Science Arena Publications
Specialty Journal of Accounting and Economics
Available online at www.sciarena.com
2017, Vol, 3 (2): 39-47

Evaluation of The Effects of Economic Growth, Energy Consumption and Urbanization On the Quality of the Environment in The Middle East; A Panel Data Approach

Sayed Nematallah Moosavi[1], Sohrab Bameri[2*]
[1]Associate Professor of Agricultural Economics, Islamic Azad University, Marvdasht Branch, Iran
[2]PhD student of Agricultural Economics, Islamic Azad University, Marvdasht Branch, Iran.
*(Corresponding Author)

Abstract: *In this research, using co-integration analysis in panel data, short and long run relationship between carbon dioxide emission, per capita income, energy consumption and urbanity in the Middle East countries between the years 1990-2013 was investigated. The results of the research show an N-shaped relationship, an inverse relationship between per capita income and pollution. The effect of energy consumption has high statistical importance, in that it is expected that pollution emissions per capita will increase by about 8 percent in the long run and it increases by about 5.6 percent in the short run, as energy consumption per capita increases by 10 percent. Urbanity index has a little positive effect on pollution emission per capita.*

Keywords: *carbon dioxide emission, per capita income, panel data, co-integration analyses.*

INTRODUCTION

With the importance of environmental issues, many countries attempt to minimize environmental damages caused by economic activities, as well as achieving goals of growth and development, by proper planning and use of proper methods. In this respect, studying economic-social aspects of pollutant gas emissions and their environmental impacts particularly in the current situation in which the volume of greenhouse gases is rising take on special importance (Bagheri, 2010; Moqadasi and Ziaee,2011). This issue has become more important to developing countries that give a higher priority to economic growth and are fiercely vying for decreasing their distance from other industrialized countries (Knowles and Owen, 1995). Most of these countries are facing the issue of environmental degradation in order to achieve the goals of growth and sustainable development, because most of their economic activities depend on the use of natural resources and there are few activities that not ending up with creation of waste and pollution emission. For this reason, in an attempt to move along the path of development, the environment and economic development are not only two opposite poles, but they are also factors of symmetrical promotion of societies together (Bestanifar and Sameti, 2004). Apart from other factors, energy assumes a determining role in countries' economic growth and its importance is still growing. Increasing dependence on energy has led this segment to interact with other economic sectors, as well as making the speed of growth and economic development dependent on the level of energy consumption. Myers and Kent (2003) contend that greater use of energy has given rise to an average increase of production factor and economic growth utilization even after the industrial revolution particularly in recent decades, but the use of energy caused environmental degradation due to its polluting effects, as the major quantity of greenhouse gas released in the world is in the form of carbon dioxide gas which is caused by the combustion of fossil fuels.

Concerns about environmental issues continue to exist for increase of urban population as a social phenomenon, as well as for economic growth and energy consumption. Urbanization is one of the most important phenomena in the present age and has received the attention of policy makers and researchers in recent decades due to important economic and social impacts on society (Ibrahimi and Al Murad, 2009). There are two different points of view regarding the link between urban population growth and environmental pollution. The former suggests that urban population increase positively affects environmental pollution, because the use of infrastructures, transportation, energy and ultimately pollution emissions increase as do urbanity. In addition to this, transition from agriculture to industry is coupled with environmental pollution increase (Fallahati and Hekmatifard, 2013). However, the latter emphasizes that the ground for utilizing the benefits of using resources is provided as urbanity grows, causing energy to be consumed effectively in cities compared to villages. Moreover, in line with such a view, if cities have proper and efficient management and access of urban population to clean and environmentally friendly technologies is provided, we can expect that urbanity growth can reduce pollution emission per capita. As such, this relationship between urban population growth and the rate of environmental pollution can be either positive or negative (Jones, 1991; Alam et a., 2007).

