

# Democracy and Environmental Quality

by

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*The relationship between several local and global air pollutants and economic development is evaluated. We find empirical support for our hypothesis that democracy provides the best conduit to environmental quality, relative to other governmental structures, thus leading to decreased concentrations or emissions of pollution. The results have policy implications for the developing world, as well as the United States. Ê*

The relationship between national income and environmental quality is of great interest to economists, policy-makers, and the public at large. This interest is reflected by growing conflicts between global environmental concerns and global economic development policy, as seen by frequent uprisings at WTO meetings. Previous literature on this relationship has focused on the so-called Environmental Kuznets Curve (EKC), which hypothesizes an inverted-U shape when pollution indicators are plotted against income per capita, as shown in Figure 1. Explanations for this hypothesis generally focus on several primary factors that interact to produce the shape. Among these are: (1) changes in the composition of aggregate output as economies evolve from agricultural to industrial to service-based goods and services, (2) technological progress, and (3) increases in demand for environmental quality as income grows.

However, the relationship between environmental quality and economic development is not formed in isolation from political institutions that govern the process of policymaking in a particular country. Thus, for example, Dasgupta and Måler aptly emphasized in 1995: “The connection between environmental protection and civil and political rights is a close one. As a general rule, political and civil liberties are instrumentally powerful in protecting the environmental resource-base, at least when compared with the absence of such liberties in countries run by authoritarian regimes.” This observation raises several important questions: How does public environmental policy influence the relationship between per capita income and pollution, and how does that public policy represent the citizens’ preferences for environmental quality?

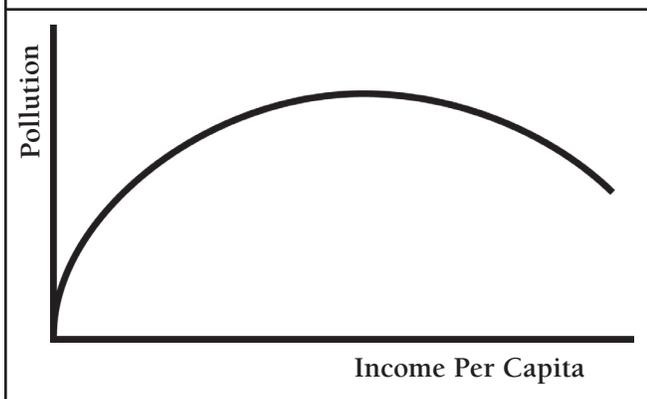
We develop a model that directly incorporates the relationship between societal preferences and provision of public-pollution abatement, utilizing

a measure of quality of governance as a proxy for weights on those preferences. We call this quality of governance variable “polity” and define it to have a low value for authoritarian governments and higher values for governments that are more democratic. We hypothesize that democracy and its associated freedoms provide the conduit through which agents can exercise their preferences for environmental quality more effectively than under an autocratic regime, thus leading to reduced concentrations and/or emissions of pollution. We estimate an econometric model of the relationship between several local and global air pollutants and economic development, measured by national income per capita. The model explicitly accounts for critical aspects of the socio-political-economic regime of a country. Additional variables such as income inequality, age distribution, and urbanization are also included.

## **Relationship between Environmental Policy, Governance, and Preferences**

One of the major determinants of environmental policy is the political regime of a particular country, or “governance.” One study has argued that corruption and rent-seeking behavior can influence the relationship between income and the environment. They show that corruption causes the turning points of an EKC to rise above the socially optimum level. Another study has suggested that well-defined property rights, democratic voting systems, and respect of human rights can create synergies that lead to increased levels and efficacy of environmental policy.

We propose a simple explanation of the role of political structure on the relationship between income and environmental quality, based on the relationship between the demand and supply of environmental quality. Because environmental quality is mostly a public good, and in many cases the capital costs of the required infrastructures to abate pollution are huge,

**Figure 1. Environmental Kuznets Curve**

### Explanation of the Curve

*It is claimed that many environmental health indicators, such as water and air pollution, show the inverted U-shape: in the beginning of economic development, little weight is given to environmental concerns, raising pollution along with industrialization. After a threshold, when basic physical needs are met, interest in a clean environment rises, reversing the trend. Now society has the funds, as well as willingness, to spend to reduce pollution.*

