

BUILDING EORA: A GLOBAL MULTI-REGION INPUT-OUTPUT DATABASE AT HIGH COUNTRY AND SECTOR RESOLUTION

Topic: MRIO-showcase I: Global MRIO frameworks

Author: Manfred Lenzen

Co-Authors: Arne Geschke, Daniel Moran, Keiichiro Kanemoto

The problem of climate change is now perceived as more severe, more urgent, and as a result more political. The latter is reflected in increasing debates about the national responsibilities for the damages expected from climate change. In particular, exporters of emissions-intensive commodities now argue more strongly than ever for a consumer-responsibility principle.

In response to these recent trends, various accounting, labelling, reporting, life-cycle, and policy frameworks for consumer responsibility have been created or revived, and some of these deal with international trade, such as the European EIPOD project. In order to underpin these initiatives, a comprehensive and reliable multi-region input-output (MRIO) database on emissions and international trade is necessary. MRIO-based studies have recently been successful in bringing the issue of carbon embodied in international trade to wider audiences, and in triggering debate amongst decision-makers.

Such databases should ideally cover the entire world at high sector detail, so that emissions-intensive industries or commodities can be singled out. However, previous multi-region studies have used either sector-disaggregated models for a limited number of countries, or sector-aggregated models for the world. At present there are a number of initiatives aimed at compiling large-scale global MRIO tables. The databases generated by these initiatives have different purposes, and this is reflected especially in their choice of sector and country detail. Most initiatives do not provide for maximum sector disaggregation, but instead most initiatives opt for a breakdown into around 50 regions and 120 sectors common to all countries. Further differences relate to whether a continuous time series is generated or not, and how many valuation sheets exist. Most databases do not provide quantitative information on reliability and uncertainty.

The aim of this work is to describe the Eora World MRIO tables. The Eora MRIO tables address a number of shortcomings, and to go beyond existing ambitions for MRIO compilation. Eora's goals are:

1. Detail: Disaggregation of countries and sectors to the maximum possible level of detail, in order to assist environmental life-cycle and footprint-type assessments of international trade in the most accurate way possible;
2. Dynamics: Creation of a historical time series back to 1970, in order to allow trend and scenario analyses, and projections;
3. Flexibility: Compilation of table sheets expressed in basic prices as well as margins and taxes, and in current and constant US\$, so that calculations for different purposes can be carried out;
4. Transparency: Minimisation of assumptions made during the compilation (such as ratios of purchasers to basic prices), and close adherence to the raw data;
5. Uncertainty: Provision of standard deviation estimates for all MRIO elements in order to aid comparative assessments, hypothesis testing, and decision-making;
6. Reliability: Provision of data for constraint violations in order to inform expert users and statisticians about the discrepancies between the fully balanced MRIO and disparate raw data;
7. Timeliness: Continuous updating of the entire database, so that user analyses are relevant at the time;
8. Budget: Implementation of the entire compilation and updating capability using less than 12 person-years initially, and less than 2 person-years per year continually;

9. Openness: Public, free availability for research purposes, so that there is no barrier for wide dissemination.

At the time of publication, the Eora MRIO tables are characterised by:

Detail: We disaggregate the world into 187 countries at a detail of 20-500 sectors;

Dynamics: We created a historical time series spanning 1990-2009;

Flexibility: We compile table sheets in basic prices as well as 2 margins, taxes on products, and subsidies on products;

Uncertainty: We routinely calculate standard deviation estimates for all MRIO elements;

Reliability: We have developed a web interface allowing the user to gauge overall adherence to raw data, and to query individual constraint violations;

Timeliness: We are able to continuously update the entire database with a delay of about two years;

Budget: The creation of the Eora database and website has required 12 person-years;

Openness: The database is available to pilot users from January 2012. Pending a successful pilot stage, the Eora MRIO tables will be released to the public at the Bratislava IO Conference.

These goals were achieved through a high level of procedural standardisation, automation, and data organisation. This paper and presentation describes the realisation of the Eora MRIO tables.