Dialectic of the Relationship Between Unemployment and Economic Growth According to Okun's Law in Egypt

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Abstract

The study focused on the subject of unemployment and economic growth in Egypt, using a set of econometric methods to determine the relationship between the variables of the study and to analyze the appropriateness of okun's law to the Egyptian economy. Statistical results of the unit root test indicate that the time series of the variables under study are stable at their levels. In addition, the application of Co- integration test confirmes that the variables are integrated. Moreover, it tends to be stable in the long run. however, while testing the causality of a Granger, there is a negative long-term causal relationship in one direction, going from the gross domestic product to unemployment. The analysis depends on annual data from the International Financial Statistics (IFS) published by the IMF for the period 1980-2018.The Okun coefficients estimated at -0.78, meaning that a 1% increase in economic growth leads to a decrease in unemployment of 0.78%.

Keywords: GDP,Unemployment,Okun's law، Co-integration, Granger Causality,Egypt.

1.Introduction

Unemployment is one of the most important challenges facing the countries of the world at different levels of progress and their economic, social and political systems. Unemployment is no longer only a third world problem, but has become one of the most dangerous problems of developed countries. Perhaps the worst and most prominent features of the global economic crisis that all countries face alike are represented in The problem of unemployment is exacerbated, as there is a large proportion of the unemployed distributed all over the world (Sadiku, et al., 2015).

The high unemployment rate means that resources are not being used efficiently. Therefore, it should be that full employment remains a key objective of macroeconomic goal of any government because it increases and improves the economic performance (Dahmani,2019). Reducing unemployment and achieving a high economic growth rate is considered one of the most important objectives of the economic policy of any country. Economic growth is measured by the gross domestic product, and it is defined as the increase in the quantity and quality of goods and services produced in a country during a certain period of time. (Soylu, et al., 2018).

The economic literature indicates that there is a large correlation between economic growth and unemployment, through Okun's law, which assumes that unemployment is inversely related to growth(Okun,1962), so any increase in economic growth rates by 3% will necessarily lead to a reduction in unemployment rates by 1%, but this analysis does not apply to all countries. It is based on the nature of economic growth and the type of prevailing unemployment. High growth rates indicate the economy's need for additional labor force to be employed from the surplus labor market, while the slowdown in the economy leads to a decrease in new job creation below the normal level. This matter is considered natural in the theoretical analysis of the relationship between growth and the change in the unemployment rate, but what reduces the value of this analysis is the lack of proportionality between economic growth rates and unemployment rates, as an increase in economic growth by a certain percentage does not necessarily lead to a decrease in the unemployment rate at the same rate.

In light of the foregoing, there is a large correlation between changes in growth and changes in the unemployment rate, as high growth rates indicate the economy's need for additional labor to be employed from the labor market surplus formed in previous periods. On the other hand, the state of recession, which usually corresponds to low or negative growth rates, indicates an increase in unemployment rates due to the loss of job positions. While the slowdown in the economy leads to a decrease in the creation of new jobs that are below the natural level at which unemployment is supposed to start to decline.

On the other hand, the results of the study (Faisal, 2007) concluded that the high rate of economic growth and a decrease in the unemployment rate do not confirm the existence of a strong relationship between growth and unemployment in Algeria. Significant reduction in unemployment rates Perhaps the main reason is due to the structuring of the Algerian economy, which relies heavily on the growth achieved in the hydrocarbon sector, which, despite its importance, does not create jobs significantly that would lead to a significant reduction in the unemployment rate.

By applying Okun's law to four Arab countries (Egypt, Morocco, Algeria and Tunisia), Mossa (2008) concluded that output growth does not translate into higher employment rates. Likewise, the study (Al-Shorbagy, 2009), which went to research the impact of economic growth on employment during the

period (1985-2005), using joint integration and the self-regression model for distributed slowdown periods, and concluded that there is a slight significant impact of economic growth on employment. For growth in some periods such as (1975-1979) and the period (2004-2008), the unemployment rate was not responsive to changes in the economic growth rate. What this means is that economic growth in Egypt is growth without job opportunities.

