

## The Validity of Okun's Law, Case of Jordan

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### Abstract

The main aim of this study is to empirically examine, investigate and test the relationship between unemployment rate and economic growth within Jordanian economy over the period of time (1982-2016), in order to examine the validity of Okun's law, which suggests a negative relationship between unemployment rate and economic growth, several economic methods are employed by using descriptive statistics, as well as some econometric tests, in order to analyze the variables under study.

The empirical results of this study show a negative relationship between unemployment and GDP in the period 1982-2016 in Jordanian economy, which is consistent with Okun's law. In other word, this study offered an additional empirical evidence to confirm the validity of the Okun's law in the case of Jordan over the period 1982-2016. So any attempt to increase economic growth through some economic policies such as expansion in spending would reduce unemployment rate, where the Okun's coefficient of GDP with respect to unemployment rate is - 0.004, such that an increase of 100 million Jordanian Dinars in the Real GDP will cause 40% decrease in the unemployment rate, which is about half percent in unemployment rate in the next. The findings of this thesis may help economists and policymakers when adapting policies in order to adjust unemployment level in the economy.

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**Keywords:** Unemployment rate, economic growth, Okun's law, Jordan

### Introduction

The main goals of macroeconomic, are to have an economic growth with full employment and stable prices. The mega concerns of every economy are Economic growth and unemployment, where unemployment is often used to measure the health of economy. Unemployment is defined by bureau of labor statistics (BLS) as people who don't have jobs and actually looking for work in the past four weeks. The unemployment rate can be

defined as the ratio of the number of people unemployed to the total number of people in the labor force, where the labor force is the number of people employed plus the number of people unemployed. Milton Friedman and Edwin Phelps developed the concept of natural rate of unemployment in 1960s. It is defined as the low level of unemployment at which economy faces a stable inflation rate. And it is equal to the frictional unemployment rate plus the structural unemployment rate. Okun's law investigates the statistical relationship between economic growth and unemployment and the loss of the output when unemployment is above the natural rate, in other words the output depends on the amount of labor used in the production process. So there is a negative relationship between unemployment and GDP.

The unemployment has a multi-dimensional effects on both economic side and social side, so extensive analysis is carried out to understand the cause and solution for this problem. Also GDP is a main objective for fiscal and monetary policies to create more jobs in order to reduce the unemployment. However that many studies confirm that an increase in GDP sometime is not sufficient to create more jobs to reduce unemployment, also some studies confirm that a reduction in employment sometime is not sufficient to increase GDP. So economists and policymakers work to increase economic growth and reduce rates of unemployment and in order to achieve full employment and stable prices level. But in general the unemployment reduction should be consistent with economic growth in a long-term period.

Jordanian economy is among the smallest economies in the middle east, with scarce resources of water, oil and gas, beside the regional and international crises of wars and instability, all generate local and permanent economic problems such as high rate of unemployment , high rate of inflation, budget deficit, public dept and high rate of poverty. These factors forced the government of Jordan to take a number of steps in recent years to open its economy , control public dept, boots foreign direct investment and increase privatization in order to increase the economic growth and to lower the rates of unemployment and inflation. This study is of paramount importance, Firstly because it analyzes and identifies an important relationship between two main variables of any economy, Secondly it indicates facts compatible with theoretical basis based on Okun law. The findings of this thesis may help economists and policymakers in outlining the outcomes, effects and side effects of unemployment, and GDP and the relationship between these variables, when adapting policies in order to adjust unemployment level in the economy. Also this study will serve as a reference material for future researchers.

## **Study Objective**

The main aim of this study is to empirically examine, investigate and test the relationship between unemployment rate and GDP within Jordanian economy over the period of time (1982-2016), in order to examine the validity of Okun's law.

## **Theoretical and literature Review**

The economic growth and unemployment are the two primary factors that economist must consider when they want to study any economy, the relationship between the two variables has been studied by many economists and researcher almost in all countries. Okun's law suggests a negative relationship between unemployment and GDP.

The exact cause of unemployment will always be disputed, because there are many and numerous predication theories to explain the unemployment. In general, there are many types of unemployment, such as frictional, seasonal, structural, cyclical, induced, hidden unemployment, Behavioral unemployment, where some workers refuse certain types of jobs available due to social and public attitudes, Disguised unemployment is due to higher employment than what actually needed for work especially in public sectors. Each type causes a unique problems for government. In modern economy unemployment has a variety of causes related to general level of economic activity or to the failure of the labor market in the economy to work toward optimally. There will always be some frictional unemployment in any economy, because information isn't perfect and it takes time to find work, so a rate of 2% would be considered to be full unemployment. Frictional unemployment is a short term and a natural part of the job search process and in fact it is good for the economy as it allows workers to move to jobs where they can be more productive.

