The Global Trade Analysis Project: Report, Issues and Future Directions

2013

Compiled by
Terrie Walmsley

With contributions from
Angel Aguiar, Meghan Alexander, Ginger Batta, Alla Golub, Thomas Hertel, Wendy Kincaid, Robert McDougall, Badri Narayanan, Jevgenijs Steinbuks and Nelson Villoria

Center for Global Trade Analysis
Purdue University

Background Paper for the GTAP Advisory Board Meeting
Shanghai, China
June 10-11, 2013

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CENTER FOR GLOBAL TRADE ANALYSIS June 6, 2013

Dear Board Members,

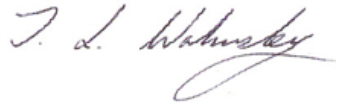
In February 2013 the Center released the GTAP 8.1 Data Base to the board. This new database raised the total number of individual countries in GTAP to 134 by adding 5 new African data bases, as well as fixed a number of issues with the protection data. The GTAP 8.1 Data Base is to be released to the public this month, along with several satellite datasets: land use (GTAP-AEZ), CO2 emissions (GTAP-E), migration (GMig2), and foreign capital (GDyn).

Over the last year, thanks to additional funding from the FAO, OECD, US-ITC, EPRI, Productivity Commission and ERS-USDA, we have also released the land use dataset and made significant progress on the Non-CO2 emissions data. Progress has also been made to incorporate the new skills data prepared by Marinos Tsigas and Alison Weingarden into the GTAP Data Base, bring the number of labor categories to 5. This GTAP 8.1L Data Base is expected to be released to the board in the next few weeks. Over the last few months we have also been developing a plan for the version 9 data base. We look forward to your comments and suggestions on the future of the GTAP Data Base in light of emerging policy issues.

Climate change and energy-related research continues to grow in interest amongst advisory board members and the network. Below we outline the current and future research that the Center is undertaking in this area, including projects in the areas of water, bio-fuels, new energy technologies, global land use for food and fuel, climate change impacts and climate change mitigation policies. We are also undertaking a project for the Asian Development Bank to develop a GTAP-based, Multi-region IO framework to investigate supply chain issues.

As you will see in the following document, Center staff members have made significant progress this year towards the goals set at last year's meeting in Geneva. I hope you enjoy reading what we have done and helping us think about the year ahead. We look forward to your feedback and to a fruitful discussion of these issues in Shanghai.

Yours Sincerely,



Terrie L. Walmsley
Director, Center for Global Trade Analysis
Purdue University

I. Executive Summary

Background

- The GTAP 8.1 Data Base was released to the board in February, 2013 and will be distributed to the public prior to the board meeting. The new version fixes some issues in protection and factor taxes, while also adding additional domestic support data and a number of countries, bringing the total number of regions to 134.
- Satellite datasets for land use (GTAP-AEZ) and CO2 emissions (GTAP-E) were completed this year. Most of the satellite datasets accompanying the GTAP 8.1 Data Base have now been updated and released to the board. Work has also progressed on the development of the NonCO2 emissions satellite dataset and we will shortly be sending this out for review.
- Work is underway to: (i) disaggregate labor in the GTAP data base into 5 occupational categories, based on skills, (ii) separate ad valorem and specific tariffs, and (3) produce a GTAP-MRIO for analysis of supply chain issues.
- The Center has also experience continued growth and success with research activities in the areas of energy, climate change, land use, and water. In particular considerable work has been taking place to release the latest versions of the GTAP-E model aggregation program, as well as releasing a new GDyn-E model.

Challenges for the upcoming year and beyond

- We have developed a plan for the GTAP 9 data base and beyond which will be implemented over the next few years. This year the challenges will be:
    a) Finalizing the documentation and writing papers on the construction of the GTAP Data Base.
    b) Making some of the larger changes required for the GTAP 9 Data Base, such as the changes required to the FIT program for adjusting national IO tables and reconciling them to the other external datasets.
    c) Developing programs to process supply and use tables and working with statistical offices to improve the regional data
    d) Public release of the non-CO2 emissions dataset.
- Hiring additional staff, particularly for the data team.

Recommended Strategies

- Terrie Walmsley, Badri Narayanan and Angel Aguiar have begun writing papers on the GTAP Data Base. Badri Narayanan and Angel Aguiar continue to interact with authors of the various data documentation chapters.
- Badri Narayanan will be working closely with Rob McDougall to alter the FIT program within the GTAP construction process so that it can address emerging challenges.
- Angel Aguiar is taking the lead on the supply and use table conversion and on working with statistical offices.
- Amer Ahmed is currently finalizing the Non-CO2 emissions under the guidance of Steve Rose.
- Discussion on staffing will be a top priority for the management team this year.

II. GTAP Advisory Board Members[1] and Other Attendees

Liwayway Adkins, liwayway.adkins@doe.gov
US Department of Energy, Washington, DC, USA

Anders Aeroe, aeroe@intracen.org (absent)
Mondher Mimouni, mimouni@intracen.org
International Trade Centre, Geneva, Switzerland

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Janine Pelikan, janine.pelikan@ti.bund.de
Thünen Institute of Market Analysis (TI), Braunschweig, Germany

Mohamed Hedi Bchir, hedi.bchir@gmail.com (absent)
United Nations Economic and Social Commission for Western Asia (UNESCWA)

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Nathan Associates, Arlington, VA, USA

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International Food Policy Research Institute (IFPRI), Washington, DC, USA

Martina Brockmeier, martina.brockmeier@uni-hohenheim.de
University of Hohenheim, Stuttgart, Germany

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Rob Dellink, robertus.dellink@oecd.org
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Aziz Elbehri, aziz.elbehri@fao.org (absent)
FAO, Rome, Italy

Richard Garbaccio, garbaccio.richard@epa.gov (absent)
US Environmental Protection Agency, Washington, DC, USA

Paolo Giordano**,** paolog@iadb.org (absent)
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CEPII, Paris, France

Hans Grinsted Jensen, hans@foi.dk
Institute of Food and Resource Economics (FOI), University of Copenhagen, Denmark

[1] Agency reports are available in the supplementary materials:
http://www.gtap.agecon.purdue.edu/events/Board_Meetings/2013/supp_material.asp.

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World Trade Organization, Geneva, Switzerland

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The MIT Joint Program on the Science and Policy of Global Change, Cambridge, MA, USA

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The Australian Bureau of Agricultural and Resource Economics & Sciences (ABARES), Canberra, Australia

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EPRI (Electric Power Research Institute), Global Climate Change Research Group, Washington DC, USA

Susumu Suzuki, susumu.suzuki@cao.go.jp
Economic and Social Research Institute (ESRI), Tokyo, Japan

Marinos Tsigas, marinos.tsigas@usitc.gov
US International Trade Commission, Washington, DC, USA

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Geert Woljter, geert.woltjer@wur.nl
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Asian Development Bank, Manila, Philippines

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Johannes Kepler University, Linz, Austria

Guests of the Board

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Xingguo Ye, yxg@shift.edu.cn
Shanghai University of International Business and Economics, Shanghai, China

III. Schedule for GTAP Advisory Board Meeting

Location: Information Building, Shanghai University of International Business and Economics
No. 1900, Wen Xiang Road, Song Jiang, Shanghai, 201620, China

Monday, June 10, Room 503	
8:45am	**Bus departs hotel to SUIBE**
9:00am-9:30am	**Informal coffee/tea for those who arrive early, Room 501**
9:30am-11:00am	**Welcome and Overview** Chair: Thomas Hertel • Overview and Issues (40 min) - Terrie Walmsley *Discussion (20 min)* • The GTAP Data Base: Versions 8 and 9 (20 min) - Badri Narayanan *Discussion (10 min)*
11:00am-11:30am	**Coffee/Tea Break**, **Room 501**
11:30am-12:45pm	**The GTAP Data Base** Chair: Marinos Tsigas • I-O Tables (20 min) - Angel Aguiar *Discussion (10 min)* • Skills Data (15 min) - Terrie Walmsley *Discussion (10 min)* • NonCO2 Emissions (10 min) - Tom Hertel *Discussion (10 min)*
12:45pm-2:15pm	**Lunch, Rooms 501/502**

2:15pm-3:45pm	**The Network** Chair: Janine Pelikan • 2013 Conference Report (5 min) - Xingguo Ye *Discussion (10 min)* • 2014 Conference Report (5 min) - Antoine Bouët *Discussion (10 min)* • 2015 Conference Proposal (10 min) - Terrie Walmsley *Discussion (10 min)* • Research Fellows Report and committee nominations (10 min) - Sergey Paltsev *Discussion (30 min)*
3:45pm-4:15pm	**Coffee/Tea Break**, **Room 501**
4:15pm-4:40pm	**Education Plan** Chair: Geert Woltjer • Education Plan (15 min) - Terrie Walmsley *Discussion (10 min)*
4:40pm-5:00pm	**Other Data and Modeling Issues raised by Board** Chair: Terrie Walmsley • NTMs (10 min) - Ken Kawasaki *Discussion (10 min)*
5:00pm-6:00pm	**Discussion of Data Base and Research Issues** Chair: Terrie Walmsley
6:15pm	**Bus returns to hotel**
7:15pm	**Dinner: Bus departs hotel** • Restaurant: 华亭湖时代大酒店 (Chinese name only); roughly translates to *Hua Ting Lake Restaurant* • Address is No. 99, Bin Hu Road, Songjiang District, Shanghai • 350 RMB / person

Tuesday, June 11, Room 503	
8:45am	**Bus departs hotel to SUIBE**
9:00am-9:30am	**Informal coffee/tea for those who arrive early, Room 501**
9:30am-11:00am	**Research and New Directions** Chair: Patrick Jomini • MRIO Discussion (30 min) - Terrie Walmsley - Joe Francois - Marinos Tsigas - Susan Stone - Csilla Lakatos *Discussion (30 min)* • Total Requirements Coefficients (20 min) - Rob McDougall and Badri Narayanan *Discussion (10 min)*
11:00am-11:30am	**Coffee/Tea Break, Room 501**
11:30am-1:00pm	**Priorities for Forthcoming Year** Chair: Thomas Hertel • Budget and Staffing (20 min) - Terrie Walmsley *Discussion (20 min)* • Revisit Priorities for Next Year (20 min) - Terrie Walmsley *Discussion (30 min)*
1:00pm-2:30pm	**Lunch, Room 501/502**
2:30pm	**Bus returns to hotel (vans available following additional meetings)**
2:30pm-6:00pm	**Additional Meetings**
2:30pm-3:30pm	Energy: Subsidies and disaggregation of electricity (Robert McDougall), Room 503
3:30pm-4:30pm	Estimating Tariff Concessions and Non-Tariff Barriers (Ken Kawasaki), Room 501
4:30pm-6:00pm	Land Use in Agriculture and Forestry, Emissions Factors and Climate Change Shocks (Nelson Villoria), Room 503

IV. Mission and Goals

Our Mission

To provide leadership in economic policy analysis by fostering collaboration to achieve better data and research outcomes.

We value:

- *International Collaboration* because it increases quality of data and analysis.
- *Objectivity and transparency* because they are crucial to our data work and analysis.
- *Discovery* because improving methodology leads to better policy analysis.
- *Learning* because it creates critical vibrancy both within the Center and in the expanding network and improves the quality of analysis undertaken.
- *Engagement* because it helps us serve policy analysts and decision makers with better data and analysis.

We believe that:

- Better data leads to better policy analysis which leads to better policy.
- Reconciling data makes data better.
- CGE modeling provides useful policy insights.
- Avoiding duplication in data production is efficient.
- Collaboration enhances individual efforts.
- Having more trained users enriches policy debates.

Goals

1. ***Data Goal*:** To Improve the quality of data products through:
    a. Improving the quality of contributed I-O data
    b. Addition and improvement of other datasets
    c. Monitoring of data quality using comparison programs
    d. Version control and documentation
2. ***Research Goal*:** To actively participate in quantitative economic analysis of pressing global concern in the areas of Trade and Development and Global Environmental Issues
3. ***Model Goal*:** To promote further development of GTAP-based models
4. ***Education Goal*:** To expand and improve education for global economic analysis worldwide
5. ***Staffing Goal*:** To actively seek and encourage talented staff and graduate students
6. ***Collaboration Goal***: To actively seek opportunities for fostering collaboration with institutions around the world

V. Center Staff, Research Associates, Graduate Students and Visitors

Center Staff

Angel Aguiar, Research Economist and Data Base Construction Specialist
Angel is a Data Base Construction Specialist and Research Economist. His responsibilities include the macro datasets and working with the contributors of the regional I-O data for the GTAP Data Base. Angel also teaches in GTAP Short Courses and undertakes economic research on global trade and migration.

Meghan Alexander, Senior Program Manager
Meghan manages the pre-proposals, logistics, budgets and implementation of GTAP courses, conferences and the annual board meeting; liaises with advisory board members and Purdue; manages international visa, work authorization and human resource issues; and oversees the Center's finances.

