Vol 6, No 2, 2014 ISSN: 1309-8055 (Online)

# SUSTAINABLE DEVELOPMENT, HUMAN DEVELOPMENT AND INSTITUTIONAL QUALITY (CASE OF MIDDLE EAST COUNTRIES)

**Davood Behboudi**

University of Tabriz, Islamic Republic of Iran

Associate Professor

E-mail: dbehbudi@tabrizu.ac.ir

**Soha Moosavi**

University of Tabriz, Islamic Republic of Iran

*PHD Student of Economics, University of Tabriz, Iran*

E-mail: Soha750@tabrizu.ac.ir

## Abstract

In recent years, sustainable development has been accounted as one of the most important policy goals at the global level. Many empirical studies have been carried out to determine the relationship between economic growth and environmental quality. The model so-called Environmental Kuznets Curve (EKC) was in most of empirical studies. The aim of this study is to estimate a Modified EKC (MEKC) in which development and sustain was used instead of economic growth and environment. In the present study, negative value of adjusted net saving was used as non-sustainability indicator and human development index was used as development indicator. The statistical population is the Middle East countries and the period of estimation is 1996-2010. The Panel Data method was used in order to estimate the models in this group of countries. Variables such as natural resource abundant and institutional qualities such as Rule of Law, Political Stability, Regulatory Quality and Control of Corruption were used as control variable to specify the model. The results show an inverse N-shaped relation between human development and non-sustainability of resources in the Middle East countries.

Keywords: Adjusted net saving, Human development, Sustainable development, Kuznets Environment Curve

JEL classifications: O150, O400, O470, Q010

Vol 6, No 2, 2014 ISSN: 1309-8055 (Online)

## 1. Introduction

Sustainability and growth have been the objects of many studies during the last century. Sustainable development has been defined in many ways, but the most frequently quoted definition is from Our Common Future, also known as the Brundtland Report (WECD, 1987):"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- the concept of **needs**, in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of **limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs."

Human development has been defined as enlarging people's choices in a way which enables them to lead longer, healthier and fuller lives. The Human Development Index (HDI) is a composite statistic of life expectancy, education, and income indices used to rank countries into four tiers of human development. In the 2010 Human Development Report a further Inequality-adjusted Human Development Index (IHDI) was introduced. While the simple HDI remains useful, it stated that "the IHDI is the actual level of human development (accounting for inequality)" and the "the HDI can be viewed as an index of "potential" human development (or the maximum IHDI that could be achieved if there were no inequality)" (UNDP, 2012).

In this paper, we have adopted the definition of institutional quality provided by Kaufman *et al*. (2003), where six different characteristics describe this aspect: Rule of Law (RL), Political Instability (PI), Government Effectiveness (GE), Control of Corruption (CC), Regulatory Framework (RF), and Property Rights and Rule-based Governance (PR).

The aim of this paper is to collect such recent suggestions, trying to make some steps ahead: i) to model a modified EKC (MEKC) in a panel context; ii) to partially solve the question of reduced form, including an endogenous covariate represented by the quality of institutions to explore the relation between human development and

sustainable development and the effect of institutional quality on sustainable development in the Middle East countries.

Apart from the introduction, the remainder of the paper is organized as follows. Section 2 is the review of the human development and sustainable development literature. Section 3 is about data source, methodology and empirical results. Section 4 presents concluding remarks.

## 2. Literature review

In recent years, sustainable development has been accounted as one of the most important policy goals at the global level. In follow we show some of the studies about sustainable development and human development.

Ranis, Stewart & Ramirez (2000) examined the casual relationship between human development and economic growth for a panel of 76 developing countries in the period 1960-1992. The empirical results show that there is a bidirectional relationship between human development and growth.

Neumayer (2001) studied the sustainablity of human development index for 155 countries during 1970 to 1995. Results of panel cointegration test indicate that in the longrun, human development index does not sustain in most of these countries.

Ranis & Stewart (2003) explored the causal relationship between carbon human development and economic growth in the Latin American countries for the period 1960–2000. Using of the Granger causality test, they found a unidirectional causality running from human development to economic growth but no causality running from economic growth to human development.

