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# Study of the Export Value on National Output Growth (With Johansen Test) Seyed Morteza Afqah<sup>1</sup>, Saeed Abbasi<sup>2</sup>, Salar Ghorbani<sup>1</sup> and Roholah Bazr Afkan<sup>1</sup>

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## **ABSTRACT**

International Trade relations of each nation can be effective on their economic growth. These relations can lead to using the production factors on economy sectors that have more advantages and leads to improvement in efficiency of production factors and Gross Domestic Product (GDP) of each nation. In recent years many studies have been done by using different econometric modules and methods in order to answer the question that is export growth will lead to the economic growth? In this study the effect of the export value (Oil & Gas) on the national production growth (Economic Growth) had been examined through 1961 to 2011 by Johansen Test that the result shows a strong positive correlation between the value of Oil & Gas Export and Iran Economic Growth. In fact if the value of Iran Oil & Gas Export increases in 1 unit, the Economic Growth will increase 2/301 units.

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### Introduction

The relation between the Iran Export & Economic Growth is one of the important and controversial subjects in Economy and good experimental studies have been done in the field of relation between Export and Economic Growth. The main important reason of these researches can be known as the disagreements between the economists. Economic growth is one of the goals that any economy will look for it. To reach this goal, the factors which cause this growth have to be identified. Export is one of the factors that can lead to economic growth. The effect of export, especially the Oil & Gas Export is undeniable on Iran's Economic Growth but since it has not been used properly and optimal, the results were not desirable. With this introduction a question will raise in reader's mind that if the Iran's Oil & Gas Export increases, the Economic Growth will increase? This research is composed of six parts. In second part the research literature and the third part the research background will be expressed. On the fourth part the research methodology (Johansen Test) has been studied. On the fifth part the experimental results and finally on the last part the conclusion and suggestions will be provided

## The Subject Literature

Since the Oil & Gas Export is an effective factor in forming the nation's economy and can affect all parts of economy, looking at the Iran's Oil & Gas Export developments seems to be helpful. Iran like most of the developing countries benefit from extensive activities in foreign trade and like most of these countries is often price feasible. In the field of export, over 80% of nation's foreign exchange earnings will be provided from export of petroleum and gas which is an exhaustible source. The Oil production and export procedure does not only rely on economic issues but also depends on political issues as well. Lack of basic investment in non-oil products and also no need of planning in developing the non-oil export due to the significant income of oil is the major factor of extreme dependence of country to selling oil during the years before revolution. The general strategy of this era was more sales of Oil & Gas in order to providing the possibility of consuming the importing goods. After revolution also we've witness the fluctuation in oil income

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due to the positive and negative shocks in oil world prices and the fluctuations in exporting oil from country. Therefore, it seems that instead we rely on the oil income, we need to consider the non-oil exporting which has been considered less.

## The Effect of (Oil & Gas) Export Value on Economic Growth

Increasing the oil price not only effect the importers but also will affect the exporters as well. The Oil Shocks usually effect different channels of economy. In fact the Oil price is transferring the financial sources from importing countries to exporting countries. If the oil price increases the industry productivity decreases to the production cost & inflation and therefore, the economic growth decreases (Javad<sup>3</sup>, 2013)

The level of a country's development has a direct relationship with its trade relations. Therefore export expansion and obtaining financial resources is the most common target of politicians. A country can increase its productivity by exporting which by stimulating national production can increase the employment rate and can provide the required financial sources to import, therefore, the domestic consumption increases and it seems that there's a positive relation between import and economic growth (Taghavi<sup>2</sup> & Colleagues, 2012). In field of international trade and economic expansion, the relation between the economic growth & import growth has been considered. Export can be a context for importing capital goods. The Neoclassic growth model which the Solo model is the leading of those is the main theoretical framework of showing the economic growth. In analyzing the Neoclassic, decreasing the trading obstacles, increases the trading and level of productivity. Gross Domestic Production (GDP) increases by capital accumulation and reallocation of resources which increases the economic growth. In the field of import & economic growth there are four perspectives available: 1. Export is an engine for economic growth i.e. more export causes more growth. 2. Export & growth are both endogenous and affect each other's factors. 3. Expansion in export causes stimulation in economic growth. 4. There's a 2 way relation between export and economic growth. Export can cause economic growth for several reasons: 1. Increase in export creates required sources

for capital goods which affect the economic growth. 2. A country which is exporting can reach an appropriate economic scale. 3. Export growth can make the exporting country with an average advantages and investment increases in that country. 4. Transferring the export causes the entrance of technology to the exporting country. All these issues can cause the economic growth and in result it seems that there's a positive relation between the economic growth and export expansion (Aljarah<sup>5</sup>, 2005).

