Title

Augmenting the GTAP Database

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Abstract

All databases for CGE models can be presented in a Social Accounting Matrix (SAM) format, which provides a comprehensive record of economic transactions in a concise and explicit representation of the transactions between agents/accounts. Since 2004, one representation of the GTAP database has been a global SAM with satellite accounts (McDonald and Thierfelder, 2004 and 2019)[1].

A SAM must be ‘complete’ and ‘consistent’: ‘complete’ in the sense that all transactions between accounts are reported and ‘consistent’ in the sense that total incomes equal total expenditures for all agents. The SAM representation of the GTAP database demonstrates that the information about inter institutional transactions within regions and inter institutional transactions between regions are ‘incomplete’. If a SAM is ‘consistent’ but ‘incomplete’, economic analyses are compromised because the recorded transactions must have been distorted when rendering the SAM ‘consistent’. The GTAP SAM is ‘consistent’ but ‘incomplete’. The analysis reported in this paper demonstrates the nature of the distortions in the GTAP SAM and provides a method by which the GTAP SAM may be augmented and thereby reduce the degrees of distortion.

The data in the basic GTAP database (Aguiar *et al*, 2022) have been augmented in three general ways. First by disaggregating the accounts in the basic GTAP database, e.g.,

[1] This is a revised version of GTAP Technical paper 22 (https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=1645)

disaggregating sectors (Horridge/Split Com, GTAP power) and households (MyGTAP, G_MIG, GLOBE). Second, by replacing the regional household construct to better articulate the transactions between domestic institutions, e.g., the GLOBE (McDonald and Thierfelder, 2009), R23 (McDonald and Thierfelder (2016) and MyGTAP (Walmsley, c 2018). And third, by adding data about different types of inter-regional transactions on the current account, e.g., the MyGTAP, G_MIG, R23, GLOBE and ANARRES models. The analysis reported in this paper focuses on inter institutional transactions within and between regions.[2]

The lack of detail about inter institutional transactions within regions is easily resolved, albeit partially, by adding one data point for each region, and reorganising the data in the SAM to remove the regional household. It is demonstrated that there is a pragmatic and simple method for reconciling the transactions data.

Addressing the problems presented by the absence of data on inter institutional transactions between regions, i.e., current account transactions,[3] is more complex. First, reconciled data for a range of current account transactions must be developed and added to the database, which renders the SAM 'inconsistent'. And second the database must be re-estimated. A pragmatic method for resolving the problems presented by underspecified current account transactions is demonstrated, and the data and GAMS code are open source (Sonmez and McDonald, 2004; McDonald and Robinson, 2023).

The databases used in this exercise are GTAP version 11 together with IMF data on government expenditures and World Bank data on GDP, current account flows, foreign factor payments, aid, grants and remittance flows. The method used is like that used for the R23 database (McDonald *et al*., 2016).

The motivation for augmenting the GTAP database comes from two key considerations for policy analyses. First, the limited degree of detail on the external accounts of regions impedes the development of valid policy conclusions. In circumstances, where the inter-regional transactions on the external account of primary income and current transfers are

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2 Institutions in the System of National Accounts (SNA) are defined as households, incorporated business enterprises, non-profit institutions serving households (NPISH), and governments (see WG (2015), chapter 4, paragraphs 4.2 to 4.9).

3 Care needs to be taken when using the term current account. The overwhelming majority of transactions reported in a SAM are on the current account, the exceptions relate to the interface between current and capital accounts, e.g., internal and external balances, investment, depreciation, etc. The concern in this study is with current account transactions between regions.

substantial, e.g., aid, workers' remittances, etc., there is the potential for significant distortions. And second, the GTAP databases are increasingly being used for policy analyses where intra- and inter- regional transactions data are as important as the inter regional trade data.

References

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Suggested Topics

Social Accounting Matrix, Trade Analysis, Computable General Equilibrium

Status

Sections 1 to 5 written. Empirical work for section 4 complete. Data collection for section 5 is partially complete. Entropy estimation code complete. Remaining work to complete: (i) reconciling inter regional transactions, (ii) re-estimating the global SAM, and (iii) sections 6 and 7.