Ginger Batta, Communications and Information Technology Specialist
Ginger is responsible for the design, development, and maintenance of the GTAP website; the sales, distribution, and reporting of all GTAP products; the content organization and development of the annual conference, and participant relations for all GTAP events.

Mary Burfisher, Senior Education Advisor
Mary is leading development of GTAP 101, the Center's new online, introductory course on the GTAP Model and applied economic analysis. She is also engaged in a research project on preferential trade agreements in the Pacific Rim.

Alla Golub, Research Economist
Alla is Research Economist at the Center working on analysis of energy and climate change mitigation policies. Alla's responsibilities include extending GTAP Model to enhance its applicability to analysis of climate change mitigation policies and responding to requests by sponsor institution for analysis of particular climate policy options.

Thomas Hertel, Executive Director and Distinguished Professor
Thomas focuses on strategic issues and new research directions for the Center, as well as Consortium member development. He also supervises graduate students and is heavily involved in a number of environment-related projects at the Center.

Wendy Kincaid, Research Account Coordinator
Wendy assists the Center staff with the research account processes from proposal to reconciliation and closing. She also tracks and reports Center finances, formats the GTAP Data Base Documentation, and coordinates the technical and working paper series.

Csilla Lakatos, Research Associate
Csilla was a Research Associate at the Center through February 2013 and worked with the USITC to develop capacity for the modeling of foreign direct investment and the activities of multinational companies in a computable general equilibrium setting.

Robert McDougall, Senior Research Economist
Robert works on special projects which significantly improve the GTAP Data Base and Models. This year he has been working on energy data, energy modeling, and the development of programs to compare databases and ensure data base quality.

Badri Narayanan, Data Base Manager and Research Economist
Badri is in charge of the management and construction of GTAP Data Base releases and documentation. This year, Badri has been working on construction of the GTAP 8.1 Data Base and planning for GTAP 9 Data Base. Badri is also conducting research on a range of issues, including child labor, the role of border protection, inter-fuel substitution, FTAs and domestic support. He teaches in the GTAP short courses as well.

Jevgenijs Steinbuks, Post-Doctoral Research Associate
Jevgenijs is currently funded under an NSF grant through the University of Chicago's Center for Robust Decision-making Under Uncertainty. He is examining issues of long run competition for land in the face of uncertainty. He has also taken the lead on the processing of IEA Energy data. He will be joining the Research Department of the World Bank in July, 2013.

Wallace Tyner, Senior Policy Advisor and Professor
Wally advises the Center on policy. Most recently he has been spearheading a number of large research projects and proposals in the areas of energy, climate change, and biofuels.

Nelson Villoria, Research Assistant Professor
Nelson is part of the Center's management committee, leads the annual GTAP Short Course, advises graduate students, maintains the GTAP-AEZ modeling and database framework, and conducts research on improving bilateral transport margins in the GTAP Data Base as well as including heterogeneous firms in the GTAP framework. His research interests are on global land use and agricultural international trade.

Terrie Walmsley, Director and Research Associate Professor
Terrie oversees the day-to-day activities of the Center, as well as focusing on new initiatives in development of the GTAP Data Base and the Center's educational activities. Terrie also supervises graduate students and undertakes research on trade, development and migration.

Research Associates

Roman Keeney, Faculty Research Associate
Roman is an Associate Professor with the Department of Agricultural Economics and Research Associate of the Center. He works on agricultural issues such as land use and biofuels and teaches in the GTAP Short Course.

Kemal Sarica, Departmental Research Associate
Kemal is an energy economist with the Department of Agricultural Economics. He is primarily interested in energy market modeling, in particular policy design and implementation and resulting market responses in terms of price volatility and investment. He is currently investigating the electricity market, using an agent based modeling scheme.

Farzad Taheripour, Faculty Research Associate
Farzad is a Research Assistant Professor with the Department of Agricultural Economics and Research Associate of the Center. He has developed data and models to introduce bio-fuels into the GTAP framework and link the GTAP Model with water and energy models. He works on emissions due to land use changes associated with the production of first and second generations of bio-fuels.

Graduate students (*country of origin*)[2]

Zeynep Akgul *(Turkey)*
Zeynep Akgul is a Ph.D. student in the Department of Agricultural Economics. She has worked on macroeconomic mechanisms and alternative closures in the GTAP Model. She is currently working on the implementation of firm heterogeneity and monopolistic competition into the GTAP Model.

Uris Baldos *(Philippines)*
Uris Baldos is a PhD student in the Department of Agricultural Economics. He has worked on updating the global land use data bases for GTAP versions 7 and 8. He is currently preparing the necessary files/data to update the Land Use and Land Cover Data Base for version 9.

Caitlyn Carrico *(USA)*
Caitlyn Carrico is a Ph.D. student in the Department of Agricultural Economics. She is working on developing more intricate labor markets within the GTAP Model. She has worked on processing global labor statistics for the GTAP Data Base, and working to map between the supply-side and demand-side of an expanded U.S. labor market within the GTAP Model.

Zekarias Hussein *(Ethiopia)*
Zekarias is a PhD student in the Department of Agricultural Economics. He is investigating the poverty implications of climate change mitigation policies, and working on updating the macroeconomic data and agricultural production targeting for GTAP 8. He is also working on the GTAP Africa Project.

Zeynep Burcu Irfanoglu *(Turkey)*
Burcu is a PhD candidate in the Department of Agricultural Economics. Lately, she has been working on the FAO dataset and the assignments of the course GTAP 101. Her dissertation is about viability of trade sanctions as an enforcement mechanism in global GHG mitigation agreements. Burcu's research interests are multilateral environmental agreements, international trade, and post-harvest crop losses.

Jing Liu *(China)*
Jing is a PhD student in the Department of Agricultural Economics. She is working on a DOE-funded project aimed analyzing the water-land-food-energy-climate change nexus.

Jeffrey Peters *(USA)*
Jeff has transferred into our PhD program from Civil Engineering where worked on equilibrium modeling of transport and energy infrastructure. He has just started work on the redesign of the electric power sector in GTAP.

Visitors to the Center

Judy Conner, Retired (GTAP)
Betina Dimaranan, International Food Policy Research Institute
Ken Itakura, Nagoya City University
Kazuhiko Oyamada, Institute of Developing Economies, Japan External Trade Organization
Everett Peterson, Virginia Tech
Marinos Tsigas, US International Trade Commission

[2] See supplementary materials for graduate student CVs.

VI. Objectives and Accomplishments

Progress towards Goals over Past Year

Below is an assessment of our progress towards the core objectives outlined last year in the Board meeting summary:
(http://www.gtap.agecon.purdue.edu/events/Board_Meetings/2012/documents/2012_Summary.pdf).

1. ***Data Goal*:** To Improve the quality of data products

Tasks	***Individuals***
Improving the quality of contributed I-O data (core)	
Primary Priority	
Updating old I-O tables (EU and Asia)	Aguiar
We are currently developing programs to facilitate the contribution of supply and use tables. These could be used to re-format the EU tables once we find a contributor.	
We had hoped to obtain a new table for Hong Kong; however it has not been received. IO tables were also received for Belarus, Colombia, Brazil, Japan, Korea, Taiwan, and Singapore.	
Collaborate to improve African I-O data (UNECA Stats Offices)	Aguiar Walmsley
New IO tables have been obtained for Burkina Faso, Benin, Togo, Guinea, Nigeria, Rwanda, Malawi, Mozambique, Tanzania, and Zambia. These were incorporated into the GTAP 8.1 Data Base. We are also in touch with various National Statistical Offices in Africa and with the UNECA about upcoming tables.	
Further examination on whether the treatment of the dwellings sector can be improved	Aguiar McDougall
We are continuing to look for alternative data sources before deciding how to continue with improvements to the dwellings sector.	
Updates to the Agricultural and non-agricultural disaggregation modules	Narayanan Peterson
Burcu Irfanoglu has been working with Badri Narayanan to collect and pre-process agricultural data from the FAO. Everett Peterson will begin working on these data in July. We expect to update the data being used for agricultural disaggregation in version 9.	
Addition/Improvement of Other Datasets in GTAP Data Base (core)	
Primary Priority	
Labor Splits	Walmsley

	Carrico Narayanan Golub
Employment and wage data have been provided by Marinos Tsigas for 5 ILO labor categories, 12 sectors and up to 95 countries. Filling of this data has proceeded in two direction: *First, the data was filled out to the full GTAP sector and country levels using standard techniques employed elsewhere in the GTAP Data Base. This approach was applied to the GTAP 8 Data Base and is currently being implemented v8.1. This will be released to the board members in prior to the Board meeting. Further information on this will be discussed at the Board meeting.* *Second, an alternative approach to filling the data using econometric techniques to estimate labor share payments as a function of educational attainment, level of economic development and other variables is being investigated. Preliminary results indicate that only a low proportion of sample variance in the shares of labor payments can be explained by the regressors, indicating that above-mentioned filling method may be preferred.*	
Continue to improve Energy Module	McDougall Grad
Robert McDougall and Burcu Irfanoglu have been working on updating the documentation for the energy module. This should be released to the public shortly. In addition, Jeff Peters has begun outlining a potential strategy for redesign of the electricity sector in GTAP.	
International Transport Margins	Villoria Hummels
International Transport Margins, by mode, will be updated in Version 9. See appendix 3 for further details on the proposal.	
FIT Module changes (taxes & domestic support)	McDougall Narayanan
No further work has been carried out on the FIT module this year. It remains a high priority for v9, as modification of this program is a key element of our data plan.	
Domestic support, PSE database for Africa – MAFAP	Narayanan
Domestic support for non-member economies have been revised (for 2004) and updated (for 2007) in version 8.1. Indonesia is a new addition, while we have five other non-member countries. *During the last board meeting there was some discussion about using MAFAP (FAO) data as a potential data source for African countries. No further work has been carried out on MAFAP as it is an on-going project and data has not been released on their website. If there are any updates on this dataset, then please let us know.* *Further information on this can be found on the FAO website at: http://www.fao.org/fileadmin/templates/mafap/documents/MAFAP-*	

Methodology_Paper__Preliminary_Draft__29_April.pdf	
In addition, Carlos Ludena has brought to our attention a new, OECD-compliant, domestic support data base being developed for Latin America and the Caribbean.	
Secondary Priority	
Agricultural Production Targeting in construction	Narayanan
No further work has been undertaken on the agricultural production targeting module.	
Tertiary Priority	
Domestic margins	Aguiar McDougall
No progress has been made here. This is a longer term goal which will be implemented gradually over several versions.	
Land rents	Hertel
No changes have been made to the method for estimating and distributing land rents in agriculture.	
Addition/Improvement of Protection Data (core)	
Primary Priority	
Fixes to Tariff data (zeros in EU)	Narayanan
This fix was incorporated into the GTAP 8.1 Data Base released to the board in February, 2013.	
Work with ITC-Geneva to make the MAcMaps data and online tools available to board members and then to the network	Narayanan Mimouni
During the Board Meetings in Geneva last year, ITC staff gave a detailed demo on using the tools in ITC-MAcMAP website. We discussed providing GTAP staff and Board members a login and password so that this could be access. We would be grateful if you could provide this, since many of the board do find it to be a useful way to cross-check the data, as was done to assist us in understanding the problems in Chinese tariff dataset in GTAP 8 Data Base. MAcMaps is available free of charge, via their website to users from developing countries.	
Update TASTE to v8	Narayanan Horridge Laborde Pelikan
Janine Pelikan has been working with David Laborde and Mark Horridge to incorporate the GTAP 8 protection data into TASTE. Unfortunately, bound tariff rates have not yet been provided by the ITC and hence it has not been released. We may release an interim version without bound tariffs to be used for other types of tariff analyses.	
Finalize report and distribute	Narayanan Bouët
Report from Antoine Bouët was finalised and posted on the Board website in	

April 2013.

Monitoring Data Quality using Comparison Programs (core)

Primary Priority

Papers documenting construction and impacts of processing (e.g., comparing changes in I-O tables during the construction process)	Narayanan Aguiar

A working paper for new users documenting the GTAP Data Base has been produced. This has also been published in Japanese in the Life Cycle Assessment Journal.

www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3965

A second paper, aimed at more advanced users and documenting the GTAP Data Base construction process is currently being written.

Version Control and Documentation

Primary Priority

Finalize Documentation	Narayanan Aguiar McDougall

Updates to the documentation are taking place on an ongoing basis. Documentation for the GTAP 8 Data Base is slowly coming together. If you have contributed we would be grateful if you could update your documentation as quickly as possible, as users of the GTAP Data Base greatly appreciate being able to refer to and reference the documentation. References to the work of contributors also represent an important means of acknowledging these important contributions. The documentation is available on the website at:

www.gtap.agecon.purdue.edu/databases/v8/v8_doco.asp.

Release GTAP 8.1 Data Base and Africa Data Base	Narayanan Aguiar

The GTAP 8.1 Data base was released to the board in February and is expected to be released to the public in May, prior to the board meeting. We are currently finalizing the satellite datasets.