Given the importance of the issue, in this research an evaluation of the effect of economic growth, energy consumption and urbanity on environmental pollution in the area of the Middle East was presented. The Middle East is a term referred to as a geographical area on earth, which includes the Persian Gulf and the margin of the Southwest Asia. Much of the area has been frequently faced with sand storms due to its special climatic conditions, creating a condition for sever climatic pollutions (Asgari, 2010). Select countries in this study include Iran, Saudi Arabia, Bahrain, UAE, Oman, Jordan, Lebanon, Yemen, Turkey, Cyprus, Iraq, and Egypt, which were evaluated during 1990-2013. It should be noted that there are other countries in this region, which were excluded due to defects of data obtained from sample.

Research background

The link between environment and economic growth can be divided into three categories thematically; first, studies focusing on the relationship between economic growth and environmental pollution and examining Kuznets curve hypotheses with great accuracy, the hypotheses of this curve show that a one-sided causation is at play from income to pollution emission, i.e. pollution is believed to be a function of income (Dinda and Coondoo, 2006; Saleh et al., 2009). The second series of studies lay an emphasis on the link between economic growth and energy consumption. As emissions of pollutants are normally caused by fossil fuels, energy consumption has been viewed as an index of pollution emission (Aqeel and Butt, 200; Soytas and Sari, 2006; Armen and Zare, 2009). Third series of studies concerning economic growth and environmental pollution deal with the link between economic growth, energy consumption and pollution emission; in other words, this class of studies is a mix of two former studies and the two factors energy consumption and emission of greenhouse gases are playing a role as an index of the environment quality (Ang, 2007; Pao and Tsai, 2010, Muhammadbaqeri, 2010). In linking economic growth to the environment, the effect of urbanity factor is of importance. Urbanity rise exerts a negative influence on the quality of the environment according to Kasman and Duman (2015), Fetros et al., (2011), and it has a positive influence according to Hussein (2011).

Research theory

One way of examining the relation between economic growth and the quality of is the environmental Kuznets curve. This curve shows there is an inverted U-shaped relation between income and pollution, in that as economy growth increases, so does pollution emission in the first place and it falls in a critical point (turning point) of pollutant emission. This point is different to various environmental pollutants and indicators. According to this, to examine the relationship, a second-degree model is used (Agras and Chapman, 1999).

$$(1)\quad CO_{2it} = B_0 + B_1 GDP_{it} + B_2 GDP_{it}^2 + \alpha Z_{it} + \delta_{it}$$

In this model, i and t are country and time indexes. CO_2 is pollution emission and GDP is economic growth, Z also represent other variables affecting pollution. If $\beta_1 < 0$ and $\beta_2 > 0$, then a U-shaped relation exists between economic growth and pollution.

In order to study probability relation between economic growth and quality of environment, in some studies, third-degree form of per capita income is considered in model (Dinda, 2004; Lopez et al., 2014).

$$(2) \qquad CO_{2it} = B_0 + B_1 GDP_{it} + B_2 GDP_{it}^2 + B_3 GDP_{it}^3 + \alpha Z_{it} + \vartheta_{it}$$

With hypotheses as follows; if β1= β2= β3=0, then there is no relation between income and pollution; if β1> 0 and β2= β3, an incremental monotonic relationship or linear relationship exists between income and pollution, if β1<0, and β2= β3=0, a decremented monotonic relationship exists between income and pollution, if β1>0 and β2<0 and β3=0, there is an inverted U-shaped relationship between income and pollution, and it is expected that in a critical point (turning point) the trend of pollutant emission would change, if β1<0 and β2>0, and β3=0, a U-shaped relationship exists between income and pollution; if β1>0 and β2<0 and β3>0, a third-degree polynomial and an N-shaped relationship is established between income and pollution; if β1<0 and β2>0 and β3<0, a third-degree polynomial and an inverted N-shaped relationship exists between income and pollution.

