*Research Article*

# THE RELATIONSHIP BETWEEN ECONOMIC GROWTH AND ENVIRONMENTAL ISSUES

***Mohammad Sadegh Alipour**
*Statistical Research and Training Center, Statistical Center of Iran*
*\*Author for Correspondence*

**ABSTRACT**
In recent world beside the economic growth, other economic indicators must be considered for measuring the development level. This paper aims to measure the impact of recent issues of environmental on GDP. Regarding to completion or destruction of natural resources, Mineral resources and other environmental issues we would able to evaluate the economy. In order to find the relationship between economic growth and environment issue the paper has applied GDP, energy consumption and emission of CO2. The results statistically show that economic growth has positive relation with growth rate of energy consumption. On the other hand co2 emission is increasing while energy consumption growth increases.

*Keywords: Environment, Energy Growth Rate, GDP, Emission of CO2*

**INTRODUCTION**
During the last three centuries and particularly after the industrial revolution, great evolutions took place in European Countries, America and Japan. Before World War II especially before the big depression in 1930s, economical thoughts were largely based on classical theory. Following this economical crisis and also inability of market for solving the problem, new theory was initiated by John M. Keynes. The Keynesian followers are really tend to government intervention in economy, and where the market system in not able to solve the economical problems. During this period many theories such as Classical, Keynesian and Monetarist theories were considered by economists.

In the late 20th century and at the beginning of 21st century, the view to resolving society problems and economy was almost changed and sustainable economic development was considered instead of focus on economic growth. So in this period, poverty, inequality and environment destruction were of the most problem dealing with economists. As a result of this, the UN millennium statement containing Millennium Development Goals (MDG), was addressed by the UN in 1990s and many countries agreed, so it made them to try more to solve the poverty issue and stability of the environment (United Nations, 2003).

In economic development definitions and concepts, being sustainable, providing the needs of the future generations as well as environmental considerations have special place in development and improvement issues. Following the recent discussions of sustainable development within last three decades, a lot of terms are provided in economy field like green GDP, green jobs, green growth and etc. that all have environmental considerations.

*Objectives*
In recent world, economic growth and measuring the negative environmental externalities on GDP is an interesting issue. Although economic growth is considered as an index for measuring the development level, other indicators such as environments indicators must be considered as sustainable development indicators (Avazalipour *et al.,* 2009). The main objective of this paper is finding a relationship between GDP growth and environment issue.

*Research and Theoretical Background*
Relationship between development level of countries and the achievement of environmental standards has been focused by researchers. Traditional measurement of GDP and its growth cannot specially consider as an index for sustainable development and there is a lot of criticism on it. Although one of the measurement instruments for success and economic operation of each society is undoubtedly GDP that shows the economical operation of the society in fiscal year, it does not show the economical welfare that

*Research Article*

is according to the sustainable development and environmental considerations. The concept of green GDP that was provided around 1990, was in reply to the weakness and lack of the current method in measuring GDP in providing economic costs due to decrease and distortion of natural resources, pollution increase and negative effects on human health (Stockhammer *et al.,* 1997; Torras, 2003).

*Traditional GDP and Its Limitations*

Following to industrialization western countries, developing countries especially Asia are going to increase investment as well as economic development. These countries have followed economic plan and production growth in different economic parts in the form of five-year plan at their agenda. In some cases, economic reforms, decentralization, attracting direct foreign investment and economic growth around 8% are put in goals. Therefore, these countries generally focus their five-year operation as well as yearly operation on GDP (Srinivasan, 2003).

According to the general methods, monetary value of all new services and goods that are produced in one fiscal year in geographical area on a country is named GDP. But this GDP that is calculated in traditional way according to the national accounting method has some weak points and problems that we summarize them below.

- Traditional GDP does not consider the income distribution as well as how the benefits of economic growth distribute within the individuals and who these individuals are.

- GDP has some weak points and problems in calculating the activities of individuals who works in the house or their goods do not pass the official ports and market (Avazalipour *et al.,* 2009).

- There is no difference between activities that has positive effect on welfare and those that has negative effect on it in calculating GDP or if there are any, they are not measurable. Its classic example is oil extraction and its meeting that increase GDP from one side but has environmental risks from the other side that GDP neglects them.

- Traditional GDP cannot reflect the true human welfare since its numbers and accounts are for survival of the society via current consumption and do not show the decrease of natural resources and stores for the future generations.

In accordance with the abovementioned matters, this subject is totally agreed that traditional GDP has some weak points and problems since it does not consider the nature role in human welfare and achievement to the sustainable development significantly. Today the subject of exact estimation of the missing costs like damages to the natural resources and environmental pollution should be considered in national accounts and lead to green GDP.

*Green GDP and Performed Studies*

By national accounting and environmental statistics communication we can academically consider stable development and GDP, but practically it is difficult to some extent to define essential standards for measuring natural capitals and estimations of environmental costs and destruction costs of environmental capitals, and finally that to what extent we have achieved stable objectives should be evaluated. Even when precise information is impossible technically, one can estimate it through national accounting, environmental re-evaluation and by proper pricing, and get Green GDP.