Unemployment is not only affecting the overall national economy and the level economic activities in the country, but also affecting all others social sides and these costs can be divided into economical, fiscal and social costs.

The direct solution for unemployment is obviously to create more jobs. High unemployment rate is one of the biggest problems for any economy working below its full output potential or below its production possibility frontier (PPF). There are some policies to reduce unemployment, the demand side and the supply side policies, but all of these policies need efforts and require a lot of patience. All these policies revolve around the efforts of increasing aggregate demand (AD). Monetary policy is a quick and usually effective policy to reduce unemployment by lowering interest rate, encourage households to borrow money to buy houses, cars and other things they need, which decreases the saving and increases the consumer's income available for consumption, results in stimulating more demand in the

economy. Also low rate interest allow firms to borrow money, and encourage businesses and companies to invest in the economy, thus hiring more workers to meet the rising demand, resulting in unemployment reduction. Fiscal policy is used when the monetary policy does not work, then the government must either increase spending or cut taxes to stimulate the economy. Fiscal policy is very effective once executed , also provide confidence for households and firms to consume and invest. When the government rises its spending on capital projects or by increasing aggregate demand, more jobs are created in the economy. Also cutting taxes has similar effects to lowering interest rate, which increases consumer's disposal income ,increases the whole demand and more workers are required. There is a negative side of the fiscal policy, that it can worsen the budget deficit, due to expansionary spending and tax reduction, which creates more government dept and then slow down economic growth rate. Supply side policies are working on the supply side to control the problem of high unemployment, such as:

(1) Regional policy incentives is a government technique in giving grants and subsidies to firms to locate in areas of high unemployment.

(2) Improving geographical mobility of labor by providing grants or low-cost housing schemes to encourage workers to move to other regions, where there are jobs available.

(3) Improving in job information by providing information on job vacancies among the labor force can reduce the level of unemployment in the country.

(4) Improving flexibility in the labor market in term of hiring and firing workers and increased shifts or maximum working hours that can help reducing unemployment.

(5) Cutting wages is effective in reducing unemployment if wages are flexible, but Keynesian economists argue that this could lead to a further fall in aggregate demand, and may be ineffective in reducing classical unemployment.

Okun's law suggests a negative relationship between unemployment and GDP. However that many studies confirm that an increase in GDP sometime is not sufficient to create more jobs to reduce unemployment, also some studies confirm that a reduction in employment sometime is not sufficient to increase GDP. But in general, the unemployment reduction should be consistent with economic growth in a long-term period, and Okun's law analysis the gap between potential economy output and actual output rate under the condition of full employment or even high unemployment depending on the levels of current and historical economic growth.

Also the difference model of Okun's law suggests a negative impact of an increase in the Real GDP on the rates of unemployment and can be expressed and written in the form:

$$\Delta \text{UNER}_t = B_0 + B_1 \Delta \text{GDP}_t + \varepsilon_t \dots\dots\dots(1)$$

Where  $\Delta \text{GDP}_t$  is the change in real GDP in year t,  $\Delta \text{UNER}_t$  is the change in the unemployment rate in year t,  $\varepsilon_t$  is the error term,  $B_0$  is the intercept coefficient(constant) and  $B_1$  is the slope coefficient(Okun's coefficient)

Many empirical studies show either a positive or negative relationship exists between unemployment, and GDP. Over all there is a little debate that Okun's law represent one of the most straightforward and convenient methods to investigate the relationship between unemployment and GDP besides its simplicity statement in statistical form, which can be seen in the following studies:

(1) Awad, study (2011) ,**The Problem of Unemployment in Jordan.** The object of this study was to clear out the causes and the effects of the unemployment in Jordan, this study shows that in spite of high levels of education and health standard Jordanians enjoy compared to other Arab countries, Jordanians face a chronic unemployment problem particularly among youths. The overall unemployment rate around 13% during the last few years and expected to further deteriorate in light of high percentage of young university graduates who will be seeking jobs soon. Most unemployment in Jordan is attributed to behavioral attitude and/or to structural labor market problem. Externally, the long period of stagnation that was affected the region since early eighties, followed by the ongoing financial and economic crises contributed to further to the deterioration of economic performance for both economic and political instabilities in the region.

