Priagus

by Priagus Priagus

Knowledge E
Engaging minds

Conference Paper

Impact of Foreign Investment and Natural Resources Sharing Funds Against Environmental Degradation in Indonesia

Priyagus

Faculty of Economics and Business, University of Mulawarman – East Kalimantan

Abstract

This study examines the impact of foreign investment as a reflection of economic globalization and fiscal policy in the form of natural resource revenue sharing in development against environmental degradation, especially water in Indonesia. Using 33 provincial panel data during 2011-2015 with the basic model of EKC's of cubic forms. The results explain that is a relationship between income and degradation that support the EKC hypothesis, but it not significantly. Foreign investment has a positive and significant impact on increasing degradation, while fiscal policy has a negative and not insignificant impact on reducing environmental degradation. Natural Resources Sharing Funds are not entirely used for environmental costs but are also used to provide basic infrastructure. The government needs to increase supervision of foreign capital, increase revenue sharing for natural resources and focus more on improving the environment.

Keywords: EKC, Foreign Invesmen, Sharing Funds Natural Resource, Water Degaradation.

OPEN ACCESS

1. Introduction

Natural resources are one of the strategic capital in development but the excessive and poorly planned exploitation of natural resources has caused many losses. One of the important agenda of Suitanable Developmen Goal (SDG'S) 2030 related to natural resources is water. UNDP (2016) describes water as the core of sustainable development because it can reduce poverty, promote economic growth and environmental sustainability.

The World Bank explains that 60 percent of the population in Asia lives with a polluted water environment. The water environment quality in Indonesia is on average at less than air and land. Asici (2013) the current economic growth paradigm is unsustainable especially in middle income countries. Uchiyama (2016) research on the environment is mostly done on air. This research is fakus on water pollution, because most of life is highly dependent on it.

The trade-off between economic development and environmental degradation exists for a long time, due to the lack of empirical evidence and sufficient data in some countries [35]. The World Bank (1992) the impact of economic development on the environment (air pollutants) follows an inverted U shape with different turnig point, Grossman and Krueger (1995) pollutants oxygen, metal and bacterial regimes.

At the beginning of development, the increase in income will be followed by an increase in environmental degradation to a certain level, then degradation begins to decline in line with the increase in income. This relationship is then known as the hypothesis of Environmental Kuznet Kurve (EKC). The EKC hypothesis seems to put the degradation problem only in terms of income, in fact many factors affect degradation, such as technology, investment and regulation, so that inverted U shape has a diversity for different types of pollution and region.

The water quality index in Indonesia is at the lowest level compared to air and land. Densely populated settlements by rivers, exploitation of forest resources, factory waste disposal and lack of government oversight contributed significantly to the degradation of the water environment. Data from the Ministry of Environment and Forests, since 2011-2015, the quality index of the confusion tends to decline and are at less than (IKLH <66), while the water quality is less likely to change or average at 53.19 (very low). At the end of the National Medium Term Development Plan (RPJMN), Indonesia's environmental quality index is expected to increase and reach 66.5-68.5 (middle).

In Indonesia, environmental degradation has received serious attention from the government and has been formulated in the medium-term development plan (RPJMN 2015-2019) so that the model in this study, in addition to proving an inverted U-shape also includes policy variables, to measure its contribution to environmental degradation. Thus, the contribution of this research contains three things as follows:

First, test the EKC hypothesis with composite water pollutants, not partial as some previous studies: Shafik and Bandyopadhyay (1992), Granda and Munoz (2008) BOD pollutants, Kangkang et al. (2009) COD and NH3 pollutants, Grossman and Krueger 1995) oxygen pollutant, metal and pathogenic contents, Diao et al. (2009), Baojan

et al. (2011), Peng et al. (2014) industrial wastewater pollutants, Orubu and Omotor (2011) organic matter pollutant, Torras and Boyce (1998) Fecal Coli pollutants.Second, examine the impact of foreign investment reflecting aspects of globalization, market and transfer of degradation from developed countries to developing countries. Several studies using foreign capital variables such as Cole et al. (1997), Wheler (2000), Dasgupta et al. (2002), Halkos and Paizanos (2013), Hakimi and Hamdi (2016). Third, examine the fiscal policy of natural resource revenue sharing, reflecting internalizing exsternal costs in the production process. Several studies have used policy variables (government roles) such as Mohapatra and Giri (2008), Bhattarai and Hammig (2001), Asici (2013), Xu (2014).

