

ANALYSIS

# The Environmental Kuznets Curve, environmental protection policy and income distribution

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## Abstract

The effect of economic growth on pollution emissions differs substantially among high-income countries. I address this issue by analyzing public environmental policy decisions. Individual heterogeneity, relative income effect and the political framework in which policy decisions are taken determine the emergence of the downward sloping segment of the Environmental Kuznets Curve (EKC). Income inequality produces a gap between the country's ability to pay for environmental protection and a country's willingness to pay. I test this result by using OECD data on public R&D expenditure for environmental protection. The conclusion is that contrary to the EK hypothesis, moments of the income distribution function other than the mean may be important for the emergence of a virtuous path of sustainable growth in high-income countries. © 2000 Elsevier Science Ltd. All rights reserved.

*Keywords:* Environmental policy; Environmental curve; Voting models; Development path; Income inequality; Median voter theorem

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## 1. Introduction

The hypothesis of an inverted U-shaped relationship between growth in per capita income and environmental degradation, as illustrated by the Environmental Kuznets Curve (EKC), has recently been the subject of much empirical investigation. The argument according to which economic growth is ultimately beneficial for the

environment is controversial since it prompts the idea of a development path, a stage-based link between environmental quality and economic growth.

Studies of the link between levels of per capita income and environmental pressure, particularly pollution emissions, have revealed clear patterns. Pollution emissions usually decline for higher levels of per capita income. However, the explanatory power of a polynomial in per capita GDP in regressions for environmental quality drops significantly when we move from poor countries to

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high income countries (Roberts and Grimes, 1997; Magnani, 1999). Furthermore, in this latter group the effect of economic growth on emissions differs substantially among countries (De Bruyn et al., 1998). By suggesting that there may be other variables, besides the level of economic activity, that explain the evolution of pollution emissions in high income countries, the empirical results invite an examination of socio-economic factors that can directly affect the quality of the environment.

In recent times, scholars in the field have returned to the role of policy as a determining factor for the emergence of a downward sloping segment in the EKC (Baldwin, 1995; Grossman and Krueger, 1995). The environmental literature argues that the link between economic growth and environmental amenities in high income countries hinges upon the evolution of supply and demand for environmental care (Antle and Heidebrink, 1995). In particular, if the income elasticity of demand for environmental amenities is large, the demand for pollution abatement policies is likely to rise with GDP per capita. If the income elasticity condition (IEC) holds, an economy is more likely to experience declining levels of pollution emissions as per capita income increases.

This article focuses on the theoretical and empirical foundations of the EKC hypothesis by examining the determinants of public expenditure for environmental care in high income countries. Section two contrasts the foundations of the IEC of the traditional environmental literature with the hypothesis that within-country income inequality may damage the environment by reducing the demand for pollution abatement (DPA). By combining a political economy approach to policy determination (Alesina and Rodrik, 1994) with the literature on the relative income effect on consumption decisions in rich countries (Ng and Wang, 1993), section three of this study goes on to provide the IEC with further specification. It establishes that when a relative income effect is in place, voters' preferences over consumption of private goods and public goods, such as environmental amenities, depend on their relative position in the income distribution function. In particular, I show that in countries where a ma-

ajoritarian voting system applies, income distribution parameters and the exposure to environmental risk determine the level of pollution emissions by impacting upon the willingness of the median voter to pay for environmental protection. The level of environmental protection depends on two effects, an absolute income effect and a relative-income effect. While growth in per capita income may increase the capacity to pay for environmental amenities (the absolute income effect), income inequality may drastically reduce a country's willingness to pay (the relative income effect) by shifting the median voter's preferences away from consumption of the public good 'environmental amenities'. This result sheds light on the important question as to whether economic growth is sufficient for improvements in environmental care in economically advanced societies. A high income elasticity of demand for DPA is not a sufficient condition to lead to declining levels of pollution as per capita income grows.

The analysis of a model of environmental policy determination leads to interesting testable results. If there is a relative income effect and the IEC holds in this new environment, income inequality has a negative effect on pro-environment public expenditure. Furthermore, the positive impact of economic growth (growth in per capita income) on environmental policy is reduced by income inequality. To test these hypotheses, section four uses OECD data on R&D expenditure for pollution abatement from 1980 to 1991. The empirical results point to a positive absolute income effect and a negative impact of income inequality on environmental protection. This second finding implicitly evidences the importance of the relative income effect in individual consumption decisions and the need for a reformulated IEC. The concluding section argues for the explanatory power of a model where income distribution parameters affect preferences and the political process of decision making. Such a model accounts for the fact that countries who have similarly high rates of economic growth show very different responses of pollution emission to GDP and GDP growth.

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