Environmental Engel curves and displacement effects of pollution: An empirical investigation

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Abstract

The emergence of an inverted U-shaped environmental Engel curve (EEC), which describes the relationship between household income and pollution, is mainly attributed to a shift in households' preferences towards environmental quality following income growth. At the same time, such a shift might be difficult to predict due to the issue of displacement effects of pollution costs; this occurs when individuals living in higher-income regions transfer pollution costs to lower-income regions, so that higher environmental quality in a region is achieved at the detriment of other regions. This paper utilizes longitudinal data on household carbon dioxide emissions aggregated at the regional level for the 20 regions of Italy within the period 1995-2008, in order to derive accurate estimates of households' elasticities for environmental degradation, as well as to test the hypothesis of displacement effects. Our results reveal the emergence of a U-shaped relationship between household emissions and income, whereas the displacement effects hypothesis does not find empirical support, thus suggesting that negative environmental outcomes are not externalized. Ultimately, these findings indicate a progressive increase in the marginal utility for non-environmental goods by Italian households, calling for a sustained effort by the institutions to increase citizens' awareness on environmental matters.

JEL-codes: Q53; Q56; R11.

Keywords: Environmental Engel curve, Emissions, Displacement effects, Spatial econometrics.

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1 Methods

For the analysis, both non-spatial and spatial panel specifications are utilized to test the validity of the environmental Engel curve (EEC). With reference to the spatial analysis, a spatial autoregressive model with fixed effects (SAR-FE) is estimated through a two-step efficient GMM estimator. The computation of partial derivative measures (spatial spillovers) from the SAR-FE model is carried out to test the hypothesis of displacement effects of pollution costs.

2 Results

- First, carbon dioxide emissions deriving from household activities denote a positive and significant degree of spatial autocorrelation among Italian regions.
- Secondly, a U-shaped relationship is detected among household emissions and income, so that the EEC hypothesis does not hold, and higher levels of income increase the marginal utility of Italian households for non-environmental goods.
- Third, the hypothesis for which individuals have an income elastic demand for environmental quality does not find empirical support.
- Finally, the coefficient estimates for the spatial spillovers do not provide evidence of displacement effects of pollution costs among households residing in different regions.

3 Conclusion

This paper tests for the Italian scenario the presence of the environmental Engel curve (EEC), which posits an inverted U-shaped relationship between household income and pollution, attributed to a shift in households' preferences towards environmental quality following increases in their level of income. Our econometric results bear noteworthy implications. First, the validity of the EEC hypothesis is not confirmed. Conversely, on average, Italian household seem to have an inelastic demand for environmental quality, and this entails for the latter a higher marginal utility for non-environmental goods. Secondly, the hypothesis of displacement effects of pollution costs does not find empirical support, so that negative environmental outcomes are not externalized to household residing in neighboring regions. These results provide empirical support to the findings detected

by previous studies examining the Italian scenario, but which considered different environmental indicators. A sensibilisation campaign by the institutions on environmental matters addressed to the Italian households may represent a valid suggestion as a policy recommendation.

4 References

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