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ECONOMIC ANALYSIS OF THE EFFECT OF SOME FACTORS ON THE AGRICULTURAL EXPANSION OF THE RAINY LANDS IN IRAQ FOR THE PERIOD (1980-2016).

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Abstract

The objective of the study was to study the most important factors affecting the expansion of the rainy lands in Iraq using time series data for the period (1980-2016). The model included the rainy cultivated area as a dependent variable as well as the price of wheat and the amount of fertilizer and the number of animals (milk cows), the rate of rainfall, the number of harvesting machines, investment funds and population growth as independent variables. In order to select the appropriate model for the nature of the data, the stability of the variables included in the model through the Augmented Dickey- Fuller test. The results of this test showed the instability of all variables at the level and stabilized after taking the first difference. Therefore, the model of co-integration and error correction were adopted in analysis. Statistical methods were also used to identify the phenomenon studied and the associated variables. The most important results showed that the effect of agricultural products prices was significant and positive in the agricultural expansion, especially that more than 80% of the rainy land is grown with wheat crop, which is subsidized by the government, which leads producers to increase the cultivated areas and overcome natural factors such as scarcity of rain by using irrigation sprays which are usually also supported. It was also found that the population growth was highly influential in agricultural expansion as the increase in population leads to high aggregate demand for agricultural commodities and products, and hence on land allocated for agricultural production. Therefore, the research recommends providing government support for production inputs, which is important for agricultural expansion for increased agricultural production to meet the need of increasing local demand under population pressure.

Key words: error correction model, stability, investment spending, population growth.

Introduction

The agricultural production is of great economic importance through its contribution to achieving food security and enhancing and diversifying the sources of national income. The total amount of arable land from irrigated lands and lands that depend on rain is (44.46) million donums, which represents (26.2%) of the total area of Iraq. The proportion of arable land that depends on rain is 49.8% of the total arable land. Agriculture has contributed to a limited share in meeting the need of local production but this contribution has diminished over time as nature and climate variability, particularly rainfall, surface area and soil quality in agricultural production. The increase of agricultural production depends on agricultural expansion through increasing the cultivated area and raising the productivity of one donum. This expansion faces many natural, economic and social determinants. Determining the impact of these factors is important in the formulation of appropriate agricultural policies and plans and programs. also, the nature of agriculture and the agricultural structure in Iraq and its change has an impact on agricultural expansion. In addition, urban expansion (residential and industrial) may compete with agricultural expansion as a result of the interaction between land use and change according to the change in the concept of better land use, which is the net return, which is the main determinant of the type of use. The net revenues are affected by the increase in demand for agricultural commodities and products and the availability of suitable technology, so the prices of agricultural products and production costs play an important role in the volume of net revenues from the use, whether agricultural or other uses. The rain - based

agriculture is mainly distributed in the northern areas of Iraq by 90%. This type of agriculture is called rain - based agriculture or dry farming because it relies on rain in the winter. The growing population leads to increased demand for agricultural goods and products to meet the need for food and other needs such as industry and trade. However, the rate of growth in agricultural production and productivity is still below the required level to meet the need of local demand, which increased Iraq's dependence on imports from abroad. Most economic studies indicate that the rate of growth of agricultural production did not exceed 1% or a little more than that, as is the expansion of cultivated areas, in addition to the low rate of growth of the donum yield of most agricultural products. This requires studying the factors affecting agricultural expansion in order to develop appropriate agricultural and economic policies to achieve the objectives of agricultural development and raise the proportion of the contribution of the agricultural sector in the generation of national income and reduce dependence on abroad and ensure that the foreign currency is not wasted in order to use it for other economic purposes.

Materials and Methods

Economists distinguish between two concepts of supply:

1. The natural supply of the land.

2. Economic supply of land.

The physical Supply represents the surface of the globe and its subsoil and the atmosphere that surrounds it and is characterized by being fixed or limited, due to the stability of the size of the globe while the natural supply of the land is a key factor in determining the over-all supply, which includes the total area of land actually used in addition to the total area not yet used. The economic supply of the land is limited to the part actually exploited and the exploitable part of its natural supply range because the land does not gain any economic significance, except when man shows increasing interest in it and evaluates it and requests it for use or when there is a desire to acquire them and a willingness to bear the costs necessary to reclaim and develop them so the economic supply of the land includes two factors:

• Supply economic which refers to the range of land area currently used for various purposes such as agriculture, mining, industry, trade, transportation, construction, recreation, entertainment and wood production.

