



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

2010

**Compiled by
Terrie Walmsley**

**With contributions from Angel Aguiar, Meghan Alexander,
Ginger Batta, Alla Golub, Thomas Hertel, Robert
McDougall, Badri Narayanan, Farzad Taheripour, and
Wallace Tyner**

**Center for Global Trade Analysis
Purdue University**

**Background Paper for the GTAP Advisory Board Meeting
Penang, Malaysia
June 7-8, 2010**

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List of Supplementary Materials available on the GTAP Website

(http://www.gtap.agecon.purdue.edu/events/Board_Meetings/2010/supp_material.asp)

Agency Reports

Graduate Student CVs

Annual Report on I-O Tables

Proposal for improving the TASTE software

Africa and the Global Economy A Proposal to enhance the quality of Global Analysis
in Africa

GTAP Website Report

Report on GTAP Usage

Research Fellows CVs

2010 Conference Proposal

2011 Conference Proposal

2012 Conference Proposal



CENTER FOR GLOBAL TRADE ANALYSIS

June 16, 2010

Dear Board Members,

Next week, the Center will release the GTAP 7.1 Data Base to the public. This release includes the long-awaited updates to the European I-O data, as well as improvements in the EU macro data and the domestic support data from Hans Jensen and Hsin Huang. We are very grateful to Marc Mueller (previously of the JRC-IPTS in Spain, now at the University of Bonn) for the SAMs and to Scott McDonald and Csilla Lakatos for their work in making these GTAP-ready.

We have also commenced preparations for the GTAP 8 Data Base. We have been interacting with data contributors and are pleased to announce that we will be releasing the GTAP 8 Data Base with two different base years. This should aid those doing dynamic modeling as well as those thinking about model validation. With time, we hope to lengthen this time series.

The skills data being compiled by Marinos Tsigas and Alison Weingarden from the USITC is also progressing well - a first draft has already been reviewed. On another front, Nico van Leeuwen visited the Center this year. Due to his efforts, we were able to commence work on the commodity tax data. We look forward to hearing more from Marinos Tsigas and Nico van Leeuwen at the board meeting.

After discussions at the board meeting last year about the need to obtain funding to update the Center's research-related datasets, the Center released the "Satellite Data and Utilities" this year for which users must pay – with the idea that this revenue will help support a graduate student working in this area. These satellite data sets include the non-CO₂ emissions, land use (to be posted shortly) and the migration data. We expect that more datasets will be added to this in the near future.

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 which includes projects in the areas of bio-fuels, new energy technologies, global land use for food and fuel, climate change impacts and climate change mitigation possibilities.

We would also like to welcome three new board members. Steve Rose from the Electric Power Research Institute, who has been actively engaged in research activities with the Center for many years; Martina Brockmeier, who is a long-serving board member, but introduces the University of Hohenheim to the board; and finally, Mark Horridge, a member of the GTAP Research Fellow Hall of Fame and now board member at-large, from the Centre of Policy Studies, Monash University. We look forward to the new perspectives and valuable contributions which these new members offer.

Finally, we would like to ask board members for their assistance in compiling a new brochure for the Center that documents some of the great work you have done using GTAP. We are looking

for a paragraph or two from each of you on policy relevant research your group or agency has done in the past 10 years. We would appreciate your help with this and hope to also include these on the website.

As you will see in the following document, the GTAP team has continued to work towards its goals. I hope you enjoy reading what we have done and our thoughts on the year ahead. We look forward to discussing these issues with you in Penang, Malaysia.

Yours Sincerely,

A handwritten signature in cursive script, appearing to read "T. L. Walmsley".

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

Executive Summary

Background

- GTAP 7.1 Data Base was released to the board in February 2010. It will be released to the public in May.
- Satellite data and utilities released including non-CO2 emissions and migration data.
- Two new board members, including the Electric Power Research Institute and the University of Hohenheim; and a new board member at-large, Mark Horridge from the Centre of Policy Studies, Monash University.
- The Center has appointed Nelson Villoria as a new Research Faculty member. He will commence work in August.
- Continued growth and success in research activities in the area of bio-fuels and land use, with new initiatives underway in the climate change area.
- Continued high demand for courses, attendance at conferences and interest by potential hosts.

Challenges for the upcoming year and beyond

- Work on the GTAP 8 Data Base has commenced. Issues related to the construction include:
 - a) The development of a feasible agenda for v8, given data, staffing and time constraints. A key challenge for version 8 will be building on the improvements made in energy and protection data made previously in versions 6 and 7, while also releasing the data base with two base years (for purposes of model validation and dynamic analysis). This is likely to affect both the Center and our contributors of the macroeconomic datasets.
 - b) Areas of improvement between version 8 and the previous versions will include new labor skills split data and improvements to taxes.
 - c) Issues related to ensuring quality control for the regional data bases, including dwellings data and peer review of new country submissions, will also be important.
- Continue offering the GTAP community state-of-the-art trade protection data.
- Education of users who are unable to come to the GTAP Short Courses, either because of high demand or insufficient funding.
- Our ability to continue to attract and retain quality staff; and how the Center should be structured given some staff are choosing to live away from Purdue.

Recommended Strategies

- The Center has decided upon a schedule for the construction of the GTAP 8 Data Base. Recent staff changes will assist us in meeting this schedule, although another post-doc familiar with the energy data would help to meet our goals in this area.
- We have spoken with our macro data contributors who are supportive of our efforts to distribute the GTAP 8 Data Base with two base years.
- Over the next year, the Center will add an additional short course as well as focusing on internal staff training, further development of the graduate course, and continuation of the live forums.
- Angel Aguiar recently joined Terrie Walmsley in Australia. The Center will continue to monitor the effectiveness of this regional office.

GTAP Advisory Board Meeting¹
Penang, Malaysia
June 7-8, 2010

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¹ Agency reports are available in the supplementary materials.

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Agenda
 Penang, Malaysia
 June 7-8, 2010

| Monday, June 7 | |
|-----------------------|---|
| 9:00am-10:20am | <p>Welcome and Overview Chair: Thomas Hertel</p> <ul style="list-style-type: none"> • Introductions (10 min) - Thomas Hertel • Overview and Issues (20 min) - Terrie Walmsley <i>Discussion (10 min)</i> • Data Base: Progress and Future Directions (20 min) - Terrie Walmsley <i>Discussion (20 min)</i> |
| 10:20am-10:50am | <p>Coffee Break</p> |
| 10:50am-12:00pm | <p>GTAP Data Base Issues Chair: Hugo Rojas-Romagosa</p> <ul style="list-style-type: none"> • Taxes (20 min) - Terrie Walmsley <i>Discussion (10 min)</i> • Skill Shares (10 min each) - Marinos Tsigas - Robert McDougall <i>Discussion (20 min)</i> |
| 12:00pm-1:30pm | <p>Lunch – Meeting on Africa Projects</p> |
| 1:30pm-3:00pm | <p>GTAP Data Base Issues Chair: Will Martin</p> <ul style="list-style-type: none"> • Data Issues: Protection (5 min each) - Willem van der Geest - Sebastien Jean <i>Discussion (10 min)</i> • Satellite Data (5 mins each) <ul style="list-style-type: none"> - Non-CO₂ Emissions Tom Hertel - CO₂ Emissions Alla Golub - Non-Tariff Measures Joe Francois |

| | |
|---------------|--|
| | <p>- FDI Data Sebastian Jean <i>Discussion (30 min)</i></p> <p>• Other Data-related Projects (opportunity for board members to speak for 5mins on any current proposals²) (20 min in total)</p> |
| 3:00pm-3:30pm | Coffee Break |
| 3:30pm-5:00pm | Discussion of Data Base and Research Issues Chair: Terrie Walmsley |
| 7:00pm | Dinner |

| | |
|------------------------|---|
| Tuesday, June 8 | |
| 9:00am-10:30am | <p>The Network Chair: Paolo Giordano</p> <ul style="list-style-type: none"> • 2010 Conference Report (10 min) - Mia Mikic <i>Discussion (10 min)</i> • 2011 Conference Proposal (10 min) - Representative from FEEM <i>Discussion (10 min)</i> • 2012 Conference Proposal (10 min) - Willem van der Geest <i>Discussion (10 min)</i> • Research Fellows Report (10 min) - Antoine Bouët <i>Discussion (20 min)</i> |
| 10:30am-11:00am | Coffee Break |
| 11:00am-12:30pm | <p>Priorities for Forthcoming Year Chair: Thomas Hertel</p> <ul style="list-style-type: none"> • Budget and Staffing (20 min) - Meghan Alexander <i>Discussion (20 min)</i> • Revisit Priorities for Next Year (20 min) - Terrie Walmsley <i>Discussion (30 min)</i> |
| 12:30pm-2:30pm | Lunch |

² Please let us know in advance if you would like to talk about a project you are involved in.

I. Mission and Goals

Our Mission

To provide leadership in economic policy analysis through better data, fostering collaboration and research.

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.
- *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 insights.
- Avoiding duplication in data production is efficient.
- Collaboration enhances individual efforts.
- Having more trained users enriches policy debates.