Costantini & Martini (2006) examined the effect of human development on sustainablity of resources over the period 1990–2000. Panel cointegration test showed a long run relationship and results of panel causality indicated unidirectional causality from human development to sustainablity of resources.

Dietz, Neumayer & de Soysa (2007) studied the effect of institutional quality and natural resources on Adjusted Genuine Saving from 1984 to 2001. The results showed that corruption index has e positive effect on Adjusted Genuine Saving but the effect of natural resources on it is negative in the long run.

Costantini & Monni (2008) investigated the relationship between economic growth, human development and environmenal quality for developed and developing countries from 1970 to 2002. Results indicated that there is an inverted U shaped relationship between human development and economic growth in these countries.

Esmaeili & Abdollahzadeh (2009) studied the effective factors on oil exploitation using of environmental Kuznets curve over the 1990 to 2000 years. They found the inverted U shaped curve for oil exploitation.

Behboudi, Mamipour and Karami (2010) investigated the long-run relationships between natural resource abundance, human capital and economic growth in the Petroleum Exporting Countries for 1970–2004 period. The long-run estimates showed that the effect of human development on economic growth is positive in developed countries and is negative in developing countries.

## 3. Data, Methodology and results

### 3.1. Data

Annual data from 1996 to 2010 were obtained from the World Development Indicators (World Bank, 2012), UNDP (2012) and World Government Index (2012) for the countries investigated in this research includes: Cyprus, Egypt, Iran, Jordan, Lebanon, Morocco, Oman, Saudi Arabia, Sudan, Tunisia, Turkey. The number of Middle East countries has been decreased to 11 because the data of variables related to some countries have not been presented. The production modeling framework is given as follows in general notation:

$$NGS_{it} = \alpha_0 + \alpha_1 HDI_{it} + \alpha_2 (HDI_{it})^2 + \alpha_3 (HDI_{it})^3 + \alpha_4 M_{it} + \alpha_5 IQ_{it} + e_{it} \qquad (1)$$

where $NGS_{it}$ denotes the negative of the Genuine Saving as the non-sustainablity of resources index in billions of current U.S. dollars; $HDI_{it}$ is the human development index; $M_{it}$ is the share of fuel export from total export as the resources aboundant index; $IQ_{it}$ represents institutional quality includes $RL_{it}$ (Rule of Law) and $GE_{it}$ (Government Effectiveness).

Genuine Saving (GS) index provided by the World Bank in the World Development Report (World Bank, various years). GS is formally expressed in equation 2:

$$GS = K - (F_R - f_R)(R - g) - b(e - d) \quad (2)$$

where K represents economic capital formation while other terms are adjustments for consumption and degradation of natural capital. In particular, the economic value of natural resources consumption (resources extracted R minus natural growth rate g for renewables) is given by the resource rental rate ($F_R$) net of the marginal cost of extraction ($f_R$), while pollution (emissions e minus natural dissipation rate d) is evaluated by the marginal cost of abatement b.

### 3.2. Data, Methodology and results

Panel unit root tests of Levin and Lin (2002) (LL) test and Im, Pesaran, and Shin (1997) (IPS) are first applied to test if there are unit roots in panel data sets. In the second step, the Johansen Fisher panel cointegration test is used to examine the cointegrating relationship. Afterward, we proceed to estimate the model with the DOLS (dynamic OLS) estimator. In what follows, the econometric procedures and the resulting findings are to be described in the steps of the present exercise.

#### 3.2.1. Panel unit root tests

One familiar panel unit root test is the Levin and Lin (2002) test. The LL test is an extension of the standard Dickey–Fuller test to the panel framework. The null of a unit root is investigated against the alternative of a stationary process for all cross-sectional regions. That is, they test the null hypothesis of $\rho_i = \rho = 0$ for all i, against the alternative of $\rho_1 = \rho_2 = ... = \rho < 0$ for all i, with the test statistics $t_{\hat{\rho}} = \hat{\rho} / S.e(\hat{\rho})$, where $\hat{\rho}$ is estimated from the auto-regressive model as follows:

$$\Delta y_{it} = \mu_i + \rho y_{it-1} + \sum_{k=1}^{p} \phi_{ik} \Delta y_{it-k} + \varepsilon_{it} \quad (3)$$

for ($i=1,\ldots,N$) and ($t=1,\ldots,T$). This panel-based ADF test restricts the coefficients $\rho_i$ by keeping them homogenous across all units of the panel. The limitation of the LL test is the assumption of homogeneity and independent error terms across cross-sectional units.