• Potential economic supply which covering the land area expected to be exploited at any time in the future.

The economic supply of land increases with the increase in the price-to-cost ratio and decreases when the ratio decreases which is one of the important indicators that guide the economists of the earth in their continuous attempts to increase the economic supply of the land (Abdi, 1977, pp. 116-117). The economic supply of land can be increased globally, nationally, regionally or locally by various means, the most important of which are summarized as follows:

1. Horizontal expansion of land use: Most countries of the world are characterized by rapid population growth or overpopulation as this population explosion necessitates more food security through agricultural expansion by overcoming all obstacles that prevent expansion such as scarcity of irrigation water, poor drainage, environmental stress, lack of transportation and many crops and agricultural products are characterized by low prices in general. The horizontal agricultural expansion is done by adding new lands to the agricultural field through agricultural encroachment on grasslands, deserts and forests and then gradually turning them into agricultural production lands. The different methods of modern agriculture confirm the manifestations of human technical intervention in the soil sector (Al-saadi *et al.*, 2008, p.187).

2. Vertical expansion in the use of land: It is the increase of the productive capacity of the soil using modern technological means such as improved seeds, appropriate fertilizers and accurate water rationing in irrigation with the expansion of drainage networks in order to get rid of the soil surplus water in order to ensure that the plant absorbs amounts of water only according to need as well as to protect the soil from the damage of excess water in addition to the practice of agricultural rotation which allow to give an opportunity to rest from stressful plants such as cotton and in these periods of rest renewed activity by getting rid of excess salts and cracking the surface of the soil so that sunlight can penetrate into it to activate bacteria all these technical factors undoubtedly change the distribution of soil elements such as minerals and salts (Alsaadi *et al.*, 2008, p. 188). The vertical expansion of land use aims to create the possibility of doubling land production in order to support more people in the same exploited area. There are also factors that help the success of the vertical expansion in addition to the technical factors mentioned earlier, including programmed farm financing, and improved means and methods of transport and intensified factors of capital, labor, management and others.

While the demand for land is a derivative demand where the land is not required as an independent factor

but is demanded for the purpose of obtaining goods and products that can be obtained by using the land. There are many factors influencing the demand for agricultural land such as population size, population growth rate, age structure of the population, level of income of people, in addition to other social, economic and technological factors because the characteristics of the population in modern societies are determined by the overlap of three main factors: available resources, biological factor and civilization factor. These characteristics determine the amounts of land resources used in any use, but also the characteristics of that use and methods used in that use. (Mustafa, 1998, pp. 87-89).

The increase in production needs agricultural expansion, but the natural supply of land resources becomes limited with the approach of economic supply and this use becomes more expensive and therefore we find that there are many factors that affect agricultural expansion, including prices of agricultural products as well as production costs in addition to economic policies such as policy Government support, investment policies and natural factors such as water availability (Barlowe, 1958, p. 18).

Many researchers, including (7) (8) (9) (10), were interested in agricultural expansion. The most important research was based on many variables, including areas planted with maize crop, soybeans, wheat, barley, population growth and agricultural exports, growth in additive value of agricultural production. Annual growth in cereal cultivated areas and average per capita income. so most research has been based on the use of error correction model (ECM) according to the following steps:

First: Time Series Stability Test.

Applied studies using time series data need to ensure that this series is stable or stationary. This stability characteristic is determined by some statistical characteristics. In the absence of stability, the regression we get between time series variables is often spurious. one of the most important preliminary indications that the estimated regression from the time series data is false is the large value of the R^2 coefficient and the significant increase of the estimated parameters significantly, With autocorrelation, which appears in the value of the (Durbin – Watson) coefficient. This is because time data often has a trend factor that reflects certain conditions that affect all variables and change in the same direction, although there is no real correlation between them, and this often occurs in the waves of stagnation and recession sweeping societies.

