Journal of Agricultural Economics and Social Sciences

Journal homepage & Available online at: www.jaess.ekb.eg

Performance Indicators of Agricultural Investment Policies in Egypt

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ABSTRACT

The research aims to study the current situation of agricultural investments in Egypt during the study period (99/2000-2018/2019). Also, identifying the efficiency of agricultural investments. Annual data covering the period 2000-2019 was used to measure the efficiency of agricultural investments in Egypt. The research also conducts econometric model to determine the actual relationship between the various economic factors that make up the economic structure of society, namely investment, income and consumption. The results reveal that inefficiency of investments in the agricultural public sector according to the criteria of investment rate, return on investment, and Endothelial coefficient, while it is noted that there is efficiency in agricultural investments in the private sector. Finally there is statistically significant positive relationship between the average of investment per capita(y) and the average of agricultural income per capita, the average of short-term agricultural loans per capita and the average per capita of agricultural exports in one year lagged (xs variables), where those (xs) changing by 1 L.E would result in statistically significant increasing of agricultural investment per capita by L.E 1.35, 1.5 and 2.6 respectively, while there is statistically significant negative relationship between the average of investment per capita(y), and the real interest rate, where this (x) changing by 1 L.E would result in statistically significant decreasing in agricultural investment per capita by L.E 2.95.

Keywords: Investments- efficiency – Policies- Investment Performance

INTRODUCTION

Investments are one of the main tools of the economic and social development plan; the success of economic and social development policies depends on several factors, including the volume of investments and the efficiency of their distribution in different areas and effective use of those investments.

The agricultural sector is one of the most important sectors of the Egyptian national economy; The agricultural sector cannot play its role in development without the availability of an appropriate amount of investments, as agricultural investments amounted EGP 29.1 billioni, contributing about 4.4% of the total investments in 2020/2021. as it is one of the most important means for implementing agricultural development programs, which in turn helps to increase production capacities; Hence the increase in the rates of capital formation and the contribution of the agricultural sector in the gross domestic product.

Justifications and research problem

The problem include the lack of investments directed to the agricultural sector and their incompatibility with the contribution of the agricultural sector to economic and social life, which led to a decrease in the quantity of agricultural exports, as well as a decrease in agricultural development rates and thus a decrease in the ability of the agricultural sector to increase rates of self-sufficiency in agricultural products. In addition to the suffering of the Egyptian economy from the local resource gap, which can be covered through external sources of financing, whether through foreign loans, grants and aid, or through foreign direct investment.

Objectives

The research aims to study the current situation and development of agricultural investments during the study period (99/2000-2018/2019). Also, identifying the efficiency of agricultural investments in Egypt and measuring them by the following: investment rate, Endothelial coefficient, investment multiplier, and return on investment.

Data and measurement procedures

The research depends on secondary data published by Ministry of Planning and Economic Development (PoED), the Central Agency for Public Mobilization and Statistics (CAPMAS), the National Bank of Egypt (NBE), Ministry of Agriculture and Land Reclamation (MALR), in addition to a number of research papers, theses, studies and scientific books relevant to the research subject.

Annual data covering the period 2000-2019 was used to measure the efficiency of agricultural investments in Egypt. The research also conducts econometric model to identify the most important factors affecting the average per capita of agricultural investment.

Methodology and model specification

In the following part, some criteria and indicators that can be used to determine the efficiency of agricultural investments in Egypt during the study period for the agricultural sector are as follows:

- Investment Rate = *INV÷GDP* (The higher the value of the index, the lower investments efficiency)

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DOI: 10.21608/jaess.2022.176501.1120

- $R_{INV} = GDP \div INV$ (The higher the value of the index, the higher investments efficiency)
- $Inv_{multiplier} = \Delta GDP \div \Delta INV$ (The higher the value of the index, the higher investments efficiency)
- $S_{coeff.} = ((INV_{AGR}/INV_{TOTal}) \div (GDP_{AGR}/(GDP_{Total}))$. (The higher the value of the index, the lower investments efficiency)

A model has also been designed to determine the actual relationship between the various economic factors that make up the economic structure of society, namely investment, income and consumption it consists of 4 equations as follows:

$$1\text{-}\ Inc_t = F(Con_{t-1}, Inv_t, IF_t, MLo_t, EX_{t-1})$$

Where:

Inc_t: Agricultural income per capita in LE of year t over the period (2000-2019).