The second test presented here is the well known IPS (1997) test which relaxes the assumption of the identical first order auto-regressive coefficients of the LL test and allows varying across regions under the alternative hypothesis. IPS test the null hypothesis of $\rho_i = 0$ for all i, against the alternate of $\rho_i < 0$ for all i. Thus, instead of pooling the data, IPS uses separate unit root tests for the N cross-section units. Their test is based on the (augmented) Dickey–Fuller statistics averaged across groups. Then the average of the $t_{\rho_i}$ statistics can be used to perform the following $Z_{t-bar}$ statistic:

$$Z_{t-bar} = \sqrt{N}(\bar{t} - E(\bar{t}))/\sqrt{Var(\bar{t})} \quad (4)$$

Where $\bar{t} = (1/N)\sum_{i=1}^{N} t_{\rho_i}$, the terms $E(\bar{t})$ and $Var(\bar{t})$ are, respectively, the mean and variance of individual specific t-statistic. Based on the Monte Carlo experiment results, IPS demonstrates that their test has more favorable finite sample properties than the LL test. Both test statistics of LL and IPS are asymptotically distributed as standard normal with left-sided rejection area.

Table 1 reports the results of panel unit root tests. At the 5% significance level, the LL test shows that all series are stationary in level, and the IPS test statistics shows that these panels have heterogeneous unit roots, or are integrated of order one (i.e. they are symbolically I(1)).

### 3.2.2. Panel cointegration test

Given that each of the variables contains a panel unit root, we proceed to examine whether there is a long-run relationship between the variables using the Johansen Fisher panel cointegration test proposed by Maddala and Wu (1999). The

Johansen Fisher panel cointegration test is a panel version of the individual Johansen (1988) cointegration test. Based on the same principles underpinning the Fisher ADF panel unit root test described above, the Johansen Fisher panel cointegration test aggregates the p-values of individual Johansen maximum eigenvalue and trace statistics. If $\pi_i$ is the p-value from an individual cointegration test for cross-section *i*, under the null hypothesis for the panel,

$$-2\sum_{i=1}^{N}\log(\pi_i) \rightarrow X_{2N}^2 \qquad (5)$$

The value of the chi-square statistic is based on the MacKinnon *et al.* (1996) p-values for Johansen's (1988) cointegration trace test and maximum eigenvalue test. In the Johansen type panel cointegration test, results are known to depend heavily on the VAR system lag order. The results, which are reported in Table 2 support existence of cointegrating vectors.

Table 1: panel unit root tests

| Variables | LL | IPS |
|---|---|---|
| NGS | -1.82* | -0.14 |
| HDI | -3.75* | -1.20 |
| M | -3.36* | -1.55 |
| RL | -6.50* | -0.46 |
| GE | -7.00* | -0.55 |
| ΔNGS | ---- | -5.29* |
| ΔHDI | ---- | -7.89* |
| ΔM | ---- | -5.04* |
| ΔRL | ---- | -3.23* |
| ΔGE | ---- | -3.39* |

* denotes the rejection of the null of nonstationary at the 5% level of significance.

Table 2: panel cointegration test

| Hypothesized No. of CE(s) | Fisher Stat. (from trace test) | Fisher Stat. (from max-eigen test) |
|---|---|---|
| None* | 74.18 | 69.17 |
| At most 1* | 25.80 | 26.37 |
| At most 2 | 16.54 | 16.54 |

* denotes the rejection of the null hypothesis at the 10% level of significance.