Research model

In this research, in order to evaluate the effect of the variables GDP, energy consumption and urban population on carbon dioxide emission, a model proposed by Dinda (2004) and Kasman and Duman (2015)

$$(3) \quad LnCO_{2it} = \beta_0 + \beta_1 LnGDP_{it} + \beta_2 LnGDP_{it}^{\ 2} + \beta_3 LnGDP_{it}^{\ 3} + \beta_4 LnEC_{it} + \beta_5 UP_{it} + e_{it}$$

In this model, Ln stands for natural logarithm. i and t indexes are country and time respectively. CO_2 is per capita carbon dioxide emission and its unit based on tone per year. GDP is per capita gross domestic production which is measured by dollar and purchase power equilibrium, E is per capita energy which is based on oil/kg. UP is the percentage of people who live in urban regions (World Development Indicator, 2015).

It is expected that an increase in energy consumption would lead to an increase in Co2 emission, i.e. β_4 becomes positive. Moreover, it is expected that β5 and β6 would become positive (Kasman and Duman, 2015).

Model estimation method

Like time series models, in synthetic models the problem of spurious regression continues if they are non-stationary. High observation of R^2 is not because real relationship between variables (Gojarati, 2004). Therefore, the use of unit root in panel data is essential for ensuring the accuracy and validity of results. To check out variable stationary in this research, the tests Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003) were used.

Examining variable co-integration is important in panel data as in time series data. When there is evidence of a unit root in data, co-integration method can be useful in order to avoid the occurrence of spurious regression and to determine a long-run relationship between variables. The most important point in co-integration analyses is that it is likely for a linear combination of the variables to be stationary and without trend, despite non-stationary state of most time series and an increasing or decreasing stochastic trend in a long run. In other words, if an economic theory is true and connection of variable set, we expect that a combination of the variables becomes stationary and trend-free in a long run (Abrishami, 2002).

Panel co-integration tests have more power and validity compared to co-integration tests at every single level. These tests can be used even under conditions that time period is shorter and sample size is smaller (Baltagi, 2008). In panel data, in order to test co-integration relation, Pedroni's (2004) and Kao's (1999) methods were used.

In co-integration test, Pedroni (2004) considers the possibility of fixed effect and heterogeneous time series among levels as follows;

(7) $$y_{it} = \alpha_i + \delta_{it} + \beta_{1i}\chi_{1it} + \beta_{2i}\chi_{2it} \ldots + \beta_{mi}\chi_{mit} + \varepsilon_{it}$$

Where *i= 1,2, …, N* represents select countries, t=1, 2, …, T represents a time span and m is the number of explanatory variables. α_i and δ_i provides the chance to investigate certain fixed effects of parts and trends. ε_{it} is residual of equation 5. To run co-integration test, the residual of the above equation was used and we have;

(8) $$\hat{\varepsilon}_{it} = \rho_i \hat{\varepsilon}_{it-1} + u_{it}$$

Hypotheses of co-integration test as follows;

(9) $$H_0 : \rho = 1$$
$$H_1 : \rho < 1$$

Where the null hypothesis suggests the lack of a co-integration relationship between variables at all levels and the alternative variables suggests a co-integration between variables.

Pedroni introduced seven different statistics in two distinct groups in order to examine null hypothesis about the lack of a co-integration vector in heterogeneous panel models.

The first group is known as within-dimension, in that time factors are considered. This set of tests allows for testing heterogeneity among pats. The statistics suggest the average of panel co-integration test statistics throughout levels. The hypotheses of this set of statistics for all *i*s are as follows;

(10)

$$H_0 : \lambda_i = 1$$
$$H_1 : \lambda_i = \lambda < 1$$

λ_i here has the same value for all levels and the hypotheses of the test are as follows;

The second set of Pedroni's tests is called between-dimension. It should be noted that λ_i here does not have the same value for different levels and the null hypothesis suggests no long-run relationship between variables.