The oil development fans believe that although this black gold can reach economic growth in the field of employment, providing government's income in order to fight with poverty, transferring technology, improving of infrastructure and encourage related industries but the experiences of the oil export countries have been shown few of those until now. Some also believe that oil development will cause slower economic growth, obstacles for economic diversity, poor welfare function, and high level of poverty, inequality and unemployment. Countries dependent on oil have a weak government, high corruption, rentier culture, poor in health, economy and environment and specific involvement and war (Karl<sup>6</sup> 2007).

Negative & positive shocks in oil price can affect the macroeconomic variables and increasing the oil price is pleasant for export countries and bad for oil importing countries. Changes in oil price can result from the supply & demand parties. Since he companies use oil as an input for production, if the oil price increases the production cos of companies will increase and therefore produce less and production increases which result in decrease in economic growth (Jimenez-Rodriguess and Sanchesz<sup>7</sup>, 2003)

### **Research Background**

Anayochukwn and Ezeji<sup>8</sup> (2013) surveyed the non-oil export effect on economic growth of Nigeria through the years 1984 to 2009 by using the Grenjer path test and came to the conclusion that there's a positive relation between the non-oil export and economic growth in Nigeria.

Jawad<sup>9</sup> (2013) studied the oil price shock on the Pakistan economic growth through the years 1973 to 2011 and came to the conclusion that oil price shock has a little effect on Pakistan economic growth.

Gilbert<sup>10</sup> and colleagues (2013) studied the non-oil export effect on Cameron's economic growth through the years 1975 to 2009 by using the integration method and came to the conclusion that exporting the agricultural products has a different effect on Cameron's economic growth. Export of coffee and banana has positive effects on economic growth while exporting Cacao has a negative effect.

Mirjamali Mehrabadai<sup>11</sup> & Colleagues (2012) studied the effect of non-oil export on Iran's economic growth through the years 1973 to 2007 by using VAR Method and came to a conclusion that non-oil export has a positive result on Iran's economic growth.

Saher<sup>12</sup> (2011) studied the effect of oil price on India & Pakistan economic growth through 1972 to 2009 by integration method and came to the conclusion that there's a positive relation between the economic growth and oil price in Pakistan while the oil price has a negative result in India's economic growth.

Aljarrah<sup>13</sup> (2008) studied the economic growth and non-oil export in Saudi Arabia by using the simultaneous equations and came to the conclusion that there's a positive relation between the non-oil exports and economic growth.

Jimenez-Rodrigues and Sanchez<sup>14</sup> (2003) studied the oil price shocks on the United States economic growth by using the

VAR Test and came to the conclusion that the oil price shocks have a negative result in economic growth.

Smith<sup>15</sup> (2001) studied the export effect on Cast Arica's economic growth through 1950 to 1997 by using the integration methods and came to the conclusion that the export effect is positive and weak on Cast Arica's economy growth. **Research Methodology** 

## Generalized Dickey Fouler Test

Applying normal & traditional methods of econometric methods in estimating the module coefficients by using the timing series data is based on that the module variables are stationary. Existence of unit roots defined as non-stationary of data which leads to creating problems in credibility of tests. Generalized Dickey Fouler test can be named as one of the famous stationary tests. In order to survey the Stationary and non-stationary variables the Dickey Fouler test was used which is reached by the following relation:

 $\mathbf{D}\mathbf{Y}_{t} = \mathbf{a}_{0} + \mathbf{a}_{1}\mathbf{Y}_{t-1} + \boldsymbol{\Sigma}\mathbf{B}_{j}\mathbf{Y}_{tj} + \mathbf{U}_{t}$ 

J=1,2,....,p

Which U<sub>t</sub> is the Waste Sentences.

