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مؤشرات الأداء للزراعة المصرية فى المدى الطويل

محمد بدير العراقى ثناء النوبى احمد سليم صفية محمد أمين حبيشى*
قسم الاقتصاد الزراعى، كلية الزراعة، جامعة عين شمس

المستخلص

يتناول البحث بالتحليل أداء الزراعة المصرية خلال الفترة 1961-2021. وقد شهد العقد 1991-2000 أعلى معدلات النمو السنوي في الانتاج النباتى والإنتاج الحيواني والانتاج السمكى وبالتالي في إجمالي الإنتاج الزراعي. بالإضافة إلى ذلك، شهد عقد التسعينيات أكبر معدل نمو سنوي في الأراضي الزراعية بمعدل 2.2%. ويعادل ذلك زيادة في الأراضي الزراعية بمقدار 1.56 مليون فدان خلال 10 سنوات. بينما تحققت أقل معدلات للنمو فى الفترات 1970-1980 و 2011-2021 .

ولقد تم تقدير دالة الانتاج الزراعى المصرى خلال الفترة 1981-2021 و اختبار فرض العائد الثابت للسعة حيث تبين أن دالة الإنتاج الكلي للزراعة المصرية متفقة مع فرض العائد الثابت للسعة. وتقدر الدراسة مرونة الإنتاج بالنسبة للأراضي الزراعية بنحو 0.575 كما توصلت الدراسة إلى أن التقدم التقني مسؤول عن 46.2 % من النمو فى الإنتاج الزراعي خلال الفترة 1981-2021 في حين أن الأراضي الزراعية مسؤولة فقط عن 22.2% من النمو فى نفس الفترة. أى ان التقدم التكنولوجى هو المسبب الرئيسى للتقدم فى الزراعة المصرية ولذلك فإن تبنى تقنيات جديدة والتحسين المستمر في أساليب الإنتاج أمر ضروري للتوسع المستقبلي فى الانتاج الزراعى من أجل التغلب على صعوبة التوسع فى الموارد الطبيعية وبوجه خاص موارد الأراض والمياه.

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الباحث المسئول: صفية محمد امين حبيشي
البريد الالكترونى :safyam.a.hebaishy@gmail.com

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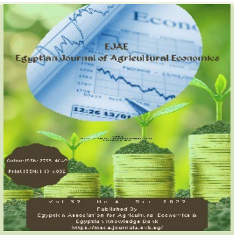

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Long-Run Performance Indicators of Egyptian Agriculture

Mohamed B. El-Eraky Thanaa E. A. Seleim Safya M. A. Hebaishy*
Department of Agricultural Economics, Faculty of Agricultural, Ain Shams University

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ABSTRACT

The study examines the performance of Egyptian agriculture during the period1961-2021. It is evident that the decade of 1991-2000 witnessed the peak of annual growth in crop production, animal production and aquaculture production and consequently in total agricultural production. The 1990s saw the largest rate of growth in agricultural land where a total increase of 1.56 million feddans was observed. In contrast, the least rates of annual growth coincided with the periods of 1971-1980 and 2011-2021.

The study reveals that the aggregate production function for Egyptian agriculture is agreeable with constant returns to scale. The production elasticity with respect to arable land is 0.575. The study concludes that technical progress is responsible for 46.2% of the growth in agricultural production while arable land is responsible for only 22.2 percent of growth during the period 1981-2021. Therefore, adoption of new technologies and constant improvements in the methods of production are necessary for future expansion of Egyptian agriculture in order to overcome the difficulty of expanding land and water resources

Corresponding Author: Safya Mohamed Amin Hebaishy
Email: **safyam.a.hebaishy@gmail.com**

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Introduction:

This research is concerned with the analysis of Egypt's agricultural production during the period 1961-2021. This long period has witnessed major political and economic changes in the country. The political system ranged from central planning and socialist orientation under President Nasser to liberal economic orientation under subsequent political systems. But starting from early 2011 the country went through a period of political instability following the January 2011 revolution and the rule of Muslim Brothers.

The study examines the performance indicators for Egyptian agriculture in general and for aggregate production in particular during the long time period of 1961-2021. Special attention is devoted to the rates of annual growth of the main components of agricultural production and of the main factors of production. In addition, the research attempts to estimate an aggregate production function for Egyptian agriculture and test the validity of the hypothesis of constant returns to scale. The relative importance of different factors underpinning the growth of the agricultural sector is estimated. Finally, the study concludes with policy implications and recommendations.

The Problem Statement:

The studies that shed light on the long-run performance of Egyptian agriculture are rather limited in the agricultural economics literature. It is of special interest to access the long –run performance of the agricultural sector under different political and economic regimes. For example, how the growth of the agricultural sector is affected by political instability and by the changing economic policies in the last sixty years. The study will attempt to shed some light on the performance indicators of Egyptian agriculture during this long time period.