### 3.2.3. Panel cointegration estimation

Given the evidence of panel cointegration, the long-run relations can be further estimated by several methods for panel cointegration estimation, e.g. the bias-corrected OLS (BCOLS) estimator, the fully modified OLS (FMOLS) estimator proposed by Phillips and Moon (1999) and Pedroni (1995), and the dynamic OLS (DOLS) estimator proposed by Kao and Chiang (2000). The choice of the preferred methods has been discussed in McCoskey and Kao (1998) and Kao and Chiang (2000). They pointed out that the latter two estimators have a non-negligible bias in small samples. On that account the FMOLS and DOLS are preferable, with the DOLS exhibiting the least bias in small samples using Monte Carlo simulations. Moreover, time effects can be included in the panel dynamic regression without affecting the sequential asymptotic variance of the estimator (Mark &Sul, 2003). Therefore, we base our following inferences mainly on the DOLS estimators with time effects. The DOLS estimator is fully parametric and offers a computationally convenient alternative to the FMOLS estimator proposed. Consider a cointegrated regression for homogeneous panels as follows:

$$y_{it} = \alpha_i + \lambda_i t + \theta_t + \beta' x_{it} + u_{it} \qquad (6)$$

$$x_{it} = x_{it-1} + v_{it}$$

for ($i=1,\ldots,N$) and ($t=1,\ldots,T$). $x_{it}$ is a $k\times 1$ vector composed of the regressors. $\alpha_i$, $\lambda_i t$ and $\theta_t$ represent individual specific effect, individual specific linear trend, and common time effect, respectively. The second equation in Eq. (6) states that the independent variables are an integrated process of order one for all $i$ so that their first differences are stationary. The estimator is based on the error decomposition

$$u_{it} = \sum_{j=-p}^{q} \gamma_j' \Delta x_{it-j} + \varepsilon_{it} \qquad (7)$$

**Where** $p$ and $q$ are respectively the number of lead and lag, and $\varepsilon_{it}$ is orthogonal to all leads and lags of the first difference of the variables $x_{it}$. Inserting Eq. (7) in the regression Eq. (6) yields

$$y_{it} = \alpha_i + \beta X_{it} + \sum_{j=1}^{P} \eta_j \Delta X_{i,t-j} + \sum_{j=1}^{P} \varsigma_j \Delta X_{i,t+j} + e_{it} \qquad (8)$$

**The** OLS estimator for $\beta$ in Eq. (8) is known as a panel dynamic OLS estimator. The DOLS estimator is straight forward to compute, and relevant test statistics have standard asymptotic distributions (Mark &Sul, 2003).

Table 3: panel cointegration estimation

| Variable | Coeficient (t-statistic) |
|---|---|
| Intercept | 19.16* (-2.98) |
| HDI | -106.05* (-3.18) |
| $(HDI)^2$ | 200.05* (3.51) |
| $(HDI)^3$ | -103.24* (-3.11) |
| M | -0.11* (-3.56) |
| RL | -4.31* (-2.22) |
| GE | -9.27* (-4.16) |

| | |
|---|---|
| Adjusted $R^2$ | 0.92 |
| Turning Point (HDI) | 0.37, 0.92 |

***** denotes the estimator of a parameter is significant at 1% level of significance.

Table 3 reveals that The coefficients are statistically significant at the 1% level for human development, aboundant of resources, rule of law and government effectiveness, respectively. The results show an inverse N-shaped relation between human development and non-sustainability of resources. Accordingly, estimated coefficients indicate that an increase in human development affect on non-sustainablity in three steps; on the other word, an increase in human development first decreases non-sustainablity of resources; by recieving the first turning point, increases it and finaly, after second turning point, decreases non-sustainablity. The impact of aboundant of resources, rule of law and government effectiveness on non-sustainablity of resources is negative, that is, increases in aboundant of resources, rule of law and government effectiveness increase sustainable development.

## 4. Concluding remarks

The aim of this study is to estimate a Modified EKC (MEKC), by using the empirical framework known as Environmental Kuznets Curve, in which development and sustainablity was used instead of economic growth and environment. In the present study, negative value of genuine saving was used as non-sustainability indicator and human development index was used as development indicator. The statistical population is the Middle East countries and the period of estimation is 1996-2010.

The results of unit root test indicate that according to the LL test, all series are stationary in level, and according to the IPS test statistics, these panels have heterogeneous unit roots, or are integrated of order one. Afterwards, the panel cointegration test results indicate that there are the cointegrating relationships between non-sustainablity, human development, aboundant of resources, rule of law and government effectiveness. As a result of the existence of long-run cointegration, normal estimation methods for panel data model should be bias-corrected in econometrics and thus the DOLS estimator is adopted. The results indicate that an inverse N-shaped relation between human development and non-

sustainability of resources. The impact of aboundant of resources, rule of law and government effectiveness on non-sustainablity of resources is negative and statistically significient. Considering to positive impact of institutional quality on sustainablity of resources, institutions are playing an active role to designate policy actions (and regulations) oriented towards sustainable development path.