Con_{t-1} : Agricultural consumption per capita in LE in lag one year t-1 over the period (2000-2019).

Inv_t: Agricultural investment per capita in LE of year t over the period (2000-2019).

IF_t : Inflation rate of year t over the period (2000-2019).

MLo_t : Per capita of medium-term agricultural loans in LE of year t over the period (2000-2019).

EX_{t-1} : per capita of agricultural exports in LE in lag one year t-1 over the period (2000-2019).

$$2\text{-}\ Con_t = F(Inv_t, Inc_t, S_t, IF_t, LD_t, SLo_t, EX_{t-1}, TAX_t)$$

Where:

Con_t : Agricultural consumption per capita in LE of year t over the period (2000-2019).

Inc_t: Agricultural income per capita in LE of year t over the period (2000-2019).

IF_t : Inflation rate of year t over the period (2000-2019).

LD_t : Local debit Per capita. in LE of year t over the period (2000-2019).

SLo_t : Short-term agricultural loans Per capita in LE of year t over the period (2000-2019).

EX_{t-1} : Agricultural exports per capita in LE in lag one year t-1 over the period (2000-2019).

TAX_t : Income taxes per capita in LE of year t over the period (2000-2019).

$$3\text{-}\ Inv_t = F(Inc_t, Con_t, S_t, R_t, SLo_t, EX_{t-1})$$

Where:

Inv_t: Agricultural investment per capita in LE of year t over the period (2000-2019).

Inc_t: Agricultural income per capita in LE of year t over the period (2000-2019).

R_t : Real interest rate of year t over the period (2000-2019).

SLo_t : Short-term agricultural loans Per capita in LE of year t over the period (2000-2019).

EX_{t-1} : Agricultural exports per capita in LE in lag one year t-1 over the period (2000-2019).

$$4\text{-}\ Inv_t = Inc_t - Con_t$$

The model consists of structural equations that measure the direct effect of the explanatory variable on the dependent variable, while the reduction equations measure the total direct and indirect effect of the specified variables on the internal variables. From the description of the model it noted that the equations of the model are over-defined, so the best method for estimating in this case is the two-stage least squares method (2SLS), where this method gives a more efficient results.

RESULTS AND DISCUSSIONS

Empirical Results

Egyptian Agricultural Investment Efficiency

Table 1 presents criteria of Egyptian agricultural investments, it can be noted that inefficiency in the investments of the agricultural public sector this is because the agricultural public sector received investments that exceeded the agricultural GDP generated from it.. While there is efficiency in both the investments of agricultural private sector this is because the generated GDP exceeds the investments directed to this sector, and total investment rate of the agricultural sector.

The results presented in table 1 reveal that inefficiency in the return on agricultural public sector investment (this has been explained previously), while there is efficiency in both the return on agricultural private sector investment and the return on total agricultural sector investment.

Table 1. The Rate and Return of Public and Private Agricultural Investment in Egypt over the period (2000-2019).

Indicator	Agricultural Investment Rate			Return on Agricultural Investment		
	Private Sector	Public Sector	Total	Private Sector	Public Sector	Total
Value	0.04	52.21	0.07	29.96	0.04	18.01

Source: The National of Egypt NBE.
- Ministry of Planning and Economic Development (PoED)

Table 2 reveals there is efficiency in both the investments of agricultural private sector, and total investment of the agricultural sector (according to Investment multiplier) This is because the sector achieved a greater GDP than the increase in investment directed to this sector, while there is inefficiency in the investments of the agricultural public sector this is because the sector achieves GDP less than the increase in investment directed to this sector. Also, there is efficiency in both the investments of agricultural private sector, and total investment of the agricultural sector which indicates that agricultural sector achieved GDP greater than the investments it obtained (according to Endothelial coefficient), while there is inefficiency in the investments of the agricultural public sector, which indicates that the agricultural sector has received investments that exceed the value of the GDP generated from it.