Also, econometrics studies of the relationship between growth and unemployment do not indicate the existence of a general and unified union, nor can a one-way relationship between growth and unemployment be found (Ozel, et al., 2013).Therefore ,The aim of this study is examine whether a relationship type is the validity of Okun's law in the egyptain economy, which it links between real gross domestic product and unemployment during the period 1980-2018 . The output and the Unemployment data were collected from Financial International Statistics (FIS). This paper depends on the descriptive and Econometrics analysis to show the relationship between economic growth and unemployment According To Okun's Law, based on Model of study(Yahia,2018).The plan of this paper will be as follows: Section (2) presents Theoretical background .Section (3) shows The evolution of the relationship between the GDP growth rate and unemployment rates during the study period. The methodology is explained in Section (4). Conclusion and policy recommendations presented in section (5).

2. Theoretical background

2.1. Okun's law

Okun's law is a macroeconomic relationship that describes the relationship between output and unemployment. In his article "Potential GNP : Its measurement and significance in American Statistical Association" (1962), Arthur Okun (1928-1980) presented two empirical relationships connecting the rate of unemployment to real output, which have become associated with his name.as a decrease in the real GDP rate by 3% leads to an increase in the unemployment rate by 1%. Okun attributes this to a state of slowing economic growth. Okun's law has made many scientific contributions (Abdellah, 2018).Consequently, the deviations in the unemployment rate from their level are related to the deviations in the GDP (Daly & Hobun, 2010).Okun proposed two forms of the relationship between GDP growth and unemployment, namely:

The gap model takes the following form**:**

$$Y_t - Y^*_t = -\beta (U_t - U^*_t) + £ \qquad (1)$$

Where (Y_t): real GDP growth**.**   (Y^*_t): potential output**.**

(U_t): Actual unemployment rate**.**

(U^*_t): the rate of unemployment at potential output (the natural rate of unemployment).

The difference version of Okun's Law

$$\Delta Y_t = \beta_0 - \beta_1 \Delta U_t + £ \qquad (2)$$

$$\Delta U_t = \beta_0 - \beta_1 \Delta Y_t + £ \qquad (3)$$

When measuring the effect of unemployment on economic growth, we use equation (2), and when measuring the effect of economic growth on unemployment, the equation (3) is used (Abdel-Hadi, 2017) .Some research indicates that Okun's law may occur only during periods of business cycle contraction, and that during expansions this relationship does not materialize (Meyer & Tasci, 2012).

2.2. LITERATURE review

The economic literature included research and studies that dealt with the nature of the relationship between GDP growth and unemployment, whether at the level of developed or developing economies, which differ in terms of the variables used, the method of statistical analysis used and the time period of the study, which is reflected in the results of those studies and their importance. Standard studies show the existence of a causal relationship according to Granger's concept. However, theoretical analysis does not always confirm this relationship, given its focus on unemployment as an economic phenomenon resulting from a defect in economic policies. Finally, reference is made to what distinguishes this study from previous studies.

A number of studies investigate empirically the relationship between output and unemployment, These studies mostly reveal the validity of the relation between output and unemployment rate .The Study (Soylu, et al., 2018) aims to measure the impact of economic growth on employment in Eastern European countries for the period 1992-2014, by analyzing Okun's law -using the Autoregressive Distributed Lag (ARDL) approach to cointegration. The results of this study can be summarized that unemployment and growth are integrated, and that a 1% increase in GDP will result in a decrease in the

unemployment rate by 0.08%.(Abdellah, 2018) found, applying to Algeria for the period 1989-2015 and using the ARDL model, that there is a negative relationship between changes in unemployment and economic growth, and that an increase in GDP of 1% leads to a decrease in the unemployment rate by 0.78% in the long run