(11) $$H_0 : \lambda_i = 1$$
$$H_1 : \lambda_i < 1$$

According to this, the seven statistics that Pedroni used for panel co-integration test include;

Within-dimension test statistics which include;

1- Panel v-statistic, 2- Panel Phillips–Perron Type r-Statistics, 3- Panel Phillips-Perron Type t-stastic, 4- Augmented Dickey–Fuller (ADF) Type t-Statistic

Between-dimension test statistics include;

1- Group Phillips–Perron Type r –Statistic, 2- Group Philips t-Statistic, 3- Group ADF Type t-Statistic

In Kao (1999), in an attempt to do co-integration tests, Pedroni's early approach is used with the difference that it is just fixed effects of levels and homogenous variable coefficients are considered in the primary regression. In this research, in order to test co-integration relationship, both Pederoni's and Kao's techniques are used.

The purpose of panel co-integration tests is eventually to answer the question if there is a long-run relationship or not. By assuming panel co-integration, the next phase is to estimate panel co-integration vector. In recent years limited approaches were used for estimating co-integration vector of panels. The first approach is built on Fully Modified Ordinary Least Squares (FMOLS), which is introduced for estimation of long-run relationship of panel co-integration. Another approach which was used less is Dynamic Ordinary Least Squares (DOLS), which is was proposed by Stock and Watson (1996), in that it assesses the reaction of dependent variable in proportion to changes of independent variables by making some adjustments in ordinary least squares. As the most important advantages of both approaches compared with other estimators of co-integration vector, which proved to be useful in small samples, it can avoid simultaneous bias and have normal asymptotic distribution.

Data used in this research is time series and derived from different resources including world data banks (WDI), world energy statistics (IES). In order to estimate the research model, Excel, Eviews, and STATA were used.

Results and discussion:

In [Table 1], the results of both Levin, Lin and Chu's (2002) stationary test and Im, Pesaran and Shin's (2003) test show that all variable have unit root and variables of interest become stationary by one-time differencing.

Table 1: stationary results of variables of interest

variables	Levin, Li, and Chu (LLC)		Im, Pesaran and Shin		Stationary state
	level	pause	level	pause	
Logarithm of carbon dioxide emission	(0/379) -0/307	/171***(0/000) -6	0/032(0/487) -	7/137***(0/000) -	I(1)
Logarithm of GDP	(0/850) 1/038	/374***(0/000) -6	1/700(0/955)	4/272***(0/000) -	I(1)
Second-power logarithm of GDP	(0/862) 1/092	/273***(0/000) -6	1/773(0/961)	4/049***(0/000) -	I(1)
Third-power logarithm of GDP	(0/877) 1/161	/074***(0/000) -6	1/845(0/967)	3/837***(0/000) -	I(1)
Logarithm of per capita energy consumption	(0/922) 1/424	/296***(0/000) -6	1/597(0/944)	5/745***(0/000) -	I(1)
Logarithm of urban population	(0/937) 1/536	/119***(0/000) -6	1/536(0/937)	6/119***(0/000) -	I(1)

Ref: findings of (*,**, ***, with 10, 5 and 1 percent significance level, respectively)

Therefore, the doubt about spurious regression can be confirmed and there is a need to examine co-integration relationship between variables. The results of Pedroni's co-integration test in [Table 2] show that among seven within-dimension and between-dimension statistics more statistics (four statistics) are significant at one percent level, and the null hypothesis about the lack of a co-integration vector can be rejected. The results of Kao's co-integration test in [Table 3] also suggest that the null hypothesis about the lack of a co-integration vector is strongly rejected at one percent significance level. Generally, the results of both Pedroni's and Kao's co-integration test confirm the long-run relationship between the variables of interest and pollution caused by carbon dioxide emission.

