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What are the Determinants of Investment in the Iraqi Agricultural Sector?

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Abstract

The agricultural sector is one of the main economic activities that contribute to a country's national economy. However, this sector's growth in Iraq is facing difficulties considering the decline of agricultural capital stock and its reliance on government investment, which is insufficient. Therefore, it requires activating investment in the agricultural sector. Agricultural investment is affected by many determinants that prevent its development. This study aims to investigate the determinants of investment in Iraq such as the rate of inflation, corruption, and agricultural gross domestic production (GDP) for the period 2004Q1-2019Q4. The Autoregressive Distributed Lag Model (ARDL) is used to investigate the study parameters. The results indicated a significant impact of corruption, inflation, and agricultural GDP on Iraq's agricultural investment in the long run. A 1% decrease in the inflation rate leads to an increase in agricultural investment by 50%. An increase in agricultural GDP by 1% leads to increased agricultural sector investment by 59%. 20% of the defect in the previous year for agricultural investment was corrected in the current year.
The results also indicated a long-term equilibrium relationship between investment in the agricultural sector, inflation, corruption, and agricultural GDP, which differed in their impact between the short and long terms. Therefore, decision-makers in Iraq must draw a clear future vision and set appropriate laws to attract investment in the agricultural sector for its development. The country needs financial and economic policies that achieve low and stable inflation rates and limit the adverse effects of inflationary pressures in the short and long term and combat the country's rampant corruption.

Keyword: Agricultural Investments; Inflation; Corruption; and Agricultural GDP, ARDL.

1. Introduction

Agriculture is one of the main economic activities that contribute to the national economy. Food security is linked to national security, which depends on providing food from local agricultural production. The agricultural sector's advancement contributes to diversifying the economy, alleviating poverty, and strengthening the national economy. In other words, the development of the agricultural sector contributes to combating unemployment, reducing the volume of imports, developing society, and strengthening the national economy. The agricultural sector in Iraq is an important economic sector. It is ranked the third after the oil sector and the service sector in terms of its contribution to the GDP.
In the last two decades, the agricultural sector's contribution to GDP has declined. There has been a migration of many families from the countryside to the city after low production, high costs, and declining returns. Iraq has become a significant importer of grains and foodstuffs after the sharp decline in agricultural production and increased demand for foodstuffs, driven by an annual population growth rate of more than 3%. The decline in the rate of agricultural growth has led to a significant increase in dependence on imports to meet the needs of the growing domestic demand for agricultural commodities whose prices have risen globally. It led to an increase in the burden on the Iraqi trade balance. Therefore, it is necessary to raise agricultural production level by developing and improving the physical means of production and raising its productive efficiency, called investment [1].
The agricultural sector needs huge capitals to increase the volume of productive capacities, expand and improve the existing ones, reclaim lands, use agricultural mechanization and modern methods in agriculture, etc., and thus raise the growth rates of the agricultural sector.
The growth of the agricultural sector in Iraq is facing difficulties in light of the decline in agricultural capital stocks and its reliance on government investment Government investment in infrastructure, human investment, training and education is insufficient to develop agriculture in Iraq. Instead, it requires activating private investment in the agricultural sector and increasing its contribution to the capital stock.

Agricultural investment is affected by many variables and obstacles that prevent its development. The matter requires diagnosing its determinants according to economic theories and studies, such as inflation rate, agricultural GDP, interest rate, exchange rate, loan size, and other variables. Several studies, such as [2] and [3], were conducted that focused on studying the limitations of agricultural investment in Iraq. What distinguishes this study from others is its use of one of the indicators of economic freedom, which is corruption, whose effect has not been studied in those studies. The agricultural GDP was also used instead of the country's GDP used in previous studies; in addition to that, it differs from those studies in that it covers recent years' data.

This study aims to show the extent of the impact of Iraqi agricultural GDP, inflation rate, and corruption on investment in the agricultural sector in the short and long terms.

