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Test of economic growth and unemployment using vector auto regression in Iraq

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Abstract

Economic growth and unemployment are considered the most imperative variable for the studies related to construct and implementing economic policies. Hence the core purpose of this study is to examine the cause and effect relationship between two variables "economic growth and unemployment" in Iraq. The time series data has been taken from 1999-2017 and VAR model has been used to test the relationship. Statistical software Eviews 9 has been used to run the VAR model. The results have shown that there is a negative relationship between unemployment and growth rate in Iraq which is economically and statistically significant.

Keywords: Economic growth, Vector auto regression, Economic policies, Unemployment and growth rate.

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Prueba de crecimiento económico y desempleo usando la regresión automática de vectores en Irak

Resumen

El crecimiento económico y el desempleo se consideran la variable más imprescindible para los estudios relacionados con la construcción e implementación de políticas económicas. Por lo tanto, el propósito central de este estudio es examinar la relación de causa y efecto entre dos variables "crecimiento económico y desempleo" en Irak. Los datos de la serie temporal se tomaron de 1999-2017 y el modelo VAR se utilizó para probar la relación. El software estadístico Eviews 9 se ha utilizado para ejecutar el modelo VAR. Los resultados han demostrado que existe una relación negativa entre el desempleo y la tasa de crecimiento en Iraq que es económica y estadísticamente significativa.

Palabras clave: Crecimiento económico, Regresión automática de vectores, Políticas económicas, Desempleo y tasa de crecimiento.

1. INTRODUCTION

In current dynamic era of globalization, every economy is struggling to reduce unemployment though attainment of high economic growth rate. In literature, high unemployment rates have always been a major topic of discussion for economist but after 2008 crises, this issue has become critical. Currently every country is focusing on economic growth and reducing unemployment. Moreover, unemployment is directly related to stability and prosperity of any country.

For measuring the growth of any economy, the macro economists developed a tool called Gross Domestic Production per

capita income. The literature explains in the economic growth, the rise in production in any specific nation with in specific time of period, normally annually or by annually. This precise progression in production of goods and services is called economic growth of the economy. This economic growth leads to words the term income per capita because income per capita signifies the proliferation in economic activities as well as an increase in per capita income of a specific society (SOYLU, ÇAKMAK & OKUR, 2018).

Unemployment is one of the most relevant and important variables of macroeconomic. Unemployment represents a situation or economic condition in which a country have those people who has desire and ability to do work, but they cannot find jobs according to their abilities. This specific term could be used in relation to all factors of production. These factors might be idle and not be used properly for production. Moreover, with the context of labour, unemployment represents those numbers of entities who are eligible and competent enough to do work but do not possibly found jobs in specific market or country. Meanwhile, term unemployment also covers those labor, who are working under their capacity or not fully capitalized in production process (KENNY, 2019).

This study is going to examine the relationship among two most significant economic variables in the context of Republic of Iraq. The economy of Iraq was witnessed a radical decline in its growth in the year 1980's as compared the growth rate of last decade 1970's (ALMSAFIR, 1993). Since then several wars and invasions were

contributed in slow growth and disorder of basic infrastructure. The poor performance of economy generated high rate of unemployment and poverty in the country (ANNING, TUAMA & DARKO, 2017).

In this paper, the first part of study has described the base line concepts and theoretical groundings of the economic growth and unemployment. Meanwhile, in second part of the study an inclusive literature review will be discussed. However, in the third part the whole concept is covered under the growth theories. In the next sections, sources of data, research design and methodology with empirical results after analysis are presented. The last part of the study will comprises discussion on results and conclusions with some policy implication recommendations.

This research is going to probe the link among GDP growth rate (economic growth) and unemployment in Iraq. Through holistic review of the literature author found that this study is unique in its nature. In literature many authors recommended to conduct such study to cover the existing literature gape. So, this study will be a significant contribution to the literature.

The economic growth has always been debate among the economists around the globe. The economic growth rate of any economy highlighted its strength as well as its social welfare indicators. Different economic growth theories explain the different dynamics of growth which determine the rate of any nation's economic development. These theories also explain the reasons for

differences in growth rate and income between the different economies around the world.