Data and Methodology:

The study depends primarily on date from the US Department of Agriculture, Economic Research Service, and International Productivity Database. In turn the USDA data are mostly generated from the database of the U.N. Food and Agriculture Organization. The main time series covered in this study include the following variables.

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- Output: Gross value of agricultural production, $1000 at constant 2015 prices.
- Crop Output: Gross value of crop commodities, $1000 at constant 2015 farm gate prices.
- Animal Output: Gross value of animal and insect products, $1000 at constant 2015 farm gate prices.
- Aquaculture Output: Gross value of aquaculture products, $1000 at constant 2015 farm gate prices.
- Labor: Numbers of economically active adults (male and female) primarily employed in agriculture, 1000 persons
- Machinery: Metric horsepower (1000 CV) of farm machinery in use includes (tractors, harvester- threshers, milking machines, water pumps).
- Agricultural Land: 1000 hectares of arable land plus land in permanent crops.
- Animals: Farm inventories of livestock and poultry, measured in 1000s of standard livestock units.
- Capital: Value of agricultural capital stock, $million, constant 2015 prices.

The study calculated the average annual rates of growth for each variable using logarithmic time trend models. To calculate the annual rate of growth for any variable, say Z, we estimate the trend equation $\ln Z = \alpha + \beta \text{ Time}$. The estimate of β would be the annual growth rate of Z in the specified time period. The calculations are carried out for each decade in the time period 1961-2021. The aggregate production function for Egyptian agriculture is estimated in two forms. The first form is the unrestricted Cobb-Douglas function. The second form is the production function after imposing and testing the validity of the restriction of constant returns to scale.

Total Agricultural Production:

Total agricultural production is composed of three main components; namely crop production, animal production and aquaculture production. The gross values of agricultural production with its components are depicted in figure 1. The values are in constant US dollar prices of 2015 in order to adjust for inflation and fluctuations in the exchange rates. Figure 1 show that values of agricultural production were growing steadily during the study period 1961-2021. But the pace of growth has been fluctuating from one period to another. Table 1 indicates that the rate of annual

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growth for total agricultural production was at its peak during the decade of the 1990s; 4.6 %. And it was at its lowest level during the period 2011-2021; 1.2%.

Generally speaking, the rates of annual growth in animal and aquaculture production are higher than their counterparts for crop production except for the decade of 1971-1980. The decade of 1991-2000 witnessed the highest rates of annual growth in crop production, animal production and aquaculture production and consequently in total agricultural production. The rates of annual growth for the 1990s were 4.5 %, 3.8 %, 20 % and 4.6 % for crop production, animal production, aquaculture production and total agricultural production respectively.

The lowest rates of annual rates of growth of crop production, animal production and total production coincided with the period of 2011-2021. The rates of annual growth for this period were 0.65 %, 0.59 % and 1.2 % for crop production, animal production and total production respectively. The period of 2011-2021 witnessed the January 25, 2011 revolution and the subsequent political instability. The second lowest rate of annual growth in total agricultural production was 1.9 % for the period 1971-1980. This period witnessed the eruption of the 1973 war and the diversion of economic resources to war efforts.

The lowest rate of annual growth for aquaculture production was observed for the period 1961-1970. This period showed very little interest in aquaculture as the country relied more on wild fisheries. In contrast major strides in the aquaculture sector have been realized in the 1980s and the 1990s. Now aquaculture provides Egypt with about 80 percent of its total fish production.

As figure (1) illustrates the gap between the value of total agricultural production and the value of crop production is widening over time due to the increased importance of animal and aquaculture production. The value of crop production as a percentage of the value of total agricultural production fell from 76.7 percent during the period 1961-1970 to 66 percent for the period 2011-2021.

With regards to animal production, the largest rate of annual growth was achieved in the 1990s while the lowest rate is recorded for the period 2011-2021. But for the whole period of 1961-2021 the growth rate of animal production superseded the growth rate of crop production. Of course, the growth of the aquaculture sector is far faster than the growth of crop and animal sectors.