In this study, the following hypothesis will be tested: Is there a relationship between gross agricultural GDP and the rate of inflation and corruption with Iraqi agricultural investment in the short and long terms?

The study will be divided into six sections. The second section includes a set of previous studies that dealt with factors affecting agricultural investment. The third section includes the data source and study methodology; the fourth section includes the standard model; and the statistical methods used; the fifth section includes the analysis of the results, and finally, the sixth section deals with the conclusions that were reached.

2. Literature Review

Many studies have focused on the factors affecting investment in the agricultural sector and on foreign investment, such as the exchange rate, interest rate, and inflation, in addition to the impact of monetary and financial economic policies ([4]; [5]; and [6]) Others were interested in studying the relationship between economic growth and agricultural investment and their impact on Economic development ([7]; and [8]). [9] Examined the impact of investment on infrastructure growth in the agricultural sector (1970-2000). The study concluded that investment has an essential impact on the Iraqi agricultural growth by reducing costs. The study also found that technological progress has slowed due to weak private investment.

[10] concluded that Iraq's agricultural investment was weak due to the economic blockade and wars that Iraq has lived through and its focus on infrastructure projects during the study period (1980-2003). [11] Also presented a study on the effect of investment on GDP growth in Iraq's Kurdistan Region (2004-2012). Quantitative analysis for this study showed that GDP growth is not closely related to investment growth. [12] Studied the impact of agricultural investment in Egypt and its importance in developing the agricultural sector. The study found that agricultural investments declined by about 7.75 billion pounds and that agricultural investment represented (3.24) % of the total investment. This low percentage does not match this sector's importance, which is reflected in the agricultural sector. The study of [2] aimed to measure the impact of GDP, exchange rate, interest rate, and inflation on investment during the period (1990-2014) using the Autoregressive Distribution Lag (ARDL) Model. The study found that GDP positively affected agricultural investment, while other variables' effect was negative. These variables differed in their short- and long-term impacts on agricultural investment during the study period.

[3] study concluded that there is no clear strategy for agricultural investment in Iraq by studying the size of agricultural loans, inflation, deficit, surplus from the general budget, and the value of support for the agricultural sector over agricultural investment in Iraq for the period (1995-2015). [13] Found that Iraq faces challenges in agricultural investment, such as infrastructure and poor performance of economic policies, which created an environment that is not attractive to investors. [14] Study focused on the importance of investment and its relationship to the national economy. The study touched on the weakness of the laws that the state placed in front of investors. However, investment in Iraq witnessed a significant increase after 2003, but it is modest compared to other Arab countries' investment.

The study of [15] showed that agricultural investment's relative importance to national investment is in a clear and continuous decline compared to other economic sectors. The study found a positive relationship consistent with the economic logic between average per capita agricultural income, average per capita agricultural investment, average per capita agricultural consumption, average per capita share of agricultural exports in EGP / person, inflation rate, and average per capita share of medium-term loans. The results of the study of [16] presented the existence of a long-term relationship between government investment, oil income, investment stocks, added value, national income, and inflation rate. In another study prepared by [17] on 36 countries, including 12 countries in the Middle East, the researchers included GDP to measure market size and corruption index, in addition to economic stability variables such as inflation and government spending. The two researchers concluded that GDP and the degree of openness positively impacted the investment flow, while corruption, inflation, and government spending, hurt investment.

A standard model was estimated in a study conducted by [18] of 80 countries (least developed countries) for the most critical economic and political variables that play a significant role in determining the flow of investments. They concluded that the increase in real GNP per capita helps to attract more investments and that political instability dramatically reduces the flow of investments.