The literature Physiocrats insisted the agriculture is one of the most contributed industry of any economy. They highlighted that it is the only way to grow just because of its output is always higher than its spending. Physiocrats argued that agriculture plays an inexorable role in the economic progress and growth. According to the classical economists "A. Smith, D. Ricardo and T. Malthus" argued in their "Classical Growth Theory" that salaries of labor must be determined at the level of free market wage. Likewise, researchers examined that how a country distributed its national income between the factors of production (Ricardo). However, researchers also argued that technological advancements are critical in economic development and growth (Schumpeter).

In the neoclassical economic model does not have enough strength to implement its policies in politics. It has no clear mechanism to allow economy to adopt policy implementations structure in a way that accepts technological advancements for growth (SHAW, 1992). Nevertheless the neoclassical economic growth model is required to discover different ways to solve the problem of inequality among the different nations. Currently it is a big question among the economist that why some countries are richer as comparison of others are poor and which growth tools can be permanently resolved this growth issue among counties.

On the other hand, in the socialist economic system all the factors of productions are under the state ownership and state is free to determine the wage as per social justice or equitable distribution of wealth (karl Marx). In this theory, he argued that there are sufficient number of skilled and unskilled labor available in market and system which should be capable to entertain all of them through production enhancement. Although, in capitalist system it is the demand of system to generate unemployment for continues growth rate.

Literature argued that the empirically American economy has proved an inverse relationship among the unemployment rate and the economic growth rate (OKUN, 1962). Researchers were debating that this inverse relationship was contingent on the contribution in the workforce and the period of work, that brings a significant variation in productivity (HOLMES & SILVERSTONE, 2006). This theoretical base is a proven fact that when one unit of workforce will increased, it must produce more goods and services (OKUN, 1962).

One of the most effective model of growth is "Endogenous growth model" which is emphasize that the economic growth should be established within the system. The Endogenous growth theory decorated the role of state in the country to achieve the perfect required growth rate. There is another model that is claim the growth of an economy is called "Arrow Romer Model". This model basis by the "learning by doing", vision which was suggested by ARROW (1962). The model given by Romer or the famous "Romer's model",

emphasize on the extensive use of labor force in the production functions.

There are various studies that explain the relationship among two variables that we are going to explore in this research "economic growth and unemployment rates" and are chronologicaly presented below:

2. METHODOLOGY

In this study, we have adopted multiple regressions for analysis where the GDP (indicator for economic growth) serves as the "dependent variable", while unemployment rates serve as the explanatory variable in the formulation of the models which captures the relationship among the variables of interest. Followed by analysis of data and interpretation of results with major findings for practice and policy implications.

Vector Autoregressive (VAR) Model approach has been used in the research study using annual time series data from 1990-2016 for both variables : Gross Domestic Product (GDP), and Unemployment with data obtained from Central Bank of Iraq (CBI), and World Data Bank (World Economic Indicators). According to Del Negro and Schorfheide (2011),

> At first glance, VARs appear to be straightforward multivariate generalization of univariate autoregressive models. At second sight, they turn out to be one of the key empirical tools in modern macroeconomics.

A brief introduction to Vector Auto Regression (VAR):

VAR treats every endogenous variable in the data as function of endogenous variables lagged values. This is why they provide us a simple but flexible alternative to the traditional multiple equation models, like the one that were prevalent in policy work in 60's or 70's. We can say that the vector auto regressions are fundamentally simple models in the way that they are actually "multivariate linear time series models" which are designed to capture the joint dynamics of time series data.

The beginnings of VAR's if we go to small historical detour are very closely related to the research work of American economist Christopher A Sim. Sim's research work published in 1980, in the Econometrica titled "Macroeconomics and reality". It was actually a seminal work with Tom Sargent in which both of them were awarded the Nobel Prize in Economics in 2011.

Now to answer the question of why we have used this VAR model is deeply grounded to the Sim's critique. As in 1980 Christopher A. Sim criticized previously prevailed large-scale macroeconomic models of the era. Because these large-scale models have impose very strong restrictions during test and Sim was strongly

against for this kind of research. Similarly they were largely inconsistent with the notion that "economic agents take the effect of today's choices on tomorrow's utility into account". This was Sim's critique which is a major motivation for the selection of VAR model in the perspective of our sample country Iraq.

According to SARGENT and SIM (1977), in an economic world where the rational and forward looking agents prevailed so no variable can possibly deemed as exogenous. That is why, Sim suggested this VAR as a substitute which allow us to examine macroeconomic data efficiently and without imposing any unnecessary or strong restrictions.

