



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

**Background Paper for the GTAP Advisory Board Meeting  
Washington DC  
June 13-14, 2016**

**By:**

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**Center for Global Trade Analysis  
Purdue University**

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May 27, 2016

Dear GTAP Advisory Board Members,

There was much to be pleased about over the last year as well as areas where we hoped to have achieved more. The public rollout of GTAP 9 went smoothly with 10 month sales following the trajectory of version 8. The new version has a few extra features: 3 base years (2004, 2007, and 2011), 11 new countries and a number of updated Input-Output (I-O) tables, and new satellite accounts for non-CO<sub>2</sub> emissions and power activities. We have recently released Version 9a that contains some important fixes, but had anticipated releasing Version 9.1 with a number of new I-O tables, particularly for some large economies such as India and the United States. Several thorny issues have led us to hold back on these until both the Center and contributors are satisfied with the quality of the final product. We hope to have this in your hands prior to the June Board meeting. In addition, we are working closely with the European Commission and its research arm in Seville to incorporate new I-O tables for all 28 European Union countries. Finally, we are planning ahead for version 10. Working with Advisory Board Members, we anticipate increasing the number of sectors for the first time since 2001! Our focus has mostly been on a refinement of the service sectors which together comprise 70% of global GDP. The release date to the Board is still uncertain, though our working target for the first pre-release to Board members is end of 2016.

The educational programs have been firing on all cylinders! GTAP 101 continues to be successful – drawing increasingly from developing countries. We are also seeing an uptick in the number of GTAP 101 students that are applying for the standard short course. The dynamic short course was delivered in October 2015 and was well attended. We are currently preparing a more focused online-only course on preferential trade agreements—our thanks to Mary Burfisher who is taking the lead in preparing and delivering the course.

In terms of staffing, with the arrival of Erwin Corong, we had anticipated being at full strength, but we were informed in the fall that Badri Narayanan was leaving the Center for personal reasons. Most of you are aware of the centrality of Badri's work to the data team. As we go to press, we are forging ahead to find his replacement, though finding a like-replacement will be difficult. Our thanks to Angel, Erwin and Rob who have in the meantime taken up the slack. Roman Keeney has taken over fully the running of the GTAP Short Course and he hopes to introduce a new program for continued engagement with short course alumni in the near future. The Center is also proud to announce another freshly-minted Ph.D., Jeffrey Peters, who is moving to Stanford where he will assume a prestigious Fellowship.

We are very grateful for the support of our Board Members and, as well, senior management at Purdue University. Despite the somewhat disheartening news of the past 12 months, and at-times shrill political discourse, we believe that the work we do collectively improves our ability to inform decision makers about the tradeoffs they will inevitably have to adjudicate in continuing the progress towards better livelihoods for all.

Sincerely,

A handwritten signature in black ink, appearing to read "Dominique van der Mensbrugge".

Dominique van der Mensbrugge, Ph.D.  
Research Professor and Director of GTAP  
Center for Global Trade Analysis  
Department of Agricultural Economics, Purdue University

# Executive Summary

The list below highlights a number of important accomplishments in the Center during the past year. Detailed discussion follows in the subsequent report.

## Data Base and Models Updates/Releases

- GTAP 9 Data Base – May 2015
- GTAP 9 Satellite Data and Utilities
  - GTAP-Power Data Base – August 2015
    - Electricity-detailed extension of the GTAP Data Base
  - GDyn Data Base – February 2016
    - Based on GTAP 9, World Development Indicators, and IMF's Balance of Payments and International Investment Position Statistics. A FlexAgg program for the 2011 reference year has been produced to assist in aggregating the GDyn Data Base.
  - GMig2 Data Base – February 2016
    - Contains global bilateral migration and remittances data consistent with GTAP 9
  - GTAP-E Data Base – February 2016
    - Provides carbon dioxide (CO<sub>2</sub>) emissions data distinguished by fuel and by user for each of the 140 countries/regions in GTAP 9
  - GTAP Non-CO<sub>2</sub> Emissions Data Base – February 2016
    - Complements GTAP-E and provides information on other greenhouse gas (GHG) emissions such as methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), fluoridated gas (FGAS)
- GTAP 9a Data Base Bug-Fix—May 2016

## Network

- Two offerings of GTAP 101
- 23<sup>rd</sup> Annual Short Course held in West Lafayette
- 2015 Dynamic Short Course held in West Lafayette
- 2016 Conference and Board Meeting held in Washington DC
- 2017 (West Lafayette/Purdue) conference on track
- 2018 Conference proposal (Colombia) submitted for consideration

## Research Projects

- Strong external funding for selective research activities in the Center aimed at advancing the frontiers of GTAP-related data, modeling and policy analysis
- Specifics on projects detailed on page 27

## Staffing

- Badri Narayanan departed the Center in December 2015. The search for his replacement is currently underway.
- Nelson Villoria departed the Center in July 2015. Uris Lantz Baldos, a former graduate student and Post-doctoral Research Associate in the Center was hired as a Research Assistant Professor and will begin in August 2016.

# GTAP Advisory Board Representatives and Other Meeting Attendees

## GTAP Consortium Agency Representatives

- **Agricultural Economics Research Institute** (The Hague, The Netherlands)  
Hans van Meijl - [hans.vanmeijl@wur.nl](mailto:hans.vanmeijl@wur.nl) (absent)  
Heleen Bartelings - [heleen.bartelings@wur.nl](mailto:heleen.bartelings@wur.nl) (Monday)  
Lindsay Shutes - [lindsay.shutes@wur.nl](mailto:lindsay.shutes@wur.nl) (Tuesday)
- **Asian Development Bank** (Mandaluyong City, Philippines)  
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- **Economic Research Service, US Department of Agriculture** (Washington DC, United States)  
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- **European Commission - DG Trade** (Brussels, Belgium)  
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- **Food and Agriculture Organization of the United Nations** (Rome, Italy)  
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- **Organisation for Economic Co-operation and Development** (Paris, France)  
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Kenichi Kawasaki - [k-kawasaki@grips.ac.jp](mailto:k-kawasaki@grips.ac.jp)
- **The World Bank** (Washington DC, United States)  
Maryla Maliszewska - [mmaliszewska@worldbank.org](mailto:mmaliszewska@worldbank.org)
- **Thünen Institute of Market Analysis** (Braunschweig, Germany)  
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- **United Nations Conference on Trade and Development** (Geneva, Switzerland)  
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- **United Nations Economic and Social Commission for Western Asia** (Beirut, Lebanon)  
Mohamed Hedi Bchir - [hedi.bchir@gmail.com](mailto:hedi.bchir@gmail.com)
- **United Nations Economic Commission for Africa** (Addis Ababa, Ethiopia)  
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- **US Department of Commerce** (Washington DC, United States)  
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- **US Environmental Protection Agency** (Washington DC, United States)  
Richard Garbaccio - [garbaccio.richard@epa.gov](mailto:garbaccio.richard@epa.gov)
- **US International Trade Commission** (Washington DC, United States)  
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William Powers - [william.powers@usitc.gov](mailto:william.powers@usitc.gov)
- **World Trade Organization** (Geneva, Switzerland)  
Roberta Piermartini - [roberta.piermartini@wto.org](mailto:roberta.piermartini@wto.org) (absent)  
Bob Koopman - [robert.koopman@wto.org](mailto:robert.koopman@wto.org)

#### **Member at Large**

- **Brian O'Neill** - [boneill@ucar.edu](mailto:boneill@ucar.edu)  
National Center for Atmospheric Research

#### **Guests of the Board**

- **Mark Horridge** - [mark.horridge@gmail.com](mailto:mark.horridge@gmail.com)  
Centre of Policy Studies, Victoria University
- **Andrés Escobar** - [aescobare@unicartagena.edu.co](mailto:aescobare@unicartagena.edu.co)  
Universidad de Cartagena
- **Alejandro Pardo** - [apardo@procolombia.co](mailto:apardo@procolombia.co)  
PROCOLOMBIA - USA

# GTAP Advisory Board Meeting Agenda

**Monday, June 13**

Location: The World Bank, 1818 H Street, NW, Washington DC 20433 USA (Room: MC 2-800)