(Mojica & Tatlonghari, 2017) examined whether there existed the relationship between unemployment and economic growth in the Philippines through the implementation of Okun's law. using time series data from 1990-2014. Using three gap model, (first difference model) and (ARDL model), the results show that Okun's coefficients based on gap model are consistent with theoretical expectations of a negative relationship. While the results of Okun's coefficient indicated according to the first difference (model) that it is not only unimportant, but also does not correspond to the theoretical expectations of a negative relationship. While the dynamic model (ARDL) indicated that the current level of unemployment is greatly influenced by the previous level of unemployment, the rate of labor force participation in the past and present, and the degree of trade openness. There is also evidence of long-term equilibrium relationships in the three models based on tests of cointegration. study (Khaliq, et al., 2014): The relationship between unemployment and GDP growth was examined in nine Arab countries (Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Sudan, Syria, Tunisia) during the period 1994-2010. The results of this study that Economic growth has a negative effect on the unemployment rate, that an increase in economic growth by 1% will reduce the unemployment rate by 0.16%, and that an increase in the population growth rate by 1% will lead to an increase in the unemployment rate by 0.37% .Study (Bhda, Issa, 2012): The study attempted to measure the relationship between economic growth and unemployment rates in the Palestinian territories for the period 1996-2011 by knowing the extent of verification of the applicability of the Okun Law. The study found an inverse relationship between the rate of change in the rate of growth in the GDP, and the change in the rate of unemployment in the Palestinian economy.

The study (El-Bagoury, 2011, aimed to demonstrate the impact of economic growth on unemployment in Egypt using a multiple regression model during the period 1990-2010. The study found a weak negative significant effect of economic growth on unemployment. The estimated value

of the partial elasticity of unemployment in relation to growth Economic -0.5, which means that an increase in economic growth by 1% will lead to a reduction of unemployment by 0.5%.

A number of studies investigate empirically the relationship between output and unemployment, These studies mostly reveal the validity of the relation between output and unemployment rate. study (Rabeh et al., 2017): It analyzed the relationship between economic growth and unemployment in Algeria during the period 1990-2015. By using the VAR model, I found that unemployment rates are not stable and that there is a long-term positive relationship between the two variables, and thus Oken's law does not apply to the study. A study (Bengdu, 2017). It aimed to measure the impact of economic growth on unemployment in Algeria during the period 1990-2014 using the ARDL model. The study concluded the absence of joint complementarity in the relationship, which means that the economic growth rates achieved during this period were insufficient to reduce unemployment rates. (Muhammad, et al., 2014): It tries to measure the relationship between growth and unemployment in the Iraqi economy using Okun's law during the period from 1970-2010. The study found that the relationship between growth and unemployment is weak and was not simultaneous, and thus it reflects the non-applicability of Okun's law in Iraq, because unemployment in the Iraqi economy is not cyclical, but rather structural or frictional unemployment.

A study (Adrioche, 2013),aimed to study whether the Okun relationship applies to the Algerian economy during the period 1980-2011. And using co-integration test, it concluded that the two rates go in the same direction, that is, the law of Oken does not apply to the Algerian economy. A study (Kreishan, 2011): It sought to define the relationship between unemployment and economic growth in Jordan through the application of Okun's law. Using time series data during the period 1970-2008, the study used the unit root test and co- integration test, to determine the relationship between unemployment rate and economic growth. The results concluded that Okun's law cannot be confirmed in Jordan. Therefore, it is possible to refer to Low economic growth does not explain the unemployment problem in Jordan.

2.3 .Dialectic the impact of economic growth on unemployment:

This difference in the nature of actual growth and its impact on unemployment is what makes economic policies in developing countries fail

to reduce unemployment rates despite achieving somewhat high growth rates. Economic growth is a quantitative change that can occur in two directions, one of which is related to the increase in labor productivity, which usually does not lead to creating additional opportunities as it results from an improvement in the productive performance of the already existing workers, and this type of growth does not usually coincide with a significant reduction in unemployment rates. The other trend is related to creating additional job opportunities that lead to a reduction in unemployment rates. The growth associated with increased productivity cannot lead to a large reduction in unemployment, and this creates a kind of heterogeneity in economic policy, so that two contradictory goals are sought at the same time, namely an increase. Productivity and a reduction in the unemployment rate. Rising labor productivity leads to an increase in the productive capacities of the economy without the need to employ new labor, but the natural increase in the number of new entrants to the labor market is a great pressure on the economy's ability to absorb this increase.

