MEASUREMENT AND INTERPRETATION OF THE ROLE OF SOME MACROECONOMIC VARIABLES IN AGRICULTURAL PERFORMANCE IN SELECTED ARAB COUNTRIES FOR THE PERIOD 1990-2020

Ramya Amer Khalil Al Allaf[1,*] and Eman Mustafa Rashad[2]

[1]Dept. of Agricultural Economics, College of Agriculture and Forestry, University of Mosul, **Iraq.**
[2]Dept. of Economics, College of Administration and Economics, University of Mosul, **Iraq.**

[*]**Corresponding author:** ramiaalalaf83@uomosul.edu.iq   **Received:** 15 April 2022 **; Accepted:** 1 June 2022

ABSTRACT: The agricultural sector in most of the developing countries is one of the most vital sectors except for oil, as it contributes to providing the most fundamental needs of individuals, foremost of which is food, as well as employing 40% of the total population. However, the performance of the aforementioned sector does not meet the performance of the agricultural sectors in the developed countries as it can not cover the needs of the population, as the reason for this is that it is subject to the effects of a number of macroeconomic variables, namely the values of agricultural exports and imports, cash supply, foreign exchange and Government revenues and expenditures, as the independent variables in the standard models, which were used for estimation. So, a number of Arab countries were that include (Iraq, Egypt, Jordan, Morocco and Tunisia). The study was pivoted on the hypothesis that macroeconomic variables contribute to a varying levels to the performance of the agricultural sector represented by the agricultural growth and the contribution of agriculture to the gross domestic product, the rate of agricultural exposure and agricultural productivity as the dependent variables. 2020 and data of Panel Data type and Eviews_12 software and its tests were used in this study. A set of conclusions were drawn, the most important of which were the economic policies adopted with varying roles, but they are not ideal for the performance of the sector mentioned above. The researchers recommend reorganizing the structure of economic policies and enhancing agricultural awareness programs in the sample countries in the direction that achieves the largest possible amount of agricultural production for them.

Key words: Agricultural development, agricultural investment, Macroeconomic Variables.

INTRODUCTION

The agricultural sector in most of the developing countries is one of the most important economic sectors in terms of its contribution to the gross local production and the employment of 40% of the total labor force. Therefore, agriculture is considered one of the most vital sectors that contribute to the achievement of economic development and raising the populations standard of living of. The importance of the mentioned sector, but it is witnessing a clear decline in the productivity rates of its economic resources, which led to the widening of the food gap in these countries. This was accompanied by a decrease in its annual growth rates because it was affected by a number of financial, monetary and trade policies. This was accompanied by a growth in population rates in the

countries in question to be 3% annually, which exceeds their counterparts of developed countries, as well as the correlation of the performance of the agricultural sector in developing and developed countries with the efficiency of the performance of macroeconomic variables. In this respect, a number of international organizations, including the organization (Bretton & Woods) of great importance for these variables in terms of their relationship to the performance of the agricultural sector, which pivots on the ideas of the neo-classical school that forced many of these countries to implement a package of economic reform programs and this means that this type of program is concerned with the issue of imbalance between economic policies and the performance of the agricultural sector in terms of the growth rate, the contribution to the GDP, the commercial exposure and agricultural

productivity. In this regard, many developing countries have sought the reconfiguration their agricultural environment by implementing a package of economic reform programs and attracting foreign direct investing companies so as to accomplish the highest possible efficiency in the agricultural performance and reorganizing of the macroeconomic variables that aim at achieving a balance in terms of the agricultural activity, primarily the trade balance.

Research problem

The agricultural sector in most of the developing countries is one of the major productive sectors rather than the oil industry. Therefore, the study of performance indicators of this sector is necessary to identify the changes that take place due to the change in many development plans in these countries and the variation of the impact of development on their growth and their agricultural activities development according to the nature of production and the degree of development achieved by the agricultural sector. Many governments adopted certain to policies to raise the performance efficiency of their agricultural sectors, but the inefficient use of these policies created a disorder in this sector performance of the productive elements that reflected its effects on the growth rates and its contribution to the gross domestic product, agricultural exposure and agricultural productivity. Usually, this sector is not affected by these changes only, but also by the policies that influence the macroeconomic environment. So, oscillation in the performance occur due to encountering various crises that lead to instability and a decline in its growth rates, which were reflected negatively in the process of economic and agricultural development in these countries.