*The extension of the Kuznets Curve to environmental health in general has been doubted. For example, energy, land and resource use (sometimes called the “ecological footprint”) do not fall with rising income. While the ratio of energy per real GDP has fallen, total energy use is still rising in most developed countries. In general, Kuznets curves have been found for some environmental health concerns (such as air pollution) but not for others (such as landfills).*

individuals or groups within a society are unable to effectively provide them. As such, it is usually the State that provides these goods. However, the State’s environmental policy is at least partly influenced by the society’s preferences for environmental quality. In particular, the relationship between the public’s preferred level of environmental quality and the level actually supplied by the State depends on the weights the policymakers place on the various societal preferences.

To illustrate, consider the following simple model. Suppose that the people in a society can be aggregated into two distinct groups based on some distinguishing characteristic. The categorical distinction can be made along any number of characteristics that are likely to

affect environmental preferences; for example, “rich vs. poor,” “educated vs. non-educated,” “urban vs. rural,” or “young vs. old.” The groups’ environmental preferences are assumed to be reflected by their preferred levels of pollution-abatement expenditure to be undertaken by the state.

Our model of public environmental-quality provision highlights the importance of the type of political regime for the relationship between economic development and environmental quality. It suggests that environmental-quality expenditures are partly a function of the citizen groups’ preferences, but these preferences are subject to political distortions, misrepresentation, or neglect by the State. The more open and democratic are the political institutions, however, the more likely it is that the citizens’ preferences will be reflected in actual policy decisions, and environmental quality as a normal public good will increase.

### General Results

We tested the hypothesis of an inverted-U shaped relationship between the direct effects of national income per capita and pollution indicators conditional on the type of government, population density, and technology, as well as the marginal effect of increasing the quality of the public institutions on environmental quality. Results suggest that economic growth alone, as measured by a change in GDP, is insufficient to improve environmental quality. Rather, conscious environmental policy emanating from the existing political institutions, as represented by the polity variable, is necessary. In other words, the type of government in place clearly influences the chances of environmental policies being implemented.

Of the five models estimated, only one (emissions of non-methane volatile organic compounds [VOC]) supports the EKC hypothesis of an inverted-U shaped relationship. The turning point for the VOC curve is inversely related to the quality of political institutions, but tends to occur at GDP levels at the upper end of the distribution. Our results support the findings of the previous literature; namely, growth in income per capita is not sufficient to explain increases in pollution abatement as nations develop. As emphasized in the statement by Dasgupta and Mäler quoted earlier, conscious choices of environmental policy coming from people exercising their civil rights to express preferences are the key to understanding the relationship between economic development and environmental quality.

Our testing of the effects of the government on the estimated relationship corroborates this hypothesis. In all cases, the marginal effect of the polity variable with respect to the pollutant is negative for the majority of the income range under consideration, suggesting that countries with more democratic institutions have a greater tendency to reduce pollution. For those pollution measures for which the effect is dependent on income levels ( $\text{CO}_2$ , VOC, and  $\text{SO}_2$ ), the marginal effect of democratization is intensified with income. At very low levels of income for four of the five models, however, the estimated marginal effect of democratization of political institutions could be positive. This implies that, in very low-income countries, for most government types, the State and the people assign such a high priority to industrial development that pollution emissions increase. However, this effect is lessened as income per capita rises.

### Specific Results

Thus, environmental policy-making considerations are of paramount importance in describing the relationship between economic development and the environment. We turn now to the results of the model that decomposes the environmental-policy indicator variable. We try to account for both the preferences of the society and the mechanism through which these preferences are translated into realized pollution abatement.

As expected, the relationship between GDP per capita and the various pollution measures is similar to that estimated in the basic model. However, the  $\text{NO}_x$  model now has an EKC relationship with a turning point well outside the sample range of income. Nevertheless, the similarity in conditional results suggests that the decomposition is valid, and that demand considerations based on societal preferences are an important determinant of overall environmental quality. Income growth conditioned on greater polity scores is predicted to have a relatively smaller impact on increased emissions in four out of five cases. Furthermore, the marginal effects of increasing polity on pollution remain negative at the mean sample values. This creates an inverted-U when plotting pollution versus polity, just as in the EKC.