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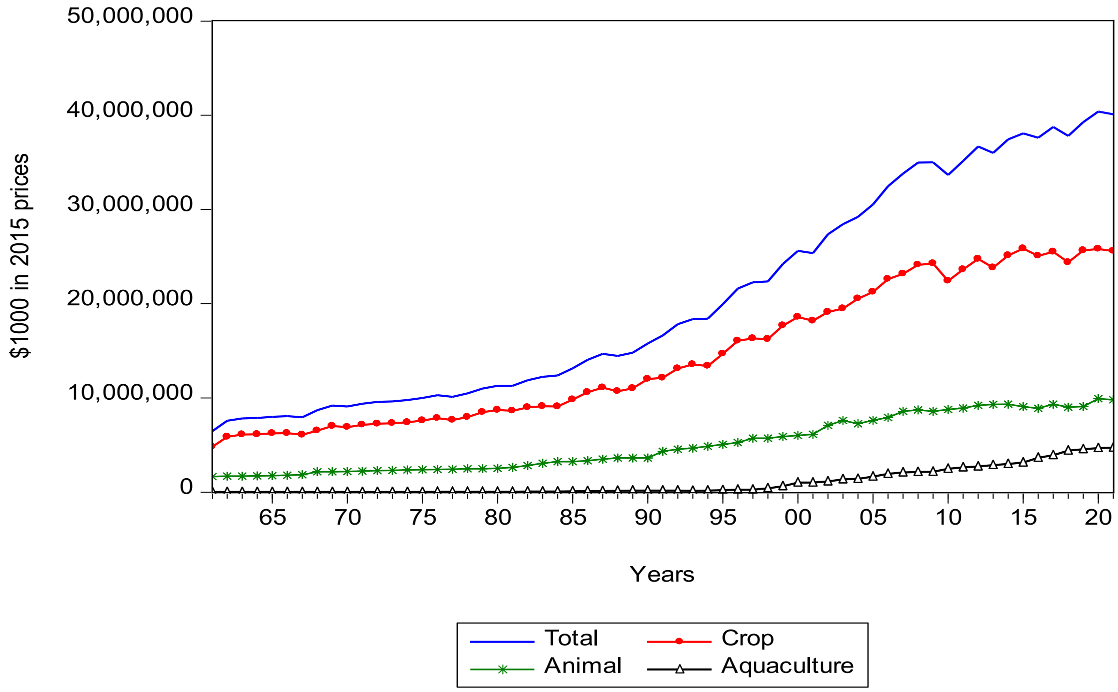
Figure (1): Value of Agricultural Production, 1961: 2021



Farm Inputs:

Labor: The labor force employed in the agricultural sector tended to shrink overtime. This was evident during the periods 1971-2000 and 2011-2021. The overall rate of annual growth of agricultural labor force during the period 1961-2021 was a meager 0.27 percent. The shrinking of agricultural labor force could be attributed to the massive migration of Egyptian unskilled workers to oil rich countries right after the 1973 war. The rising oil prices after the war contributed to the construction boom in the Gulf countries and raised the demand for migrant workers. The shrinking labor force in the agricultural sector might have contributed to the low performance of the sector in the 1970s. This happened at a time when alternative farm inputs like farm machinery were not widely utilized.

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Table (1): Annual Growth Rates of Domestic Agricultural Production

Period	Crop Production	Animal Production	Aquaculture Production	Total Domestic Agricultural Production
1961-1970	2.9	3.41	0.67	3.0
1971-1980	2.1	1.27	10.98	1.9
1981-1990	3.6	3.48	14.31	3.6
1991-2000	4.5	3.82	20.02	4.6
2001-2010	3.0	3.51	9.66	3.5
2011-2021	0.65	0.59	6.84	1.2
1961-2021	2.95	3.38	11.81	3.2

Source: calculated from the data in Table (1) in the Annex

Machinery: The dwindling labor force was partially compensated by a surge in employment of farm machinery. Farm machinery includes tractors, harvester-threshers, milking machines and water pumps. Overall rate of growth of farm machinery during the period 1961-2021 was 4.3 percent annually. The decade of the 1970s marked the time period with the largest rate of annual growth in farm machinery; 7.51 %. This surge in farm machinery was a way to make up for the lost labor force because of migration to the Gulf countries. Figure (2) shows the upward trend of the employment of farm machinery in Egypt.