Research importance

The importance of the research is manifested in the importance of the agricultural sector as it provides food products necessary for human survival and supplying foreign currencies via the exports or decreasing the agricultural imports and the achievement of local food security, which is witnessing an increasing demand over time due to the high rates of population growth in the developing countries besides its contribution to provide the necessary funds to finance industrial sector investments, especially in the early stages of economic development, providing the industrial sector with raw materials, as they represent inputs into the industrial production process, in addition to being a market for products from the non-agricultural sectors in which about 40% of the total workforce have jobs, indicated that the inability of the agricultural sector to provide food products is not only an obstacle to economic growth, but rather an obstacle to its political stability, as the food crisis

has developed in these countries and reached a critical situation in which they depend on foreign sources to feed their population with high prices and the reason behind this is the incompetent performance of its macroeconomic policies represented by the financial, monetary and trade policies that were reflected on the agricultural performance indicators, especially in terms of the growth rates and its contribution to the gross domestic product and the commercial exposure and agricultural productivity.

Objective of the research

Macroeconomic variables are considered as one of the most important means by which the performance efficiency of the agricultural sector is measured in developing countries because they study the way to achieve a balanced level in the agricultural sector. So, the current research aims at investigating the effect of a number of macroeconomic variables on the agricultural sector performance for a number of developing countries in the following fields:

1- The growth rate of agricultural output.

2- Contribution of agricultural output to GDP

3- Ratio of agricultural commercial exposure.

4- Agricultural productivity.

Hypothesis of the research

Many international economic organizations have paid great attention to macro variables and their effect on the agricultural performance indicators in developing countries. Therefore, our study pivots on the hypothesis that macroeconomic variables contribute with varying effects on the performance of the agricultural sector in developing countries according to their economic structures and the efficiency of their systems in dealing with the economic policies that created these variables.

Research methodology

First - the research relied in its methodology on the method of linking two directions

1- A descriptive approach that relies on the theoretical studies.

2- Quantitative approach that is based on the econometric methods, and then interpreting the results of the quantitative method to evaluate the practical aspect of the study.

Secondly, a number of Arab countries have been selected, including: (Iraq, Egypt, Jordan, Morocco and Tunisia), As for the reason for choosing these countries, it is due to the following:

1- They are agricultural countries

2- The high contribution of their agricultural product to their GDP

3- They hIt has come a long way in liberalization and commercial openness

4- It provides the necessary data about it, which is a reason for choosing it as a sample for our study.

Duration

Our study included a time series of 31 years from 1990-2020. As for the motivations for choosing this period, it is due to the following:

1- The scarcity of theoretical and applied studies that studied this subject during the mentioned period, which was as an incentive to adopt it with the aim of adding what is new to the subject on one hand and comparing the results that were reached with the results of previous studies on the other.

2- The aforementioned period of time enables us to obtain economic results with high statistical significance.

3- The period stands for different intellectual trends among economists about the role in which macro variables affect the performance of the agricultural sector and development programs in developing countries.

4- The clarity of the effect of macroeconomic variables on the of the agricultural sector performance in developing countries, especially after these countries joined the World Trade Organization, which led to results with varying influence to the performance of their agricultural sector.

Reference presentation and contemporary studies of the effect of macroeconomic variables on agricultural performance

Macroeconomic variables are regarded as one of the most important means by which a balanced level of income is achieved through the performance of the agricultural sector and to identify the changes that occur and the growth rates and the problems encountered with time. In this respect there were several theoretical and practical studies that tackled this subject, including the studies conducted by The World Bank and International Fund Organizations and other organizations, which were interested in manifesting the effect of these variables on the efficiency of the agricultural sector performance as it plays an important role. This is clear through its role in distributing resources between sectors with the aim of increasing their economic efficiency and the effect on the income levels and its redistribution it. Despite the limited number of studies in accordance with the time sequence, the researchers focused on them to analyze and discuss the problem of the research.

