

Study For Effect of Macroeconomic Variables on Environmental Performance Indicators

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Abstract-----Due to the economic, social, cultural and political development of society and the establishment of coordination and alignment between these dimensions , the most basic elements of planning in achieving sustainable development. EPI (Environmental Performance Index) , executive functioning political systems in order to reduce environmental stress on human health and natural resources to enhance the dynamic environment and the management of risk estimates. In this study, the effect of macroeconomic variables on environmental performance indicators for 10 countries in the Middle East , including Iran, were studied . Data from the World Bank website and EPI, during the years 2010 - 2000 were collected. Estimated using panel data methods (panel) and STATA software were taken . The results showed that the higher per capita income countries , education (literacy) is greater than the index number closer to 100 would be . It is suggested to achieve high economic growth in addition to preservation of the environment , water resources , soil, natural resources and the capacity utilization of existing manpower as well .

Keywords-----Environmental performance indicators, macroeconomic variables, some Middle Eastern countries, panel data.

I.Introduction

Twenty years after the Earth Summit in Rio, the governments using quantitative metrics such as pollution control and natural resources management challenges are trying to demonstrate their environmental performance improvement. And investment in this field increased.

EPI¹ has facilitated the comparison of countries. Environmental policies include the effects of environment on diseases, water (its impact on human health), air pollution (its effect on human health), air pollution (its effects on ecosystems) water resources (their impacts on ecosystems) biodiversity, forests, fisheries and aquatics, agriculture, and climate changes.

EPI is calculated according to a total of 20 national- environmental indicators which are classified into 9 categories and provides the ranking of environmental issues management methods for each country. This indicator is evaluated using criteria such as gross domestic product (GDP), the population of each country, the area of each country, etc. After the Industrial Revolution, the countries gradually marched towards industrialization. Raising the level of production was their most important aim in the field of economy and their competition to reach development, started. The rapid growth of GDP in many countries led to intense pressure on environment and caused degradation. Its comparative range has been defined as something between zero to one hundred. So that the closer the environmental performance index is to zero, it reflects a lower value of the index, and the closer it is to one hundred, it constitutes a higher value of the index and a closer position to the desired policy goal. In the field of environmental performance indicator and environmental sustainability indicator, some national and international

¹ Environmental Performance Index

studies have been carried out and some of them can be mentioned as follows:

Samimi and et al (2011) examined the effect of ESI on the economic growth of developing countries. The study results showed that there is a normal and significant relationship between this index and the economic growth and Kuznets U-shaped curve.

Sutton Paul (2003) using satellite imagery, empirically studied the effect of environmental sustainability index on the evaluation of ecosystem. He concluded that ESI is effective on the sustainability of ecosystems and in some cases, due to the deficiencies in this index, there will be a separation between consumption and production and ecosystem adaptation.

The present study investigated the effect of macroeconomic variables on the Environmental Performance Index (EPI) in some of the Middle East countries. The purpose of this study was to evaluate the per capita of gross domestic production, literacy index and trade openness on environmental performance index of the studied countries. Therefore it was assumed that the higher the GDPP, the higher is the education level, and the higher is environmental performance index.

II. Materials and Methods

In order to assess the impact of macroeconomic variables on EPI in the case study countries, the panel data method was used. The data were collected from the websites of EPI and the World Bank. The study period was 2000-2010. The general pattern of the model is as Equation (1):

$$EPI = \beta_1 + \beta_2 GDP + \beta_3 TRAD + \beta_4 LI \quad (1)$$

EPI: Environmental Performance Index, GDPP: per capita gross domestic production, L.I (Literacy Index): the index of literacy and TRAD: the level of trade openness.

As mentioned, panel data econometric model was used in the present study. In order to select OLS model from POOLED, evaluation of fixed effects (FE), random effects (RE), Hausman test and the Lagrangian multiplier- Pagan method (LM) was carried out by

STATA 12 software. The test results are presented in Table 1.

Table 1- Hausman test and by the method of Pagan

Result	P-Value	Chi2	Test
RE	0.0000	314.51	LM
RE	0.0820	6.70	Hausman

Source: finding of this study

As a result, the random effects model was adopted. The result of the data estimation by random effects is presented in Table 2.

Table 2- Results of model estimation

Probability	z-statistic	coefficient	Independent Variable
0.002	0.10	-0.0069245	per capita GDP
0.027	0.79	0.2809736	Openness to trade
0.009	1.02	0.1293474	Index of literacy
0.004	2.89	33.41962	Fixed component
1.88			Wald chi2
0.0077			Prob>chi2
0.87			Rho

Source: finding of this study

As mentioned, the independent variables in the present study are per capita GDP, literacy index and openness of trade share and the effects of each of these variables were assessed on environmental performance index. It is expected that the higher per capita income has a positive effect on environmental performance index (It was mentioned that the closer EPI to 100, it indicates a higher and better performance). Based on the results, the coefficient of the GDP variable is negative, but it is statistically significant. It can be argued that there is a reciprocal relationship between environmental performance index and per capita GDP. But since in this study, the selected studied countries of the Middle East are among developing countries and in some cases underdeveloped countries (such as Iraq, Egypt, etc), therefore the GDPP coefficient appears with a negative sign. And reflects the fact that the more a country is backward and less-developed, it will enjoy less «EPI» environmental performance sub-Indices (water

resources, environmental health, water treatment, ecosystem adaptation, agriculture, fisheries, etc) and therefore it will have a lower per capita income and per capita production. The openness of the trade share has had a positive and significant effect on environmental performance index and actually this reflects the fact that stronger transactions and economic relations between the countries result in the country being closer to the sustainable development. Also in line with expectations, the more the literacy index is, the higher the access and optimal use of environmental performance index will be and this index will be higher. According to the results the significance of literacy index emphasizes on this point.

III. Results and discussion

The process of economic growth and development is such an issue that most of the countries have had paid a special attention to it in recent decades. So that, environmental challenges have become one of the main concerns of the governments. According to the results obtained in this study, it was observed that the GDP, openness of trade share and even literacy index play an important role in Environmental Performance Index (EPI) which are effective in the economic growth trend of the studied countries. Also due to lack of proper and efficient management in some selected countries, despite the positive impact of per capita GDP on EPI, this variable appeared with a negative coefficient in the model. And reflects the fact that if a country wants to grow and develop economically, it should utilize the appropriate managerial style for protection of the environment and by promotion of science and technology, takes a step towards sustainable development and particularly its economic growth.

Since Iran was included among the selected countries in this study, and given to its 5 to 10 percent decline in per capita gross domestic production due to environmental degradation in recent years that can lead to weakening problems for the Iranian economy in the long run, therefore the following issues are offered to pass through Iranian environmental challenges:

- 1- Changing the national computational system with regard to environmental degradations and reducing the efficiency of contributing factors.
- 2- Conservation of energy resources.
- 3- Strategic planning for sustainable development of each of the sub-indices of Environmental Performance (EPI) separately.
- 4- Creating an integrated environmental management.
- 5- Allocating a specific budget line in the national budget in order to deal with environmental hazards.

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