The rest of the paper is organized as follows. Section 2, review the sustanainable development, growth and environmental literature. Section 3, describe the data use and empirical model. Section 4, discusses empirical resul of the estimation. Finally, some conclusion and recomendation with policy implication.

2. Literature Review

2.1. Sustainable development

Development activities in developing countries including Indonesia have not implemented internalizing external cost proportionally into threats to environmental sustainability. Sustainable Development was introduced by the World Environment Commission (*Brundtland Commission*) in its 1987 report on "Our Common Future". Although it is very difficult to make the concept of sustainability, World Bank (1992), Beckermen (1992). Sustainable development is a development activity to meet the needs of the present generation without sacrificing the interests of future generations.

World Bank (1992) developing country output increased 4-5, while world output will increase 3.5 times during 1990-2030, causing some environmental indicators to deteriorate. This will not happen if a sound and restrictive environmental policy is in place. Therefore the Dinda (2015) green growth strategy is a prerequisite for sustainable development, ie growth with attention to reducing pollution, waste, greenhouse gases, natural resource depletion, energy efficiency, protection of biodiversity and local ecosystems.

2.2. Economic growth and environment

Economic growth illustrates the increase of national GNP. Samuelson and Nordahus (2005), several factors that cause economic growth are: 1.Human resouce (labor supply, education, dicipline, motivation). 2.Natural Resource (land, mineral, fuels, enviromental quality). 3.Capital formation (machine, factories, road). 4.Technology (science, enginering, management, entrepreneurship).

Mankiw (2007) Some of the determinants of Crusoe's productivity are: physical capital (the knowled and skill that workers acquire through education, training and experience), natural resources (the input into the production of goods, land, river, and mineral deposits), and technological knowledge (society's understands of the best way to produce goods and services) that are interrelated in a complex.

This relationship is subsequently written in the aggregate production function (APF) as follows: Q = AF (K, L, R). where Q: Output, K: service and capital productivity, L: labor input, R: natural resource input, A: technological level, F: production function or Y = A F (L, K, H, N). Y: number of outputs, L: number of labor, K: number of physical capital, H, number of human capital, N: amount of natural resources. A: technology, F production function that explains the input combination to produce output.

Barro (1996) economic growth in 100 countries from 1960-1990 increased due to several factors such as: education, life expectancy, low government consumption, legal and inflationary improvements and trade. The role of technology is so important that it was once considered exogenous. Capolupo (2009) variable of economic growth is a combination of institutions, geography, social culture so it can take place in the long term.

The study of the relationship between economic growth and environmental pollution is categorized into several groups, Kasman and Duman (2015). First, a study examining the relationship between economic growth and the environment with EKC patterns. Second study on revenue and environmental relationships with concentrations on income and energy and finally, the combined study of both and focus on emissions, energy consumption and income. Panayotou (2003). Does EKC really exist, what is the role of other factors besides income, how relevant are statistical cross-country relationships, what are the implications of environmental damage and what is the role of environmental policy.

The EKC hypothesis explains the relationship between several indicators of environmental degradation and per capita income. Degradation increases with the increase in income to a certain point (turning point), then decreases as income increases or

resembles the inverted U letter, as Kuznet hypotheses, about the relation of income and inequality [24], so EKC becomes the analogy [14, 21]. This condition raises the assumption that the relationship of income and pollution is unidirectional. It means that income change causes the environment to change and not the other way around.

Coondoo and Dinda (2002) there are three different types of causality relationships between income and the environment. First, for developed countries, causality occurs from emissions to income. Second, for central and southern American and Japanese countries, the causality of income from emission to emission. Third, for Asian and African countries bidirectional causality is applied. Thus, the curve form of the relationship between income and the environment is not only inverted U shape, but varies for each country and type of pollutant.