In **2018**, **Alimat and Batayneh**, in their study on the impact of agricultural exports and trade openness on agricultural growth, that Jordan witnessed a great trade openness after the economic liberalization in the mid-nineties, so this study aimed at measuring the impact of agricultural exports on agricultural growth. As for the importance of research, it emerged from the importance of the agricultural exports sector in Jordan is an influential sector in the agricultural development process through its role in supplying the hard currencies needed to increase the values of investment allocations for the sectors of the national economy in the Kingdom, opening new markets for national products and increasing the efficiency of agricultural production. In the practical aspect of this study, it was found that agricultural exports contribute to raising the rate of agricultural growth, but it is still unable to cover the values of imports, especially of strategic crops. The study also showed the important role of agricultural external trade in achieving the intellectual and cultural development of the developing countries through the development of their agricultural projects and the export sector in them. This contributed successfully to make Jordan join the International Trade Organization, which raised competitive ability of its agricultural products, which are characterized with a relative advantage. The researchers recommended that agricultural policy makers should pay attention to developing the agricultural projects, establishing free zones for agricultural production, providing export services and enacting laws that attract the foreign direct investment companies that have the ability to increase the agricultural output and this has an important impact on raising the growth rate of agricultural output in Jordan (**Alimat and Batayneh, 2018, 361 - 371**). In **2019**, a study showed **Setshedi and Mosikari** on the impact of some macroeconomic variables on the performance of the agricultural sector in South Africa for the period 1981-2017, in which they explained the role of the agricultural sector in economic development, providing job opportunities, achieving food security and enhancing the welfare of individuals, but the agricultural sector in it is still traditional and with limited productivity. So, the study aimed at estimating and analyzing the impact of a number of macroeconomic variables on agricultural productivity, including government support, foreign exchange rate, interest rate, and government spending. From the results of the quantitative analysis, the positive and significant role of the government sending was evident in addition to the role of the exchange rate and interest rate on the agricultural productivity and the researchers considered that these variables have a very important role in bringing about the growth and agricultural development in South Africa. The researchers recommended that is essential to increase the

government spending towards agricultural investment endeavoring to develop a stable exchange rate policy in order to provide an appropriate climate for foreign and local investors to employ their money and companies in developing the agricultural sector performance (**Setshedi and Mosikari, 2019,3-15**). Moreoer, in **2020**, the results of study of **Onakoya and Alyande**, about the economy variables effect on the performance of the agricultural sector in Nigeria 1980-2017, showed that agricultural economy is the main source that constitutes the national income items due to the variety and diversity of the agricultural products exports as agriculture represents 65% of the local product, more than 80% of the exports and 50% of the government revenues. Moreover, it represents 70% of the laborforce. But the government attention to this sector decreased since the seventies of the past century because the government oriented to the oil sector, which witnessed elevated prices in the seventies. Yet, the shocks inflicted to the oil sector and the international decline in oil prices motivated the agricultural policy makers to heed to this sector. So, the study focused on identifying the effect of some economic variables including the exchange rate, interest rate, inflation level and commercial exposure on the agricultural growth. Results showed that the exchange rate and the agricultural exports have a positive impact of the growth of the agricultural product, while the variables of the interest rate and the labor force had non-positive impact and the inflation had no effect on the growth.

The researchers explained that the returns of agricultural exports were 25% of the total returns of the agricultural sector during the period 2018-2019. So, the agricultural sector was superior over the oil sector, as its contribution was 8.6% of the GDP during the same period. The most important recommendations of the researchers included: the necessity of paying more attention to the monetary, financial and trade policies to enhance agricultural production, as well as increasing the values of investment allocations of agricultural products to be exported in an attempt to transform the Nigerian economy from a source of raw materials into exporting agricultural products, which plays an important role in raising the rate of agricultural growth. **Onakoya and Alyande (2020, 69 - 86)** and in **2021**, they clarified both **Okafor and Isibor** in their study on the development of the agricultural sector in Nigeria, which is the main sector in terms of provision food and raw materials for manufacturing and investment in increasing government revenues and agricultural export returns and employing about 75% of the labor force in Nigeria, in addition to providing local and international markets for agricultural producers. The study aimed at identifying the effect of some macroeconomic variables like exchange rate and inflation on the productivity of the unit area during the period 1986-2020. Results of the quantitative side demonstrated that the fluctuations in exchange rates of Nigeria's currency make the owners of investment and agricultural trade companies refrain from investing and working because exchange rate fluctuations increased The prices of imported inputs to the extent that they are unable to compete in foreign markets. As for the most important recommendations of researchers, it is the need for central banks to follow a policy that influences the rate of inflation exchange rates to raise the productivity of the unit area and its agricultural growth rate (**Okafor and Isibor, 2021,9-20**).

It is clear from reviewing the previous studies that most of them were descriptive studies that dealt with the subject within the framework of the concepts of modern economic theory and Quantitative economics theory, but what distinguishes our study is that it studied the subject in its descriptive form, as well as it dealt with it in a quantitative standard method by measuring and interpreting the impact of a number of macroeconomic variables on the agricultural performance.