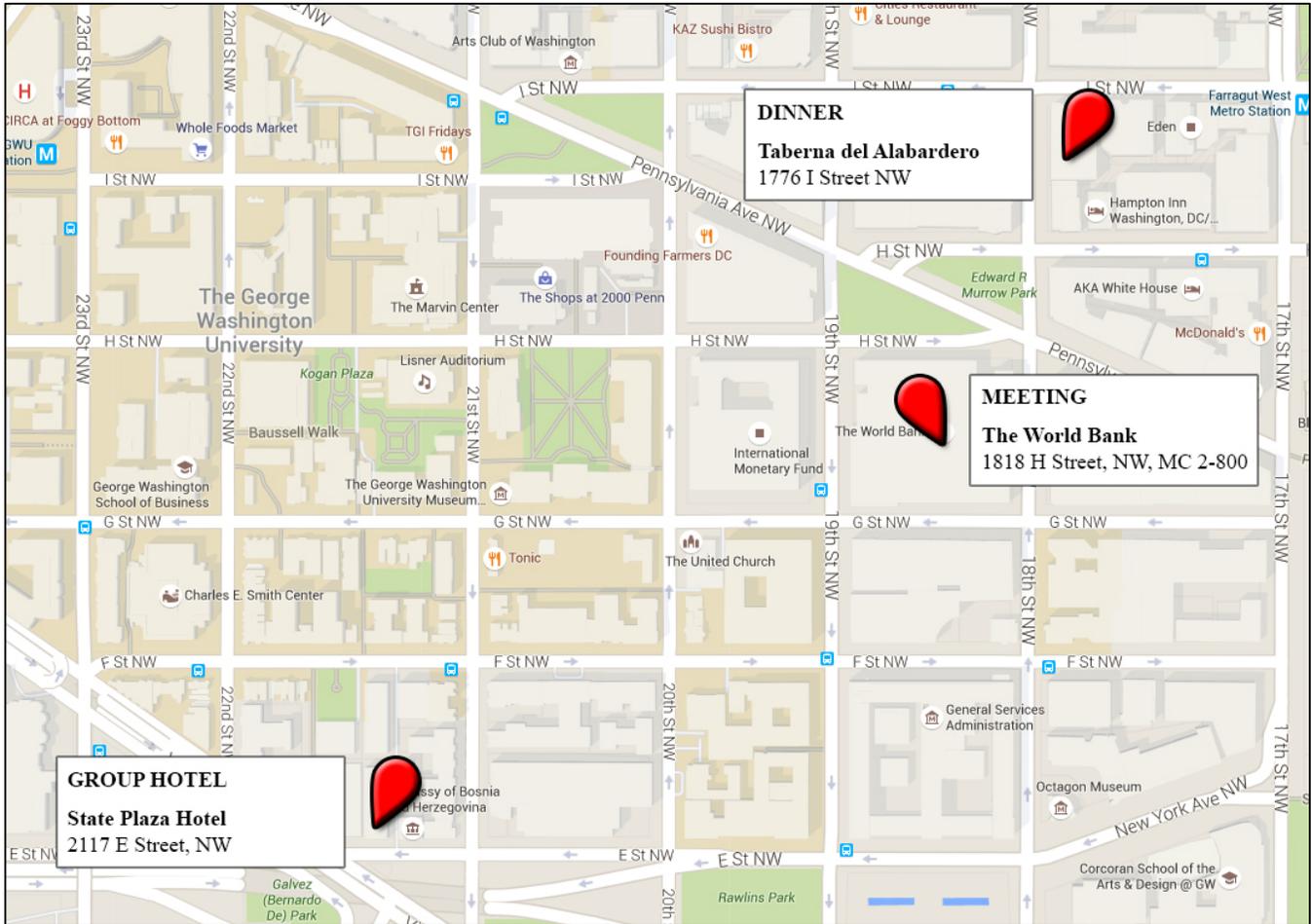
<b>8:30-9:00am</b>	<b>Welcome Coffee</b> <i>*Attendees will be required to present a government-issued photo ID before entering the World Bank. Please plan to arrive early to allow time to pass through security.</i>
<b>9:00-10:30am</b>	<b>Welcome and Overview</b> (Chair: Maryla Maliszewska) 9:00-9:30 <b>Overview and Issues</b> (Dominique van der Mensbrugge) 9:30-10:00 Discussion 10:00-10:20 <b>The GTAP Data Base: Version 10</b> (Angel Aguiar) 10:20-10:30 Discussion
<b>10:30-11:00am</b>	<b>Coffee Break</b>
<b>11:00am-12:20pm</b>	<b>The GTAP Data Base: Updates on Core Components</b> (Chair: Lucian Cernat) 11:00-11:10 <b>Reshaping Services</b> (Robert McDougall) 11:10-11:20 Discussion 11:20-11:30 <b>I-O Tables</b> (Angel Aguiar) 11:30-11:40 Discussion 11:40-11:50 <b>Income and Factor Taxes</b> (Robert McDougall) 11:50-12:00 Discussion 12:00-12:10 <b>International Margins</b> (Robert McDougall) 12:10-12:20 Discussion
<b>12:20-1:30pm</b>	<b>Lunch</b>
<b>1:30-2:30pm</b>	<b>The Network</b> (Chair: Gopinath Munisamy) 1:30-1:35 <b>2016-2019 GTAP Research Fellow Nominations</b> (Kenichi Kawasaki) 1:35-1:45 Discussion: Voting, Future Committee Selection 1:45-1:50 <b>2016 Conference Report</b> (Maryla Maliszewska) 1:50-2:00 Discussion 2:00-2:05 <b>2017 Conference Report</b> (Ginger Batta) 2:05-2:15 Discussion 2:15-2:20 <b>2018 Conference Proposal</b> (Andrés Escobar, Universidad de Cartagena) 2:20-2:30 Discussion
<b>2:30-3:00pm</b>	<b>Coffee Break</b>
<b>3:00-4:00pm</b>	<b>New Developments at the Interface of Data and Modeling</b> (Chair: Janine Pelikan) 3:00-3:15 <b>Incorporation of Domestic Margins</b> (Erwin Corong) 3:15-3:30 Discussion 3:30-3:35 <b>MRIO</b> (Caitlyn Carrico) 3:35-3:45 Discussion 3:45-3:50 <b>Labor Database</b> (Caitlyn Carrico) 3:50-4:00 Discussion
<b>4:00-5:15pm</b>	<b>Parking Lot: Other Data and Modeling Issues</b> (Chair: Frank van Tongeren) <i>Topics to be determined.</i>
<b>6:00pm</b>	<b>Dinner: Taberna Del Alabardero</b> , 1776 I Street NW, Washington, DC 20006 <i>Entrance on 18th St. between H and I *See map following the agenda for further details.</i>

# GTAP Advisory Board Meeting Agenda

Tuesday, June 14

<b>8:30-9:00am</b>	<b>Welcome Coffee</b> <i>*Attendees will be required to present a government-issued photo ID before entering the World Bank. Please plan to arrive early to allow time to pass through security.</i>
<b>9:00-10:00am</b>	<b>New Developments at the Interface of Data and Modeling</b> (Chair: Paolo Giordano) 9:00-9:05 <b>Mainstreaming HET Model</b> (Zeynep Akgul) 9:05-9:15 Discussion 9:15-9:20 <b>Advances in Water</b> (Jing Liu) 9:20-9:30 Discussion 9:30-9:35 <b>Mainstreaming AEZ/Land Use Database</b> (Uris Baldos) 9:35-9:45 Discussion 9:45-9:50 <b>Gridded Population Projections</b> (Brian O'Neill) 9:50-10:00 Discussion
<b>10:00-10:30am</b>	<b>Coffee Break</b>
<b>10:30-11:35am</b>	<b>Education, Outreach and Strategic Communication</b> (Chair: Stephen Karingi) 10:30-10:40 <b>Education Plan</b> (Roman Keeney and Mary Burfisher) 10:40-10:50 Discussion 10:50-10:55 <b>Journal of Global Economic Analysis</b> (Niven Winchester) 10:55-11:05 Discussion 11:05-11:10 <b>Network Outreach and Mentoring</b> (Ginger Batta) 11:10-11:20 Discussion 11:20-11:25 <b>Graduate Program Development Plan</b> (Caitlyn Carrico and Zeynep Akgul) 11:25-11:35 Discussion
<b>11:35am-1:00pm</b>	<b>Priorities for Forthcoming Year</b> (Chair: Sébastien Jean) 11:35-11:45 <b>Center Finances</b> (Wendy Kincaid) 11:45-12:00 Discussion 12:00-12:05 <b>Staffing</b> (Dominique van der Mensbrugge) 12:05-12:10 Discussion 12:10-12:30 <b>Revisit Priorities for Next Year</b> (Dominique van der Mensbrugge) 12:30-1:00 Discussion
<b>1:00-2:00pm</b>	<b>Lunch</b>
<b>2:00-3:30pm</b>	<b>Additional Meetings (Room: MC 2-800)</b> 2:00-2:30 <b>Services, Travelers' Expenditures</b> (Robert McDougall) 2:30-3:00 <b>Non-tariff Measures</b> (Kenichi Kawasaki) 3:00-3:30 <b>Crafting Baselines &amp; Future Scenarios</b> (Dominique van der Mensbrugge)
<b>4:00-5:15pm</b>	<b>Pre-Conference Seminars (Room: MC 2-800)</b> 4:00-4:30 <b>GTAPAgg2</b> - Join Erwin Corong and Mark Horridge for a demonstration of the new GTAP aggregation utility. 4:30-5:15 <b>Standard GTAP Model in GAMS</b> - A replicate of the standard GTAP Model has been developed in GAMS and coupled with a GUI. Join Wolfgang Britz, Dominique van der Mensbrugge, and Erwin Corong for an overview and demonstrations on how to use it and generate simulation diagnostics.

# Washington DC Area Map



# 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
7. **Communication Goal:** To facilitate communication amongst members of the network as well as between the Center and key stakeholders

## Center Staff, Research Associates, Graduate Students and Visitors

### Center Staff

- **Angel Aguiar, *Research Economist and Data Base Construction Specialist***  
Angel works with the macro datasets and contributors of the regional I-O data for the GTAP Data Base. He collaborates on special data modules to improve the GTAP Data Base and satellite data sets such as GDYN and GMig2. This year, Angel has been managing the construction of the GTAP Data Base 10. Angel also teaches in GTAP Short Courses and leads the bi-annual GTAP Dynamic Course. He undertakes economic research using the GTAP framework.
- **Zeynep Akgul, *Post-doctoral Research Associate***  
Zeynep is a Post-Doctoral Research Associate in the Center for Global Trade Analysis. She has developed the GTAP firm heterogeneity module GTAP-HET, which incorporates endogenous productivity changes and firm entry into domestic and export markets. She is currently working on estimation/calibration of key parameters in firm heterogeneity.
- **Uris Baldos, *Post-doctoral Research Associate***  
Uris is a post-doctoral researcher in the Center for Global Trade Analysis. He is in charge of updating the GTAP Land Cover and Land Use Data Base. His current research interests focus on the global farm-food-environment nexus and on economic modelling. Uris is the co-developer of SIMPLE: a Simplified International Model of agricultural Prices, Land use and the Environment. Uris will move to his new position as Assistant Research Professor in the Center in August.
- **Ginger Batta, *Senior Program Manager***  
Ginger manages the proposal phase, logistics, finances, participant relations, execution and reporting for all events including the GTAP conferences, advisory board meetings, short courses, dynamic short courses, GTAP 101, and GTAP PTA courses. She also manages the sales, distribution, licensing, and reporting for all GTAP products as well as handles general communication with the GTAP Network.
- **Mary Burfisher, *Senior Education Advisor***  
Mary leads the GTAP 101 Course as well as advising the Center on education-related items. In Fall 2016, she will introduce an online mini-course in analyzing preferential trade agreements.
- **Erwin Corong, *Research Economist***  
Erwin works on integrating domestic trade, transport, wholesale and retail margins into the GTAP Data Base and modeling framework. He currently runs the build programs for GTAP 9.1 Data Base and contributes in updating the GMig2 satellite Data Base.
- **Hao Cui, *Post-doctoral Research Associate***  
Hao (David) Cui is a post-doctoral research associate with the Department of Agricultural Economics. His current research area is energy economics, with a focus on biofuels, land use and emissions.
- **Jeremy Douglas, *Web and Information Technology Specialist***  
Jeremy is responsible for the design, development, and maintenance of the GTAP website.
- **Alla Golub, *Research Economist***  
Alla is Research Economist at the Center working on analysis of energy and climate change mitigation policies. Alla writes competitive grant proposals and serves as principal and co-principal investigator on several projects. Alla also teaches in GTAP Short Courses.
- **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 trade and environment-related projects at the Center.

- **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 economic and policy issues. His current work focuses on measurement of domestic support in developing countries (with Narayanan), analysis of the 2014 US Farm Bill (trade distortion and distributional consequences) and other policy issues with incidence in US agriculture. Beginning with the 2016 Annual Short Course, Roman will be replacing Villoria in the role of lead instructor sharing responsibilities for course management with Ginger Batta.
- **Wendy Kincaid, *Operations Coordinator***  
Wendy assists the Center staff with the research account process from proposal to reconciliation and closing. She also manages Center finances and Consortium billing, formats the GTAP Data Base Documentation, and coordinates the technical and working paper series. She works closely with the Director on all University-related processes.
- **Jing Liu, *Post-doctoral Research Associate***  
Jing is a post-doctoral scholar at the center of Global Trade Analysis Project. She is contributing to developing the SIMPLE-on-a-Grid model and applying it to study agricultural sustainability in the US and the nexus of food-energy-water at the global scale. Jing also works with Nelson to estimate grid-level cropland supply elasticity for the Americas and Africa.
- **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, services trade, and tax data and the development of programs to compare databases and ensure data base quality.
- **Krishnamurthy Sriramesh, *Senior Advisor for Strategic Communications***  
Sriramesh advises the Center on communications and outreach strategy.
- **Farzad Taheripour, *Faculty Research Associate***  
Farzad is a Research Associate 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 also has accomplished a major revision of the natural gas sector in the GTAP Data Base. He works on emissions due to land use changes associated with the production of first and second generations of bio-fuels.
- **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.
- **Dominique van der Mensbrugghe, *Director and Research Professor***  
Dominique oversees the day-to-day activities of the Center, as well as focusing on new initiatives in development of the GTAP Data Base and models and policy applications. He also supervises graduate students, in the context of his ongoing research on trade, development and the environment.