Satellite Data

Primary Priority

Make GTAPAgg more flexible and provide GTAP-E GTAPAgg for (CO_2 emissions)	Narayanan Horridge

At the 2011 Board meeting funds were contributed by FAO, EPRI, OECD, Productivity Commission, US ITC and USDA-ERS to help us establish the continuous production of the satellite datasets. This project has been very successful in helping us achieve our goal of producing the satellite datasets alongside the GTAP Data Base. We have also begun selling the land use dataset and will also sell the NonCO2 emissions dataset once it is available. This is expected to bring in sufficient funds to continue to update these two datasets in future.

The GTAP-E Data Base and FlexAgg program, consistent with the GTAP-E model has been added to the GTAP Satellite Data and Utilities. The GTAP-E

FlexAgg Package for version 8 with 2004 and 2007 was made available to GTAP Data Base subscribers.	
Land use data and GTAPAgg/FlexAgg program	Baldos Hertel Villoria
This task is completed. GTAP 8 Land Use and Land Cover Data Base were added to the GTAP Satellite Data and Utilities. Land use dataset together with the standard data base for 2004 and 2007 were included in a single FlexAgg package.	
Non-CO_2 emissions	Ahmed Steve Rose
Amer Ahmed and Steve Rose, along with Tom Hertel, have been working closely on the Non-CO2 emissions data. It is expected to be sent for review shortly. Tom Hertel will present a summary of the work undertaken on this data at the board meeting.	
Secondary Priority Support IRIO work	Wang
Terrie Walmsley, with David Hummels and Tom Hertel, has been working on developing a GTAP MRIO database for use in an ADB funded project on supply chains. The database incorporates information obtained from the trade data and utilizes the BEC concordance for division of trade amongst intermediate and final demand. Joe Francois has provided us with a new BEC concordance which we also hope to investigate and compare with our own. A summary of the work done, as well as some discussions by other board members on on-going work in their institutions will be given at the board meeting. There is also an organized session on this topic at the conference.	
MyGTAP: use, document, include more government information	Walmsley Minor
The MyGTAP model and database programs have now been used successfully in a number of projects related to the Africa Project funded by the World Bank and in a recent project for the USITC. It is hoped that the model documentation and some of these applications can soon be published.	

2. ***Research Goal*:** To actively participate in quantitative economic analysis of pressing global concern

Tasks	***Individuals***
Trade and Development	
Continue to publish papers on trade, poverty, migration/labor	GTAP Staff Grads
A number of papers and projects have been undertaken over the last year. These are provided below.	
Global Energy and Environmental issues	
Continue to publish papers on energy and environmental	GTAP Staff

issues	Grads
A number of papers and projects have been undertaken over the last year. These are provided below.	

3. ***Model Goal*:** To promote further development of GTAP-based models

Tasks	***Individuals***
Primary Priority	
Finalize technical paper on GDyn-E Model	Golub
A paper documenting the GDyn-E model has now undergone review for the GTAP technical paper series. We are now waiting for Alla Golub to finalize the paper in light of reviewer comments.	
Finalize technical paper on tariff aggregation tools	Martin
Will Martin and colleagues are continuing to finalize this paper in light of reviewer comments.	
Finalize paper on macro transmissions mechanisms	Villoria Walmsley Hertel McDougall
Paper on macro transmissions is being completed and will be sent for external review in the coming weeks.	
Finalize poverty technical paper appendix; obtain country contributions	Hertel
Carlos Ludena is supporting development of poverty modules for 16 countries in Latin America and the Caribbean. In the process, this technical paper is being revised to reflect improved methodologies and more clear-cut instructions to contributors. Monica Verma and Eduardo Magalhaes are also involved.	
Secondary Priority	
Technical paper on a Firm Heterogeneity Model	Villoria Walmsley
The introduction of heterogeneous firms into the standard GTAP Model is advancing with a technical paper prepared for external review in Spring/Summer 2014.	

4. ***Education Goal*:** To expand and improve global economic analysis education worldwide

Tasks	***Individuals***
Education	
Primary Priority	
GTAP Short Course (Arlington, VA)	Villoria
Course was successfully completed. Thanks are due to the instructors on this course: Amer Ahmed, Mary Burfisher, Roman Keeney, Amanda Leister, Robert McDougall, Peter Minor, Badri Narayanan, Marinos Tsigas and Nelson Villoria	
Dynamic GTAP Short Course (Denmark)	Walmsley
The Dynamic GTAP Course, held in Denmark, was a great success thanks to our	

host, Hans Jensen, and the great team of instructors: Alla Golub, Anna Strutt, Angel Aguiar and Ken Itakura.	
Prepare Education plan	Walmsley Villoria Burfisher
A comprehensive education plan that complements the current Short Courses has been developed. The plan has short and long-term objectives. The first phase of the plan is a basic course in the economics of General Equilibrium that will help to prepare students for the most advanced GTAP Short Course, while expanding access to the GTAP modeling framework. This course is called "GTAP 101" and has been developed is being taught by Mary Burfisher. The course is currently accepting enrollments for an October course. Please help us promote this entry-level course which we expect will feed nicely into our normal short course.	
Secondary Priority	
Live Forums on topics of interest to the Network	Narayanan
Narayanan and Aguiar conducted two live web-based sessions on the GTAP 8 Data base.	

5. ***Staffing Goal*:** To actively seek and encourage talented staff and graduate students

Tasks	***Individuals***
Recruitment	
Primary Priority	
Active recruitment of graduate students	Villoria
Recruitment activities are carried on annually and include meet-and-greet with incoming students, as well as, a general involvement with the graduate program. Formal course offers, especially, AGEC 618 - a PhD course in General Equilibrium Analysis - as well as two seminars on frontier topics on land use, resources, and energy economics AGEC 596 by Thomas Hertel; AGEC 690 by Nelson Villoria) have expanded the academic offerings of the Center.	
Hire Research Account Coordinator	Walmsley
Wendy Kincaid joined the Center in September 2012 and has been assisting with research projects and the tracking of Center finances.	

6. ***Collaboration Goal*:** To actively seek opportunities for fostering collaboration with institutions around the world

Tasks	***Individuals***
Primary Priority	
Collaboration with EU consortium led by Joe Francois	GTAP Staff
No projects were undertaken this year with the EU consortium.	
Continue to collaborate on GEOSHARE and potential for providing inputs into satellite data	Hertel Villoria

The pilot phase of GEOSHARE is currently finalizing its first year and we are exploring ways in which GEOSHARE can enhance the GTAP-AEZ data base and associated applications.	
Continue to collaborate on Energy and Environmental data and research	Hertel Golub Steinbuks
As can be seen in the section on Energy and Environmental research below, the center collaborates extensively with others in this area, focusing on climate change impacts as well as mitigation policies and their implications for food security and the environment.	
Another recent collaboration is with the New Earth, located at Harvard University, on the development of their Social Hotspots Database. This database utilizes a GTAP-MRIO and is used for social footprint assessments, social sustainability reporting and Social Life Cycle Assessments by companies, policy-makers and investors. You may have seen the emails to GTAP-L. For further information on this project see their website: http://socialhotspot.org/	

Proposed Activities over the next year and beyond

The goals and objectives are discussed in detail below. Here we include a summary of the proposed objectives for the coming year.

1. ***Data Goal***: To Improve the quality of Data Products.

Tasks	***Individuals***
Improving the quality of contributed I-O data (core)	**Aguiar**
Primary Priority	
• Develop programs that would facilitate the contribution of Supply and Use tables and alternative formats more consistent with those coming out of statistical offices	Grad
• Work with contributors to improve the EU IO Tables	
• Work more closely with National Statistical Offices (NSOs) and OECD	Walmsley McDougall
• Further examination on whether the treatment of the dwellings sector can be improved	
Addition and Improvement of Other Datasets used in GTAP Data Base (core)	**Narayanan**
Primary Priority	
• Respond to feedback on Labor Splits	Walmsley
• Further investigate Services trade data obtained from Joe Francois	McDougall
• Improved estimation of International Transport Margins	Villoria McDougall
• FIT Module changes (to accommodate improved targeting of taxes & domestic support)	Peterson
• Updates to the Agricultural and non-agricultural	McDougall

disaggregation modules • Fixes required to energy module and African countries • Incorporation of Agricultural production targeting into main construction build process	
Secondary Priority	
• Examine possibility of targeting trade balances	McDougall
• Examine the availability of NSO data (production, etc., by year) to update IO tables as part of FIT process (when redo FIT)	Aguiar McDougall
• Domestic Margins	and Aguiar
• Domestic support, PSE database for Latin America and Africa – MAFAP	Ludena
Addition/Improvement of Protection Data (core)	**Narayanan**
• Update TASTE to v8	Pelikan Guimbard Laborde
Version Control and Documentation	Narayanan
• Begin to implement pre-release process for version 9	McDougall Aguiar Walmsley
Monitoring Data Quality using Comparison Programs (core)	**Narayanan**
• Undertake more pre- and post-data Comparisons	Aguiar McDougall
Communication (core)	**Narayanan**
• Add a number of FAQs to the website to address questions like: Is GTAP SNA compatible?	Aguiar
• FAQ/Website: where does my money go?	Kincaid
Satellite Data	**Narayanan**
• Release new GTAPAgg	Horridge
• Finalize NonCO2 emissions satellite dataset	Ahmed Rose Hertel
• Incorporate land use construction into main build	Baldos Villoria
• Major update to Land Use Data, including Physical data	Villoria
• Finalize MRIO and document (release BEC concordance to WITS to facilitate automated aggregation of sourcing estimates)	Walmsley
Publish more papers on the GTAP data Base construction Process	
• Papers on data base construction process, including specific examples of why data do not match original data	Aguiar McDougall Narayanan

	Walmsley
• Paper/chapter outlining how much I-O tables have changed - ranking of countries. Which changed the most and which the least and why?	Aguiar Walmsley

2. ***Research Goal*:** To actively participate in quantitative economic analysis of pressing global concern

Tasks	***Individuals***
Trade and Development	
Primary Priority	
Continue to publish papers on trade, poverty, migration/labor	GTAP Staff Grads
Global Energy and Environmental issues	
Primary Priority	
Continue to publish papers on energy and environmental issues	GTAP Staff Grads

3. ***Model Goal*:** To promote further development of GTAP-based models

Tasks	***Individuals***
Technical papers	***Kincaid*** ***Walmsley***
Primary Priority	
Finalize technical paper on GTAP-E Model	Golub McDougall
Finalize technical paper on tariff aggregation tools	Martin
Finalize paper on macro transmissions mechanisms	Walmsley Hertel McDougall Villoria
Revise poverty technical paper to reflect latest improvements in handling of the survey data.	Hertel Narayanan
Paper on incorporation of specific tariffs into the data base and standard model	Villoria
Secondary Priority	
Technical paper on a Firm Heterogeneity Model	Villoria Grad

4. ***Education Goal*:** To expand and improve global economic analysis education worldwide

Tasks	***Individuals***
Education	

Primary Priority	
GTAP Short Course (Turkey)	Villoria Batta Alexander
Implement Education plan	Walmsley Burfisher Villoria
Secondary Priority	
Live Forums on topics of interest to the Network	Narayanan Aguiar Batta

5. ***Staffing Goal*****:** To actively seek and encourage talented staff and graduate students

Tasks	***Individuals***
Recruitment	
Primary Priority	
Hire a new data team member	Walmsley Alexander Hertel

6. ***Collaboration Goal:*** Actively seek opportunities for fostering collaboration with institutions around the world.

Tasks	***Individuals***
Seek partners and funding opportunities for collaboration (core)	
• Attend IO meetings	Aguiar
• Ongoing work with contributors, see IO report	Aguiar
• Extend collaborations with the ILO	Walmsley
• Explore ways to help board members get the message out to other divisions	Walmsley
Conferences	
Primary Priority	
Work with Antoine Bouët and his collaborators at IFPRI on 2014 Conference (Dakar)	Batta Alexander Walmsley

VII. The GTAP Data Base and Other Data Projects: Progress and Future Objectives

In this section we concentrate on the primary product of the GTAP network – the GTAP Data Base. In the first sub-section, we summarize the post-releases of GTAP 8 Data Base. In the second subsection, the timetable and priorities for future versions of the GTAP Data Base and satellite datasets are discussed.

The GTAP 8 Data Base Post-releases

An overview of the evolution of the GTAP Data Base is provided on the website:

http://www.gtap.agecon.purdue.edu/about/history.asp#db

The reason we include the word 'Post-releases' in this section, is that we do not have just one interim release (GTAP 8.1 Data Base), but several other releases pertaining to version 8:

1. GTAP 8.1 Africa Data Base
2. GTAP 8.1-L Data Base with the new labor splits data from USITC
3. GTAP 8.2 Data Base with more updated IO tables
4. Several satellite datasets pertaining to GTAP 8.1 Data Base

In March 2012, the GTAP 8 Data Base was made available to the public. During the 2012 Board Meetings, several issues pertaining to the tariff dataset in this release were raised. Consequently, CEPII agreed to investigate them in depth and come up with revisions. The revised dataset, submitted in October 2012, addressed the concerns raised by the Board members, with the following approach:

1. Unit values used in the preparation of tariff dataset were too high or too low for certain commodities and countries, causing the ad valorem equivalents of specific tariffs to be too low or too high, respectively. This was rectified by replacing the unit values with more than 5000% deviations from global average unit values by the global average. The Chinese tariffs on 'crp' sector, as a result, turned out to be lower than those in GTAP 8 Data Base. Unit Values have also been revised using recent COMTRADES data,
2. GTAP 8 data Base included small but non-zero intra-EU tariffs, arising from tariffs between EU members and France's overseas territories. These tariffs were removed in the revised version.

