35,481,273	66.1	7,799,431	2019Q3
3,226	257,269	60,591,401	37,897,412	70.5	8,766,711	2019Q4

3,172	261,382	53,145,283	32,793,876	64.1	8,605,770	2020Q1
3,118	265,496	40,605,447	28,983,658	54.8	8,444,830	2020Q2
3,063	269,609	53,223,928	29,896,211	35.8	8,283,890	2020Q3
3,009	273,722	51,799,667	26,959,255	16.8	8,122,949	2020Q4

المصدر: العمود (!) الموقع الرسمي لمنظمة الأقطار المصدرة للنفط أوبك، الاعمدة (2,3) البنك المركزي العراقي على الموقع http://cbiraq.org/?fbclid، العمود (4,5,6) وزارة التخطيط ، دائرة الحسابات القومية.

Supplements

Estimation Period

Model	*RMSE*	*MAE*	*MAPE*	*ME*	*MPE*	*AIC*
(B)	27.9125	23.5097	39.913	4.07517E-15	-18.1254	6.68756
(C)	28.1223	23.4757	39.8942	-2.40331E-15	-18.1453	6.73195
(D)	19.984	15.999	25.2828	-7.03908E-13	-7.74962	6.07809
(E)	28.7176	22.8605	35.7361	5.46079	-8.87909	6.77385
(F)	28.7136	22.9748	35.696	5.41587	-8.74311	6.77356
(I)	14.6909	9.93684	15.9801	0.0475851	0.925973	5.40387
(J)	12.0777	7.5682	12.2214	-0.875353	-2.42719	5.04155
(K)	15.2331	9.75527	15.8667	-0.0348489	0.0210889	5.47635
(M)	11.0457	7.68142	12.6664	0.247374	-2.397	4.89232
(N)	11.3795	7.7117	12.3882	0.178515	-0.443199	4.89305
(O)	11.2514	7.65453	12.244	0.214077	-0.753552	4.89982
(P)	11.3281	7.68675	12.1957	0.214619	-0.722905	4.9134
(Q)	11.223	7.59802	12.381	0.376728	-1.91979	4.92417

Appendix (2) Results of forecasting oil prices from the first quarter of 2021 to the fourth quarter of 2025

Model: ARIMA(1,0,1) with constant

		Lower 90.0%	*Upper 90.0%*
Period	*Forecast*	*Limit*	*Limit*
Q1/21	44.8782	26.4433	63.313
Q2/21	48.7114	19.3446	78.0783
Q3/21	51.9407	16.8226	87.0588
Q4/21	54.6612	15.9767	93.3458
Q1/22	56.9531	15.9251	97.9811
Q2/22	58.8838	16.2708	101.497
Q3/22	60.5104	16.8073	104.214
Q4/22	61.8807	17.4201	106.341
Q1/23	63.035	18.0447	108.025
Q2/23	64.0075	18.6449	109.37
Q3/23	64.8268	19.2019	110.452
Q4/23	65.517	19.7068	111.327
Q1/24	66.0985	20.1572	112.04
Q2/24	66.5883	20.5542	112.622
Q3/24	67.0009	20.9012	113.101
Q4/24	67.3486	21.2022	113.495
Q1/25	67.6414	21.462	113.821
Q2/25	67.8882	21.6853	114.091
Q3/25	68.096	21.8766	114.315
Q4/25	68.2711	22.0399	114.502

Estimation Period

Model	*RMSE*	*MAE*	*MAPE*	*ME*	*MPE*	*AIC*
(B)	9.5424E6	7.93104E6	1793.99	8.98452E-9	-1766.98	32.1719
(C)	6.13352E6	4.31883E6	1152.72	5.91664E-9	-1136.19	31.3174
(D)	6.1674E6	4.30264E6	1164.84	-1.07376E-8	-1148.08	31.3578
(E)	6.85145E6	4.75109E6	870.976	1.53718E6	-841.828	31.5388
(F)	6.65344E6	4.58868E6	881.016	1.57261E6	-852.585	31.4801
(I)	1.40078E7	9.12441E6	68.1306	-38033.1	-16.7694	32.9397
(J)	8.3348E6	5.33232E6	824.143	96650.7	-797.421	31.9307
(K)	6.55869E6	5.04145E6	1049.96	211070.	-1021.77	31.422
(M)	6.25861E6	4.66394E6	1108.49	-3902.45	-1089.38	31.3578
(N)	6.08382E6	4.5266E6	737.997	904360.	-710.628	31.3599
(O)	6.04814E6	4.38648E6	801.097	-4658.55	-780.485	31.3776
(P)	6.42978E6	4.90343E6	968.278	1.33286E6	-939.901	31.3823
(Q)	6.26696E6	4.39741E6	1073.04	301046.	-1054.05	31.3898