### *Graduate Students*<sup>1</sup>

- **Caitlyn Carrico** (USA)  
Caitlyn Carrico is a Ph.D. candidate in the Department of Agricultural Economics. She has worked on expanding labor statistics from two skill types to five occupational types within GTAP Data Base versions 8.1L and 9. She has also worked on the USITC-funded project that disaggregated U.S. households using the MyGTAP framework. She developed a GTAP-based MRIO as part of a project on public procurement for the European Commission. She worked on an external project for the World Bank examining linkages between migration and commodity prices within the GMig2Dyn framework. She is currently further developing the GTAP MRIO and preparing a paper.
- **Iman Haqiqi** (Iran)  
Iman is a PhD student in the Department of Agricultural Economics. He has worked on agricultural producer support estimates and agricultural production targeting for GTAP 9 Data Base. Iman is also involved in OECD ENV-Linkages Model. He develops necessary data files, helps with model simulations, and tests the model results. GTAP support emails are received by him and he may either reply or forward to other GTAP staff. He is also collaborating in finalizing GTAP Water Data Base.
- **Luis Moises Peña-Lévano** (Peru)  
Luis is a PhD candidate specializing in international agricultural trade in the Department of Agricultural Economics. Luis, together with his advisors Dr. Taheripour and Dr. Tyner are responsible for the land use data base of the GTAP 9. They are currently developing a new expansion for the GTAP-BIO model which incorporates forest carbon sequestration entitled GTAP-BIO-FCS. His current research involves the analysis of the economic benefits and costs of mitigating climate change. Recently, he is studying the role of forest sequestration as a mitigation methods and its impact on food security.
- **Guolin Yao** (China)  
Guolin is a PhD student in the Department of Agricultural Economics. She works on an NSF project about complex dynamics of telecoupled human and natural systems through examining economic and environmental spillover impacts of soybean international trade between China and Brazil. She has helped improve GTAP-BIO database. She is working on model validation and modifying GTAP-BIO model for oilseed trade purposes.

### *Visitors to the Center*

- **Ken Itakura**, Nagoya City University
- **Kazuhiko Oyamada**, Institute of Developing Economies, Japan External Trade Organization
- **Marina Kuzmenko**, Russian Foreign Trade Academy
- **Andrés Escobar**, Universidad de Cartagena

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<sup>1</sup> See supplementary materials ([www.gtap.agecon.purdue.edu/events/Board\\_Meetings/2016/supp\\_material.asp](http://www.gtap.agecon.purdue.edu/events/Board_Meetings/2016/supp_material.asp)) for CVs.

# Objectives and Accomplishments

## Progress towards Goals over the Past Year

Below is an assessment of our progress towards the core objectives outlined last year in the Board Meeting summary:

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

Tasks	Responsibility
<b>Improving the quality of contributed I-O data (core)</b>	<b>Aguiar</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Document the guidelines for contribution of Supply and Use tables <i>Expected with the domestic margins.</i></li> </ul>	Aguiar
<ul style="list-style-type: none"> <li>Work with contributors to improve the EU and US I-O Tables <i>Ongoing</i></li> </ul>	Grad
<i>Secondary Priorities</i>	
<ul style="list-style-type: none"> <li>Implementation of the dwellings module in version 9.1 <i>Planned for first pre-release of version 10.</i></li> </ul>	McDougall
<ul style="list-style-type: none"> <li>Multi-year Input-Output Tables <i>Planned for first pre-release of version 10.</i></li> </ul>	Aguiar
<b>Addition/Improvement of Datasets used in GTAP Data Base (core)</b>	<b>Narayanan</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Investigate possibilities for services sector disaggregation for v10 <i>Planned increase from 15 to 22 services sectors.</i></li> </ul>	Aguiar, McDougall
<ul style="list-style-type: none"> <li>Collaborate with ITC on further splitting tariff dataset and other developments on tariff dataset <i>Ongoing</i></li> </ul>	Pichot, Mimouni
<ul style="list-style-type: none"> <li>Commodity tax fixes <i>Expected for 1st pre-release of version 10.</i></li> </ul>	McDougall
<ul style="list-style-type: none"> <li>Agricultural I-O tables <i>Expected for 3rd pre-release of version 10.</i></li> </ul>	Peterson, McDougall
<ul style="list-style-type: none"> <li>New EU domestic support <i>Fixes included in version 9.1</i></li> </ul>	IPTS
<ul style="list-style-type: none"> <li>International Transportation Margins <i>Updates included in version 9.1</i></li> </ul>	Villoria, McDougall
<ul style="list-style-type: none"> <li>Data and methodological improvements in income/factor taxes <i>Expected during the version 10 cycle.</i></li> </ul>	McDougall
<ul style="list-style-type: none"> <li>Export subsidies <i>Delivery of 2011 data is pending.</i></li> </ul>	Laborde

<ul style="list-style-type: none"> <li>Improvements to energy and services trade data processing <i>Expected in 3rd pre-release of version 10.</i></li> </ul>	McDougall
<ul style="list-style-type: none"> <li>Domestic Margins <i>Planned for version 10 pre-release</i></li> </ul>	Corong, McDougall
<ul style="list-style-type: none"> <li>Land use data set – update and automation <i>Completed before conference.</i></li> </ul>	Baldos
<i>Secondary Priorities</i>	
<ul style="list-style-type: none"> <li>Examine possibility of targeting trade balances <i>No update</i></li> </ul>	McDougall
<ul style="list-style-type: none"> <li>Examine the availability of National Statistical Office (NSO) data (production, etc., by year) to update I-O tables as part of FIT process (when redo FIT) <i>No update</i></li> </ul>	Aguiar
<ul style="list-style-type: none"> <li>Examine integration of biofuels into standard data base <i>No update</i></li> </ul>	Aguiar, McDougall, Narayanan, Taheripour
<ul style="list-style-type: none"> <li>Domestic support, PSE database for Latin America and Africa – MAFAP <i>No update</i></li> </ul>	van Tongeren, Balié
<ul style="list-style-type: none"> <li>Baseline/forecast tool for updates <i>Baseline webpage (<a href="http://www.gtap.agecon.purdue.edu/models/Dynamic/Baseline/">www.gtap.agecon.purdue.edu/models/Dynamic/Baseline/</a>) has been updated with Shared Socio-Economic Pathways (SSP) data</i></li> </ul>	Resource dependent
<ul style="list-style-type: none"> <li>GTAPAgg2 <i>Distribution to subscribers began with version 9a</i></li> </ul>	Horridge, Narayanan
<ul style="list-style-type: none"> <li>Agricultural Production Targeting <i>No update</i></li> </ul>	Narayanan, Haqiqi
<ul style="list-style-type: none"> <li>Disaggregation of GTAP Sectors <i>New sectors classification includes 67 sectors</i></li> </ul>	McDougall, Aguiar
<b>Addition/Improvement of Protection Data (core)</b>	<b>Narayanan</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Update TASTE to v9 <i>Available from: <a href="https://www.gtap.agecon.purdue.edu/access_board/default.asp#dataresources">https://www.gtap.agecon.purdue.edu/access_board/default.asp#dataresources</a></i></li> </ul>	Pelikan, Laborde, Horridge
<b>Satellite Data</b>	<b>Narayanan</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Release any pending satellite datasets (GDyn, GMig2, land use, GTAP-E, non-CO<sub>2</sub> emissions) based on version 9 <i>All were released (land use pending)</i></li> </ul>	Aguiar, Golub, McDougall, Villoria, Irfanoglu
<i>Secondary Priorities</i>	

<ul style="list-style-type: none"> <li>Plan about new satellite datasets (e.g. MRIO, POWER)</li> </ul>	Aguiar, Golub, McDougall, Villoria, Irfanoglu
<i>Power data base has been released, MRIO expected end of year.</i>	

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

Tasks	Responsibility
<b>Trade and Development</b>	<b>Various</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Continue to publish papers on trade, poverty, migration/labor and global supply chains</li> </ul>	Staff and Grads
<ul style="list-style-type: none"> <li>“Commodity Prices, Remittances, and Migration: Developing Country Implications”</li> </ul>	Carrico, Ahmed, Aguiar
<i>For this project, we analyze endogenous migration response to sustained low oil prices using the GMig2Dyn modelling framework. We specifically focus on migration from South and Southeast Asia to the GCC region, a prominent corridor for migration. To be presented at the conference.</i>	
<b>Global Energy and Environmental issues</b>	<b>Various</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Continue to publish papers on energy and environmental issues with a special focus on the land-water-energy-climate nexus</li> </ul>	Staff and Grads
<b>Firm Heterogeneity</b>	<b>Akgul</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Publish paper and further develop the application</li> </ul>	Akgul
<i>The manuscript on firm heterogeneity was revised and resubmitted for the Journal of Global Economic Analysis in January 2016 and received reviews in March 2016. The manuscript is currently being prepared for final production prior to Summer 2016.</i>	
<i>A new project that involves further development and policy application of the firm heterogeneity model is expected to start at the end of May 2016. The project will be funded by USITC.</i>	

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

Tasks	Responsibility
<b>Technical and Working Papers</b>	<b>Various</b>
<ul style="list-style-type: none"> <li>A GTAP-MRIO for the GTAP 9 Data Base</li> </ul>	Carrico
<i>Incorporating agent-specific tariffs into the GTAP-MRIO Database to allow for differential rates between industry, investment, and private-household/government. The technical paper details the data construction process as well as offers a simulation demonstrating the novelties of the new database.</i>	
<ul style="list-style-type: none"> <li>“A GTAP-E Extension for Emission Abatement Analysis: An Application of Total Requirements Coefficients”</li> </ul>	McDougall, Narayanan
<i>No update</i>	