3. Data Source and study Methodology

Investigating the effect of each of the market size, macroeconomic stability and freedom of stability on investment in the agricultural sector (fixed capital formation in the agricultural sector) (INVG) in Iraq, quarterly data (2014Q1-2019Q4) were used by using Distributed Lag (ARDL) Model supplied by ([19]; and [20]) Agricultural GDP (GDPA) is used as an indicator of market size. The market size index is of great importance in attracting investment. Economies characterized by the availability of large markets attract investments. Therefore, the indication of the market size factor is expected to be positive. As for the indicators of macroeconomic stability, they have a significant role in attracting investments. Among the most important of these indicators is inflation (INFL), which is considered one of the most critical variables that show stability in the economic environment. The rise or fall of inflation affects the host country's inflows, and the sign of this variable is expected to be negative.

The most important indicator of economic freedom is corruption (CORR) that influences an investor's decision. The spread of corruption in the investment environment leads to the reluctance of investors to invest in it. Corruption is spreading an atmosphere of insecurity, which affects investors' ability to implement contracts, and it is expected that the signal of this indicator will be positive. These variables were converted into a logarithmic function to reduce the level of variance. Agricultural GDP and inflation data were obtained from the Central Bank of Iraq. The corruption data was obtained from Transparency International Organization. A CPI (Corruption Perception Index) that ranges from 0 (very corrupt) to 10 (very clean) was used in many studies such as [21], and [22]. The reliability of CPI cannot be questioned as it is closely related to economic variables [23]. Table 1 illustrates a description of the variables used in the study.

Table 1. Summary of Description of Variables.

	INVG	INFL	GDPA	CORR
Mean	607733.1	10.67	7518071	1.76
Median	328507.8	12.88	6832552	1.8
Maximum	3890960	53.23	13128623	2.2
Minimum	13034.9	10.07	2486866	1.3
Std. Dev.	924869.7	16.80	2938607	0.26
Skewness	2.832902	1.29	0.427871	0.25
Kurtosis	10.64156	3.63	2.643256	2.22

It is clear from Table 1 that the lowest value for the average corruption in Iraq is 1.3 and the highest value is 2.2, with an average of 1.75, which indicates the size of rampant corruption in Iraq. Iraq is considered one of the most corrupt countries. The average value of the agricultural investment was 607733 million Iraqi dinars. The highest value was 3,890,960 million dinars, and the least value was 1, 3034 million dinars, which means low investment in the agricultural field. The average inflation was 10.6. The lowest value of inflation was 10.06, and the highest value was 53.23, indicating the large fluctuation in inflation.

4. Econometric Model

Several ways to test the existence of co-integration among variables are in use, including [24]; [25]; and [26]. These tests require that the variables under study be nonstationary in their levels and stationary in the first difference, that these variables are co-integration of the same level. According to [27] the results obtained from the use of previous tests are inaccurate in using small samples, and as a result, the use of the Autoregressive Distributed Lag (ARDL) Model becomes an appropriate alternative. The ARDL test has several advantages that distinguish it from other tests, among which it can be applied regardless of the degree of co-integration of the variables under study, whether it is I(0) or I(1). The ARDL test is appropriate if the sample size is small [28], unlike other co-integration tests, which require a large sample size to obtain more efficient results [29]. In addition to that, ARDL enables the researcher to obtain short and long run results at the same time; however, it is not possible to use ARDL if one of the variables is an integral of the second level, i.e., that I(2), and the dependent variable must be nonstationary in the level [19]. The ARDL model test is among the variables under study in the framework of Unrestricted Error Correction Model (UECM) takes the following formula between the dependent variable (Y) and the vector of independent variables (X):

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta Y_{t-i} + \sum_{i=1}^{n} \delta_i \Delta X_{t-i} + \lambda_1 Y_{t-1} + \lambda_2 X_{t-1} + \varepsilon_t \qquad (1)$$

where:

Δ is the first differences of variables ; n and p, are the time lags of the dependent and independent variables, respectively ; λ_1 and λ_2 is the long-run relationship coefficients ; δ_1 and α_1 is the short-term relationship coefficients ; and ε is the random error, when mean is equal to zero, and the variance is constant and has no subjective correlations between them.