MATERIALS AND METHODS

Description of the standard models used for estimation

First: Dependent variables: A number of dependent variables have been used as the variables that represent agricultural performance in the sample countries, which are:

Y_1= **Agricultural output growth rate**

Y_2= **Contribution of agricultural output to GDP**

Y_3= **Agricultural economic exposure rate**

Y_4= **agricultural productivity**

Second: The independent variables: The macroeconomic variables are one of the most important means by which the efficiency of the performance of the economic sectors is measured, including the agricultural sector, because it is concerned with studying how to reach a state of balance in this sector. The independent variables included in the standard models and used in the estimation are:

X_1= Value of agricultural exports in billions of dollars

X_2= Value of agricultural imports in billions of dollars

X_3= foreign exchange rate in dollars

X_4= Broad cash supply in billions of dollars

X_5= Government revenue in billions of dollars

X_6= Government expenditures in billions of dollars

The results of the quantitative analysis of the effects of macroeconomic variables on agricultural performance in the sample countries for the period 1990-2020

1- The impact of macroeconomic variables on the growth rate of agricultural output

In order to estimate the effect of macroeconomic variables on the growth rate of agricultural output, several estimation formulas were tested, and the semi-logarithmic formula in the fixed effects model (FEM) gave the best results:

$Y_1 = 0.300 - 0.029 Log X_1 - 0.074 Log X_2 - 0.232 Log X_3 - 0.985 Log X_4$

$t^* = (6.782) - (0.876) - (1.263) - (4.306) - (5.214)$

$+ 0.286 Log X_5 - 0.273 Log X_6$

$(4.121) - (4.397)$

$\overline{R^2} = 0.29$ $F = 7.350$ $DW = 2.031$

The explanatory power of the estimated model indicates that 29% of the changes in the growth rate of agricultural output Y_1 in the Arab countries, the study sample is explained by changes in the foreign exchange rate X_3, money supply X_4, government revenues X_5 and government expenditures X_6. The rest of the variables of the estimated model did not show statistical significance as they didn't pass the statistical tests, and the estimation results showed that the calculated F value exceeded the value of its tabular counterpart when the level of significance is 1%, which indicates the significance of the assumed linear relationship between the dependent variable and the independent variables. The calculated DW value showed that there was no autocorrelation between the values of the random variables and there was no problem of multiple linear intercorrelation between the values of the independent variables according to Klein's test.

The value of elasticity foreign exchange rate[(*)] X_3 was 0.734 and the negative sign of this variable parameter was in agreement with the concepts of the economic theory and its interpretation; that decreasing the exchange rate (raising the value of the currency) means decreasing the prices of imported agricultural commodities in the local currency. So, the imported inputs of agricultural production increases and this reflects its impact on raising the growth rate of agricultural output. The flexibility of cash supply was X_4 with a value of 0.311 and the negative sign of this variable parameter means that the increase in the money supply contributes to raising the inflation rates and this is a non-positive effect on the growth rate of

agricultural output because it leads to an increase in the production costs, especially in the sectors producing strategic crops like grains, in addition to its role in decreasing the competitiveness of the exports of the mentioned countries in the external markets. The flexibility of government revenue values X_5 was 0.905 and the positive sign for the parameter of this variable agreed with the concepts of economic theory, in this respect study confirmed the positive effect of revenues on elevating the growth rate of agricultural output in terms of its contribution to the provision of capital goods and high-yielding production inputs that contribute to increasing the amount of agricultural output and raising its growth rates. This was achieved by relying on the state revenues, especially in the early stages of its agricultural development. The value of the flexibility of government expenditures X_6 was 0.863 and the negative sign of the variable parameter contradicts with the concepts of the economic theory. This is explained in that the countries in question allocate a great deal of their expenditures to the development of their industrial sectors on the grounds that they are the means that achieve the economic development, in addition to that, their internal conditions make them allocate the bulk of their expenditures towards Its military sectors at the expense of neglecting the agricultural sector, which justifies the mentioned relationship between the two variables **(Ogunlesi, 2018, 1-20)**. The significance of the agricultural export values variable X_1 did not appear to affect the dependent variable and this is due to the inability of the agricultural commodities exported to compete with their counterparts in the global market in terms of quality and price, in addition to the fact that these countries focus on exporting surpluses and do not abide by agreements In the field of this type of export, this means getting rid of certain commodities for a foreign importer not on the basis of the possibility of continuing to deal with it due to the lack of agricultural products allocated for export **(Al-Rasoul, 2015, 521-537)**. The variable of agricultural imports X_2 was not significant in terms of affecting the rate of agricultural growth and the reason for this is that the rate of international trade is often not in the interest of the economies of the sample countries and this made the costs of importing agricultural products high especially for production goods. This is one of the non-positive results produced by macroeconomic policies (The policy of economic globalization) in the performance of the developing agricultural sector **(Al-Hayali, 2013, 113)**, The positive sign of the constant parameter and its significance indicates that the agricultural sectors in the countries of in question are experiencing a certain amount of growth in the case of the stability of the values of the parameters of the estimated model. Results of DW test showed that there is no autocorrelation between the values of random variables **(Al-Sefo, 1988, 274)**.

