



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2017; 3(7): 1206-1209
www.allresearchjournal.com
Received: 14-05-2017
Accepted: 17-06-2017

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Relationship between economic growth and environment across developed and emerging nation

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Abstract

Purpose: The paper intends to find out the relationship between economic growth and environment variables across various nations. Then this paper will also provide policy implications for the government

Methodology: Cross sectional least square regression across 15 developed nation and 14 emerging nation between EPI and GDP index

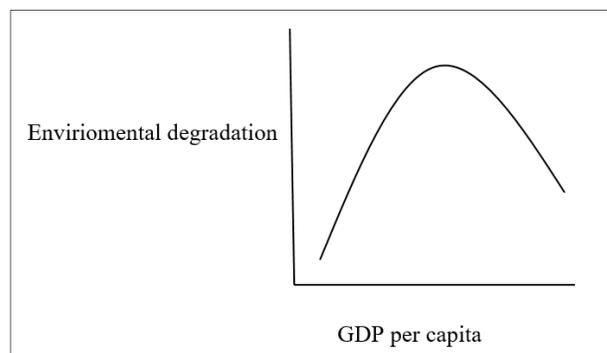
Findings: The results of the paper supports the EKZ curve and suggest in in case of higher GDP countries, there is a positive relationship between economic growth and environment indicators (later part of EKZ curve). Moreover, there is no relationship in case of developed nations and there is more intense and positive relationship in case of emerging nations.

Keywords: Economic growth, Environment performance index, Comparisons, Policies

Introduction

Countries are achieving economic growth at the sake of depletion of natural resources and degradation of natural environment. This study intends to take environmental issues and provide implications in this regard. In the global ranking of EPI, India ranks much behind other emerging and developing nations like china and Brazil. The quality of air is very poor which constituent degradation in the environment of the country. India is on the verge of achieving higher economic growth and development. This growth could be at the cost of environment of the country. The paper intends to find out the relationship between economic growth and environment variables across various nations. The paper seeks to establish basic foundations in this regard and trigger further questions for future scholars.

The relationship between environment and economic degradation has been established with the help of Environmental Kuznets Curve (EKC). The shape of the curve is inverted U shaped.



Source: Lewis (1954).

Fig 1: Environmental Kuznets Curve

At the very initial stage, as growth increases, there will be increase in the environmental pollution. After a certain point, increase in growth will results in lower environment

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pollution. There are three perspectives on the explanation of the shape of the curve that is given below:

Individual Perspective

The reason behind this shape is that, at the initial stage when people having low income level, they will seek to have consumption and growth prospects and they will not care for the environment. After achieving a certain level on income, they will acknowledge the importance of environment quality.

Firm perspective

Firm initially ignore the environment issue, to expand its production process and survive the basic competition. Then, after a certain point, it will invest in alternative environmental friendly technology.

Society Perspective

At initial level, society seeks to satisfy basic demand such as food, clothing and shelter. They will not consider environment as precious at that point of time. After a certain point of time, a society matures, and has more awareness towards the protection of environment.

The turning point estimated by previous researches comes out to be \$5000 – 34000 for GDP per capita. Only 10% of the developed countries have reached this turning point

However, there are certain studies which confront the logic given above. They have given argue that as GDP per capita increases, emissions such as CO2 also increases due to more purchasing of personal cars. If a country follows the policy of enhanced economic growth, then it leads to more environmental degradation and more pollution (Brandon and Hommann, 1995) [5].

Developing countries have found to have more emission than developed nations because it has been seen that developed countries tries to set up units in developing countries in pollution centered states (Jha, 1999) [6].

Moreover many developing nations in asia, Africa, and latin America had focused on the short term objectives of economic growth and had very less concern for environmental indicators. Since, these countries were facing crisis in 1980s-90s

Mukherjee and Kathuria (2006) [7] finds out the support of EKC relationship in fourteen Indian States over 1990-2001. They have discovered that Indian states are experiencing growth at the expense of economic growth, therefore india is in initial stage of EKC curve.