Testing the existence of a long-run relationship, i.e., co-integration between study variables is the first step in the ARDL test. F-Statistics is calculated for the parameters of the lagging variables of the variables with the value of tabulated and computed F-statistics as in [19] and [30]. They provided two types of tabulated values for different numbers of variables because F's distribution is a non-standard distribution. The minimum value assumes that all the study variables are stationary in their original values, meaning that they are integration in the level, i.e., I (0). The upper limit's value assumes that the variables are not stationary in their level and stationary in the first difference of their values, meaning that they are integrated from the first level, i.e., I (1). If the calculated F-statistics is higher than the upper limit value at a specified level of significance, then the null hypothesis is rejected. It means that there is a co-integration between the variables regardless of the order of the covariant. If the calculated F-statistics is less than the minimum value at a certain level of significance, then the null hypothesis cannot be rejected, and the conclusion is that there is no co-integration between the variables. If the calculated F-statistics falls between the lower and upper values of the tabulated values, the result is inconclusive. Thus, there is no ability to decide whether there is co-integration between the variables or not.

In the case of Co-integration between the variables, the second step includes estimating the long-run equation with the following formula:

$$Y_t = \alpha + \sum_{i=1}^{n} \beta_i Y_{t-i} + \sum_{i=1}^{m} \delta X_{t-i} + \varepsilon_t \qquad (2)$$

Where:

β and δ is the coefficients of variables; n and m is the Lag periods of these variables and ; ε is the error term.

The third step is to estimate short-term parameter by building the following error correction model:

$$Y_t = C + \sum_{i=1}^{n} \beta_i Y_{t-i} + \sum_{i=1}^{m} \delta X_{t-i} + \psi ECT_{t-1} + \varepsilon_t \qquad (3)$$

where:

ECT_{t-1} is the error correction limit; ψ is the speed of correcting the actual values towards the dependent variable's equilibrium values, reflecting the long-run effects, and the value of this parameter ranges between zero and one.

The time-series stationary test is not necessary to start implementing ARDL, but this test cannot be used if there are stationary variables in the second difference, i.e., I (2), so the stationary test will be performed before the ARDL test is performed.

There are several methods for testing the stationary of time series, including Autocorrelation Function (ACF), Graphical Analysis and Unit root test. The Unit Root Test can be performed in several ways, the most important of which is Augmented Dickey-Fuller (ADF) Test. The ADF test is based on the following equation:

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{i=1}^{n} \delta_i \Delta Y_{t-i} + \varepsilon_t \quad \text{(Intercept)}$$

$$\Delta Y_t = \alpha_1 + \alpha_2 t + \beta Y_{t-1} + \sum_{i=1}^{n} \delta_i \Delta Y_{t-i} + \varepsilon_t \quad \text{(Interceptand Trend)} \qquad (4)$$

where:

Δ is the first difference of the time series; Y_t . δ is the parameter of the variable; t is the time direction and ; ε is the pure white noise error term.

Another widely used unit-root test is Philips-Perron (PP) test. The PP test differs from the ADF test by not containing lagging values for differences and considers the correlation in the time series' first differences. The hypotheses in the ADF and PP. test are as follows:

$$H_0 : \delta = 0 \quad ; \text{ VS. } H_1 : \delta < 0 \qquad (5)$$

If H_0 is rejected, this means that Y_t is stationary. If it is not rejected, it means Y_t is not stationary. The Lag period is chosen in the ARDL model before the specified model is evaluated by the OLS method in order to cancel the autocorrelation in random errors, according to one of the following standers: Akaike Information Criterion (AIC), Schwarz information Criterion (SIC), Final Predication Effort (FBE) and Hannan and Quinn (H.Q.). The quality of the run relationship between the variables under study is ensured through a series of diagnostic tests, including the serial correlation test by using the Lagrange multiplier of residual, the functional form test by use Ramsey Resort, and Autoregressive Conditional Heteroscedasticity (ARCH).

