

Part I: Introduction

Chapter 1

Introduction

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The goal of this chapter is to introduce readers to the Global Trade Analysis Project (GTAP) and provide a bit of history on the data base and software which accompany this documentation. Those readers who are already familiar with GTAP may wish to scan section 1.2 to get a feel for the history of the data base as well as future directions, before moving on to Chapter 2. However, individuals who have not had extensive contact with this Project will likely find that this material provides a useful lens through which to view the version 3 data base and associated software.

1.1 Overview of GTAP

What is GTAP?

GTAP was established in 1992, with the objective of lowering the cost of entry for those seeking to conduct quantitative analyses of international economic issues in an economy-wide framework. The Project consists of several components:

- a fully documented, publicly available, global data base,
- a standard modeling framework,
- software for manipulating the data and implementing the standard model,
- a global network of researchers with a common interest multiregion trade analysis and related issues,

- a consortium of national and international agencies providing leadership and a base level of support for the Project, and
- a Worldwide Web site for dissemination of data, software and Project-related information (www.agecon.purdue.edu/gtap/).

Motivation for GTAP

As the world economy becomes more integrated, there is an increasing demand for quantitative analyses of policy issues on a global basis. One example is provided by the recent Uruguay Round negotiations under the auspices of the World Trade Organization. At the time these negotiations were being concluded, there was great interest in estimates of the likely impact of this agreement on individual countries, international trade and world-wide welfare. Sector-by-sector analyses provided a valuable input into this process. However, by its very nature, the WTO agreement affects all sectors and most regions of the world, so there is no way to avoid employing a data base which is exhaustive in its coverage of commodities and countries. A similar problem exists when one wishes to analyze the economic implications of climate change, economic growth, or any one of a number of issues affecting the world as a whole. The Global Trade Analysis Project is designed to facilitate such multi-country, economy-wide analyses. As country coverage in GTAP improves, it is also being widely used to look at the impact of regional trade agreements in Asia (APEC), Latin America (MERCOSUR), Europe (expansion of the EU), and elsewhere.

GTAP Data Base

The central ingredient in GTAP's success has been the global data base. It combines detailed bilateral trade, transport and protection data characterizing economic linkages *among regions*, together with individual country input-output data bases which account for intersectoral linkages *within regions*. (See Table 1 for a complete list of regions and commodities in version 3 of the GTAP data base.) Construction and maintenance of this data base adheres to the following principles:

Public Availability. The data base is made available to anyone requesting it, at cost. This prevents needless duplication of effort in creating this public good. In particular, existing aggregations of the data base are provided for free, via the GTAP Web site. New aggregations can be ordered, for a nominal fee, and are then added to the Web site. Finally, the full data base may be purchased, along with documentation and software, by those interested in performing their own aggregations.

Regular Updates. The current release is the third (Version 3) since 1992.

Broad Participation. The network of GTAP users represents an excellent resource for improvement of the data base. Another benefit from broad participation is extensive scrutiny of the data base. Those who identify areas for improvement or extension of the data base are free to make this available to GTAP staff in order to have it considered for incorporation into the version 4 data base. The operational concept is "if you don't like it, help fix it!"

Comparative Advantage. By making the full data base available, and offering to incorporate improvements provided by members of the network, each individual is able to work to his/her own comparative advantage, while capitalizing on the contributions of others.

Documentation and Replicability. One requirement for new contributions to the GTAP data base is that the sources and procedures used to create them be provided along with the data. This publication represents the complete documentation for the version 3 data base. Further information may be obtained by contacting the individual contributors directly. In addition to this policy of exhaustive documentation, the associated model and software supporting GTAP applications are designed to permit applications to be readily replicated by others. Together these two features are designed to enhance the credibility and comparability of global trade analyses.

Model and Software

In order to operationalize this large data base, a standard modeling framework has been developed. The components of this multiregion, applied general equilibrium model are relatively standard. However, distinguishing features include: the treatment of private household behavior, international trade and transport activity, and global savings/investment relationships. Also, quite a number of auxiliary variables have been introduced in order to facilitate a variety of alternative closures. For a complete description of the GTAP modeling framework and selected applications, see:

Hertel, T.W. (editor) *Global Trade Analysis Using the GTAP Model*, New York: Cambridge University Press, 1996.

This model is implemented using the GEMPACK software suite, developed at the IMPACT Project, Monash University, under the direction of Ken Pearson, with the support of the Australian Industry Commission. Software accompanying this book (freely available via the GTAP Web site) permits the user to conduct simulations of the standard model in which changes in policy, technology, population and factor endowments are examined. The user specifies the split between exogenous and endogenous variables (i.e. model closure). Behavioral parameters may also be altered. Outputs include a complete matrix of bilateral trade, activity flows (and percentage changes) by sector and region, private and government consumption, regional welfare, and a variety of summary variables. Users with access to GEMPACK may also modify the theory of the model. There are currently

more than 60 documented applications of the standard GTAP framework, worldwide, and many more are currently underway. These are aimed at addressing a great variety of issues including: trade policy reform, regional integration, energy policy, global climate change, technological progress, and links between economic growth and trade.

