

International material resource dependency in an international input-output framework

Topic: EXIOPOL: Latest progress and preliminary results of work on a global, detailed MR EE SUT/IOT database

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Over the last decade an increasing awareness regarding embodied emissions and resources in traded products has resulted in attempts to track emissions and natural resource use along the international supply chain. A multi-regional input-output (MRIO) model is an appropriate methodological framework to undertake this type of environmental analyses, because direct and indirect, domestic and international environmental impacts are considered simultaneously. However, an extensive MRIO model capturing most of world trade has a vast data requirement. As indicated by [Wiedmann, Ecological Economics, 2009] there is still room for improvements in data availability and quality. The EU-funded EXIOPOL project will create a multi-regional environmentally extended input-output database. This database, containing domestic and international trade flows of 43 countries, is essential for estimating the actual environmental impacts of international production and consumption. The project has an important role in delivering the desired improvements.

In this study we investigate the value added of the EXIOPOL database by partially replicating the analysis of Lenzen (Economic Systems Research, 2004). The analysis performed in Lenzen (2004) focuses on four individual countries that are rather alike (Denmark, Germany, Sweden and Norway). The EXIOPOL database allows for a far more extended test of MRIO models. The deviations in environmental accounting that result from (1) assuming that domestic CO₂ emissions coefficients can be used to calculate the emission embodied in international trade and (2) using a uni-directional framework instead of a multi-directional framework are reported.

In addition, the EXIOPOL project devotes much work to detailing the sectors that are important from an environmental point of view. The database includes, for all 43 countries, tables that feature around 125 sectors/products. The tables are collapsed to 60 products and 30 sectors to investigate the value added of the increase in detail. Due to the extent of the database we can provide distributions of the deviations instead of point-estimates. This allows us to investigate whether deviations are larger depending on the specific country or sector that is analyzed.

Our focus will be on CO₂ emissions and water use. Investigating both a by-product and a natural resource will uncover the differences between these types of environmental extensions propagated through the international linkages. Different sectors will be responsible for the bulk of CO₂ emissions and the use of water, most likely located in different countries. Analyzing both emissions and a natural resource while adhering to the concept of consumer responsibility under the different assumptions provides for a check of the methodology that has been identified as the most desirable methodology.