Aye (2017) [8] find that as the economy grows, more Carbon dioxide is released perhaps due to more industrial activities without employing environmentally friendly techniques that should enhance environmental quality.

The Environmental Performance Index (EPI) is a technique of measuring and giving score to the performance on environment of various countries. It is developed by Yale University and Columbia University in association with the World Economic Forum and the Joint Research Centre of the European Commission.

Component of EPI

Empirical investigations

In this study, we intended to find out relationship between environment indicator and Economic growth. Environment

Performance Index has been taken up as the proxy for Environment indicator and Economic growth is proxies by GDP per capita variable.

First of all, we had selected 30 nations which are having high level of GDP in dollars terms. The selection of high GDP countries means if theory of EK curve is viable, then we will find out positive relationship between environment and economic growth.

Then we classify each country as developed and emerging nation based on criteria of GDP.

The selected nations are listed below:

Table 1

Developed nations	Emerging Nations
United states	China
Japan	India
Russia	Brazil
Germany	Indonesia
France	Mexico
United Kingdom	Iran
Italy	Nigeria
South Korea	Thailand
Saudi Arabia	Argentina
Canada	Poland
Spain	Egypt
Turkey	Pakistan
Taiwan	South Africa
Australia	Philippines
Netherlands	
Malaysia	

The Correlation between GDP per capita and EPI in these 30 countries is found to be 0.714 which is in line with the theory of EK curve. In case of developed nations correlation is 0.25, where as for emerging nations it is coming out be 0.82. Therefore, it can be said that growth has significant implications for developing nations, then developed nations. Moreover emerging nations is improving EPI at rate of 15.85% over 10 years. Whereas, developed nations keeps on increasing EPI at rate of 12.33%. This may be due to the fact that emerging nations have more potential towards improving EPI then developed nations.

Ln GDP per capita

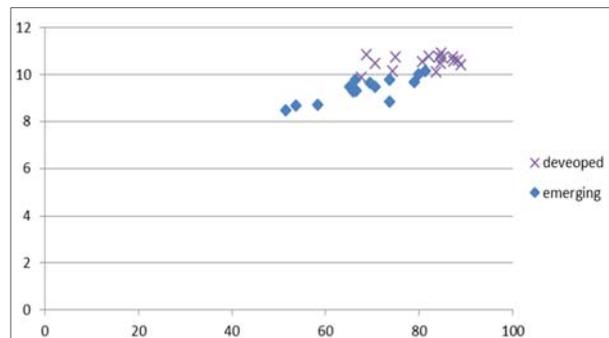


Fig 1

EPI

The graph above shows that as GDP per capita increase, EPI also increases. Therefore we are at the later part of EKZ curve as we have selected higher GDP countries in our study. More over Developed nations are having higher EPI

score than emerging nations which can easily visualized from the graph.

The impact GDP on EPI

Then, we have run the following regression equation for our study, in which log of EPI is the dependent variable and log of GDP per capita is the independent variables. The reason for taking log is that data will become stationary and can be interpreted in the form of percentages

$$\text{LNEPI} = a + b \text{ LNGDPPC} + e$$

Where, LNEPI stands for log of EPI

LNGDPPC stands for log of GDP per capita

We have run regression three times, firstly for all thirty countries, then for developed nations and developing nations

Regression results on complete sample

Adjusted R square of 0.6421 suggests that model is well fitted. The coefficient of LNGDPPC is 0.16 suggest that one percent rise in GDP per capita leads to rise in EPI score by 0.16 percent, which is significant at 5 percent level of significance

Table 2

Complete sample	Observations 30 Adjusted R Square 0.6421 Significance F 0.0			
	Coefficients	Standard Error	t Stat	P-value
Intercept	2.672649	0.224877	11.88496	1.87E-12
In per capita gdp	0.163357	0.022431	7.282515	6.28E-08

