

Developing a consumer demand model with feedback mechanisms by combining input-output analysis and agent-based modeling to estimate future demand and environmental impacts

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Drawbacks of environmentally extended input-output analysis have been identified as its retrospective scope and lack of relevance to future environmental policy making. Furthermore, the lack of detail in the household consumption vector of MRIOs, along with the assumptions of representative, rational and non-interacting consumers in consumption modeling have been identified as limitations to modeling scenarios of future consumption using MRIO, but also for demand models in general. In this work, we seek to overcome these challenges by using an MRIO database comprising over 200 countries to develop country-specific demand models for a wide range of countries. The demand systems will use consumption data in a time-series from the MRIO to create models based on the Almost Ideal Demand System (AIDS) or the Perhaps Adequate Demand System (PADS). By using exogenous micro-economic data for several of these countries, we seek as an extension to the country-specific demand models to add elements of agent-based modeling (ABM) to the demand models. We do this by introducing a feedback mechanism of environmental information gained from the MRIO and supply this to the consumers of the ABM in every iteration of the model run, which in turn will influence consumer decisions and create scenarios of future consumption and environmental impacts. The goal here is to in a novel way combine ABM and MRIO to take advantage of the bottom-up perspective of ABM and the top-down perspective of MRIO. This can contribute to both overcome the limitations of MRIO in future demand modeling, and to increase the future environmental policy relevance of MRIO.