A cost-effective KRAS-based approach to the construction of MRIO tables under limited data availability

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The multiregional input-output (MRIO) framework lends itself to a variety of policy analysis applications at all levels of government. Even though data availability has improved dramatically in recent years, it is still often the case in empirical applications that the necessary input-output information can be found only in part or not in the right format (e.g. in terms of product or industry classification). This is especially true when the analyst's interest lies primarily in a subnational geographical entity.

This paper argues that the KRAS algorithm of Lenzen et al. (2009) provides a highly flexible, easy to code and cost-effective framework for getting around many practical data issues that are often encountered in applications. KRAS is an advanced version of RAS that can handle arbitrarily sized and shaped constraints on the elements of the system, deal with negative entries and non-unity constraint coefficients, and automatically resolve constraint inconsistencies that would cause traditional RAS to be infeasible.

In a nutshell, the proposed approach works as follows. First, a plausible initial guess is made for each variable in the system. For example, in the context of subnational MRIO construction, this step might involve using non-survey techniques to generate interregional trade flows (e.g. Gallego and Lenzen 2009, Sargento et al. 2012) and proportional allocation methods to obtain preliminary estimates of all other unobserved components of the regional systems from their national counterparts (e.g. Jackson 1998). By contrast, in an application in which the goal is to convert an existing MRIO to a new classification, the initial guesses can be supplied by an approximate initial matching between roughly corresponding aggregates. Secondly, the preliminary estimates are simultaneously balanced using KRAS to ensure that the resulting MRIO is both internally consistent from an accounting standpoint and, at the same time, adheres to any statistical information that may be available from external sources (e.g. e.g. industry value added, international trade, final use aggregates…).

This paper demonstrates the approach using two distinct applications: 1) constructing a 21-region subnational MRIO covering the 21 regions of Italy under very limited data availability; 2) obtaining a (short) time series of multicountry input-output tables organized according to the ISIC4 classification by converting and updating the older ISIC3-based OECD intercountry tables using partial ISIC4-based information.

References

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