The Center also carried out investigations that revealed a data processing error that lead to the swapping of Singapore and Senegal as exporters to all GTAP countries, resulting in wrong data for tariffs by all importers on these two countries. This has also been fixed in GTAP 8.1 Data Base, which was released in February 2013 to the Board. Since this is a bug-fix release, we decided to make it public by May 2013. This version has the same 2004 and 2007 as reference years and 57 sectors, but has five more regions in Africa (thus raising the total number of GTAP regions to 134): Benin contributed by Badri Narayanan, Burkina Faso, Guinea and Togo contributed by Lacina Balma and Rwanda contributed by Zekarias Hussein. Several I-O tables have also been updated/improved: Brazil (Joaquim Bento Ferreira-Filho), Belarus (Csilla Lakatos), Colombia (Gabriel Piraquive Galeano), Japan (Suzumu Suzuki), Korea (Jong-Hwan Ko), Nigeria (Khalid Siddig), Singapore (Nhi Tran), Taiwan (Hsing-Chun Lin), Malawi, Mozambique, Tanzania and Zambia (Zekarias Hussein). A full report on the IO tables is available in the supplementary materials:

https://www.gtap.agecon.purdue.edu/events/Board_Meetings/2013/supp_material.asp

Apart from minor labeling changes to the data file and FlexAgg, other improvements made in this version are as follows:

a) ***OECD Domestic Support data for non-OECD members***: With inputs from Joanna Komarowska and Hans Jensen, we incorporated this data for both 2004 and 2007. The countries included here are Brazil, China, Indonesia, Russia, Ukraine and South Africa. Secondly, the new headers introduced in GTAP 8 Data Base (PYRT, PAYD) on detailed domestic support information were removed from the Data Base files, because of the incompatibility of these values with the numbers in the data base. We shall provide them as part of GTAP Data Base documentation.

b) ***Tax fixes:*** In GTAP 8 Data Base, Australian taxes on energy usage were wiped out completely. We have fixed this in GTAP 8.1 Data Base, by retaining the taxes from the Australian IO table. A few minor bug-fixes have been incorporated in the treatment of income and factor taxes.

Other Post-releases

GTAP 8.1 African Data Base
In 2007 the World Bank Netherlands Partnership program and the European Commission funded the release of a GTAP Africa Data Base based on version 6. This year the World Bank Netherlands Partnership program funded another Africa data base based on version 8.1. This will be made public along with version 8.1, before the Board meeting.

As we try to improve the country data in Africa we are increasingly collaborating with AGRODEP (http://www.agrodep.org/) and PEP (http://www.pep-net.org/), two networks that aim to bring modeling to Africa and other developing countries.

GTAP 8.1-L Data Base with labor splits data
In 2012 we received new wage and employment data from Marinos Tsigas and Alison Weingarden from the USITC. These have now been processed by Terrie Walmsley and Caitlyn Carrico and are being incorporated into the GTAP Data Base construction build by Badri Narayanan. We expect to release a version of the GTAP 8.1 Data Base to the board that incorporates these labor splits before the Board Meeting in Shanghai.

GTAP 8.2 Data Base
We continue to receive updated IO tables, including Turkey and some Latin American countries. While it is too late now to include them in a public release, we expect to release them to the Board, in GTAP 8.2 Data Base to the board only, by August 2013.

Satellite Data and Utilities

At the 2011 Board meeting funds were contributed by FAO, EPRI, OECD, Productivity Commission, US ITC and USDA-ERS to help us establish the continuous production of the satellite datasets. This project has been very successful in helping us achieve our goal of producing the satellite datasets alongside the GTAP Data Base. We would like to extend a special thanks to those who have persevered and supported us in this goal.

The Center is currently consolidating all the construction programs and applications for the satellite datasets, so that in future these datasets can be develop alongside the GTAP Data Base release and released in a timely manner. Since the Center has now agreed to provide these datasets on an on-going

basis, staff must now go back and ensure that data construction programs are regionally flexible and that models are documented appropriately. In particular this process involves:

1. Working with graduate students and developers of these datasets to update/re-create flexible data construction programs.

2. Incorporate as many of the satellite construction programs as possible into the main build. The benefit of this is that specific inputs to these datasets will be collected at the same time as other inputs to the GTAP Data Base and then the dataset will be produced at the same time as other releases. This will significantly reduce the amount of time taken to produce these datasets. Any major updates in construction will still need to be done by the developers; however this will become a standard part of the GTAP release schedule.

3. Ensure that each of the satellite datasets is accompanied by a readily available and well documented model (e.g. ensuring that the CO2 emissions satellite dataset is compatible with the standard GTAP-E model and that that model is documented).

4. We also need to ensure that each dataset comes with a standard FlexAgg-like aggregation package. We are currently working with Mark Horridge to develop a more flexible GTAPAgg program that can be used with alternative datasets, without the need for multiple copies of the program on your computer's hard drive. This is expected to be released as part of the pre-release cycle in version 9 data cycle.

The following is a list of the satellite datasets and a summary of the progress made:

GTAP-E Data Base: There has always been high demand from the network for a GTAP-E aggregation program to accompany the GTAP-E model. To cater to this demand, we decided to maintain a release of GTAP-E Data Base, for distribution free of cost, to all GTAP standard Data Base subscribers, beginning with version 8. We have now incorporated the construction programs for CO2 emissions (and GTAP-E) into the main GTAP Data Base construction program. Alla Golub and Robert McDougall are currently finalizing this package, including data, model, and flexible aggregation package.

Non-CO2 Data: For the GTAP 8 Data Base, Amer Ahmed, Steven Rose and Tom Hertel have contributed the non-CO2 dataset. Its documentation is being revised further to facilitate its review in May or June. We will hear from Tom Hertel at the board meeting regarding progress in this area.

Land use and Land Cover Data: Land-use data for the GTAP 8 Data Base was developed by Uris Baldos and Tom Hertel. Updated land use and land cover data was developed for 18 Agro-ecological zones for both base years: 2004 and 2007. Documentation for this is available from the website (Baldos and Hertel, 2012; GTAP Research Memorandum No: 23). Badri Narayanan, with input from Nelson Villoria and Alla Golub, prepared a FlexAgg package that incorporates land-use data into the standard GTAP 8 Data Base, in a way compatible with a version of the GTAP-AEZ model, which has also been distributed via the GTAP website. At this time, Badri Narayanan is working on updating this for GTAP 8.1 Data Base, using the construction programs prepared by Uris Baldos. After internal reviews, this will be made available to the Board and then to the public, several weeks ahead of the Board meeting in Shanghai.

GDyn Data: Terrie Walmsley and Angel Aguiar updated the GDyn data base to accompany GTAP v.8.1. This is currently being included in the main GTAP database construction program by Badri Narayanan.

GMig2 Data: Angel Aguiar and Terrie Walmsley have constructed the GMig2 data for GTAP 8.1 Data Base, which will be made available for the GTAP 8 data subscribers, along with GDyn. While all other satellite datasets are now being distributed in forms consistent with the standard FlexAgg package, Gmig2 will follow the same course from version 8.1.

TASTE Tool: Janine Pelikan, with inputs from Mark Horridge and David Laborde, has been working on updating the TASTE for GTAP 8.1 Data Base. Since the tariffs have changed in version 8.1, we expect to focus on this version for the release of TASTE. However, the bound tariff rates, which are crucial for the use of the TASTE tool for WTO analyses, are not yet available. We would be grateful for any information on when these bound rates are likely to become available? We expect a detailed review from these authors on the progress in TASTE, before the board meeting.

Ensuring Quality: Comparisons, Reviews and Outstanding Concerns

Quality reports and issues related to the GTAP Data Base are placed on the GTAP website and updated regularly.

a) The issues raised since the recent public release of the GTAP Data Base and our response to these issues can be found at: https://www.gtap.agecon.purdue.edu/access_board/GTAP8.asp#issues. We released the GTAP 8a Data Base last year to address some software issues involved in the data base for users who have GEMPACK licenses older than version 10, but since we later realized that these issues cannot be completely resolved, we have now provided patch files for both GTAPAgg and FlexAgg in the website. The major motivation for GTAP 8.1 Data Base was the issues in tariff data, among other minor aspects and improvements.

b) The annual report on the quality of contributed I-O tables is included in the supplementary materials for the board meeting:

https://www.gtap.agecon.purdue.edu/events/Board_Meetings/2013/supp_material.asp

The GTAP Data Base: Priorities for Future Releases

In this section we outline a few priority areas for public release v9. We also provide a tentative schedule for this release. The reference years of this release will be 2004, 2007 and 2011. Following this we provide a list of a few additional items we are currently considering to further improve the GTAP Data Base in either version 9 or beyond. We would be interested in hearing the extent to which these should be prioritized.

The GTAP 9 Data Base

Tariff Data

CEPII and ITC have been responsive to the queries about the tariff data after the last year's board meeting. This has been extremely important for the credibility of the GTAP data base in trade policy analyses. ITC provided a detailed tariff dataset for China that helped us investigate the issues in the 'crp' sector, while CEPII fixed this and other issues, in the revised MAcMAPs dataset. ITC has also agreed to provide us the 2011 tariff dataset for v. 9 by August 2013. In this context, one aspect worth noting is that it is highly desirable to have as much consistency as possible for the sources and methodologies used for data for all the reference years. Thus, one priority in this area will be to ensure that we use new datasets for 2004 and 2007 as well, to be consistent with the 2011 dataset. In version 8, however, we could not

pursue fully achieve this goal, as the 2004 tariff dataset was not revised after contribution in version 7. The problem is that tariffs are often revised and if we use versions submitted at different times, they are not fully consistent and therefore disrupt the quality of the time series data which we are slowly building.

Protection Data Processing Module
In addition to developments with the source data, we also need to remove tariffs on travelers' expenditures, which show up in the trade flows, and retain tariffs on zero trade flows, by using reference-group-weighted tariff for zero or very small trade flows. This is being pursued for version 9.

Export subsidies for 2004 were contributed in version 7, by Aziz Elbehri; while for 2007, it was contributed by David Laborde, with many revisions in methodology, including increased country and sector coverage, bilateralization of rates and inclusion of export taxes. Thus the export subsidies data for 2004 and 2007 were not strictly comparable in version 8. This will be addressed in version 9, since David Laborde expects to contribute this dataset for 2004, 2007 and the latest available year (circa 2011).

Energy subsidies from OECD
Energy subsidies committee had some discussions over e-mail and expects to meet in Shanghai during the Board meetings, to discuss the possibilities of including OECD energy subsidies data in the standard GTAP Data Base in version 9. We would also be interested in hearing whether the IEA subsidy data would be available for inclusion in the GTAP Data Base.

Commodity Taxes and Domestic Support
A number of technical changes are required to the FIT Module to ensure that we stop removing commodity taxes from IO tables and that we appropriately target domestic support rates in the protection module. Targeting the domestic support rates will also help us re-include the decomposition of the domestic support, which was removed from GTAP 8.1 Data Base, owing to the lack of conformity of the decomposition numbers with the actual domestic support data. These are being pursued for version 9.

In addition, it is desirable to extend the coverage of domestic support to more countries. In version 8.1, we have included Indonesian data from the OECD dataset, in addition to other non-member economies. This exercise has also been useful to learn the new format of OECD domestic support dataset available on their website, for inclusion in GTAP Data Base.

Income Taxes
In version 8, new income tax data was not collected for the new reference year. Instead older 2004 rates were applied to the new data. While this assumption may be reasonable in many cases, up to date income tax information is readily available. In future versions we intend to collect additional data from international datasets such as IMF and World Bank to update the tax rates in each version.

Labor Skill Splits
New wages and employment data for 5 ILO skills categories, 12 GTAP sectors and up to 95 countries has been received from Marinos Tsigas and Alison Weingarden. This dataset has now been filled and applied to the GTAP Data Base by Terrie Walmsley, Caitlyn Carrico and Badri Narayanan. We plan to include this data in version 8.1-L that will be released to the board before the board meeting.

In May, Tom Hertel, Terrie Walmsley and a number of board members (Robert Koopman and Marinos Tsigas from the USITC, Anders Aeroe ITC, Csilla Lakatos EC, and Alejandro Nicita and Ralf Peters UNCTAD) met with ILO staff in Geneva (and via Skype) to discuss future developments in the skills splits data in GTAP, as well as other potential areas of collaboration. This meeting was initiated by David Cheong of the ILO, and designed to build on the visit of Marinos Tsigas, who presented his work in on the skill shares for GTAP, earlier in the day.