Before beginning to study the fluctuations of any economic phenomenon it is necessary to first make sure that there is a trend in the time series, and depending on the nature of the growth of the series we can distinguish between stationary time series and non-stationary time series has certain direction, and the fact this series carries this or that characteristic directly related to the choice of the appropriate prediction technique as follows, knowing that this is not a theoretical framework as much as a simple introduction before entering the tests:

1. Stable time series: A stable time series is a series that it levels change over time without changing the average, over a relatively long period of time, *i.e.*, the series does not have a tendency to increase or decrease, while the unstable time series is constantly changing average Increases or decreases (Sheikhi, 2011, p. 201). A stable time series is a series whose levels change over time without changing the average, over a relatively long period of time, that is, the series does not have a tendency to increase or decrease, while the unstable time series is constantly changing average Increase or decrease (Shekhi, 2011, p201) and a time series is static if three characteristics are available in it as follows (Hill *et al.*, 2011, p. 477):

• Stability of arithmetic mean over time (Constant mean):

$E(Yt) = \mu$

• Constant variance over time: (Constant variance):

$var(yt) = \delta 2$

• The common variance between any two values of the same variable is dependent on the time gap between the two values, not on the actual value of the time calculated when the variance, *i.e.* on the difference between two time periods:

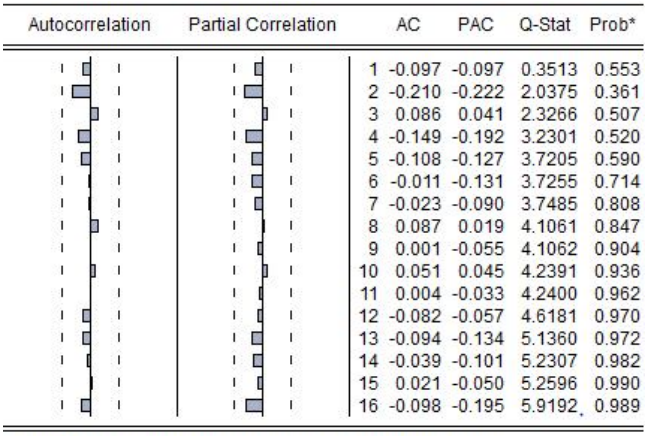
$cov(yt, yt+s) = cov(yt, yt-s) = \gamma s$

2. Unstable time series: Many time series, especially economic variables, are unstable. These are general trend time series that do not meet the above conditions. There are two types of unstable time series. The first is the unstable time series of the static type with a general trend which is a shock that affects the time series at a moment in time and is effective at that moment only. The second type is the time series of the type that is more prevalent compared to the first type, where the impact of shock at a particular moment has a continuous and decreasing reflection on the time series and the difference method is usually used to bring back stable (Sumaya, 2010, p. 197).

3. Second: Co-integration: If there are two unstable series when used in estimating a particular relationship, it is not necessary to obtain a false regression,

if they have the characteristic of co-integration and co-integration is the association between two or more series where the he fluctuations in one of these cancels the fluctuations in the other in such a way that the ratio between their values is constant over time (Atea, 2004, p. 670). The interdependence of variables is a statistical property of data that can be interpreted as an economic equilibrium relationship, However, when two or more series are linked to form a long-term equilibrium relationship, the series themselves move simultaneously with time and the difference between them is constant even if they include stochastic vectors. Therefore, the principle of common integration ensures that there is a long-term equilibrium towards which the economic system moves over time and that (et) is the error of imbalance that represents the extent to which the system deviates from equilibrium. The definition of co-integration is based on the fact that if the data of the X and Y variables are of the same degree, a common integration analysis can be used to test for long-term equilibrium between unstable time series at their levels. For example, there is a common integration of first-order integrated time series I (1). If the series of residues resulting from the variable relationship model is integrated to zero I (0), this means that there is a long-term equilibrium between time series despite a short-term imbalance.

It is necessary to verify the rank of the common integration of each series by the Augmented Dickey - Fuller (ADF) test, which is known as the stability of the series (unit root tests). The determination of the rank of stability is very important in determining the standard model that should be used to study the relationship between two or more variables.