[(*)] The elasticities of the semi-logarithmic functions are calculated in the following way: $ep = \frac{\beta i}{\overline{Y}}$

2- The effect of the macroeconomic variables on the contribution of agricultural production to the gross domestic product

In order to estimate the effect of macroeconomic variables on the contribution ratio mentioned before, the semi-logarithmic formula in the fixed effects model (FEM) showed the following results:

$$Y_2 = -0.964 - 0.0009X_1 - 0.017X_2 - 0.004X_3 - 0.002X_4 + 0.0002X_5 - 0.0004X_6$$

$$t^* = -(15.98) - (0.086) - (2.265) - (1.978) - (3.348) (0.831) - (1.136)$$

$$\overline{R^2} = 0.81 \qquad F = 66,809 \qquad DW = 0.169$$

The value of agricultural import elasticity X_2 was 0.101 and the explanation negative sign for the parameter of this variable is found in the absence of economic links between the agricultural import sector and the rest of the other sectors that makes up the structure of the agricultural economy in the countries under discussion and that resulted in the existence of double economies in which the agricultural sector was neglected at the expense of the rest of the other sectors with short-term returns. This will prevent this type of import from contributing in stimulating its growth and agricultural contribution to GDP (**Gilani, 2015, 2222 - 2855**). The elasticity of the foreign exchange rate X_3 was 0.023 and the negative sign of this variable parameter is in agreement with the concepts of the economic theory, which stipulates that decreasing the local currency exchange rate for the research sample countries (increasing the value of local currency) leads to a decrease in the prices of imported agricultural commodities in local currencies. So, the imported quantities of inputs of production factors and investment goods that contribute to increasing the agricultural growth rate and thus increasing its contribution to the GDP (**Al-Taee, 2021, 139**). The elasticity of money supply X_4 value was 0.011. The negative sign of this variable parameter are interpreted in that the decrease of cash supply results in the decrease of the relative prices of the local produces compared to their counterparts in the market and this encourages the neighboring countries to import them and the returns of in the foreign currency contribute to increasing the agricultural investment, which in turn, increases the general average and contribution. This result is in conformity with the results of the study conducted by (**Mashinini et al., 2019, 94-99**). The values of agricultural exports X_1 were not significant due to the lack of this type of imports in addition to the opportunities available for competition in the international markets (**Divanbeigi and Saliola, 2016, 1-22**). the variable general revenues X_5 were

not significant in their effect on the dependent variable. This is because the highest portion of these revenues are allocated to developing the short-run sectors, especially the industrial sector as they are more beneficial and contribute more in accomplishing the economic development compare to the agricultural one (**Akpan et al., 2015, 77-93**). The values of public expenditures X_6 showed no significance in terms of affecting the dependent variable. This is because the economic policy makers in the countries of the sample refrain from increasing the expenditure in the agricultural sector due to the long agricultural cycle and the risk and uncertainty conditions, which make spending related to risk. So, the decision makers tend to expanding the spending scope to the sectors that have returns in the short-run on the expense of the agricultural sector and this makes this variable weak in affecting the increase of the agriculture contribution to the GDP. The significance of the constant indicates that there is a portion of contribution from the macreconomic variables in the GDP even when the variables of the estimated model are constant. Results of D-W test showed that there is a positive autocorrelation between the values of the random variables. As long as the estimated model is not used for future forecasts, the result of this test will not have effect on the estimated results (**Ghazal, 2003, 145-146**).

3- The impact of macroeconomic variables on agricultural economic exposure

In order to estimate the effect of macroeconomic variables on the rate of agricultural economic exposure, the double logarithmic formula was in the fixed model (FEM) gave the best result, as follows:

$$\text{Log}Y_3 = 0.050 + 0.076\text{Log}X_1 + 0.0125\text{Log}X_2 - 0.024\text{Log}X + 0.448\text{Log}X_4$$

$$t^* = (2.065) \quad (3.143) \quad (3.196) - (0.660) \quad (3.725)$$

$$- 0.094\text{Log}X_5 + 0.265\text{Log}X_6$$

$$- (2,493) \quad (4,700)$$

$$\overline{R^2} = 0.96 \qquad F = 39.788 \qquad DW = 2.287$$

The elasticity of [*] (*) the values of agricultural exports X_1 was 0.076, and the positive sign for the parameter of this variable is in agreement with the concepts of economic theory and the economies of the sample countries, which endeavored to expand their agricultural projects and provided them great support to market their products, especially the strategic ones. This resulted