These contradictions in the perception of the relationship between growth and unemployment are reflected in the perception of the economic policy pursued, is it to reduce unemployment or to stimulate growth? Does the direct relationship between increased growth and lower unemployment necessarily mean that there is no difference between a support policy and that directed towards eliminating unemployment? Perhaps the deficiency in the relationship between growth and low unemployment and the consideration of growth, regardless of its nature and source, leads to a reduction in unemployment, constituting the biggest deficiency in the conception of appropriate policies to eliminate unemployment. (Muawiya et al., 2012).

We note that despite the Egyptian economy achieving high rates in industrialization, as well as adopting capital-intensive industrialization strategies, it suffers from high unemployment rates due to the adoption of productive policies that depend on the heavy use of capital without taking into account the relative abundance of the labor component, and its qualification and integration into work, which contributed In the increasing contradiction between economic growth and increasing unemployment rates in Egypt (El-Bagoury, 2011).

3.The evolution of the relationship between economic growth and unemployment rates (1980-2018):

There are some shocks that the Egyptian economy was exposed to, externally and locally, that affected the rate of GDP growth. In 1991, the Gulf War took place between Iraq and Kuwait, which led to a decrease in the GDP from 5.67% in 1990 to 1.13% in 1991. In 2001 events occurred. September led to a decrease in the rate of GDP growth from 3.54 in 2001 to 2.39% in 2002. In 2008, the global financial crisis had many negative effects on the global economy and thus on the Egyptian economy, as the rate of GDP growth decreased from 7.16% in general. 2008 to 4.67% in 2009. Among the biggest shocks at the local level is the January 25 revolution in 2011, which resulted in a significant decrease in the rate of GDP growth from 5.15% in 2010 to 1.76% in 2011.In 2016, Egypt tended to take many measures to push the wheel of economic growth. In 2016, the Central Bank took an initiative aimed at supporting and financing small and medium enterprises. This initiative contributed greatly to reducing unemployment rates, as it decreased from 12.4% in 2016 to 12.1%. In 2017 to 11.4% in 2018 (Central Agency for Public Mobilization and Statistics - "Egypt in numbers" - Cairo - March - 2018).

Figure 1: Relationship between GDP Growth rate and unemployment in Egypt (1980-2018)
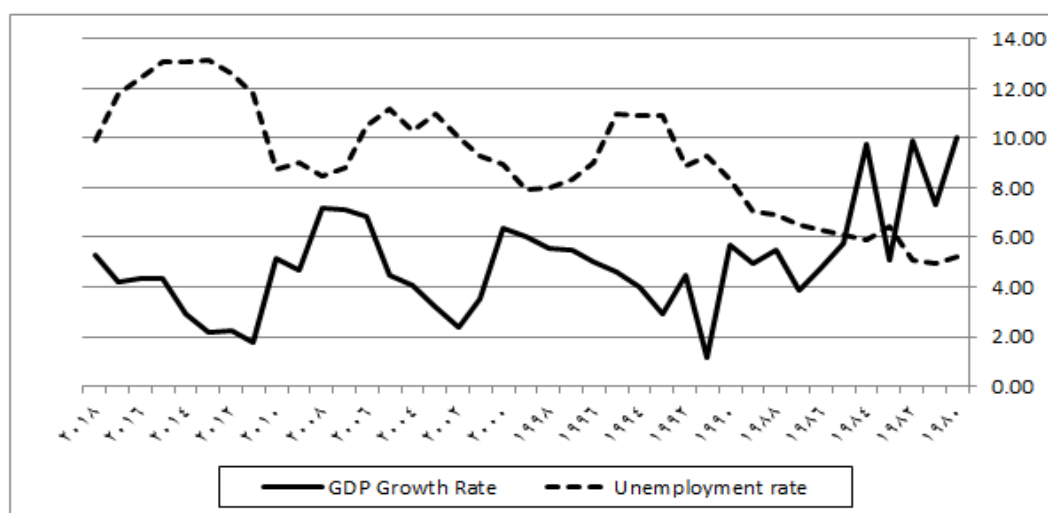
Source : Using (IFS)data

Looking at the developments of the GDP growth rate during the previous years, we find a significant increase in the growth rates, as it increased from 4.2% in 2017 to 5.3% in 2018, and an average of 3.5% during the fiscal years

2013-2016. The economic growth rate also increased and continued to rise in the first half of the fiscal year 2019, reaching 5.4% compared to 5.2% in the same period in the previous fiscal year.