Our Vision

In 2020, GTAP is an exceptionally vibrant network of global economic policy analysts, with more than 10,000 individuals in 150 countries making contributions. The GTAP Data Base and Models are used in research centers throughout the world, leading to ever greater transparency in global economic analysis. GTAP-based results are influential among decision makers. After 10 years of intensive model validation efforts, GTAP-based models are widely accepted in the professional literature. Indeed, editors of leading journals actively seek out GTAP-based papers on contemporary policy issues.

The GTAP Data Base remains at the core of the Center. National and international agencies actively collaborate with the Center, sending their staff to Purdue to learn and contribute to the GTAP Data Base construction process and hosting GTAP staff. This cooperative arrangement by which the data base is now assembled has spawned rapid growth, with active collaborators in more than 100 countries. It is now possible for these agencies to scrutinize the affect of key assumptions on the data base and propose modifications to the official GTAP Data Base. Center staff are located around the world in a hub-and-spoke system centered at Purdue University. They collaborate with the network on important global issues, and offer local short courses. The 50 consortium members meet regularly through teleconferences to contribute ideas and to help keep the Center's efforts focused on our vision.

Goals 2008-2012

1. **Data Goal:** To Improve the quality of data products through:
 - Improving the quality of contributed I-O data
 - Addition and improvement of other datasets
 - Monitoring of data quality using comparison programs
 - 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 global economic analysis education worldwide
5. **Staffing Goal:** To actively seek and encourage talented staff and graduate students
6. **Collaboration Goal:** Actively seek opportunities for fostering collaboration with institutions around the world

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

Center Staff

Angel Aguiar, Data Base Construction Specialist and Research Economist

Angel is a Data Base Construction Specialist and Research Economist. His responsibilities include the macro datasets and working with the contributors of the regional Input-Output data for the GTAP Data Base. Angel also teaches on courses and undertakes research on global migration.

Meghan Alexander, Program Manager

Meghan oversees the logistics, sales and marketing of GTAP courses, conferences and the board meeting; as well as liaising with board members and Purdue administration. Meghan also oversees the Center's finances.

Ginger Batta, Information Technology Specialist

Ginger oversees the design, development, and maintenance of the GTAP Website and the preparatory web course websites. Outside of this, she is also responsible for the sales, distribution, and reporting of GTAP Products and the online organization of GTAP's core events.

Alla Golub, Research Economist

Alla works on special projects related to climate change mitigation policy with a focus on land-based activities. She is currently working with the FAO on a project that evaluates the effects of GHG mitigation policies on global distribution of livestock production. She was also working on various issues related to bio-fuels modeling with GTAP.

Thomas Hertel, Executive Director

Thomas' focus is on strategic issues and new research directions for the Center, as well as consortium development. He also supervises graduate students and is increasingly involved in a number of environment-related projects at the Center.

Robert McDougall, Deputy Director

Robert works on special projects which significantly improve the GTAP Data Base and Models. This year he has been working on documentation and the development of programs to compare data bases and ensure quality.

Tasneem Mirza, Post-Doctoral Research Associate

Tasneem was employed as a post-doctoral research associate with the Center in January and February 2010, before joining the Asian Development Bank in the Philippines. During this time, she assisted with the education plan and with a paper examining the first draft of the skills data from the USITC.

Badri Narayanan, Data Base Manager and Research Economist

Badri has taken over the management and construction of GTAP Data Base releases. This year Badri has been working on the construction of the GTAP 7.1 Data Base and the data base documentation. Badri has also been working on linking a Partial Equilibrium model with standard GTAP Model for disaggregated analysis.

Wallace Tyner, Senior Policy Advisor

Wally advises the Center on policy. Most recently he has been spearheading a number of large research projects and proposals in the area of energy and bio-fuels.

Nelson Villoria, Post-Doctoral Research Associate

Nelson is a post-doc with the Center working with Tom Hertel on an econometric investigation into the global pattern of land cover change in response to US crop price shocks. This work is funded by the EPA. This work helps to determine where the bio-fuels-induced land use change is most likely to occur.

Terrie Walmsley, Director

Terrie oversees the management of the Center as well as the GTAP Short Courses and board meetings. Terrie also assists the data base team with the GTAP Data Base construction, supervises graduate students and undertakes research on the Dynamic GTAP Model and labor migration.

Research Associates

Roman Keeney, Faculty Research Associate

Roman is an Assistant Professor with the Department of Economics and associate of the Center. He works on agricultural issues such as land use and bio-fuels.

Farzad Taheripour, Research Economist

Farzad 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 land use changes associated to bio-fuels as well.

Graduate students (country of origin)³

Angel Aguiar (Ecuador)

Angel completed his PhD in the Department of Agricultural Economics in December, 2009. He extended the Dynamic GTAP Model to account for undocumented workers. He then used this model to examine the impact of changes in the United States immigration policies towards undocumented workers.

Misak Avetisyan (Armenia)

Misak is a PhD student in the Department of Economics. Misak is working on the Greenhouse Gas impacts of international trade. This year Misak worked on the non-CO₂ emissions dataset for the GTAP 7 Data Base.

Uris Baldos (Philippines)

Uris Baldos is a PhD student in the Department of Agricultural Economics. He has been working on the update of the global land use data base. In addition, he has been assisting Tom Hertel with the compilation of a comprehensive set of background materials on the global supply and demand for land in agriculture, in preparation for Tom's AAEA Presidential address.

Zekarias Hussein (Ethiopia)

Zekarias is a PhD student in the Department of Agricultural Economics. He is currently working on the macroeconomic data and agricultural production targeting for the GTAP 8 Data Base. He is interested in working on trade and the Africa Project.

Csilla Lakatos (Romania)

Csilla is a PhD student in the Department of Agricultural Economics. Csilla has extended the entropy-theoretic allocation of foreign ownership in the GDyn Model to take account of bilateral ownership.

³ See supplementary materials for graduate student CVs.

Currently she is working on including knowledge capital in the GTAP Model. This year Csilla assisted with the EU I-O tables and the FDI dataset.

Amanda Leister (USA)

Amanda is a PhD student in the Department of Agricultural Economics. She is studying trade policy, in particular, the proposed Special Safeguard Mechanism under the WTO, using both CGE and econometric methods.

Jing Liu (China)

Jing is a PhD student in the Department of Agricultural Economic. She is just beginning to work on the project aimed at incorporating water (river basins) into the GTAP Model.

Tasneem Mirza (Bangladesh)

Tasneem completed her PhD in the Department of Economics in December, 2009. Tasneem examined the impact of improving border logistics through increased trade-related productivity which reduces effective prices and increases trading competitiveness.

Monika Verma (India)

Monika is a PhD student in the Department of Agricultural Economic. She is investigating the impacts of international trade and commodity price volatility on poverty and nutrition.

Nelson Villoria (Venezuela)

Nelson completed his PhD student in the Department of Agricultural Economics in September, 2009. He used gravity models of international trade to estimate the impacts of China's growth on developing countries. He is also investigating the global land use impacts of regional supply and demand shocks in agriculture.

Visitors to the Center

Nico van Leeuwen, Netherlands Bureau for Economic Policy Analysis (CPB), The Netherlands, September 2009 – March 2010

Janine Pelikan, Johann Heinrich von Thünen Institute, Germany, January - March 2010

III. Objective 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/2009/documents/2009_Summary.pdf). For further information on progress see sections IV, V and VI below.

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

| <i>Tasks</i> | <i>Individuals</i> |
|--|--------------------|
| Improving the quality of contributed I-O data (core) | |
| – v7.1: EU I-O Tables | TW, CL and BN |
| – v8: Incorporation of Metadata and treatment flags, peer review system and reviewer guidelines, provide programs used for EU, I-O disaggregation module | AA, TW, and CL |
| – Tertiary priority: adjust I-O contributor requirements to include domestic margins | RMD, TW and AA |

Progress:

The EU SAMs were received from Marc Mueller from JRC-IPTS in August 2009. Scott McDonald and Csilla Lakatos then converted the tables into the GTAP format for inclusion in the new GTAP 7.1 Data Base. Scott McDonald is currently working with Csilla Lakatos to document these programs and make them publicly available for other contributors later in 2010.

The Annual Report on I-O tables is available in the board meeting supplementary materials: http://www.gtap.agecon.purdue.edu/events/Board_Meetings/2010/supp_material.asp. Some of the issues from this report are discussed below.

Angel Aguiar has now started working on the I-O tables and will be introducing the peer review process in the upcoming year. If you are interested in assisting us with a review and/or in establishing a set of guidelines for the review process please let us know.

| | |
|---|--------------------|
| Addition and Improvement of Other Datasets (core) | RMD, BN |
| – v7.1: factor taxes, domestic support | USITC, NVL, BN, LA |
| – v8: skill splits, Commodity taxes, protection, energy | |
| – Tertiary Priority: domestic margins | RMD, BN |

Progress:

Improvements to the agricultural domestic support were made in version 7.1, along with the new I-O tables for the EU and Vietnam. Factor taxes were not revised; these improvements will be included in version 8.