Annex (3) results of the predictive ability of government spending variable from the first quarter of 2021 until the fourth quarter of 2025

Model: Linear trend = -7.54712E7 + 371624. t

		Lower 95.0%	*Upper 95.0%*
Period	*Forecast*	*Limit*	*Limit*
Q1/21	3.04417E7	1.78329E7	4.30506E7
Q2/21	3.08134E7	1.81886E7	4.34381E7
Q3/21	3.1185E7	1.85439E7	4.3826E7
Q4/21	3.15566E7	1.88988E7	4.42144E7
Q1/22	3.19282E7	1.92533E7	4.46032E7
Q2/22	3.22999E7	1.96073E7	4.49924E7
Q3/22	3.26715E7	1.99609E7	4.53821E7
Q4/22	3.30431E7	2.03141E7	4.57721E7
Q1/23	3.34147E7	2.06668E7	4.61626E7
Q2/23	3.37864E7	2.10191E7	4.65536E7
Q3/23	3.4158E7	2.13711E7	4.69449E7
Q4/23	3.45296E7	2.17226E7	4.73367E7
Q1/24	3.49012E7	2.20736E7	4.77288E7
Q2/24	3.52729E7	2.24243E7	4.81214E7
Q3/24	3.56445E7	2.27746E7	4.85144E7
Q4/24	3.60161E7	2.31244E7	4.89078E7
Q1/25	3.63877E7	2.34738E7	4.93016E7
Q2/25	3.67594E7	2.38229E7	4.96958E7
Q3/25	3.7131E7	2.41715E7	5.00904E7
Q4/25	3.75026E7	2.45198E7	5.04854E7

Estimation Period

Model	*RMSE*	*MAE*	*MAPE*	*ME*	*MPE*	*AIC*
(B)	1.39594E7	1.16142E7	41.2206	-1.40246E-8	-19.5573	32.9327
(C)	4.59108E6	3.05293E6	9.12635	1.31481E-9	-2.28875	30.7381
(D)	4.33938E6	2.74367E6	7.32779	7.53823E-8	-1.20783	30.6547
(E)	6.15035E6	4.46792E6	13.1757	171139.	-1.51369	31.3229
(F)	5.47622E6	3.83357E6	11.0997	127701.	-1.16361	31.0907
(I)	7.3225E6	4.77566E6	14.4679	3381.15	-0.584324	31.6423
(J)	4.62758E6	2.88794E6	8.32558	-97559.9	-0.722242	30.7539
(K)	4.89461E6	3.21009E6	9.64598	-205717.	-0.130502	30.8367
(M)	4.13769E6	2.6814E6	7.35682	495048.	0.891371	30.5595
(N)	4.06709E6	2.5214E6	6.91178	334806.	0.488595	30.5839
(O)	4.14E6	2.6328E6	7.24079	292085.	0.318095	30.5901
(P)	4.40479E6	2.97003E6	8.24973	869617.	2.28096	30.6258
(Q)	4.4055E6	2.9711E6	8.28063	797580.	2.03935	30.6261

Appendix (4) Results of the predictive ability of the GDP variable from the first quarter of 2021 to the fourth quarter of 2025