The current recovery in economic growth has not been reflected in general economic growth on the labor market indicators, although the unemployment rate decreased by the third quarter of the fiscal year 2019 to 8.1%, compared to 11.77% before the start of reforms at the beginning of the fiscal year 2017, and this rate (8.1%) is the lowest rate. Unemployment rates since 2011. But looking at the employment rates, we find that they decreased to 38.5% of the total working-age population (15-64), compared to the employment rates at the beginning of the fiscal year 2017, when they were 40.4%, and the labor force participation rate also did not increase. (Total as a percentage of the population in the age group (15-64)), where it was 51.1 in fiscal year 2017 and continued almost the same in fiscal years 2018 and 2019, when it was 51.2 (World Bank, World Development Indicator, 2019). Some of the challenges related to the labor market are due to the high unemployment rate among the educated, youth and women. In the second quarter of the fiscal year 2019, the percentage of unemployed people with a university degree was 44.6%, among the age group 15-29 it was 78.7%, and unemployment among females was 16.7%.

4. Estimating the Model of the Relationship Between the Economic Growth rate and the Unemployment rate.

Formulating the Econometric model is one of the most important and difficult stages of building the model, through what it requires of determining the variables to be included in the model. the Econometric models play an important role in testing economic theories by explaining the relationships between the independent variables and the dependent variables. From Literature Review and economic theory, the Econometric model of the study can be formulated as follows:

$$U_t = \beta_0 - \beta_1 Y_t + e_t$$

U_t : the unemployment rate (dependent variable).
Y_t : the growth rate of the GDP (the independent variable).
t: time, β_0, β_1 the parameters of the model, and e_t the random variable (Residual).

The model covers the time period from 1980-2018 and the choice of this period is due to the fact that it witnessed a number of external and local economic crises that the Egyptian economy was exposed to, which was clearly reflected in the level of economic performance in general and the labor market in particular. Annual data were obtained from World Bank publications (World Bank, World Development Indicator, 2019). And the Central Bank of Egypt .

4.1 the model description.

Model estimation steps:

First: Measuring the nature and strength of the relationship between the growth rate of GDP and the unemployment rate:

The SPSS program and the E-Veiws program were used to calculate the correlation coefficient between the GDP growth rate and the unemployment rate during the period (1980-2018), it was found that the correlation coefficient between the GDP growth rate and the unemployment rate is negative, meaning that there is a strong inverse relationship between them, as the value of the correlation coefficient (-0.84) .

4.2.Testing the Causal Relationship Between the GDP Growth rate and the Unemployment rate requires the following steps:

First: Examining stationary series and determining the degree of lag in time for the variables: Time series analysis is important to ensure the stationary of the time series before test the causal relationship test through unit root tests and determining the degree of integration of time series.

1-Testing the stability of the data through the Unit Roots Test and determining the integration order:

The first stage in the time series analysis is to test the stability of the series variables in order to avoid the spurious regression or the spurious correlation problem. The unit root will be used to find out the degree of integration of the time series of the variables and to find out whether the variables are stable or not. The study will be based on the Augmented Dickey-Fuller (ADF) and the null hypothesis test of the unit root (the instability of time series): **H_0: X has a unit root.**

Determine the degree of lag for time series:
The degree of lag (P) is determined by the Schwarz information criterion (SC)

The lag period for the variable of GDP growth rate and The unemployment rate variable has three.