The USITC have dedicated resources to assisting us with improving the skill splits in the GTAP Data Base. This work is being undertaken by Marinos Tsigas and Alison Weingarden. A first draft of the data was provided to the Center, which were then reviewed by Nico van Leeuwen and Robert McDougall. Marinos Tsigas and Alison Weingarden are now incorporating these comments into the dataset. Marinos Tsigas will report on progress on this at the Board meeting.

The first draft of the skills data was also used to develop an aggregation of the GTAP Data Base with 5 labor categories. This data base was used by Tasneem Mirza, Badri Narayanan and Nico van Leeuwen to examine how the additional detail in labor can impact the results of a simulation. This paper is being presented at the conference in an organized session on labor. The paper is available at:

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3390

During his visit, Nico van Leeuwen also spent time investigating the availability of commodity tax data for use in improving this data in the GTAP Data Base. Nico will present an update at the board meeting on the work required to ensure that this data is included in the GTAP 8 Data Base.

Badri Narayanan has also begun the necessary job of overhauling the protection module for the GTAP 8 Data Base.

A draft research memorandum in response to the marine bunkers issue has also been produced by Robert McDougall and Nico van Leeuwen. This will be posted on the website shortly.

Monitoring Data Quality using Comparison Programs (core)

- Priority: Further work on Comparison Programs RMD
- Secondary Priority: Comparing Simulation Results across data bases TH, TW, Grad student

Progress:

The comparison programs developed by Robert McDougall have been used extensively this year to make comparisons between the GTAP 7 and 7.1 Data Bases. The comparisons have assisted us tremendously during the v7.1 release process to improve the EU I-O tables, determine the acceptability or otherwise of other I-O data and in highlighting areas of concern for future improvements. This comparison has been posted on the board website.

https://www.gtap.agecon.purdue.edu/access_board/GTAP7.asp#issues

Versions and Documentation

BN, TW, RMD, AA, TH

- Priority: Documentation (core), Interim releases (core)
- Secondary priority: Multiple Versions of GTAP Data Base (chopping block), Version Control, Documentation of Construction Process (core)

Progress:

The GTAP 7.1 Data Base was released to the board in February and is expected to be released to the public in May. The decision to release to the public reflects the fact that there have been considerable improvements in the EU data and in domestic support.

Obtaining the final chapters to complete the documentation has been very difficult. Missing chapters include the documentation of the United States I-O table, agricultural production targeting, trade, energy and FIT. The documentation can be found at:

http://www.gtap.agecon.purdue.edu/databases/v7/v7_doco.asp

Additional Data Bases (previously non-core)

TW, BN, CL

- Secondary Priority: Examine ways in which we can obtain funding and personnel time to update non-core data in a timely manner (e.g., GHG emissions, land use, migration etc), Africa data, FDI

Progress:

The Center introduced the “Satellite Data and Utilities” this year. These data are available, at a fee, to subscribers of the GTAP Data Base. The fee is intended to assist us in covering the future costs of updating these additional datasets. Data currently posted here includes the non-CO₂ emissions data and the migration data (GMig2) data. Other data to be included in these satellite data, in the near future, are land use, CO₂ emissions and *ad valorem* equivalent estimates of Time as a Barrier to Trade.

The non-CO₂ emissions data was produced by Misak Avetisyan, Steve Rose and Tom Hertel. The data and documentation are available at:

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3191.

On labor migration, Terrie Walmsley has recently completed a new time series bilateral migration data base by gender with Chris Parsons, Caglar Ozden and Maurice Schiff. An earlier version of this data has been used to update the GMig2 Data Base to 2004 and is available on the board website. The time series data base is expected to be made available to the public with the release of a special edition of the World Bank Economic Review. Once the data is released publicly the GMig2 Data Base for version 7 will be updated and released to the public.

The GDyn Data Base has also been updated to the GTAP 7 Data Base and is available to board members and users of the GDyn Model. It is documented at:

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3169

Terrie Walmsley and Csilla Lakatos have also been working with Houssein Boumellassa and Lionel Fontagne to convert the bilateral FDI stocks and flows data base produced by CEPII (Houssein Boumellassa, Christophe Gouel and David Laborde) into GTAP compatible format. A preliminary version of the FDI data is available on the board website at:

http://www.gtap.agecon.purdue.edu/access_board/default.asp

It is expected that this FDI data will be revised by CEPII in May and then released to the public.

Open Sourcing

BN, RMD

- Secondary Priority: Examine ways in which to circulate
-

some of the later-stage modules to contributors (core)

Progress:

To date only the files for the pre-processing of the Domestic Support Data have been shared with Hans Jensen. This allowed Hans to give us some feedback on issues related to problems with the domestic support processing.

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

| <i>Tasks</i> | <i>Individuals</i> |
|--|--|
| Trade and Development <ul style="list-style-type: none">– Priority: documentation of poverty module, dissemination of PE-GE Model, encourage graduate student work on NTBs– Secondary priority: Labor migration | TW, BN, RMD, AA, TH, AR, Graduate students |

Progress:

The PE-GE technical paper and application by Badri Narayanan, Thomas Hertel and Mark Horridge has now been peer-reviewed and released to the public as a GTAP technical paper, along with all the files needed for replication. It is available at:

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3192

Badri would be pleased to collaborate with any consortium members who would like to apply this methodology to a pressing trade policy question facing their agency.

Samiul Hague, a graduate student in the Department, is currently working under the direction of Thomas Hertel, Terrie Walmsley and Fan Zhai to incorporate firm heterogeneity into the GTAP Model using the approach outlined by Fan Zhai in his recent publications on this topic.

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=2307

Thomas Hertel is presently working with Maros Ivanic, Ana Rios and Monika Verma to finalize a GTAP Technical Paper documenting the GTAP poverty module and the methodology for extending it to additional regions. They plan to finalize this during the summer.

On labor migration, Terrie Walmsley and Angel Aguiar are also working with Amer Ahmed from the World Bank on a Dynamic version of the Migration Model (GMig2-Dyn) for a project for the World Bank and the Asian Development Bank to investigate migration policies in Asia.

| | |
|---|--------------------------------------|
| Global Energy and Environmental issues <ul style="list-style-type: none">– Priority: continue to publish papers, develop methodologies for incorporating climate change impacts and GHG mitigation opportunities (non-core) | TH, WT, AG, FT and graduate students |
|---|--------------------------------------|

Progress: There has been a great deal of work underway in this area over the past year. These include research into the economic and environmental impacts of bio-fuels, analysis of the global impacts of

climate change mitigation policies – particularly in agriculture and forestry, and analysis of the impacts of climate change and climate volatility on agriculture and poverty in developing countries.

On the bio-fuels front, Alla Golub, Thomas Hertel and co-authors published in *BioScience* the analysis underpinning California’s Low Carbon Fuel Standard assessment of GHG emissions from global land use change. Farzad Taheripour and Wally Tyner completed a similar study for Argonne National Labs. These researchers have also published economic assessments of other aspects of the global impacts of bio-fuels in a number of other journals. Of particular interest is the recent work, spear-headed by Farzad, to better understand the role of biofuel by-products which are an important source of revenue for the bio-fuels industry, and which also have important implications for the structure of the global livestock sector. More recently, Farzad and Alla revisited the GTAP-BIO Model, GTAP-BIO Data Base and its parameter and improved them in several ways. We anticipate that a new version of the modified bio-fuels data base and model will be released in the near future, coincident with the publication of a journal paper. This will be released as a RunGTAP version archive which will incorporate all the latest features. As such it will provide a good starting point for others seeking to conduct economy-wide analysis of bio-fuels. In addition, Wally, Farzad, and co-authors have provided a comprehensive analysis of land use changes and consequent CO₂ emissions due to US corn ethanol production. These authors merge all modifications made in different versions of GTAP-BIO into a new version called GTAP-BIO-ADV.

The second major area of Energy and Environment research being undertaken in the Center relates to assessment of the potential for agriculture and forestry to make significant contributions to GHG emissions abatement. The data base and modeling framework underpinning this work is documented in the 2009 book edited by Hertel, Rose and Tol. The methodology is more fully developed in the 2010 article in *Resource and Energy Economics* by Golub, Hertel, Lee, Rose and Sohngen. It incorporates into a modified GTAP Model, partial equilibrium marginal cost of abatement curves for agriculture, as well as carbon forest sequestration supply schedules. Those authors find that, while agriculture and forestry account for just 30% of current emissions, they provide 50% of the abatement at \$27/ton CO₂eq.

The final line of research being undertaken in the environment area relates to climate change impacts in agriculture. Most of this work is being undertaken in collaboration with the World Bank. The research has a global component, but the regional focus is on East Africa – particularly Tanzania. Ahmed, Hertel and Diffenbaugh have published a paper in *Environmental Research Letters* documenting the link between increased climate volatility, agricultural production variability and poverty vulnerability. They have also been working closely with climate scientist and geographers to better assess the impact of climate extremes on agricultural productivity.