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.097	-0.097	0.3513	0.553
		2	-0.210	-0.222	2.0375	0.361
		3	0.086	0.041	2.3266	0.507
		4	-0.149	-0.192	3.2301	0.520
		5	-0.108	-0.127	3.7205	0.590
		6	-0.011	-0.131	3.7255	0.714
		7	-0.023	-0.090	3.7485	0.808
		8	0.087	0.019	4.1061	0.847
		9	0.001	-0.055	4.1062	0.904
		10	0.051	0.045	4.2391	0.936
		11	0.004	-0.033	4.2400	0.962
		12	-0.082	-0.057	4.6181	0.970
		13	-0.094	-0.134	5.1360	0.972
		14	-0.039	-0.101	5.2307	0.982
		15	0.021	-0.050	5.2596	0.990
		16	-0.098	-0.195	5.9192	0.989

*Probabilities may not be valid for this equation specification.

Reference: Eviews 10 program outputs.

Fig. 1: Partial correlation. The figure shows that all variables are within the boundaries, this means there is no partial correlation.

The existence of a common integration relationship between economic variables is revealed by Johansen test for co-integrating time series analysis (Alabdali, 2007, p. 24).

Third: Error Correction Model – ECM:

This model was used to test the co-integration between time series variables of the same degree, where the concept of co-integration is based on "if the model variables are unstable in their levels or integrated in the first order (the series is stable in their differences). A linear combination of these variables can be generated. it is static as a zero integral, in which case the variables become the same, Thus, the level of variables can be used to regress by comparing the probability ratio to the critical values at the 5% level of significance, you can determine the number of vectors for common integration. After making sure that the time series of the variables of the study model are unstable at their levels and stable at the differences, and then verify that they are all jointly integrated. Variables that achieve common integration reflect the equilibrium relationship to the long-term, after proving the existence of this relationship on the long term of course there is an imbalance in the short term and therefore can handle the amount of error in the regression model of the variables of time under study like "balance error" can use this amount of error to correlate short-term behavior of the dependent variable with its long-term value. Granger and Engle, (1987) proved that it is possible to estimate the true relationship between time series variables, which are linked by a common integration relationship through its representation of the ECM model.

This is done by introducing the estimated residues from the long-term regression model as an independent variable one-time lag et-1 as shown in the following model:

$\Delta yt = \alpha 0 + \alpha 1 \Delta xt + \alpha 2\ ut\text{-}1 + \varepsilon t$

Where the (et) is equal to the amount of random error ut = (yt-1-B0-B1xt-1) that is, one late time period for the error of the regression of co-integration (Shabeeb, 2016, p. 30-31).

Results and Discussion

The research was based on the time series data for the period (1980-2016), the model used was as follows:

$ly = f\ (lx_1,\ lx_2,\ lx_3,\ lx_4,\ lx_5,\ lx_6,\ lx_7)$

whereas :

lx_1 : Wheat price

lx_2 : Fertilizer quantity

lx_3 : Number of animals (cows)

lx_4 : Rain

Table 1: Results of stability test of studied variables using (test).

At Level									
		LY	LX1	LX2	LX3	LX4	LX5	LX6	LX7
With Constant	t-Statistic	-1.9228	-1.4545	-2.2500	-1.2557	-4.6242	-2.0279	-0.8779	-6.9082
	Prob.	***0.3185***	***0.5448***	***0.1931***	***0.6392***	***0.0007***	***0.2741***	***0.7837***	***0.0000***
		n0	n0	n0	n0	***	n0	n0	***
With Constant & Trend	t-Statistic	-2.2867	-0.2265	-2.1553	-1.6688	-4.9344	-2.6309	-1.5849	-7.3701
	Prob.	***0.4301***	***0.9899***	***0.4989***	***0.7444***	***0.0017***	***0.2698***	***0.7792***	***0.0000***
		n0	n0	n0	n0	***	n0	n0	***
Without Constant & Trend	t-Statistic	0.0647	0.9714	0.1452	0.5359	-0.1511	0.2499	1.1784	-1.3145
	Prob.	***0.6970***	***0.9088***	***0.7219***	***0.8270***	***0.6240***	***0.7530***	***0.9356***	***0.1702***
		n0	n0	n0	n0	n0	n0	n0	n0
At First Difference									
		d(LY)	d(LX1)	d(LX2)	d(LX3)	d(LX4)	d(LX5)	d(LX6)	d(LX7)
With Constant	t-Statistic	-5.6956	-3.5316	-8.1013	-5.7122	-6.5665	-6.7921	-5.4520	-5.5325
	Prob.	***0.0000***	***0.0129***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0001***	***0.0001***
		***	***	***	***	***	***	***	***
With Constant & Trend	t-Statistic	-4.5290	-3.6965	-8.1652	-5.6558	-6.4304	-6.6993	-5.3858	-5.7233
	Prob.	***0.0054***	***0.0359***	***0.0000***	***0.0003***	***0.0000***	***0.0000***	***0.0005***	***0.0003***
		***	***	***	***	***	***	***	***
Without Constant & Trend	t-Statistic	-5.7663	-3.0731	-8.2126	-5.6530	-6.6793	-6.8596	-5.2286	-5.2875
	Prob.	***0.0000***	***0.0031***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***
		***	***	***	***	***	***	***	***