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[*] Elasticities in the logarithmic functions are calculated as follows: ep=β$_i$

in the likelihood of their access to global markets. The economic openness to the outside and integration with globalization and removal of restrictions to the movement of foreign trade in contributed in achieving the above purpose (**Yahya, 2018, 193**). The elasticity of values of agricultural import X2 was 0.012. The positive sign of this variable parameter is in conformity with the concepts of economic theory. The reason is that these countries are often net importers of most types of agricultural products due to the insufficiency of their local products. This contributed to the spread of economic globalization policies that stimulated rapid growth and the removal of barriers and customs restrictions that face the movement of foreign trade, which resulted in the contribution of this type of imports in increasing the rate of agricultural economic exposure (**Mohamed, 2017, 562 - 545**). The elasticity of cash supply reached X$_4$ was 0.448 and the positive sign of the parameter of this variable is in agreement with the concepts of economic theory, which states that increasing the cash supply is one of the most vital means in expanding the scope of agricultural activities by increasing the values of investment allocations, which leads to an increase in their production capacities. Thus, this reflects its effect on increasing the import of inputs and export of products, which leads to an increase in agricultural economic exposure rates. (**Salim and Ahmed, 2019, 66-73**). The elasticity of government revenue values X$_5$ was 0.094 and the negative sign for the parameter of this variable contradicted with the concepts of economic theory on the basis that these revenues cause a number of disorders in allocating the economic resources, in addition to the fact that sample countries are not able to use them soundly, which prevented their contribution to raising the agricultural exposure in certain countries (**Santos and Ceccacci, 2015, 1 - 94**). The elasticity of the values of public expenditures X$_6$ was 0.265. The positive sign for the parameter of this variable is in conformity with the concepts of economic theory and the results of studies conducted by IMF experts in the Middle East and North Africa, which stated that increasing public expenditures means increasing the returns that are obtained by the state from its various sources on which it depends in determining its expenses. Therefore, the increase in these expenditures makes the sample countries allocate a portion of them to the development of their agricultural sectors, especially the countries that are interested in this sector. This, in turn, leads to a high rate of agricultural exposure abroad (**Akpan *et al.*, 2015, 77 -93**). The foreign exchange rate variable X$_3$ was not significant because the exchange rates of the currencies of the sample countries did not witness

significant changes during the research period and so had no significance in terms of influencing the dependent variable. The constant significance indicates the presence of an agricultural economic exposure even in the case of the stability of the rest of the variables of the estimated model. The DW test results showed that calculated d* value is in the critical region and this doesn't mean that there is an autocorrelation between the values of the random variables and it is considered economically acceptable.

4- The effect of macroeconomic variables on agricultural productivity

In order to estimate the effect of macroeconomic variables on the unit area productivity for the sample countries, the estimation results showed that the double logarithmic formula gave the best results in the fixed effects model (FEM) as follows:

$$LogY_4 = 0.447 - 0.044LogX_1 + 0.186LogX_2 + 0.204LogX_3 + 0.092LogX_4$$

$$t^* = \quad (7.730) - \quad (1.028) \quad (2.983) \quad (3.340) \quad (0.343)$$

$$+ 0.106LogX_5 - 0.041LogX_6$$

$$(1.448) - (0.389)$$

$$\overline{R^2} = 0.97 \quad F = 54.815 \quad DW = 0.779$$

The elasticity of agricultural import values X$_2$ was 0.186. The positive sign of this variable parameter was in agreement with the concepts of economic theory, which confirms that agricultural imports provide a large part of the production inputs and intermediate goods necessary to raise productivity and achieve agricultural growth, as well as a means of transferring knowledge and scientific ideas that are indispensable to increase the agricultural productivity (**Abbabah, 2019, 30-42**). Foreign exchange elasticity X$_3$ was 0.204 and the positive sign for the parameter of this variable means that when the exchange rates of the sample countries rise, the prices of their agricultural products become cheap in foreign markets, so the quantities required of them increase and the values of their exports rise. This leads to an increase in the revenue of these countries in hard currencies that leads to stimulating the investment in the agricultural sector, especially one of the crops with export prospects and that is considered an incentive for farmers to increase agricultural productivity in order to obtain more foreign revenues (**Al-Kutachi, 2011, 84**). The variable agricultural exports X$_1$ values of was not significant because the exports of the sample countries are characterized by being the

primary products, so the trade balance of this type of exports is low to the extent that its effect on agricultural productivity does not appear. This result is in agreement with the study of (**Shombe, 2008, 25**). The variable cash supply X_4 was not significant and the reason behind that is the high risk and uncertainty in the developing agriculture and the reluctance of many investors to invest their money in the agricultural sector and this will be accompanied by the transfer of many workers to other sectors that bring quick returns and more guarantees than the agricultural sector and that made this variable ineffective to agricultural productivity (**Dlamini *et al.*, 2019, 97 - 98**). The public revenue variable X_5 was not significant in terms of its effect on the agricultural productivity and the reason behind that is the huge amounts of fixed capital needed by the agricultural sector. This is accompanied by an increase in the average risk of the investment as well as the small-sized and multiplicity of the agricultural properties in which the public revenues don't appear in the agricultural productivity. So, this made the agricultural policy