Figure (2): Farm Machinery

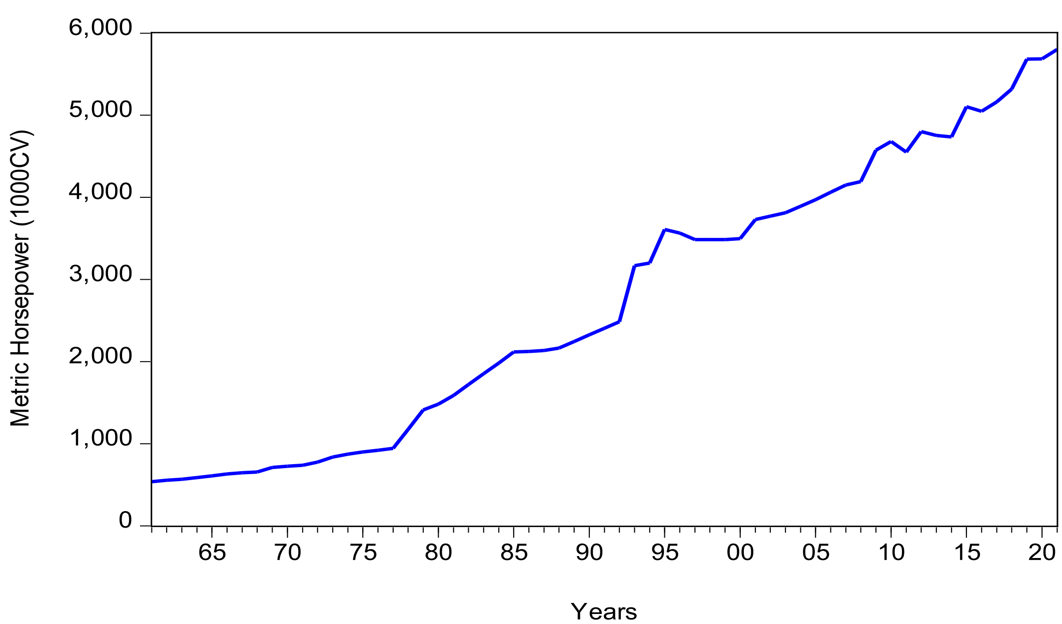

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Table (2): Annual Growth Rates of Agricultural Inputs

Period	Labor	Land	Capital Stock	Animals	Machinery
1961-1970	1.5	1.7	2.6	2.4	3.32
1971-1980	-1.2	-2.0	2.2	0.6	7.51
1981-1990	-0.2	0.9	3.4	3.1	3.82
1991-2000	-0.06	2.2	13.8	1.8	3.91
2001-2010	4.2	1.0	2.5	0.09	2.47
2011-2021	-2.7	0.97	3.2	-5.8	2.43
1961-2021	0.27	0.8	5.5	1.6	4.3

Source: calculated from the data in Table (2) in the Annex

Agricultural Land: Land under cultivation has increased from 2568 thousand hectares in 1961 to 4031 thousand hectares in 2021; figure (3)**.** This is equivalent to an increase from 6.163 million feddans to 9.674 million feddans in 61 years. That is arable land in Egypt has increased by about 57 percent in 61 years. Of course the addition to arable land requires the reclamation of desert land that cost large outlays. The decade of the 1990s witnessed the largest annual rate of growth in arable land, 2.2 %. In fact, arable land increased from 2643 thousand hectares in 1991to 3291 thousand hectares in year 2000. This is equivalent to an increase of 1.56 million feddans in 10 years. The period of 1961-1970 witnessed the second largest annual rate of growth in arable land; 1.7 %. The land reclamation efforts in the 1960s were successful in adding about 660 thousand feddans to the agricultural land base. Unfortunately, a sizable portion of arable land was lost in the 1970s to urban expansion at an annual rate of 2 percent. That is about 976 thousand feddans of arable land were lost in the 1970s.

Capital Stock: Agricultural capital stock is measured in constant 2015 prices in million dollars. It entails inputs that are used over several seasons such as machinery, buildings, fruit and nut-bearing trees and breeding stock. The agricultural capital stock grew faster than any other input during the period 1961-2021. Again the decade of the 1990s saw an impressive 13.8 % annual rate of growth. The overall rate of growth during the period 1961-2021 was 5.5 percent. It seems that Egyptian agriculture is becoming more dependent on capital and less dependent on labor in recent decades. This trend could be explained by two points. First: expansion of capital stock is a necessity to make up for the shrinking agricultural labor force. Second: increased land base in the desert requires more reliance on capital resources