(2) Kreishan study(2011), **The economic growth and unemployment :An empirical analysis.** The study investigate the relationship between the economic growth and unemployment in Jordan through the implementation of Okun's law by using annual data 1970-2008. The results do not show the negative relationship between the economic growth and unemployment as suggested by Okun's law, in the sense that increasing the aggregate demand will not affect unemployment .

(3) Al-Habeeb study(2012), **The relationship between unemployment and economic growth in Jordan and some Arab countries.** The study to highlights the relationship between the economic growth and unemployment and to reveal the social development that lead to increasing economic growth. The results show that their no strong positive relationship between the economic growth and unemployment ,so that increasing the economic growth will not significantly reduce unemployment in some Arab countries such as Jordan and Algeria.

(4) Arouri study(2012), **Macroeconomic variables and unemployment :The case of Turkey**. The study investigate the impact economic growth, Inflation , Export growth, Exchange rate ,Interest rate, and Money growth on unemployment in Turkey. The findings of this study: The economic growth, Inflation , and Export growth create negative impact on unemployment , but Exchange rate ,Interest rate, and Money growth create negative impact on unemployment .So these results are inconsistent with Okun's law , and also the results are inconsistent with Philips curve relationship .

(5) Olanipekun and Akeju study(2014), **unemployment and economic growth**. The study intends to test the relationship between the economic growth and unemployment as stated in Nigeria by using econometric techniques to determine the relationship between economic growth and unemployment in the short and long run. The results show that there is a positive relationship between the economic growth and unemployment in the short and long run in Nigeria ,so that increasing the foreign direct investment will reduce unemployment rate.

(6) Stober study(2015), **The validity of Okun's law; An assessment of United Kingdom' unemployment output relationship** . The study provides an assessment of the output and unemployment relationship by using squarely time series data 1971-2013. The results show the negative correlation between the output and unemployment as suggested by Okun's law, in the sense that increasing the economic growth by 1.8% will keep the unemployment rate constant.

### **Research Methodology**

This study is designed to investigate, and test the relationship between unemployment and economic growth on Jordanian economy over the period 1982-2016. This study provides following methods of investigation and analysis:

(1) A descriptive graphical analysis such as trend, patterns and plots is used to analyze Jordanian GDP,and unemployment to investigate the mutual relationship between these variables .

(2) An econometric analysis method with the aids of the EVIEWS techniques is used to examine the economic model in order to explore the relationship between unemployment and GDP on the Jordanian economy over the period 1982-2016.

### **Data**

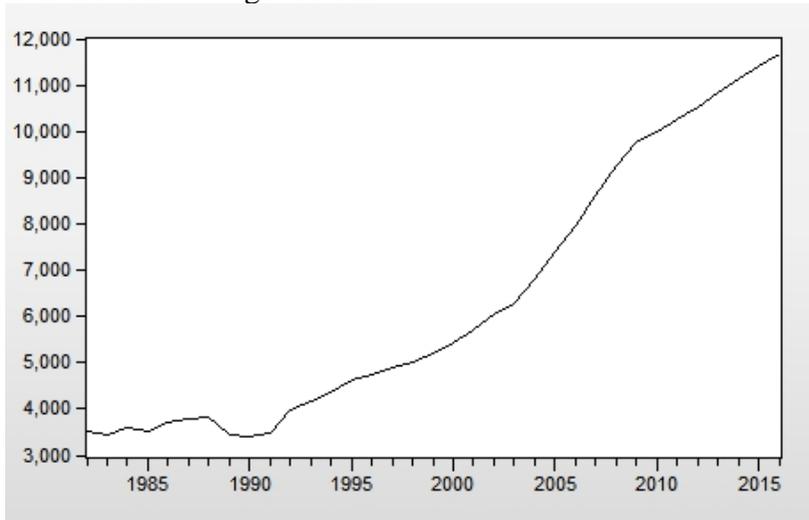
The annual time series data over a forty years period from 1976 to 2015 of the selected variables( GDP rate, and unemployment rate) of Jordanian economy were collected from Department Of Statistics in Jordan(DOS),

Central Bank of Jordan(CBJ) , international financial statistics and Global Bank data base.