5. Results and Discussion

Multiple tests were performed regarding time series stationarity and co-integration by using ARDL, long-run model estimation using ARDL model, error correction formula estimation of ARDL-ECM model, and ARDL-ECM structural stability test.

5.1. Unit Root Test

The ADF Test and P.P. Test were used to test whether the study variables were stationary or not and to determine the degree of their integration. Table 2 illustrate the ADF and P.P. Tests results at level and the first differences with a intercept, trend and intercept and none at the significance level of 1%, 5%, and 10%.

Table 2. Results of the unit root test (ADF and PP)

	Augmented Dickey-Fuller (ADF) Test						Phillips-Perron (P.P.) Test						
	Level			1st Difference			Level			1st Difference			
	Intercept	Trend and Intercept	None	Intercept	Trend and intercept	None	Intercept	Trend and intercept	None	Intercept	Trend and intercept	None	Decision
LNINVG	-1.771 (0.392)	-2.017 (0.581)	0.548 (0.832)	-6.618*** (0.000)	-6.656*** (0.000)	-6.554*** (0.0001)	-1.949 (0.309)	-2.341 (0.406)	-0.426 (0.803)	-6.756*** (0.000)	-6.786*** (0.000)	-6.703*** (0.001)	I(1)
LNINF	-0.749 (0.826)	-3.712* (0.029)	-1.146 (0.146)	-5.432*** (0.000)	-5.399*** (0.000)	-5.226*** (0.000)	-0.594 (0.884)	-3.061 (0.125)	-1.411 (0.146)	-5.457*** (0.000)	-5.426*** (0.000)	-5.251*** (0.000)	I(1)
LNGDPA	-0.858 (0.349)	-2.198 (0.482)	-01.407 (0798)	-4.223*** (0.001)	-4.126*** (0.000)	-4.239*** (0.000)	-1.789 (0.382)	-2.229 (0.466)	-0.332 (0.778)	-4.314*** (0.001)	-4.227*** (0.007)	-4.325*** (0.000)	I(1)
LNCORR	-2.778* (0.068)	-3.018 (0.136)	-0.316 (0.568)	-3.411*** (0.014)	-3.721*** (0.028)	-3.442*** (0.000)	-1.739 (0.407)	-1.479 (0826)	-0.418 (0.529)	-3.454*** (0.013)	-3.743** (0.027)	-3.484*** (0.000)	I(1)

Note: The figures in parenthesis are P-value, *** denote that the corresponding coefficient significant at the 1% level.

Table 2 shows that each of the variables of interest (agricultural investment, inflation, agricultural GDP, and corruption) contains the unit roots at the level, while it becomes stationary after taking its first difference, i.e., I (1). It supports the view that many macroeconomic variables are not stationary at their level but become stationary after their first difference [30].

5.2 Co-integration Test by using ARDL

The application of the Co-integration test in the ARDL model among the variables requires first determining the time lag period for those variables by using SIC., AIC, FBE, H.Q., and L.R.

Table 3. Lag selection Criteria.

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	-118.3417	NA	0.000694	4.078057	4.217680	4.132672
1	160.0164	510.3232	1.11e-07	-4.667213	-3.969099	-4.394142
2	195.7260	60.70636*	5.78e-08*	-5.324201*	- 4.067594*	-4.832673*
3	209.9583	22.29720	6.25e-08	-5.265276	-3.450178	-4.555291
4	217.6801	11.06794	8.53e-08	-4.989337	-2.615746	-4.060895

Note: * indicates lag order selected by the criterion

Table (3) presents that the study variables' time gap is two gaps for all tests.
The ARDL test based on the UECM model and the Bound Test proposed by [19] is best suited for testing the existence of co-integration among the study variables according to the following formula:

$$\Delta \mathrm{INVG_t} = \alpha + \sum_{i=1}^{n} \beta_i \Delta INVG_{t-i} + \sum_{i=0}^{m} \delta_i \Delta INF_{t-i} + \sum_{i=0}^{p} \phi_i \Delta GDPA_{t-i} + \sum_{i=0}^{q} \vartheta_i \Delta CORR_{t-i} + \lambda_1 INVG_{t-1} + \lambda_2 INF_{t-1} + \lambda_3 GDPA_{t-1} + \lambda_4 CORR_{t-1} + \varepsilon_t$$

The regression equation's statistical tests are shown in Table 4 by applying the above equation. 92% of the changes in Iraq's agricultural investment can be explained by variations in agricultural GDP, corruption, and inflation rate.