Regression results on Developed nations

Adjusted R square of 0.03 suggests that model is not well fitted. There are other variables which are affecting EPI among developed nations. The coefficient of LNGDPPC is 0.10 suggest that one percent rise in GDP per capita leads to rise in EPI score by 0.10 percent, which is not significant at 5 percent level of significance. Therefore we can say that in case of developed nations do not have relationship between environment indicators and economic growth

Table 3

Developed nations	Observations 16 Adjusted R Square 0.03 Significance F 0.23			
	Coefficients	Standard Error	t Stat	P-value
Intercept	3.320149	0.851826	3.897684	0.001609
In per capita gdp	0.101246	0.080753	1.253778	0.230456

Regression results on Emerging nations

Adjusted R square of 0.68 suggests that model is not well explanatory. The coefficient of LNGDPPC is 0.22 suggest that one percent rise in GDP per capita leads to rise in EPI score by 0.22 percent, which is significant at 5 percent level of significance. Therefore we can say that in case of emerging nations, there is a relationship environment indicators and economic growth.

Table 4

Emerging nations	Observations 14 Adjusted R Square 0.68 Significance F 0.00			
	Coefficients	Standard Error	t Stat	P-value
Intercept	2.112936	0.396967	5.322703	0.000181
In per capita gdp	0.223949	0.04227	5.298095	0.000189

The impact EPI on GDP

Then, the reverse regression equation has been, in which log of GDP per capita is the dependent variable and log of EPI is the independent variables. The reason for taking log is that data will become stationary and can be interpreted in the form of percentages

$$\text{LNGDPPC} = a + b \text{ LNEPI} + e$$

Where, LNEPI stands for log of EPI

LNGDPPC stands for log of GDP per capita

We have run regression three times, firstly for all thirty countries, then for developed nations and developing nations

Regression results on complete sample

The coefficient of LNEPI is which suggest that one percent rise in EPI leads to rise in GDP by 4 percent, which is significant at 5 percent level of significance

Table 5

Complete sample	Observations 30 Adjusted R Square 0.6421 Significance F 0.0			
	Coefficients	Standard Error	t Stat	P-value
Intercept	-7.25234	2.370329	-3.05964	0.004844
In epi	4.006391	0.550138	7.282515	6.28E-08

Regression results on Developed nations

Adjusted R square of 0.03 suggests that model is not well fitted. The coefficient of LNGDPPC is 0.99, which is not significant at 5 percent level of significance. Therefore we can say that in case of developed nations do not have relationship between environment indicators and economic growth.

Table 6

Developed nations	Observations 16 Adjusted R Square 0.03 Significance F 0.23			
	Coefficients	Standard Error	t Stat	P-value
Intercept	6.169957	3.490049	1.767871	0.09886
In epi	0.997052	0.795239	1.253778	0.230456

Regression results on Emerging nations

The coefficient of LNEPI is 3.12, which suggest that one percent rise in EPI will leads to rise in GDP per capita score by 3.128 percent, which is significant at 5 percent level of significance. Therefore we can say that in case of emerging nations, there is a positive relationship environment indicators and economic growth

Table 7

Emerging nations	Observations 14 Adjusted R Square 0.68 Significance F 0.00			
	Coefficients	Standard Error	t Stat	P-value
Intercept	-3.80096	2.488706	-1.52729	0.152609
In epi	3.128043	0.590409	5.298095	0.000189

Conclusion and Implications of the study

The results of the paper supports the EKZ curve and suggest in in case of higher GDP countries, there is a positive relationship between economic growth and environment indicators (later part of EKZ curve). Moreover, there is no relationship in case of developed nations and there is more intense and positive relationship in case of emerging nations. Therefore, it is in the interest of environment, to increase the GDP per capita of less developed nations, to enhance their commitment towards the protection of

environment. Moreover, improvement in EPI in emerging nations has significant positive impact on economic growth. Therefore it is important to enhance environment performance to boost economic growth for emerging nations. In further study, more control variable and tools can be used in these areas to consolidate the results of our study. We can also take less developed nations into our study.

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