The theory of GDP calculation was resulted in some occasions in the role of public science and politics in 1990. One of the most important and highlighted attempts to realize Green GDP was done by China Republic. In 2006, the state of China discussed environment friendly GDP through Environmental Protection Organization and Statics National Office. A report offered by these organizations shows that the loss of economic impact on the environment will reach to 3 percent of China's GDP in 2004. But, the main and key problem in the calculation method still has been unsolved. For example, only half of the costs of 20 types of pollution in China were more than the amount of predicted Green GDP in this country (Wu and Wu, 2010). The results of researches about the relationship among economic growth, trade liberalization and, environmental quality show that there is uniform relationship between economic growth and the emission of carbon dioxide (Grossman and Krueger, 1993; Selden and Song, 1994). Another study shows that open economic reverses environment destruction process by promotion of technology and its impact on the productivity. The experiences of industrial countries show that there is a

*Research Article*

relation between economic growth and environment in such a manner that in some of these countries there is an indirect relationship relative to energy consumption and gross domestic production (Zhang, 2007). Another study that has been done in Iran speaks of the impact of economic openness degree on the environment destruction in long term. The results have shown that the emission of carbon dioxide have destructive influence on the environment, positively and at 10 percent level per capita (Agheli *et al.,* 2010).

**MATERIALS AND METHODS**
*Data and Research Method*
At first, this Paper has applied data and information from the statistical center of Iran and balance sheet of energy from power plant ministry of Iran. After more consideration and using from the related function, the best one has been chosen for proper model. The model which has been applied is as follows:

$$GDP\_Gi = f(Energy\_Gi , Pop\_Gi ) \tag{1}$$

Where **GDP_**Gi shows the growth rate of GDP as dependent variable; Energy_Gi indicates the energy growth rate and Pop_Gi is the growth rate of population.

$$CO2\_Gi = f(Energy\_Gi , Pop\_Gi ) \tag{2}$$

Where **CO2_**Gi shows the growth rate of **CO2** as dependent variable; Energy_Gi indicates the energy growth rate and Pop_Gi is the growth rate of population.

**RESULTS AND DISCUSSION**
*Results and Conclusion*
This subsection has estimated the statistics regression of equations 1 and 2. It has provided the process of changes in GDP growth rate with regard to energy changes.

$$GDP\_Gi = 0.335 Energy\_Gi + 2.35\ Pop\_Gi \tag{1-1}$$
$$(1.665) \qquad\qquad (3.048)$$
$$GDP\_Gi = 2.074 + 0.548 Energy\_Gi \tag{1-2}$$
$$(1.54) \quad (2.36)$$

The resulting regression in both equations 1-1 and 1-2 show that there is a positive relationship between economic growth and energy growth. Since t-value of energy is obtained 2.36, so we reject null hypothesis. It is to note that the population growth rate has positive effect on GDP growth rate. The study on energy and co2 growth has shown that, there is a positive relationship between Energy growth rate and co2 growth rate.

$$CO2\_Gi = 1.23\ + 0.961 Energy\_Gi \tag{2-1}$$
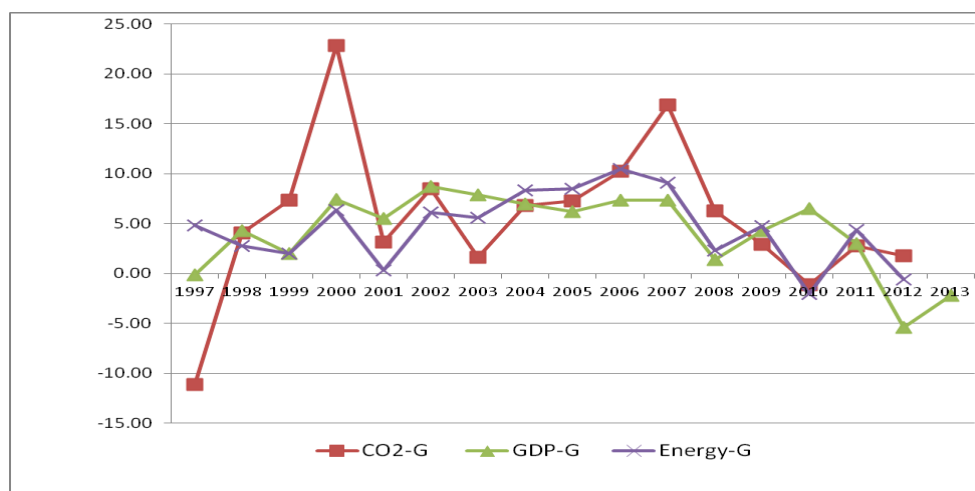$$(0.43) \quad (2.36)$$



**Figure 1: GDP, Energy and CO2 Growth Rate in Iran**

*Research Article*

Figure 1 illustrates the status of GDP, Energy and CO2 Growth Rate in Iran during 1997-2013. A study of GDP growth shows that the highest rate happened in 2002, in which energy growth and co2 growth happened in the highest rate.