All of this work depends on the availability of new satellite data bases on land use and GHG emissions. However, the original work undertaken under an EPA funded project was just for the year 2001 (GTAP v.6). Based on interest expressed by board members at the 2009 meeting, these data bases have been updated. The CO₂ and non-CO₂ data bases are already available to board members. The land use data base will be completed and posted prior to the June board meeting.

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

| <i>Tasks</i> | <i>Individuals</i> |
|--------------|--------------------|
|--------------|--------------------|

Actively seek out potential papers for the GTAP Technical Papers (core)

- Priority: Better documentation of GTAP-E Model and data LA, AG, RMD
- Secondary priority: seek out technical papers on issues of relevance to improving the theory of the GTAP Model TW, TH

Progress:

The Dynamic GTAP Model book has now been revised in response to reviewer’s comments and will be sent back to the publisher within the next month. Once we have a date for publication this will be announced. The book will come with a number of applications which will be made publicly available with the release of the book.

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

| <i>Tasks</i> | <i>Individuals</i> |
|--|--------------------------|
| Make short course materials more widely available to public (core) <ul style="list-style-type: none"> – Priority: Thailand course, Internal training of staff and PhD’s, and live forums. – Secondary: webinars, hiring a new person/outsource GTAP courses, encourage more new graduate students to pursue PhD’s in quantitative global economic analysis | TW, GB, MA, new post-doc |

Progress:

In August 2009 the Center held its annual course at UN ESCAP in Thailand. The course included 23 individuals from 15 different countries. The course was very successful at teaching people from the region, who would not otherwise have been able to attend a course at Purdue.

The Center also held two additional ‘Live forums’ for the network. The first in November, 2009 was on the Africa Data Base, and the second in February was on the services trade data. Feedback for these forums has been very positive and staff members have also found this additional interaction with the network helpful.

We were also fortunate to have Tasneem Mirza for a few months before she started work at the ADB. During this time she developed an additional web module on modeling NTMs. It is hoped that more of these modules will be developed and that we will be able to make these available to the network.

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

| <i>Tasks</i> | <i>Individuals</i> |
|---|--------------------|
| Seek a new person to assist with data base work (core) <ul style="list-style-type: none"> – Priority: Mentor new staff | Everyone |

- Secondary: Hire a computer science student and a course coordinator, promotion path for Center staff, Continue to monitor hub and spoke system via internal and external reviews.

Progress:

We have begun to place materials on a staff and graduate student training website to share with new staff and graduate students. Badri Narayanan and Fen Chan (a master’s student at Purdue) have also compiled a *Zotero* data base comprised of all the GTAP applications. We expect to share this data base amongst staff for training purposes as well as to facilitate research and improved referencing of existing applications.

We were very fortunate that Nico van Leeuwen visited the Center during the year. He assisted us in our preparation of the GTAP 8 Data Base and in particular with commodity taxes, the skills data and the energy data.

Unfortunately, Levent Aydin was unable to work for the Center, thus we are still looking for someone to assist us with the energy data. In the next few months we will advertise for a post-doc.

Tasneem Mirza and Nelson Villoria also joined the Center as post docs. Tasneem assisted with the education plan and with a paper on the skills data before going to the ADB in the Philippines. Nelson has been working on an EPA funded project to investigate the change in the pattern of land cover in response to US crop price shocks.

Early in 2010, we advertised for a Research Faculty member to assist with research projects and courses. We interviewed three candidates and recently made an offer to Nelson Villoria. We look forward to Nelson joining the Center in this new capacity on August 15.

We have also begun to develop and collect materials to assist with staff and graduate student training.

In August 2009, we undertook an assessment of Center management following Terrie Walmsley’s relocation to Australia. The report was generally positive and provided us with a few new ideas to improve the functioning of the Center under this new mode of operation. In relation to this Meghan Alexander and Ginger Batta have taken on more responsibilities for the day-to-day activities of the Center, and Meghan Alexander, in particular, has been given more authority to deal with university and board member matters.

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

| <i>Tasks</i> | <i>Individuals</i> |
|---|---------------------------|
| Seek partners and funding opportunities for collaboration (core) – Priority: Consortium institutions and Europe (core) | TW, TH |

Progress:

Janine Pelikan visited the Center for three months to work with Tom Hertel on linking the CAPRI and GTAP Models. This work will be presented by Janine at the conference.

The Center has also been discussing the possibility of a joint position with the LEI. It is expected that Nelson Villoria will take a more active role in furthering this relationship in his new role as Research

Faculty member.

In addition to updating the website, a number of other small changes have been made to the organization. We have included a number of additional web pages to link to other data bases, models and networks. If you would like to include a link to your web page or model please send the details to Ginger Batta.

Terrie Walmsley and Angel Aguiar are now located at the University of Melbourne and are involved in a project with the Asian Development Bank, and has also been asked to review a report undertaken by the Productivity Commission. They also continue to interact with the Centre of Policy Studies at Monash University.

Proposed Activities over the next year and beyond

The goals and objectives are discussed in detail in sections IV, V and VI below. Here we include a summary of the proposed objectives.

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

| <i>Tasks</i> | <i>Individuals</i> |
|--|-----------------------------|
| Improving the quality of contributed I-O data (core) <ul style="list-style-type: none">– v8: peer review system and reviewer guidelines, chopping block, dwellings, update sectoral concordances, Annual report– Tertiary priority: Incorporation of Metadata and treatment flags, adjust I-O contributor requirements to include domestic margins, I-O disaggregation module | BN, AA, TW, RMD |
| Addition and Improvement of Other Datasets (core) <ul style="list-style-type: none">– v8: Protection module improvements: factor taxes, skill splits, Commodity taxes, energy– Tertiary Priority: domestic margins | RMD, BN, TW, USITC |
| Monitoring Data Quality using Comparison Programs (core) <ul style="list-style-type: none">– Priority: Comparison Programs– Secondary Priority: Comparing Simulation Results across data bases | RMD TH, TW, Grad student |
| Versions and Documentation <ul style="list-style-type: none">– Priority: Documentation (core), v8 Pre-releases (core), Multiple Versions of GTAP Data Base (chopping block)– Secondary priority: Version Control, Documentation of Construction Process (core) | BN, RMD, AA, TW |
| Additional Data Bases (previously non-core) <ul style="list-style-type: none">– Priority: Make available CO2 emissions data base, Time as a Barrier Data Base and the GMig2 data | TW, TH and AG |

– Secondary Priority: NTBs

7. **Research Goal:** To actively participate in quantitative economic analysis of pressing global concerns.

| <i>Tasks</i> | <i>Individuals</i> |
|---|--|
| Trade and Development <ul style="list-style-type: none"> – Priority: Papers related to NTBs, Africa, and utilizing GDyn Model – Secondary priority: Papers on Labor migration | TW, BN, RMD, AA, TH, AR, Graduate students |
| Global Energy and Environmental issues <ul style="list-style-type: none"> – Priority: continue to publish papers, incorporate second generation bio-fuels into GTAP, incorporate water and river basins into a modified GTAP Model, and improve representation of mitigation opportunities in agriculture and forestry. (non-core) | TH, WT, AG, FT and graduate students |

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

| <i>Tasks</i> | <i>Individuals</i> |
|--|---------------------------------|
| Actively seek out potential papers for the GTAP Technical Papers (core) <ul style="list-style-type: none"> – Priority: GTAP-E Model and Data, Documentation of poverty module, Firm Heterogeneity Model, GDyn-E Model – Secondary priority: seek out technical papers on issues of relevance to improving the theory of the GTAP Model | AG, RMD TW, TH AG, TH, MA |

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

| <i>Tasks</i> | <i>Individuals</i> |
|--|--------------------|
| Make short course materials more widely available to public (core) <ul style="list-style-type: none"> – Priority: Short course at Purdue and course in Ethiopia in March 2011, Internal training of staff and PhD's, and live forums – Secondary: Education plan | TW, GB, MA |

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

| <i>Tasks</i> | <i>Individuals</i> |
|--|--------------------|
| Seek a new person to assist with data base work (core) – Priority: seek a post-doc to work on energy data | Everyone |

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

| <i>Tasks</i> | <i>Individuals</i> |
|---|--------------------|
| Seek partners and funding opportunities for collaboration (core) – Priority: Look for opportunities to collaborate with the LEI (core) | TW, TH, NV |

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

In this section, we first outline in detail the progress made in the last year with the GTAP 7 Data Base, documentation and issues reporting. Second, priorities for future releases related to the GTAP 8 Data Base. Finally, we summarize the situation regarding other data activities being undertaken.