Model: ARIMA(1,1,1) with constant

		Lower 90.0%	*Upper 90.0%*
Period	*Forecast*	*Limit*	*Limit*
Q1/21	5.66683E7	4.97332E7	6.36034E7
Q2/21	5.93872E7	5.15628E7	6.72116E7
Q3/21	6.10533E7	5.29771E7	6.91295E7
Q4/21	6.22039E7	5.40381E7	7.03696E7
Q1/22	6.3102E7	5.48954E7	7.13086E7
Q2/22	6.38764E7	5.56459E7	7.21069E7
Q3/22	6.45903E7	5.63425E7	7.28382E7
Q4/22	6.52746E7	5.70124E7	7.35369E7
Q1/23	6.59444E7	5.7669E7	7.42197E7
Q2/23	6.6607E7	5.83192E7	7.48949E7
Q3/23	6.72662E7	5.89662E7	7.55662E7
Q4/23	6.79236E7	5.96116E7	7.62357E7
Q1/24	6.85803E7	6.02563E7	7.69042E7
Q2/24	6.92365E7	6.09006E7	7.75723E7
Q3/24	6.98925E7	6.15448E7	7.82402E7
Q4/24	7.05484E7	6.21889E7	7.89079E7
Q1/25	7.12043E7	6.2833E7	7.95756E7
Q2/25	7.18601E7	6.3477E7	8.02432E7
Q3/25	7.25159E7	6.41211E7	8.09108E7
Q4/25	7.31718E7	6.47652E7	8.15784E7

Estimation Period

Model	*RMSE*	*MAE*	*MAPE*	*ME*	*MPE*	*AIC*
(A)	87159.4	45828.0	11.6326	1470.48	-1.94711	22.751
(B)	450626.	388981.	107.989	-8.21755E-11	-75.7176	26.0662
(C)	453439.	386235.	107.664	5.73517E-11	-75.7465	26.1081
(D)	333399.	267225.	87.9605	1.00802E-8	-42.4695	25.5224
(E)	477423.	347229.	71.633	146447.	-28.6819	26.2111
(F)	477821.	349251.	71.8434	146571.	-28.5772	26.2128

(G)	195446.	112813.	34.3995	3402.42	-14.0366	23.516
(H)	87166.1	45157.3	11.4621	1448.99	-1.91903	22.7806
(I)	58522.7	17952.7	5.99523	122.732	3.6163	21.9838
(J)	87701.0	46012.0	12.0115	-7065.4	-2.3152	22.8222
(K)	67468.6	32987.2	11.5941	42.4661	2.24452	22.2682
(M)	55538.6	23965.4	7.22005	341.21	2.35378	21.8791
(N)	55622.4	24303.3	7.51109	365.788	1.97876	21.9115
(O)	58959.8	18361.3	6.10227	-1.77273	3.65231	21.9692
(P)	59411.6	18361.5	6.10231	-1.77275	3.65235	22.0139
(Q)	59411.6	18361.5	6.10231	-1.77275	3.65235	22.0139

Appendix (5) results of the predictive ability of agricultural investment variable from the first quarter of 2021 to the fourth quarter of 2025

Model: Exponential trend = exp(13.245 + -0.00137851 t)

		Lower 90.0%	*Upper 90.0%*
Period	*Forecast*	*Limit*	*Limit*
Q1/21	381594.	99223.6	1.46753E6
Q2/21	381068.	98919.0	1.468E6
Q3/21	380543.	98610.7	1.46853E6
Q4/21	380019.	98298.9	1.46914E6
Q1/22	379496.	97983.6	1.46981E6
Q2/22	378973.	97664.8	1.47054E6
Q3/22	378451.	97342.6	1.47135E6
Q4/22	377929.	97017.0	1.47222E6
Q1/23	377409.	96688.3	1.47316E6
Q2/23	376889.	96356.2	1.47417E6
Q3/23	376370.	96021.1	1.47524E6
Q4/23	375851.	95682.8	1.47638E6
Q1/24	375333.	95341.5	1.47758E6
Q2/24	374816.	94997.3	1.47886E6
Q3/24	374300.	94650.1	1.48019E6
Q4/24	373784.	94300.1	1.4816E6
Q1/25	373269.	93947.3	1.48307E6
Q2/25	372755.	93591.8	1.4846E6
Q3/25	372242.	93233.6	1.4862E6
Q4/25	371729.	92872.8	1.48787E6

