

Economic Study of Unemployment in Egypt and Impacts on GDP

Nagwa Mosad El-Agrody, Afaf Zaki Othman and Monia Bahaa El-Din Hassan

Department of Agricultural Economy, National Research Centre, Cairo, Egypt.

Abstract: Unemployment is considered one of the most important and serious problems most countries suffer, where it results in negative impacts on the national economy. The volume of labor force in Egypt amounted to some 23.9 million persons in 2007, whereas the volume of national unemployment amounted to some 1.87 million persons representing 7.8% of the total labor force in 2007, and the volume of agricultural unemployment amounted to 730 thousand representing 34.2% of the national unemployment. The current study revealed that, the volumes of national and agricultural unemployment have been growing at statistically significant annual amounts estimated at 64 and 22 thousand persons during the study period (2000-2007), respectively. However, the rate of unemployment in urban areas surpassed that in rural areas during 2007, indicating that the agricultural sector has the capacity to absorb more labor. The study indicated that, the rate of unemployed persons holding middle-education degrees ranked on top of the total unemployed persons, both in urban and rural areas, which can be attributed to the absent link between the level of education and the real needs of the labor market. The study showed that, the most important factors contributing to the rising volume of national unemployment include privatization and inflation, and that increases in agricultural investments and agricultural domestic product resulted in raising the volume of agricultural unemployment. The resulted data showed that, the increases in exchange rate and per capita share of GDP are the most important factors contributing to increasing GDP. Therefore, the research recommends exerting efforts to redistribute investments in the field of agriculture, and lowering interest rates to promote investments, reduce the rates of agricultural unemployment, and boost the volume of GDP. In addition, the research recommends amending the implemented privatization policies, the application of which led to raising both the national and agricultural unemployment rates in Egypt. [Nature and Science 2010;8(10):102-111]. (ISSN: 1545-0740).

Key words: Unemployment - National unemployment - Agricultural unemployment - labor force - Unemployment Rates.

1. Introduction

Unemployment is one of the most serious problems suffered by many social systems around the world, where it leads to negative consequences in the economic and social sphere. Therefore, governments strive to reduce unemployment rates and mitigate its impacts, where reduction of unemployment rates became a test for the ability of the economic system to grow fast enough to provide job opportunities and reemploy the idle power in a short period. Eman Mohamed Ali Ismaeel (2004) (3).

During the period (1994-2007), the volume of labor force in Egypt increased from 16.8 to 23.9 million persons, up by 42%. The volume of national unemployment increased from 1.87 million in 1994 to about 2.14 million in 2007, up by 14%, while the volume of agricultural unemployment increased from 470 thousand in 1994 to approximately 730 thousand in 2007, up by 55%. In 2007, the volume of agricultural unemployment represented about 34.2% of the volume of national unemployment (The Central

Agency for Public Mobilization and Statistics 1994-2007) (CAPMAS) 10

2. Problem and Objectives

The study aims to identify the causes of the increasing rate of agricultural unemployment during that period, as well as its impact on GDP. Moreover, propose some recommendations to mitigate the impacts of the increasing rate of agricultural unemployment in Egypt.

Methodology and Sources of Data:

To achieve its objectives, the study relied on both quantitative and descriptive statistics in explaining and describing the studied economic variables. The study applied simple and multiple linear regression models to estimate the parameters of economic relationships during the period (1994-2007). As regards the data, the study relied on secondary data, either published or unpublished, from

the Central Agency for Public Mobilization and Statistics (CAPMAS), the Ministry of Agriculture and Land Reclamation (MoALR), (1994-2007)(9), in addition to some websites and economic researches relevant to the study subject.