The meeting provided a useful exchange of information and we hope that further collaboration will result. We were told that they have recently restructured their labor force survey data and as a result employment data would no longer be collected at the skill and sectoral level concurrently. However we were very encouraged by the fact that other new datasets were being made available and that they were eager to collaborate in the future. They were also interested in hearing more about how our filling techniques might be used to fill other datasets, such as social indicators.

Agricultural Production Targeting
Agricultural production targeting was introduced to improve the agricultural production data, particularly in the European IO tables. The agricultural production targeting is currently done prior to the database construction process itself and is susceptible to human error as files get transferred between staff members. Since agricultural production targeting is still desired by board members, we have decided that it should be included in the main build process so that such errors can be reduced.

Agricultural Disaggregation
In version 9, we expect to update the FAO agricultural data, with the help of Everett Peterson, for disaggregating agriculture in those IO tables requiring further disaggregation. Burcu Irfanoglu has been assisting Everett Peterson, with inputs from Badri Narayanan, to process the data from FAO for this purpose. We have also ordered UN commodity production statistics dataset to fill in the missing data for a few agricultural and food processing sectors.

Energy
Minor improvements in the construction of energy volumes, prices, taxes and emissions datasets are expected to be made in the version 9 data cycle. One issue needs special attention. Malawi, Mauritius and Uganda have significant oil sectors. In the construction process, we revise the energy sector to conform better to IEA data, which record data for these countries not individually, but as part of "rest of Africa". "Rest of Africa" now produces and exports oil in significant quantities. We apportion those flows, with other energy flows, among "rest of Africa" member countries according to GDP share. The problem with this approach is that the production and exports actually belong to Chad and Equatorial Guinea, which are not separately identified in our the data base, but end up reassigned to other countries like Uganda, which are. We hope to bring in data from other sources (such as UN commodity production statistics) to improve our disaggregation of the IEA energy balance data countries and avoid this problem.

Dwellings Module
Angel Aguiar made several improvements to the treatment of dwellings sector towards the end of version 8 data cycle. However, the lack of any real international data source on dwellings or knowledge about its structure has made us wary of implementing further changes. Discussions with statistical agencies also suggest that there is no consistent treatment being applied across countries. Hence, we have decided that until we have a better understanding of what is being done, we will continue to be cautious about making changes to the dwellings sector in the GTAP Data Base.

Set Labeling
Some of you may have noticed that a couple of the 3-letter *country* codes are identical to existing 3-letter *sector* codes. While this does not seem to result in any big issues for GAMs or Gempack users, it can affect the ordering of countries when some lesser-known GAMs programs are used. As a result we do plan to change our commodity codes in version 9. If you have any preferences please feel free to express them to Badri Narayanan.

GTAPAgg
There are two issues related to GTAPAgg:

First, with the number of satellite datasets and aggregation programs having increased significantly with this release, not only have the number of datasets and accompanying GTAPAgg/FlexAgg programs which need to be downloaded increased, but the number of checks that we need to undertake to check the data and ensure the software are compatible has also increased. We would like to work with Mark Horridge so that different datasets can be accommodated by the same GTAPAgg program.

Second, increasingly we would like the flexibility to add extra headers which should not be aggregated, but are only for information or are aggregated in a more complicated way. Mark Horridge has been working on a new GTAPAgg package that addresses these issues above. A draft version has been reviewed by the GTAP staff and a final version is expected to be used in the first pre-release of GTAP 9 Data Base.

International Transport Margins
Nelson Villoria will lead the project on improving the data on modal shares used in international transport margins. A detailed proposal on this is available in the appendix.

Changes in Construction Programs
Apart from the changes in methodologies, we also expect to make major changes in the data construction programs. The most important of them is to separate programs and data to avoid possibilities of confusions and mix-ups arising from multiple reference years in the data base, while also making sure that we use exactly the same set of programs for all years. Another challenge with increase in the number of years in future releases is about how to arrange the data files. So far, the strategy has been to prepare separate GTAPAgg and FlexAgg packages for every reference year, which we expect to continue in version 9 as well. Another possibility is for us to construct just one set of data files with all years indexed therein, along with programs that split it into single-year data bases. Your feedback will be useful for our planning for future releases, in this regard.

Base Years
For all the future releases, we will include all the previous reference years starting from 2004. For version 9, we will have 2004, 2007 and 2011, for example. We had internal discussions on the choice of the latest base year. While 2010 would have meant uniform gap between the reference years, we chose 2011 because we do not expect any delay from our contributors, mainly for the trade and tariff dataset, if we chose 2011 rather than 2010. Further, ITC expects to provide greater geographical coverage for 2011 than for 2010. For these reasons, we chose 2011 as the latest base year for version 9. This would also improve the lag between the release year (2015) and the latest base year (2011), by one year compared to version 8.

Schedule for version 9
Below is the tentative schedule for the GTAP 9 Data Base. The first pre-release is expected by the end of this year, the second early next year and the third one after the 2014 board meetings in Senegal. The final release candidate is expected by December 2014.

Release	Updates	When?
Pre-release 1	Macro, Merchandise Trade, Tariff, Labor Splits,	October/November 2013
Pre-release 2	Energy, Domestic Support, Dwellings, International transportation margins, Agricultural IO tables	March 2014

Pre-release 3	Services trade data, CDE parameters, FIT module fixes, Export Subsidies,	August 2014
Final release candidate	Board Feedback	December 2014

The satellite datasets for version 9 are expected to be available along with the final release candidate.

Other GTAP Data Base Priorities

At our annual strategic meeting, staff discussed a number of ways in which the database could be further improved in light of concerns raised about our methods and the development of new global datasets (e.g., EXIOPOL and WIOD. The following additional changes to the GTAP Data Base were discussed.

Supply and Use Tables (SUT)

It was decided that we should develop programs to convert supply and use tables in house, so that GTAP can now start to accept supply and use tables that are in a more common format. This would also help to ensure EU tables are updated more frequently. Angel Aguiar, Terrie Walmsley and a graduate student, Luis Pena Levano, have started working on these programs.

As part of this we also discussed moving to commodity by industry (SUT) or industry by industry (OECD). In the end we decided that changing to commodity by industry seemed unnecessary if we offered contributors the option to contribute SUTs, and we did not feel that industry by industry would meet the needs of the GTAP Network.

In addition to accepting SUTs it was also decided that we should try to work more closely with the OECD and National Statistical offices. Angel Aguiar is increasingly in contact with NSO. In November 2012, Robert McDougall and Terrie Walmsley were invited to forum at the OECD in Paris, organized by Frank van Tongeren and Susan Stone, on global modeling and data efforts at the OECD. At this time we met with the OECD statistical group, although it was not clear how collaboration might proceed. We would welcome any suggestions on how to interact more effectively with the OECD statistical division and Eurostat.

Trade balances

We are also considering matching the trade data with external data on trade balances. This would allow us to better match all the components of GDP, but would require scaling of the balance discrepancies.

Targeting Production Data

It is our understanding that annual production data exists for a selection of industries. We are considering adjusting the regional data (IO Tables) to match production by sector for the reference year. This would help update the country data for any structural changes, particularly for those tables that have older reference years. It may also assist us in addressing the African energy issue discussed above. We will begin exploring potential data sources in the next year.

Papers and Comparisons

Staff at the Center also decided that they need to publish more papers on the construction of the GTAP Data Base and how the regional data changes as a result of that process. As a result we have started to develop a number of research papers, including working paper 67.

Walmsley, T. L., A. Aguiar, and B. Narayanan. 2012. “Introduction to the Global Trade Analysis Project and the GTAP Data Base.” GTAP Working Paper series 67, West Lafayette, IN: Center for Global Trade

Analysis.

Services Data
We are currently using services trade data provided by the CPB, Netherlands, although we recently received a different set of services trade data from Joe Francois, which was used in the WIOD dataset. We hope to compare the two data sources to see if there is potential to improve the current data.

Domestic Margins
This has long remained in the GTAP Data Base wish list and we plan to make a beginning in GTAP 9 Data Base, contingent on the availability of resources, particularly a new staff member who may have to be recruited in near future.

Multi-Regional Input-Output (MRIO) Tables
The latest literature on international trade has been overwhelmingly filled with the use of MRIOs. In order not to lag behind others in this area, Terrie Walmsley and Tom Hertel are working with David Hummels and Joe Francois to develop a GTAP-based MRIO. You will hear more about this at the board meeting. The database incorporates information obtained from the trade data and utilizes the BEC concordance for division of trade amongst intermediate and final demand. Also include in this database are the 5 ILO labor categories. Joe Francois has provided us with a new BEC concordance which we also hope to investigate and compare with our own. Once we agree on this concordance we hope to make it available to the public via WITS.

Other Data Related Activities: Progress and Priorities

GTAP Africa Project
The aim of the GTAP Africa Project is to improve the quality and coverage of the African economies and to include more inter-regional and intra-institutional data to improve modeling of African economies.
In terms of regional country coverage, we have been working with a number of colleagues in Africa. Before the Board Meetings this year, we expect to release a second Africa Data Base based on version 8.1, taking advantage of the contributions mentioned in beginning of this section. This will contain all the GTAP African regions at their fully disaggregated level and aggregate all other regions geographically, while providing complete sectoral detail. This project was funded by a BNPP grant with the assistance of Will Martin.

Different types of taxes, tariffs and support payments
In GTAP 8 Data Base, we provided the break-up between ad valorem and specific tariffs in the data base files. We also included the break-up between different types of domestic support payments. While we have retained the former in GTAP 8.1 Data Base and in future releases, we have removed the latter, since the numbers shown in such decomposition do not match those in the data base, owing to difficulties in targeting domestic support. We expect to address this in version 9. However, these disaggregated datasets are likely to trigger further research on taxes, tariffs and domestic support. Apart from the work pursued by Narayanan and Villoria on specific and ad valorem tariff that can be later extended all other types of taxes, we also plan to pursue research on domestic support payments, utilizing such disaggregated information.

VIII. Research and Model Development: Progress and Future Objectives

Research Goal: To actively participate in quantitative economic analysis of pressing global concern in the areas of: Trade and Development; and Global Energy, Land Use and Climate Change

Model Goal: To promote further development of GTAP-based models
These two goals have been combined here because in selecting areas of research the center endeavors to also further develop the GTAP suite of models. Below we discuss research and Model development in two key areas: Trade and Development; and Global Energy, land use and climate change.

Trade and Development

Trade and development continue to offer important opportunities for the Center in terms of research and database development. The number of research challenges in the area of trade and development continues to grow. The Center is actively involved in research in trade policy, poverty and migration, and several models and model extensions have been further developed this year in these areas.

Core Funded Projects
The further development of the Static and Dynamic GTAP Models continue to be core research for Center staff. Research activities conducted this year included:

- A graduate student, Zeynep Agkul, has been assisting Robert McDougall, Terrie Walmsley, Thomas Hertel and Nelson Villoria in documenting a macroeconomic decomposition tool for the GTAP Technical Paper Series. This tool will aid GTAP users in better understanding the mechanisms driving economy-wide results in the GTAP Model.

- Zeynep Akgul is also incorporating a simplified theory of heterogeneous firms into the GTAP Model, based on the earlier work of Fan Zhai, and will be working with Fan Zhai, Nelson Villoria, Thomas Hertel and Terrie Walmsley in the implementation of that model.

- Badri Narayanan and Nelson Villoria are working on a version of the standard GTAP Model that includes both specific and ad valorem import tariffs. Results of this work will be presented at this year's GTAP Conference. This work will be expanded to include other policy instruments. This is important for accurate representation of tariffs, and it is also very important when modeling domestic support policies for agriculture.

- To understand the source of emissions abatement in the GTAP-E model results, we develop a framework to decompose the changes from various substitution possibilities in the model. Computation of Total Requirement Coefficients (TRCs) is required for this exercise. This work comprises three different stages, of which the first one is completed so far: development of cygpack software package to run GEMPACK programs in Cygwin environment; an application using standard GTAP model to illustrate the usefulness of TRCs; and decomposition of results from an illustrative GTAP-E model simulation.

Externally Funded Projects

1. Quantitative Analysis of Vulnerability Reduction and Diversification in Africa, World Bank and Netherlands Partnership program, 2011-13

Staff: Terrie Walmsley, Angel Aguiar and Badri Narayanan
Collaborators: Peter Minor, Will Martin, Stephen Karingi, Mary Burfisher, Scott McDonald, Anna Strutt, Maros Ivanic and Rob Davies

The GTAP Model is widely used to examine the impact of trade liberalization on the global economy; however the GTAP Model and database do not include many of the features prevalent in developing countries, such as the government's heavy reliance on foreign aid and import tax revenues, and the need for examining the impact of policies at the household level. Access to quality data in developing countries is also problematic. This year the project has involved mentoring five individuals from Africa to use the MyGTAP modeling suite, and the release of the African GTAP Data Base (in May). Three of the papers were presented at the 10th Partnership for Economic Policy (PEP) General Meeting, in Cape Town, South Africa on May 9, 2013.

