An inter-city input-output database distinguishing firm ownership in the Greater China area during 2002-2017

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China, the largest emerging economy, has considerable variations across cities in their economic structure and level of development. However, most multi-region input-output (MRIO) tables in China focus on provinces or urban agglomerations and cannot reflect the tremendous geographical heterogeneities of economic activities across Chinese prefectural cities, where regional economic centres usually located for domestic and global production. We construct an inter-city input-output (IO) database with 42 sectors in the Greater China area.

Compared with previous work, our database has the following innovations:

First, it uses a variety of microdata to estimate the economic structure of each city covered, including economic census, annual surveys of industrial firms, urban and rural household surveys, and detailed custom trade statistics. These micro-level data are aggregated to obtain estimates for the structure of gross output, value-added, major categories of final demand and imports and exports for every prefectural-level city. The use of such rich micro-level data significantly improves the quality of the constructed IO tables at the city level. In addition, we further combine the structure estimates from micro data with Chinaâ€™s provincial and city-level aggregate statistics as constraints which provide more precise structural shares for production, intermediate and final demand and trade. Such a combined bottom-up and top-down approach also facilitates efficient workflows for the next benchmark year of 2023, in which the fifth China Economic Census and the eighth China Input-Output Survey have been integrated into one undertaking starting in 2023 and can provide more consistent data for the future city-level MRIO compilations.

Second, it applies a three-tier architecture to organize the compilation of the inter-city IO database. The first tier is the raw data for further processing, which stores enormous micro and macro data from various sources. The second tier is the derived data and tables for IO table compilation, including processed data at the city level from the first tier to estimate the sector and firm ownership structure for each prefectural city and external data as constraints such as provincial input-output tables and GDP estimates by production-, income-, and expenditure-methods. In this stage, three series of intermediate data products, i.e., prefectural-city SRIOs by firm ownership for each province (total of 337 SRIOs), provincial-wide prefectural-city MRIOs by firm ownership for 27 provinces and Chongqing, and full city-level MRIOs for mainland China (total of 340 cities), are generated and can be applied to specific research topics elsewhere. The third tier is the final database, i.e., the ownership-based inter-city IO tables including the HMT region for the four benchmark years.

Third, it is the largest inter-city IO table to date in the world. It contains the complete above-prefectural cities in the Greater China area with 335 prefecture-level cities from 27 provinces, four municipalities directly under the Central Government (i.e., Beijing, Shanghai, Tianjin, and Chongqing with separate urban and rural regions, subtotal of five regions in the table) in mainland China, and Hong Kong, Macao and Taiwan (HMT), a total of 343 regions. It is the first time to construct benchmark SRIOs for Macao and harmonize benchmark year and sector classification for Hong Kongâ€™s and Taiwanâ€™s IO tables with SRIO tables of mainland China, respectively.

Fourth, it is the first city-level IO table with firm ownership information. It distinguishes domestically owned, HMT-owned, and foreign-owned firms for every city and sector for each of the four

benchmark years. At Chinaâ€™s prefecture-city level, the constructed tables are based on the 42-sector classification consistent with the official input-output classification issued by the National Bureau of Statistics of China, and each sector at the city level identified its firm heterogeneity by firm ownership information. The firm ownership information is determined by registered capital types from firm-level microdata and then aggregated into the three major groups.

Finally, it covers four benchmark years, i.e., 2002, 2007, 2012 and 2017 with a consistent method that can generate more broad applications. It not only provides more possibilities for users to carry out new economic and environment policy-related applications to and/or re-estimations of various topics such as trade in value-added across cities, carbon footprint estimation, and spatial distribution of production and employment in the Greater China area based on the time series of inter-city IO tables, but also provide a new data source for linking city-level IO tables with global ICIO for domestic and global production network analysis and shed light to other large economies with great variations of subnational regions like China to build their own inter-city IO tables.