**Descriptive and Graphical Analysis Approach.**

Jordan has limited natural resources, potash and phosphate are the main export commodities. Services account are more than 70 percent of the GDP and occupy more than 75 percent of the jobs in Jordan. The policymakers aim to demographic opportunity of well educated young population to build a dynamic and a knowledge-base economic through integration with neighbors in trade, remittances, foreign direct investment and tourism. In fact the Jordanian economy is dominated by services, transportation, tourism, manufacturing and remittances from Jordanians working abroad. But the on-going political crises in the region has formed economical shocks to Jordanian economy, causing the public dept to rise sharply reaching about 90 percent of the GDP , and expecting to be higher in the coming years.

The trend of the Real GDP, in the Jordanian economy over the period 1982-2016 is shown in Fig.1 below.



Real GDP Trend

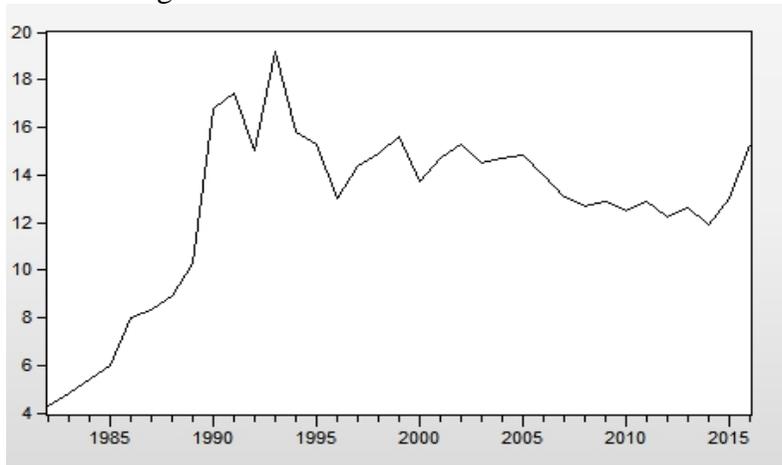
Fig. 1

It can be seen clearly from Fig. 1, that the Real GDP is decreasing in some periods such as 1986-1990 and 2007-2010, and is increasing in other periods such as 1989-1995 and 1996-2004. Fig.1 shows that the Real GDP is high from 1982 until 1983 due to the high remittances of Jordanian working abroad, then it goes down as the prices of oil declines rapidly forcing Jordanian workers to return home especially from the Arab Gulf countries. The Real GDP decreased sharply to the minimum value in 1989 due to the devaluation of the Jordanian Dinar. In 1993 the Real GDP rose up due to the

direct foreign investment in Jordan. Therefore the economic growth is decreasing and increasing steadily except in certain year where the economy experiences some economic shocks.

Unemployment is a worldwide phenomenon, every country has its share because full employment hardly exists and some economists think that a 3% unemployment rate is healthy and it is due to a transfer of labor from one job to another (frictional unemployment). The Jordanian unemployment rate is one of the highest rates in the world, but the Jordanian extended family system is able to absorb and tolerate this high rate, in such that if one member or more of the family work, then they support the whole family. Also the Jordanian labor market is a unique one, one third of the labor force is working abroad, and one third of the working labor force in Jordan are guest workers.

The trend of unemployment rate of the Jordanian economy from 1982 until 2016 is shown in Fig.2 below.



