



AENSI Journals

## Advances in Environmental Biology

ISSN-1995-0756 EISSN-1998-1066

Journal home page: <http://www.aensiweb.com/AEB/>

### The Effect of Energy Consumption on Economic Growth of Members of Islamic Conference Organization Countries

<sup>1</sup>Mohammad Hosein Mahdavi Adeli and <sup>2</sup>Salman Sotudania

<sup>1</sup>Department of Jurisprudence and Principles of Islamic Law, Faculty of Theology and Islamic Studies, International Campus of Ferdowsi University of Mashhad, Iran.

<sup>2</sup>Ph.D. Student of Department of Administrative and Economic Science, International Campus of Ferdowsi University of Mashhad, Iran.

#### ARTICLE INFO

##### Article history:

Received 11 August 2014

Received in revised form 21 September 2014

Accepted 1 October 2014

Available online 17 October 2014

##### Keywords:

Energy consumption

GPD, panel data

OIC, Cochrane-avkart

Hausman test, Granger causality

#### ABSTRACT

**Objective:** This paper is aimed to investigate the influence exerting on economic growth in OIC member states by energy consumption effect. **Method:** The essay model has been estimated using the data pertains to 11 OIC member states for a period of 9 years since 1990 to 2007 by econometric methods for panel data. After estimating the model, we came to conclusion that there is one-side Granger causality from the energy consumption to economic growth. **Results:** The results also indicate that if the model autocorrelation is dealt with Cochrane-avkart, 34 percents of economic growth rate is explained by energy consumption variable and in case it is dealt with AR(1) method, only 16 percent of economic growth rate is explained by energy consumption variable.

© 2014 AENSI Publisher All rights reserved.

**To Cite This Article:** Mohammad Hosein Mahdavi Adeli and Salman Sotudania, The Effect of Energy Consumption on Economic Growth of Members of Islamic Conference Organization Countries. *Adv. Environ. Biol.*, 8(11), 1478-1481, 2014

#### INTRODUCTION

Today, the influence and significance of energy and its role in the economy of any country is obvious. The need of the various economic sectors of the country for energy is a fact which can do irreparable damage to the country's development process in case it is not been paid enough attention. Acceptance of energy authority in the current and future economy of the country and urgent need for foreign exchange earnings and using that take for granted the domestic consumption, the need for preserve, and accurate and economical utilization of energy. Achieving sustainable economic development entails the producing and utilization of energy to be planned in harmony with other inputs such as human resources, ingredients, funds and... Regarding that the total final energy demand has grown an annual average percent of 8.6 percent since 1357 to 1386 and the consumption of oil product has grown by 7.5 percent, it is obvious if this trend continues, the need for refinery, power plants, oil and gas pipelines, and the other capital equipment is inevitable in order to respond their increasing demand and providing the all above facilities and also providing the required exchange has no alternative except for reducing the consumption and more frugality according to OPEC's oil production ceiling. Since the great part of currency earnings is related to crude oil export and this earnings is highly influenced by price volatility or OPEC quotas and since the quota specified by OPEC is the production quota not the export quota, then the way to increase the foreign exchange earnings from oil export is to decrease its consumption, whereas about 15 to 20 percent of produced gas is not recoverable annually for different reasons and it burns inevitably. After oil crisis in 1973, the relationship between energy consumption and economic growth was investigated more seriously and what is still vague and controversial in energy economy field is to pinpoint the causal relationship between energy carrier consumption (oil and gas) and the growth of economic sectors. That's why it's necessary to investigate the relationship between energy carrier consumption and economic growth in Iran in order to manage the energy of the country to energy consumption accurate planning [9].

In this paper, the effect of the mentioned variables on the economic growth of OIC is examined regarding the energy significance. Indeed, the main objective of the paper is to explain the effect of energy consumption on economic growth in these countries during 1990-2007.

**Corresponding Author:** Salman Sotudania, Department of Administrative and Economic Science, International Campus of Ferdowsi University of Mashhad, Iran.  
Tel: 07113336254 E-mail: [ssotudania@yahoo.com](mailto:ssotudania@yahoo.com)

*Theoretical research:*

Today, in addition to labor and property inputs, the energy is also being raised as one of the significant inputs of production in macroeconomic debate and production is considered the function of labor, capital, and energy. It is also assumed that there is a direct relationship between the consumption rate of these inputs and the production level. On the other hand, the energy consumption is the inverse function of its price and the changes in energy prices has significance effect on energy consumption and consequently on GPD. The economic growth literature in undeveloped countries has the great significance. The significance can be considered from two perspectives. First, as achieving the goal of development is not possible without entitlement the economic growth, and second although the growth of macroeconomic growth and economic growth generally is devoid of behavioral, value, and distribution meaning, yet it also relates to the size of the country economy and it provides a measure for comparison with other countries [6].