The GTAP 7.1 Data Base: Review of Progress

A brief overview of the history of the GTAP Data Base is provided on the website:
<http://www.gtap.agecon.purdue.edu/about/history.asp#db>

Within the next week the first interim release of the GTAP 7 Data Base will be made available to the public. The following changes were incorporated into version 7.1:

- a) The latest European I-O tables from Marc Mueller have been included, after being adjusted to match the GTAP format by Csilla Lakatos and Scott McDonald.
- b) Removal of Myanmar. As a result of feedback from David Laborde we have removed Myanmar from the GTAP 7.1 Data Base.
- c) Adjustments to the EU macro data.
 - a. Initial comparisons were made between the GTAP macro data and the macro data from the updated EU I-O tables which revealed discrepancies. Our primary source for macroeconomic data is the World Bank. The World Bank relies on National Income Account (NIA) data from the OECD for high-income countries. While some of these discrepancies are expected, due to different harmonization procedures of the OECD and EUROSTAT, we were able to confirm that OECD NIA data had been updated. The largest adjustments were made to Hungary, Greece, and Bulgaria.
 - b. During this investigation, we were also able to fill in some missing data for the EU. In version 7, private and government consumption for Belgium, Cyprus, Luxembourg, and Malta were missing and had to be estimated. In version 7.1 we use the estimates from EUROSTAT provided by Marc Mueller.
- d) Cotton support estimates from the OECD were revised. Gaspar Frontini (European Commission) noted some discrepancies in the computation of US cotton subsidies in GTAP 7 Data Base. Further in-house investigation found that the current level of aggregation at which the OECD domestic support data were being contributed did not allow us to arrive at an accurate figure for cotton subsidies, since the subsidies for GTAP sectors PFB, V_F and OCR were aggregated. Subsequently, OECD gave us the subsidies broken up among these three sectors and this has been fixed in v7.1.
- e) EU Domestic support data in GTAP 7 Data Base was constructed based on the assumption of equalized rates of domestic support across crop sectors. Hans Jensen has contributed the revised estimates of EU domestic support, with categories of activity-generic, group-generic and activity-specific payments, as for other OECD member countries in GTAP 7 Data Base. This has been incorporated in GTAP 7.1 Data Base.
- f) Updated I-O tables for China from Zhan-Ming Chen and Vietnam from James Giesecke have been added.
- g) In the Time Series Trade Data, non-zero intra-regional trade flows have been reported for China for the years 2005 and 2006. This is due to incorrect reporting and has been fixed in GTAP 7.1 Data Base, by zeroing out these flows.

Data Base Documentation

A great deal of the documentation for the GTAP 7 Data Base is already available on the GTAP website. Twenty-three of the 31 primary chapters have already been posted on the website and the remaining chapters will be posted in a few months. Of the I-O table documentation, we are only waiting on documentation for the USA and Kyrgyzstan (we do not expect to receive documentation for Kyrgyzstan as it was part of a project which has been finalized and the contributor is no longer responding). Please note that in future IO tables must be contributed with draft documentation. This will ensure some documentation is obtained and assist with the review process. We would like to strongly encourage all board members who supported the contribution of these countries or of other datasets to assist us in obtaining the remaining documentation, as this is a very important part of dissemination of the data base. The documentation can be found at:

http://www.gtap.agecon.purdue.edu/databases/v7/v7_doco.asp

Future GTAP Data Base Releases

The GTAP 8 Data Base

The Center is now preparing for the release of the GTAP 8 Data Base. Under the current schedule, we are hoping to obtain initial data inputs during May and June, for a first pre-release by July 2010.

In order to meet the needs of the GTAP Network, the Center has decided to have two base years for GTAP 8 Data Base. Almost all of the data contributors have agreed to contribute the necessary inputs for 2004 and 2007, so that we can construct v8 with both base years on a fully consistent and comparable basis. This is an attempt towards ensuring time-series data available with GTAP Data Base versions in the future. In the past, each version has had many improvements, which had usually meant changes in methodologies, leading to lack of comparability across different versions of GTAP Data Base. The move to multiple base years is likely to be very valuable to our network members and we'd like to thank all of those contributors who will make this possible.

Although this is expected to have some impact on the time it will take to produce version 8, we are aiming for a final release to the public in the latter half of 2011. The following contains a list of areas in which progress has already been made towards version 8.

I-O Tables

The Annual Report on I-O tables is available in the board meeting supplementary materials:

http://www.gtap.agecon.purdue.edu/events/Board_Meetings/2010/supp_material.asp

The main issue raised in the Annual I-O Table Report, and in the report by Robert McDougall comparing versions 7 and 7.1, is the clear deterioration in the availability of dwellings data obtained from I-O table contributors. In particular this is a serious issue in the EU I-O tables. During the GTAP 8 Data cycle, Angel Aguiar will build a module that replaces zero or bad dwellings data with data obtained from the representative table and/or international data sources. Angel is currently reviewing the tables and available data to examine the issue. Further details on this can be obtained in the Annual I-O Table Report in the supplementary materials.

Moreover, for the first time in the development of the GTAP Data Base, the number of countries in the data base fell, from 113 in version 7 to 112 in version 7.1. With an increased emphasis on the quality of incoming I-O tables, we expect that expansion in country coverage will slow considerably in upcoming releases. With Angel Aguiar now fully on board we can also implement the peer review process discussed in previous board meetings and further develop the tools and web-based materials available to contributors to assist them in contributing quality I-O tables. This will include making the GAMs program developed by Scott McDonald publicly available, along with our other GEMPACK materials.

Protection Data

Considerable improvements have been made on the protection data over the last few GTAP versions with the production of the MACMaps dataset by ITC-Geneva, the collaboration between ITC-Geneva and CEPII in the making this dataset available to the GTAP Data Base and the further collaborations with Monash University in the production of TASTE. We hope that we can continue to offer the GTAP community state-of-the-art protection data which are fully integrated into the global GTAP Data Base, as well as synchronized with the TASTE software for conducting HS-6 level policy experiments.

Export Subsidies

Aziz Elbehri has contributed agricultural export subsidies data for most of the previous versions of GTAP Data Base. However, he has indicated that he will not be able to contribute for GTAP 8 Data Base, owing to his work responsibilities. David Laborde has kindly agreed to contribute this data for GTAP 8 Data Base in near future. Aziz Elbehri has also generously volunteered to assist the new contributor with this transition.

The Protection Construction Module

With all the improvements in the sources of protection data in recent versions, the Center now plans to revise the protection module in GTAP Data Base Construction Process to fix some of the known errors, and improve ease of maintenance, by removing the sub-modular structure and updating to current best practice for programs. Taxes on intermediate usage, non-agricultural output subsidy rates from the I-O tables and tariffs on zero-trade flows, which are all removed in the current protection module, will be retained as a result of the improvements in the module. Handling of domestic support will also be rationalized to ensure that its input is fed into protection module. There are a few other and much more complex issues related to handling of travelers' expenditure, which we also hope to address, although this may not be completed during the version 8 cycle.

Energy Data

Significant improvements have been made to the energy price and volumes data during versions 6 and 7. Further revisions however will require a post-doc who is knowledgeable in this area.

Nico van Leeuwen has improved the treatment of energy volumes data for international marine bunkers. This improvement will be incorporated in GTAP 8 Data Base. A draft research memorandum on this issue has also been produced by Robert McDougall and Nico van Leeuwen. This will be posted on the website shortly.

Taxes

Commodity Taxes

We have become aware of a number of issues concerning tariffs and commodity taxes. The most important of these is the elimination from the final data base of information in contributed I-O tables on taxes on non-energy inputs into non-agricultural industries. We expect to address these through an overhaul of the relevant modules (final assembly, I-O table fitting, and protection) in the GTAP 8 cycle.

We also plan to incorporate commodity taxes into the GTAP 8 Data Base. A memo on the expected revisions to commodity taxes has been made available in the supplementary materials and Nico van Leeuwen will discuss this at the board meeting.

Value Added

Skill shares

The current methodology for splitting labor in value added across skilled and unskilled workers dates back to contributions made by Liu, Jing, Nico van Leeuwen, Tri Thanh Vo, Rod Tyers and Thomas Hertel to the GTAP 4 Data Base. Thanks to Bob Koopman and the USITC, resources have now been provided to update the skill shares in the GTAP 8 Data Base. Marinos Tsigas and Alison Weingarden recently contributed a preliminary version of the skill-splits dataset with labor broken out into 5 skill categories. Nico van Leeuwen and Robert McDougall have provided feedback on this and further improvements are expected from USITC later this year.

Other Data Related Activities: Progress and Priorities

Future Directions for TASTE: Tariff Analytical and Simulation Tool for Economists

The TASTE program has been a very successful tool in assisting GTAP users to aggregate and prepare tariff shock files. Last year David Laborde and Mark Horridge presented a proposal to extend TASTE. Unfortunately funding was not obtained. The proposal is again included in the supplementary materials.

GTAP Africa Proposal

The GTAP Africa Data Base, based on the GTAP 6 Data Base, was publicly released in December 2008. It includes data for 39 regions (30 African regions and 9 other aggregated regions) and the 57 sectors of the GTAP Data Base. As of April 20, 2010, 162 individuals have downloaded the GTAP Africa Data Base.

<http://www.gtap.agecon.purdue.edu/databases/Africa/default.asp>

We continue to be involved in efforts to improve the African data and are interested in any potential funding sources for continuing and extending the previous Africa Data and Capacity Building project which concluded earlier this year. A detailed GTAP Africa proposal, including some of the activities that the Center could be engaged in, is included in the supplementary materials.