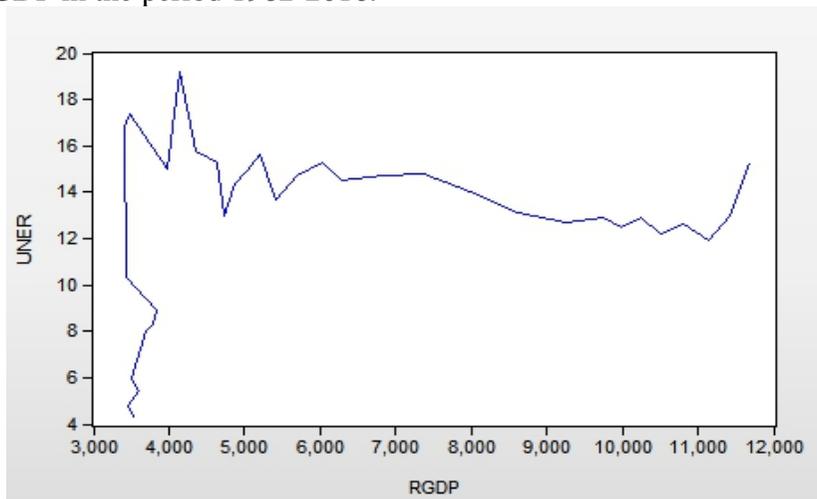
Unemployment Rate(UNER) Trend  
Fig.2

The unemployment rate on the Jordanian economy over the period 1982-2016 has been in the double-digits with an exception of the period between 1982 to 1988 because of the better employment opportunities for the Jordanian labor force outside Jordan, especially in the Arab Gulf countries, which kept the employment rate low and steady in the 1970s and 1980s. The rapid decline in oil prices in 1983 caused the Jordanian workers in the Arab Gulf countries to return home, creating high unemployment rates within Jordan. In 1989, the high unemployment of 10.28 percent combined with the highest level of inflation of 25.67 percent was due to the devaluation of the Jordanian Dinar. The second Gulf war in 1990 has affected Jordan badly due to the influx of about 0.33 million people from Iraq and Kuwait, which drove the unemployment rate to higher levels again. From Fig.2, it can be seen clearly

that the unemployment rate increases rapidly from 1982 until 1993, where the unemployment rate starts going down rapidly then up and down slowly until 2013. So we could say that 1993 is a structural breaking point or turning point.

There are many different type of unemployment in Jordan namely: frictional, cyclical, structural, seasonal, voluntary, involuntary (compulsory), behavioral and disguised unemployment. The most insidious types of unemployment in Jordan are behavioral unemployment , where some workers refuse certain types of jobs available due to social and public attitudes, and disguised unemployment due to higher employment than what actually needed for work especially in public sectors. The unemployment rate in Jordan has held steadily in a double- digits with a few exception in 1970s and 1980s.Unemployment could be the most serious problem facing economy since the establishment of the Kingdom in 1946, because of the limited natural resources, high population growth rate due to compulsory migration results of regional wars and unstable political situation , global economic slowdown growth, scare opportunities in labor market and the existence and of behavioral and disguised unemployment. It is impossible to find solution for all causes of unemployment, but there are many certain measures can be adopted to reduce the unemployment rate by increasing the GDP rate to create more jobs and more employment opportunities and by changing the conditions in the labor market, such as taxes cut, minimum wages, and unemployment compensation. In general terms the fundamental solution requires restructure of the economy on the basis of ownership of production and the needs of all people to participate in.

Fig.3 shows the relationship between unemployment rate(UNER) and Real GDP in the period 1982-2016.



Unemployment Rate- Real GDP Diagram

Fig.3

The graph in Fig. 3 shows a negative relationship between unemployment rate and GDP on Jordanian economy most of the time in this period.

**Econometric Analysis Approach**

The simple linear regression is an approach to model the relationship between the a dependant (regressand) variable y and un independent (regressor) variable x. It is a method to determine which model best fits the data. The simple stochastic linear model is:

$$y_i = a + b x_i + e_i \dots \dots \dots (2)$$

where y is the function of x, i.e  $y = f(x)$ ,  $y_i$  is the  $i^{th}$  value of the dependent variable y, a is a is the intercept, b is the slope coefficient,  $x_i$  is the  $i^{th}$  value of the independent variable x, and  $e_i$  is the error ,which contain the variability of  $y_i$  not explained by  $x_i$  .

In practical cases, the linear regression is used to predicate the model to an observation data of y and x in order to estimate the values of unknown parameters a and b, then the model could be tested for statistical significance to show wither an increase independent variable x causes an increase or a decrease in the dependent variable y as hypothesized. It should be noticed that if the estimate of b is zero, then there is no relationship between the two variables x and y.

The difference model of Okun’s law in economic terms , expressed by equation(1) is:

$$\Delta UNER_t = B_0 + B_1 \Delta GDP_t + \epsilon_t \dots \dots \dots (1)$$

Where  $\Delta GDP_t$  is the change in economic growth ( real GDP) in year t,  $\Delta UNER_t$  is the change in the unemployment rate in year t,  $\epsilon_t$  is the error term,  $B_0$  is the intercept coefficient(constant) and  $B_1$  is the slope coefficient(Okun’s coefficient)

