

규제연구 제20권 제2호 2011년 12월

환경규제가 우리나라 해외직접투자에 미치는 영향

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. 2000 2007 8

(OECD)

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I. 서론

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20
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, ,

(environmentally sound and sustainable
development)

,
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(pollution heaven country)

(pollution heaven hypothesis)

(industrial flight hypothesis)

Figure 1 is a line graph illustrating the relationship between GDP and CO₂ emissions for China and the USA from 1980 to 2006. The Y-axis represents CO₂ emissions in million tons, ranging from 0 to 21. The X-axis represents GDP in billion USD, ranging from 3.4 to 11. China's emissions (solid line) show a sharp increase starting around 1990, reaching approximately 18 million tons by 2006. The USA's emissions (dashed line) show a more gradual increase, reaching approximately 12 million tons by 2006. The graph illustrates the 'pollution heaven hypothesis' (industrial flight hypothesis) where emissions are higher in countries with higher GDP.

1) () . (:)

1991	1992	1993	1994	1995	1996	1997	1998
1,318,957	1,352,325	1,450,339	2,366,536	3,217,381	4,525,310	3,829,225	4,792,108
1999	2000	2001	2002	2003	2004	2005	2006
3,384,947	5,245,126	5,296,928	3,978,578	4,739,739	6,486,307	7,187,866	11,619,902

2) , GDP
(energy intensity) .
McCallum(1995)
 ,
 . Blonigen(2005)
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II. 선행연구

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2)
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$$\ln x_{ij} = a_1 \ln y_i + a_2 \ln y_j + a_3 \ln Distance_{ij} + \sum_{m=1}^M \beta_m \ln(z_{ij}^m) + \epsilon_{ij},$$

 x_{ij} j i , y_i y_j i j GDP, $Distance_{ij}$
 , z_{ij}^m (m = 1, ..., M) .

Keller and Levinson(2002)

OECD(1997)

()

. Xing and

Kolstad(2002) , 1

Bartik(1985) 1972 1978 500

. McConnell and Schwab(1990) 1973 1982

, (State)

. Wheeler and Mody(1992) 1980

Fabry and Zenghi(2000), Wheeler(2002), Eskeland and Harrison(2003)

.3)

(2002)

3) Neumayer(2001), Eskeland et al.(2003), Bruunermeier et al.(2004), Ederington et al.(2004), Levinson et al.(2007)

(2002)

· ,

· (2002)

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· (2010)

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III. 모형과 데이터

1. 모형

(gravity model) ,

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.⁴⁾ Blonigen(2005)

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4) Bergstrand(1985), Lipsey(1999), Eaton & Tamura(1994), Sazanami & Wong(1997), Swedenborg(2001)

(GDP) ,

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1 (1) 2 (2) 5)

1 GDP , 2 GDP 1 GDP

. GDP 1 GDP 1 2

. 1 GDP ,

. 2

GDP 1 GDP , 6)

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,

(robustness)

$$\ln(FDI_{ijt}) = \beta_0 + \beta_1 \ln(D_{ij}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(ER_{jt}) \quad (1)$$

$$+ \beta_4 \ln(Openness_{jt}) + \epsilon_{ijt}$$

$$\ln(FDI_{ijt}) = \beta_0 + \beta_1 \ln(D_{ij}) + \beta_2 \ln(POP_{jt}) + \beta_3 \ln(PCGDP_{jt}) \quad (2)$$

$$+ \beta_4 \ln(ER_{jt}) + \beta_5 \ln(Openness_{jt}) + \epsilon_{ijt}$$

$$FDI_{ijt} \quad t \quad i \quad (\quad) \quad j \quad (\quad)$$

5) (1) 1, (2) 2 .

6) 1 GDP .

, .

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SITC(Standard International Trade Classification)

Low and Yeats(1992) 13)

. ,

.14)

〈표 1〉 환경오염산업의 분류

SITC		SITC	
251	,	634	()
322	, ,	635	
334		641	
515		642	
516		661	
523		67	
524		68	
562		69	
598			

: Low and Yeats(1992), pp.98-99.

.

2000 2007

.