In addition, many of the countries in Southern Africa are also on the Chopping Block for potential exclusion from the GTAP Data Base in versions 8 and 9. TIPS, South Africa, have expressed an interest in working with us to update the Southern African I-O tables. They are also interested in hosting a course.

We are also currently involved in efforts to develop an African modeling network (AGRODEP) and we hope to hold a course in conjunction with the UNECA in March 2011.

Global FDI Data

A global bilateral multi-region multi-sector foreign direct investment (FDI) stocks and flows database has been contributed to GTAP by Houssein Boumellassa, Christophe Gouel and David Laborde from CEPII (Centre d'Etudes Prospectives et d'Informations Internationales) as a result of a project initiated by DG Trade of the European Commission. This database is fully consistent, balanced and suitable for use in CGE work. This has now been extended to all 57 GTAP sectors by Csilla Lakatos and Terrie Walmsley. Both stocks and flow data are available. We expect these to be updated in May and released to the public shortly thereafter. These can be found on the website at:

http://www.gtap.agecon.purdue.edu/access_board/default.asp

Satellite Data and Utilities

In last year's issues report and board meeting the issue of updating the additional datasets that the Center produces as a result of its research activities was raised. The main problem with updating these datasets is our inability to obtain funding for such activities. This year we introduced the Satellite Data and Utilities which are available to GTAP Data Base subscribers for an additional fee:

<http://www.gtap.agecon.purdue.edu/databases/Utilities/default.asp>

| GTAP Satellite Data and Utilities Pricing | |
|--|--------------|
| License Types | Price |
| Single Academic User License | \$200 |
| Multiple Academic User License | \$400 |
| Government/Private Sector User License | \$1,335 |

The Satellite Data and Utilities currently include two datasets and we have plans to add more:

- GTAP 7 Non-CO2 Emissions Data Base
- Documented in *Development of the Preliminary Version 7 Non-CO2 GHG Emissions Dataset*
- GMig2 Data Base: FlexAgg 6 package
- This is a DOS based aggregation program to produce data for the GMig2 Model. Documented in *A Global Bilateral Migration Data Base: Skilled Labor, Wages and Remittances*

The non-CO₂ emissions data for the GTAP 7 Data Base was produced by Misak Avestisyan, Steven Rose and Thomas Hertel. This data is available to network members through the Satellite Data and Utilities

and via the board website.

At the board meeting we will hear more about some of the developments in the satellite datasets and utilities.

Time as a Barrier

Peter Minor has been working on adapting David Hummels' time to trade estimates to produce a global dataset of estimates of time to trade for CGE/GTAP analysis. This dataset is expected to be made available as part of the Satellite Data and Utilities later this year.

V. Research: 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 and Environmental issues.

Trade and Development

Trade and development continue to offer important opportunities for the Center in terms of research and data base development. Whenever possible funding is sought for research related projects in trade economic development, however certain tasks, such as the continued development of the Dynamic GTAP Model are considered core. The number of research challenges in the area of trade and development continues to grow. Below are those areas where the Center hopes to continue to influence research.

Dynamic Model Applications

The Center continues to work on applications and extensions of the GDyn Model. Current projects include:

“Modeling cross-border investment in CGE: some alternatives and mechanisms” by Lakatos, Csilla and Terrie Walmsley. In this paper the global trust in the GDyn Model, used to allocate saving across foreign investments, is replaced with a bilateral allocation.

Terrie Walmsley and Anna Strutt recently incorporated the financial crisis into the GDyn Model in a project for UN Economic and Social Commission for the Asia Pacific. This will allow us to have a baseline for other projects that includes the financial crisis.

Angel Aguiar and Terrie Walmsley have recently developed a dynamic version of the migration model (GMig2-Dyn). This model is being used in a project for the World Bank and the Asian Development Bank to investigate the impact of migration within Asia. It was also used to investigate the impact of US policies to address undocumented workers from South America.

In addition considerable work is being undertaken to include land use and GHG emissions in both the static and dynamic models by Misak Avetisyan, Alla Golub, and Thomas Hertel (see below).

Poverty

Thomas Hertel is presently working with Maros Ivanic, Ana Rios and Monika Verma to finalize a GTAP technical paper documenting the GTAP poverty module and the methodology for extending it to additional regions. We plan to use this extended version to examine the poverty impacts of bio-fuels, climate change and climate policy. There is some interest in using and extending the poverty module to examine issues related to Africa for the Africa project.

Incorporating New Trade Theory

Samiul Hague, a graduate student, is currently working under the direction of Thomas Hertel, Terrie Walmsley to incorporate firm heterogeneity into the GTAP Model using the approach outlined by Fan Zhai.

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=2307

Non-Tariff Barriers

Tasneem Mirza, with Thomas Hertel, has examined the impact of improving border logistics through increased trade-related productivity which reduces effective prices and increases trading competitiveness. This work was presented at the 12th Annual Conference in Chile.

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3127

Trade Policy

Amanda Leister, funded under a USDA National Needs Fellowship, is studying the impact of the proposed Special Safeguard Mechanism under the WTO, using both CGE and econometric methods. This work will be presented at the conference.

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3365

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3380

Sohini Chowdhury, a graduate student in the Department of Economics at Purdue University is investigating the discriminatory nature of the specific tariffs levied by industrialized countries like the EU, USA, Japan and Southeast Asia on their agricultural imports. In order to investigate this she has both PE models, as well as the GTAP model. This work was presented at the 12th Annual Conference in Chile.

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3031

Migration

Terrie Walmsley is currently working on a number of fronts to further develop the migration model and data base. In addition to incorporating dynamics (with Angel Aguiar), Walmsley is also working with Chris Parsons (and others at World Bank) to obtain time series data on the gender (and eventually the age) of migrants.

“Measuring the Impact of the Movement of Labour Using a Model of Bilateral Migration Flows”, by Terrie Walmsley, Alan Winters and Amer Ahmed is a revision of the GTAP technical paper and has been submitted to a special edition of World Bank Economic Review.

“The Evolution of Global Bilateral Migration 1960-2000”, by Caglar Özden, Chris Parsons, Maurice Schiff, and Terrie Walmsley documents this new time series migration database. The paper and database are expected to be released as part of a special edition of World Bank Economic Review.

Global Energy and Environmental issues

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 bio-fuels policies. These are broad topics, so the Center’s current work agenda is emphasizing the land use, agriculture, forestry and poverty dimensions of these policies. These topics are of increasing importance in global economic policy, as evidenced by the diversion of funding and resources by government and academic institutions towards them. During the Center’s 2008 strategic planning retreat, this area of work was highlighted as a new priority area for the Center. However, this work is still in its relative infancy, and there are significant opportunities and challenges ahead where the Center can clearly play the role of a global research leader in analysis of the global land use and poverty impacts of energy, environment and climate issues.

In order to establish the Center as a global research leader in these areas, peer-reviewed publications are essential. Below is a list of papers in this area that have recently emerged from the Center. As can be seen from the list of authors, this work has increasingly been drawing us into inter-disciplinary collaborations with climate scientists, ecologists and geographers.

| <i>Title/Objective of paper</i> | <i>Timeline</i> | <i>Authors</i> |
|--|---|---|
| Global Impacts of Bio-fuels | Published in <i>The Energy Journal</i> | Thomas Hertel, Wally Tyner, and Dileep Birur |
| The Indirect Land Use Impacts of US Biofuel Policies: The Importance of Acreage, Yield and Bilateral Trade Responses | Published in the <i>American Journal of Agricultural Economics</i> | Roman Keeney and Thomas Hertel |
| Bio-fuels and their Byproducts: Global Economic and Environmental Implications | Published in <i>Biomass and Bioenergy</i> | Farzad Taheripour, Thomas Hertel and Wally Tyner, Jayson Beckman and Dileep Birur |
| Global livestock impacts of bio-fuels | Incorporated in the UN-FAO State of Food and Agriculture Report, currently under journal review | Farzad Taheripour, Thomas Hertel, Wally Tyner |
| Bio-fuels and Commodity Market Volatility | Presented at an NBER workshop in March and at the EAAE meetings in Berlin | Thomas Hertel and Jayson Beckman |
| Effect of GHG Mitigation Policies on Livestock Sectors | Report prepared for FAO and paper prepared for the 13 th GTAP conference | Alla Golub, Benjamin Henderson, Thomas Hertel, Steven Rose, Misak Avetisyan |
| PE model of cellulosic ethanol | Draft paper | Wally Tyner, Farzad Taheripour |
| Land use and GHG emissions abatement | Published in <i>Resource and Energy Economics</i> | Alla Golub, Thomas Hertel, Huey-Lin Lee, Brent Sohngen, Steve Rose |
| Effects of US Maize Ethanol on Global Land Use and Greenhouse Gas Emissions: Estimating Market-mediated Responses | Published in <i>BioScience</i> | Thomas Hertel, Alla Golub and collaborators from UC Berkeley |
| GHG emissions from indirect land use change due to bio-fuels | Published in <i>BioScience</i> | Alla Golub, Thomas Hertel and collaborators from UC |

| | | |
|---|---|--|
| Bio-fuels data base | GTAP Research Memorandum | Farzad Taheripour, Dileep Birur, Wally Tyner |
| Climate Volatility and Poverty Vulnerability | Published in <i>Environmental Research Letters</i> | Amer Ahmed, Noah Diffenbaugh, Thomas Hertel, Navin Ramankutty and Pedram Rowhani |
| Validating the GTAP-E Model | Under third round review with <i>Energy Economics</i> | Jayson Beckman, Thomas Hertel and Wally Tyner |
| Economic Analysis of Land Use in Global Climate Change Policy | Routledge, 2009 | Edited by Tom Hertel, Steven Rose, and Richard Tol |
| Land Use Changes and Consequent CO ₂ Emissions due to US Corn Ethanol Production: A Comprehensive Analysis | Report Prepared for Argonne National Labrotary, 2010 | Wally Tyner, Farzad Taheripour, Qianlai Zhuang, Dileep Birur, Uris Baldos |
| Economic and Environmental Consequences of US Corn Ethanol Production: A Comprehensive Analysis | Paper prepared for the 13 th GTAP conference | Farzad Taheripour, Wally Tyner, Tom Hertel, Alla Golub, Dileep Birur, Uris Baldos, Qianlai Zhuang, |