<ul style="list-style-type: none"> <li>“The GTAP-Power Database: Disaggregating the Electricity Sector in the GTAP Data Base” the current draft is GTAP Resource #4619 (database and documentation)</li> </ul>	Peters
<ul style="list-style-type: none"> <li>“GTAP-Power: an electricity-detail version of the GTAP model with capacity expansion and factor utilization.” (model version)</li> </ul>	Peters
<p><i>“GTAP-E-Power: An electricity-detailed extension of the GTAP-E model.” Underway and being presented at the annual conference in Washington, DC</i></p>	
<ul style="list-style-type: none"> <li>Does I-O data stability matter for CGE model results?</li> </ul>	Narayanan, Aguiar, McDougall
<p><i>No update</i></p>	
<ul style="list-style-type: none"> <li>Volume preserving CES and CET formulations</li> </ul>	van der Mensbrugge
<p><i>Underway and being presented at the annual conference in Washington, DC.</i></p>	
<ul style="list-style-type: none"> <li>Incorporating Water into the GTAP Model</li> </ul>	Hertel, Liu, Taheripour, Liu, van der Mensbrugge, Haqiqi
<p><i>The Center continues its work on incorporating water in the GTAP model. As part of a project undertaken for the OECD, van der Mensbrugge and Haqiqi have introduced water in the OECD’s ENV-Linkages model. It takes advantage of the work done by Hertel, Liu and Taheripour in introducing water in agricultural production with the split of rain-fed and irrigated production (at a national level, i.e. aggregating the basin/AEZ dimensions). It extends the incorporation of water for other uses—livestock, industrial and municipal uses using data from FAO’s Aquastat database. This introduces an economy-wide demand for water that is balanced by water supply. Exogenous demand is specified for ground-water recharge and for environmental services. N.B. It is a hybrid GE/PE model as water demand outside of crops is based on simple iso-elastic demand curves and water does not enter into the production function outside of irrigated crops.</i></p>	
<b>Software</b>	<b>Various</b>
<ul style="list-style-type: none"> <li>GTAPAgg2</li> </ul>	Horridge, Narayanan
<p><i>Distribution to subscribers began with version 9a</i></p>	
<ul style="list-style-type: none"> <li>The Standard GTAP Model in GAMS</li> </ul>	van der Mensbrugge
<p><i>A GAMS version of the standard GTAP model has been developed and tested. Though there are multiple GTAP-based models in GAMS, including the widely appreciated GTAPinGAMS model developed and freely distributed by Tom Rutherford, none is an exact replica of the GEMPACK version of the GTAP model. This new GAMS version is an exact replica. It includes some optional extensions, some of which will be implemented in the GEMPACK version. The new Standard GTAP model in GAMS has been coupled with Wolfgang Britz’s Graphical User Interface (GUI) to facilitate ease of use and visualization of model results. The new model and the GUI will be presented at a pre-conference event in Washington, DC. Documentation of both the model and the GUI are under preparation.</i></p>	

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

Tasks	Responsibility
<b>Education Plan</b>	<b>Various</b>
<i>Primary Priorities</i>	

<ul style="list-style-type: none"> <li>2015 GTAP Short Course (Purdue)</li> </ul>	Villoria, Keeney, Batta, Douglas
<p><i>A very successful course was offered at Purdue in July 2015 to 24 participants. Three of these participants were offered fellowships to help reduce costs so they could attend.</i></p>	
<ul style="list-style-type: none"> <li>GTAP 101 Course(s)</li> </ul>	Burfisher, Batta, Douglas
<p><i>Two successful offerings of GTAP 101 were held in 2015. Demand for this course remains strong and graduates are feeding into the standard short course.</i></p>	
<ul style="list-style-type: none"> <li>2015 GTAP Dynamic Course (Purdue)</li> </ul>	Aguiar, van der Mensbrugge, Batta, Douglas
<p><i>After a 3-year hiatus due to internal staffing turnover at the Center, the Dynamic Short Course was revamped and offered at Purdue in October 2015 to 16 participants. Plans remain to offer this course every other year, with the next being held in 2017.</i></p>	
<ul style="list-style-type: none"> <li>Further investigate development of online mini-courses on special topics</li> </ul>	Burfisher, van der Mensbrugge, Hertel
<p><i>An online course in applied analysis of preferential trade agreements will be offered in Fall 2016.</i></p>	

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

Tasks	Responsibility
<b>Recruitment and Hiring</b>	<b>Various</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Career path development</li> </ul>	van der Mensbrugge
<p><i>GTAP's research staff is selected and hired according to the rules and regulation of Purdue University's hiring of administrative and support staff. We are developing a framework for career path development for the research staff that is more like that of public agencies—such as the World Bank and the OECD—with job-appropriate promotion criteria. Purdue University has similar frameworks in other fields, for example research scientists that will assist in its development.</i></p>	
<ul style="list-style-type: none"> <li>Replacement plan for Nelson Villoria</li> </ul>	van der Mensbrugge
<p><i>We are pleased to announce the appointment of Uris Baldos who is already well known to the GTAP community. Uris was selected after a competitive selection process and will begin his appointment in August 2016. Uris will pursue his work on the SIMPLE model and is also leading a USDA-sponsored project on measuring and estimating agricultural productivity. In addition to his research load, Uris will be working in the Center's instructional programs and the mentoring of the Department's graduate students.</i></p>	
<ul style="list-style-type: none"> <li>Replacement plan for Badri Narayanan</li> </ul>	van der Mensbrugge
<p><i>(As we go to press) we are actively searching for a replacement of Badri Narayanan. Badri has been a big loss to the Center and we hope to be able to replace him with someone of equal value—as a colleague and in terms of expertise.</i></p>	

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

Tasks	Responsibility
<b>GTAP Conferences and Board Meetings</b>	<b>Batta, van der Mensbrugge</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>2016 Conference and Board Meeting (Washington DC, USA)</li> </ul>	Batta, van der Mensbrugge, World Bank
<i>Planning for both events has run very smoothly. Maryla Maliszewska from The World Bank will present an update at the board meeting on the conference.</i>	
<ul style="list-style-type: none"> <li>2017 Conference and Board Meeting (West Lafayette, IN, USA)</li> </ul>	Batta, van der Mensbrugge
<i>The conference committee will meet over lunch during the conference in Washington DC to discuss plenary speakers, organized sessions and funding. Logistical planning is already underway and will continue through the event.</i>	
<ul style="list-style-type: none"> <li>2018 Conference: solicit proposals</li> </ul>	van der Mensbrugge, Batta
<i>The Economics and Social Research Department, Faculty of Economic Sciences, Universidad de Cartagena prepared and submitted a proposal for the 2018 conference to be held in Cartagena. This proposal was circulated to the board in November 2015 for comments. Further information on this proposal will be presented at the board meeting.</i>	
<b>Seek partners/funding opportunities for collaboration (core)</b>	<b>Various</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Attend I-O meetings</li> </ul>	Aguiar
<i>Not this year</i>	
<ul style="list-style-type: none"> <li>Ongoing work with contributors</li> </ul>	Aguiar
<i>I-O Report available at: <a href="https://www.gtap.agecon.purdue.edu/events/Board_Meetings/2016/supp_material.asp">https://www.gtap.agecon.purdue.edu/events/Board_Meetings/2016/supp_material.asp</a></i>	
<ul style="list-style-type: none"> <li>IAMC &amp; EMF</li> </ul>	van der Mensbrugge
<i>The Center continues its engagement with two important networks focused on energy markets, emissions and climate change. The Energy Modeling Forum (EMF) has been in existence since the 1970s, originally setup to assess the impacts of the oil crisis of that period. It continues to assess energy markets, but it has also evolved into the primary global research network assessing the economic impacts of greenhouse gas mitigation and much of its work feeds into WGIII of the IPCC. It combines the expertise of more than 20 modeling groups of different model types, but includes many CGE models calibrated to various versions of the GTAP Data Base. The second network is the Integrated Assessment Modeling Consortium (IAMC). The IAMC was setup in 2007 to help coordinate the global research community in support of activities for the IPCC. Though it has a similar membership to EMF, it is a broader consortium that also includes the scientific communities underlying IPCC's WGI and WGII (the climate scientists and research on impacts, adaptation and vulnerability). We participated at the IAMC's annual meeting in Potsdam in November 2015.</i>	
<ul style="list-style-type: none"> <li>AGRODEP</li> </ul>	van der Mensbrugge
<i>The Center participates on the steering committee of the African Growth and Development Policy Modeling Consortium (AGRODEP). AGRODEP is an initiative aimed at positioning African experts to take a leadership role in the study of strategic development questions and the broader</i>	

<i>agricultural growth and policy debate facing African countries. AGRODEP facilitates use of economic modeling tools, promotes access to data sources, provides training and research grants, and supports collaboration between African and international researchers.</i>	
• AgMIP	van der Mensbrugge
<i>The Center is pursuing its engagement with the Agricultural Intercomparison and Improvement Project (AgMIP). The Center was present at AgMIP's annual workshop held at the University of Florida in February 2015 and also participated at the inception workshop of the Coordinated Global and Regional Integrated Assessments (CGRA) of Climate Change and Food Security hosted by the Aspen Global Change Institute in Aspen, CO in September 2016. The global economics team of AgMIP also met at various times over the past year to flesh out the work program for Phase 2 of its coordinated activities, of which one of the main objectives is to elaborate the agricultural storylines, also known as the representative agricultural pathways (RAPs), for the five socio-economic pathways (or SSPs).</i>	
• ITC, CEPPII, Ken Kawasaki, UNESCWA	Narayanan
<i>Domestic support project funded by USDA/IATRC and Water project funded by the World Bank.</i>	
• Other potential partnerships/collaborations	Hertel, van der Mensbrugge
<i>Competitive grant funding obtained from NSF and USDA; exploring consortium membership for the National Council for Applied Economic Research (NCAER) in New Delhi, India, addition of consortium membership for GRIPS (Ken Kawasaki) in Japan.</i>	

**7. Communication Goal:** To facilitate communication amongst members of the network as well as between the Center and key stakeholders

Tasks	Responsibility
<b>Improve user support system</b>	<b>Narayanan</b>
<i>Primary Priorities</i>	
• GTAP-L, gtapsupport, contactgtap: Continue offering support	Narayanan, Aguiar, Corong, Batta, Douglas
<i>Support has been given as usual, through gtapsupport, contactgtap and GTAP-L. Iman Haqiqi has taken over the gtapsupport address. Ginger Batta handles the contactgtap address.</i>	
<b>Strategic Communication</b>	<b>Hertel</b>
<i>Primary Priorities</i>	
• Continue to build upon the 2014 strategic meeting working with Sriramesh Krishnamurthy	Hertel
<i>Sriramesh has been busy with personal matters, but hopes to return to this activity in the coming year.</i>	
• Journal of Global Economic Analysis	Hertel, Winchester
<i>The JGEA website has been set up and first issue will be published prior to the June conference. We are currently working on the second issue, with the goal of publishing it at the end of 2016.</i>	