, GDP, , 1 GDP, ,

WDI(World Development Indicators)

13) Low and Yeats(1992)

14) 1% (2009), (2005)

‘Great Circle Distance’
 ‘Great Circle Distance’
 CEPII(Centred’Etudes prospectives
 et d’Informations internationales)

〈표 2〉 변수 정의 및 자료출처

FDI			
GDP		GDP(US)	WDI
PCGDP		1 GDP(US)	WDI
POP			WDI
Distance		()	CEPII
Openness		GDP , (%)	WDI
ER	EI_j	$(\frac{CO_{2j}}{GDP})$	WDI
	$\frac{EI_j}{EI_i}$	$(\frac{CO_2/GDP_{상대국(j)}}{CO_2/GDP_{한국(i)}})$	WDI

IV. 분석 결과

(1) (2) 8 (2000~2007)
 pooled-OLS

(elasticity)

1. 전체 국가를 대상으로 한 추정 결과

($\alpha_3 > 0$), 1 GDP
 , 2 GDP (POP) 1 GDP(PCGDP)
 1 2
 (GDP)
 GDP 1% 1% 2.3%
 (POP) 1% (Distance) (-)
 1 GDP (-)
 (Openness) (-) 2
 (+)
 ,
 (EL_j) 1 2
 (+) (-)
 ,
 ($\frac{EL_j}{EL_i}$) , 1 2 (+) (-)
 , 1

〈표 3〉 환경규제가 한국의 해외직접투자에 미치는 영향의 추정결과

		ER= EL_j		ER= EL_j / EL_i	
		1	2	1	2
ln(Distance)	-	-3.72 (0.67)***	-2.22 (0.70)***	-3.39 (0.67)***	-2.17 (0.71)***
ln(GDP)	+	0.96 (0.25)***		1.07 (0.25)***	
ln(PCGDP)	+		-0.03 (0.29)		0.10 (0.29)
ln(POP)	+		2.32 (0.34)***		2.34 (0.35)***
ln(TRADE)	+	-0.01 (0.73)	2.71 (0.86)***	0.11 (0.72)	2.74 (0.87)***
ln(ER)	+	0.54 (0.51)	-0.74 (0.51)	1.19 (0.51)**	-0.32 (0.55)
		16.95 (13.94)	-14.42 (14.22)	14.06 (11.77)	-21.24 (13.36)
# OBS		432	432	432	432
R^2		0.12	0.18	0.14	0.18

: 1) ()

2) *, **, *** 99%, 95%, 90%

2. OECD 국가와 비OECD 국가를 대상으로 한 추정 결과

OECD OECD ,

(1) 투자 상대국이 OECD 국가인 경우

OECD

< 4> .

(EI_j) ,

1 GDP (+)

GDP

2 (POP)

(+)

OECD (POP)

(DIST) 1 2

(-) ,

OECD

2 1 GDP (+)

OECD ,

1 (+)

(Openness)

2 (+)

OECD (+)

$\left(\frac{EI_j}{EI_i} \right)$,

GDP, , , , 1 GDP

(-)

(-)

(-)

〈표 4〉 OECD 국가를 대상으로 한 추정결과

	ER=EI _j		ER=EI _j /EI _i		ER=EI _j		ER=EI _j /EI _i	
	1	2	1	2	1	2	1	2
ln(Dist)	-4.84 (0.87)***	-2.88 (1.17)**	-4.71 (0.87)***	-2.61 (1.19)**	-4.94 (1.01)***	-4.24 (1.17)***	-4.61 (1.01)***	-4.18 (1.21)***
ln(GDP)	0.49 (0.33)		0.61 (0.34)*		1.55 (0.37)***		1.69 (0.36)***	
ln(PCGDP)		-0.41 (0.46)		-0.36 (0.47)		1.15 (0.49)**		1.47 (0.53)***
ln(POP)		1.60 (0.55)***		1.80 (0.57)***		1.97 (0.53)***		2.07 (0.53)***
ln(Openness)	-0.34 (0.93)	2.77 (1.55)*	-0.76 (0.88)	3.35 (1.57)**	-0.13 (1.00)	1.19 (1.53)	0.38 (0.99)	1.36 (1.55)
ln(ER)	-1.23 (0.59)**	-1.27 (0.58)**	-0.81 (0.63)	-0.96 (0.62)	-1.06 (0.65)	-1.03 (0.65)	-0.36 (0.72)	-0.35 (0.72)
	51.94 (18.0)***	8.97 (24.63)	38.45 (15.58)**	-8.33 (23.65)	23.16 (20.28)	5.95 (25.07)	6.54 (17.62)	-6.65 (22.90)
# OBS	176	176	176	176	176	176	176	176
R ²	0.18	0.20	0.17	0.19	0.28	0.29	0.28	0.29

: 1) ()

2) *, **, *** 99%, 95%, 90%

OECD

OECD

(2) 투자 상대국이 비OECD 국가인 경우

OECD ,

< 5> .