Table 2: **Results of Pedroni's co-integration test**

Between dimension		Within dimension	
0/812 (0/791)	RHO-group statistic	-0/603 (0/726)	**Panel-v statistic**
-5/408*** (0/000)	PP-group statistic	0/625 (0/734)	**Panel-RHO statistic**
-4/657*** (0/000)	ADF-group statistic	-2/442*** (0/007)	**Panel-PP statistic**
		-2/506*** (0/006)	**Panel-ADF statistic**

Ref: findings of (*,**, ***, with 10, 5 and 1 percent significance level, respectively)

Table 3: Results of Kao's co-integration test

ADF-statistic	-6/535*** (0/000)

Ref: findings of (*,**, ***, with 10, 5 and 1 percent significance level, respectively)

In order to estimate long-run and short-run relationship, Fully Modified Ordinary Least Squares (FMOLS) and Error Correction Model (ECM) were used respectively, the results of which are shown in [Table 4]. It should be noted that all parameters of ECM are in the form of first-order difference. The values of the coefficients can be interpreted as elasticity of per capital pollution emission for each respective variable. The statement can explain more than 90 percent of carbon dioxide emission by using the variables of interest.

Table 4: results of long-run estimation of economic factors affecting carbon dioxide emission in the Middle East

probability	**t statistic**	**Standard error**	**coefficient**	**variable**
0/000	-16/107	0/130	-2/099***	Per capita GDP
0/000	10/218	0/027	0/277***	Second power of GDP
0/000	-8/128	0/001	-0/011***	Third power of GDP
0/000	27/141	0/029	0/792***	Energy consumption
0/045	2/009	0/021	0/043**	Urban population
R-squared= 0/984		Sum squared resied = 4/191		
Adjusted R- squared=0/983		SE. of regression = 0/124		
Mean dependent var = 1/732		SD. Dependent var = 0/984		

Ref: findings of (*,**, ***, with 10, 5 and 1 percent significance level, respectively)

In [Diagram 1], a long-run relationship between pollution caused by carbon dioxide and per capita income is presented. In this diagram, values are in the form of natural logarithm. As seen, an inverted N-shaped relationship exists between per capita income and pollution emission. Given this plotted diagram, the concave side of the curve changes at per capita income level 2.4420 dollar, and the concavity of this curve in points is 322.5 and 60572.8 dollar. For this reason, as per capita income increase initially, pollution emission decreases. This situation continues by the limit of 322-dollar income. After this, it is expected that pollution emission increases and thir trend continues as long as per capita income reaches the limit of 60573 dollars. As it continues to increase, it is expected that pollution emission decreases. This conclusion for the shape of the relationship between per capita income and pollution emission is consistent with Akbostanci et al. (2009).

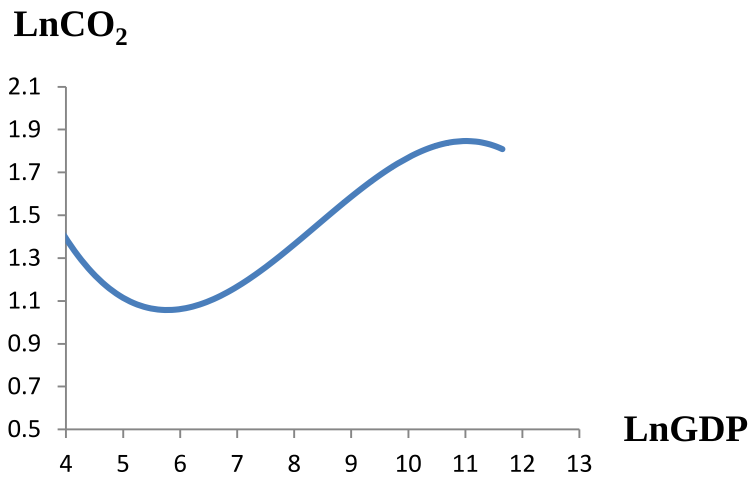

Diagram 1: Long-run relationship between per capita income and carbon dioxide emission in the Middle East

The results of tables 4 and 5 show that the effect of the variable energy consumption has a high level of statistical importance and its coefficient is remarkable, in the sense that it is expected carbon dioxide emission increases by about 8 percent in the long run and by about 6.5 percent in the short run, as per capita energy consumption increases by 10 percent. This result is consistent with that of Tiwari (2011).