- External Shocks and Adjustment Policy in Kenya by Christopher Hugh Onyang
- Evaluating Policy Options for Strengthening the Resilience of the Zimbabwean Economy to Higher Food and Fuel Prices by Godfrey Mahofa and Anna Strutt
- Impacts of Removing Refined Oil Import Subsidies in Nigeria on Poverty by Khalid Siddig, Angel Aguiar and Harald Grethe.

This project will be finalized by July, 2013.

2. Modelling services and/or investment related policy measures, USITC, 2011-2013

Staff: Csilla Lakatos
Collaborators: Tani Fukui

The principal focus of this project was the construction and policy application of a global database on the activities of foreign affiliates and model that is being constructed within the GTAP framework. Prior efforts at modeling the activities of foreign affiliates in a CGE framework use FDI data as a proxy for measuring the output and input structure of foreign affiliates. By contrast, this project makes use of foreign affiliate operations data, which allows us to directly estimate sales and value added shares of foreign affiliates by country of ownership and sector. A number of papers have resulted from this project and are listed below. This project is now completed.

3. Multiple Households in GTAP framework, USITC, 2012-2013

Staff: Angel Aguiar, Caitlyn Carrico
Collaborators: Marinos Tsigas

The purpose of this project is to further disaggregate U. S. household and endowments in GTAP. The project will use and expand upon the MyGTAP model and data facilities. The model will be adapted to include supply of factor services. This model will then be used to examine the impact of the Trans-Pacific Partnership. Preliminary work will be presented at 16th Annual Conference on Global Economic Analysis (June 12-14, 2013).

4. Understanding the effects of food price policies on food nutritional security in South Asia, World Bank. August 2013-August 2014.

Staff: Nelson Villoria
Collaborators: Elliot W. Mghenyi (World Bank).

This study will estimate the effect of the Minimum Support Price policy applied to India to a comprehensive set of crops, prominently rice and wheat, on production, consumption, trade, and commodity prices in countries within South Asia region. The study is part of a larger effort that seeks to assemble empirical evidence on performance of food policies in South Asia, the extent to which markets for food commodities are integrated – both within and across countries, and draw implications for a regional food price stabilization agenda/policy.

Publications
Below is a list of papers in this area that have emerged from the Center recently in the area of trade and development:

Aguiar, A., and T. L. Walmsley, 2013. "Deport or Legalize? An Economic Analysis of US Immigration Reform." GTAP Working Paper series 74, West Lafayette, IN: Center for Global Trade Analysis. Also submitted to Applied Economic Perspectives and Policy, May 2013.

Aguiar, A. and T. L. Walmsley. 2013. "The Importance of Timing in the U.S. response to Illegal Immigrants: A Recursive Dynamic Approach." GTAP Working Paper series 75, West Lafayette, IN: Center for Global Trade Analysis.

Fukui, T. and C. Lakatos. 2012. "A Global Database of Foreign Affiliate Sales." GTAP Research Memorandum No. 24, Center for Global Trade Analysis, Purdue University, IN, USA.

Lakatos, C. "Knowledge Capital: a Factor of Production." Under review in the Journal of Productivity Analysis, November 2012.

Lakatos, C. and T.L. Walmsley. "Dispute Settlement at the WTO: Impacts of a No Deal in the US-Brazil Cotton Dispute." Under review in The World Economy, November 2012.

Lakatos, C. and T.L. Walmsley, 2012. "Investment creation and diversion effects of the ASEAN–China Free Trade Agreement." Economic Modelling 29(3), 766-779.

Walmsley, T. L. and L. A. Winters, 2012. "Relaxing Restrictions on the Temporary Movement of Natural Persons: A Simulation Analysis." In Hoekman, B., *The WTO And Trade In Services*, Edward Elgar Publishing.

Walmsley, T. L., A. Aguiar, and B. Narayanan, 2013. "A Global Dataset of Input-Output Tables Linked by International Trade and Policy Data." Journal of Life Cycle Assessment, April.

Walmsley, T. L., A. Aguiar, and B. Narayanan. 2012. "Introduction to the Global Trade Analysis Project and the GTAP Data Base." GTAP Working Paper series 67, West Lafayette, IN: Center for Global Trade Analysis.

Presentations
Aguiar, A. "Economic Effects of Return Migration in South America." Presented at 4th Regional CGE

meeting in Latin America, Guayaquil, Ecuador, April 20, 2012.

Aguiar, A. "Regional Data in the GTAP Data Base." Presented at 4th Regional CGE meeting in Latin America, Guayaquil, Ecuador, April 20, 2012.

Ahmed, A. and A. Aguiar. "Climate Change and Economic Growth in Bangladesh." Conference Paper presented at the 15th Annual Conference on Global Economic Analysis, Geneva, Switzerland, 2012.

Lakatos, C. and T. Fukui. “Liberalization of FDI in Retail Services: A Fast Death Instrument for India?” Conference Paper presented at the 15th Annual Conference on Global Economic Analysis, 2012.

Narayanan, B. and T. Walmsley “The Role Labor Standards in International Trade: the Case of Child Labor” Invited talk at Madras Institute of Development Studies, Chennai, India, July 2012.

Narayanan, B. “An Introduction to GTAP Model and Data Base.” Presented at the Joint World Bank-Madras School of Economics Workshop on Diagnostic Tools and Instruments for Assessing Environmental Challenges, Chennai, India, December 2012.

Narayanan, B. “An Introduction to GTAP Model.” Invited lecture at Indian Institute of Management, Tiruchirapalli, India, December 2012.

Narayanan, B. “Overview of GTAP 8 Data Base.” Presented at the 15th Annual Conference on Global Economic Analysis, Geneva, Switzerland, 2012.

Narayanan, B. “Economic research on Indian Textile Industry.” Invited Talk at S V Patel Institute of Textile Management, Coimbatore, India, July 2012.

Narayanan, B. “Impact of Pollution Abatement on the trade competitiveness of Indian Textile Sector.” Invited Talk at Madras School of Economics, Chennai, India, July 2012.

Narayanan, B. “Global Economic Analysis of Technical and Industrial Textiles.” Invited Plenary Talk at International Conference on Industrial and Technical Textiles, PSG College of Technology, Coimbatore, India, August 2012.

Perez, I., W. Britz, and B. Narayanan. “Post-model Analysis in large-scale models: the examples of Aglink-Cosimo, CAPRI and GTAP.” Presented at the 15th Annual Conference on Global Economic Analysis, Geneva, Switzerland, 2012.

Sen, R. and B. Narayanan. “Integrating India into global production networks through RTAs and productivity gains: The case of the Auto-Parts Industry.” Presented at the 15th Annual Conference on Global Economic Analysis, Geneva, Switzerland, 2012.

Global Energy, Land Use and Climate Change

From the point of view of the Center’s research agenda, “Energy and the Environment” (E&E) refers to research into global environmental issues with significant trade dimensions. Currently this encompasses policies related to climate change impacts, climate change mitigation, as well as biofuels and other renewable energy policies and their implications for global trade, land use emissions and economic welfare. These are broad topics, and many in the network are working in these areas. The Center’s current research agenda emphasizes the land use, agriculture, forestry, and poverty dimensions of these policies.

Core funding
The further development of the Static and Dynamic GTAP-E Models continue to be core research for Center staff. Research activities conducted this year included:

- Alla Golub and Thomas Hertel are developing a dynamic extension of the GTAP-BIO Model to assess economic and environmental impacts of biofuels in dynamic setting. A paper based on this work will be presented at the 16th Annual Conference on Global economic Analysis.

- Alla Golub has also developed a dynamic version of the GTAP-E Model and corresponding technical paper to analyze US and global carbon pricing policies. GDyn-E technical paper went through round of reviews and is currently being revised.

- Alla Golub and Robert McDougall are continuing to develop of various utilities to assist users of the model in climate change policy analysis, which will culminate in a GTAP-E technical paper.

- Graduate student, Burcu Irfanoglu, under the supervision of Alla Golub and Juan Sesmero (Purdue University) is extending the GTAP-AEZ-GHG model to analyze the effectiveness of punitive tariffs and border tax adjustments as enforcement mechanisms in Global Greenhouse Gas Emissions Mitigation Agreements. A paper focusing on comparison of border tax adjustment and punitive tariffs viability in deterring free-riding will be present at the Agricultural and Applied Economics Association Annual Meeting this year and has been submitted for review.

- Graduate student, Zekarias Hussein, under the supervision of Alla Golub and Tom Hertel, has been incorporating the poverty module GTAP-POV into GTAP-AEZ-GHG model to analyze impacts of Annex I GHG mitigation and global carbon sequestration inventive policies on poor households in developing countries. The paper on this work is under review with Environmental Research Letters.

Externally Funded Projects

1. Center for Robust Decision Making under Uncertainty for Climate and Energy Policy, National Science Foundation, 2010-2015

Staff: Tom Hertel, Jevgenijs Steinbuks, Alla Golub (July 2013)
Collaborators: K. Judd, Y. Cai and T. Munson

Global land use research to date has focused on quantifying uncertainty effects of three major drivers affecting competition for land: the uncertainty in energy and climate policies affecting competition between food and biofuels, the uncertainty of climate impacts on agriculture and forestry, and the uncertainty in the underlying technological progress driving efficiency of food, bioenergy and timber production. The market uncertainty in fossil fuel prices has received relatively less attention in the global land use literature. Petroleum and natural gas prices affect both the competitiveness of biofuels and the cost of nitrogen fertilizers. High prices put significant pressure on global land supply and greenhouse gas emissions from terrestrial systems, while low prices can moderate demands for cropland. In a recently published paper in *Environmental Research Letters,* Steinbuks and Hertel use a perfect foresight, partial equilibrium model, based in large part on GTAP data, in order to assess and compare the effects of these

core uncertainties on the optimal profile for global land use and land-based GHG emissions over the coming century. The model that we develop integrates distinct strands of agronomic, biophysical and economic literature into a single, intertemporally consistent, analytical framework, at global scale. Their analysis accounts for the value of land-based services in the production of food, first- and second-generation biofuels, timber, forest carbon and biodiversity. The authors find that long-term uncertainty in energy prices dominates the climate impacts and climate policy uncertainties emphasized in prior research on global land use.

Outputs of this research include the development of a dynamic forward-looking model of socially optimal land-use decisions. The results have been published in GTAP Working Paper 64 and are currently under review in the *Journal of Environmental Economics and Management*. This research has also been presented in a number of research conferences (EMEE, AGU, ASSA, EAERE, GTAP). Ongoing work on a second paper, aimed at the environmental sciences audience is underway. Further work in progress involves the development of stochastic extensions of this intertemporal model.

Jevgenijs Steinbuks has now moved to the World Bank and so Alla Golub will now be working on this project.

2. Economic and Environmental Consequences of Widespread Deployment of Solar Photovoltaics, Purdue Global Policy Research Institute, 2012-2013

Staff: Jevgenijs Steinbuks
Collaborators: F. Zhao, C. Xiang, and G. Satija

This was a pilot project for NSF and DOE funding. Under this project a dynamic partial equilibrium model aimed at explaining the economic trade-offs between traditional and solar energy, and consumer electronics sector, which competes for rare metals with solar photovoltaics was developed. The model is to be calibrated on GTAP data. Research findings were presented at USAEE/IAEE annual meetings.

3. Effects of GHG Mitigation Policies on Livestock Sectors, Phase II, FAO, 2010-2012

Staff: Alla Golub, Tom Hertel, Burcu Irfanoglu
Collaborators: B. Henderson, D. Pambudi

Recent research has shed light on the cost effective contribution that agriculture can make to global greenhouse gas (GHG) abatement, however, the resulting impacts on agricultural production, producer livelihoods and food security remains largely unexplored. In work published in the *Proceedings of the National Academy of Sciences*, Golub, Henderson, Hertel, Gerber, Rose and Sohngen use the GTAP-AEZ-GHG model to develop an integrated assessment of the linkages between land-based climate policies, development and food security, with a particular emphasis on abatement opportunities and impacts in the livestock sector. Targeting Annex I countries and exempting non-Annex I countries from land-based carbon policies on equity or food security grounds may result in significant leakage rates for livestock production and for agriculture as a whole. They find that such leakage can be eliminated by supplying forest carbon sequestration incentives to non-Annex I countries. Furthermore, substantial additional global agricultural abatement can be attained by extending a GHG emissions tax to non-Annex I agricultural producers, while compensating them for their additional tax expenses. These authors also evaluate the impacts of climate policies on livelihoods and food consumption in developing countries. In the absence of non-Annex I abatement policies, these impacts are modest. However, strong income and food consumption impacts surface, due to higher food costs, once forest carbon sequestration is promoted

at global scale. This work has culminated in the development of the GTAP-AEZ-GHG model and was published in the Proceedings of the National Academy of Sciences publication titled "Global Climate Policy Impacts on Livestock, Land Use, Livelihoods and Food Security".