Estimation Period

Model	*RMSE*	*MAE*	*MAPE*	*ME*	*MPE*	*AIC*
(A)	710.671	431.968	10.4122	-1.8665E-13	-1.01844	13.1178
(B)	1643.11	1096.31	30.0994	-3.14311E-13	-13.7854	14.8381
(C)	1651.36	1081.34	29.7895	3.61123E-13	-13.7516	14.8775
(D)	1517.15	1000.42	28.6018	1.49799E-12	-11.3676	14.7374
(E)	1671.93	991.366	25.0652	251.637	-5.66382	14.9023
(H)	705.537	424.176	10.2112	14.0896	-0.553414	13.1473
(I)	612.064	188.321	4.51343	0.367665	1.09932	12.8631
(J)	719.962	434.165	10.3883	-19.6492	-1.22312	13.2172
(K)	715.453	352.755	8.29882	-0.785505	1.0978	13.1752
(M)	311.172	130.044	3.2807	45.408	0.822434	11.6866
(N)	315.439	123.475	3.53876	5.79017	0.319937	11.7138
(O)	319.501	134.848	3.71437	8.79395	0.189978	11.7688
(P)	320.39	121.284	3.34683	8.06851	0.429619	11.7744
(Q)	320.604	131.821	3.31596	41.8662	0.770665	11.7757

Appendix (6) Results of forecasting the agricultural imports variable for the first quarter of 2021 to the fourth quarter of 2025 ARIMA(2,0,4) with constant

		Lower 90.0%	*Upper 90.0%*
Period	*Forecast*	*Limit*	*Limit*
Q1/21	3007.54	2485.59	3529.5
Q2/21	3029.1	1865.66	4192.55
Q3/21	2993.82	1149.85	4837.79
Q4/21	2989.53	463.867	5515.2
Q1/22	2991.08	164.835	5817.32
Q2/22	2995.3	70.9138	5919.68
Q3/22	2999.97	58.3995	5941.54
Q4/22	3003.85	62.1887	5945.5
Q1/23	3006.45	61.7035	5951.21
Q2/23	3007.83	57.1575	5958.5
Q3/23	3008.26	52.5547	5963.97
Q4/23	3008.11	49.6796	5966.55
Q1/24	3007.69	48.301	5967.08

Q2/24	3007.23	47.6619	5966.79
Q3/24	3006.84	47.2732	5966.4
Q4/24	3006.58	46.9817	5966.17
Q1/25	3006.44	46.7849	5966.09
Q2/25	3006.4	46.691	5966.1
Q3/25	3006.41	46.6784	5966.14
Q4/25	3006.45	46.7106	5966.19

Estimation Period

Model	*RMSE*	*MAE*	*MAPE*	*ME*	*MPE*	*AIC*
(A)	*2.51E+12*	*1.92E+12*	*4.31864*	*1.18E+12*	*3.37726*	*57.1014*
(B)	*2.23E+12*	*1.53E+12*	*3.08568*	*0.00128265*	*-0.07888*	*56.8976*
(C)	*2.77E+13*	*2.50E+13*	*97.9703*	*0.0107996*	*-66.0454*	*61.9316*
(D)	*9.11E+12*	*7.52E+12*	*18.0633*	*-0.0202206*	*-7.29545*	*59.7391*
(E)	*6.98E+12*	*5.91E+12*	*18.5807*	*0.0257353*	*1.01528*	*59.2374*
(F)	*1.86E+13*	*1.43E+13*	*26.5593*	*-1.97E+11*	*-4.41155*	*61.1694*
(G)	*1.64E+13*	*1.26E+13*	*22.5015*	*-3.40E+11*	*-3.17637*	*60.9204*
(H)	*3.32E+12*	*2.64E+12*	*5.98047*	*1.85E+12*	*4.95366*	*57.6939*
(I)	*2.51E+12*	*1.89E+12*	*4.25549*	*1.16E+12*	*3.32791*	*57.1309*
(J)	*2.21E+12*	*1.50E+12*	*3.37147*	*-1.02E+11*	*0.342272*	*56.8811*
(K)	*2.23E+12*	*1.51E+12*	*2.97165*	*-8.89E+10*	*-0.09283*	*56.9225*
(L)	*2.43E+12*	*1.69E+12*	*3.71309*	*-1.79E+11*	*-0.00872*	*57.0688*
(M)	*2.08E+12*	*1.42E+12*	*3.07891*	*3.38E+11*	*1.19981*	*56.7571*
(N)	*2.08E+12*	*1.40E+12*	*3.12678*	*2.44E+11*	*1.16319*	*56.8164*
(O)	*2.09E+12*	*1.38E+12*	*2.84269*	*-8.34E+10*	*0.078545*	*56.8247*
(P)	*2.07E+12*	*1.37E+12*	*2.98731*	*2.85E+11*	*0.194408*	*56.8359*
(Q)	*2.11E+12*	*1.44E+12*	*3.14312*	*3.69E+11*	*1.27411*	*56.8392*