Urban population increase has led to an increase in pollution among select countries in the Middle East. However, the value of this variable remains at a low level, in that it is expected per capita pollution emission increases by about 0.4 percent in the long run and by about 0.1 percent in the short run, as urbanity increases by 10 percent. The positive influence of this index is devoid of any statistical importance in the short run. However, what is important is urbanity increase in the long run that cause pollution emission to increase in the Middle East. The positive influence of this index on pollution emission is consistent with the study of Kasman and Duman (2015). In their study, urbanity index is of significant both in the short run and long run.

The coefficient of error correction sentence is significant at 1 percent probability level according to [Table 4] and it takes negative mark. That is to say, it is expected that at each period about 40 percent of the deviation of the short-run relationship from the long-run path will change. Accordingly, the effect of a shock on pollution emission variable in the short run can slightly longer than that in two periods, and after this the short-run relationship will come to a long-run balanced trajectory.

Conclusion and suggestions

In this research, the effect of economic growth, energy consumption and urbanity on environmental pollution was investigated in the Middle East. For environmental pollution, per capita carbon dioxide emission index was used. The results of the research show that in the long run an inverted N-shaped relationship is established between per capita income and pollution emission, and Kuznets' environmental hypothesis was not confirmed for select countries. Therefore, these countries cannot see themselves being protected against environmental concerns. It is thus recommended that particularly for levels of per capita income less than 60 thousand dollars (second concavity of curve) they should solemnly attempt to reduce pollution emission.

Energy consumption has the greatest impact on pollution emission as expected. Thus, it is suggested that pollution be reduced by reducing subsidies on energy consumption, imposing environmental duty and taxes on illegal uses.

For the study area, index of urban population has a positive effect on per capita pollution emission in both short run and long run. Accordingly, it is necessary for policy makers to take some measures so as to help city growth cause the least damage to the environment. In other words, urban development programs should be made in accordance with environmental issues.

References

1. Abrishami, H. (2002). Applied Econometrics. Tehran University Press
2. Agras, J., & Chapman, D. (1999). A dynamic approach to the Environmental Kuznets Curve hypothesis. Ecological Economics, 28(2), 267-277.
3. Akbostancı, E., Türüt-Aşık, S., & Tunç, G. İ. (2009). The relationship between income and environment in Turkey: Is there an Environmental Kuznets Curve?.Energy Policy, 37(3), 861-867.
4. Alam, S. Fatima, A. & Butt, M. S. (2007). Sustainable development in Pakistan in the context of energy consumption demand and environmental degradation. Journal of Asian Economics, 18(5), 825-837.
5. Ang, J. B. (2007). CO_2 emissions, energy consumption, and output in France. Energy Policy, 35(10), 4772-4778.
6. Aqeel, A., & Butt, M. S. (2001). The relationship between energy consumption and economic growth in Pakistan. Asia-Pacific Development Journal, 8(2), 101-110.
7. Armen, A. and Zare, R. (2009). Energy consumption in various sectors and its relationship with economic growth in Iran; causality analysis based on Toda and Yamamato. Journal of Energy Economy Studies, volume 6, issue 21, PP. 67-92
8. Asgari, S. (2010). Environmental degradation of Middle East and natural, economic and social insecurities. 4th International Congress of the Islamic World Geographers. Zahedan, University of Sistan and Baluchestan
9. Baltagi, B. (2008). Econometric analysis of panel data (Vol. 1). John Wiley & Sons.
10. Bastanifar, I., Sameti, M. (2004). An inquiry of green tax effect on decreasing of air pollution of Isfahan products in Isfahan Province. *GIAN and International Symposium and Workshop Isfahan University*, 14-18, pp.271-282.
11. Dinda, S. (2004). Environmental Kuznets Curve Hypothesis: a survey. Ecological Economics, 49(4), 431-455.
12. Dinda, S., & Coondoo, D. (2006). Income and emission: a panel data-based cointegration analysis. Ecological Economics, 57(2), 167-181.
13. Falahi, F. and Hekmatifard, S. (2013). Study of factors associated with the rate of carbon dioxide emission in Iran's cities (panel data approach), Journal of Iran Energy Economy, year II, 150, 126-9
14. Fotros, M. Ferdowsi, M. and Mehrpeima, H. (2011). Study of the effect of energy intensity on environmental degradation in Iran (co-integration analysis). Journal of Ecology. Vol 37, issue 60, pp. 13-22
15. Gojarati, D. (2004). Econometric principles. Vol 2, translated by Abrishami, H. Tehran; Tehran University Press