So there are two main purposes to you VAR in this study:

1. Macroeconomic Forecasting.

2. Structural or policy analysis.

As far as forecasting is concerned VAR provide us better forecasts for "univariate time series models" and also elaborate theory based on "simultaneous equation model". Hence for this motive the reduced VAR is effective and sufficient. But for performing structural analysis, in VAR model we require a structure, for the economic identification of VAR model. For this purpose, we need use structural VAR that has the capacity to investigate and examine the response to shocks. Similarly, another utilization of VAR is to analyze the sources of fluctuations in business cycle. Thus we can say that this VAR provide us the benchmark in response or against the modern macroeconomic

dynamic theories, thus VAR can help distinguish between competing theoretical models.

2.1. Road Map for VAR Analysis

This map explains what we want from the VAR analysis in this research:

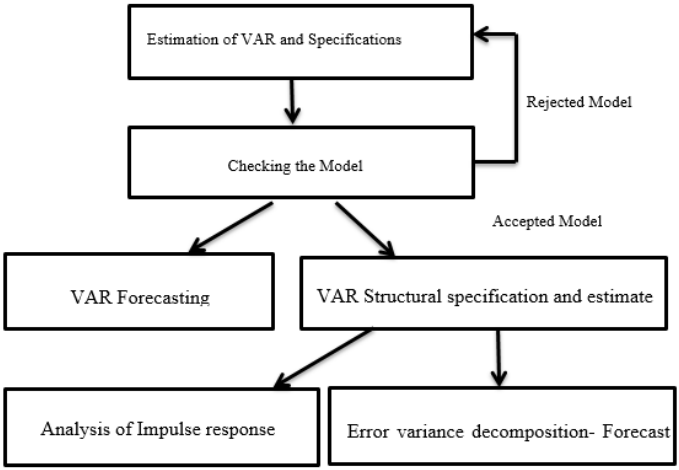


Figure 1: Explanation of VAR analysis

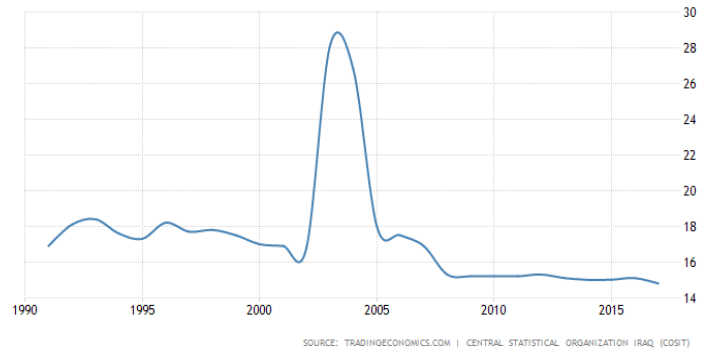
3. RESULTS AND DISCUSSION

Date has been collected from World Bank WDI and Central bank of Iraq. Before we start the reporting of results here are few glimpses of data for both variables. The GDP growth rate and unemployment rate in Iraq for the last 20 years. There is an alarming

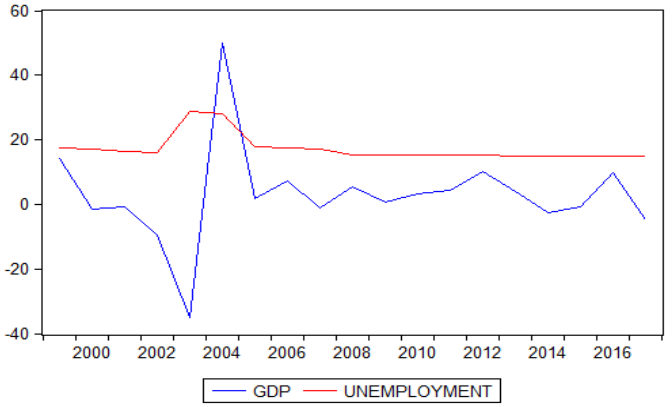
situation as the data is displayed in graph form for better understanding before analysis:

The statistics from Central Bank of Iraq shows that

The Gross Domestic Product (GDP) of Iraq reduced till 0.50 percent in 2017 in comparison to the previous year. GDP Annual Growth Rate of Iraq averaged 7.71 percent from 1991 till 2017, reached an all-time high of 54.16 percent in 2004 and a record low of -56.40 percent in 1991.