*The relationship between energy consumption and economic growth:*

According to different economic schools, the factor influencing the economic growth which is considered in growth function includes the capital and work force, both skilled and unskilled. Energy is imported in the new pattern of growth, but it is not the same in different models. For instance, Burnett and Wood argued that there is a production factor in function of the total energy production which has the detachable and weak relationship with work force.

The proposed production function:

$$Q = F(G_{(K,E)}, L) \quad (1)$$

They believe that energy and capital are combined and create the production factor G and then they combine with the labor in order to produce. Therefore, labor is combined with G, not with capital and energy separately. Of course, some neoclassical economists believe that energy has small role in economic production and it is an intermediary input and the production factors are just work force and land.

On the other hand, the other economists believe that energy is constant, recoverable, and able to get the matter, and it does not waste. Therefore, in the growth biophysical models which are proposed by Ayres and Nair, production of economic goods entails spending copious amount of energy in production. So, energy is the only and the most important growth factor. Work force and capital are also the mediating factors which need energy in order to be used. Therefore, if we consider the production as a function of capital, labor, and energy input, then:

$$Q = f(K, L, E) \quad (2)$$

$Q$  is the GPD product,  $K$  is the capital inputs,  $L$  is the work force input, and  $E$  is energy input. It also has been assumed that there is a direct relationship between the consumption rate of inputs and the production level. In other words, increasing in each of the inputs cause the production to increase, mathematically:

$$\frac{\partial Q}{\partial K} > 0, \frac{\partial Q}{\partial L} > 0, \frac{\partial Q}{\partial E} > 0 \quad (3)$$

The input  $E$  can be provided by the selection of factors such as oil, gas, electricity, coal, and... which are known as energy carriers.

*Model and estimation method:*

We utilized a linear method in the study:

$$LGDP_{it} = \alpha_{it} + \beta_i LEC_{it} + \varepsilon_{it} \quad (4)$$

$LGDP_{it}$  Equals to the countries GPD logarithm,  $LEC_{it}$  equals to the consumption energy logarithm,  $\alpha_i$  is countries effects, and  $\varepsilon_{it}$  is waste diversion estimated from the long term relationship.

In the study, the desired pattern is estimated using combined data and the methods to estimate this type of data which includes the method of fixed effects and the random effect. It should be mentioned that first we estimate static and co-integration of model variables using Pedarouni and Im Pesaran & Shin for combined data and through appropriate software. In the study, the Panel method is used to estimate the model.

*Estimate the model:*

It is necessary to examine how static variables are taking place in order to ensure about non-spurious regression and following it the uncertain results. For the purpose the Im, Pesaran and Shin (ISP) has been used.

**Table 1:** Static-taking test (Im Pesaran & Shin test), in the level and the intercept.

Individual intercept				variable
$I^{st}$ difference		Level		
prob	statistic	prob	statistic	
0.0001 00.	-3.71169	1.0000	4.73370	LEC
0.0007	-3.19138	1.0000	3.89895	LGDP

Source: research findings

**Table 2:** Static-taking test (Im Pesaran & Shin test), at the level and the intercept and time process.

Individual intercept and trend				variable
$I^{st}$ difference	Level			
prob	statistic	prob	statistic	
-	-	0.0001	-3.62467	LEC
-	-	0.0098	-1.29288	LGDP

Source: research findings

Therefore the variables under investigation are at the level and intercept and the dwell time i.e.  $I(0)$ .

More, the causality relationship between the variables is investigated. Granger causality test results in table (3) indicate that if the optimal lag  $K$  which is selected based on Schwarz Bayesian criterion,  $K$  is 3 and since the variables are in resting level (the latter), therefore the maximum co-integration ( $d_{max}$ ) of variables which is determined in static test equals 0. The results indicate that in the first case energy consumption has the effect on economic growth with three delays which confirm being the one-way of Granger causality from energy consumption to economic growth.

