



IPS Paper

Harnessing the Power of Input-Output Analysis for Sustainability

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Brief Description

The new G20 Data Gaps Initiative asks for collecting emission data and multiregional IO tables to enable the calculation of aggregate carbon contents.

What sectoral distinctions do we need, what level of granularity? What is the role of international linkages? Do we need information on technology? This paper investigates how the use of IO tables for sustainability can be enhanced.

Based on US IO tables and data on company level emissions, I build up a micro simulation that can act as a laboratory for answering these questions.

Abstract

Carbon content disclosures and estimations can come on various levels: national, sectoral, group, single company, installations and – without a time dimension – the product level. On all of these levels, carbon contents have important functions as a key input for all sorts of allocation decisions, for consumers, investors and government agencies. Quite generally, a major problem for estimating carbon contents are Scope 3 emissions: the carbon dioxide emitted for the production of intermediate inputs. Producers may know their inputs, but even they need good estimates of the carbon contents of these inputs unless there is direct information from providers. In trade policy, it is extremely important to reliably assess the carbon content of imports, in order to avoid carbon leakage.

Input-Output (IO) models provide the natural basis for organising the available information. On a sectoral basis, they take account of all production interlinkages – at least conceptually – using data that is available in most countries, often in a harmonised way. Combining the IO-matrix with sectoral information on direct emissions, one can readily track emissions over the entire value chain. This is why the new Data Gaps Initiative recommends making harmonised IO Tables and emission statistics available.

In order to contribute to this work stream, the project presented here investigates how aggregate measurement and IO tables can best be developed as an important source for firm level and product level estimates.

Specifically, I investigate the use of aggregate statistics for firm level or product level analysis for the USA. The BEA works out extremely refined IO tables. Roughly every 5 years, benchmark statistics with 405 industries and product groups are produced, in addition to annual data on 71 industries.

I start with micro level information on company emissions. The micro database contains information on direct emissions and energy use, together with information on the sector and turnover. With sector level information matching what is available in the micro data, I can construct survey weights for firms. Using those weights, I build a micro simulation of the US economy that reproduces the sectoral structure, the aggregate emissions and the known production interactions.

This micro-simulation is a laboratory to assess various questions of measurement related to DGI recommendation 1, specifically:

- How important are fine sectoral distinctions in areas of activity where emissions are heterogeneous and/or high?
- How important is an explicit account of international interlinkages?
- How well can sectoral data serve as proxies for the carbon content of company level output or products?
- How informative are they as inputs in carbon accounting?

For any type of measurement, one may compute the average error based on the knowledge of the simulated “truth”. The simulation is an infrastructure for discussing measurement issues consistently and on a quantitative basis.