Table 2. Investment multiplier and Endothelial coefficient of Agricultural sector in Egypt over the period (2000-2019).

Indicator	Agricultural Investment multiplier			Agricultural Endothelial coefficient		
	Private Sector	Public Sector	Total	Private Sector	Public Sector	Total
Value	37.5	0.10	27.55	0.14	23.15	0.13

Source: The National of Egypt NBE.
- Ministry of Planning and Economic Development (PoED)

Agricultural Investment performance Indicators

Table 3 reviewed the performance indicators of agricultural investments and it was found that agricultural investments had a positive impact on the performance of agricultural investments, represented by an increase in the real agricultural investments per capita, as well as the agricultural investment per feddan(area unite), as well as the ratio of total agricultural investments to real national investments, and finally, an increase in the coverage rate of agricultural savings to agricultural investment, but they had a negative impact on the decrease in the profitability of the unit of money invested in agriculture.

Table 3. Agricultural investment performance indicators in Egypt over the period (2000-2019).

Indicator	Profitability of a unit of money invested in agriculture	real agricultural investments per capita	agricultural investment per feddan	coverage rate of Agricultural savings to agricultural investment	Ratio of agricultural investments to real national investments
Value	12.6	256.3	916.5	82.5	6.83

Source: The National of Egypt NBE.
- Ministry of Planning and Economic Development (PoED)

Model estimation results

The first stage is to estimate structural equations for each of the income, consumption and investment functions, while second stage (reduction formula) is to substituting the estimated values of the independent variable that is an internal variable in the model for the internal variable in the behavioral equation.

Structural equations model

Results of applying multiple regression analysis of determinants per capita of agricultural income presented in Table 4 reveal that is a direct relationship consistent with the economic theory between the average per capita of agricultural income (y variable), and the average per capita of agricultural consumption in one year lagged, the average per capita of agricultural investment, the average per capita of medium-term agricultural loans and the average per capita agricultural exports in one year lagged(x's variables), where those changing by 1 L.E would result in statistically significant increasing per capita of agricultural income by L.E 1.21, 0.67, 0.54 and 0.32 respectively.

Table 4. Structural equations of Income, Consumption and Investment functions.

	Equation	R^2	F
Income	$85.1+ 1.21\ Con_{t-1} + 0.67\ Inv_t -1.6\ IF_t + 0.54\ MLo_t + 0.32EX_{t-1}$ (2.5)* (3.2)** (-1.9) (4.3)** (2.61)*	0.77	16.2
Consumption	$157.2 + 0.47\ Inc_t – 3.24\ IF_t – 1.2\ LD_t + 2.14\ SLo_t + 0.68EX_{t-1}$ (3.2)** (-2.47)* (-2.53)* (3.24)** (3.41)** $- 0.24\ TaX_t$ (-1.9)	0.85	22.3
Investment	$124.0+0.25Inc_t -5.3R_t + 0.72SLo_t + 0.21EX_{t-1}$ (3.2)** (-2.8)** (4.62)** (2.06)	0.89	25.1

**** at 0.01 level of significance. * at 0.01 level of significance.**
Source: Estimated equations of the simultaneous model based on:
- Central Agency for Public Mobilization and Statistics (CAPMAS).
- Ministry of Planning and Economic Development (PoED).