On the whole, these results have important implications for policy making. Because of the importance of human development on sustainable development, governer shoud investigate to promoting education and other factors of human development in order to recieving sustainable development. Also, considering to negative impact of institutional quality on non-sustainablity of resources, policy makers shoud develop the program to promote the quality of institutions and organisations in order to reduction of non-sustainablity of resources.

## BIBLIOGRAPHY


Behboudi, D., Mamipour, S., Karami, A. (2010). Natural Resource Abundance, Human Capital and Economic Growth in the Petroleum Exporting Countries. *Journal of Economic Development***,** 35, 81-102.

Constantini, V., Monni, S. (2006). Sustainable human development for European countries. *Journal of Human Development*, 6(3), 329-351.

Constantini, V., Monni, S. (2008). Environment, human development and economic growth. *Ecological Economics***,** 64(4), 867-880.

Dietz, S., Neumayer, E., de Soysa, I. (2007). Corruption, the resource curse and genuine saving. *Environmental and Development Economics*, 12(1), 33-53.

Esmaeili, A., Abdollahzadeh, N. (2009). Oil exploitation and environmental Kuznets curve. *Energy Policy*, 37(1), 371-374.

Im, K. S., Pesaran, M. H. and Shin, Y. (1997), "Testing for unit roots in heterogeneous panels." *Mimeo*.

Johansen, S. (1988), "Statistical analysis of cointegration vectors." *Journal of Economic Dynamics and Control,* 12, 231–254.

Kao, C. and Chiang, M. H. (2000), "On the estimation and inference of a cointegrated regression in panel data. In B. (Ed.), Nonstationary Panels, Panel Cointegration, and Dynamic Panels, Advances in Econometrics." *Amsterdam: JAI Press,* 15, 161-178.

Kaufman, D., Kraay, A., Mastruzzi, M. (2010). The Worldwide governance indicators : A summary of methodology, data and analytical issues. *World Bank Policy Research Working Paper*, 5430.
Levin, A., Lin, C.F. and Chu, C. (2002), "Unit root tests in panel data: asymptotic and finitesample properties." *Journal of Econometrics,* 108, 1–24.
MacKinnon, J.G. (1996), "Numerical distribution functions for unit root and cointegration tests." *Journal of Applied Econometrics,* 11, 601–618.
Maddala, G. S. and Wu, S. (1999), "A comparative study of unit roots with panel data and a new simple test." *Oxford Bulletin of Economics and Statistics,* 61, 631–651.
Mark, N. C. and Sul, D. (2003), "Cointegration vector estimation by panel DOLS and long-run money demand." *Oxford Bulletin of Economics and Statistics,* 65, 655–680.
McCoskey, S. and Kao, C. (1988), "A residual-based test of the null of cointegration in panel data." *Econometric Reviews,* 17, 57–84.
Neumayer, E. (2001). The human development index and sustainability- a constructive proposal. *Ecological Economics*, 39(1), 101-114.
Pedroni, P. (1995), "Panel cointegration: Asymptotic and finite sample properties of pooled time series test with an application to the PPP hypothesis." *Indiana* University Working Papers in Economics, 95-013.
Phillips, P. C. B. and Moon, H. R. (1999), "Linear regression limit theory for nonstationary panel data." *Econometrica,* 67, 1057–1111.
Ranis, G., Stewart, F., Ramirez, A. (2000). Economic growth and human development. *World Development*, 28(2), 197-219.
Ranis, G., Stewart, F. (2003). Economic growth and human development in Latin America. *Yale Economic Growth Center Discussion Paper*, 826.
United Nations Development Programme. (2012), Undp.org.
WDI. (2012), **"**World Development Indicators**".** The *World Bank, Washington DC*.
(WCED). (1987), **"**World Commission on Environment and Development**".** *Our common future.* Oxford: Oxford University Press.