

Structural path decomposition analysis and its use in comparing multiregional input-output databases

Topic: Structural Comparisons

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Abstract:

Analysts wishing to calculate consumption-based emission accounts or to understand the full supply chain impacts of consumption of products now have the choice of several multiregional input-output (MRIO) databases from which to base their calculations. Studies have shown that the results produced by each database differ at both the national and product sector level. The research challenge now is to develop techniques for understanding the nature and cause of difference in the databases. Recent work has utilised matrix difference statistics to determine the size and pattern of difference and structural decomposition analysis has been used to apportion the difference to elements of the environmentally-extended Leontief equation. This paper takes the research one step further by comparing the emissions associated with various global value chains within each MRIO database. The study applies structural path analysis to identify the 100 largest paths in each of the databases. We then find the differences in common paths between each database. For the top 50 paths that contain the largest difference, Structural Path Decomposition (SPD) is used to identify the contribution that each part of the supply chain makes towards the difference. To enable meaningful comparison between the Eora, EXIOBASE, GTAP and WIOD MRIO databases, each is aggregated to a common classification system of sectors and regions. The results should identify key flows that are the cause of difference in the databases. Understanding the differences in the results is important to users of MRIO systems as they are increasingly applied to important policy questions.

Keywords:

Multiregional input-output databases, variation, global value chains, structural path decomposition analysis, consumption-based accounting, model comparison