#### *Urbanization*

We now turn to the effects of the individual preference shifters on the pollution indicators, conditional on the type of government in place in a given society. Urbanization has an unambiguous net positive effect

on all pollution indicators, with the exception of  $\text{CO}_2$  emissions, at high levels of democracy and national income. This suggests that the effects of increased fossil-fuel use in urban societies mostly dominate any economies of scale or preference effects.

#### *Income Inequality*

Another abatement demand shifter widely discussed (and disputed) in the literature is income inequality, as it is hypothesized that the distribution of income may play a role in the income/environment relationship. In this application, the proxy for income inequality is found to have a negative relationship with environmental quality in three of the five regressions at the sample mean.

Interestingly, a distinction can be made here between greenhouse gasses (such as  $\text{CO}_2$ ) and the ozone and acid-rain generating chemicals. The latter pollutants most often exhibit an EKC relationship because their consequent damages are primarily local in nature, whereas carbon compounds are global in their environmental impacts. One explanation for this intriguing result may be the relationship between income inequality and differences in environmental preferences of the poor and rich. That is, the poor are the primary victims of local air pollutants because they can neither afford the high local costs associated with environmental amenities, nor can they choose environmental quality over having a job that is overly exposed to pollution. They often have to live and work immediately downstream and downwind, thus bearing a disproportionate burden of local pollution. As such, the environmental preferences of the poor are biased toward reduced local pollution.

In contrast, the rich, who can afford, and gain from, environmental amenities, have a lot of interest in amenity values associated with protection of rain-forest biodiversity, endangered species, and the like, and have little interest in some kinds of local pollution. Thus, assuming that the political behavior of each group (whether rich or poor) is self-interested, environmental quality outcomes depend largely on which group's environmental interests get served by the State. Government action, in turn, depends on politicians' sensitivity to the issue of environmental justice (both within and between generations) and on the effectiveness of each group to influence them.

#### *Age Distribution*

A similar pattern appears in terms of the age distribution of the society, as measured by the percentage of the

population less than fifteen years of age. NO<sub>x</sub> and VOC emissions are negatively correlated with the proxy for youth, independent of the level of national income. A similar result holds for SO<sub>2</sub> emissions, but the relationship reverses with high GDP per capita levels (achieved by only 18 percent of the observations in the sample). This may partly reflect the empirical fact that infants and young children are the main victims of local ground-level, ozone-producing pollutants, and the greater sensitivity of politicians to health hazards of these pollutants among the very young. Again, however, the greenhouse gas CO<sub>2</sub> emissions are predicted to increase with the share of youngsters in the population, and this marginal effect is intensified with increases in GDP per capita.

#### *Local versus Global Pollutants*

It appears that the nature of the pollutant may affect the policy weights given to preferences and, thus, the rate at which the preferred environmental policy is translated into actual policy. At low-income levels, more weights are seemingly given to abatement policies aiming at local pollutants (such as NO<sub>x</sub>, VOC, and SO<sub>2</sub>). The main victims of these pollutants are the inner-city, low-income groups and their damages become visible in a relatively short period. Conversely, less weight may be given to policies aiming to abate global or regional air pollutants (such as CO<sub>2</sub>). This means policies aiming to improve environmental amenities that benefit, and support the lifestyle of, the rich receive less weight. And this is more likely to be the case the more democratic is the political regime of a society.

#### *Education*

The last preference shifter under consideration is the education of the populace, as proxied by the illiteracy rate for people greater than fourteen years of age. At least one education term is significant in all of the emissions models, though no significant correlation could be determined for ambient SO<sub>2</sub>. The relationships all follow the same pattern, with illiteracy positively correlated with emissions at relatively low levels of income, but the marginal effect reversing sign at higher levels.

### **Conclusions**

This article discusses the link between income per capita and environmental quality. Recognizing that the often-cited “inverted U-shaped” relationship or EKC is not an inevitable result of income growth, a

model was developed that specifically accounted for different environmental-policy regimes, reflecting the demand for environmental quality as a public good.

Results of the exercise support the hypothesis that the qualities of political institutions and several indicators of societal preference interact with each other to create the inverted-U shape, which is frequently cited in the environment-development literature. Estimates of individual effects for each of the included preference shifters support the hypothesis that more democratic governments respond favorably to environmental demands by the populace.

For additional information on this subject, the authors recommend the following sources:

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