3. Result and Discussion

I. The Concept of Unemployment:

Unemployment is defined as the situation where the society does not fully or optimally utilize its labor force. Classical and Keynesian thinkers classified unemployment into several types. According to classical thinkers, there are two types of unemployment; these are voluntary and involuntary unemployment. Voluntary unemployment is the situation where individuals are able to work but are not willing to work at the prevailing wage rates. Contrary to that, involuntary unemployment is the situation where individuals are willing and able to work at the prevailing wage rates, but does not find work⁽⁸⁾. Classical thinkers believe that if the labor market is liberalized the flexibility of wages and prices guarantees reaching full employment at equilibrium, and in case unemployment occurs, it shall be voluntary. Keynesian thinkers argue that the key determinant of employment level is not the real wage, but the level of effective demand for labor, and that unemployment occurs due to inadequate national income, which should be increased in order to increase effective demand until sufficient to reach full employment. Keynesian thinkers classified unemployment into four types; the first is frictional unemployment, which involves people being temporarily between jobs, searching for new better ones. The second is structural unemployment, which occurs as a result of dynamic changes in the structure of the economy, which results in a mismatch between the skills of workers looking for jobs and the vacancies available, either due to technological changes or capital intensity. The third is cyclical unemployment, which occurs as a result of economic cycles that lead to falls in aggregate demand or aggregate expenditure thus lower employment opportunities. The fourth and last is hidden unemployment, which describes the case where individuals are already employed but do not add to the GDP, usually spread in developing countries with dense population, especially where Agriculture is the predominant sector (Mona El-Tahawe 2009)8.

II. Unemployment in Egypt

Egypt's economy suffers from four key structural imbalances. The first is the imbalance between production and consumption; the second is the imbalance between exports and imports; the third is the imbalance between saving and investment, and the fourth is the imbalance between state revenues and expenditures, which is the main cause of the problems experienced by the Egyptian economy, the most serious of which is unemployment (Mohamed Mosa Othman (2009) (6).

Characterization and Analysis of National and Agricultural Unemployment

The problem of unemployment is represented in the waste of available resources, which prevents achieving sustainable growth in GDP as a result of continued consumption without adding to production. In addition, the volume and type of unemployment affects both the economic environment and the social structure. Landmann,(2004-2005) (4) The following study examines unemployment in Egypt from different aspects:

1. Volume of National and Agricultural Unemployment:

As described in Table (1), studying the volume of unemployment in Egypt during the period (1994-2007) revealed that the volume of national unemployment reached about 2.14 million persons 2007 representing about 0.9 of the labor force, and that unemployment rate reached a minimum of 8.12% in 1999 and a maximum of 11.26% in 1995.

Studying the trend of evolution in the volume of unemployment during the study period, represented by equation (1), indicates that the volume of unemployment followed a statistically significant annual rate of increase estimated at about 64.3 thousand persons, equivalent to a growth rate of 3.4% of the average number of unemployed persons, estimated at 1.89 million during the period (1994 - 2007).

As revealed in table (1), in 2007, the volume of agricultural unemployment reached around 730 thousand persons representing 34.2% of the volume of national unemployment for the same year. Moreover, the volume of agricultural unemployment reached a minimum of 470 thousand representing 25% of the volume of national unemployment in 1994, and a maximum of 780 thousand representing 36.2% of the national unemployment in 2004.

Table (1): Unemployment Rates and the Volume of National and Agricultural Unemployment in Egypt during the Period 1994-2007

Year	Labor Force (million)	Unemployment Rate (%)	National Unemployment (million)	Agric Unemployment (million)	Rate of Agric to National Unemployment (%)
1994	16.812	11.14	1.873	0.47	25.09
1995	16.969	11.26	1.910	0.48	25.13
1996	17.3	8.4	1.400	0.50	35.71
1997	17.277	8.37	1.446	0.53	36.65
1998	17.631	8.21	1.448	0.57	39.36
1999	18.230	8.12	1.480	0.60	40.54
2000	18.901	8.98	1.698	0.64	37.69
2001	19.340	9.22	1.783	0.65	36.45
2002	19.877	10.17	2.021	0.67	33.15
2003	20.360	11.01	2.241	0.69	30.79
2004	20.872	10.32	2.154	0.78	36.21
2005	21.972	11.24	2.450	0.69	28.16
2006	22.878	10.64	2.434	0.71	29.17
2007	23.859	8.95	2.135	0.73	34.19

Source: Website of the Central Agency for Public Mobilization and Statistics (CAPMAS), Misr Intranet.

Studying the general trend of the evolution in the volume of agricultural unemployment during the study period (1994 - 2007), represented by equation (2), indicates that the volume of unemployment followed a statistically significant annual rate of

increase estimated at about 22.4 thousand persons, equivalent to a growth rate of 3.6% of the average number of agricultural unemployed persons during the period.