Future Projects

Currently Taheripour is taking the lead to introduce the first and the second generations of bio-fuels into the GTAP Data Base version 7 and the latest version of GTAP-BIO-ADV. This will open a new line of research on bio-fuels and their environmental and economic implications. We will be adding cellulosic bio-fuels to GTAP-BIO-ADV. With funding from US-DOE and USDA Hertel, Taheripour, Tyner and Liu are also working on a GTAP-compatible representation of water in the form of river-basins (somewhat analogously to the land use/Agro-ecological Zone data base). This is being undertaken in collaboration with an hydrologist at the University of Illinois (Ximing Cai) (non-core). In addition, Tyner, Taheripour, and Sarica (a new Post Doc at Purdue) are planning to make a soft link between MARKAL (an energy model) with GTAP-BIO-ADV to study alternative pathways of energy production.

We are in discussions with US-DOE regarding development of a special version of the GDyn Model which adequately incorporates energy, GHG emissions and abatement possibilities. The new GDyn Model will cover biofuel sectors as well. This project will be jointly undertaken with the US-DOE, with a focus on international investment leakage, among other things.

On a methodological front, Keeney and Hertel have been conducting research on the endogenous response of crop yields to the higher prices induced by bio-fuels. This includes both the intensive margin (higher yields on existing land) as well as the extensive margin (potentially lower yields as cropland expands into more marginal areas). One paper has been published and another is in process. In a similar vein, Villoria and Hertel have conducted an econometric investigation into the global pattern of land cover change in response to US crop price shocks. They test the two main competing hypotheses – the Armington (product differentiation) and Integrated World Markets hypotheses and reject the latter in

favor of the former. This is important as it determines where the bio-fuels-induced land use change is most likely to occur. In addition, Taheripour and Zhuang (our colleague at the Department of Earth and Atmospheric Science at Purdue) have used a Terrestrial Ecosystem Model (Tem) to evaluate productivity of forest and pastureland versus exiting cropland across the world at the AEZ level. A combination of this work and the work done by Kenney and Hertel in this area could generate a solid base to provide a set of regional land conversion factors at the AEZ level.

Finally on the bio-fuels front, Golub, Hertel, Taheripour and Tyner are just finalizing a book chapter which reviews and synthesizes all of their work on CGE analysis of bio-fuels. They will be happy to share this with any board members who would like to review this draft manuscript.

Based on the foundational work published in the 2010 issue of *Resource and Energy Economics* by Golub, Hertel, Lee, Rose and Sohngen, Golub, Hertel and Rose are undertaking a research project with the UN-Food and Agriculture Organization (FAO), focusing specifically on abatement possibilities and impacts in the global livestock sector. A final report will be available in the coming months and a paper based on this work will be presented at the conference in Penang.

In the area of climate change impacts, Tom Hertel and Stephanie Rosch (a Purdue graduate student) are just completing a survey paper on climate, agriculture and poverty. This will be published in the third quarter issue of *Applied Economic Perspectives and Policy*.

VI. The Model, Education and the Network

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

Investment and Dynamics

The Dynamic GTAP Model book has now been revised in response to reviewer's comments and will be sent back to the publisher this month. Once we have a date for publication this will be announced.

Once the book is released, public access to the GDyn Model will increase. Currently people interested in GDyn must come to a course to gain access to the RunGDyn software and model applications. The book will allow people to teach themselves and will come with applications. The RunGDyn software is also being replaced with the more general RunDynam software which can be purchased from the Centre of Policy Studies at Monash University. We do have some concerns about how this might impact the quality of papers using the GDyn Model. We will continue to control distribution of the GDyn Data Base and assess the situation.

Model Linking

The PE-GE technical paper and application by Badri Narayanan, Thomas Hertel and Mark Horridge has now been peer-reviewed and released to the public as a GTAP Technical Paper, along with all the files needed for replication. It is available at:

http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3192

The technical paper was also published in Economic Modelling:

Narayanan, Badri G., Hertel, Thomas W. and Horridge, J. Mark (2010). "Disaggregated data and trade policy analysis: The value of linking partial and general equilibrium models", *Economic Modelling* 27 (3): 755-66.

Badri would be pleased to collaborate with any consortium members who would like to apply this methodology to a pressing trade policy question facing their agency.

With increased interest in the local as well as global environmental impacts of national policies, the demand for multi-scale models is increasing. While GTAP is well-suited to assess the global impacts of policies such as bio-fuels mandates, it is less well-suited to identifying the local environmental impacts of such policies. In a recently published paper, Wolfgang Britz and Tom Hertel provide such a multi-scale analysis of EU biodiesel policies, blending the GTAP and CAPRI Models. In order to do so, they modify the GTAP Model to incorporate a maximum revenue function which is calibrated to reproduce essential features of the CAPRI Model. With this in place, they simulate the global impacts of EU biodiesel expansion. The resulting equilibrium prices changes may be passed back to CAPRI to determine the local environmental impacts of these policies within the EU.

Further work along these lines is now being undertaken by Britz, Pelikan and Hertel. Janine Pelikan visited the Center for three months from January to March, 2010 to work with Tom Hertel on a linkage between the CAPRI Model of EU agricultural production and resource use with the GTAP Model. During this time, she wrote a paper together with Thomas Hertel and Wolfgang Britz which links the CAPRI and GTAP Models through a common supply system, as characterized by a multi-product, restricted revenue function for the EU crops sector. The paper analyzes the global, EU and regional effects of introducing a bio-diversity targeted set-aside program in the EU. Wolfgang Britz has organized a special session at the upcoming conference in Malaysia focused specifically on this theme. Janine will present this work during that session. This paper is available on the website at:

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

Last year we outlined a number of concerns about the education of users in the GTAP Model. The 5 key challenges for GTAP in this area are outlined again below:

- How to satisfy demand for short courses given limited resources?
- How to help network members gain advanced knowledge on model development and the data base?
- How to cater for and raise the quality of untrained users who cannot afford our courses (or for whom places are unavailable due to supply constraints)?
- How do we educate policy makers in the GTAP Model and Data Base?
- How to train visitors, grads and new staff members quickly so they can be more productive?

Below is a summary of some of the progress made and future directions in education:

- Internal Training of Staff, graduate students and visitors:
 - A website has been started to share training materials between staff and graduate students.
 - Badri Narayanan is currently working on the documentation of the data base construction process.
 - Badri Narayanan and Terrie Walmsley will be participating in a GAMs course in July 2010.
 - Badri Narayanan has taken over the GTAP Seminar Series. Seminars have been undertaken by Sohini Chowdhury, Janine Pelikan, Alla Golub, and Angel Aguiar. Further details are available on the website: <http://www.gtap.agecon.purdue.edu/about/seminars.asp>
- For untrained users:
 - The Center held another two ‘Live forums’ for the network this year. The first in November, 2009 was on the Africa data base, and the second in February was on the services trade data. As Nico van Leeuwen was visiting it was an ideal opportunity to have both Robert McDougall and Nico van Leeuwen available to answer questions. These “live forums” are available for viewing at:
<http://www.gtap.agecon.purdue.edu/events/Forums/default.asp>.
Feedback for these sessions has been very positive and staff members have also found this additional interaction with the network helpful.
- For advanced users:
 - We were fortunate to have Tasneem Mirza for a few months before she started work at the ADB. During this time she developed an additional web module on modeling NTMs. It is hoped that more of these modules will be developed and that we will be able to make these available to short course participants following the course.
 - Nelson Villoria recently accepted an offer for the Research Faculty member position. One of Nelson’s responsibilities will be to run additional short courses – we plan to offer two courses will be offered next year. Additional courses will also be held overseas.

- In addition Terrie Walmsley will be teaching the graduate GTAP course jointly with Tom Hertel in both Purdue and Melbourne. During this time they hope to revise and extend the course.
- For Policy Makers
 - There is some concern amongst staff that this is not our strengths. We would therefore require the assistance of board members to undertake these courses.

