An Economic Analysis of The Impact of Some Agricultural Economic Variables on Iraq's Agricultural Gross Domestics Production Using ccr Model (2008-2019)

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Abstract

The research aimed to determine the impact of some agricultural economic variables on agricultural domestic products. This relationship was estimated between agricultural loans and agricultural investment and the rate of agricultural capital accumulation as independent variables, and agricultural GDP as a dependent variable during the period 2008 - 2019 with quarterly data, so that the number of surveyed observations became 48 observations and using the legal canonical Cointegrating Regression (CCR), the results showed that there is a positive and very high impact for each of the variables of agricultural loans and capital accumulation while the agricultural investment variable was not significant despite its positive sign. The research recommended that agricultural lending should in-kind take the largest share of the loan while being the dominant one and that has tightened control over the destination of the agricultural loan and the guarantees of its repayment on time.

Keywords: Canonical, Method, Agricultural loans, ADF. Quarterly data.

1. Introduction

The agricultural sector needs substantial capital because the capital-to-output coefficient is high in its early stages, that is, the flexibility of its production system is weak. The material basis in agriculture is investment spending, which is a means of achieving capital accumulation, as well as the performance of agricultural government loans in raising agricultural production levels. There are economic verses related to the subject of the research, and among these studies, what is covered [1]. By analyzing the public investment in agricultural commercial machines in plant production in Iraq for the period 1980-2009, reaching results, the most important of which is that the automatic public investment is about 1202 million dinars for the duration of the research. The average annual growth rate for the value of plant output in Iraq was 12.48. The value of plant production in Iraq in 1980 was 1388 million dinars and rose to 3167 million dinars in 2009, as the researcher had done[2].

The Total Agricultural Investment Equation shows that this investment is increasing by 0.21%, 0.54%, 0.52%, an increase of 1% in both agricultural exports and GDP in the previous year and agricultural income in the previous year. Overall agricultural investment is declining by about 0.91% and 0.23%, with a 1% increase in the agricultural balance deficit and exchange rate. That is, the variables have an impact on gross agricultural investment in a given year, agricultural domestic product in the previous year, agricultural income value, and agricultural exports. It also studied [3] the impact of rural agricultural finance on raising the standard of living of small-scale peanut farmers in West Kordofan State, with results, most importantly, that rural agricultural finance increased rural household income, thus increasing the area under cultivation from the peanut crop, and also contributed to improving the standard of living of small-scale farmers in the study area. The researcher [4] study The impact of agricultural economic surplus on agricultural growth has also been studied in elected Arab countries with policies of liberalization and economic control. It has been concluded that the conditions of agriculture in considered Arab countries, whether liberalized or controlled, are close to a large part of self-sufficiency agriculture, as small and scattered farms reduce the calculated agricultural surplus. It also addressed [5,6,7,8] topics relevant to the topic of research. The importance of research comes from the role played by important economic indicators such as loans, investment, and agricultural capital accumulation as criteria for agricultural economic performance to detect their impact on agricultural domestic products. The research assumes that there has been a positive and moral impact on agricultural GDP for the duration of the study. The research problem is that agricultural investment, capital accumulation, and loans are among the most important pillars of agricultural development. Successful State policies depend on the size of these investments and the
composition or accumulation. The objective of the research was to determine the impact of some agricultural economic variables and using quarterly data on agricultural GDP.