Table (2): General Trend Equations for National and Agricultural Unemployment in Egypt for the Period 1994-2007

Equation No.	Variable	Equation	R ²	F	Growth Rate
1	National Unemployment	$\hat{Y}_t = 1.409 + 0.0643 X_t$ (3.781)	0.54	14.3	3.402
2	Agricultural Unemployment	$\hat{Y}_t = 0.454 + 0.0224 X_t$ (10.371)	0.90	107.55	3.60

Source: Calculated From Table (1)

Where:

\hat{Y}_t = Estimated value of the dependent variable Y in year t

X_t = Time variable (1, 2, 3,,18)

The figure between brackets is the calculated t value

2. Labor Force and Unemployment by Gender

As illustrated in table (3), the percent males surpassed that of females in terms of the labor force all over the study period, where it a maximum of 78.7% in 2001 and a minimum of 76.1% in 2004 while females reached a maximum of 23.9% a minimum of about 21.3% and during the same years, respectively.

The same table also shows the percent of unemployment, it is relative to the labor force for males and females. It is clear that, female unemployment rates surpassed that for males along the study period, and that unemployment rate for males reached a maximum of 7.49% in 2003, while that for females reached a maximum of 25.09% in 2005.

Table (3): Evolution of Unemployment Rate and Contribution to Labor Force by Gender for the Period 2000-2007

Year	Contribution to Labor Force (%)		Unemployment Rate (%)	
	Male	Female	Male	Female
2000	77.78	22.22	5.06	22.73
2001	78.66	21.34	5.60	22.57
2002	78.15	21.85	6.33	23.89
2003	77.79	22.21	7.49	23.31
2004	76.08	23.92	5.94	24.26
2005	77.03	22.97	7.12	25.09
2006	77.66	22.34	6.8	24.00
2007	76.14	23.86	5.9	18.6

Source: Website of the Central Agency for Public Mobilization and Statistics (CAPMAS), Misr Intranet.

3. Geographical Distribution of the Unemployed

It is clear from Table (4), that the total number of unemployed persons at the country level increased from 1.7 million in 2000 to 2.5 million in 2005, up by 44%, and then dropped to 2.134 million in 2007, representing about 26% of volume of unemployment in 2000. The table also shows that in 2000, unemployment in urban and rural areas reached 46.4% and 53.6%, while reached 54.7% and 45.3% in the two areas in 2007, respectively.

It is also clear from the table that the percent of unemployed males in urban areas increased during 2005 and 2007 compared to 2000. Nevertheless, it was higher than the percent of unemployed males in rural areas during the same years. As regards females, the percent of unemployment in rural areas was higher compared to urban areas for the same two years, which might be attributed to the reluctance of rural females to work, the lack of employment opportunities suitable for them, or to the tendency of rural females to achieve higher education levels.

Table (4): Number and Percent of Unemployed Persons in Urban and Rural Areas by Gender during 2000, 2005, and 2007

(100 persons)

Year	Urban Areas						Rural Areas						Country Total
	Male	%	Female	%	Total	%	Male	%	Female	%	Total	%	
2000	3396	43.1	4486	56.9	7882	46.4	4040	44.4	5061	55.6	9101	53.6	16983.0
2005	6334	51.7	5911	48.3	12245	50	5610	45.8	6642	54.2	12252	50	24497.0
2007	6262	53.6	5415	46.4	11677	54.7	4517	46.7	5158	53.3	9675	45.3	2135.2

Source: Website of the Central Agency for Public Mobilization and Statistics (CAPMAS), Misr Intranet.

4. Age Structure of the Unemployed

Studying the relative importance of unemployed persons according to age groups at country level and at level of urban and rural areas during the years 2000, 2005 and 2007, shown in Table (5). It is revealed that, the age group (20-24) ranked first in terms of unemployment at the country level during the three years, where it reached 43%, 47.7% and 47.5% for three years, respectively. Moreover, the percent of unemployed persons in urban areas surpassed that in rural areas for this age group. The age group (25-29) ranked second, where the number of unemployed persons belonging to this group accounted for 25.8% at the country level during the years 2000 and 2007, while ranked third in 2005 by recording 20.5% at the country level. Moreover, unemployed persons belonging to this group in rural areas was higher compared to urban areas, where they accounted for 37.8% compared with 23.2% in the two areas, respectively. As for the age group (15-19), it ranked

second in terms of unemployment at the country level in 2005, where it reached 24.2%, while ranked third during the years 2000 and 2007, where the number of unemployed persons belonging to this group accounted for 21.4% and 15.4% during the two years, respectively.