Turning to agricultural consumption, results presented in Table 4 reveal that there is statistically significant positive relationship between the average per capita of agricultural consumption (y variable), and the average per capita of agricultural income, the average per capita of short-term agricultural loans and the average per capita agricultural exports in one year lagged(xs variables), where those (xs) changing by 1 L.E would result in statistically significant increasing in agricultural consumption per capita by L.E 0.47, 2.14 and 0.68 respectively, while there is statistically significant negative relationship between the average per capita of agricultural consumption (y variable), and the annual Inflation rate, local debit per capita (xs variables), where those (xs) changing by 1 L.E would result in statistically significant decreasing per capita of agricultural consumption by L.E 3.24 and 1.2 respectively. According to the results presented in Table 4 It turns out that there is statistically significant positive relationship between the average of investment per capita(y) and the average of agricultural income per capita, the average of short-term agricultural loans per capita and the average per capita of agricultural exports in one year lagged (xs variables), where those (xs) changing by 1 L.E would result in statistically significant increasing of agricultural investment per capita by L.E 0.25, 0.72 and 0.36 respectively, while there is statistically significant negative relationship between the average of investment per capita(y), and the real interest rate, where this (x) changing by 1 L.E would result in statistically significant decreasing in agricultural investment per capita by L.E 5.3.

Reduced equations model

Table 5 presents reduced equations model. It can be noted that is statistically significant positive relationship between the average per capita of agricultural income (y variable), and the average per capita of agricultural consumption in one year lagged, the average per capita of agricultural investment, the average per capita of medium-term agricultural loans and the average per capita agricultural exports in one year lagged(x's variables), where those changing by 1 L.E would result in statistically significant increasing per capita of agricultural income by L.E 0.78, 2.3, 1.3 and 1.5 respectively, while there is statistically significant negative relationship between the average per capita of agricultural income (y variable), and the annual Inflation rate, where this (x) changing by 1 L.E would result in statistically significant decreasing in the average per capita of agricultural income by L.E 2.5.

Table 5. Reduced equations model of Income, Consumption and Investment.

	Equation	R^2	F
Income	$123.2+ 0.78\ Con_{t-1} + 2.3\ Inv_t – 2.5\ IF_t + 1.3\ MLo_t + 1.5EX_{t-1}$ (3.2)** (2.4)* (3.14)** (4.2)** (2.9)**	0.81	66.2
Consumption	$52.3 + 0.75\ Inc_t – 4.25\ IF_t – 0.97\ LD_t + 3.58\ SLo_t + 1.39EX_{t-1}$ (2.91)** (-3.9)** (-2.6)* (5.03)** (1.9) $- 1.3\ TaX_t$ (-3.8)**	0.86	33.2
Investment	$92.2+1.35\ Inc_t -2.95\ R_t + 1.5\ SLo_t + 2.6\ EX_{t-1}$ (4.3)** (3.5)** (6.1)** (4.7)**	0.91	36.1

**** at 0.01 level of significance. * at 0.05 level of significance.**
Source: Estimated equations of the simultaneous model based on:
- Central Agency for Public Mobilization and Statistics (CAPMAS).
- Ministry of Planning and Economic Development (PoED).

It is clear from Table 5 that the average per capita of agricultural income, the average per capita of short-term agricultural loans and the average per capita of agricultural exports in one year lagged(x's variables), where those (xs) changing by 1 L.E would result in statistically significant increasing per capita of agricultural consumption by L.E 0.75, 3.58 and 1.39 respectively, while there is statistically significant negative relationship between the average per capita of agricultural consumption (y variable), and the annual Inflation rate, local debit per capita and the average Income taxes per capita (xs variables), where those (xs) changing by 1 L.E would result in statistically significant decreasing per capita of agricultural consumption by L.E 4.25, 0.97 and 1.3 respectively.

The estimation results presented in Table 5 reveals that there is statistically significant positive relationship between the average of investment per capita(y) and the average of agricultural income per capita, the average of short-term agricultural loans per capita and the average per capita of agricultural exports in one year lagged (xs variables), where those (xs) changing by 1 L.E would result in statistically significant increasing of agricultural investment per capita by L.E 1.35, 1.5 and 2.6 respectively, while there is statistically significant negative relationship between the average of investment per capita(y), and the real interest rate, where this (x) changing by 1 L.E would result in statistically significant decreasing in agricultural investment per capita by L.E 2.95.

