

The Effects of Aggregation: A case of carbon footprint accounting by using Multi-Region Input-Output models

Topic: Embodied CO2 emissions in trade

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Aggregation uncertainty in input-output analysis has been recognized as one of the critical barriers impeding the acceptance of input-output analysis as a practical tool in the standardisation process of carbon footprinting. It is particularly important when using multi-region input-output models to account for emissions embodied in international trade. In this paper, we examine the effects of sectoral aggregation in multi-region input-output models on carbon footprint accounting by a Monte Carlo-type of sensitivity analysis. By using the ten-region and 76-sector Asian International Input-Output Table, we calculated the errors of random aggregation of sectors against the 76-sector carbon footprints of each region. The error ratios can be as high as more than 2.5 times (in particular for Indonesia) and converge to the range of -10% to 10% for most regions when the number of simulations is as large as 100,000. We also conducted statistical analysis on the relations between error ratios and the characteristics of aggregated sectors, including the carbon intensity, output share in national economy, degree of differences in technical coefficients among sectors to be aggregated, etc.