4. Global Agriculture and Forestry Greenhouse Gas and Renewable Energy Research, EPRI, 2010-2012

Staff: Tom Hertel, Alla Golub, and Nelson Villoria
Collaborators: Steven Rose

There are two parts to this project

a. Total factor and relative agricultural productivity and deforestation

Agriculture is a primary driver of global deforestation, and agricultural productivity is a critical factor that some suggest could be stimulated to diminish land competition, and reduce deforestation in particular. Total factor productivity (TFP) improvements have been an important part of historic agricultural productivity gains. This project employs a variant of a dynamic GTAP model to analyze the potential implications of TFP growth, decomposed into catching-up and frontier shift components, on deforestation. The results indicate that regional total factor productivity increases, including technological convergence (or catching-up), could increase regional deforestation. Agricultural total factor productivity improvements, especially for crops, imply increased returns to agricultural lands and increased incentives for regional deforestation of extensive and intensive forests. The results have potential implications for targeted productivity improvements to regions/sectors, something of policy interest as a development strategy or strategy for reducing deforestation. This work culminated in AJAE conference proceedings paper "Total factor and relative agricultural productivity and deforestation."

b. Analysis of land-use change impacts of biofuels in the dynamic GTAP framework

In recent years, many economic models, partial and general equilibrium, static and dynamic, were used to analyze impacts of bioenergy on land use, food and fuel prices, and greenhouse gas emissions. One of them is a variant of computable general equilibrium (CGE) GTAP model nick-named GTAP-BIO – the modeling framework mandated for use in California's Low Carbon Fuel Standard assessments of biofuels. The GTAP-BIO is static, yet most biofuel mandates refer to some future period in time, and without an explicit baseline, it is difficult to evaluate the relative stringency of such policies. In addition, presenting biofuels induced land use change analysis in the context of a dynamic baseline is more appealing to policy makers. This paper documents development of a dynamic version of GTAP-BIO model – GDyn-BIO (the paper is in progress).

5. Macroeconomic and Industrial Implications of Carbon Policies, DOE, 2010-2012

Staff: Tom Hertel and Alla Golub
Collaborators: Liwayway Adkins and Bryan Mignone

A new GDyn-E model was developed and corresponding technical paper submitted for review. The model was used to analyze two separate GHG mitigation policies: unilateral (Annex I) GHG abatement, and US Clean Energy Standard (CES).

1. Analysis of Annex I abatement. Special attention in the analysis is devoted to carbon leakage through various channels, including investment channel. Alternative parameterization of the inter-fuel and capital-fuel substitution is considered and their impact on carbon leakage analyzed. This work formed a basis for the submitted technical paper.

2. US CES. Global impacts of CES are analyzed by linking GDyn-E with a detailed model of the U.S. energy sector, NEMS-PI. By linking NEMS-PI and GDyn-E, this analysis exploits the strengths of both "bottom up" and "top down" modeling frameworks to develop a more complete analysis of an illustrative energy policy. While the application of this model linkage is of interest in its own right in the context of the CES analysis, the paper makes a broader contribution by proposing a methodology for linking these frameworks in a more general way. The analysis of sectoral, investment and carbon leakage impacts of the CES formed a basis for the presentation at the 15th GTAP conference.

6. Research in Integrated Assessment Inter-Model Development, Testing and Diagnostics, Stanford-AIM/DOE, 2010-2013

Staff: Tom Hertel, Uris Baldos, Jing Liu
Collaborators: Many

Noah Diffenbaugh, Tom Hertel and Monika Verma have used the GTAP model in conjunction with high resolution climate simulations for North America, and a statistically estimated, climate impacts model, in order to investigate the role of climate change in shaping future commodity market volatility under alternative economic scenarios. In a paper published in *Nature Climate Change*, they find that US corn price volatility exhibits higher sensitivity to near-term climate change than to energy policy influences or agriculture-energy market integration, and that the presence of a biofuels mandate enhances the sensitivity to climate change by more than 50%. The climate change impact is driven primarily by intensification of severe hot conditions in the primary corn-growing region of the US, which causes US corn price volatility to increase by a factor of 4 in response to global warming projected over the next three decades. Closer integration of agriculture and energy markets moderates the effects of climate change, unless the biofuels mandate becomes binding, in which case corn price volatility is instead exacerbated by a factor of 1.5. In further work (under review) the authors explore more fully the role of economic integration in facilitating adaptation to climate change. Here, they find that intersectoral integration between the agricultural and energy markets can be a double-edged sword, absorbing a portion of increased volatility in the source market, but also inheriting price volatility from the newly integrated energy markets. For US corn, market-driven intersectoral and international trade integration both appear to offer potential for adaptation, with the former reducing future corn price variation by about 27% relative to baseline. A mandate-driven intersectoral integration, however, exacerbates the future corn price variation by about 54% relative to the baseline.

7. Introducing water resources into the GTAP Modeling framework, USDA-DOE, 2009-2012

Staff: Tom Hertel, Farzad Taheripour, Jing Liu
Collaborators: N/A

Farzad Taheripour, Jing Liu and Tom Hertel have developed a version of the GTAP model in which rainfed and irrigation agriculture are disaggregated by River Basin and Agro-Ecological Zone. They use this framework to analyze the global land use and emissions impacts of expanding production of US corn ethanol. The authors find that constraints on irrigation expansion -- in river basins where the International Water Management Institute has identified serious physical water scarcity -- result in higher estimates of GHG emissions (about 25% higher than previous work) from biofuel-induced land use change. The logic of this result is as follows: (a) Irrigated yields are, on average, about twice as high as rainfed yields in the same Agro-Ecological Zone, (b) Irrigated agriculture tends to occur in dry areas which are less carbon-rich, (c) so if there is any constraint on irrigation expansion anywhere in the world, more rainfed area is required. To make up for the same global production increase on rainfed lands, more area is needed, and

(d) greater expansion in the more carbon-rich rainfed areas generates greater GHG emissions. The authors are currently using this framework to examine the impact of future water shortages on production, land use and international trade in 2030.

8. GEOSHARE, UK-DFID and DEFRA and USDA

Staff: Tom Hertel, Nelson Villoria
Collaborators: Navin Ramankutty, Stefan Siebert, Jawoo Koo, Andy Nelson, Carol Song
This is a pilot project aimed at assessing the feasibility of doing for the geospatial community something like GTAP has done for the trade community. It is focused on several countries in Africa and South Asia and aims to create high quality, interoperable, geospatial data on agriculture, poverty and the environment. One product of GEOSHARE would be high quality satellite data bases for use with GTAP-type models.

9. Understanding the cross-country correlation of supply shocks to agricultural production. Incentive Award from Purdue University Global Policy Research Institute, 2011-13

Staff: Nelson Villoria, Thomas Hertel
Collaborators: Hao Zhang, David Ubilava, Dev Niyogi

Although weather correlation across countries is crucial for the analysis of trade (and its interactions with storage) it is largely ignored in the literature. As our understanding of climate processes – variability and change - improves, so does our understanding of the evidence of correlated climates across large geographic regions. Under auspices of the Purdue Global Research Institute the collaborators above have responded to the most recent call from the US Department of Agriculture for competitive grants in the area of Climate Change and Variability. The proposed research will fill the gap between trade- storage- and weather links by explicitly modeling the effects of geographically correlated weather patterns on bilateral trade patterns. This research has a heavy statistical component and explicit policy relevance that comprises of reducing the large climatological datasets used to simulate future climate using general circulation models and using these variables to explain bilateral trade patterns. From the statistical work, we will parameterize a computational economic model that allows relating weather shocks to the uses of agricultural supply: consumption, trade, and storage. Such tools will offer valuable insights into various policy issues for dealing with food price instability. An initial set of results are being prepared for publication, and will be presented in the First International Workshop on Econometric Applications in Climatology (June 6-7, 2013) as well as on the 16th Annual Conference on Global Economic Analysis (June 12-14, 2013).

Publications
Below is a list of papers in this area that have emerged from the Center over the past year:

Ahmed, S.A., N. Diffenbaugh, T.W. Hertel, and W. Martin, 2012. "Agriculture and Trade Opportunities for Tanzania: Past Volatility and Future Climate Change," Review of Development Economics 16(3):429-447.

Avetisyan, M., T.W. Hertel, and G. Sampson, 2013. "Is Local Food more Environmentally Friendly? The GHG Emissions Impacts of Consuming Imported vs. Domestically Produced Food." Environmental and Resource Economics (in press).

Baldos, U.L. and T.W. Hertel, 2012. "SIMPLE: A Simplified International Model of agricultural Prices,

Land use and the Environment." GTAP Working Paper No. 70, Purdue University.

Beckman, J., T.W. Hertel, F. Taheripour, and W.E. Tyner, 2012. "Structural Change in the Biofuels Era." European Review of Agricultural Economics, 1(39):137-156.

Desai, C., G.E. Elliehausen, and J. Steinbuks. "Effects of Foreclosure Laws and Bankruptcy Asset Exemptions on Mortgage Default and Foreclosure Rates." Journal of Real Estate Finance and Economics, forthcoming in 2013.

Diffenbaugh, N.S., T.W. Hertel, M. Scherer, and M. Verma, 2012. "Implications of Climate Volatility for Agricultural Commodity Markets under Alternative Energy Futures." Nature Climate Change April 22.

Golub, A. "Analysis of Climate Change Policies with GDyn-E." GTAP Technical Paper Series (submitted September 2012).

Golub, A., B. Irfanoglu, and B. Hertel. "Effects of GHG Mitigation Policies on Livestock Sectors." Final report submitted to Food and Agriculture Organization of the United Nations, April, 2012.

Golub, A., B. Henderson, T.W. Hertel, P. Gerber, S. Rose and B. Sohngen, 2012. "Global Climate Policy Impacts on Livestock, Land Use, Livelihoods and Food Security," Proceedings of the National Academy of Sciences.

Golub, A. and T.W. Hertel, (2012). "Modeling Land Use Change Impacts of Biofuels in the GTAP-BIO Framework." Climate Change Economics, Volume 03, Issue 03.

Hertel, T.W., 2012. "Global Applied General Equilibrium Analysis using the GTAP Framework." chapter 12 in *The Handbook of Computable General Equilibrium Modeling*, volume 1B edited by Peter Dixon and Dale Jorgenson, part of the Handbook of Economics Series from Elsevier Publishers.

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Golub, A., T.W. Hertel, and S. Rose. "Effects of Environmental and Energy Policies on Long Run Patterns of Land Use." Selected Poster, Agricultural and Applied Economics Association Annual Meeting, Seattle, Washington, USA, August 2012.

Hertel, T.W., J. Steinbuks, U. Baldos. 2012. "Competition for Land in the Global Bioeconomy." Presented at 28th International Conference of Agricultural Economists, Foz do Iguaçu, Brazil.

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Irfanoglu, Z. B., A. Golub, T.W. Hertel, and B.B. Henderson. "Effects of Carbon Based Boarder Tax Adjustments on Carbon Leakage and Competitiveness in Livestock Sectors." Selected paper, Annual Agricultural and Applied Economics Annual Meeting, Seattle, Washington, August 2012.

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McDougall, R. and B. Narayanan. “A GTAP-E Extension for Emission Abatement Analysis.” Presented at the 15th Annual Conference on Global Economic Analysis, Geneva, Switzerland, 2012.

Narayanan, B. and Steinbuks, J. “International Inter-fuel Substitution Elasticities.” Invited Inaugural Guest Lecture at Solar Energy Society of India, PSG College of Technology, Coimbatore, India, July 2012.

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Steinbuks, J., T. W. Hertel. 2012. “The Optimal Allocation of Global Land Use in the Food-Energy-Environment Trilemma.” Presented at the American Economic Association Meetings, Chicago, IL.

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Steinbuks, J., G. Satija, F. Zhao. “2012 Economic and Environmental Consequences of Long-Term Deployment of Photovoltaics.” Presented at 31st USAEE/IAEE North American Conference Austin, Texas

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Villoria, N. B., A. Golub, D. Byerlee, and J. Stevenson, 2013. "Will Intensification of Oil Palm Production Reduce Green House Gas Emissions from Deforestation?" Invited paper at the 2013 Winter ASSA Meetings (San Diego, CA, January 2013).