.Reference: Eviews 10 program outputs

* significant at the level of 10%, ** significant at the level of 5%, *** significant at the level of 1%, No: not significant.

lx_5 : Number of combine harvesters

lx_6 : Investment spending

lx_7 : Population growth

ly : The dependent variable represents the rainy lands.

Unit Root Test: Unit Root Test aims to measure the stability of time series at the level in various ways including the (Augmented Diky Fuller) test as shown in table 1:

Result of table 1, showed that all variables are unstable and become stable after taking the first difference at all levels.

Second: Determine the duration of deceleration: Before conducting a co-integration test, the duration of deceleration must be determined according to the most accurate used criteria.

Table 2, shows that when examining the appropriate deceleration period and relying on the SC test, it was found that the first deceleration period was better than using the second deceleration period.

Third: Johansen Test for common integration to test a long-term equilibrium relationship, the Johansen test has been used. There are two types of test: impact test and maximum value test.

Table 3, shows that there is a long-term equilibrium relationship between model variables using both trace test and maximum value:

1. Trace test: Since the calculated value of the maximum potential rate is 245.6719 greater than the critical value of 159.2597 at the level of 5%, which indicates the rejection of the null hypothesis that there is no vector for co-integration. Thus, we can say that there is an equation for co-integration, as is the case for atmost 1 and atmost 2, as it is clear that there are two other equations for co-integration.

In terms of 3 atmost, 4 atmost, 5 atmost, 6 atmost, and 7 atmost, the calculated value of the maximum potential rate is smaller than the critical value at 5%, *i.e.*, no fourth vector is possible.

Table 2: Deceleration test.

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-191.3443	NA	1.71e-05	11.72614	12.08528	11.84861
2	-18.37011	254.3738	3.12e-08	5.315889	8.548182*	6.418193
3	74.74162	93.11173*	1.12e-08*	3.603434*	9.708876	5.685565*

Reference: Eviews 10 program outputs.

2. Max value test: Since the calculated value of the maximum potential rate 89.58966 is greater than the critical value of 52.36261 at the level of 5%, which indicates the rejection of the null hypothesis that there is

Table 3: Johansen Test for common integration.

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE (s)	**Eigen Value**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.928280	245.6719	159.5297	0.0000
At most 1 *	0.773685	156.0822	125.6154	0.0002
At most 2 *	0.693422	105.5641	95.75366	0.0089
At most 3	0.568162	65.36644	69.81889	0.1076
At most 4	0.377055	36.81651	47.85613	0.3562
At most 5	0.287203	20.72439	29.79707	0.3751
At most 6	0.221079	9.213403	15.49471	0.3460
At most 7	0.020915	0.718638	3.841466	0.3966
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; ** MacKinnon-Haug-Michelis (1999) p-values.				