The zero hypothesis in this test argues the non-stationary. In fact if the error probability is more than 0/05, the zero hypothesis is accepted and the non-stationary exists and vice versa.

## **Determining the Optimal Lag**

First issue in Vector Regression modules is determining the optimal lag. Here, in order to determine the lag length the Schwartz-Bizin (SC), Akaeik (AIC), Final Predict Error (FPE), Hannan Queen (HQ) and Likelihood Relative (LR) have been used. Finally since the system stability will be provided by the first optimal, the first optimal has been chosen based on the Hannan Queen and Schwartz Bizin criteria as the optimal lag module.

## VAR Test

In Regression Vector modules, each variable is considered as an equation for its lag and other variables. Simple form of a VAR Module is shown as follow in a two variable condition:

(1) Yt = b10- b12 zt +  $\gamma$ 11 yt-1 +  $\gamma$ 12 zt-1 +  $\epsilon$ yt

(2)  $Zt = b20 - b21 yt + \gamma 21 yt - 1 + \gamma 22 zt - 1 + \epsilon zt$ 

Evit and ezt have pleasant feature or so-called White Noise. Since the  $Z_t$  is correlated with  $\varepsilon vt$  and  $Y_t$  with  $\varepsilon zt$ , the mentioned equations cannot be estimated directly. Since application of econometric equations requires the hypothesis that there's no relation between the explanation variables and disturbing elements, therefore by substituting the  $Z_t$  from the second equation in the first equation and by placing the  $Y_t$  from the first equation in the second equation can reach to the following equation:

$$(3) \ Y_t \ = \! \alpha_{10} + \alpha_{11} \ y_{t\text{-}1} + a_{12} \ z_{t\text{-}1} \! + \! c_{1t}$$

 $(4) \ Z_t = \alpha_{20} + \alpha_{21} \ y_{t\text{-}1} \ + \alpha_{22} \ z_{t\text{-}1} \ + c_{2t}$ 

(5)  $e_{1t} = (\varepsilon_{yt} - b_{12} \varepsilon_{zt})/(1 - b_{12} b_{21})$ 

(6)  $e_{1t} = (\epsilon_{zt} - b_{21} \epsilon_{yt})/(1 - b_{12} b_{21})$ 

Since the  $\varepsilon_{zt}$  &  $\varepsilon_{yt}$  have pleasant features, it can be concluded that  $e_{1t}$  &  $e_{1t}$  also have same behavior. It is required to mention that in above relations only the first lags have been considered and by using appropriate tests, determining the number of optimal lags should be applied. In this research, by Hannan Queen and Schwartz Bizin Criteria we found that the best optimal lag is the second lag.

### Johansen Test

In Johansen test the two test of Effect and the Maximum Special amount will be used in order to determine the collective vectors. To do so, first the degree will be reached based on the result from optimal lag and make it equal to 1, then we estimate the five module in order to decide on the definite variables of definite intercept and the process of collective vectors. These 5 modules are as following:

1. lack of intercept and time procedure in long-term & short-term

2. existence of intercept and time procedure in short-term and existence of time procedure in long-term

3. existence of intercept and lack of time procedure in short-term and existence of time procedure in long-term

4. lack of time procedure in short-term and existence of time procedure in long-term

5. existence of time procedure in short-term which leads to the second degree of time procedure in long-term

#### **Obtained Results**

### **Results for Generalized Dickey Fouler Test**

 Table 1. Results for Dickey Fouler Test for Export Value of Oil & Gas

-	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.851847	0.8626
Test critical values: 1% level	-3.568308	-
Test critical values: 5% level	-2.921175	-
Test critical values: 10% level	-2.598551	-

 
 Table 2. Results for Dickey Fouler Test for National Production Growth

-	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.770151	0.9996
Test critical values: 1% level	-3.577723	-
Test critical values: 5% level	-2.925169	-
Test critical values: 10% level	-2.600658	-

