

Construction of Enterprise-Level Global Supply Chain Database and its Application to Scope 3 Emissions

Topic: Advancing Multi-Regional EEIO Models: A Developer's Summit on Learnings, Evolution, and Future Directions (II)

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Data tracing global supply chains, commonly captured in input-output models, is a foundational resource across economic, regulatory, investment, defense, and environmental applications. Such models provide insight into interdependency and environmental burden-shifting, forming part of the empirical basis for policies such as Scope 3 embodied emissions targets, supply chain transparency, life cycle assessments, and product declarations. Current approaches, based on national statistics, remain constrained by sector-level resolution, limiting their precision and utility in certain applications. Here, we present an enterprise-level multi-regional input-output (EMRIO) table. This database combines official national input-output tables with publicly available firm-level production and transaction data, creating a globally consistent account of purchases and sales across 9,466 companies, 86,305 subsegments, and 121 countries. Building such a database required addressing several practical challenges. Firm-level data are often incomplete, reported under different accounting standards, and classified using systems that do not align neatly with national statistics. We therefore developed transparent reconciliation and scaling procedures to align company data with national accounts while preserving overall economic consistency. The finer resolution allows supply chain transactions to be represented in greater detail, making it possible to trace embodied flows, identify concentration risks, and better attribute environmental and economic impacts at the company level. Beyond methodological advances, EMRIO enables firm- and product-level applications that are difficult to support with conventional MRIOs. At the enterprise level, it provides a consistent basis for estimating Scope 3 emissions, chemical footprints, and other indirect environmental burdens, and can be integrated with financial and ESG datasets for corporate evaluation and transition risk analysis. At the product level, it supports hybrid approaches that combine input-output analysis with process-based LCA and bills of materials, enabling more detailed product assessment and environmental declarations.