**Table 3:** Granger causality test.

Causality direction	Critical value	Father statistic	Influential variable	Dependent variable
$LGDP \neq LEC$	0.1267	1.98059	LGDP	LEC
$LEC \rightarrow LGDP$	0.0067	4.48238	LEC	LGDP

Source: research findings

As we know, in Panel data method we use F-limer test (chow test) in order to determine if the data fusion test is being used to estimate the model or panel data. The results indicate that the data are panel.

Regarding the previous results, the long relationship between variables was confirmed. Accordingly, it is necessary to utilize appropriate method in order to pinpoint the relationship circumstance and its measure. To achieve the purpose, Hausman test was used to determine the appropriate method in order to estimate the pattern parameters. Having conducted the test, we can acquire the appropriate method of estimation among the fixed and random effects methods, since the null hypothesis indicates the fact that there is no difference between the fixed effects estimators and random effects estimators. The results demonstrate that fixed effects method is the appropriate method to estimate the pattern.

After specifying the appropriate method to estimate the parameters, we proceeded with the pattern estimation whose results are in table 4.

**Table 4:** The result of estimation after fixing autocorrelation.

prob	t-statistic	Std.Error	Coefficient	Variable
0.0000	5.695594	3.800139	21.64405	C
0.0062	1.412025	0.042137	0.159499	LEC AR(1)
F-Statistic: 1067.329 R-Squared: 0.994178				

Source: research results

In the present paper, energy consumption coefficient has a great significance. The results related to the coefficient reveal that increasing energy consumption has the positive effect on economic growth.

#### Discussion and conclusion:

A higher per capital energy consumption usually indicates the development of a country through comparing countries and the higher consumption is usually associated with higher GPD. In other words, on the one hand average per capital industrial countries is much higher than the same in developed and undeveloped countries, on the other hand high energy consumption transform more added values in these countries. The experience of developed countries has also demonstrated that we can achieve a higher economic development and welfare through increasing manufacturing technologies performance and energy consumption with being constant and

reducing the consumption. In the study, the relationship between energy consumption and economic growth was investigated using the data panel of 11 countries of OIC during 1995-2007. The results indicate that energy consumption has both positive and negative effect on economic growth—the higher energy consumption, the more economic growth. There is also a one-way Granger causality relationship from energy consumption to economic growth.

#### REFERENCES

- [1] Abrishami, Hamid, Azar Mostafayi, 2001. the investigation of relationship between economic growth and consumption. 45 major petroleum products in Iran. *Journal of Knowledge and Development*, 14: 11.
- [2] Aqeel, A. and M.S. Butt, 2001. The Relationship between Energy Consumption and Economic Growth in Pakestan. *Asia-Pacific Development Journal*, (8: 101-110.
- [3] Arman, Seyed Aziz, Roohallah Zare, 2005. investigation of Granger causality relationship between consumption, 1381 *Quarterly Energy Research and Economic Development in Iran during the Iranian economy*, 1342-1346, (24): 115-119.
- [4] Asafu-Adjaye, John, 2000. The Relationship Between Energy Consumption, Energy Prices and conomic Growth: Time Series Evidence from Asian Developing Countries. *Energy Economics*, (22): 615-625.
- [5] Fatai, K., L. Oxley, F. Scrimgeour, 2004. Energy Consumption and Employment in New Zealand: Searching for Causality. *NZAE Conference 2002*
- [6] Mahdavi, Abolqasem, 1999. Iran's overall growth strategy, publishing company, pp: 141-132.
- [7] Masih, A.M.M. and R. Masih, 1997. On the Temporal Causal Relationship Between Energy Consumption, Real Income Prices: Some new Evidence from Asian Energy Dependent NICs based on Multivariate Cointegration Approach. *Jurnal of Policy Modeling*, 19(4): 417-440.
- [8] Mehara, Mohsen, 2007. Energy Consumption and Economic Growth: The Case of Oil Exporting Countries. *Energy Policy*, 35: 2939-2945.
- [9] Najarzade, Reza, Azam Abbas Mohsen, 2004. The relationship between energy carriers consumption and growth of economic sectors in Iran, *Quarterly Energy Economics Studies*, 2: 61-80.
- [10] Pesaran, M. Hashem, Pesaran, Bahram, 1997, Working with Microfit 4.0, Interactive Econometric Analysis, Chapter 16, London: Cambridg.
- [11] Zamani, Mehrzad, 2006. Energy Consumption and Economic Activities in Iran. *Energy Economics*. Article in Press.