Taguchi (2012) with local pollutant analysis (sulfur) is more likely to enact the EKC hypothesis than globally because of its high diversity of conditions. Asici (2013) the relationship between income and natural pressures (CO_2) is stronger, in middle and low income groups, than in high-income countries. Uchiyama (2016) EKC pattern naturally corresponds to the economic growth rate of each country, no consensus is reached about the environmental improvements turning point. Wu (1998) has a positive relationship between environmental quality and income, but high income levels do not indicate comparable spending. Cole et al. (1997) the relationship between per capita income and environmental quality is unavoidable, Lim (2011) some pollutants worsen and then improve with economic growth.

Evidence of reversed U relationship only applies to some pollutants and regulation is the dominant factor in reducing pollution [12]. The relationship between income and different types of emissions depends on many factors, not all pollutants follow the EKC pattern [31]. Bertinelli et al. (2008) the relationship of income and pollution depends on the capacity of the state in improving its environment, so its form may vary.

The basic model of the relationship between income and environmental degradation by Shafik and Bandyopadhyay (1992) is divided into three: Linear, squared and cubic logs. Kijima et al. (2010) explains, EKC model is categorized in several forms, namely: dynamic and static; macroeconomics and microeconomics; short and long term and deterministic and stochastic. Uchiyama (2016) techniques are classified into two categories: First, state-based, Second, data-based and estimation methods.

Grossman and Krunger (1995) are the pioneers of EKC researchers using a cubic model and several control variables. Torras and Boyce (1998), Bhattarai and Haming (2001), Mohapatra and Giri (2009), Baojuan et al. (2011), Peng et al. (2014). This study uses a static model plus two control variables, foreign investment policy and natural

resource revenue sharing. The model used in this study adopted from [14] that is cubic model with several control variables simultaneously. The estimation method used is Common, Fixed Effect and Random Effect.

3. Research Methodologi

3.1. Type and source of data

The data used in this study is secondary to the Ministry of Environment and Forestry. Form of combined data of series (series) and cross or (pool data) covering 33 provinces throughout Indonesia, in the period 2011-2015. Based on these sources, the rivers that are sampled are large cross-provincial rivers as much as 109 and monitoring is done at least 4 times a year. The parameters used in determining the quality of water include 7 indicators that can be grouped into (oxygen, metal and bacteria content). Based on this indicator, the agency makes a composite Index of Environmental Quality (IEQ) of water. In order for this value to describe degradation, the researcher process by making the conversion of absolute value reduction of the index number to the maximum.

3.2. Empirical model

$$\text{Ln (DEGAIR)} = \beta_0 + \beta_1 \ln(\text{PDKAP1}) + \beta_2 (\ln(\text{PDKAP2})^2$$

$$+ \beta_3 (\ln(\text{PDKAP3})^3 + \beta_4 \ln(\text{PMA}) + \beta_5 (\ln(\text{DSDA}) + \varepsilon_i \tag{1}$$

Theoretically, the EKC Hypothesis (U shape) occurs when:

if $\beta_1 > 0$, $\beta_2 < 0$ and $\beta_3 = 0$. The turning point will be reached at $\beta_1 / 2\beta_2$,

[8, 13, 14, 27, 29]

TABLE 1: Definitions and expectations of variable relationships.

No	Variabels	Notation	Unit	Sign
1	Water Degradation	DEGAIR	Index	Dependent variabel
2	GRDP per capita	(PDKAP) 1	Million Rp	+
3	GDP per capita squared	(PDKAP) 2	Million Rp	-
4	GRDP per capita cubic	(PDKAP) 3	Million Rp	
5	Foreign investment	PMA	Million $	+
6	Revenue-sharing fund of natural resources	DSDA	Million Rp	-

4. Results and Discussion

Based on the results of the analysis with the cubic model presented in Table 2, the EKC hypothesis occurs, but is not significant with a turning point of $ 109,793, this result supports Mohapatra and Giri (2008) SPM pollutants with a peak point of $ 307, Torras and Boyce (1998) some pollutants (Smoke, Heavy Particle and Fecal Coli), but not support for Sulfur dioxide pollutants, Disolve Oxygen. Taguchi (2012) Local pollutant analysis is more likely to support the EKC hypothesis than globally because of its high diversity. Cole et al. (1997), Lim (2011) the relationship between per capita income and the environment is inevitable, initially worsening and then improving in tune with economic growth. The turning point obtained there is no uniformity for each country and the type of pollutant [39].