To test the mutual relationship between unemployment rate, and Real GDP in equation(1) , an econometric statistical analysis is carried out by using a simple regression tool with the aids of EVIEWS technique in order to estimate the parameters( $B_0$  &  $B_1$ ) for solving the relationship between the unemployment rate(UNER) and the Real GDP on Jordanian economy over the period 1982-2016. The Augmented Dickey-Fuller test will be run to test for unit root for all variables, co-integration test to test the long-run relationship between the variables , then data will be regressed through the regression equations to predict the relationship between the variables under study using the following tests:

(1) Unit Root Test: The assumptions of the Classical regression model necessitate that both the dependent and independent variables must be stationary and the errors have a zero mean and finite variance. Non stationary variables results in spurious regression. In order regress the data

through the regression equation (1) Augmented Dickey-Fuller unit root test and Phillips- Perron unit root test being run to test for unit root for the two variables with intercept and trend, and without intercept and trend(none) at significant 5% level, the result in Table1 below.

Table-1  $\Delta$ GDP- $\Delta$ UNER unit root test.

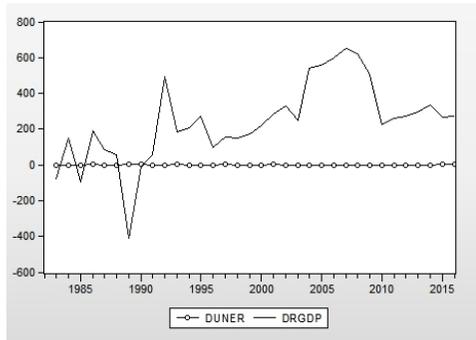
Augmented Dickey-Fuller unit root test				Phillips- Peron unit root test		
SERIES	t-statistic with trend only	t-statistic with trend& intercept	No. of differential	t-statistic with trend only	t-statistic with trend& intercept	No. of differential
$\Delta$ UNER	-6.218 (-2.954)	-6.376 (-3.553)	Level	-6.214 (-2.954)	-2.51 (-3.553)	Level
$\Delta$ GDP	-2.386 (-2.954)	-3.573 (-3.553)	Level	2.744 (-2.954)	-3.366 (-3.553)	Level
	-8.386 (-2.954)	-8.259 (-3.553)	1 <sup>st</sup> differenc	-11.569 (-2.954)	-12.057 (-3.553)	1 <sup>st</sup> differenc

Note: The number in the parenthesis ( ) is the 5%critical value.

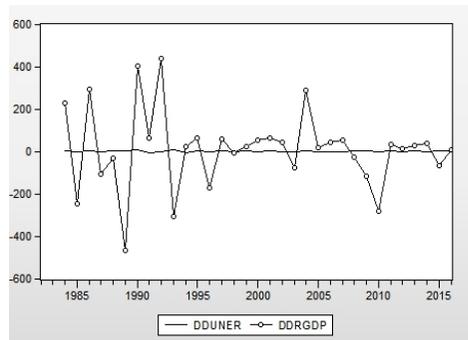
Source: unit root tests, EViews, researcher own tabulating.

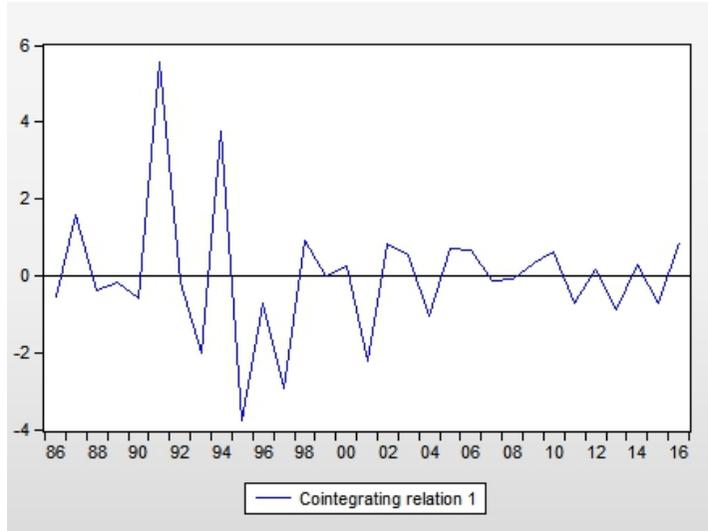
Table 1 shows that the change of unemployment rate( $\Delta$ UNER) series is stationary at its level in both Augmented Dickey-Fuller test and Phillips-Perron test, and the change of Real GDP ( $\Delta$ GDP) is not stationary at its level, but stationary at the first difference in both Augmented Dickey-Fuller test and Phillips- Perron test. So we can conclude that the change of Real GDP ( $\Delta$ GDP) and the change in unemployment rate( $\Delta$ UNER) series are not stationary at theirs level, but they are stationary at the first difference in both Augmented Dickey-Fuller test and Phillips- Perron test. Also Fig.4 below clearly shows the differences in trends with non-stationary , with stationary and the co-integration of these series.