## 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	Responsibility
<b>Improving the quality of contributed I-O data (core)</b>	<b>Aguiar</b>
<i>Primary Priorities</i>	
• Work with contributors to improve I-O tables (EU, US, others)	Aguiar, grad student
• Multi-year Input-Output Tables	Aguiar
<i>Secondary Priorities</i>	
• Document the guidelines for contribution of Supply and Use tables	Corong
• Implementation of the dwellings module	McDougall
<b>Addition/Improvement of Datasets used in GTAP Data Base (core)</b>	<b>Aguiar</b>
<i>Primary Priorities</i>	
• Implementation of sector disaggregation	Aguiar, McDougall
• Domestic Margins	Corong, McDougall
• Data and methodological improvements in commodity and income/factor taxes	McDougall
• Export subsidies update	van der Mensbrugge
• Improved Agricultural Production data (FAO and OECD consistent) and AG-IOT	McDougall
• Energy module updates: Better disaggregation of ‘rest of’ regions in IEA and implementation of subsidies	McDougall
<i>Secondary Priorities</i>	
• Examine possibility of targeting trade balances	McDougall
• Examine the availability of NSO data (production, etc., by year) to update I-O tables as part of FIT process (when redo FIT)	Aguiar
• Examine integration of biofuels into standard data base	Aguiar, McDougall, Taheripour
• Domestic support, PSE database for Latin America and Africa – MAFAP	van Tongeren, Balié
• Baseline/forecast tool for updates	Resource dependent
• Agricultural Production Targeting	Haqiqi
<b>Addition/Improvement of Satellite Data (core)</b>	<b>Aguiar</b>
<i>Primary Priorities</i>	
• Plan about new satellite datasets (e.g. MRIO)	Carrico

### 2. Research Goal: To actively participate in quantitative economic analysis of pressing global issues

Tasks	Responsibility
<b>Firm Heterogeneity</b>	
<i>Primary Priorities</i>	
• Publish manuscript	Akgul
• USITC project to further develop policy application	Akgul
<b>Trade and Development</b>	
<i>Primary Priorities</i>	
• Continue to publish papers on trade, poverty, migration/labor and global	Staff and Grads

supply chains	
<b>Global Energy and Environmental issues</b>	
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Continue to publish papers on energy and environmental issues with a special focus on the land-water-energy-climate nexus</li> </ul>	Staff and Grads

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

Tasks	Responsibility
<b>Technical and Working Papers</b>	
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Technical paper on a Firm Heterogeneity Model</li> </ul>	Akgul, Villoria, Hertel
<ul style="list-style-type: none"> <li>“A facelift for the GTAP model”</li> </ul>	van der Mensbrugge
<ul style="list-style-type: none"> <li>“Reconciling additivity with the CES and CET functional forms”</li> </ul>	van der Mensbrugge
<b>Software</b>	
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Software suite for the standard GTAP Model in GAMS: aggregation, filtering, Altertax and comparative static simulations</li> </ul>	van der Mensbrugge

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

Tasks	Responsibility
<b>Education Plan</b>	<b>Various</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>2016 GTAP Short Course (Purdue)</li> </ul>	Keeney, Batta, Douglas
<ul style="list-style-type: none"> <li>GTAP 101 Course(s)</li> </ul>	Burfisher, Batta, Douglas
<ul style="list-style-type: none"> <li>GTAP PTA Course</li> </ul>	Burfisher, Batta, Douglas
<ul style="list-style-type: none"> <li>Further investigate development of online mini-courses on special topics</li> </ul>	Burfisher, van der Mensbrugge, Hertel
<i>Secondary Priorities</i>	
<ul style="list-style-type: none"> <li>Develop and implement an “Alumni Outreach/Continued Learning Initiative” for short course graduates</li> </ul>	Keeney, Batta, Douglas

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

Tasks	Responsibility
<b>Recruitment and Hiring</b>	
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>Career path development</li> </ul>	van der Mensbrugge
<ul style="list-style-type: none"> <li>Development of a structured program for mentoring graduate students</li> </ul>	Hertel, van der Mensbrugge, Akgul and Carrico
<ul style="list-style-type: none"> <li>Replacement of Badri Narayanan</li> </ul>	van der Mensbrugge

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

Tasks	Responsibility
<b>GTAP Conferences and Board Meetings</b>	<b>Batta, van der Mensbrugghe</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>• 2017 Conference and Board Meeting (West Lafayette, IN, USA)</li> </ul>	Batta, van der Mensbrugghe
<ul style="list-style-type: none"> <li>• 2018 and 2019 Conference Proposals</li> </ul>	Batta, van der Mensbrugghe
<b>Seek partners/funding opportunities for collaboration (core)</b>	<b>Various</b>
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>• IAMC &amp; EMF</li> </ul>	van der Mensbrugghe
<ul style="list-style-type: none"> <li>• AGRODEP</li> </ul>	van der Mensbrugghe
<ul style="list-style-type: none"> <li>• AgMIP</li> </ul>	van der Mensbrugghe
<ul style="list-style-type: none"> <li>• ADB</li> </ul>	Corong, van der Mensbrugghe
<ul style="list-style-type: none"> <li>• Improving services data and modeling</li> </ul>	Hertel, van der Mensbrugghe, McDougall
<ul style="list-style-type: none"> <li>• Other potential partnerships/collaborations</li> </ul>	Hertel, van der Mensbrugghe

**7. Communication Goal:** To facilitate communication amongst members of the network as well as between the Center and key stakeholders.

Tasks	Responsibility
<b>Improve user support system</b>	
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>• GTAP-L, gtapsupport, contactgtap: Continue offering support</li> </ul>	Haqiqi, Batta, Douglas, Aguiar, Corong
<b>Strategic Communication</b>	
<i>Primary Priorities</i>	
<ul style="list-style-type: none"> <li>• Continue to build upon the 2014 strategic meeting working with Sriramesh Krishnamurthy and his graduate students to document the 'social network' provided by GTAP</li> </ul>	Hertel
<ul style="list-style-type: none"> <li>• Publish second issue of the Journal of Global Economic Analysis</li> </ul>	Hertel, Winchester
<ul style="list-style-type: none"> <li>• Initiate implementation of a GTAP wiki for data and model</li> </ul>	van der Mensbrugghe

# The GTAP Data Base and Other Data Projects: Progress and Future Objectives

In this section we concentrate on the primary product of the Global Trade Analysis Project, the GTAP Data Base. In the first sub-section, we summarize the release of GTAP 9.1 and satellite data sets, followed by a section focusing on the plan for release 10.

## GTAP 9 Data Base

In May 2015, the GTAP 9 Data Base, with three reference years was released to the public. Then in August 2015, the GTAP Power Data Base was released for all reference years. GTAP-Power is an extension of the GTAP Data Base in which the single electricity sector is disaggregated into 12 sectors, namely: transmission & distribution, nuclear, coal, gas (base and peak load), oil (base and peak load), hydroelectric (base and peak load), wind, solar, and other power technologies (Peters, 2015).<sup>2</sup>

In October 2015, the following data sets were released: GDYN, GMIG, GTAP-E, and Non-CO<sub>2</sub> emissions data—all of which are consistent with the standard GTAP format. Work is ongoing for the land use database GTAP-AEZ, and we hope to make the first GTAP-MRIO data set available to our board members by the end of this year.

### *Post-release: the GTAP 9.a Data Base*

A couple of issues were identified by GTAP Staff that needed to be revised, these are listed below:

- **Domestic support data.** Badri Narayanan reported that a processing error lead to significantly understating the 2011 domestic support in EU27 member countries. This is fixed in release 9a.
- **Capital stock data.** Alla Golub reported a very low capital stock level for Zimbabwe. Capital stock data were originally retrieved from the Penn World Tables and in release 9a selected countries in all three reference years have been revised using their regional average.

In addition, this bug fix release was also distributed with the new data base aggregator, **GTAPAgg2**, which is a new version of the GTAPAgg program redesigned to handle multiple GTAP Data Bases. This new tool will become most useful to our data base users because of the increasing number of GTAP versions, each with their own reference years and satellite data bases.

### *Post-release: the GTAP 9.1 Data Base (forthcoming)*

Several updates were achieved during the year. These are integrated in 9.1 and listed below:

- 1 new table (Tajikistan) and 7 updated tables (Switzerland, Uganda, Philippines, Costa Rica, Tunisia, New Zealand, and India). A full report on the I-O tables is available in the supplementary materials: [https://www.gtap.agecon.purdue.edu/events/Board\\_Meetings/2016/supp\\_material.asp](https://www.gtap.agecon.purdue.edu/events/Board_Meetings/2016/supp_material.asp)
- Updated income and factor taxes, international margins, and services trade data

## The GTAP Data Base: Priorities for Future Releases

In this section we outline a few priority areas for the public release of version 10 Data. We also provide a tentative release schedule for this version. The reference years of version 10 will be 2004, 2007, 2011 and 2014. Below, we also provide a list of a few items we are currently considering to further improve the GTAP Data Base in either version 10 or beyond. We would be interested in hearing from the board on the extent to which these should be prioritized.

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<sup>2</sup> Additional funding was provided by the following institutions: European Commission, US EPA, MIT, and OECD.

### ***GTAP 10 Data Base***

For version 10, we will have at least 141 regions and expect to update many tables including the EU, China, Korea, among others. As we increase the number of years in the GTAP Data Base, we also need to capitalize on the multiple submissions of I-O tables to the Center, for many countries over the years. The idea here is to use different I-O tables for different reference years, for at least some of the GTAP countries.

Version 10 will distinguish 67 sectors: 7 more services sectors and 3 more manufacturing sectors from the current 57-sector configuration. It is important to note that Version 5 (2001) was the last time the number of sectors was increased to 57. In addition, in version 10 we will introduce and explicitly account for domestic trade and transport margin flows.

The following is a list of other issues to be addressed in version 10 cycle:

1. **Commodity tax fixes** - One of the most important fixes required in the GTAP Data Base is for the defect in our international data targeting module, wherein many of the commodity tax rates from the I-O tables have been zeroed out. This requires some significant changes in our 'FIT' module, which is designed to target numbers from international sources for trade, tariff and energy datasets.
2. **Agricultural I-O tables** - We employ a global agricultural Input-Output dataset synthesized by Everett Peterson for disaggregating agricultural sectors in the contributed I-O tables. The currently used dataset was developed during the construction of version 5 data base and hence is quite outdated. Everett Peterson has updated this dataset for the years 2004, 2007 and 2011; we expect to incorporate this in version 10.
3. **Dwellings** - In version 8 data cycle, Angel Aguiar had developed a module that deals with dwellings data across the world. For the lack of official data sources, this attempt was not pursued further. We expect to work on this and incorporate it in the GTAP 10 Data Base.
4. **Data and methodological improvements in Income/factor taxes** - There are some methodological defects in the way we process this dataset. We intend to rectify the situation by improving the methodology and updating the tax rates, using the IMF Government Financial Statistics dataset. Collection and preliminary processing by Zekarias Hussein, former graduate student, has been done, further processing is required with Robert McDougall taking the lead.
5. **Agricultural export subsidies** – We are exploring options for external collaboration on collating the data for agricultural export subsidies and incorporating the data in the standard build process of the GTAP Data Base.
6. **Tariff Data** - 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 all reference years. 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 which we are gradually extending.
7. **Energy** - few improvements in the construction of energy volumes, prices, taxes and emissions datasets are expected to be made in the version 10 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 records data for these countries not individually, but as part of "Rest of Africa." Therefore, "Rest of Africa" produces and exports oil in significant quantities. We apportion those flows, with other energy flows, among "Rest of Africa" member countries according to GDP shares. 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 data base, but end up reassigned to other countries like Uganda. We plan 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.