 Table 3. Results for Dickey Fouler Test for Differential

 Export Value of Oil & Gas

-	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-9.144035	0.0000
Test critical values: 1% level	-3.571310	-
Test critical values: 5% level	-2.922449	-
Test critical values: 10% level	-2.599224	-

 Table 4. Results for Dickey Fouler Test for Differential

 Growth of National Production

-	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.843983	0.0000
Test critical values: 1% level	-3.581152	-
Test critical values: 5% level	-2.926622	-
Test critical values: 10% level	-2.601424	-

Condition of Use of Johansen Test is that all the existence variables should have a same level of a unit root in a long term relationship. As the results show the variables of Export Value (Oil & Gas) and National Production Growth are at the non-stationary level (since probability of errors obtained higher than 0/5) and they were stationary by once differential measurement (since the probability of errors obtained less than 0/5) therefore, the required condition for using Johansen Test is available.

<b>Results for</b>	Determining	the Number	of Optimal	Lags
Table	5. Determinin	ng the Numb	er of Optim	al Lags

Lag	FPE	AIC	SC	HQ
0	1.86e+10	29.32479	29.40589	29.35487
1	1.09e+09	26.48813	26.73143*	26.57836*
2	1.25e+09	26.62315	27.02865	26.77353
3	1.24e+09	26.60516	27.17285	26.81569
4	1.07e+09*	26.45118*	27.18108	26.72186

As it is shown on Table 5, the optimal lag is the first lag based on the Hannan Queen (HQ) & Bizin Schwartz criteria.

The star sign upper the figures indicates the optimal lag which shows that the optimal lag is the first lag based on the Hannan Queen and Bizin Schwartz which has been chosen as the optimal lag in this research.

#### Results for Determining the Number of Integration Vectors Table 6. Results for Determining the Number of Integration Vectors

Data	None	None	Linear	Linear	Quadratic
Trend					
Test	No	Intercept	Intercept	Intercept	Intercept
Туре	Intercept	No	No	Trend	Trend
	No Trend	Trend	Trend		
Trace	1	1	1	0	1
Max-	0	1	1	1	1
Eig					

Among these 5 modules, usually the first and fifth modules are not appropriate and won't be used and in this research the 4<sup>th</sup> module won't be used both since the effect amount & Special amount are not equal and among the third and fourth module, third module was chosen which is a linear module. Therefore, the level of integration would be 1.

## **Results for Johansen Test**

Table 7. Results for Johansen Tes			
<b>Cointegrating Eq</b>	CointEq1		
G(-1)	1.000000		
X(-1)	-2.301045		
	(5.05745)		
	[454981]		
С	-2.917018		

In Johansen Test, a variable with coefficient of 1 is a variable which is known as the dependent variable and the coefficient of other variables will be multiple in negative. As it is clear, the coefficient variable of production growth rate is one which is known as the dependent variable and if we multiple the coefficient variable of export value of oil & gas in negative, by adding a unit to the coefficient, the production growth rate will be added 2/301 unit which is reasonable (since the Absolute Value of T Student is greater than 2) the figures inside the parenthesis are SD and the figures inside the bracketed are T-Student.

#### **Results & Suggestions**

In this research, the effect of export value of oil and gas on the Iran's national production growth was studied by Johans en Test through the years 1961 to 2010 annually. The results showed that the effect of export value of oil & gas is significant & positive so that by increasing a unit in the export value of Oil & Gas, the national production growth will increase over than 2/301 units.

The suggested solution to reform an appropriate structure for government is the general policy of decreasing dependency of government's current budget from oil income and return to the procedure of before 1971. Before 1971 the country's current budget was provided in ministry of Economy & Finance and the planning organization was responsible for providing the budget for country's development and was in charge of country's development management. By returning to those years, preparing and planning the budget will be on ministry of economy & finance and the oil income will be allocated to the country's infrastructure and persistent projects by a coherent planning. It is suggested that by resuscitation of Management and Planning Organization in order to design and execute investing, the development plans would be planned from the oil income and the oil income costs on long-term and intergenerational investments would be monitored.

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