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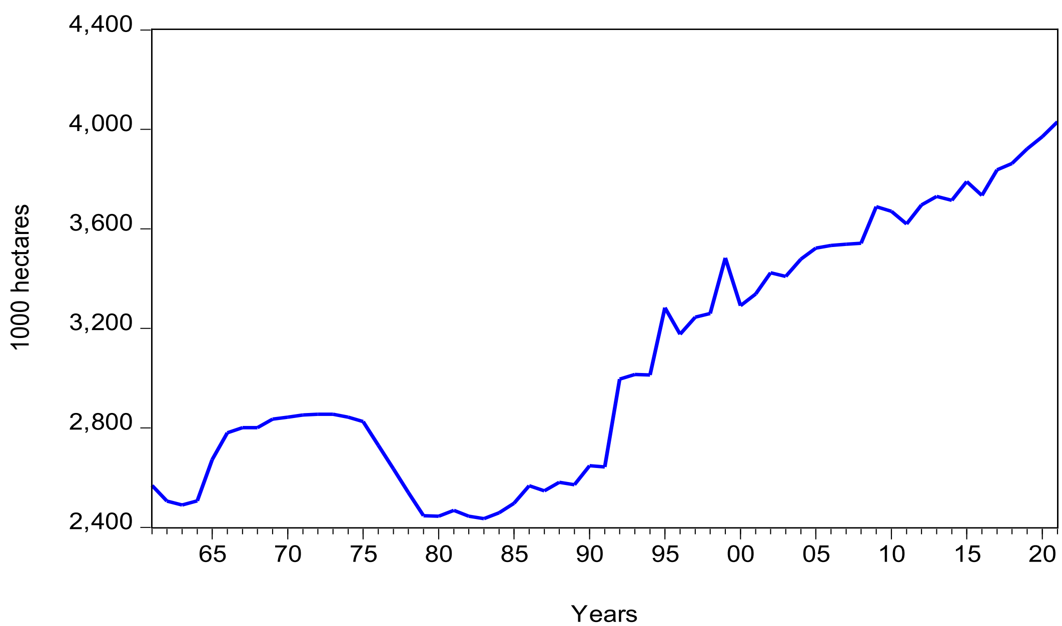
due to the dominance of large farm holdings. Currently, about one third of arable lands are classified as new lands that came about from desert reclamation over the years.

Livestock: Animal resources have grown over the period 1961-2021 by an average annual rate of 1.6 percent. The decades of the 1960s and 1980s have seen the largest rates of growth in animal resources. But there is slow growth and even decline in animal resources in recent decades. This downward trend could be explained by the severe shortage in animal feed on one hand and the less reliance on draft animals on the other hand. Draft animals are hardly used in Egyptian agriculture nowadays. The poultry industry in Egypt is almost entirely dependent on imported yellow corn and soybeans. As the country is facing hard currency problems it would be difficult to sustain the poultry industry and other commercial livestock enterprises.

Figure (3): Arable Land, 1961-2021



Aggregate Production Function:

The aggregate production function for Egyptian agriculture can be postulated in the form of Cobb-Douglas function as follows:

$$LnY_t = B_0 + B_1 LnX_{1t} + B_2 LnX_{2t} + B_3 LnX_{3t} + B_4 Ln\, X_{4t} + B_5 Ln\, X_{5t} + U_t \qquad (1)$$

Where:

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Y_t = Gross value of agricultural production in constant US dollar prices
X_{1t}=Time variable as a proxy variable for technical progress
X_{2t}= Labor force employed in agriculture
X_{3t}=Arable land under cultivation in hectares
X_{4t}= Capital stock in agriculture in constant dollar prices
X_{5t}=Animal units in year t
U_t= Disturbance term
Ln= Natural logarithms.

The disturbance term is assumed to satisfy the ideal conditions of ordinary least squares. The coefficients of the equation represent the elasticities of the respective factors of production. For example, B_2 is the elasticity of production with respect to labor force. Equation (1) is estimated by ordinary least squares for the period 1981-2021. The previous period of 1961-1980 is left out because it represents a period of socialist policies and strong government intervention in the agricultural sector. The year of 1981 marks the beginning of a new political regime and the leaning towards economic reform policies. The results of OLS estimates are presented in table (4). The second column in the table is concerned with the unrestricted form of the production function. That means no restrictions on the values of the coefficients of the production function are imposed.

Table (4) shows that all coefficients are positive as expected by the economic theory. Moreover, all estimates of the coefficients are statistically significant at 1 % level of significance except the coefficient of the animal variable which is significant at the level of 5 %. The large value of R-squared; o.997, indicates that the model fits the data quite well. In addition the value of the Durbin-Watson statistic is close to 2 which mean that serial correlation is almost nonexistent. Finally, the inclusion of the time variable in the Cobb-Douglas model serves two purposes. The first one is to mitigate the problem of non- stationary time series. The second reason is to account for the technical change that has been taking place in Egyptian agriculture during the period 1981-2021.

The results in the second column of table (4) show that the production elasticity with respect to arable land is 0.329. That is an increase of arable land by 10 percent leads to the increase of the value of total agricultural production by 3.29 percent when all other factors are held constant. The sum of the elasticities of the labor, land, capital

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and animal is 0.732. This sum is a measure of the returns to scale in the production process. The figure of 0.732 means that if we increase each one of the four inputs by say, 10 %, then the total agricultural production would increase by 7.32 %. That means that the production process shows decreasing returns to scale.