2. Materials and Methods

2.1 Canonical Cointegrating Regression Estimator

It’s a scientific correction method discovered by the researcher PARK 1992, in which he explains that CCR shifts almost eliminate the homogeneity produced by long-term correlation of joint integration equation errors and random slopes. At the same time, the rounded bias resulting from the correlation between regression and random regression errors [9] is corrected. CCR-based estimates are therefore quite effective and have the same neutrality as FMOLS. The second-degree bias of OLS is removed, depending on the transformation of variables that remove this bias, and in which both dependent and independent variables are corrected. That is, it is developed by the FMOLS method in which the correction is only for the dependent variable [10]. The small squares method has the following model:

\[ Y_t = \beta_0 + \beta_1 x_t + \epsilon_t = \vartheta Z_t + \epsilon_t \]
\[ \Delta x_t = u_t \]

Where:

\[ t = 1, \ldots, T \]
\[ Z_t = (1, x_t) \]
\[ \vartheta = (\beta_0, \beta_1) \]
\[ n \times 1 \text{ Time series of dimensions } X_t, Y_t \]
\[ \nu_t = [\epsilon_t, u_t] \]

Long-term variation of \( v_t \) is:

\[ \Omega = \Sigma_o + \Pi + \Pi' \]

\( \Omega \): Contrast Matrix and Common Variation

\[ \Lambda = \sum_t + \Pi \]
\[ \Sigma_o = \lim_{T \to \infty} T^{-1} \sum_{t=1}^{T} E (\nu_t \nu_t') \]
\[ \Pi = \lim_{T \to \infty} T^{-1} \sum_{t=1}^{T} \sum_{t'=1}^{T} E (\nu_t \nu_{t+1}') \]

And I'm splitting my matrices together with my \( v_t \) and my agents:

\[ \Omega = \begin{pmatrix} w_{11} & w_{12} \\ w_{21} & w_{22} \end{pmatrix} \]
\[ \Lambda = \begin{pmatrix} \lambda_{11} & \lambda_{12} \\ \lambda_{21} & \lambda_{22} \end{pmatrix} = \begin{pmatrix} \lambda_1 \\ \lambda_2 \end{pmatrix} \]

To define CCR you must first modify \( Y_t, X_t \) and as:

\[ Y_t^* = Y_t - (\beta_0 \sum_o^{-1} + [0, \Omega_{22}^{-1}] \Delta_t) D_t \]
\[ Z_t^* = (1, x_t) \]
\[ X_t^* = X_t - \lambda_2 \sum_o^{-1} D_t \]
The CCR regression method is estimated as follows:

\[ \hat{\theta}_{CCR} \left( \sum_{i=1}^{T} Z_i^2 \right)^{-1} \left( \sum_{i=1}^{T} Z_i^2 Y_i \right) \]

Logarithmic distribution of this method:

\[ D(\theta_{CCR} - \theta) \rightarrow \left( \int_{0}^{1} w_{2(r)}w_{2(r)}^* d_r \right)^{-1} \int_{0}^{1} w_{2(r)}d w_{1,2(r)} \]

\[ w_{1,2} = w_{11} w_{22}^{-1} w_{21} \quad [11,12] \]

3. Result and Discussion

The research relied on the quantitative method of reaching its results using the canonical Cointegrating Regression (CCR) method mentioned above using the period (2008-2019) and quarterly to obtain more accurate results since these years have become a more solid database than before and are relatively stable except for 2014 and 2015 years. It can be argued that the use of quarterly data has expanded the time series, making them more sightings and eliminating some of the problems that may arise during the analysis, as much research has emphasized the need to increase the number of sightings, particularly in time-series data, which has been the practice of recent research. The model for the variables involved in the study could be formulated in general and as follows:

Y= Gross Agricultural Domestic Product (Dependent Variable) in IQD 1 million.

X1= Agricultural loans (IQD 1 million)

X2= Agricultural investment (IQD 1 million).

X3= Accumulation of agricultural capital (IQD 1 million).

Ui= Random error limit.

B’s= the parameters.

Before the econometric analysis of research variables, quarterly time series were drawn to obtain an overview of the changes in research during the duration of the research:

Figure 1. Chart showing the quarterly time trend of research variables.
Figure 1 shows that the years 2014 and 2015 were marked by a decline in the values of all research variables due to the security conditions to which the country was exposed and a large part of the agricultural area in the north and west was cut off from the contribution to agricultural GDP.