Table 4. The Results of Estimation of Unrestricted Error Correlation Estimation ARDL-UECM.

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNINVG(-1)	0.982243	0.109582	8.963516	0.0000
LNINVG(-2)	-0.182476	0.109015	-1.673860	0.0999
LNINF	0.619692	0.195383	3.171668	0.0025
LNINFL (-1)	-0.720061	0.199122	-3.616174	0.0007
LNGDPG	1.357802	0.947056	-1.433708	0.1574
LNGDPG(-1)	1.477022	0.943420	1.565604	0.1233
LNCORR	0.165838	1.910944	-0.086783	0.9312
LNCORR(-1)	1.622208	1.950132	0.831845	0.4092

R-squared	0.917845	Mean dependent var	12.20220
Adjusted R-squared	0.907195	S.D. dependent var	1.485697
S.E. of regression	0.452602	Akaike info criterion	1.372308
Sum squared resid	11.06184	Schwarz criterion	1.646777
Log-likelihood	-34.54156	Hannan-Quinn criter.	1.480072
Durbin-Watson stat	1.957057		

Table 5 shows that the calculated value *F* Statisticis (6.149), which is greater than the critical value of the corresponding upper bound at a significant level 1%. It indicates the rejection of the null hypothesis, which states that there is no co-integration between the study variables [31]. It means that there is a long-run equilibrium relationship among these variables. The results of estimating the long-run relationship are presented in Table 5.

Table 5. Long Run Coefficient of ARDL.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNINF	-0.501262	0.192467	-2.604403	0.0119
LNGDPG	0.595408	0.075958	7.838656	0.0000
LNCORR	7.273377	2.206806	3.295885	0.0017

EC= LNINVG - (-0.5013*LNINFLATION1 + 0.5954*LNGDPG + 7.2734 *LNCORR

Table 5 indicates that all the estimated regression coefficients are statistically significant. An increase in the inflation rate by 1% leads to a 50% decrease in Iraq's agricultural investment in the long run. Therefore, high inflation leads to higher production costs and, consequently, to investors' reluctance. As for an increase in agricultural GDP by 1%, the agricultural investment will rise by 59%. According to economic theory, an increase in income leads to an increase in saving and investment. It can also be explained that the increase in GDP will increase the investment allocations to the agricultural sector from the government. Investment in the agricultural sector depends to a large extent on government investment. The decrease in corruption in Iraq by 1% leads to a substantial increase in investment; i.e. by 727%. It indicates the major obstacle that corruption places on the investors and their reluctance to invest as the spread of corruption creates an atmosphere of insecurity, affecting individuals' or companies' ability to invest. The results above indicate the significant impact of corruption, inflation, and agricultural GDP on Iraq's agricultural investment in the long run.

5.3 Error Correction Model for ARDL (ARDL-ECM)

The error correction model is used to measure the short-run relationship among agricultural investment, corruption, inflation, and agricultural GDP in Iraq. It is characterized by measuring the speed of adjustment to restore balance in the dynamic model and measuring the short-run relationship among variables. Table 6 shows the results of error correction model.

$$\Delta \mathrm{INVG_t} = \alpha + \sum_{i=1}^{n} \beta_i \Delta INVG_{t-i} + \sum_{i=0}^{m} \delta_i \Delta INF_{t-i} + \sum_{i=0}^{p} \phi_i \Delta GDPA_{t-i} + \sum_{i=0}^{q} \vartheta_i \Delta CORR_{t-i} + \psi ECT_{t-i} + \varepsilon_t$$