NONSTATIONARY



STATIONARY





UNER and GDP Trends  
Fig.4

(2) Co-integration test: Since both  $\Delta GDP$  and  $\Delta UNER$  series are not stationary at level, but there are stationary at first difference for Augmented Dickey-Fuller test and for Phillips-Perron test, co-integration test is required to examine the co-movement of the variables in the long-run. The results of Johansen co-integration test for GDP rate and unemployment rate are in Table 2 below:

Table 2  $\Delta GDP-\Delta UNER$  Johansen co-integration test.

Hypothesized No.of CE's	Eignvalue	Trace Test		Max-Eign Test	
		Trace Statistics	Propability	Max-Eign Statistics	Propability
None(R=0)	0.522672	27.54903 (15.49471)	0.005	23.66564 (14.26460)	0.00123
At most 1 (R $\geq$ 1)	0.1114281	3.883391 (3.841466)	0.0488	3.883391 (3.841466)	0.0488

Terms in( ) indicates 5%level critical value

Trace test and max-Eigenvalue test both indicate 2 cointegrating eqn(s) at the 0.05 level Source: Johansen co-integration test for  $\Delta GDP-\Delta UNER$ , Eviews , researcher own tabulating.

The result in Table-2 shows the Trace statistic and the Max. Eigen value statistic are both greater than the 5%level values, then the null hypotheses of no co-integration on both trace test and maximum Eigen value test between  $\Delta GDP$  and  $\Delta UNER$  can be rejected at 5%, also the alternative hypotheses of no co-integration could not be rejected at 5% level ,meaning that the Trace test and the Max. Eigen value test both indicates two co-integration

equations at 5% level. This means that the  $\Delta$ UNER and  $\Delta$ GDP are co-integrated and there is stationary linear relationship between these variables. Since there is a co-movement of the variables in the long-run Thus we can proceed with more tests like Vector Error Correction Model(VECM) test on these two variables.

(3) Vector Error Correction Model(VECM) test: The advantage to using a the VECM test is its ability to identify both the short-run and the long-run relationships, also it indicates the nature of the relationship between the two variables under study ,whether this relation is positive or negative. So the VECM was employed to examine the long-run relationship between the two variables based on the relation shown in equation (1) below :

$$\Delta \text{ UNER}_t = B_0 + B_1 \Delta \text{ GDP}_t + \varepsilon_t \dots\dots\dots(1)$$

Where  $\Delta$ GDP<sub>t</sub> is the change in economic growth ( real GDP) in year t,  $\Delta$ UNER<sub>t</sub> is the change in the unemployment rate in year t,  $\varepsilon_t$  is the error term,  $B_0$  is the intercept coefficient(constant) and  $B_1$  is the slope coefficient(Okun’s coefficient). Where the null and the alternative hypotheses of VECM test are:

$$H_0: B_1 = 0$$

$$H_1: B_1 \neq 0$$

By estimating equation (1) in the period 1982-2016, the results in the long -run are in Table3 below:

Table 3  $\Delta$ GDP- $\Delta$ UNER VECM test (1982-2016)

Coefficient	Coefficient Value	Std Error	t- Statistics	Prop.	R-squared	D- Watson
C <sub>1</sub>	-1.314	0.473724	-2.77	0.008	0.682	1.886

Source: VECM test, EViews, researcher own tabulating

The results in Table 3 show the estimated coefficients C<sub>1</sub> is significant because it’s probability(0.008) is less than 0.05,also the sign of the estimated coefficients C<sub>1</sub>is negative , means that a positive change in Real GDP will cause a decrease in the UNER, such that one unit(one million Jordanian Dinars) increase in the Real GDP will cause 4% decrease in the UNER, or an increase of 100 million Jordanian Dinars in the REALGDP will cause 40% decrease in the UNER, which is about half percent in unemployment rate in the next year. Also that the value of R<sup>2</sup> is 0.682 means that the dependent variable( $\Delta$ GDP) account for 68.2%of the change in the Unemployment rate ,i.e only 68.2% of the change in the Unemployment rate is explained by  $\Delta$ GDP and must be other variables not introduced in this model could explain the rest change in the Unemployment rate. D-Watson is 1.886,which is close to 2 ,so it indicates no serial correlation in this model .Thus the estimation of equation(1) in the long-run is :

$$\Delta \text{ UNER}_t = 1.192 - 1.314\Delta \text{ UNER}_{t-1} - 0.004 \Delta \text{ GDP}_t$$

Therefore the relationship between unemployment rate(UNER) and Real GDP is negative in the Jordanian economy over the period 1982-2016, which is consistent with the economic theory according to Okun's Law.