Table (2) Tests for Unit Roots Based on ADF test

	Level		First Different		Degree of Integration
	Prob.	**t-static**	**Prob.**	**t-static**	
Var$Y$	0.0002	-5.010184	-	-	I (0)
Var$U$	0.0490	-3.536674	-	-	I (0)

The reported result in table (2) indicated that the variables are stable in levels at a significance $< .05$, and since the variables are stable in levels, this means that they are integrated of I (0)

Granger Causality test:

The assumption of nothingness takes the following form:

$$H_0 : B=0 \text{ "Y does not Granger Cause U"}$$

Table (3) Granger causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
U does not Granger Cause Y	37	2.16830	0.1309
Y does not Granger Cause U		3.03320	0.0410

Table (3) shows the causal results between the two variables as it indicates the existence of a single causal relationship that goes from the rate of GDP growth to the unemployment rate, meaning that the changes that occur in the GDP explain the changes that occur in unemployment, as the null hypothesis was rejected. Because prob value = 0.0410. The assumption that changes in unemployment does not explain changes in GDP is accepted, where the value of prob = 0.1309..

Co-integration Test:

To test the existence of a long-run relationship between the two variables of the study, we use Johansen co-integration test. the study concluded that there is one co-integration relationship with a 5% significant level. This confirms

the existence of a long-run equilibrium relationship between the study variables, as shown in Table (4).

Table (4) Co-integration Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.72632	0.836190	14.53930	0.0000
Y	-0.784126	0.163796	-3.889743	0.0004

R-squared	0.7910431	Mean dependent var	9.156410
Adjusted R-squared	0.271055	S.D. dependent var	2.357651
S.E. of regression	2.012922	Akaike info criterion	4.286973
Sum squared resid	149.9187	Schwarz criterion	4.372284
Log likelihood	-81.59597	Hannan-Quinn criter.	4.317581
F-statistic	15.13010	Durbin-Watson stat	0.530238
Prob(F-statistic)	0.000403		

Based on the above, the co-integration equation, which represents the relationship between the variables, takes the following form:

$$U = 12.726 - 0.7841* Y + e$$

$$(14.539) \qquad\qquad (-3.889)$$

$$N = 39 \qquad\qquad R^2 = 79\%$$

The estimated equation indicates the significance of the relationship between GDP growth and unemployment at the level of 5% and inversely, and this is inferred from that an increase in economic growth of 1% leads to a decrease in unemployment by 0.78%. If economic growth is non-existent, unemployment is equal to 12,726

From the estimated equation, we find that:

1-There is an independent variable that is significant according to the results of running Eviews 10, in addition to the significance of the constant c.

2 -The estimated statistical results of the previous equation agree with the assumptions of the study and the economic theory, as it is noticed that there is an inverse relationship between the growth of GDP and unemployment.

5. Conclusion and policy recommendations

1- The results of the study indicate that the relationship between GDP growth and unemployment is negative. As well as the results of the coefficient of determination $R^2 = 79\%$ that indicates there are factors other than growth that affect the change in unemployment, and the remaining percentage is $R^2 = 21\%$.

2- It is evident from testing the strength and type of the relationship between the two variables using the correlation coefficient, that the relationship between the two variables is inverse and strong between them, as the value of the correlation coefficient = 0.873. where the value of the correlation coefficient ranges between zero and the correct one, and whenever it approaches the correct one, this indicates the strength of the relationship.

3- The study showed that the time series of the variables under study are stable in levels, and then they are co-integration of degree I (0).

4- The Johansen test for cointegration indicates the existence of one covariant integration vector, which reflects the existence of a long-term relationship between the two variables.

5-Granger's causality test showed a one-way relationship between GDP growth and unemployment. It is heading from the output to unemployment and not vice versa.

6- Planning education according to the needs of the labor market, as poor planning in this aspect made some majors suffer from a surplus in the supply of the workforce, while other disciplines suffer from a large deficit. Therefore, the link of educational and research activities with development and production programs became weak. Consequently, education policies need to be reviewed in a way that reduces unemployment among graduates of universities and higher and intermediate institutes and rationalizes government spending on unnecessary specialties.

7- Increasing interest in information and communication technology software that can bring about positive changes and help create new job opportunities.

8 -Attention to small and medium industries, which is one of the most important areas today to absorb large numbers of workers, which requires providing financial, administrative, legal and marketing assistance and support for them.

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