As a result of this research we conclude that there is a uniform relationship between economic growth and the emission of carbon dioxide, except 2010.

**REFERENCES**

**Agheli L, Yamchi H and Valaei (2010).** The Impact of Economic Openness Degree on the Environment Destruction in long term. *The Journal of Rahboard* (57).

**Avazalipour MS, Zandi F and Kavand H (2009).** An Analysis of Labour Force and Economic Participation of Women in Iran Based on 1996 and 2006 Census, *Journal of Population Association of Iran* **4**(7) 141-168.

**Grossman GM and Krueger AB (1993).** Environmental Impacts of a North American Free Trade Agreement. In: *The Mexico-US Free Trade Agreement,* edited by Garber A (MIT Press, Cambridge, MA).

**Selden T and Song D (1994).** Environmental Quality and Development: is there a Kuznets curve for air pollution emissions?, *Journal of Environmental Economics and Management* (27).

**Srinivasan TN (2003)**. China and India: Economic Performance, Competition, and Cooperation, An Update, Stanford University, *Working paper* No. 199

**Stockhammer E, Hochreiter H, Obermayr B and Steiner K (1997).** The Index of Sustainable Economic Welfare (ISEW) as an alternative to GDP in measuring economic welfare: the results of the Austrian (revised) ISEW calculation 1955–1992. *Ecological Economics* **21** 19– 34.

**Torras M (2003).** Welfare, Inequality, and Resource Depletion A Reassessment of Brazilian Economic Growth, Ashgate, Burlington, VT.

**United Nations (2003).** Indicators for Monitoring the Millennium Development Goals, Department of Economic and Social Affairs, Statistical Division, New York.

**Wu J and Wu T (2010).** Green GDP. In: *Berkshire Encyclopedia of Sustainability*, *Vol. ll-the Business of Sustainability* (Berkshire Publishing Great Barrington) 248-250.

**Zhang Zhong-Xiang (2007).** China is moving away the pattern of develop first and then treat the pollution. *Journal of Energy Policy* (35).

*Annexes:*

Dependent Variable: GDP_G
Method: Least Squares
Date: 09/05/15   Time: 14:29
Sample (adjusted): 1 14
Included observations: 14 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| POP_G | 2.352137 | 0.771507 | 3.048758 | 0.0101 |
| ENERGY  G | 0.335101 | 0.201230 | 1.665263 | 0.1217 |
| R-squared | 0.114716 | Mean dependent var | | 5.416725 |
| Adjusted R-squared | 0.040942 | S.D. dependent var | | 2.690662 |
| S.E. of regression | 2.635005 | Akaike info criterion | | 4.907211 |
| Sum squared resid | 83.31903 | Schwarz criterion | | 4.998505 |
| Log likelihood | -32.35048 | Hannan-Quinn criter. | | 4.898760 |
| Durbin-Watson stat | 1.110321 | | | |

### Research Article

Dependent Variable: GDP_G
Method: Least Squares
Date: 08/26/15   Time: 16:19
Sample (adjusted): 1 16
Included observations: 16 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 2.074353 | 1.338774 | 1.549443 | 0.1436 |
| ENERGY_G | 0.548878 | 0.232357 | 2.362215 | 0.0332 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.284987 | Mean dependent var | | 4.590884 |
| Adjusted R-squared | 0.233915 | S.D. dependent var | | 3.705394 |
| S.E. of regression | 3.243195 | Akaike info criterion | | 5.307463 |
| Sum squared resid | 147.2564 | Schwarz criterion | | 5.404037 |
| Log likelihood | -40.45971 | Hannan-Quinn criter. | | 5.312409 |
| F-statistic | 5.580061 | Durbin-Watson stat | | 1.210090 |
| Prob(F-statistic) | 0.033181 | | | |

Dependent Variable: CO2_G
Method: Least Squares
Date: 08/26/15   Time: 16:20
Sample (adjusted): 1 16
Included observations: 16 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.231836 | 2.837663 | 0.434102 | 0.6708 |
| ENERGY_G | 0.961483 | 0.492504 | 1.952235 | 0.0712 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.213979 | Mean dependent var | | 5.640107 |
| Adjusted R-squared | 0.157834 | S.D. dependent var | | 7.490793 |
| S.E. of regression | 6.874270 | Akaike info criterion | | 6.809917 |
| Sum squared resid | 661.5783 | Schwarz criterion | | 6.906490 |
| Log likelihood | -52.47933 | Hannan-Quinn criter. | | 6.814862 |
| F-statistic | 3.811220 | Durbin-Watson stat | | 1.242183 |
| Prob(F-statistic) | 0.071204 | | | |