According to achieved results, the research offers the following recommendations:

- Encourage agricultural investment by reducing the interest rate and taxes; to encourage investors to invest in agricultural projects.
- Pay attention to increase the efficiency of agricultural investments; through the most appropriate distribution of those investments in the various fields of the Egyptian agricultural sector.
- Encouraging the private sector to invest in the agricultural sector, and increasing the public sector investments in important infrastructure and service projects, leading to lower costs and encouraging investment in the Egyptian agricultural sector.

CONCLUSION

It can conclude the inefficiency of investments in the agricultural public sector according to the criteria of investment rate, return on investment, and Endothelial coefficient, while it is noted that there is efficiency in agricultural investments in the private sector.

Also it can be concluded that agricultural investments had a positive impact on the performance of agricultural investments, represented in increasing the share of the agricultural worker, real agricultural investments per feddan, as well as the ratio of private agricultural investments to private national investments, and finally increasing the coverage rate of agricultural savings to agricultural investment. On the other hand it had a negative impact on the decrease in the profitability of the unit of money invested in agriculture.

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مؤشرات أداء السياسات الاستثمارية الزراعية فى مصر

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الملخص

يهدف البحث إلى دراسة الوضع الراهن وتطور الاستثمارات الزراعية خلال فترة الدراسة (99 / 2000-2018 / 2019). كذلك تحديد كفاءة الاستثمارات الزراعية في مصر. تم استخدام البيانات السنوية التي تغطي الفترة 2000-2019 لقياس كفاءة الاستثمارات الزراعية في مصر. تم استخدام نموذج اقتصادي قياسي لتحديد العلاقة بين العوامل الاقتصادية المختلفة التي تتكون منها البنية الاقتصادية للمجتمع وهي الاستثمار والدخل والاستهلاك. وتكشف النتائج عن عدم كفاءة الاستثمارات في القطاع الزراعي العام وفق معايير معدل الاستثمار والعائد على الاستثمار ومعامل التوطن، فيما يلاحظ وجود كفاءة في الاستثمارات الزراعية في القطاع الخاص. كما تبين أن للاستثمارات الزراعية أثر إيجابي على أداء الاستثمارات الزراعية تتمثل في زيادة نصيب العامل الزراعي، ونصيب الفدان من الاستثمارات الزراعية الحقيقية، ونسبة الاستثمارات الزراعية إلى الاستثمارات القومية الحقيقية، وزيادة معدل تغطية الادخار الزراعى للاستثمار الزراعي. وأخيراً، توجد علاقة طردية ذات دلالة إحصائية بين نصيب الفرد من الاستثمار الزراعى وبين نصيب الفرد من كل من الدخل الزراعي، والقروض الزراعية قصيرة الأجل، والصادرات الزراعية حيث أن التغير بمقدار 1 جنيها يؤدي إلى زيادة ذات دلالة إحصائية في نصيب الفرد من الاستثمار الزراعي بمقدار 1.35، 1.5 ، 2.6 جنيهاً على التوالي. فى حين توجد علاقة عكسية ذات دلالة إحصائية بين نصيب الفرد من الاستثمار الزراعى وسعر الفائدة حيث أن التغير بمقدار 1 جنيها يؤدي إلى انخفاض ذات دلالة إحصائية في نصيب الفرد من الاستثمار الزراعي بمقدار 2.95 جنيه. ويوصى البحث بتشجيع القطاع الخاص على الاستثمار في القطاع الزراعي وفقا لكفاءة الاستثمارات الزراعية في القطاع الخاص وفقا لنتائج البحث من خلال برامج تحفيزية (خفض أسعار الفائدة والضرائب).

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