Short Course in Global Trade Analysis

Each year in July/August, a one week short course is offered on the campus of Purdue University, with the goal of introducing newcomers to the GTAP model, software and data base. This intensive, hands-on training, has proven to be an excellent way for interested researchers to become operational with GTAP. This course is occasionally offered overseas as well. More information about these offerings is available on the Web site.

1.2 History and Future Directions of the Data Base

The version 3 data base documented in this monograph builds heavily on earlier work at Purdue, as well as research and data base development efforts at a number of national and international agencies. Indeed, the Global Trade Analysis Project built very heavily on the SALTER Project which was undertaken at the Australian Industry Commission during the 1980's and early 90's. Version 1 of the GTAP data base used the same fifteen source input-output (IO) tables as SALTER (and much of the software for processing them), while supplying new bilateral trade and protection data. Versions 2 and 3 have added new regions to the data base, while gradually updating the original SALTER IO tables. Virtually all of these additions to the data base have been provided by members of the GTAP network, usually resident in the countries for which they are supplying data. We have also introduced the use of "composite regions" to cover countries for which no original source IO tables are available. As a result, the version 3 data base now has 30 regions -- double the number in the version 1 data base.

One of the most important contributions of GTAP has been in the area of improved bilateral trade data for economic modeling. This work was begun by Marinos Tsigas at Purdue University in the late 1980's, and it has emphasized the use of automated procedures for the reconciliation of reported imports and exports, in addition to the estimation of bilateral trade margins (Tsigas, Binkley and Hertel). Mark Gehlhar continued this tradition at Purdue and took this interest with him to the Economic Research Service of the USDA, where he has continued to refine his methods. Indeed,

the procedures outlined in Chapter 11 represent a significant new development which departs significantly from earlier work (eg., Gehlhar et al.). Gehlhar's latest work involves reconciling bilateral flows at a disaggregate level, thereafter aggregating up to the GTAP commodity concordance.

The GTAP protection data base has also evolved considerably since the project's inception. Most of the work for the version 1 data base was conducted by Bradley McDonald, while he was employed at ERS/USDA. Tariff data was drawn from the GATT Trade Policy Reviews, while support and protection data for agriculture was taken from a combination of OECD and ERS/USDA country studies of Producer Subsidy Equivalents (PSEs). The culmination of the Uruguay Round negotiations provided a rare opportunity to improve GTAP's protection data base. With individual countries submitting tariff schedules to the WTO, a rich data base emerged. In version 2, with the help of Denise Gray, we were able to build on disaggregated tariff data provided by the US Trade Representative's office. This data, documented in Chapter 3 of the GTAP book cited above, was aggregated up from the tariff line level using import weights. In this way, we were able to capture bilateral variation in tariffs for the same composite products. This variation, due to the composition of trade interacting with varying tariff rates, has been found to be quite significant in some cases.

The version 2 data base also witnessed introduction of a variety of non-tariff barriers, including antidumping duties, countervailing duties, price undertakings, and export restraints on textiles and wearing apparel. One problem that arose in this context was the difficulty of identifying individual components of the protection profile for a given trade flow. This has been remedied in the version 3 data base, as discussed in Chapter 8 below.

The version 3 protection data base capitalizes on work done for the World Bank's 1995 conference on the Uruguay Round and the Developing Countries (Martin and Winters, eds., 1997). Three of the five quantitative evaluations commissioned for this conference utilized GTAP data. This meant that the pre- and post- Uruguay Round protection data compiled by the World Bank, based on the WTO's integrated data base, as well as other sources, became available for incorporation into the version 3 data base. In particular, the initial data is based on pre-Uruguay Round protection levels. However, the user can also generate Uruguay Round shocks, base on a comparison of pre- and post-protection levels. Finally, the version 3 non-tariff barriers have been further augmented to include voluntary export restraints.

Future development of the data base is being heavily influenced by the GTAP advisory board. This group is made up of representatives from each of the agencies in the GTAP Consortium. Based on the March, 1996 Advisory Board meeting we envision a number of substantial changes in the version 4 data base. Foremost among these are: (a) a new base year, (b) improved commodity coverage in agriculture, high-tech manufacturing, and services, and (c) disaggregation of the labor input. Improvements to country coverage and updates of individual regions will depend on the efforts of members of the GTAP network.

In sum, the GTAP data base is a dynamic entity which is evolving in response to the needs and support of individual users as well as public agencies with an interest in international trade. We encourage you to become involved in this network, subscribing to our discussion list, possibly attending the short course, and using this data base. We look forward to your feedback!

References

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