It is of special interest to see if the data of Egyptian agriculture supports the view that the production process is actually in line with constant returns to scale. Constant returns to scale implies that increasing all factors of production by a certain percentage would lead to the increase of aggregate agricultural production by the same percentage. This version of constant returns to scale function simply results from the estimation of equation (1) subject to the constraint:

$$B_3+B_4+B_5+B_6=1 \qquad (2)$$

To test the validity of the restriction in equation (2) we have to calculate the following F- statistic:

$$F=\frac{(\mathrm{RSSE}-\mathrm{USSE})/\mathrm{r}}{\mathrm{USSE}/(\mathrm{N}-\mathrm{K})}$$

Where RSSE is the error sum of squares of the restricted model, USSE is the error sum of squares of the unrestricted model, r is the number of restrictions, N is the number of observations and K is the number of coefficients in the unrestricted model. If the calculated F-statistic is larger than the tabulated F- statistic at a given level of significance we reject the null hypothesis in equation (2). Utilizing the Wald test in E-views shows that the calculated F-statistic is 4.6 with p-value of 0.039. Therefore we do not reject the null hypothesis at the 5 % level of significance. That is the aggregate production function for Egyptian agriculture shows constant returns to scale. If, for example, all farm inputs are increased by 25 percent the aggregate agricultural production would increase by 25 percent as well.

Looking at the results of the restricted model in table (4), column 3, reveals that the elasticities of production with respect to labor, land, capital and animals are 0.252, 0.575, 0.133, and 0.04 respectively. Because of its pivotal role in agricultural production arable land has the largest elasticity of 0.575. That is increasing the land base by 10 percent and holding the other factors constant would increase aggregate agricultural production by 5.75 percent. All coefficient estimates for the restricted

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model in table (4) are statistically significant at the level of 1 % except the coefficient of animal resources which is not statistically significant.

Table (4): Aggregate Production Function

Variables	Unrestricted Model	Restricted Model
Constant	8.017 (9.661)	6.266 (39.919)
LnX_{1t}	0.728 (10.62)	0.617 (13.04)
LnX_{2t}	0.214 (5.559)	0.252 (6.959)
LnX_{3t}	0.329 (2.732)	0.575 (14.387)
$Ln X_{4t}$	0.14 (7.145)	0.133 (6.556)
$Ln X_{5t}$	0.049 (2.176)	0.04 (0.513)
R-Squared F-Statistic D-W Statistic SSE Observations	0.997 2500 1.723 0.01956 41	0.997 2841 1.879 0.02214 41

Sources of Growth:

If we rewrite equation (1) in the deterministic form, after deleting the constant term and the disturbance term, the equation becomes

$$Ln\,Y_t = B_1 LnX_{1t} + B_2 LnX_{2t} + B_3 LnX_{3t} + B_4 Ln\,X_{4t} + B_5 Ln\,X_{5t} \quad (3)$$

Taking the change in equation (3) leads to equation 4:

$$\Delta\, LnY_t = B_1 \Delta LnX_{1t} + B_2\, \Delta LnX_{2t} + B_3 \Delta\, LnX_{3t} + B_4\, \Delta\, Ln\,X_{4t} + B_5\, \Delta\, LnX_{5t} \quad (4)$$

Dividing equation (4) by the time variable gives rise to the following growth accounting relationship:

$$\text{Rate of growth in } Y = B_1*(\text{rate of growth in } X_1) + B_2*(\text{rate of growth in } X_2) + B_3*(\text{rate of growth in } X_3) + B_4*(\text{rate of growth in } X_4) + B_5*(\text{rate of growth in } X_5). \quad (5)$$

Each term on the right hand side of equation (5) represents the relative importance of a specific input in determining the rate of growth of aggregate agricultural production. This is known as Solow growth accounting equation.

For example, B_3*(rate of growth in X_3) is the contribution of arable land to the growth rate of agricultural production in a given time period. This contribution is calculated as the product of production elasticity with respect to land (B_3) and the annual growth rate of arable land in a given time period.

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Applying equation (5) to the restricted model of constant returns to scale in table (4) would give some insights to the determinants of growth of agricultural production in Egypt during the period 1981-2021. The annual rates of growth of the variables in equation (5) are 2.57 %, 0.56 %, 1.31%, 6.77%, and 1.08 % for technical change, labor, land, capital and animal resources respectively. Accordingly, the relative contribution of each factor can be summarized in table 5.

Table (5): Relative Contribution of Growth Factors

Technical Progress	Labor Force	Arable Land	Capital Stock	Animal Resources	Total
1.58	0.14	0.76	0.9	0.043	3.423

Table (5) reveals that technical progress is the most important contributor to the growth of agricultural production in Egypt. The share of technical progress to the overall growth rate of 3.423 is 1.58. That is about 46.2% of the growth in agricultural production during the period 1981-2021 is contributable to technical progress. Second in importance is arable land which contributed about 0.76 to the total growth rate of 3.423 or equivalently about 22.2 percent of the growth of total production. And about 53.8 % of the growth in agriculture is contributed to the combined growth of labor, land, capital and animal resources.

