

GTAP at the World Bank 2010-11

This has been a very active year for use of GTAP at World Bank, with modeling studies in many different units, including the Development Prospects Group, almost all Regions, and the Development Research Group.

Development Prospects Group (DECPG) work with GTAP

The Linkage model was used mostly for working on the tariff aggregation papers. The Linkage model was slightly modified to include two definitions of bilateral trade flows--one that preserves the revenue identities of the national accounts and the other that incorporates the welfare impacts of tariff changes--not with the usual import weighted average tariffs, but a tariff index that measures the true welfare costs of non-uniform tariffs lines aggregated to a much higher level.

The Envisage model has been used as part of a model comparison exercise focused on 'how to feed the world in 2050'. The exercise is an outcome of the UK's Foresight project as well as an experts meeting held at the FAO in Rome in 2010 and is being coordinated by the Agriculture and Trade Directorate at the OECD. Other participants include IFPRI (Impact model) and LEI (Leitap model). The model comparison has included partial harmonization of some key exogenous assumptions--population, GDP and yield growth--and then has concentrated on some of the fundamental difference in assumptions across models--such as land use changes, income elasticities, etc.

The Envisage model has been modified over the last year to include new estimates of the economic impacts of climate change in collaboration with Prof. Roberto Roson (Ca' Foscari University). A Latin America specific version of the model has been implemented that has been linked to two upstream models. The first model in the sequence is a global circulation model (GCM), of which two have been chosen (NCAR and Hadley). Each of these generate two long-term climate scenarios--A1B and B1--with different temperature and precipitation profiles. These are fed into a detailed crop model that is highly spatially disaggregated including such elements as soil characteristics. One of the novelties of this crop model is that it includes climate-induced changes to pests and crop diseases. The impacts on yields are aggregated to the national level and incorporated in Envisage as exogenous productivity shocks. For the moment, the impacts are limited to four crops (wheat, rice, oil seeds and maize) and Latin America.

We have started implementing release 8 of the GTAP database with a focus on the 2007 base year database. We have a simple global GE model running with the new data.

A note on staffing. DECPG has been very fortunate to recruit Maryla Maliszewska to its staff. Maryla is an experienced CGE modeler with a Phd from Sussex where she worked with Alan Winters and Alasdair Smith. On a somewhat sadder note, DECPG will be losing Dominique van der Mensbrugge this summer. He will be taking over the long-term prospects unit in the

Agricultural and Development Economics Division at the FAO in Rome. He expects to continue his extensive collaboration with the GTAP network in his new position.

Poverty Reduction and Economic Management (PREM)

The PREM Trade anchor provides a training course on trade data and tools including an afternoon session introducing staff to GTAP and other trade CGE models. The course is offered to staff twice a year.

Services Trade

Nora Dihel, Ana M. Fernandes and Aaditya Mattoo used GTAP version 7 input-output data for the following exercises:

1) For Tanzania and Uganda we used GTAP input-output tables to measure the interdependence and interconnectedness of business services with other sectors in these 2 economies. The interdependence is measured by (a) forward linkages that represent the extent to which business services sectors supply inputs to other sectors and (b) backward linkages that represent the impact on supplier sectors of a unit increase in the final demand for the output of business services sectors.

2) For Botswana, Malawi, Mozambique, South Africa and Zambia we used GTAP input-output tables to illustrate the interaction between business services and other sectors based on the magnitude of the share of business services costs in the total costs of production of those sectors. This analysis is presented in pp. 72 of a report entitled *Harnessing Regional Integration for Trade and Growth in Southern Africa*

David Tarr plans to undertake a study developing a multi-region model to analyze regional trade agreements with FDI in services. If the proposal is funded, he plans to use the GTAP dataset. The extension of the dataset to include data on FDI is likely to be especially helpful.

South Asia, Europe and Central Asia and Disaster Reduction

1- A. Markandya, M.. Muthukumar, A. Sagar, and S. Sahin (2011), "Estimating economy-environment linkages and the co-benefits of PM10 mitigation within an economy-wide model for India"

Background paper for the World Bank Study "India 2030: Vision for an Environmentally Sustainable Future", also to be presented at the GTAP conference 2011. This paper examines the environmental impacts of India's likely growth paths in terms of increased emissions of PM10, and the feedback from those emissions on its economic performance.

The analysis is carried out using the GTAP model, which quantifies the benefits of mitigation of small particles (i.e. PM10) linked to anthropogenic activities in terms of health and loss of output for India in the period 2009-2030. The first model runs reproduce (i) the actual GDP growth rates in the country in the period 2004-2009 and the official projections to 2030. They refer to a purely "economic baseline" where the health impact of the pollutants is not taken into account,

(ii) an “environment corrected” baseline. This scenario assumes improved access to water and sanitation within the Millennium Development Goals perspective, and (iii) "low carbon growth" policies under the assumption of improved energy efficiency in India based on existing bottom-up studies.

2-S. Sahin (2011), Estimation of Disasters' Economic Impact in 1990-2007: Global Perspectives

Background paper for The UN/WB joint publication: Natural Hazards Unnatural Disasters: The Economics of Effective Prevention (2010) This paper aims to estimate the global and regional impacts of major disasters occurred during 1990 and 2007 using a Computable General Equilibrium (CGE) model (GTAP). 171 major disasters are selected in terms of the size of economic damages, based on the data available from EM-DAT and NatCat databases. The losses and total impacts including higher-order effects of these disasters are estimated using are reproduced using the GTAP-CGE model for concurrent events for consecutive years. Our findings emphasize that economic burden of natural disasters is not confined to the region where the disaster physically occurs, and lead to new global balances in short to medium term, through trade linkages, price and wage effects. Thus, considering natural disasters as separate events, not accounting for global linkages, leads to an underestimation of natural disasters’ impact on the world economy.

3- S. Sahin and O.Yasuhide (2011) Evaluating Economic Effects of the 2004 Tsunami on International Trade

To be presented at the International Input Output Association (IIOA) conference 2011 This study aims to estimate the regional and global regional economic impacts of the 2004 Indian Ocean Tsunami within the GTAP model. The GTAP global database (version7) is selected to represent the relationship among the Tsunami affected countries (Indonesia, India, Sri Lanka, Maldives, and Thailand) and their major partners (Japan and US) in details in 2004.

Fewer studies exist regarding the disaster's impact on international trade. On the basis of the damage/loss information from various sources and of the previous modeling studies (Okuyama, 2010), this study will fill the gap by estimating the higher-order effect of the Tsunami, specifically in terms of international trade.

Among others, the simulations analyze the case where the major economic partners of the Tsunami affected countries (US and Japan) commit to post-disaster international aid for recovery. The CGE model is used to keep track of the feedback mechanisms between the international donor countries and the economies hit by the Tsunami under different scenarios.

East Asia and the Pacific Region

Rabih Karaky will be using GTAP to:

- Provide good baseline for various economic variables and sectoral linkages in EAP's economies with special attention to Agricultural sector,

- Test the implications of CC-AG shocks on overall economic output, resources allocation, prices, returns to factors of production, welfare, and terms of trade particularly in EAP countries.
- Evaluate the effects of technology enhancing shocks and of increasing investments in Agriculture vs other sectors
- Get quick insights on the potential impacts of a variety of policy considerations.

Development Research Group

GTAP was used, by Will Martin, with Dominique van der Mensbrugghe of DECPG and David Laborde of IFPRI, to assess the implications of tariff aggregation for the welfare and terms of trade implications of trade reform. This methodology was applied to the Doha Development Agenda.