IX. Education and the Network

New Technical Papers, Working Papers and Research Memoranda

New Working Papers

Introduction to the Global Trade Analysis Project and the GTAP Data Base
by Walmsley, Terrie, Angel Aguiar and Badri Narayanan
Publication: GTAP Working Paper No. 67
Publication Year: 2012

Competition for Land in the Global Bioeconomy
by Hertel, Thomas, Jevgenijs Steinbuks and Uris Lantz Baldos
Publication: GTAP Working Paper No. 68
Publication Year: 2012

Implications of Agricultural Productivity for Global Cropland Use and GHG Emissions: Borlaug vs. Jevons
by Hertel, Thomas
Publication: GTAP Working Paper No. 69
Publication Year: 2012

SIMPLE: a Simplified International Model of agricultural Prices, Land use and the Environment
by Baldos, Uris Lantz and Thomas Hertel
Publication: GTAP Working Paper No. 70
Publication Year: 2012

Forest, Agriculture, and Biofuels in a Land use model with Environmental services (FABLE)
by Steinbuks, Jevgenijs and Thomas Hertel
Publication: GTAP Working Paper No. 71
Publication Year: 2012

Agricultural Adaptation to Climate Change in Rich and Poor Countries: Current Modeling Practice and Potential for Empirical Contributions
by Hertel, Thomas and David Lobell
Publication: GTAP Working Paper No. 72
Publication Year: 2012

Fossil Fuel Producing Economies Have Greater Potential for Interfuel Substitution
by Steinbuks, Jevgenijs and Badri Narayanan
Publication: GTAP Working Paper No. 73
Publication Year: 2013

Deport or legalize? An Economic Analysis of US Immigration Reform
by Aguiar, Angel and Terrie Walmsley
Publication: GTAP Working Paper No. 74
Publication Year: 2013

The Importance of Timing in the U.S. response to Undocumented Immigrants: A Recursive Dynamic Approach
by Aguiar, Angel and Terrie Walmsley
Publication: GTAP Working Paper No. 75
Publication Year: 2013

New Research Memoranda
Development of a GTAP 8 Land Use and Land Cover Data Base for Years 2004 and 2007
by Baldos, Uris Lantz and Thomas Hertel
Publication: GTAP Research Memorandum No. 23
Publication Year: 2012

A Global Database of Foreign Affiliate Sales
by Fukui, Tani and Csilla Lakatos
Publication: GTAP Research Memorandum No. 24
Publication Year: 2012

Education and Courses

The Center continues to re-examine the way in which it educates graduate students, staff, visitors and network members. Demand for our short courses is noticeably lower, particularly for the standard short course, where there are fewer applications. Moreover the quality of these applicants has also fallen. This has not significantly affected our courses. In years where numbers were high, more people were accepted and classes were larger in size. Reduced applications have brought class sizes back down to a more manageable level. Further information on our strategy on education will be presented at the board meeting.

This year the Center will hold two courses:

- The GTAP Short Course will be held at Bahçesehir University, Istanbul, Turkey in late June. We would like to thank Emre Akel at the Turkish Ministry of Economy for his assistance in organizing this course.

- Despite demand for courses being low, queries and about GTAP products are high and new members struggle to teach themselves. To respond to these needs, we have been working with Mary Burfisher to offer "GTAP 101" this fall. This is a basic level course that will provide an entry point to the GTAP Data Base and modeling framework, by providing under-qualified applicants for the short course with more preparatory materials.

Research Fellows

Sergey Paltsev will report on the committee's decisions at the Board meeting. The committee includes Paltsev (Committee Chair), Terrie Walmsley and Martin Banse; with Meghan Alexander and Ginger Batta providing support.

Conference Proposals

Shanghai 2013
Xingguo Ye, Shanghai Foreign Institute of Trade or a designated representative will welcome us to Shanghai and present an update on preparations for the 2013 conference at the board meeting. This event is being jointly hosted by the Shanghai Foreign Institute of Trade, Shanghai WTO Affairs Consultation

Center (SCC/WTO) and the Shanghai Academy of Social Sciences (SASS).

Senegal 2014
In 2011 an email was sent to board members requesting feedback on a proposal to hold the 2014 conference in Dakar, Senegal. The conference would be hosted by IFPRI. At this year's board meeting we will hear more from IFPRI about the proposed conference and we will have an opportunity to vote on the proposal.

Australia 2015
Terrie Walmsley will present a proposal to hold the conference in Australia in 2015.

Proposals for each conference may be found at:

https://www.gtap.agecon.purdue.edu/events/Board_Meetings/2013/supp_material.asp

Report on GTAP Usage and the GTAP Website

Three search sources have been examined to set up a baseline to document the impact of GTAP:

1) Econlit: AEA's electronic bibliography of economics literature,
2) IDEAS: a freely available, online bibliographic database dedicated to Economics, and
3) Google Scholar: Google's dedicated engine for searching scholarly literature.

These reports are contained in the supplementary materials provided on the board website.

https://www.gtap.agecon.purdue.edu/events/Board_Meetings/2013/supp_material.asp

X. Finances, Budgets and Staffing Plan

Budgeting

To be handed out and discussed at the board meeting.

Staffing

Staffing Goal: To actively seek and encourage talented staff and graduate students

Current Staffing Plan and New Staff

This year Wendy Kincaid joined the Center as a Research Account Coordinator. Wendy assists the Center staff with the research account process from proposal to reconciliation and closing. She also tracks and reports Center finances, formats the GTAP Data Base Documentation, and coordinates the technical and working paper series.

We expect to have to hire a number of new staff members next year to assist with the increasing demands on the data base and replace staff that are leaving.

Allocation of Resources over the next year

An overview of how individuals are funded and all the activities they will spend their time over the next 12 months is given below. As you can see, many of the Center's staff are externally funded (i.e. not supported by Consortium funds or Data Base sales.)

Robert McDougall	100% core	Data Base Issues (Taxes, Energy and FIT)	Mentoring of data team	Documentation	Document GTAP-E Model	Research and Courses		
Badri Narayanan	100% core	Oversee release schedule	Website and data documentation	Data Base (Protection, trade, agricultural production targeting and support)	Satellite data schedule	Live sessions and seminars	GTAPAgg and FlexAgg	Research and Courses
Angel Aguiar	100% core	Working with I-O Table contributors	I-O Peer Review Process and documentation	I-O Educational materials	Data Base (Pre-processing of macro data, dwellings, I-O disagg)	Research and Courses		
Terrie Walmsley	100% core	Short Course and education plan	Grad student supervision	Conference and board meeting	GTAP Data Base projects (Skills Data, MRIO)	Satellite data	Research	Strategic Planning
Thomas Hertel	25% core	Assist with Conference	Research	Grad Student Supervision	Satellite data			
Nelson Villoria	50% Projects	Short Course and education plan	International Transportation Data	Grad student supervision	Research	Heterogeneous firms	Land Use and Land Cover Database and Aggregation Software	
Alla Golub	100% Projects	Dynamic GTAP-E Model	Energy and Environ research	Satellite data	Grad student supervision	Document GTAP-E Model	Short Courses	
Graduate Students	Various	Macro transmission Tech paper	Heterogeneous firms	Data Base (Agr Production Targeting, macro, Elasticities)	Short Courses	Special data Projects (Skills)	Research Projects	Satellite data projects (Land use, CO2)
Meghan Alexander	100% core	Conference and course proposals	Board meeting	Conference, Board, Course logistics	Marketing plan	Staff visas and hiring	Budgeting and Finances	

Ginger Batta	100% core	Website	Data sales and reporting	Course participant relations	Conference participant relations	Conference program development	Publicity materials	
Wendy Kincaid	100% core	Assist with Grants	Budgeting and Finances					

XI. Appendices

Appendix 1: Items for discussion on "Data Base and Research Issues"

Here are some issues that have come up over the past year and may be of interest to the board.

Data:

- energy data
- Trade in goods and services and Matching Trade balances
- Protection data or TASTE
- Commodity or Income taxes
- Domestic support
- Regional data
- factor splits/Skill splits
- GTAPAgg
- sectoral disaggregation (e.g., Electricity sector disaggregation)
- multi-year databases
- NTMs

Satellite Data and Programs:

- Non-CO2 emissions
- Land use data
- GEOSHARE
- MRIO

Research and Models:

- Government procurement

Education:

- Demand and supply of Courses
- Locations and types (web-based, data, policy makers)
- Graduate students

Network:

- board meetings and membership
- Open source
- staffing
- marketing GTAP

Appendix 2: A strategy for creating a standardized, interoperable GTAP-AEZ model and data base package

Responsible: Nelson Villoria
Collaborators/Resources: Alla Golub, Badri Narayanan, Farzad Taheripour, Uris Baldos

The land use data comprise land rents and taxes by AEZs for the 12 land-based GTAP sectors. It also provides output quantities and harvested area for the eight GTAP crop sectors. Area covered by forests, pastures, cropland, and other (four) land types are also available. Starting with V8, subscribers to both the GTAP and land use databases receive both dataset in a customized FlexAgg package ready to consistently aggregate across countries, sectors, and/or AEZs. The original GTAP-AEZ database, created using data on crop production circa 2000 from Monfreda et al. (2008) was released for GTAP 5, and has since then updated to years 2004 (V7, V8) and 2007 (V8) using information on aggregated land rents from the GTAP database, the national-level crop production data from FAOSTAT and updated time-series data on cropland and pasture cover (see Baldos and Hertel, 2012 for details). Recognizing the importance of the land use and cover data for the GTAP community, the overall aim of this activity is to establish a standardize framework to maintain the GTAP-AEZ model and database by performing the following activities:

(i) To update the land use and cover data to match reference years of new GTAP releases using the procedures documented in Baldos and Hertel (2012). This activity will be performed in coordination with Badri Narayanan for each release of the database (next major upgrade is planned for end of 2014). Included in this activity is an internal pre-release for testing performed independently by Farzad Taheripour, Alla Golub, and Nelson Villoria.

(ii) To incorporate newer and improved information on land use and cover into new datasets as they become available. The data on global land use and land cover are dated (circa 2000). However, within the context of GEOSHARE we expect to have updated versions of these datasets over the next one to two years. A main goal of the strategy is to bring the newer physical data to update the GTAP-AEZ database as soon as it is available to us. To the extent possible we will rely on previous procedures (e.g., Baldos and Hertel, 2012) to ensure compatibility. Execution of this activity will depend on the evolution of GEOSHARE.

(iii) Development of FlexAgg-based aggregation programs that facilitate creating aggregated land use and cover, as well as land-use related GHG emission factors, matching user-defined aggregation schemes. This activity is performed with each release of the GTAP data, and is performed by Badri Narayanan and Nelson Villoria.

(iv) Inclusion of the GTAP-AEZ framework in the Annual GTAP Short Courses: The theoretical underpinnings of the GTAP-AEZ model have already been documented (Hertel et al., 2009), thus, in this activity we are focusing on generating training materials to be employed in the Annual Short Course. These materials consist on a two-page theoretical brief, a guide to replicate the results in Stevenson et al (2013), as well as a simple GTAP-AEZ model with an add-on module for land-use related greenhouse gas fluxes. These materials are being prepared by Alla Golub and Nelson Villoria and will be used for the first time in the upcoming Annual Short Course (Istanbul, Turkey, June 2013).

Appendix 3: A research strategy for upgrading the bilateral transport margins, by mode, in the GTAP Data Base

Responsible: Nelson Villoria

The distribution of bilateral margins (difference between FOB and CIF prices) among transportation modes (land, air, ocean) is currently performed assuming that the sectoral transportation patterns between the US and its trading partners are representative of all the possible transportation patterns among the 129 regions and 43 sectors in the current GTAP Database. It is often the case that this assumption leads to unreasonable modal splits of the FOB-CIF margins. Thus, a stronger empirical basis for splitting current margin modal splits is highly desirable. In recent work, Cristea et al (2012) combine data for the US, Latin America, and Europe, and demonstrate that explicit modal data is available for about 75% of world trade. Moreover, around 23% of the countries without explicit modal shares are not land-adjacent, so it is reasonable to assume that most of their bilateral trade occurs via ocean or air. In order to estimate the missing modal shares, they fit an econometric model inspired in the gravity modeling of trade that explains mode-specific transport margins in terms of the composition of bilateral trade (approximated by bilateral trade weight and value), distance between countries, adjacency and fixed effects. Their model yields a high R2 (0.75), suggesting that the explanatory variable capture a meaningful portion of the variation in modal shares. The parameter estimates of this model are then used to predict the missing modal shares.

In this activity, we will use the econometric procedure proposed by Cristea et al (2012) to improve the modal splits in the GTAP database. Specifically, we will combine data for the European Union (Eurostat), the US, and Latin America (ALADI) for which we have explicit modal share data and we use out of sample prediction to generate modal splits for the remaining countries. We aim to include these margins in the second pre-release of the GTAP Database V9, in February-March 2013. An additional deliverable is a fully documented set of procedures, including the estimating equations, to ensure the process is replicable in further releases of the data.

Cristea, A., D. Hummels, L. Puzzello, and M. Avetisyan. 2012. “Trade and the greenhouse gas emissions from international freight transport.” *Journal of Environmental Economics and Management*. DOI: 10.1016/j.jeem.2012.06.002.

Hertel, T.W., H.-L. Lee, S. Rose, and B. Sohngen. 2009. “Modeling Land-use Related Greenhouse Gas Sources and Sinks and their Mitigation Potential.” In T. W. Hertel, S. Rose, and R. Tol, eds. *Economic Analysis of Land Use in Global Climate Change Policy*. London and New York: Routledge, pp. 123–154.