GDP OECD

$$(+)$$

GDP 1%

2.7~4.7%

(POP)

(+)

1%

(POP) 1%

2.18~3.91%

(DIST)

(-)

OECD

1 GDP

$$(+)$$

. OECD

(-)

OECD

1 GDP

(+) . 1 GDP

, OECD

OECD

(Openness)

(+)

1

$$(EI_j)$$

(+)

1

2

$$\left(\frac{EI_j}{EI_i} \right)$$

(+)

OECD

〈표 5〉 비OECD 국가를 대상으로 한 추정결과

	ER=EI _j		ER=EI _j /EI _i		ER=EI _j		ER=EI _j /EI _i	
	1	2	1	2	1	2	1	2
ln(Dist)	-2.05 (1.51)	-1.82 (1.54)	-2.30 (1.46)	-1.88 (1.51)	-0.94 (1.64)	-0.97 (1.68)	-1.12 (1.61)	-0.89 (1.66)
ln(GDP)	4.65 (0.70)***		4.70 (0.65)***		2.70 (0.82)***		2.76 (0.76)***	
ln(PCGDP)		3.98 (1.52)***		5.06 (1.31)***		1.48 (1.51)		2.47 (1.34)*
ln(POP)		3.91 (0.69)***		3.54 (0.68)***		2.46 (0.76)***		2.18 (0.77)***
ln(Openness)	4.01 (1.97)*	3.08 (1.95)	3.79 (1.85)**	2.28 (1.93)	-0.46 (2.03)	-0.63 (2.06)	-0.57 (1.93)	-1.53 (2.09)
ln(ER)	5.09 (1.42)***	3.00 (1.98)	7.17 (1.43)***	6.05 (1.91)***	3.51 (1.43)**	1.53 (1.96)	4.97 (1.46)***	3.98 (1.95)**
	-145.90 (31.57)	-111.92 (32.8)***	-110.13 (25.6)***	-91.41 (24.8)***	-75.24 (35.70)**	-45.90 (34.87)	-51.26 (29.64)*	-36.69 (27.81)
# OBS	232	232	232	232	232	232	232	232
R ²	0.25	0.25	0.30	0.28	0.15	0.15	0.18	0.17

: 1) ()

2) *, **, *** 99%, 95%, 90%

OECD ,
(+) OECD
(+) 1
OECD

V. 결 론

1992
(+)

OECD

(-)

OECD

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OECD

OECD

OECD

1

Xing and Kolstad

(2002)

(OECD)

GDP

GDP

GDP

참고문헌

- Asiedu, E., "On the Determinants of Foreign Direct Investment to Developing Countries: Is Africa Different?," *World Development* Vol.30 No.1, 2002, pp.107-119.
- Bartik, J. T., "Business Location Decisions in the United States: Estimates of the Effects of Unionization, Taxes, and Other Characteristics of States," *Journal of Business & Economic Statistics* Vol. 3, 1985, pp.14-22.
- Bergstrand, J. H., "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence," *The Review of Economics and Statistics* Vol.67, 1985, pp.474-481.
- Blonigen, B. A., "A Review of the Empirical Literature on FDI Determinants," NBER Working Paper 11299, 2005.
- Brunnermeier, S. B. and A. Levinson, "Examining the Evidence on Environmental Regulations and Industry Location," *The Journal of Environment & Development*,