Egyptian agriculture is highly dependent on scientific knowledge and know how technology. The contribution of technical progress to the growth of Egyptian agriculture is more than twice the contribution of arable land. This result is particularly important for the future of agricultural development. This is due to the difficulties associated with expansion possibilities of natural resources especially land and water in Egypt. Adoption of new technologies and the constant improvements in the methods of production over time are necessary for future expansion of Egyptian agriculture.

Concluding Remarks and Recommendations:

The study shows that the performance of Egyptian agriculture is responsive to changes in political and economic regimes. It seems that political stability is more conducive to agricultural growth. This is evident from the period of the 1990s which was marked by political stability and by the adoption of market –oriented policies. The study reveals that technical progress is the most important contributor to the growth of agricultural production in Egypt. The contribution of technical progress

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to the growth of Egyptian agriculture is more than twice the contribution of arable land.

The study recommends that due attention should be devoted to the need to accelerate the adoption of new technologies that enhance the productivities of limited natural resources especially water and land. It follows that the systems of agricultural research, extension and education should be upgraded in order to face up to the challenges facing Egyptian agriculture. Financial resources from public and private sources should be made available to provide for the upgrading requirements.

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Annex

Table (1): Value of Domestic Agricultural Production and its Components: 1961 -2021

Constant 1000 U.S. Dollar Prices (2015=100)

year	Crop GDP	animal GDP	fish GDP	total GDP
1961	4,813,577	1,650,021	11,583	6,475,181
1962	5,875,501	1,695,469	11,583	7,582,553
1963	6,117,274	1,693,761	13,365	7,824,400
1964	6,127,974	1,721,829	15,592	7,865,395
1965	6,236,551	1,751,485	13,810	8,001,846
1966	6,264,853	1,793,503	13,142	8,071,498
1967	6,081,464	1,852,490	12,474	7,946,428
1968	6,532,895	2,153,301	12,474	8,698,669
1969	7,021,065	2,158,255	13,142	9,192,462
1970	6,905,693	2,177,539	13,365	9,096,596
1971	7,126,038	2,240,378	15,592	9,382,008
1972	7,262,131	2,291,274	17,819	9,571,225
1973	7,306,421	2,308,967	20,047	9,635,435
1974	7,397,112	2,353,568	20,047	9,770,727
1975	7,601,487	2,381,938	20,047	10,003,472
1976	7,852,740	2,411,471	24,502	10,288,712
1977	7,643,389	2,435,307	28,957	10,107,653
1978	7,964,977	2,475,236	33,411	10,473,624
1979	8,478,653	2,488,004	37,866	11,004,523
1980	8,713,520	2,520,022	42,321	11,275,863
1981	8,614,952	2,635,280	46,776	11,297,008
1982	8,986,456	2,827,986	53,458	11,867,900
1983	9,120,399	3,052,011	55,686	12,228,096
1984	9,088,791	3,237,656	60,141	12,386,588
1985	9,822,727	3,225,179	97,165	13,145,070
1986	10,596,887	3,335,751	102,667	14,035,305
1987	11,082,782	3,492,134	107,045	14,681,961
1988	10,709,993	3,626,025	122,074	14,458,091
1989	11,025,160	3,623,538	149,264	14,797,963
1990	12,002,825	3,629,156	153,737	15,785,718
1991	12,146,756	4,331,243	160,297	16,638,296
1992	13,113,772	4,549,032	167,903	17,830,707

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1993	13,557,084	4,677,899	137,063	18,372,046
1994	13,384,399	4,867,940	151,702	18,404,041
1995	14,688,573	5,058,071	203,060	19,949,704
1996	16,073,261	5,261,928	262,431	21,597,620
1997	16,310,673	5,716,447	245,018	22,272,138
1998	16,228,982	5,721,439	404,568	22,354,989
1999	17,683,191	5,902,696	631,774	24,217,661
2000	18,572,356	6,012,968	1,019,734	25,605,058
2001	18,202,144	6,133,876	1,024,359	25,360,379
2002	19,126,679	7,084,563	1,144,356	27,355,598
2003	19,476,835	7,595,420	1,360,352	28,432,607
2004	20,541,884	7,256,640	1,411,421	29,209,945
2005	21,243,990	7,637,742	1,654,032	30,535,764
2006	22,606,499	7,928,099	1,939,915	32,474,513
2007	23,160,645	8,571,860	2,086,753	33,819,258
2008	24,115,560	8,732,053	2,126,620	34,974,233
2009	24,270,072	8,580,410	2,160,479	35,010,961
2010	22,418,622	8,776,992	2,473,389	33,669,003
2011	23,625,707	8,916,445	2,618,545	35,160,697
2012	24,763,184	9,215,034	2,711,807	36,690,025
2013	23,837,385	9,307,592	2,864,164	36,009,141
2014	25,113,373	9,344,339	2,984,916	37,442,628
2015	25,855,423	9,076,380	3,136,274	38,068,077
2016	25,081,047	8,904,754	3,636,650	37,622,451
2017	25,509,555	9,334,349	3,928,617	38,772,521
2018	24,392,327	9,013,656	4,401,316	37,807,299
2019	25,656,583	9,088,105	4,542,708	39,287,396
2020	25,797,218	9,913,301	4,678,765	40,389,284
2021	25,596,726	9,792,219	4,727,788	40,116,733

