Generic methods for estimating input-output models under partial information

Topic: EXIOPOL: Latest progress and preliminary results of work on a global, detailed MR EE SUT/IOT database
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Input-output models have been estimated under partial information ever since the postulation of the RAS technique by Stone in 1962. Methods have become much more advanced since this time, such that any type of related data can now be incorporated in the estimation techniques, not just row and column sums. We are now at the point where any information in any pricing type can be fairly easily incorporated into input-output matrix estimation. As a first step, this paper outlines the generic ability of incorporating new data sources. The flow of information from source to final product can be greatly simplified under a strict adherence to classification structures.

As a second step, this paper discusses the application of matrix estimation techniques for not only updating input-output models, but also for disaggregating the models. As an example, increased sector detail may be available from physical data such as energy or LCA databases that could be incorporated into an input-output model.

As these models are almost always underdetermined (i.e. more data points needing to be estimated than data constraints available), the choice of target function in obtaining a solution can become important. There are two components of the target function, the form, and the contents. The actual economic and physical implication of different target function forms is discussed. The contents of the target function relates (most specifically in input-output modelling) to the choice of minimising distance over coefficients or absolute flows. Under some target functions (e.g. RAS type) this is not important, but for linear or quadratic target functions, the choice has an economic meaning. This meaning is discussed with reference to the underlying uncertainty in the initial data, and the difference between updating and disaggregating input-output tables.

Source data is almost never 100% in agreement, and updating methods generally must be robust enough to handle differences in data sources. Differences can be overcome by a stepped updating method, or by incorporating a specific term within the target function to handle these differences. Again, the choice of form of the term in the target function has different economic meaning.

Finally, whilst computational ability is far beyond what was available to Stone and colleagues, we are still limited by the ability of solvers to find global minimums, and, less so, in the size of problems. These limitations eventually, flows back to the choice of target function, some being easier to compute than others. Discussion concludes on recent experience in estimating single-region and global multi-regional input-output models, with particular reference to the computability of highly conflicting source data.