Developing global multi-regional input–output table for emerging economies for 2018

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Author: Wenqiang Wang
Co-Authors: Heran Zheng

Emerging economies have become major contributors to global economic growth, contributing 70 % of global GDP growth and accounting 35% of global GDP in 2023 (17% in 2003). It is associated with the recent shifting of global values chains (GVCs) towards emerging economies, due to their cheap labor and raw materials. Despite of increasing importance of emerging economies in global value chains, most of the emerging economies face the scarcity of supply chain data due to expensive labour and statistical costs. This results in the ambiguity of how these emerging economies participate in the global value chains and how their participation contributes to economic growth.

Multi-regional input-output (MRIO) accounting serves as an indispensable statistical system for describing national production networks and as a key tool for quantify inter-country supply chains. There are 9 MRIO databases compiled by different institutions (see SI). However, the existing MRIO databases have paid insufficient attention to these emerging economies to describe their specific details in the global production network. Most emerging economies are conventionally aggregated into regions in these MRIO databases. Among them, Eora, GLORIA, and GTAP11 cover the largest number of countries (Eora: 187 countries, GLORIA: 160 countries, GTAP11: 141 countries). In contrast, WIOD and FIGARO, which primarily focus on EU countries, provide data for only 43 and 45 countries, respectively. Although EXIOBASE3rx once offered detailed data for 214 countries, this service was unfortunately discontinued in 2015. Meanwhile, MRIO datasets with relatively higher coverage of emerging economies are limited with the sector resolutions. The Eora database includes 26 highly aggregated sectors, while GTAP11 offers data for 65 sectors (with GTAP-power extending to 76 sectors).

Compiling MRIO database is challenging, requiring multi-source data and solving conflicts. This is particularly true in emerging economies whose data is often confronted with over-aggregated sectors, irregular reporting, and inconsistency. To bridge the data gap, EMERGING dataset was developed with 245 economies and 134 sectors in our previous work (EMERGING v1.0) with the entropy-based construction framework. However, the presumption of trade estimation by sectors is to aggregate and split the original input-output tables by customs data (or single constrained export data). This is not applicable to a few sectors whose products are non-tradable internationally, such as electricity or transportation. The export-constrained method might lead to errors in output and value-added when balancing the table. Here, this paper introduces bottom-up sectoral data to avoid the irrationality of presumption. To resolve conflicts between multiple sources of data, we introduce a new version of EMERGING with a new doubly-constrained compilation framework which constrains the trade data and value-added simultaneously. Apart from the compilation method, the improvement also lies in higher underlining data at sector level collected from these emerging economies. Compared to our previous version, the local data has increased from 89 to 125, which represents a better quality of the new MRIO dataset.

This paper presents a detailed compilation procedure of EMERGING MRIO data for 2018, from raw data collection, data cleaning, optimization to the MRIO table compilation. We also demonstrate the application of the table with carbon footprints for emerging countries in 2018, and show the improvement in comparison with the footprint used by the previous dataset. In the discussion, we highlight the limitation remain in the new MRIO dataset and describe further ongoing improvements for EMERGING dataset.