TABLE 2: Empirical results of the estimation.

Koefisien	Common	Prob	Fixed	Prob	Random	Prob
Constanta	2.0677	0.2243				
PDKAP1	1.9055	0.1971	1.9276	0.6048	1.9353	0.3882
PDKAP2	-0.6419	0.1267	-0.3691	0.7200	-0.5731	0.3661
PDKAP3	0.0684*	0.0790	0.0269	0.7722	0.0558	0.3396
PMA	0.0152**	0.0381	0.0036	0.7594	0.0107	0.2442
DSDA	-0.0093	0.1817	0.0142	0.2400	0.0031	0.7358
R Square	**0.1473**		**0.7502**		**0.0371**	

*** (1%); ** (5%); * (10%)

Some studies that do not support EKC hypothetical with Cubic models such as: Grosman (1995) Fecal Coli pollutants and Total Coli, Orubu and Omator (2011) SPM pollutants, Boujuan et al. (2011) Industrial Waste Gas pollutants (IWG) and Industrial Dark Matter (IDM), Bhattarai and Hammig (2001) for Asia but not to Latin America and Africa.

The diversity of the results of this study further clarify that the causality of economic and environmental growth varies for each country and the type of pollutant [10]. Many factors influence, so not all pollutants follow EKC pattern [31]. Bertinelli et al. (2008) the relationship of income and pollution depends on the country's capacity to improve its environment, so that its form may vary. Stren et al. (1996). Cross-sectional regression models will produce different patterns.

Economic growth requires natural resources Samuelson and Nordahus (2005), Mankiw (2007). Technology, educator, law and trade [3] Institutional, geographic and social [9] and in the long run, will certainly have different environmental impacts for each country, due to differences in production and policy availability.

The coefficient of foreign investment (PMA) is positive and significant, meaning that the increase of foreign investment will increase the real degradation. These results are in line with Hakimi and Hamdi's (2016), Halkos and Paizanos (2013) for Co2 pollutan, but are not in line with Wheeler (2000), Dasgupta et al. (2002) and Cole et al. (1997).

DSDA fiscal policy as a form of internalizing external cost, has not been able to reduce the real degradation. These results are in line with some studies, albeit with different pollutants such as [19] for CO_2 pollutants. Taguchi (2012) for Asian countries, including Japan. Wu (1998) high income levels have not yet indicated a comparable expenditure. Shafik (1994) most of the environmental costs are external so the pressures on the environment continue to occur

The results are not in line with the research [1] The institutional quality has a negative and significant impact on environmental pressures. Bhattarai and Hammig (2001), Xu (2014) implementation of long-term environmental policy, Dasgupta et al. (2002) Regulation is the dominant factor to explain pollution reduction, Dinda (2015) Green growth is a strategy to achieve sustainable development with more focus on improving environmental quality. Therefore, the government as an authority immediately implement the environmental regulations strictly and affirm the rights of ownership and reduce poverty to realize sustainable development.

5. Conclusions and Recommendations

5.1. Conclusion

Based on the analysis and discussion, several conclusions are formulated: First, the EKC model with the cubic equation is obtained, since the PDKAP1 variable is positive and PDKAP2 is negative and PDKP3 is zero (each variable has a mark that qualifies to produce an inverted U curve) but it not significant. Secondly, the pattern of environmental change varies greatly because it is not only related to income but by many factors and complex. Third, foreign investment (PMA) as a form of economic globalization has a positive impact or increase water degradation significantly in Indonesia. Finally, fiscal policy as an effort to internalizing external cost has no significant effect because the environmental cost is still external, the high funding requirement for the construction of basic infrastructure, causing environmental improvement, especially the water is not yet optimal.

5.2. Recomendation

This research has several recommendations as follows: First, improve selection and supervision of foreign capital managing natural resources. Second, strictly apply the rules and rights of environmental ownership. Third, increasing revenue sharing for natural resources results as an ineternalizing external cost. Finally, increase investment for environmental improvement and reduce poverty.

