CONSERVATIVE ENVIRONMENTAL INPUT-OUTPUT MULTIPLIERS BASED ON SUPPLY AND USE TABLES

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An environmental input-output (IO) multiplier is a vector that indicates the total environmental impact (e.g., emissions) required to generate a given set of consumption goods and services. Environmental IO multipliers can be calculated in the context of symmetric IO tables or of supply and use tables (SUT), being the latter option favoured by the System of National Accounts (SNA).

There are different types of SUT multipliers, since there is an indeterminacy in the transfer of embodied emissions from firms to products and from products to firms. The most common allocation rule is strict product homogeneity, according to which the emissions embodied in a product are independent of the sector that generated the product. This allocation rule does not yield a unique solution when the numbers of sectors and products are different. A solution to this problem that was recently proposed consists in forcing products to be homogeneous and allowing the multiplier to be nonconservative.

An IO multiplier is conservative if it leads to a sum of embodied emissions in final demand that matches the sum of direct emissions. We consider that a multiplier is only meaningful if it is conservative because otherwise it does not have the desired meaning of representing the total amount of emissions required to generate a given good or service. In this paper, we derive expressions for conservative multipliers from Supply and Use tables with any number of industries and products, under different allocation rules. In the case of homogeneous products we replace the currently used assumption of nonconservative strict homogeneity by an assumption of conservative quasi-homogeneity. That is, we relax the assumption of strict homogeneity and enforce a strict conservation law. The quasi-homogeneous multiplier is obtained as a least-square approximation to the strictly homogeneous one.

We illustrate the results with an empirical application, in which we calculate conservative multipliers of carbon emissions.