The same table indicated that, the total number of unemployed persons belonging to the age group (30-39) ranked fourth, where they accounted for 9.2% in 2000, 6.8% in 2005, and 10% in 2007. It is also clear that the number of unemployed persons in this age group is higher in urban than in rural areas during the three comparison years. The age groups (40-49) and (50-59) ranked fifth and sixth, respectively.

It is clear that the highest rates of unemployment in urban or rural areas are concentrated in the young and middle-age groups, either males or females, which together with other rates of unemployment kinds represent the surplus added to job market year-over-year.

Table (5): Relative Importance of the Unemployed by Age Group (15-60) During 2000, 2005, and 2007

Age Group	2000			2005			2007		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
15-19	16.6	25.5	21.4	18.4	29.9	24.2	11	20.7	15.4
20-24	43.5	42.8	43	49.2	46.3	47.7	48	46.8	47.5
25-29	29.2	22.9	25.8	23.2	37.8	20.5	28.7	22.3	25.8
30-39	10.1	8.4	9.2	8.1	5.5	6.8	10.3	9.5	10
40-49	0.4	0.3	0.4	0.9	0.4	0.7	1.8	0.6	1.3
50-59	0.3	0.1	0.2	0.2	0.1	0.1	0.1	-	1
Total	100	100	100	100	100	100	100	100	100

Source: Website of the Central Agency for Public Mobilization and Statistics (CAPMAS), Misr Intranet.

5. Relative Distribution of the Unemployed According To Educational Status.

As clear from Table (6), the volume of unemployed persons holding medium-level degrees ranked first at the level of urban and rural areas, where they accounted for 56%, 51% and 45.1% in urban areas, while accounted for 76.2%, 72.6% and 67.5% in rural areas during the years 2000, 2005 and 2007, respectively.

Holders of university and postgraduate degrees ranked second in terms of the percent contribution to the total volume of unemployed persons at the level of urban and rural areas during the study years, where they accounted for 30.2%, 34.10% and 39.3% in urban areas, while accounted for 15.7%, 19.5% and 24.8% in rural areas during the years 2000, 2005 and 2007, respectively. Holders of middle high degrees ranked

third, where they accounted for 10.4%, 7.8% and 9.3% in urban areas, while accounted for 6%, 5.2% and 4.7% in rural areas during the same years, respectively.

The total number of persons holding below medium-level degrees ranked fourth at the level of urban and rural areas, which indicates an imbalance in the educational ladder that rises in middle, middle-high, university and postgraduate education since it mismatches the needs of the labor market either in terms of proficiency and required skills, or the quality of education and whether it is technical, theoretical, or academic, all of which can be attributed to the missing link between education and the real needs of the labor market according to the concepts and criteria of labor force planning.

Table (6): Relative Importance of the Unemployed by Educational State during 2000, 2005, and 2007

Educational State Geographic Area	Illiterate	Read & Write	Below Middle Education Degree	Middle Education Degree	High-Middle Degree	University & Postgraduate Degree	Total
Urban (2000)	0.9	1.3	1.2	56	10.4	30.2	100
Rural	0.8	0.6	0.7	76.2	6	15.7	100
Total	0.8	0.9	0.9	66.8	8.1	22.5	100
Urban (2005)	2	1.7	3.4	51	7.8	34.1	100
Rural	0.9	0.6	1.2	72.6	5.2	19.5	100
Total	1.4	1.2	2.3	61.8	6.5	26.8	100
Urban (2007)	2.2	1.0	3.1	45.1	9.3	39.3	100
Rural	1.1	0.7	1.2	67.5	4.7	24.8	100
Total	1.7	0.8	2.2	55.3	7.2	32.8	100

Source: The Central Agency for Public Mobilization and Statistics (CAPMAS), Website, Misr Intranet.

6. Impact of Some Economic Variables on Unemployment Rate

Unemployment, no doubt, is linked to many economic variables that both affect and are affected by unemployment such as inflation, which usually rises with the rise in unemployment rate according to the economic theory. At full employment, unemployment reaches the minimum possible level that can prevail without leading to higher inflation rates. Moreover, unemployment affects and is affected by the country's GDP, where a 2.5% growth in GDP results in dropping unemployment rate 1% (Mohamed Nagy Hasan Khalifa 2004)(7) In addition to GDP, savings and investments influence the ability of any economic system to provide job and employment opportunities, where increases in the volume of investment in a country lead to increasing the country's capacity to provide employment opportunities.