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE (s)	**Eigen Value**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.928280	89.58966	52.36261	0.0000
At most 1 *	0.773685	50.51809	46.23142	0.0164
At most 2 *	0.693422	40.19768	40.07757	0.0485
At most 3	0.568162	28.54993	33.87687	0.1893
At most 4	0.377055	16.09212	27.58434	0.6580
At most 5	0.287203	11.51099	21.13162	0.5963
At most 6	0.221079	8.494764	14.26460	0.3306
At most 7	0.020915	0.718638	3.841466	0.3966

Reference: Eviews 10 program outputs.

no vector for co-integration and can be said to have an equation for co-integration as well as for atmost 1 and atmost 2, as there are two other equations of common integration.

As for 3 atmost, 4 atmost, 5 atmost, 6 atmost, and 7 atmost, the calculated value of the maximum potential rate is smaller than the critical value at 5%, *i.e.*, no fourth vector is possible.

Determination the error correction model:

First: the short-term relationship: Table 4, shows the estimated model in the short term, which shows the effect of independent variables on the dependent variable. The table shows that the value of the (R-squared) was (0.83), meaning that 83% of the fluctuations in the dependent variable (rainy cultivated areas) caused by the changes included in the model And that (17%) of the fluctuations are due to variables not included in the model and absorbed by the random variable effect, and the statistical value of F (13.9) is significant at the level of (1%) shows the significance of the model as a whole. The values of the parameters of the variables were mostly identical to the economic logic and the actual reality, *i.e.*, the nature of agriculture in the rainy areas, As well as the size of the parameters as it was found that population

Table 4: The Relationship between rainy cultivated areas and explanatory variables in the short term.

D(LY)=C(1)*(LY(-1)+2.50230159603*LX1(-1)-1.14737393324*LX2(-1)-1.07287971291*LX3(-1)-2.62701643356*LX4(-1)+2.04856852202*LX5(-1)-2.00676747595*LX6(-1)+279.599543252*LX7(-1)+1.32645232928)+C(2)*D(LY(-1))+C(3)*D(LX1(-1))+C(4)*D(LX2(-1))+C(5)*D(LX3(-1))+C(6)*D(LX4(-1))+C(7)*D(LX5(-1))+C(8)*D(LX6(-1))+C(9)*D(LX7(-1))+C(10)

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	-0.332820	0.037969	-8.765694	0.0000
C(2)	0.197997	0.090148	2.196364	0.0380
C(3)	0.392784	0.210044	1.870009	0.0737
C(4)	-0.482185	0.152354	-.164891	0.0042
C(5)	-0.255759	0.071340	-3.585097	0.0015
C(6)	-0.257245	0.223003	-1.153550	0.2600
C(7)	1.718912	0.305861	5.619918	0.0000
C(8)	0.182199	0.134152	1.358151	1.1870
C(9)	53.70091	7.310158	7.346067	0.0000
C(10)	0.016110	0.090514	0.177988	0.8602

R-squared	0.839548	Mean dependent var	0.047445
Adjusted R-squared	0.779379	S.D. dependent var	0.970323
S.E. of regression	0.455764	Akaike info criterion	1.506246
Sum squared resid	4.985303	Schwarz criterion	1.955176
Log likelihood	-15.60618	Hannan-Quinn criter	1.659344
F-statistic	13-35307	Durbin-Watson stat	2.119086
Prob (F-statistic)	0.000000		

Reference: Eviews 10 program outputs.

growth was the most influential variables in the cultivated areas has passed the model economic tests of the second degree, which includes the test of the existence of the problem of self-correlation using the Breusch-Godfrey LM test (Lagrange polynomial) to detect the problem of self-correlation.

The results showed that C (1) error correction limit was (-0.332820) negative and significant at the level of 1% in the sense that the two conditions are met in the model, that the imbalance in the short term can be corrected less than a year in the long term.

Table 5: Diagnostic statistics of the estimated model during the study period.

