



Reduced carbon intensity in highly developed countries: environmental kuznets curves for carbon dioxide

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The Environmental Kuznets Curves (EKC) postulates that pollution increases with the income per capita up to a maximum, above which it decreases with the further increase in income per capita, i.e. following an inverse U-shape in the pollution vs. income per capita.

It is commonly believed that EKC occurs for "local" pollutants such as nitrogen oxide and sulfur dioxide, but does not hold for CO₂ emissions. This is attributed to the fact that while "local" pollutants cause a visible environmental damage on the local/regional scale (which authorities/governments seek to avoid), the consequences of CO₂ emission have no immediate attributable local/regional consequences.

We review EKC for CO₂ exploring its relation between CO₂ per capita and the Human Development Index (HDI) between 1990 and 2010 obtained from the World Bank database. We find evidence for a reduction in CO₂ emissions per capita in highly developed countries. We propose a model according to which the emissions per capita of a country are composed of a component related to the actual state of development and a component related to the change of development. The model leads to four distinct cases of which two have EKC shape and two imply saturation. This outcome is in line with previously suggested qualitative relations.

Our analysis indicates that the EKC shaped cases better describes the empirical values. We explore the less extreme version corresponding to the so-called conventional EKC and study the maximum of the fitted curve, providing a threshold-value for the HDI and a typical maximum value for the emissions per capita. We find that approx. 5 countries have crossed the CO₂-HDI maximum, corresponding to approx. 1.5% of the world population.