Table 6. The results of the error correction formula for the error correction model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNINVG(-1))	0.182476	0.101329	1.800825	0.0773
D(LNINFL)	-0.619692	0.182070	3.403593	0.0013
D(LNGDPG)	1.357802	0.890051	-1.525533	0.1330
D(LNCORR)	0.165838	1.687787	-0.098258	0.9221
Coint Eq(-1)*	-0.200233	0.039296	-5.095551	0.0000

Table 6 presents that the coefficient of the error correction term is statistically significant with the expected negative sign. It confirms the existence of a mutual complementarity between agricultural investment, inflation, corruption, and agricultural GDP in Iraq. The estimated value of the coefficient is equal to -0.20, which means that 20% of the previous year's agricultural investment defect was corrected in the current year. The results also indicate the presence of a negative moral effect of the change in inflation on agricultural investment in Iraq in the short term, in addition to the positive effect of agricultural GDP and corruption on agricultural investment in the short term. There is an increase in inflation by 1% in the short run, leading to an increase in investment in the Iraqi agricultural sector by 62%.

5.4 Diagnostic Test

Diagnostic tests are conducted to ensure the quality of the model used in the analysis is free from standard problems, including serial correlation, functional form misspecification, and heteroscedasticity. Tables 7, 8, and 9 present the diagnostic tests for ARDL treatments.

Table 7. Breusch-Godfrey Serial Correlation LM Test.

F-statistic	0.117318	Prob. F(2,51)	0.8895
Obs*R-squared	0.283937	Prob. Chi-Square(2)	0.8676

Table 8. Heteroskedasticity Test: ARCH.

F-statistic	1.438719	Prob. F(1,59)	0.2351
Obs*R-squared	1.452081	Prob. Chi-Square(1)	0.2282

Table 9. Ramsey RESET Test.

	Value	df	Probability
t-statistic	0.026139	52	0.9792
F-statistic	0.000683	(1, 52)	0.9792

Tables 7, 8, and 9 shows that the model is free from serial correlation, functional form misspecification and heteroscedasticity. $P - Value \leq 0.05$ for all **t**he tests; therefore, the model is devoid of standard problems.

5.5 Results of the structural stability test of ARDL

According to [32], the step that follows the UECM formula of the ARDL model is to test the structural stability of the short and long-run transactions, i.e., the absence of any structural changes in the data used in this study over time. It is done using the Cumulative Sum of Recursive Residual (CUSUM) and Cumulative Sum of Square Recursive Residual (CUSUMQS). The structural stability of the estimated parameters in the CUSUM and CUSUMQS formula is achieved if the CUSUM and CUSUMQS statistic graph falls within the critical limits at the 5% level of significance. Figure 1 shows that the estimated coefficients of the ARDL model used are structurally stable over the study period, which confirms the existence of stability of the study variables.

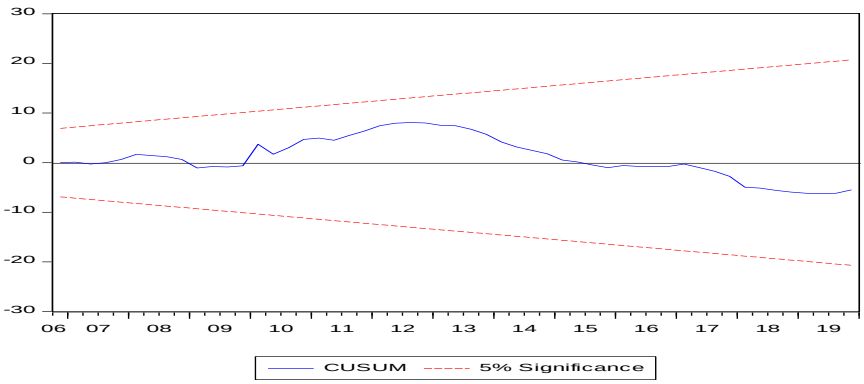

Figure 1. Cumulative Sum of Recursive Residual (CUSUM).