Source: USDA – Economic Research Service, International Agriculture Productivity Database.

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Table (2): Factors of Agricultural Production: 1961-2021

Year	Labor (1000 persons)	Capital ($million) 2015=100	Livestock (1000s of standard livestock units)	Machines (1000 CV)	Land (1000 hectares)
1961	4,836	2,594	4,864	538	2,568
1962	4,879	2,560	4,751	554	2,505
1963	4,934	2,520	4,633	567	2,490
1964	5,039	2,573	4,713	588	2,506
1965	5,209	2,628	4,797	609	2,672
1966	5,192	2,681	4,877	630	2,780
1967	5,229	2,731	4,958	647	2,801
1968	5,326	3,021	5,606	655	2,801
1969	5,438	3,121	5,719	711	2,835
1970	5,520	3,175	5,814	726	2,843
1971	5,993	3,212	5,875	738	2,852
1972	6,210	3,289	5,966	776	2,855
1973	5,947	3,374	6,028	838	2,855
1974	5,681	3,429	6,081	873	2,843
1975	5,993	3,473	6,130	898	2,825
1976	5,813	3,505	6,160	920	2,730
1977	5,634	3,536	6,186	942	2,635
1978	5,385	3,780	6,314	1,174	2,540
1979	5,488	3,888	6,202	1,410	2,447
1980	5,666	3,940	6,215	1,482	2,445
1981	5,446	4,086	6,302	1,588	2,468
1982	5,376	4,303	6,511	1,719	2,445
1983	5,434	4,456	6,562	1,851	2,435
1984	5,305	4,666	6,764	1,983	2,458
1985	5,280	4,804	6,789	2,118	2,497
1986	5,254	4,850	6,885	2,124	2,567
1987	5,229	5,017	7,262	2,136	2,547
1988	5,204	5,277	7,837	2,165	2,581
1989	5,179	5,406	7,963	2,245	2,571
1990	5,599	5,686	8,466	2,325	2,648
1991	4,333	6,046	9,154	2,405	2,643
1992	5,535	6,282	9,544	2,485	2,996
1993	5,189	7,022	9,842	3,169	3,015

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1994	5,361	7,049	9,846	3,199	3,013
1995	5,216	7,448	9,995	3,609	3,283
1996	5,369	9,470	10,260	3,566	3,176
1997	4,951	11,871	10,520	3,486	3,245
1998	4,823	14,198	10,349	3,486	3,260
1999	4,807	16,724	10,754	3,486	3,483
2000	5,097	19,590	11,122	3,497	3,291
2001	5,010	22,074	11,472	3,731	3,338
2002	4,913	24,529	11,952	3,772	3,424
2003	5,412	26,443	12,207	3,813	3,409
2004	5,958	26,695	12,154	3,892	3,478
2005	5,972	26,630	12,327	3,971	3,523
2006	6,371	27,200	12,497	4,062	3,533
2007	6,886	27,703	12,988	4,152	3,538
2008	7,116	28,062	12,543	4,191	3,542
2009	6,876	28,814	11,787	4,573	3,689
2010	6,728	29,470	11,343	4,680	3,671
2011	6,810	30,018	11,624	4,550	3,620
2012	6,378	31,325	11,997	4,802	3,696
2013	6,703	32,522	11,895	4,754	3,731
2014	6,694	33,452	11,951	4,735	3,715
2015	6,397	34,505	11,987	5,104	3,790
2016	6,478	35,772	11,909	5,047	3,734
2017	6,516	37,134	11,297	5,162	3,837
2018	5,635	38,710	10,954	5,319	3,863
2019	5,512	40,476	7,053	5,684	3,922
2020	5,325	42,454	7,058	5,687	3,971
2021	5,232	39,284	7,048	5,802	4,031

Source: USDA – Economic Research Service, International Agriculture Productivity Database.