The website has also undergone a number of changes:

- Since this is a network website and not just about the Center we have included a few additional web pages to highlight other data and models from the network. We would like to encourage you to send us links to your own models and materials.

http://www.gtap.agecon.purdue.edu/about/data_models.asp.

http://www.gtap.agecon.purdue.edu/about/trade_networks.asp

- One web page which is in great need of updating is the “Project” web page.

<http://www.gtap.agecon.purdue.edu/about/project.asp>

We would like to document some of the great work the network is doing using GTAP for policy relevant research on this page. As mentioned in the introductory letter, we would be grateful if you could send us a paragraph or two on policy relevant research your group or agency has done in the past 10 years. In so doing please describe the topic, a bit about the research, and how the research was used in the policy process. You can submit as many illustrations like this as you like, but we probably will not be able to use more than two per agency. We will compile these and produce a brochure describing the real world policy relevant research you have been doing. This kind of documentation could be useful to all of us in communicating with policy makers and the public about the importance of our research. We will also use this information to update the project web page.

VII. 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

Over the last few years the Center has been looking for new staff members to assist with the production of the standard GTAP Data Base, including working on I-O tables, energy, and taxes. Recent new hires and visitors have assisted the Center in addressing some of its immediate concerns; however with growth in Climate change and energy related research there is a need to find a post-doc who can assist with this data.

The Center recently advertised for a Research Faculty member to assist with research projects and courses. We interviewed three candidates and recently made an offer to Nelson Villoria. We look forward to working with Nelson in the future.

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.

| <i>Robert McDougall</i> | <i>Badri Narayanan</i> | <i>Angel Aguiar</i> | <i>Terrie Walmsley</i> | <i>Thomas Hertel</i> | <i>Nelson Villoria</i> | <i>Alla Golub</i> | <i>Graduate Students</i> |
|---|---------------------------------------|------------------------------------|--------------------------------------|---|--------------------------|--------------------------------------|-----------------------------------|
| 100% core | 100% core | 100% Nov | 100% core | 25% core | 50% Projects and courses | 100% Special Projects | Various |
| Documentation of v7 | Oversee release strategy | Documentation of v7 | Assist with I-O tables | Assist with GTAP Conference | Short courses | Dynamic GTAP Model Applications | Comparison programs |
| Comparison programs | Website and data documentation | I-O Tables and peer review process | GTAP Short Course and education plan | Poverty Module | Research | Land Use and Environmental Modelling | Meta data |
| Short Course | Version control | I-O Table Documentation | Grad Student Projects | Grad Student Projects | Satellite Data | Satellite data | Trade pre-processing |
| Energy | Documentation of construction process | I-O Educational materials | Conference and Board Meeting | Global impacts of climate mitigation policies | | | Short Courses and education plan |
| Trade and services trade pre-processing | Protection Module | Pre-processing of macro data | Skills Data | Climate change impacts | | | Pre-processing of macro data |
| Taxes | Short Course | Dwellings | Dynamic Model | Satellite data | | | Agricultural Production Targeting |
| Transportation Margins | Seminar series and live sessions | Research | New Africa Project | | | | Elasticities |
| I-O Disaggregation | Research | Agricultural Production Targeting | Migration research | | | | Protection and taxes – test |
| Meta-data | | | Satellite data | | | | |

VIII. Other Business

Research Fellows

Antoine Bouët will report on the committee's decisions at the Board meeting. The committee includes Antoine Bouët (Committee Chair), Thomas Hertel, Willem van der Geest, and Richard Tol. Meghan Alexander and Ginger Batta provide support in collecting CVs and providing an online forum, respectively. The CVs of the research fellows are included in the supplementary material in your folder and are available on the website at:

http://www.gtap.agecon.purdue.edu/events/Board_Meetings/2010/supp_material.asp

Conference Proposals

Penang, Malaysia 2010

Mia Mikic will welcome us to Penang and present an update on preparations for the 2010 conference at the board meeting. This event is being hosted by the UN Economic Commission for Asia and the Pacific.

Venice, Italy 2011

In January 2009, the board approved the final proposal from the Fondazione Eni Enrico Mattei (FEEM) and the Department of Economics of the Ca' Foscari University of Venice to hold the 14th Annual Conference on Global Economic Analysis in Venice, Italy. Note that this event will take place in late June due to local constraints. A copy of the proposal is contained in the supplementary materials on the website at:

http://www.gtap.agecon.purdue.edu/events/Board_Meetings/2010/supp_material.asp

Geneva, Switzerland 2012

In May 2010, the board approved the final proposal from the Economic Research and Statistics Division and Institute for Training and Technical Cooperation, World Trade Organization; the Division of Market Development and the Division for Country Programs International Trade Centre (United Nations/WTO); and the Division of International Trade in Goods and Services and Commodities, UN Conference on Trade and development (UNCTAD) to hold the 15th Annual Conference on Global Economic Analysis in Geneva, Switzerland. A copy of the proposal is contained in the supplementary materials on the website at:

http://www.gtap.agecon.purdue.edu/events/Board_Meetings/2010/supp_material.asp

New Technical Paper, Working Papers and Research Memoranda

New Technical Papers

Linking Partial and General Equilibrium Models: A GTAP Application Using TASTE
by Badri Narayanan, Thomas Hertel and Mark Horridge
GTAP Technical Paper No. 29, 2010

New Working Papers

Validating Energy-Oriented CGE Models
by Jason Beckman and Thomas Hertel
GTAP Working Paper No. 54, 2010

Global Land Use and Greenhouse Gas Emissions Impacts of U.S. Maize Ethanol: The Role of Market-Mediated Responses

by Thomas Hertel, Alla Golub, Andrew Jones, Michael O'Hare, Richard Plevin and Daniel Kammen

GTAP Working Paper No. 55, 2009

Disaggregated Data and Trade Policy Analysis: The Value of Linking Partial and General Equilibrium Models

by Badri Narayanan, Thomas Hertel and Mark Horridge

GTAP Working Paper No. 56, 2009

Predicting Expenditure Patterns across the Income Spectrum using International Cross-Section Estimates*

by Monika Verma, Thomas Hertel and Paul Preckel

GTAP Working Paper No. 57, 2009

Implications of the Bio-fuels Boom for the Global Livestock Industry: A Computable General Equilibrium Analysis

by Farzad Taheripour, Thomas Hertel and Wally Tyner

GTAP Working Paper No. 58, 2010

The Poverty Implications of Climate-Induced Crop Yield Changes by 2030

by Thomas Hertel, Marshall Burke and David Lobell

GTAP Working Paper No. 59, 2010

Commodity Price Volatility in the Biofuel Era: An Examination of the Linkage between Energy and Agricultural Markets

by Thomas Hertel and Jayson Beckman

GTAP Working Paper No. 60, 2010

Research Memoranda

Elasticities of Substitution in Nested CES Systems

by Robert McDougall

GTAP Research Memorandum No. 16, 2009

Development of the Preliminary Version 7 Non-CO2 GHG Emissions Dataset

by Steven Rose, Misak Avetisyan and Thomas Hertel

GTAP Research Memorandum No. 17, 2010

A Global Multi-sector Multi-region Foreign Direct Investment Database for GTAP

by Csilla Lakatos and Terrie Walmsley

GTAP Research Memorandum No. 18, 2010

Report on GTAP Usage and the GTAP Website

In the Center's first strategic plan, undertaken in 2004, one of our goals was to determine usage of GTAP-based papers in refereed journals. Ginger Batta has undertaken a number of searches to set up a baseline to document the impact of GTAP. Three sources have been examined:

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

The report is provided in the supplementary materials.

The GTAP website report is also contained in the supplementary materials provided on the board website.

IX. Appendices

Appendix 1: List of potential issues for the discussion during the session on “Data Base and Research Issues”.

It is unlikely that we will have time to discuss all of these, but this is a list of important issues that have come up over the past year and may be of interest to the board.

Research:

- consumer demand in GTAP
- the GTAP Baseline
- labor migration
- land use data base and modeling
- bio fuels
- trade and development
- poverty analysis
- adjustment costs
- services liberalization and FDI
- Climate change
- the environment

Data:

- energy
- services
- trade
- protection
- taxes
- regional disaggregation
- quality comparisons of inputs
- quality comparisons of the final data base
- factor splits
- TASTE Proposal
- Skill splits proposal
- Weighting schemes for protection data
- matching IMF trade totals
- CEPII trade data
- data sourcing
- releasing the data base in GAMS format
- intra-regional trade
- sectoral disaggregation
- Peer-review of I-O tables

- data management issues
- multi-year data bases

Model:

- validation exercises
- parameter estimation
- terms of trade effects in GTAP
- Technical papers
- Dynamic GTAP Model
- GTAP-E Model

Education:

- GAMs courses
- Further overseas courses
- Data Base courses
- Web courses
- Courses for policy makers

Network:

- pricing policies
- scholarships
- conferences
- board meetings and membership
- Europe
- Regional GTAP Centers
- Open source
- staffing