Probabilistic, Bayesian updating of IOTs: application to WIOD

Topic: 714B Methodological Aspects of IO Analysis (2)
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The paper summarizes the authorsâ€™ efforts on developing and application probabilistic method(s) for updating IO tables, preliminary presented and discussed on previous IIOA conferences. The core of the methodology is Bayesian framework which combines an information from observed data, additional believes (priors), and related uncertainties into posterior joint distribution of input-output table (IOT) coefficients. As we show in the paper, the framework can be applied to various IOT problems, including updating, disaggregation, evaluation of uncertainties in the data, and addressing incomplete/missing observations. The flexibility of the methodology is partially based on sampling techniques. We apply modern Monte Carlo Markov Chains (MCMC) methods to explore posterior distribution of the IOT coefficients.
The paper includes three parts. In the first part we discuss the conceptual framework of application of Bayesian techniques to probabilistic updating of IOTs, disaggregation, addressing measurement errors in data, missing observations, various specifications of priors, and computer implementation. In the second part we test the methodology on actual data, World Input Output Database (WIOD), and compare its performance with other mainstream techniques of IOT updating. In the third part we apply the methodology to build probabilistic IOTs for Russia. Based on information from national accounts for 70+ industries, and preliminary official IOT estimates for 15 main sectors, published by Rosstat for 2006, we are trying to reconstruct probabilistic IOTs for 77 sectors, using the Bayesian techniques for disaggregation and updating IOTs up to 2014.
In addition to another IOT updating technique, the main contribution and advantage of proposed methodology is a straightforward and practically achievable quantification of uncertainties in input-output tables, consistent with directly and indirectly linked with IOTs observed data, and any amount of additional information, which can be expressed by inequality constraints for IO coefficients and their linear combinations.