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.192058	Prob. F(2,22)	0.3225
Obs*R-squared	3.324293	Prob. Chi-Square(2)	0.1897
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-Statistic	1.332438	Prob. F(16,17)	0.2814
Obs*R-squared	18.91610	Prob. Chi-Square(16)	0.2730
Scaled explained SS	6.261070	Prob. Chi-Square(16)	0.9850

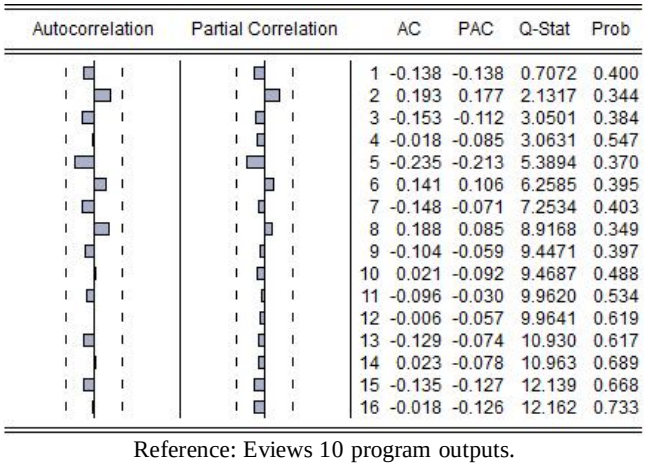
Reference: Eviews 10 program outputs.

While C (3) showed that the price of wheat has a positive and significant impact on the expansion of cultivated areas in the rainy areas, as the increase of the price of wheat by 1% leads to an increase of cultivated areas by (0.39%), which is logical as most of the cultivated areas in the rainy areas wheat is grown primarily for wheat, so wheat prices must influence expansion by increasing the area under cultivation.

As for C (4), which represents the amount of fertilizers, was significant and negative signal and is contrary to economic theory as the increase of the amount of fertilizer by 1% will lead to a decrease of areas by (-0.48%) they believe that by increasing the amount of fertilizer, crop yields will increase, so the signal is negative.

While the number of animals (cows) (C5) was significant and negative signal and is contrary to economic theory as the increase of the number of cows by 1% will lead to a decrease of areas by (0.25%), as there is an interaction between the agricultural activities themselves such as competition between animal production and plant production. Since the policies prepared by the concerned departments do not take into account the areas intended for animal production within the agricultural areas, but take the number of fields for animal husbandry and the emergence of a negative signal indicating this competition, that the increase in the number of animals will be expanded in the areas allocated for animal husbandry and thus will reduce the areas Agricultural land allocated to agricultural production to agricultural areas or allocated for agricultural consumption.

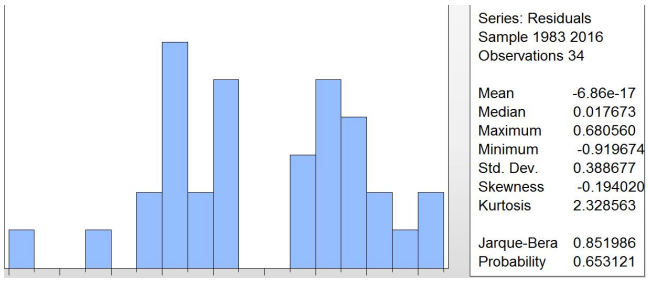
The results showed that the rainfall (C6) was not significant and negative signal and is contrary to economic theory as a decrease of 1% of rain will lead to the reduction of cultivated rainy areas by (-0.25%) as the rate of rainfall has become a factor that does not significantly affect the areas cultivation due to the dependence of farmers on irrigation systems in irrigated areas due to the scarcity of rainfall and fluctuation and the distribution of rain throughout the season was not positive to affect the growth of cultivated areas.



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.138	-0.138	0.7072	0.400
		2	0.193	0.177	2.1317	0.344
		3	-0.153	-0.112	3.0501	0.384
		4	-0.018	-0.085	3.0631	0.547
		5	-0.235	-0.213	5.3894	0.370
		6	0.141	0.106	6.2585	0.395
		7	-0.148	-0.071	7.2534	0.403
		8	0.188	0.085	8.9168	0.349
		9	-0.104	-0.059	9.4471	0.397
		10	0.021	-0.092	9.4687	0.488
		11	-0.096	-0.030	9.9620	0.534
		12	-0.006	-0.057	9.9641	0.619
		13	-0.129	-0.074	10.930	0.617
		14	0.023	-0.078	10.963	0.689
		15	-0.135	-0.127	12.139	0.668
		16	-0.018	-0.126	12.162	0.733

Reference: Eviews 10 program outputs.