Acknowledgement

Funding

References

[1] Asici, A. A (2013). Economic growth and its impact on environment: A panel data analysis. *Ecological Indicators, vol* 24, pp.324-333.

[2] Badan Pusat Statistik.(2016). *Statistical yearbook of Indonesia.*Jakarta: BPS-Statistics Indonesia.

[3] Barro, R. (1996). Determinant of Economic Growth A Cross-Country Empirical Study. *Working Paper 5698, National Bureu of Economic Research*, Cambride.

[4] Beckerman, W.(1992). Economic Growth and the Environment: Whose Growth? Whose Environment?. *World Developmenr*, Vol. 20, no. 4, pp.481-496.

[5] Bertinelli, L.,Strobi, E., Zou, B. (2008). Economic development and environmental quality: A reassessment n light of nature's self-regenaration capacity. *Ecological Economics*, Vol 66, pp. 371-378.

[6] Bhattarai, M., Hammig, M. (2001). Institusiion and the Environmental Kuznet Curve for Deforestation: A Crosscountry Analysis for Latin America, Africa and Asia. *World Development*, Vol 29, no.6,pp. 995-1010.

[7] Boujan, S., Rongrong, Z., Ying, Z. (2011). Empirical Analysis of Tangshan Economic Growth and Environmental Pollution. *Energy Procedia,* vol 5, pp. 2392-2396.

[8] Burnett, J. W. (2009). Economic Growth and environmental Degradation. *Association Anual Metting, southern Agricultural Economics, Atlanta, Georgia.* Januari-31-Febr- 3.

[9] Capolupo, R.(2009). The New Growth Theories and Their Empirics after Twenty Years. *Economics*, vol 3,pp. 53-56.

[10] Coondoo, D., Dinda, S. (2002). Causality between income and emision: a country group-specific econometric analysis. *Ecological Economomics*, vol 40, pp. 351-367.

[11] Cole, M.A., Rayner, A.J., Bates, J.M. (1997). The environmental Kuznet curve: an empirical analysis. *Environment and Development Economics*, vol.2,pp. 401-416.

[12] Dasgupta, S., Laplante, B., Wang, H., Wheeler, D.(2002). Confronting the Environmental Kuznet Curve. *Journal of Economic Perspectives*,vol.16,no.1,pp.147-168

[13] Diao, X.D., Zeng, S.X., Tam, C.M., Tam, V.W.Y. (2009). EKC analysis for studying economic growth and environmental quality: a case study in China. *Journal of Cleaner Production*,vol.17,pp. 541-548.

[14] Dinda, S. (2004). Environmental Kuznet Curve Hypothesisi: A Survey. *Ecological Economics*, vol.49,pp. 431-455.

[15] Dinda, S., 2015. A Theoretical Basic for Green Growth. *Munich Personal Repec Archive (MPRA), Paper* no.63951.

[16] Granda, C., Munoz, L.G. P. J. (2008). The environmental Kuznet Curvefor Water Quality: An Analysis its appropriatenses Using Unit Root and Cointegration Tests. *Universidad de Antioquia*,pp. 221-244.

[17] Grossman, G, M., Krueger, A. (1995). Economic Growth and the Environment. *The Quarterly Journal of Economics*,vol.110,no.2,pp.353-377.

[18] Hakimi, A., Hamdi, H. (2016). Trade liberation FDI inflow, environmental quality and economic growth: A comparative analysis between Tunisia and Marocco.*Renewable and Sustainable Energy Reviews*, vol.58, pp.1445-1456.

[19] Halkos, G., Paizanos, E A. (2013). The effect of goverment expenditure on the environment: An empirical investigation. *Ecological Economics*,vol.91,pp. 48-56.

[20] Kangkang, G., Jingshuang, L., Yang, W. (2009). Relationship Between Economic Growth and Water Environmental Quality of Anshan City in Northeast China. *Chin Geogra.Sci,* vol.19,no. 1,pp. 017-024.

[21] Kasman, A., Duman, Y.S. (2015). CO2 Emission, economic growth, energy consumtion, trade, and urbanization in new EU member and candidate countries: a Panel data analysis. *Economi Modeling*,vol.44,pp. 97-103.