To identify the impact of some economic variables on the volume of national unemployment in Egypt, the study estimated simple regression equation using Ordinary Least Squares on the relationships between the volume of unemployment as a dependent variable and each explanatory variable, then applied Stepwise regression to identify which variables have statistically significant impacts when operating together. As illustrated in Table (7), the positive correlation between national unemployment and each of the exchange rate, population and privatization

Emad Abd El-Maseeh Shehata(2006).(1) All of the three relations proved to be statistically significant. Moreover, the negative relationship between national unemployment and each of the interest rate and consumption expenditure are proved to be statistically significant.

Results of the analysis showed that the signs of the estimated parameters are consistent with the logic of economic theory, where growths in population and privatization programs led to growth in the volume of national unemployment, while a higher interest rate leads to reducing the volume of national unemployment. Moreover, the conduct stepwise analysis revealed that the most important variables that jointly affect the volume of national unemployment are per capita consumption expenditure and interest rate Eman Mohamed Ali Ismaeel(2004)(3). It also revealed that, the negative correlation between both variables and the rate of unemployment, and positive correlation between inflation rate and the volume of the national unemployment, which conforms to thought of the modern American Economist Fredman (3). Statistical tests proved that all of the estimated parameters are significant and consistent with the logic of economic theory.

The study measured the impact of some economic variables on agricultural unemployment in Egypt using the correlation matrix between the volume of agricultural labor and some of the

variables believed to have an impact on. Applying simple regression analysis between the volume of agricultural unemployment as the dependent variable and some of the explanatory variables of impact on unemployment and statistical tests revealed statistically significant positive correlation between the volume of agricultural unemployment, as the dependent variable, and each of the agricultural domestic product, average wage rate per agricultural worker, agricultural investments, real wage rate per agricultural worker, and technology, as explanatory variables. Contrary to that, results revealed statistically significant negative correlation between the volume of agricultural unemployment as the dependent variable and per capita consumption expenditure as the explanatory variable Emad Abd El-Maseeh Shehata(2006)(2).

Results of applying simple regression analysis revealed that increasing the wage rate per worker leads to increasing the volume of unemployment, which conforms to the logic of economic theory. In addition to that, it is revealed that, increasing agricultural investment allows the use of modern machinery, which might result in reducing the number of workers required to perform different agricultural operations, in addition to the fact that such machineries need special skills that may not be available in the current workers. Privatization further complicated the problem due to savings in labor.

Applying stepwise regression analysis revealed that, the most important variables that jointly affect the volume of agricultural unemployment, illustrated in Table (7), include agricultural domestic product and agricultural investments. Results of the regression analysis and statistical tests and statistical tests revealed a positive relationship between agricultural unemployment that proved to be statistically significant.

7. Impact of Unemployment on the Rate of Economic Growth

Needless to say, domestic and global economic changes experienced by the Egyptian economy during the past years have directly influenced the interaction of all the economic variables and their impact on economic growth, including the volume of unemployment Lawrebe M, Kahan(2005) (5)

To measure the impact of some economic variables on the rate of economic growth, some GDP-related explanatory variables were selected. Results of the regression analysis and statistical tests illustrated in Table (7) revealed a statistically

significant positive relationship between the volume of GDP and each of the agricultural investments, exchange rate, national unemployment, and average per capita GDP as explanatory variables, while revealed an inverse relationship between the volume of GDP and the interest rate.

Applying stepwise regression analysis revealed a positive relationship between the volume of GDP and each of the exchange rate and average per capita GDP.

To conclude with, the foregoing discussion revealed that, the main causes that led to increasing the volume of national and agricultural unemployment in Egypt during the study period (1994-2007) include privatization, implemented by GOE as of 1996 to reform the economic path and protect public money against accumulated losses, and to mitigate the debt burden on public sector companies. Privatization measures involved employment restructuring, which resulted in laying off some workers. The increase in population thus the number of persons searching for work, and the limited employment opportunities further complicated the situation and led to higher rate of unemployment.

Agricultural investments proved to be of the major factors affecting the volume of unemployment besides agricultural domestic product. In addition, higher inflation rate leads to higher national unemployment, while higher interest rate and consumption expenditure leads to reductions in national unemployment, which were approved by the current study.