Central Bank of Iraq shows the condition of unemployment in iraq as, “Unemployment Rate in Iraq is expected to be 14.00 percent by the end of this quarter”. Interview we have compiled data before VAR we have drawn a graph to show the real position of both variables together in graphical format:



3.1. VAR Results

The variables selection is done for purpose to build multivariate models which can be used to target unemployment and as a forecasting instruments.

Roots of characteristic Polynomial Test: The result of this test in Table 1 when GDP and Unemployment are endogenous variables on the other hand the constant is the exogenous variable.

Which shows that outside the unit circle, there is no root lies. Hence the VAR satisfies the stability condition. The result is shown in table 1.

Roots of Characteristic Polynomial
Endogenous variables: GDP UNEMPLOYMENT
Exogenous variables: C
Lag specification: 1 2
Date: 04/16/19 Time: 05:26

Root	Modulus
0.585453	0.585453
0.082309 – 0.415996i	0.424060
0.082309 + 0.415996i	0.424060
-0.421537	0.421537

No root lies outside the unit circle.
VAR satisfies the stability condition.

Unrestricted VAR Results: The unrestricted VAR analysis at lag one indicates that the variables are dynamically interacted. Starting with the equation of GDP and unemployment.

Vector Autoregression Estimates
Date: 04/16/19 Time: 05:33
Sample (adjusted): 2000 2017
Included observations: 18 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	GDP	UNEMPLOYMENT
GDP(-1)	-0.388141	-0.136394
	(0.19065)	(0.04582)
	[-2.03585]	[-2.97651]

UNEMPLOYMENT(-1)	2.155578	0.588457
	(0.72348)	(0.17389)
	[2.97945]	[3.38409]
C	-33.79337	7.462117
	(12.8558)	(3.08989)
	[-2.62866]	[2.41501]
R-squared	0.448724	0.558253
Adj. R-squared	0.375221	0.499353
Sum sq. resids	2256.633	130.3618
S.E. equation	12.26549	2.948014
F-statistic	6.104805	9.478032
Log likelihood	-69.02221	-43.36037
Akaike AIC	8.002468	5.151153
Schwarz SC	8.150863	5.299548
Mean dependent	2.313269	17.21667
S.D. dependent	15.51749	4.166427
Determinant resid covariance (dof adj.)		417.9390
Determinant resid covariance		290.2354
Log likelihood		-102.1180
Akaike information criterion		12.01311
Schwarz criterion		12.30990

With Lag 2:

Vector Autoregression Estimates
Date: 04/16/19 Time: 05:34
Sample (adjusted): 2001 2017
Included observations: 17 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	GDP	UNEMPLOYMENT
GDP(-1)	0.600864	-0.342009
	(0.40128)	(0.10323)
	[1.49735]	[-3.31324]

GDP(-2)	1.049156	-0.220008
	(0.40335)	(0.10376)
	[2.60108]	[-2.12040]
UNEMPLOYMENT(-1)	6.366549	-0.272330
	(1.66991)	(0.42956)
	[3.81251]	[-0.63397]
UNEMPLOYMENT(-2)	-4.992426	1.004610
	(1.87616)	(0.48262)
	[-2.66098]	[2.08159]
C	-25.44232	5.979653
	(13.8920)	(3.57354)
	[-1.83143]	[1.67331]
R-squared	0.658325	0.687546
Adj. R-squared	0.544433	0.583394
Sum sq. resids	1393.235	92.19134
S.E. equation	10.77511	2.771753
F-statistic	5.780275	6.601399
Log likelihood	-61.57440	-38.49250
Akaike AIC	7.832283	5.116765
Schwarz SC	8.077346	5.361828
Mean dependent	2.540575	17.22941
S.D. dependent	15.96414	4.294293
Determinant resid covariance (dof adj.)		381.2495
Determinant resid covariance		189.9651
Log likelihood		-92.84205
Akaike information criterion		12.09907
Schwarz criterion		12.58919

4. CONCLUSION

According to above data analysis the manuscript concludes that the relationship between GDP growth and unemployment has a strong

impact on the overall living and welfare of people. But the point that should be kept in mind that either are a number of various reasons like the political situation and the war zone in the era which has limited the scope of study. Also the years that have been taken from 1999-2017 are the era which is mostly influenced by the war and terrorist influence. So we can say that the these kind of implications have been glaring in the Iraqi economy, which are resulting negative developments such as non-availability of jobs for youth and very strong and bad impact on the overall growth of economy.

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