Y = There was growth in agricultural domestic products from the first quarter of 2008 until the fourth quarter of 2013, and the decline began to continue with the fourth quarter of 2016 when the rise began again.

X1 = Agricultural loans were affected by the agricultural initiative launched by the state at the end of 2008. From the chart, there was a rise that began from the first quarter of 2009 to continue until the fourth quarter of 2014, when they experienced a sharp decline in lending and then again from the first quarter of 2016.

X2 = Investment fluctuation over research years began in the third quarter of 2014, reaching its lowest level in the third quarter of 2016 and rising again.

X3 = Agricultural capital accumulation grew positively until 2014 as it began to decline continuously until the third quarter of 2016.

Before beginning the process of estimating the model of research, the stability of the time series of the variables involved in the research is first tested by testing the root of Unit Root TEST (and Table No. (1) Shows that the study variables are non-static in the first level but have stabilized after the first difference took them through the extended Dickey-Fuller test. (ADF) This means that there is potential for cointegration of variables.

Table 1. Grade inspection results for stability of time series of models.

| UNIT ROOT TEST RESULTS TABLE (ADF) | At Level | Y       | X1      | X2      | X3      |
|-----------------------------------|----------|---------|---------|---------|---------|
| Null Hypothesis: the variable has a unit root |          |         |         |         |         |
| With Constant                     | t-Statistic | -2.3841 | -2.3395 | -2.6377 | -2.3457 |
|                                   | Prob.     | 0.1523  | 0.1655  | 0.0947  | 0.1634  |
|                                   | n0        | n0      | *       | n0      |         |
| With Constant & Trend             | t-Statistic | -2.9732 | -2.6810 | -4.3482 | -2.7209 |
|                                   | Prob.     | 0.1518  | 0.2498  | 0.0074  | 0.2345  |
|                                   | n0        | n0      | ***     | n0      |         |
| Without Constant & Trend          | t-Statistic | -0.5809 | -0.2927 | -1.0233 | -0.7756 |
|                                   | Prob.     | 0.4594  | 0.5742  | 0.2695  | 0.3732  |
|                                   | n0        | n0      | n0      | n0      |         |
| At First Difference               | t-Statistic | -2.0935 | -2.3802 | -3.2704 | -1.7489 |
|                                   | Prob.     | 0.2482  | 0.1536  | 0.0244  | 0.3989  |
|                                   | n0        | n0      | **      | n0      |         |
| With Constant & Trend             | t-Statistic | -4.6995 | -5.7943 | -4.2204 | -2.9802 |
|                                   | Prob.     | 0.0033  | 0.0002  | 0.0108  | 0.1518  |
|                                   | ***       | ***     | **      | n0      |         |
| Without Constant & Trend          | t-Statistic | -2.1164 | -2.4230 | -2.5890 | -1.7255 |
|                                   | Prob.     | 0.0345  | 0.0166  | 0.0112  | 0.0799  |
|                                   | **        | **      | **      | *       |

Source: Prepare by the researcher using EVIEWS 9.5

As a result of the stability test and the realization of the first condition assuming the integration of the time series of the same degree, the long-term relationship between the variables will be revealed using the Johansson test, which shows us the value of Trace $\lambda$ and Maximum Eigenvalue under the following hypotheses:

$H_0: \lambda_1 = 0$  No Cointegration

$H_1: \lambda_1 \neq 0$  Cointegration

Table 2 shows that there are at least three cointegration vectors through the Trace and Maximum Eigenvalue tests below the 5% morale level, with values appearing high and below the 1% level indicating a stable linear combination of model variables.
Table 2. Test the impact and the great value of cointegration vectors.

| Hypothesized | No. of CE(s) | Eigenvalue | Statistic | Critical Value | Prob.** |
|--------------|--------------|------------|-----------|----------------|---------|
| None *       |              | 0.982567   | 320.7243  | 47.85613       | 0.0001  |
| At most 1 *  |              | 0.924877   | 146.5997  | 29.79707       | 0.0001  |
| At most 2 *  |              | 0.528838   | 35.28869  | 15.49471       | 0.0000  |
| At most 3    |              | 0.065846   | 2.928892  | 3.841466       | 0.0870  |

Unrestricted Cointegration Rank Test (Trace) 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

Table 3. Results of model assessment Canonical Cointegrating Regression (CCR).

