Evaluating uncertainties in WIOD data base

Topic: Methodological aspects of input-output analysis
Author: Oleg LUGOVOY
Co-Authors: Andrey POLBIN, Vladimir POTASHNIKOV

The process of compiling and updating Input-Output tables involves uncertainties, stemming from the lack of data, updating or balancing technique. Application of alternative methods and subjective decisions will lead to different IOT estimates, meaning that the resulting tables have an embedded uncertainty. Though this uncertainty across methods is hard to measure and, more importantly, evaluate its significance on the stage of IOT application. In this paper, we discuss a way to evaluate an uncertainty of methodological choose with an application to the WIOD and discuss the results. The study includes several steps. First, we update WIOD database on historical data with several mainstream techniques, including RAS, cross-entropy, and maximum likelihood with alternative specifications of the likelihood function (based on normal- and beta- distributions). Second, we use the resulting differences in the updated with different methodologies tables as a measure of the uncertainty from the updating technique. The estimate can also be combined with a historical data to take into account ongoing structural changes of input-output coefficients, or with other data including experts' opinion regarding expectations of further structural change of the economy. Third, we apply Monte Carlo Markov Chain methodology to simulate IOTs around a benchmark table using the estimated variance as prior information for input-output coefficients distribution. The Bayesian technique with MCMC has been discussed on previous IIOA conferences as an IOT updating tool. Instead of point estimates, the methodology allows simulating a set of matrices consistent with the data. The simulated joint posterior distributions of input-output coefficients are used to identify cells of the matrices with the most substantial variability, indicating sensitivity to the choice of the updating technique. The resulting distribution-based estimates have minimal shares of outliers and can be considered as more robust compared to the mainstream point estimates updating techniques.