8. **Energy subsidies from OECD** - The energy subsidies committee has had ongoing discussions over e-mail about the possibilities of including OECD energy subsidies data in the standard GTAP Data Base. A presentation was made to the Board in Shanghai. However, this has not progressed further. This is an issue which likely requires a champion to move it ahead and do the necessary legwork – much as we had for the agricultural subsidies data base.
9. **Domestic Support** - It is desirable to extend the coverage of domestic support to more countries from Africa and Latin America.
10. **Agricultural Production Targeting** - Agricultural production targeting was introduced to improve the consistency between the GTAP Data Base and the European I-O tables, as well as the OECD protection expenditures. This 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 (i.e. automated) in the future so that such errors can be reduced.
11. **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 will change our commodity codes in version 10.
12. **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 these 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.

### ***Schedule for version 10***

Below is the provisional schedule for the GTAP 10 Data Base. The first pre-release will be available to the Board in November 2016, the second pre-release is expected to be available before the 2017 board meeting and the third pre-release is expected for December 2017. The final release candidate is expected to be made available to the Board by May 2018.

### **Version 10: Pre-release Schedule (on first week of listed month)**

<b>Board Release</b>	<b>Updates</b>	<b>When?</b>
Pre-release 1	Macroeconomic, Merchandise Trade, Tariff data sets, Dwellings, Commodity tax fixes, disaggregation of manufactures and services, new labelling	Nov 2016
Pre-release 2	Services trade data, Domestic Support/APT, Energy data and module fixes, Export Subsidies	May 2017
Pre-release 3	CDE parameters, Other FIT module fixes, Agricultural IOT	Dec 2017
Final release candidate		May 2018

Detailed tasks and priorities for the data base are summarized below:

<b>Data Updates:</b>			
<b>Task</b>	<b>Who?</b>	<b>When?</b>	<b>Priority</b>
Macro-economic datasets: GDP and its components, government, and income & factor employment taxes, capital-stock, depreciation.	Aguiar	September 2016	High
Trade data: Merchandise	Aguiar	September 2016	
Tariff data	Aguiar	September 2016	
Trade data: Services	McDougall	March 2017	
Domestic Support/APT	Aguiar/Haqiqi	March 2017	
Energy data	McDougall	March 2017	
Export Subsidies		March 2017	
CDE Parameters	van der Mensbrugge	September 2017	
I-O Tables	Aguiar	Continuous	

Detailed tasks and priorities (cont.)

<b>Module Updates:</b>			
<b>Task</b>	<b>Who?</b>	<b>When?</b>	<b>Priority</b>
Separation of programs from data	Narayanan	June 2016	High
FIT Module:	McDougall		
Commodity tax and domestic support fix		June 2016	High
Protection module: APT (integration into FIT)			Medium
Other industries' Targeting			Low
Disaggregation Module: Improvements in Ag-IOT	McDougall/ Aguiar	September 2016 September 2017	Medium High
Domestic Margins	Corong/McDougall	September 2016	High
Dwellings Module	Aguiar/McDougall	September 2016	Medium
Sets labelling/GAMS		September 2016	High
Energy Module:			
Better disaggregation of 'rest of' regions in IEA Implementation of subsidies	McDougall	March 2017	High

### ***Targeting Production Data***

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

### ***Trade balances***

We are also considering targeting outside data on trade balances which can presently diverge from 'official' sources due to the bilateral trade reconciliation procedure used in GTAP. This would allow us to better match all the components of GDP, but would require scaling of the balance discrepancies.

## 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, Energy-Economy Interactions, Land Use and Climate Change

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

Further development of the standard and dynamic GTAP Models continue to be core research activities for Center staff. Related to this theme, the following activities were conducted this year.

### Core Funded Projects

#### *Incorporating domestic trade and transport margins into the GTAP Data Base and Modeling framework*

- **Staff Involved:** Erwin Corong
- **Description:** Domestic trade and transport margins represent flows that facilitate the delivery of goods: (a) from domestic producers to domestic agents; (b) from domestic producers to port of exit for exports; and (c) from the port of entry of imported goods to domestic agents. The current GTAP framework does not explicitly account for these domestic margin flows thereby resulting in perfect price transmission from producers to users, as well as from international to domestic markets. Explicitly accounting for domestic trade and transport margins therefore improves the current GTAP modeling framework by identifying the degree of price transmission between producers and consumers, and the differing price transmission channels faced by both producers and consumers.
- **Status:** On-going; to be included in GTAP 10 Data Base

#### *Updating the Standard GTAP Model*

- **Staff Involved:** Dominique van der Mensbrugghe, Erwin Corong, Rob McDougall, Iman Haqiqi
- **Description:** The core GTAP Model has been unchanged since 2003. To more readily allow for extension, we propose to give the model a modest facelift. Some potential changes include 1) differentiating between activities and commodities; 2) separating out investment expenditures from production activities; 3) introducing a new set to represent production factors; 4) a new production nest for aggregate intermediate demand; 5) adding regional indices to some of the key parameters (e.g. substitution elasticities); 6) a harmonized treatment of government and investment expenditures using a generic CES expenditure function; 7) implementing a nested CET specification for the allocation of domestic output; 8) introducing a sector-specific supply curve for the natural resource factor; 9) introducing a supply curve for the aggregate supply of factors; and 10) use a generic CET transformation function for the allocation of other factors—allowing for full factor mobility. Other modifications could potentially include uniform treatment of taxes and subsidies, and a harmonized treatment of Armington agents (i.e. a single set of all Armington agents). We also plan to update and unify the model documentation that is currently scattered in different publications.
- **Status:** Under review. All extensions cited above are already implemented in the GAMS version of the standard GTAP model

### Externally Funded Projects

#### *Will Global Change Jeopardize the US Forest Carbon Sink?*

- **Staff Involved:** Thomas Hertel (PI), Alla Golub (Co-PI)
- **External Collaborators:** Brent Sohngen (Ohio State University), Yongyang Cai (University of Chicago), Ken Judd (Stanford), Jevgenijs Steinbuks (World Bank).
- **Description:** US forests offset 10-15% of gross national GHG emissions. However, recent projections by the US Forest Service suggest that this sink may be in jeopardy as a consequence of the confluence of climate change, biofuels, growing population and rising incomes. Existing research on this topic suffers from serious limitations, failing to accurately model climate impacts on forestry, link regional

and global drivers, capture key economic responses to global change, incorporate uncertainty, and capture the interplay between forestry, agriculture and energy sectors. This project remedies these gaps through novel stochastic dynamic programming analysis of land use, forestry and agriculture. The analysis provides new tools to assess pressing policy issues, including the effects of climate change on land use, and optimal dynamic adaptations to climate change in the agricultural and forestry sectors.

- **Status:** Ongoing

#### ***Assessing the Long Run Sustainability of US Agriculture in an Integrated Global Economy***

- **Staff Involved:** Thomas Hertel (PI), Jing Liu, Laura Bowling (co-PI, Agronomy), Sylvie Brouder (Agronomy), Jeffrey Volenec (Agronomy)
- **External Collaborators:** Chris Kucharik (University of Wisconsin), Navin Ramankutty (University of British Columbia)
- **Description:** The overall goal of this project is to leverage existing knowledge, models and data to develop a framework for understanding the interplay between global change and local sustainability of US agriculture in the context of alternative national, state and local policies affecting agricultural productivity and environmental quality. We will examine the tradeoffs between: 1) crop production, prices and food consumption, 2) land use and associated carbon dioxide emissions, 3) groundwater depletion, and 4) nitrogen losses. Theoretical analysis shows that there are no ‘win-wins’ in this context. Environmental regulations aimed at reducing nitrate leaching, groundwater depletion and land use change reduce output and raise food prices. On the other hand, policies to promote agricultural productivity create additional incentives for intensification and cropland area expansion. By quantifying the separate effects we will be able to explore these tradeoffs individually as well as search for combinations of policies that can improve the environment while ensuring food security. The project will contribute to the field of agricultural sustainability which finds itself in the midst of a spatial information revolution with dramatic implications for public and private investments across farm, local, national and global levels. To date, multiscale analyses have suffered from excessive complexity and insufficient validation, as well as lack of replicability. By developing a new, open source framework based on existing models, data and parameters, and fostering a community of practice around these tools, this project has the potential to reshape the way we think about long run sustainability of US agriculture.
- **Status:** Ongoing

#### ***Modeling, Parameterization and Applied Policy Analysis with GTAP Firm Heterogeneity Framework with USITC***

- **Staff Involved:** Zeynep Akgul and Tom Hertel
- **External Collaborators:** Marinos Tsigas
- **Description:** This project involves further development and policy application of the GTAP firm heterogeneity model.
- **Status:** This project is expected to start at the end of May 2016.

#### ***Analysis of Russian Import Restrictions with GTAP Model***

- **Staff Involved:** Alla Golub (PI), Badri Narayanan (Co-PI).
- **External Collaborators:** Ekaterina Krivonos, FAO
- **Description:** Starting August 2014, Russia banned all imports of beef, pork, poultry, milk, milk products, as well as fruit, vegetables and fish from the United States, the European Union, Norway, Canada and Australia. The ban was introduced for political reasons in reaction to the Western sanctions over the crisis in Ukraine. Initially announced for one year, the ban was extended by Russia for 2 years until August 2016. The ban could increase food prices faced by the consumers in Russia, change size and structure of Russia’s import flows, and impact global trade. This project employs GTAP global economic data base and GTAP computable general equilibrium model to analyze economic impacts of Russia’s food import ban.
- **Status:** Completed. The manuscript is in preparation for publication.

### ***RDCEP 2 - U. Chicago/NSF: Decision Making Under Uncertainty***

- ***Staff Involved:*** Alla Golub and Tom Hertel
- ***External Collaborators:*** Yongyang Cai, University of Chicago; Jevgenijs Steinbuks, World Bank
- ***Description:*** dynamic stochastic analysis of agricultural land use, GHG emissions and sustainability.
- ***Status:*** First year of 5 year project. One of the issues analyzed under this project is impacts of uncertainty in future population, income and climate change on optimal level of global investment in agricultural R&D over the 21st century. A paper focusing on this issue will be presented at this year GTAP conference in Washington.