[22] Kijima, M., Nishide, K., Ohyama, A. (2010). Economic models for the environmental Kuznet cirve: Survey. *Journal of Economic Dynamics & Control*,vol.34,pp. 1187-1201.

[23] Kementrian Lingkungan Hidup dan Kehutanan.(2015). *Statistical yearbook of Ministry of Environment and Forestry*. Jakarta. Central of Data and Information, Ministry of Environment and Forestry.

[24] Kuznet, S., 1955. Economic Growth and Income inequality. *The American Economic Review* vol.45,no.1,pp. 1-28.

[25] Lim, J.(1997). Economic Growth and Environment: Some Empirical Evidences from South Korea. *School of Economics, Australia: University of New South Wales Sydney, NSW 2052,.*

[26] Mankiw, G. N. (2007). *Principle of Economics. Fourth Edition*, the Thomson Corporation: Thomson South-Western,

[27] Mohapatra, G., Giri, A.K. (2009). Economic Development and environmental quality: an econometric study in India. Management of Environmental Quality: *An International Journal*, vol.20,no. 2,pp.175-191.

[28] Orubu, O.,Omotor, D G. (2011). Environmental quality and economic growth: searching for environmental Kuznet curve for air and water pollutan in Afrika. Energy Policy 39, 4178-4188.

[29] Peng, S., Wu, N., Zhao, G. (2014). Modeling environmental degradation and economic growth of Henan Provinci in recent 25 years. *Applied Mechanics and Material*, vol.675-677, pp.1810-1814.

[30] Panayotou, T., 2003. *Economic Growth and The Environment*. Genewa, United Nation Economic Commission for Europe.

[31] Roca, J., Padilla, E., Farre, M., Galletto, V. (2001). Economic growth and atmospheric pollution ins Spain: discussing the environmental Kuznets curve hypotesis. *Ecological Economics*,vol.39, pp. 85-99.

[32] Samuelson, P.A., Nordhaus, W.D., (2005). *Economics*. Mc Graw-Hill. Companies, Inc.

[33] Shahbaz, M., 2013.Does financial instability increase environmental degradation? Fresh evidence from Pakistan. *Economic Modeling* 33, 537-544.

[34] Shafik, N., & Bandyopadhyay, S.(1992). *Economic Growth and environmental Quality: Time series and Cross-Country Evidence*. World Bank, Working Paper, World Development Report,

[35] Shafik, N. (1994). Economic Development and Environmental Quality: *An Econometric Analysis. Oxford Economic Paper,vol* 46,pp. 757-773

[36] Stern, D I., Common, M. S., Barbier, E. B. (1996). Economic Growth and environmental Degradation: The Environmental Kuznet Curve and Sustainable Development. *World Development*, vol.24, no.7,pp. 1151-1160.

[37] Taguchi, H. (2012). The Environmental Kuznet Curve in Asia: The Case of Sulphur and Carbon Emissions. *Asia-Pacific Development Journal*, vol.19,no.2,pp.77-92.

[38] Torras, M., Boyce, J.K.(1998). Income, inequality, and Pollution: reassessment of the environmental Kuznet Curve. *Ecological Economic, vol.25,pp. 147-160*.

[39] Uchiyama, K. (2016). Environmental Kuznets Curve Hypothesis. Development Bank of Japan Research Series, DOI 10.1007/978-4-431-55921-4-2.

[40] UNDP. (2016). Sustainable Management of Water and Sanitation.*New York*: UNDP

[41] Wheeler, D. (2000). Racing to the Bottom? Foreign Invesment and Quality in Developing Countries. USA: *Development Research Group, World Bank.*

[42] World Bank. (1992). Development and the Environment, *World Development Report.*

[43] Wu, P.I.,1998. Economic Develoment and Environmental Quality: Eviden from Taiwan. *Asian Economic Journa*l,vol.12,no.4,pp. 395-413.

[44] Xu, X. (2014). The Research on Temporal Spatial Econometric Analysis of Environmental Quality and Economic Growth. *Advanced Materials Research*, Vol. 926-930, pp.4398-4401.

Priagus