16. Gojarati, D. (2004). Econometric principles. Vol 2, translated by Abrishami, H. Tehran; Tehran University Press
17. Hossain, M. S. (2011). Panel estimation for CO2 emissions, energy consumption, economic growth, trade openness and urbanization of newly industrialized countries. Energy Policy, 39(11), 6991-6999.
18. Ibrahimi, M. and Almurad, M. (2009). Urbanity and energy consumption in member states of D8. Journal of Mashhad Pajohi
19. Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. Journal of Econometrics, 115(1), 53-74.
20. Jones, D. W. (1991). How urbanization affects energy-use in developing countries. Energy Policy, 19(7), 621-630.
21. Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. Journal of Econometrics, 90(1), 1-44.
22. Kasman, A., & Duman, Y. S. (2015). CO_2 emissions, economic growth, energy consumption, trade and urbanization in new EU member and candidate countries: a panel data analysis. Economic Modelling, 44, 97-103.
23. Knowles, S., & Owen, P. D. (1995). Health capital and cross-country variation in income per capita in the Mankiw-Romer-Weil model. Economics Letters, 48(1), 99-106.
24. Lopez- Menendez, A. J., Perez, R., & Moreno, B. (2014). Environmental costs and renewable energy: Re-visiting the Environmental Kuznets Curve. Journal of Environmental Management, 145, 368-373.
25. Mohammadbagheri, A. (2010). Study of short-run and long-run relationship between GDP, energy consumption and carbon dioxide in Iran. Journal of Energy Economy Studies, vol 7, issue 27, pp. 101-129
26. Moqadasi, R and Ziaee. Z (2011). Study of relationship between carbon dioxide emission and GDP based on panel data. Journal of Economy and Agricultural Development (Agricultural Science and Technology). Vol 25, issue 4, pp. 480-487
27. Myers, Norman, and Jennifer Kent. "New consumers: the influence of affluence on the environment." *Proceedings of the National Academy of Sciences* 100, no. 8 (2003): 4963-4968.
28. Pao, H. T., & Tsai, C. M. (2010). CO_2 emissions, energy consumption and economic growth in BRIC countries. Energy Policy, 38(12), 7850-7860.
29. Pedroni, P. (2000). Fully Modified OLS for heterogeneous cointegrated panels.
30. Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. Econometric Theory, 20(3), 597-625.
31. Saleh, A. Shabani, Z. Barikani, S. and Yazdani, S. (2009). An investigation of causality relationship between GDP and volume of greenhouse gases in Iran; a case of carbon dioxide. Journal of Development and Agriculture Economy, volume 17, issue 66, pp. 19-41
32. Soytas, U., & Sari, R. (2006). Energy consumption and income in G-7 countries. Journal of Policy Modeling, 28(7), 739-750.
33. Stock, J. H., & Watson, M. W. (1993). A simple estimator of cointegrating vectors in higher order integrated systems. Econometrica: Journal of the Econometric Society, 783-820.
34. Tiwari, A. K. (2011). Energy consumption, CO_2 emission and economic growth: A revisit of the evidence from India. Applied Econometrics and International Development, 11(2), 165-189.
35. WDI (World Development Indicators), (2015) Retrieved January 7, 2016, from http://www.worldbank.org/
36. World Bank Group. (2014). Turn Down the Heat: Confronting the New Climate Normal. Washington, DC: World Bank. Retrieved January 12, 2015, from https: // openknowledge. worldbank.org/