As for GDP, findings revealed that the most important factors that positively affect the volume of GDP include the national investment, exchange rate, volume of national unemployment, as well as the average per capita share of GDP, while interest rate had negative impact on the volume of GDP.

Therefore, the current study research recommended exerting efforts to redistribute investments in the field of agriculture, and lowering interest rates to promote investments, reduce the rates of agricultural unemployment, and boost the volume of GDP. In addition, the research recommended amending the implemented privatization policies, the application of which led to raising both the national and agricultural unemployment rates in Egypt.

Table (7): Impact of Some Variables on National Unemployment, Agric Unemployment, and GDP during the Period 1994-2007

Dependent Variable	Explanatory Variable(s)	Equation	R ²	F
National Unemployment	Privatization (X ₁)	$\hat{Y}_t = -1.576 + 0.347 X_{1t}$ (4.589)	0.62	21.06
	Population Number (X ₂)	$\hat{Y}_t = -2.364 + 0.0637 X_{2t}$ (3.780)	0.52	14.289
	Consumption Expenditure (X ₃)	$\hat{Y}_t = 3.856 - 0.0304 X_{3t}$ (4.805)	0.64	23.092
	Interest Rate (X ₄)	$\hat{Y}_t = -4.101 - 0.147 X_{4t}$ (4.588)	0.62	21.05
	Exchange Rate (X ₅)	$\hat{Y}_t = -0.897 + 0.245 X_{5t}$ (4.186)	0.57	17.523
	Consumption Expenditure (X ₃) Interest Rate (X ₄) Inflation (X ₆)	$\hat{Y}_t = 4.737 + 0.0193 X_{3t} - 0.116 X_{4t} + 0.159 X_{6t}$ (6.697) (2.735) (5.736)	0.93	45.56
Agricultural Unemployment	Technology (X ₇)	$\hat{Y}_t = 0.518 + 0.115 X_{7t}$ (3.965)	0.86	82.33
	Agric. Domestic Product (X ₁₀)	$\hat{Y}_t = 142.69 + 0.0101 X_{10t}$ (7.363)	0.81	54.07
	Real Wage Rate (X ₈)	$\hat{Y}_t = 0.535 + 0.0004 X_{8t}$	0.55	15.72
	Consumption Expenditure (X ₃)	$\hat{Y}_t = 0.968 + 0.00525 X_{3t}$ (2.044)	0.24	4.18
	Agric. Investment (X ₉)	$\hat{Y}_t = 0.391 - 0.000039 X_{9t}$ (8.022)	0.83	64.357
	Agric. Investment (X ₉) Agric. Domestic	$\hat{Y}_t = 0.366 + 0.00054 X_{9t} + 0.000014 X_{10t}$ (5.45) (12.25)	0.99	476.38

Dependent Variable	Explanatory Variable(s)	Equation	R ²	F
	Product (X ₁₀)			
GDP	Average Per Capita Share of GDP (X ₁₁) Exchange Rate (X ₅)	$\hat{Y}_t = -285.861 + 0.084 X_{11t} + 65.336 X_{5t}$ (7.00) (4.087)	0.97	186.6
	Agric. Investment (X ₉)	$\hat{Y}_t = 13.197 + 0.57 X_{9t}$ (2.734)	0.37	7.47
	Interest Rate (X ₄)	$\hat{Y}_t = 1527.4 - 78.27 X_{4t}$ (3.225)	0.45	10.4
	Exchange Rate (X ₅)	$\hat{Y}_t = 396.61 + 183.77 X_{5t}$ (7.67)	0.82	8.76
	National Unemployment (X ₁₂)	$\hat{Y}_t = -531.105 + 469.38 X_{12t}$ (4.073)	0.56	16.59
	Average Per Capita Share of GDP (X ₁₁)	$\hat{Y}_t = -228.96 + 0.135 X_{11t}$ (14.078)	0.94	218.48
	Privatization (X ₁)	$\hat{Y}_t = 127.795 + 243.74 X_{1t}$ (6.73)	0.78	45.25

Source: The Central Agency for Public Mobilization and Statistics (CAPMAS), Website, Misr Intranet.(2)

Where: \hat{Y}_t = Estimated value of the dependent variable in year t

X_t = Explanatory variable in year t

The figure between brackets is the calculated t value.

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