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| X1       | 7.540149    | 2.569613   | 2.934352    | 0.0055|
| X2       | 0.495113    | 1.101348   | 0.449552    | 0.6555|
| X3       | 0.145811    | 0.031850   | 4.578062    | 0.0000|
| C        | 3987469.    | 748509.7   | 5.327211    | 0.0000|

R-squared 0.847411 Mean dependent var 10751868
Adjusted R-squared 0.835967 S.D. dependent var 4076727.
S.E. of regression 1651114. Sum squared resid 1.09E+14
Long-run variance 4.75E+12

Source: Prepare by the researcher using EVIEWS 9.5
Table 3 shows the value of the fixed limit with a positive signal of 3987469 dinars, representing the value of the dependent variable (agricultural GDP) quarterly when the independent variables in the model are zero. This value reflects the effect of the variables excluded from the model, and because agricultural GDP is influenced by a wide range of variables, including those that can be quantified and qualitatively measured, and that these broad variables come together to achieve agricultural GDP. This marker is positive and has a moral influence. There is also a very high positive and moral impact of the agricultural loan variable, which means more unity. This is because the agricultural sector in Iraq enjoys various forms of support and subsidies. This sector, as well as its plant and animal sectors, is supported in cash and kind by the delivery of seeds, fertilizers, and machines to farmers on the side of plant production and the provision of support for food and vaccines to workers in animal production. Any increase in loans would directly expand the production process and thus constitute a direct increase in agricultural domestic output, bearing in mind that such loans should be targeted in real terms. This would be achieved through tighter control of the execution of borrowed projects and also through knowledge of the rate of loan collection and other means.

The results also showed that capital accumulation increased by one unit. (million dinars) will increase agricultural domestic product by 0.145811 million dinars, which is the result of economic logic. Capital accumulation has been a catalyst in the pursuit of profit and the increase of agricultural output by investing financial assets to increase their initial monetary value as a financial return, as well as the formation of resources for reserves and insurance. Although the change in agricultural investment was positive, it was not moral. That is true. Agricultural investments during the study period played a little part because of the lack of transparency, the prevalence of administrative corruption, the growing bureaucracy, and the existence of many legal and administrative intersections. Another important reason is that there are large imbalances in allocations in Iraqi budgets in favor of operational expenditures at the expense of investment expenditures.

The research concluded, The granting of loans enables banks to contribute to economic activity, create employment and increase purchasing power, which in turn helps to expand the exploitation of economic resources and increase agricultural output and thus its reflection in improving the standard of living of farmers. Also, Capital accumulation has been a catalyst in the pursuit of profit and agricultural output through the investment of financial assets with a view to increasing their initial monetary value as a financial return, as well as the formation of resources for reserves and insurance. In addition, To establish the hypothesis of research into the positive relationship between variables and that loans and capital accumulation were significant, except for investment, owing to lack of transparency, widespread administrative corruption, growing bureaucracy, the existence of many legal and administrative intersections and large imbalances in allocations in Iraqi budgets in favor of operational expenditures at the expense of investment expenditures. Based on the above conclusions research recommends that the agricultural lending policy be adjusted and that in-kind agricultural lending take the largest share of the loan, i.e., prevailing. Also, there should be a legal environment that contributes to capital formation by creating investment projects through public-private cooperation. Finally, a transparent agricultural economic policy to create an attractive investment environment for domestic and foreign investment and to develop the Investment Act No. 13 of 2006 amending.

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