(4) Model efficiency tests: More diagnostic tests can be carried out to verify and confirm the model efficiency and the model specifications of the model in equation(1) which is used in the VECM test, in such that the model should have a normality, and no autocorrelation (serial correlation) in order to end up with a good conclusion and interpretation as follows:

(a) Normality test: The residual has to be normally distributed with zero mean and a constant variance, to detect the misspecification problems is through observing the residuals, where Table 4 below shows the VEC Residual Normality Test.

Table 4 VEC Residual Normality Tests

Component	Jarque-Bera	df	Prob.
1	1.0635085	2	0.5871
2	4.103059	2	0.1285
Joint	5.168143	4	0.2705

Source: VEC Residual Normality Tests, EViews, researcher own tabulating.

From Table 4 above, the joint *p value* is 0.2705 which is statistically significant, so we do accept the null hypothesis of normality assumption. Therefore we have no doubt about the normality of the residual distribution, so we accept the model.

(b) Autocorrelation test: The time series data of economics is usually threatened by an autocorrelation or serial correlation, where two or more consecutive error terms are related, as a result of either excluded variables or the use of incorrect functional form. The consequences of autocorrelation are that variance of the parameter is no longer the smallest and the OLS remains unbiased, but becomes inefficient model. Table 5 below shows the results of VEC Residual Serial Correlation LM Test:

Table 5 VEC Residual Serial Correlation LM Test

Lags	LM-Stat	Chi-sq df	Prob.
1	2.727783	4	0.6044
2	1.763040	4	0.7792

Source: VEC Residual Serial Correlation LM Test, EViews, researcher own tabulating.

The results of Table 5 shows that probability values are 0.6044 and 0.7792 which are statistically significant, and greater than 5%(0.05) significant level, so we cannot reject the null hypothesis of no autocorrelation assumption. Therefore there is no Serial Correlation problem and the model is accepted.

## Conclusion

Unemployment has been always major issue for many economists in different economies, and it becomes even bigger problem in the time of

recession, where work has to be carried out on increasing the AD and supply side factors. But unemployment can be controlled to a certain limit, depending on the types and the causes of the unemployment in each country. Jordan has implemented governmental economic reforms such as open trade, privatizing and eliminating subsidies have attracted foreign investment, but economic regional and global crises have effected and depressed Jordanian GDP growth badly. The double-digit unemployment rate is alerting the decision makers to find a productive strategies to solve or ease the unemployment problem by creating more jobs, especially among the youth people. Also the high prices of goods and services in recent years, due to high prices of imported and exported goods and services, such as oil, gas ,raw materials, electricity and food as a result of international crises, regional instability and corruption.

Okun's law suggests a negative relationship between unemployment and GDP. many empirical studies in many countries show either a positive or negative mutual relationship exists between unemployment and GDP.

The findings of the descriptive analysis and the econometric analysis carried out in this study confirm a negative relationship between unemployment and GDP, which is consistent with Okun's law on Jordanian economy over the period 1982-2016. So any attempt to increase GDP through some economic policies such as expansion in spending would reduce unemployment rate, where the Okun's coefficient of GDP with respect to unemployment rate is 0.004, such that an increase of 100 million Jordanian Dinars in the real GDP will cause 40% decrease in the unemployment rate, which is about half percent in unemployment rate in the next. But many recent empirical studies show that this relationship could be positive. This empirical analysis is to extend this debate and evaluate this relationship in a developing economy. These finding of this study clearly leads a to a conclusion of a validity Okun's law in Jordan. In other words, empirical finding provided an additional proof that Okun's law could exist in a developing country such as Jordan.

It is suggested that governmental economists and policy makers to use the fiscal and monetary policies in order to obtain better control and stabilize unemployment rate to some extent. The findings of this thesis may help economists and policymakers when adapting policies in order to adjust unemployment level.

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