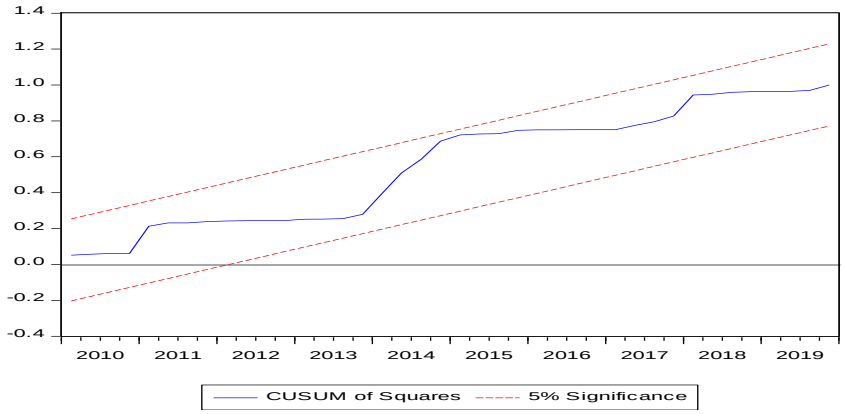

Figure 2. Cumulative Sum of Square Recursive Residual (CUSUMQS).

Conclusion

The agricultural sector in Iraq is an important economic sector. In the last century's fifties, Iraq used to export wheat, rice, and dates to Europe. Nowadays, the agricultural sector's contribution to the gross domestic product has decreased, and Iraq has become a significant importer of grains and foodstuffs. The growth of the agricultural sector in Iraq cannot be discussed in light of the decline in agricultural capital stock and its reliance on government investment alone. However, it requires activating investment in the agricultural sector and increasing its contribution to capital stock. Agricultural investment is affected by many determinants that prevent its development, requiring diagnosing its determinants according to economic theories and studies such as the inflation rate, gross agricultural GDP, interest rate, exchange rate, loan size, and other variables. This study aimed to study the determinants of investment in Iraq's agricultural sector, such as the inflation rate, agricultural GDP, and corruption in the short and long term from 2004Q1-2019Q4 using the Autoregressive Distributed Lag Model (ARDL).

The results indicate the existence of the unit root in levels in the time series under study. It is not stationary in its levels, but it is stationary at its first differences. A long-run equilibrium relationship was also reached between agricultural investment, corruption, inflation, and agricultural GDP. They change together in the long run. The current agricultural investment values are affected by its previous value as well as by the past values of corruption, inflation, and agricultural GDP. The results indicate that all the estimated long-run regression coefficients are statistically significant. In the short run, the inflation factor is significant. An increase in the inflation rate by 1% leads to a decrease in Iraq's agricultural investment by 50% and 62% in the long and short term, respectively. An increase in agricultural GDP by 1% will lead to an increase in agricultural investment by 59% in the long run, while its effect is positive and insignificant in the short run. Also, the 1% decrease in corruption in Iraq leads to a substantial increase in investment by 72% in the long term, while its effect is positive and insignificant in the short term. It indicates the tremendous impact of corruption, inflation, and agricultural GDP on Iraq's

agricultural investment in the long term. The study also found that 20% of the previous year's agricultural investment defect is corrected in the current year. Therefore, decision-makers in Iraq must draw a clear future vision and place appropriate laws to attract investment in the agricultural sector to develop and expand agricultural production capacity and increase local agricultural production. Financial and economic policies must be put in place that achieves low and stable inflation rates that limit the adverse effects of inflationary pressures in the short and long terms, as well as combat rampant corruption in the country, which has become a significant obstacle to investment in particular and economic development in general. It also recommends studying the determinants of investment in general and foreign direct investment in particular on the Iraqi economy and adding the corruption as an essential determinant of investment.

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