

CO₂

()

*

esmaeili@shirazu.ac.ir .

// : // :

(... N₂O CH₄ CO₂)

(CO₂)

CO₂

GDP

CO₂

()

SF₆ PFCs CFCs N₂O CH₄ CO₂

NMVOC CO SO₂ NO_x

(CO₂)

(H₂O)

CO₂

()

Carlsson and Lundstrom, 2000

CO₂

CO₂

(2001)

Roca

()

EKC

SO₂

)

(EKC)

(2002) Lindmark

)

CO₂

U

(

%

(2005) Wiener Abubourg

()

(2003) Friedl, and

Getzner

CO₂

³ppm_v

()

()

ppm_v

GDP (N)

CO₂

()

)

(

(CO₂)

(EKC)

() CO₂

(2003).

CO₂

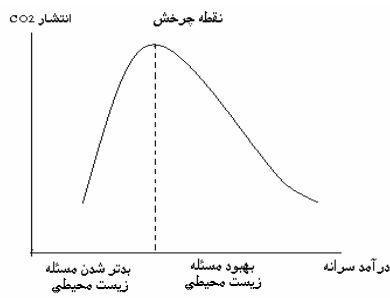
(Stern, et al., 1996)

()
(CO₂)

(CO₂)

GDP

Microfit 4.1 Eviews 5



(GDP)
U

:()

(Kuznets and Simon, 1995)

$$CO_2_t = f(E_t, T_t, P_t, S_t) \quad (EKC)$$

CO_2_t : CO₂
 E_t : EKC
 T_t :
 P_t :
 S_t :
 GDP_t :

Co₂

E_t CO₂

(Friedl, and Getzner,)

(Pesaran, and Pesaran, 1997) ARDL

:

S P

CO₂

ARDL

(v_i)

(NCV_i)

(p_i)

Siddiki,)

(

ARDL

(1999

()

:()

(p, q₁, q₂, ..., q_k)

(P)

$$\alpha(L, P)y_t = \alpha_0 + \sum_{i=1}^k \beta_i(L, P)x_{it} + u_t, \quad i=1, 2, \dots, k$$

L

y_t

α₀

$$P = \sum \left[\left(\frac{v_i \times NCV_i}{\sum (v_i \times NCV_i)} \right) \times p_i \right]$$

()

$$L^j y_t = y_{t-j}$$

(*)

:

$$\alpha(L, P) = 1 - \alpha L^1 - \dots - \alpha_p L^p$$

()

$$\beta_i(L, P) = \beta_{i0} + \beta_{i1}L + \beta_{i2}L^2 + \dots + \beta_{iq}L^q$$

i x_{it}

$$x_{i,t} = x_{i,t-1} = \dots = x_{i,t-q}$$

()

$$y_t = y_{t-1} = \dots = y_{t-q}$$

ARDL

i

q X_{i,t-q}

$$y = \alpha + \sum_{i=1}^k \beta_i x_i + v_i, \quad \alpha = \frac{\alpha_0}{\alpha(1, p)}$$

()

$$\beta_i = \frac{\beta_i(1, q)}{\alpha(1, p)} = \frac{\sum_{j=0}^q \beta_{ij}}{\alpha(1, p)}, \quad v_t = \frac{u_t}{\alpha(1, p)}$$

()

() CO₂

CO₂

ARDL

(EKC)

()

()

$$\Delta y_t = -\Delta \hat{\alpha}_0 - \sum_{i=2}^p \hat{\alpha}_j \Delta y_{t-j} + \sum_{i=0}^k \hat{\beta}_{i0} \Delta x_{it} - \sum_{i=1}^k \sum_{i=0}^q \hat{\beta}_{i,t-j} \Delta x_{i,t-j} - \alpha(1, p) ETC_{t-1} + u_t$$

%

()

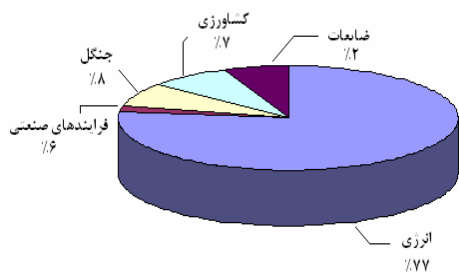
%

ECT

()

$$ECT = y_t - \hat{\alpha} - \sum_{i=1}^k \hat{\beta}_i x_{it}$$

$$\hat{\beta}_{ij,t-j} \hat{\alpha}_{j,t-j} \Delta \alpha(1, p) \quad ()$$



CO₂

()

()
t

()

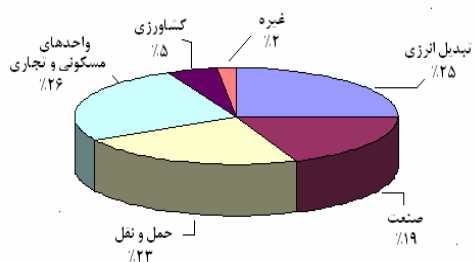
() = H₀)