### ***DOE/Stanford: Improving Integrated Assessment Models***

- ***Staff Involved:*** Tom Hertel, Uris Baldos and Jing Liu
- ***External Collaborators:*** Noah Diffenbaugh and John Weyant
- ***Description:*** This project aims to improve the representation of the energy-land-water-climate nexus in Integrated Assessment Models
- ***Status:*** Mid-way through second round of support

### ***GEOSHARE***

- ***Staff Involved:*** Tom Hertel and Nelson Villoria
- ***External Collaborators:*** Carol Song, Rosen Center for Advanced Computing, Navin Ramankutty, Stefan Siebert, Andrew Nelson, Jawoo Koo
- ***Description:*** Development of data base, software and institutional infrastructure to facilitate the development and sharing of geospatial data bases for analysis of global agriculture and environmental issues.
- ***Status:*** Pilot project completed at the end of 2014. Some work on HUBZero on going. Awaiting stakeholders joining the Board.

### ***International Agricultural R&D Investment Needs for Global Futures***

- ***Staff Involved:*** Uris Baldos and Tom Hertel
- ***External Collaborators:*** Keith Fuglie
- ***Description:*** This project focuses on the role of R&D investments in promoting future productivity growth in agriculture and seeks to assess the environmental and food security consequences of such investments.
- ***Status:*** Ongoing

### ***TTIP project with USDA***

- ***Staff Involved:*** Zeynep Akgul, Nelson Villoria and Tom Hertel
- ***External Collaborators:*** Jayson Beckman
- ***Description:*** This project involves a broader trade policy analysis in the context of TTIP negotiations by using the newly developed firm heterogeneity module of GTAP. Implications of removing trade barriers such as non-tariff measures and tariff-rate quotas are investigated with a focus on US-EU beef market access.
- ***Status:*** This project is completed in December 2015. We are currently working on preparing a manuscript for journal submission.

### ***Firm Heterogeneity project with USITC***

- ***Staff Involved:*** Zeynep Akgul, Nelson Villoria and Tom Hertel
- ***External Collaborators:*** Marinos Tsigas
- ***Description:*** This project involves a larger scale parameterization of the firm heterogeneity module of GTAP with a focus on the choice of two key parameters, productivity distribution parameter and elasticity of substitution across product varieties. The objective is to provide elasticities that are consistent with the underlying firm heterogeneity theory bringing the current developments in the empirical literature on this topic into the CGE analysis. GTAP sectoral definition will be used.

- **Status:** This is an ongoing project expected to be completed in May 2016.

#### ***Economic and Environmental Impacts of a Possible Ban on GMO Crops in the US***

- **Staff Involved:** Farzad Taheripour, Harrison Mahaffey (MS student), Wallace E. Tyner
- **Description:** Examine the economic, land use, and GHG emission impacts of banning GMO crops in US.
- **Status:** Accomplished, a paper will be published based on this project.

#### ***Complex Dynamics of Telecoupled Human and Natural Systems***

- **Staff Involved:** Thomas Hertel, Farzad Taheripour, Guolin Yao (Ph. D.),
- **External Collaborators:** several institutions including Michigan State University.
- **Description:** The goal of this project is to evaluate the effects of telecoupling processes (trade of agricultural products such as food and flows of their corresponding monetary values) on dynamics of telecoupled human and natural systems. To achieve the research goal, we demonstrate the telecoupling processes using traded products that are produced in both sending and receiving systems, thereby forming both trade and competition relationships between them.
- **Status:** In progress

#### ***Public procurement data base extension and modelling modifications for analysis purposes, European Commission, 2014-15***

- **Staff Involved:** Thomas Hertel, Angel Aguiar, Robert McDougall, Badri Narayanan, Caitlyn Carrico
- **External Collaborators:** Joseph Francois (World Trade Institute & CEPR), Robert Stehrer (The Vienna Institute for International Economic Studies, wiiw), Lucian Cernat and Zornitsa Kutlina-Dimitrova (European Commission)
- **Description:** The objective of this project is to improve the government representation in a general equilibrium model and underlying data base of the world economy. The GTAP Data Base was extended to consider public investment, as well as the origin of imports (via the construction of an MRIO). We also modified the model to consider different government procurement regimes to test the implications of liberalization scenarios.
- **Status:** Completed

#### ***GTAP-BIO Data Base Update: Introducing biofuel into the version 9 of GTAP Data Base***

- **Staff Involved:** Farzad Taheripour, Luis Peña-Lévano (Ph.D student), Wallace E. Tyner
- **Description:** Introduce biofuels into the GTAP 9 Data Base for 2011 and generate land use data base for this year.
- **Status:** Accomplished, a working paper is posted on the GTAP website for the land use part. A report will be posted for the biofuel part.

#### ***The Implications of Data Base Year for Estimating Biofuel Induced Land Use Change Emissions in GTAP: Comparing Forecasting and Backcasting***

- **Staff Involved:** Farzad Taheripour and Wallace E. Tyner
- **Description:** In this project we compare and contrast forecasts for biofuel impacts made using the 2004 data base with backcasts removing the same levels of biofuels from the 2011 data base. We explore several different options and explain the differences between the backcasts and forecasts.
- **Status:** The draft report for the project has been completed.

#### ***An Exploration of Agricultural Land Use Change at the Intensive and Extensive Margins: Implications for Biofuels Induced Land Use Change Modeling***

- **Staff Involved:** Farzad Taheripour, Cui Hao (Post Doc), Wallace E. Tyner
- **Description:** Expansion in crop production due to biofuels or other system shocks can occur at the extensive or intensive margins. That is, more land can be brought into cultivation, or the existing land can be used more intensively as in double cropping. GTAP modelers have generally focused more on

the extensive margin. However, in recent years, data suggests in many regions, there has been significant change on the intensive margin. The purpose of this project is to do a better job of handling changes at the intensive margin.

- **Status:** This research is in progress.

#### ***Nexus between forest carbon sequestration and changes in crop yields due to climate change.***

- **Staff Involved:** Luis Peña-Lévano (Ph. D.), Farzad Taheripour, Wallace E. Tyner
- **Description:** This project examines consequences of climate change for crop yields in the presence and absence of a forest carbon sequestration.
- **Status:** Work in progress

#### ***Low-Water High Growth in South Asia-Phase II: A General Equilibrium Modeling Approach***

- **Staff Involved:** Farzad Taheripour, Thomas Hertel, Badri Narayanan G.
- **External Collaborators:** Sebnem Sahin (World Bank)
- **Description:** This project examines the economic and environmental impacts of water scarcity for economies of South Asia.
- **Status:** We are currently working on the second phase of this project

#### ***Enhancement of the OECD Env-Linkages model and incorporation of a new water module***

- **Staff Involved:** Dominique van der Mensbrugghe, Tom Hertel, Farzad Taheripour, Iman Haqiqi
- **External Collaborators:** Rob Dellink, Jean Chateau, François Chantret (OECD)
- **Description:** The OECD Environment Directorate has been using a GTAP-based global recursive dynamic computable general equilibrium model since the late 1990s to support its analytical work, part of which feeds into the Directorate's occasional Environmental Outlook report. The Directorate requested assistance to give the existing (GAMS) code a face-lift and improve its performance after many years of use and to incorporate a new water module based on the Center's experience with water modeling.
- **Status:** Project is completed. The new water module developed for this project is being ported to the ENVISAGE model.

#### ***Managing Wealth of Carbon Intensive Nations***

- **Staff Involved:** Dominique van der Mensbrugghe, Wally Tyner, Farzad Taheripour, Badri Narayanan, Jeff Peters, and Iman Haqiqi.
- **External Collaborators:** Grzegorz Peszko, Neha Muki, Alexander Golub, Anne Schopp, John Rogers (World Bank)
- **Description:** A number of low and middle-income countries have historically developed a comparative economic advantage in energy and carbon intensive sectors, whether extractive, energy or manufacturing and have traditionally been more concerned about the impact of climate change policies that they are about the impacts of climate change. This study aims to explore a large range of development paths for these countries, under various policy environments, to elucidate development policies that are robust over most of the potential range. The World Bank's Envisage model is providing a set of scenarios subject to a number of exogenous assumptions to highlight the challenges and opportunities for this set of countries. Future work will focus on Monte Carlo-type analysis and robust decision making under uncertainty.
- **Status:** This project is near completion. It required a number of enhancements to the Envisage model: incorporation of the new GTAP power database, development of a resource depletion module for coal, oil and natural gas, inclusion of assumptions on a range of future energy technologies (such as CCS), and incorporation of a wide number of assumptions on non-price changes in energy demand, for example changes in preferences for renewable power.

#### ***Projecting Food Demand***

- **Staff Involved:** Dominique van der Mensbrugghe and Verena Mecklenbrauck

- **External Collaborators:** Jae Edmonds (PNNL), Leon Clarke (PNNL) and Stephanie Waldhoff
- **Description:** The principle aim of this project is to provide an improved system to project food demand in the context of the shared socio-economic pathways (SSPs). Though the work is intended to feed in directly into PNNL's GCAM model, it will have broad applicability to many partial equilibrium models.
- **Status:** Terms of reference under discussion, though work has commenced.

#### **Updating the World Bank's Envisage model**

- **Staff Involved:** Dominique van der Mensbrugghe, Erwin Corong, Iman Haqiqi
- **External Collaborators:** Amer Ahmed, Maryla Maliszewska (World Bank), Roberto Roson (University of Venice) and Martina Sartori (University of Trento)
- **Description:** The World Bank wishes to update the Envisage model to the latest version of the GTAP 9 Data Base, including the satellite databases (notably energy, non-CO2 emissions, and the future release of the power database). Simultaneously, efforts will be underway to update the climate change impact functions in Envisage—partly to reflect the new GTAP release, but also to reflect the significant amount of new research and data available with the IPCC's Fifth Assessment report.
- **Status:** About to start. Note that some of the desired changes have already been done in the context of the aforementioned project on carbon dependent economies.

#### **Theme Chapter of Asian Development Outlook 2016 Update**

- **Staff Involved:** Dominique van der Mensbrugghe and Erwin Corong
- **External Collaborators:** David Raitzer (Asian Development Bank)
- **Description:** The objective of this project is to write a background paper on “The Economics of Global Greenhouse Gas Emissions Policies in Asia.” This paper will assess what a global climate agreement can mean for developing Asia, in terms of energy and land use systems, as well as overall economies, drawing on modeling. The analysis focusses on a range of plausible scenarios for how the Paris Agreement evolves and is implemented over the period through 2050. The Envisage model will be used to quantify the policy choices over a variety of scenarios.
- **Status:** About to start.