makers in the sample countries refrain from employing the public revenues in the agricultural sector compared to the rest of sectors (**Akpan *et al.*, 2015, 122**). The public expenditures variable values X_6 was not significant in terms of affecting the agricultural productivity and this explains the same effect of the values of public revenues in the sample countries. The significance of the constant indicates a certain amount of increase in agricultural productivity in the when the effect of the remaining variables of the estimated model is stable. The results of the D-W test showed that the calculated d* value is located in the critical region, and this result does not mean that there is autocorrelation between the values of the random variables and it is considered economically acceptable. The results of the quantitative analysis can explain the effects of macroeconomic variables on the variables of the agricultural performance of the Arab countries in question for the period 1990-2020, as shown in the following table.

Schedule 1. The results of the quantitative analysis of the impact of macroeconomic variables on the performance of the agricultural sector in the Arab countries for the period 1990-2020

Variable type	Xi	X_1	X_2	X_3	X_4	X_5	X_6	Model type	Function type
Agricultural growth rate $Y_1=$ $\overline{R^2} = 0.29$ F = 7.350 DW = 2.031	β_i	0.029 -	-0.074	-0.232	-0.985	0.286	-0.273	Fixed Effects Model (FEM)	semi-logarithmic
	t*		-0.876	-1.263	-4.306	-5.214	4.121	-4.397		
Contribution of agricultural output to GDP=Y_2 $\overline{R^2} = 0.81$ F = 66,809 DW = 0.169	β_i	0.0009-	-0.017	-0.004	-0.002	0.0002	-0.0004	Fixed Effects Model (FEM)	semi-logarithmic
	t*	-0.086	-2.265	-1.978	-3.348	0.831	-1.136		
Agricultural economic exposure rate $Y_3 =$ $\overline{R^2} = 0.96$ F = 39.788 DW=2.287	β_i	0.076	0.125	-0.024	0.448	-0.094	0.265	Fixed Effects Model FEM)	double logarithmic
	t*	3.143	3.196	-0.660	3.725	-2.493	4.700		
Agricultural productivity $Y_4 =$ $\overline{R^2} = 0.97$ F = 54.815 DW = 0.779	β_i	0.044-	0.186	0.204	0.092	0.106	-0.041	Fixed Effects Model (FEM)	double logarithmic
	t*	-1.028	2.983	3.340	0.343	1.448	-0.389		

Source: Prepared by the researcher based on the results of the quantitative analysis of the effect of macroeconomic variables on the performance of the agricultural sector in the Arab countries for the period 1990-2020

CONCLUSIONS

1- The agricultural sector is in the Arab countries is one of the most important sectors, rather than the oil sector, as it contributes to achieving economic development and about 40% of the

population job opportunities. Despite this importance, this sector suffers deterioration and the lack of its investment allocations, which resulted in the emergence of non-positive results in its performance.

2- The agricultural status in most of the countries of the world undergo backwardness of production systems, which made it depend on external sources to feed the populations and this is reflected through its impact on the increasing burdens of its balance of payments and the low performance of agricultural sectors.

3- The cash supply is one of the strongest independent variables that has a negative impact on the agricultural growth rate in the Arab countries, followed by government revenues variable with a positive impact, then government spending and the exchange rate with a negative impact.

4- Agricultural imports are one of the strongest independent variables and they have a negative impact on agricultural contribution, followed by cash supply and exchange rate in the Arab countries.

SUGGESTIONS

1- Developing the agricultural sector in the researched countries through attracting foreign direct investing companies, providing financial assistances, providing encouraging privileges and incentives for the producers as this contributes to the support the production of various types of agricultural crops because the sample countries possess the appropriate agricultural environment and climate necessary for good agriculture to make them good competitors of their counterparts in the developed countries.

2- Developing the agricultural sector by increasing the values of their investment allocations to enhance its infrastructure, especially in the areas of irrigation, land reclamation and the development of labor-intensive agricultural industries in a way that leads to meet the need for local consumption and at the same time providing a surplus for export and thus limiting foreign imports.

3- Adopting a balanced monetary policy that contributes to raising the efficiency of the performance of the agricultural sectors in the sample countries by directing capital expenditures towards productive agricultural activities to minimize inflation and to regulate price increases and this is considered the main objective of the policy mentioned above.