- 2004, pp.6-41.
- Costantini, V. and F. Cresp, "Environmental Regulation and the Export Dynamics of Energy Technologies," *Ecological Economics* Vol.66, 2008, pp.447-460.
- Eaton, J. and A. Tamura, "Bilateralism and Regionalism in Japanese and U.S. Trade and Direct Foreign Investment Patterns," *Journal of the Japanese and International Economies* Vol.8, 1994, pp.478-510.
- Ederington, J., A. Levinson and J. Minier, "Trade Liberalization and Pollution Havens," *Advances in Economic Analysis & Policy* Vol.4, 2004.
- Eskeland, G. S. and A. E. Harrison, "Moving to Greener Pastures? Multinationals and the Pollution Haven Hypothesis," *Journal of Development Economics* Vol.70, 2003, pp.1-23.
- Fabry, N. and S. Zenghi, "FDI and the Environment: Is China a Polluter Haven?," University de Marne-la-Vallee Working Paper No.2002-02, 2000.
- Gastanaga, V. M. and J. B. Nugent, "Host Country Reforms and FDI Inflows: How Much Difference Do They Make?," *World Development* Vol.26, 1998, pp.1299-1314.
- Graham, E. M., "U.S. Direct Investment abroad and U.S. Exports in the Manufacturing Sector: Some Empirical Results Based on Cross Sectional Analysis," *Multinational Firms and International Relocation, New Horizons in International Business Series*, 1997, pp.90-102.
- Keller, W. and A. Levinson, "Pollution Abatement Costs and Foreign Direct Investment Inflows to U.S. States," *Review of Economics and Statistics* Vol.84, 2002, pp.691-703.
- Levinson, A. and S. Taylor, "Unmasking the Pollution Haven Effect," *International Economic Review* Vol.49, 2008, pp.223-254.
- Lipsey, R. E., "The Location and Characteristics of U.S. Affiliates in Asia," NBER Working Paper No.687, 1999.
- Low, P. and A. Yeats, "Do 'Dirty' Industries Migrate?," World Bank Discussion Paper 159, 1992.
- McCallum, J., "National Borders Matter: Canada-U. S. Regional Trade Patterns," *American*

- Economic Review* 85(3), 1995, pp.615-617.
- McConnell, V. D. and R. M. Schwab, "The Impact of Environmental Regulation on Industry Location Decisions: The Motor Vehicle Industry," *Land Economics* Vol.66, 1990, pp.67-81.
- Neumayor, E., "Pollution Havens: An Analysis of Policy Operation for Dealing with an Elusive Phenomenon," *Journal of Environment and Development* Vol.10, 2001, pp.147-177.
- OECD, *Economic Globalisation and the Environment*, 1997.
- Sazanami, Y. and Y. C. Wong, "Strategies of Japanese Multinationals: Changes in the Locational Importance of Asia, the EC and North America," In P. Buckley and J. L., Mucchielli (eds.), *Multinational Firms and International Relocation*, Cheltenham, UK and Brookfield, US: Edward Elgar, 1997, pp.103-122.
- Swedenborg, B., "Determinants and Effects of Multinational Growth: The Swedish Case Revisited," In M. Blomstrom and L. S. Goldberg (eds.), *Topics in Empirical International Economics: A Festschrift in Honor of Robert E. Lipsey*, University of Chicago Press, 2001, pp.99-136.
- Wheeler, D., "Beyond Pollution Havens," *Global Environmental Politics* Vol.2 No.2, 2002, pp.1-10.
- Wheeler, D. and A. Moody, "International Investment Location Decisions: The Case of U.S. Firm," *Journal of International Economics* Vol.33, 1992, pp.57-76.
- World Bank, World Development Indicators, available at <http://data.worldbank.org/>
- Xing, Y. and C. D. Kolstad, "Do Lax Environmental Regulations Attract Foreign Investment?," *Environmental and Resource Economics*, 2002, pp.1-22.

A Study on the Effect of Environmental Regulation on Direct Investment of Korea

Lee, Ji-yeon and Han, Hyun-Ok

According to the pollution heaven hypothesis, strict environmental regulation weakens the competitiveness of firms in the country, forcing the firms to move to other countries with loose environmental regulation. This study explores how environmental regulation in foreign countries affects direct investment of Korea to those countries empirically.

When all the countries are included in the analysis, we do not find strong evidence for supporting the pollution heaven hypothesis. However, only the non-OECD countries are considered, we find the pollution heaven hypothesis might hold in Korea.

Key words: Environmental Regulation, Pollution Heaven Hypothesis, Foreign Direct Investment