

Regional optimization of air pollution in Greece via input-output analysis

Topic: Regional Input-Output Modelling 4

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This paper explores the use of a multi-region input-output based model for optimizing production on a per-sector basis, while taking into account regional environmental constraints on air pollution and economic impact. The basic model, informed by recently published empirical and environmental data for Greece (which is partitioned into five regions), is used to accomplish two things. First, we determine the regional economic impact of reducing each of a set of major air pollutants (including particulates, and gasses that contribute to global warming and acidification). This is done by solving an optimization problem where we ask to maximize regional GVP subject to constraints on energy use, final demand, and air pollution. Second, we explore the effects on the national and regional economies from localizing environmental policy to target the pollutant deemed most problematic in each region. Our analysis considers two pollution reduction scenarios which entail a 9% and 4.5% reduction, respectively, in the volume of each region's "priority" pollutant.

Depending on the pollutant under consideration, our analysis suggests that significant reductions may be possible with minimal effect on the regional or national gross value of production. Moreover, depending on the level of reductions sought, regulating a single pollutant may be sufficient to induce reductions in other pollutants as well, leading to more concise environmental policies. More specifically, at the aggregate level, the most intense fluctuations in both economic and environmental variables are observed under the more restrictive (9%) scenario. At the sectoral level, under both scenarios, secondary production sectors are subject to the most significant reductions in all regions, in contrast to the tertiary production sectors which are favoured the most by the optimal solution.