4- Adopting an effective policy for agricultural imports that endeavors to meet the demand in times of scarcity of local production and seeking to increase the agricultural production in a way that accomplishes self-sufficiency and reduces the imported quantities.

REFERENCES

Abbabah, A. (2019). The impact of agricultural exports on the agricultural output in Algeria during the period 2000–2016, Journal of Economics and Sustainable Development, Volume 1, No. 2.

Akpan, S. B.; Samuel, J. U. and Inimfon, P. (2015). Roles of macroeconomic variables on Agricultural diversification in Nigeria, American Journal of economics and business Administration 7 (2).

Al-Hayali, A. I. M. (2013). The reality of strategic grain trade in some developing countries in light of the negative effect of globalization, An M. Sc. thesis, College of Agriculture and Forestry, University of Mosul.

Alimat, M. A. and Batayneh, I. (2018). "The Effect of Agricultural Exports and Trade Openness on The Agricultural Growth in Jordan", Privad International Journal of Economics and Business, Volume 4, No. 3.

Al-Kutachi, E. T. N. (2011). The status of agricultural exports in some developing countries in light of the negative effect of the World Trade Organization (a comparative study) for the period 1980–2010, A master Thesis, College of Agriculture and Forestry, University of Mosul.

Al-Rasoul, A. A.; Mahmoud, A. S.; Sameh, M. H. S.; Amna, A. and Al-Sayyed, H. (2015). The Role played by Agricultural Exports in Agricultural Economic Growth in Egypt: (Econometrics Study), Alexandria Journal for Scientific Exchange, Vol. 36, No. 4.

Al-Sefo, W. I. (1988). Introduction to Econometrics, Directorate of Dar Al-Kutub for Printing and Publication, Ibn Al-Atheer Street, Mosul.

Al-Taee, M. L. Y. (2021). The status of inflation in the Iraqi economy and its effect on the agricultural growth for the period 1990-2018, A Master thesis, College of Agriculture and Forestry, University of Mosul.

Divanbeigi, R. and Saliola, F. (2016). Regulation the transformation of Agriculture, http://www.fao.org

Dlamini, S.; Nashinin, M. S. and Dlamini, D. V. (2019). The effects of monetary policy on agricultural output in E swat ion, international Journal of Economics and financial research, Vol.5, Issue.5

Ghazal, Q. N. (2003). The effect of globalization on selected developing countries, A Ph.D. thesis, College of Administration and Economics, University of Mosul.

Gilani, S. W. (2015). The Impact of agricultural imports and exports on agricultural productivity,

Journal of economics and sustainable development, Vol. 6, No.11.

Mashinini, M. S.; Sotja, G. D. and Dlamini, D. V. (2019). The effects of monetary policy on agricultural in Swatting, international Journal of Economic and financial Research, Vol.5, Issue. 5.

Mohamed, M. A. (2017). The effect of Exchange Rate Change on the Total and Agricultural Foreign Trade in Egypt, Menoufeyya Journal of Agricultural and Social Economics, Volume 2 October.

Ogunlesi, A. (2018). Agricultural productivity fiscal and trade policies nexus in sub – Saharan Africa: A panel structural vector error correction Mode analysis, MPRA Paper No, 90202, Dalhousie University Canada, https://mpra.ub.uni-muenchen.de/90202

Okafor, O. and Isibor, A. (2021). Macroeconomic variable and Nigerian agricultural sector development, British Journal of management and marketing studies, 4(4).

Onakoya, A. B. and Alyande H. A. (2020). "Macroeconomic variables, The oil and the agricultural sectors in Nigeria, Asian social science, Vol. 16, No.1; 69 - 86.

Salim, Y. A. and Ahmed, A. F. (2019). Impact of monetary policy on domestic agricultural product in Iraq for the period 1990–2014, Iraqi Journal of agricultural sciences 50 (2).

Santos, N. and Ceccacci, I. (2015). Egypt Jordan, Morocco and Tunisia Key trends in the a grifood sector, united nations, Rome.

Setshedi, T.J. and Mosikari (2019). Empirical Analysis of macro-economic variables towards agricul-tural productivity in South Africa. Ltal-ian Review of Agricultural Economics 74(2).

Shombe, N. H. (2008). Causality relationships between total exports with agricultural and manufacturing GDP in Tanzania, IDE Discussion paper No. 136, institute of developing economics, on the websitehttp://doi.org/10.20651.

Yahya, M. T. (2018). Measurement and Interpretation of the Impact of Macroeconomic Variables on the Exports of Selected Developing Countries for the period 2000–2005, PhD thesis, Institute of Arab Research and Studies, Cairo.

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