

Alternative approach to measure the emissions embodied in value added and resulting income-based emissions

Topic: Environmental Input-Output Modeling

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With growing concern about global warming, much effort has been put on quantifying the responsibilities of each country/region's carbon emissions in fighting against climate change. Currently, both direct and indirect responsibility measures have been advocated. Direct measure is the production-based responsibility, which is simple and easy to calculate, but not able to account for the "carbon leakage" issues. Indirect measures using environmentally-extended input-output framework include the consumption-based and income-based responsibilities. They are linked with upstream and downstream embodied emission flows. The upstream embodied emission flow is connected with the final demands using the Leontief model, while the downstream embodied emission flow is connected with value added using the Ghosh model. The results of indirect measures are found to be useful to implement direct measure in global and regional climate policy makings. This paper gives an alternative approach to measure the emissions embodied in value added using the Leontief model and resulting income-based responsibility. An illustrative example and empirical studies using the data of the Asian countries will be presented. Implications of different approaches to measure the embodied emissions in value added will also be discussed.