Appendix (7) results of the prediction of the variable value of agricultural output for the first quarter of 2021 to the fourth quarter of 2025

Period	Forecast	Lower 90% Limit	Upper 90% Limit
Q1/21	8.11E+13	7.76E+13	8.46E+13
Q2/21	7.74E+13	7.08E+13	8.41E+13
Q3/21	7.51E+13	6.54E+13	8.48E+13
Q4/21	7.36E+13	6.11E+13	8.61E+13
Q1/22	7.27E+13	5.75E+13	8.78E+13
Q2/22	7.21E+13	5.45E+13	8.96E+13
Q3/22	7.17E+13	5.19E+13	9.15E+13
Q4/22	7.15E+13	4.97E+13	9.33E+13
Q1/23	7.13E+13	4.76E+13	9.50E+13
Q2/23	7.12E+13	4.57E+13	9.67E+13
Q3/23	7.12E+13	4.40E+13	9.83E+13
Q4/23	7.11E+13	4.23E+13	9.99E+13
Q1/24	7.11E+13	4.08E+13	1.01E+14
Q2/24	7.11E+13	3.94E+13	1.03E+14
Q3/24	7.11E+13	3.80E+13	1.04E+14
Q4/24	7.11E+13	3.66E+13	1.05E+14
Q1/25	7.11E+13	3.54E+13	1.07E+14
Q2/25	7.11E+13	3.41E+13	1.08E+14
Q3/25	7.11E+13	3.29E+13	1.09E+14
Q4/25	7.11E+13	3.18E+13	1.10E+14

استخدام طرائق السلاسل الزمنية للتنبؤ بقيمة الناتج الزراعي وبعض المؤشرات المالية المؤثرة عليه في العراق للمدة (q1-2025q42021)

م. نجلاء صلاح مدلول* أ.د جدوع شهاب أحمد* أ.د أحمد حسين بتال**

* جامعة تكريت/ كلية الزراعة/ قسم الاقتصاد والإرشاد الزراعي

** جامعة الانبار/ كلية الإدارة والاقتصاد/ قسم الاقتصاد

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الخلاصة

هدف البحث الى التنبؤ بقيمة الناتج الزراعي وبعض متغيرات السياسة المالية باستخدام بيانات ربع سنوية من الربع الأول لسنة 2021 حتى الربع الرابع لسنة 2025، وذلك من خلال تطبيق طرائق السلاسل الزمنية المختلفة (السلوك العشوائي، الاتجاه العام، المتوسطات المتحركة، التمهيد الاسي البسيط، أسلوب براون في التمهيد الاسي، نماذج ARIMA) على كل من المتغيرات التالية (قيمة الناتج الزراعي، أسعار النفط، الانفاق الحكومي، الناتج المحلي الإجمالي، الاستثمار الزراعي، الاستيرادات الزراعية) ، وقد أظهرت النتائج ان أنموذج ARIMA(1,0,1)، هو أفضل أنموذج للتنبؤ بأسعار النفط حتى الربع الرابع من عام 2025، كما اشارت النتائج الى ان أنموذج الاتجاه العام هو افضل نأموذج للتنبؤ بمتغير الانفاق الحكومي حتى الربع الرابع من عام 2025، في حين كان أنموذج ARIMA(1,1,1) هو الانموذج المختار للتنبؤ بمتغير الناتج المحلي الإجمالي حتى الربع الرابع من عام 2025، كذلك اتضح من النتائج ان افضل أنموذج مستخدم للتنبؤ بالاستثمار الزراعي هو أنموذج التمهيد الاسي، في حين كان انموذج ARIMA (2,0,4) هو الانموذج الافضل للتنبؤ بالاستيرادات الزراعية حتى الربع الرابع من عام 2025، كما اشارت النتائج الى ان أفضل أنموذج يمكن توظيفه للتنبؤ بمتغير قيمة الناتج الزراعي هو أنموذج الاتجاه التربيعي حسب اختبارات القدرة التنبؤية للنماذج المختلفة.