Fig. 2: Autocorrelation function. The figure shows that all variables fall within the boundaries, this means there is no autocorrelation.



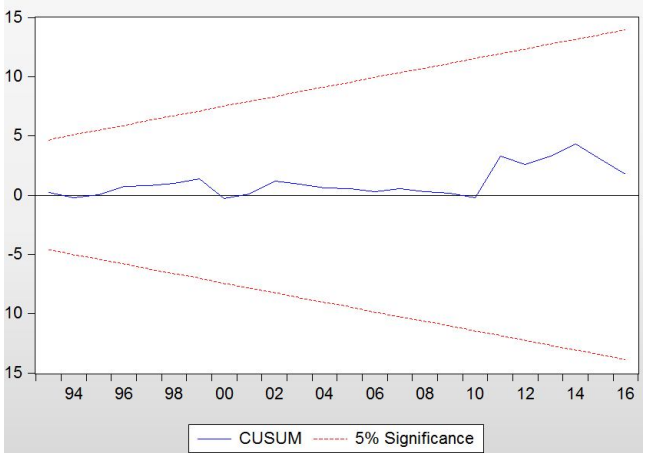
Reference: Eviews 10 program outputs.

Fig. 3: Test of the natural distribution of residues for the period (1980-2016).

In terms of the harvesting machines (C7), it was significant and with a positive signal and is identical to the economic theory. When the number of harvesting machines increases by 1%, the cultivated areas will increase by 1.71%. The provision of technology, including harvesting machines, encourages the expansion of cultivated areas. This factor also implicitly refers to government support through loans to purchase agricultural machinery. This support encourages the expansion of cultivated areas.

As for the investment spending (C8) the results showed that government subsidies had a positive but non-significant effect, which means that more support is needed for agriculture in the rainy areas.

Also in terms of population Growth (C9) the results showed that the population growth was significant and positive indication, which is in line with the economic theory. as the population growth increases by 1%, the cultivated areas will increase by (53.7%) which is a



Reference: by researcher according the Eviews10 program outputs.

Fig. 4: To test the suitability of the regression model.

significant effect, but it is produced with the reality of consumption of wheat crop and increased government support for this strategic crop in order to meet the growing need of people for this crop, which is related to food security and that more than 80% of the rainy areas cultivated wheat crop, therefore, in our view of the estimated parameters we refer to the explanation to this crop and in general the research concluded that population growth affects significantly the expansion of agricultural land more than the impact of other variables, due to the state policy in achieving food security and self-sufficiency. especially from the wheat crop, which is the staple food of the community when the population increases, government subsidies to wheat farmers and other strategic grain crops increase in the second degree, which encourages the expansion of cultivated areas. The effect of factors on the expansion of agricultural land varies according to the type of agricultural activity and irrigation method. The factors affecting the expansion of the rainy areas are somewhat different from the factors affecting the irrigated areas and this requires more scientific research to study this issue by region and type of agricultural production. The population growth should be taken into account in agricultural policies and the development of legislation and laws that limit the transformation of agricultural land to other uses.

Estimated Model Tests

In order to confirm the validity of the results obtained, some important tests should be conducted, including:

1. Partial correlation function:

2. Autocorrelation function:

3. Test the normal distribution of residues:

Since the Jarque-Bera probability value indicates acceptance of the null hypothesis due to the P-value is greater than 5%. This means that the residues are distributed naturally and that this is a good indicator of the quality of the estimated model.

Detection of self-correlation problem by LM test as well as test of Hetroscedasticity problem.

Table 5, indicates that the model has passed the standard tests (the test of the autocorrelation problem and the problem of hetroscedasticity problem. The (LM) test results showed a probability value of (0.1897), of which we can accept the null hypothesis that the model does not suffer from the problem of autocorrelation. It also showed that there is no problem of hetroscedasticity using a probability value of (0.2730) which is greater than 5% if the model does not suffer from the existence of the problem.

To test the suitability of the regression model (determining the validity of the model selection), the (Cusum test) was used as shown in fig. 4.

The appropriateness of the estimated model has been tested as shown in the figure and it is noted that all the values of the treatments were within confidence limits which means that the model used is good and appropriate.

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