() ()

$$t = \frac{\sum (\hat{\alpha}_i - 1)}{\sum S \hat{\alpha}_i} \quad ()$$

: $\hat{\alpha}_i$

: $S\hat{\alpha}_i$



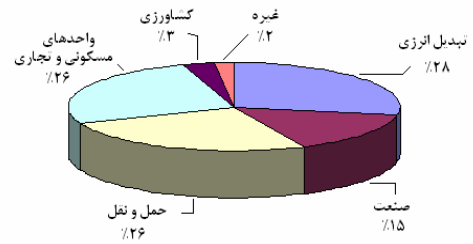
ECM

()

)

(

CO₂



() :

% %

% %

()

% %

% %

%

() :

	I(1)		(/) **	CO2
	I(0)		(/) **	E
	I(0)		(/) *	E2
	I(1)		(/) **	S
	I(1)		(/) **	T
	I(0)		(/) **	p

(:) .

** *

)E ()

) E2 ()

()

()) p (

()) CO2

) S (

()) T ()

ARDL(1,1,0,0,2,2)

ARDL

OLS

()

F () /

()

() CO₂

) ()

(

P T

ARDL(1,1,0,0,2,2)

:()

/	*** /		C
/	*** /		CO2 (-1)
/	*** /		E
/	*** /		E(-1)
/	*** /		E2
/	*** /		S
/	/		T
/	* /		T(-1)
/	/		T(-2)
/	/		P
/	* /		P(-1)
/	** /		P(-2)

(:) .

*** ** *

:()

	F = / (/) R ² = / DW = / χ ² = / [/] F = / [/]	

(:)

()

EKC

/ t

(%) / ()

()

()

SBC

ARDL(1,1,0,0,2,2)

:()

/	*** /		C
/	*** /		E
/	** /		E2
/	*** /		S
/	** /		T
/	[*] /		P

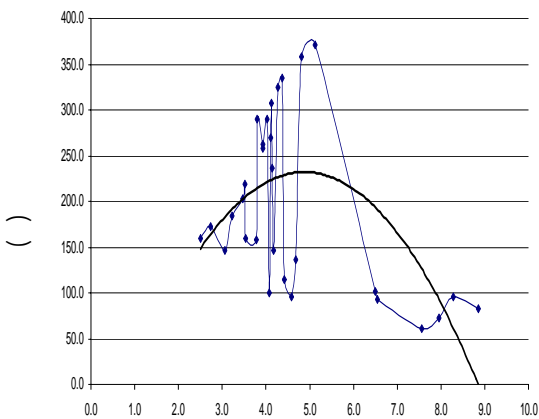
*** ** * [*]

(:)

()

U

CO₂



()

:()

()

() CO₂

()

()

CO₂

EKC

()

/

/

(ECM)

ECM

)

(ECM)

(

(ECM)

: ()

/	*** /		dC
/	*** /		dE
/	*** /		dE2
/	*** /		dS
/	** /		dT
/	[*] /		dT1
/	/		dP
/	** /		dP1
ECM(-1) = (/) ***			
R ² = /		DW = /	

*** ** * [*]

(CO2)

(EKC)

ARDL

U

- 1- Direct
- 2- Indirect

CO_2
(/)

- 4- Environmental Kuznets Curve
- 5-Turning Point
- 6- Net Calorific Value
- 7- Auto-Regressive Distributed Lag
- 8- Spurious Rrgression
- 9-Akike Informaton Criterion
- 10- Schwarts Bayesian Criterion
- 11- Hannan- Quinn Criterion
- 12-Benerjee, Dolado & Master

() CO₂

Carlsson, F. and S., Lundstrom .2000. Political and economic Freedom and the environment: The case of CO₂ emissions. Working Paper in Economic, Department of economics, Sweden: Goteborg University. No. 29.

Friedl, B. and M., Getzner. 2003. Determinants of emission in a small open economy. *Ecological Economics*, Vol. 45, pp. 133-148.

Kuznets, P. and P., Simon . 1995. Economic growth and income inequality. *American Economic Review*, 7: 45-55.

Lindmark, M. 2002. An EKC-pattern in historical perspective: carbon dioxide emissions, technology, fuel prices and growth in Sweden. *Ecological Economics*, 42: 333-347.

Pesaran, M.H. and B., Pesaran . 1997. Working with Microfit 4. : An introduction to econometrics, Oxford University Press, Oxford.

Roca,J.and et al .2001. Economic growth and atmospheric pollution in Spania: discussion the environmental Kuznets Curve hypothesis. *Ecological Economics*, 39: 85-99.

Siddiki,J.U. 1999. Economic liberalization and growth in Bangladesh: 1974-75, PhD Thesis, Kingston University, UK.

Stern,D.I., M.S.,Common and E.B.,Barbier .1996. Economic growth and environmental degradation: the Environmental Kuznets Curve and sustainable development. *World Dev.* 24: 1151-1160.

Wiener Abubourg,R., D.,Good and K.,Krutilla .2005. Environmental Kuznets curves for Co2 emission in Latin America and Caribbean: A multivariate contingency Approach. 13th EAERE Annual Conference, 25 June 2005.