## **Publications**

- Aguiar, A., B. Narayanan, R. McDougall (2016) “The Global Trade Analysis Project (GTAP) Data Base version 9: Overview,” *Journal for Global Economic Analysis* (forthcoming).
- Baldos, U.L.C. and T.W. Hertel. (2015) “The Role of International Trade in Managing Food Security Risks from Climate Change,” *Food Security* (7):275-290. <http://link.springer.com/article/10.1007/s12571-015-0435-z#page-1>
- Britz, W., A. Drud and D. van der Mensbrugghe (2016) “Reducing unwanted consequences of aggregation in large-scale economic models—a systematic empirical evaluation with the GTAP model,” Paper under review.
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## **Presentations**

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- Akgul, Z. “Firm Heterogeneity, Non-Tariff Measures, and International Trade Agreements: The Case of US-EU TTIP Agreement on Beef Trade.” Paper presented in the Session “Selected Dissertation Reports at the International Agricultural Trade Research Consortium, Clearwater Beach, FL, December 2015.
- Baldos, U.L.C., T.W. Hertel and Keith Fuglie, “Appraising the costs and benefits for R&D led climate adaptation”, invited panel presentation at the International Conference of Agricultural Economists, Milan, Italy, August 10, 2015.
- Golub, A., and B. Narayanan. “Global Economic Impacts of Russian Restrictions on Food Imports”. Paper presented at the International Agricultural Trade Research Consortium, Clearwater Beach, FL, December 2015.
- Golub, A., Y. Cai, T. Hertel, and J. Steinbuks. “Energy Price Uncertainty and Global Land Use”. Selected Poster, Agricultural and Applied Economics Association Annual Meeting, San Francisco, CA, USA, July 2015.
- Gopalakrishnan, B.N., F. Taheripour, T.W. Hertel, and S. Sahin (2015) “Water Scarcity in South Asia: A dynamic Computable General Equilibrium Analysis,” Presented at the 2015 Agricultural and Applied Economics Association meeting, July 26-28, 2015, San Francisco, CA. Also presented at the 18th Annual Conference on Global Economic Analysis, Jun 17-19 2015, Melbourne, Australia.
- Hertel, T.W., based on work with U.L.C. Baldos, “Food and Environmental Security in an Era of Globalization”, seminar presented at the IRI-THYS Center, Humboldt University, Berlin, March 17, 2016.
- Hertel, T.W., “Climate Change, Agricultural Trade and Food Security”, Presentation at the annual meetings of the American Association for the Advancement of Science, Washington, D.C., February 14, 2016.
- Hertel, T.W. in collaboration with Farzad Taheripour and Badri Narayanan, “Food Security, Irrigation, Climate Change and Water Scarcity in India”, invited presentation at the American Geophysical Union meetings, San Francisco, CA, December 14, 2015.
- Hertel, T.W. in collaboration with Uris Baldos and Jing Liu, “Exploring the Food-Land-Water Nexus

- with SIMPLE-on-a-global-grid”, presentation to the PIAMDDI meetings, Stanford University, December 15, 2015.
- Hertel, T.W., “Global Land use Modeling for the Food-Energy-Water Nexus”, presentation to the NSF workshop on Food Energy and Water Systems, Iowa State University, October 12, 2015.
- Hertel, T.W., based on work with U.L.C. Baldos and Keith Fuglie, “Food and Environmental Security in an Era of Globalization”, Opening plenary talk to the German Association of Agricultural Economists, Gewisola, in Giessen, Germany, September 23, 2015.
- Hertel, T.W. and U.L.C. Baldos, “Green Revolutions Past and Future: Implications for Food Security and the Environment”, presentation to the EU-IATRC conference on Global Food Security Challenges, Milan, Italy, August 7-8, 2015.
- Hertel, T.W. “Climate Adaptation and Mitigation: An Economic Perspective on Land-based Policies and Food Security”, plenary talk to the IPCC Summit on Food Security, Dublin, Ireland, May 28, 2015.
- Hertel, T.W. “Agricultural Impacts of Climate Change: Adaptation and Mitigation”, presentation to the 21st annual meeting on Integrated Assessment of Climate Change, Snowmass, Colorado, July 28, 2015.
- Hertel, T.W. “Green Revolutions Past and Future: Implications for Food Security and the Environment”, presentation to the EAAE-IATRC Conference on Global Food Security, Milan, Italy, August 7-8, 2015.
- Hertel, T.W., based on a paper with Uris Baldos and Keith Fuglie “Appraising the gains from R&D-led climate adaptation in agriculture”, presentation at the International Conference of Agricultural Economists, Milan, Italy, August 10, 2015.
- Peña-Lévano, L., F. Taheripour, and W. Tyner (2015) “The Economic Benefits and Costs of Mitigating Climate Change: Interactions among Carbon Tax, Forest Sequestration, and Climate Change Induced Crop Yield Impacts,” Presented at the 2015 Agricultural and Applied Economics Association meeting, July 26-28, 2015, San Francisco, CA.
- Taheripour F., T.W. Hertel, B.N. Gopalakrishnan, S. Sahin and J. Escurra (2015) “Agricultural Production, Irrigation, Climate Change, and Water Scarcity in India,” Presented at the 2015 Agricultural and Applied Economics Association meeting, July 26-28, 2015, San Francisco, CA. Also presented at the 18th Annual Conference on Global Economic Analysis, Jun 17-19 2015, Melbourne, Australia.
- Taheripour, F., H. Mahaffey, and W. Tyner (2015) “Evaluation of Economic and Land Use Impacts of Substituting Non-GMO Crops for GMO in the US,” Presented at the 19th ICABR Conference Ravello, Italy: June 16 - 19, 2015. Also presented at the 2015 Agricultural and Applied Economics Association meeting, July 26-28, 2015, San Francisco, CA.
- van der Mensbrugge, D. (2015) “Global income inequality: past, present and future,” Presented at the 9<sup>th</sup> Annual Ecological Sciences and Engineering Symposium on *Inequality in Complex Systems: Characterizing Global Disparities*, Purdue University, 21 September.
- van der Mensbrugge, D. (2015) “GTAP Release 9.0,” Presented at the 8<sup>th</sup> Annual Meeting of the Integrated Assessment Modeling Consortium (IAMC) held in Potsdam, Germany, 16-18 November.

- van der Mensbrugghe, D. based on work with T. Hertel and U. Baldos (2015) “Predicting Long Term Food Demand, Cropland Use and Prices,” Presented at the 2<sup>nd</sup> Macroeconomics of Agriculture and Development (MAD) Workshop, Université de Bordeaux, France, 19-20 November.
- van der Mensbrugghe, D. based on work with T. Hertel and U. Baldos (2015) “Lessons from the Agricultural Model Intercomparison (AgMIP) project,” Presented at the Annual Joint Global Change Research Institute (JGCRI) Integrated Assessment Workshop, College Park, MD, 1-2 December.
- van der Mensbrugghe, D. (2015) “Economic consequences of climate change impacts on crops,” Presented at Annual Meeting of the Agribusiness Council of Indiana’s leadership program, Purdue University, 3 December.
- van der Mensbrugghe, D. (2016) “Climate change and the Energy-Agriculture-Climate Change Nexus,” Presented at a Workshop on Long-term scenario building for food and agriculture: A global overall model for FAO, Department of Agricultural Development Economics, Food and Agriculture Organization of the United Nations (FAO), Rome, Italy, 19 February.
- van der Mensbrugghe, D. (2016) “Shared Socio-Economic Pathways: Implications for Asia,” Talk presented in the Asia Development Policy Lecture Series, Asian Development Bank (ADB), Manila, the Philippines, 21 March.
- van der Mensbrugghe, D. (2016) “Top-down Approach to Global Integrated Assessment Modeling: A standard approach using GTAP-based global CGE Models,” Presented at a Workshop on Energy and Climate Change Modeling sponsored by the Korean Environmental Institute (KEI), Seoul, Republic of Korea, 23-24 March.
- van der Mensbrugghe, D. (2015) “Shared Socio-Economic Pathways and Global Income Distribution,” Paper presented at the 18<sup>th</sup> Annual Conference on Global Economic Analysis, Melbourne, Australia.

## Education and Network

### Additions to the GTAP Paper Series

The following were added to the GTAP Technical, Working and/or Research Memoranda Series in the past year.

#### Technical Papers

- **Modern Trade Theory for CGE Modelling: the Armington, Krugman and Melitz Models**  
by Dixon, Peter, Michael Jerie and Maureen Rimmer  
GTAP Technical Paper No. 36

#### Working Papers

- **Using continental grids to improve our understanding of global land supply responses: Implications for policy-driven land use changes in the Americas**  
by Villoria, Nelson and Jing Liu  
GTAP Working Paper No. 81

#### Research Memoranda

- **Development of the GTAP Land Use Data Base for 2011**  
by Peña-Lévano, Luis Moises, Farzad Taheripour and Wally Tyner  
GTAP Research Memorandum No. 28

#### Journal of Global Economic Analysis

- First issue pending release prior to the 2016 Conference and Advisory Board Meeting

### Courses

The Center continues to examine the ways in which it educates network members. Demand for the standard GTAP Short Course has recovered in the past few years and with the addition of new course applications as well as the offering of fellowships, we are continuing to see demand for the standard course. The GTAP 101 Course, now onto its seventh offering, continues to be in high demand and is beginning to feed graduates into the standard short course as planned. After postponing the 2014 Dynamic Short Course offering due to staffing challenges within the Center, the course was re-worked and offered in October 2015.

#### 2016 Course Offerings

- GTAP 101 – January 25-March 6 and September 12-October 28
- GTAP Short Course – August 6-12
- GTAP PTA – October 24 – November 20

#### Future Educational Goals

- Further investigate development of online mini-courses on special topics
- Develop and implement an “Alumni Outreach/Continued Learning Initiative” for short course graduates

### Conferences

Proposals for the conferences below (when available) can be accessed at:

[https://www.gtap.agecon.purdue.edu/events/Board\\_Meetings/2016/supp\\_material.asp](https://www.gtap.agecon.purdue.edu/events/Board_Meetings/2016/supp_material.asp)

#### *Ken Pearson Scholarship*

In 2016, Centre of Policy Studies, Victoria University, graciously endowed one scholarship, in the name of the late Ken Pearson, in recognition of his many contributions to the GTAP Network.

### ***Thomas Rutherford Scholarship***

Also in 2016, the GAMS Development Corporation awarded one scholarship, in honor of Thomas Rutherford.

The purpose of both scholarships is to provide a program to support the participation of promising young researchers at the annual GTAP conference and encourage their contribution to the use and further development of analytical software for CGE modelling.

Eligible candidates are early career researchers, within five years of the start of their career, and active in undertaking applied model-based analyses of real world problems using either GEMPACK or GAMS. It is also required that candidates have a paper be accepted for the conference.

For the 2016 Conference, forty-five individuals applied for consideration for these scholarships, and after deliberation by the scholarship committees, comprised each of a CoPS/GAMS and GTAP designee, as well as a member of the conference program committee, the following recipients were named.

#### ***Ken Pearson Scholarship***

Dr. Martina Sartori  
Post-Doc Researcher  
University of Trento, Italy

#### ***Thomas Rutherford Scholarship***

Dr. Christian Otchia  
Postdoctoral Fellow  
Nagoya University, Japan

### ***2016 Conference (Washington DC, United States)***

Maryla Maliszewska, The World Bank, will present an update on preparations for the 2016 conference at the board meeting. This conference is being jointly organized by The World Bank and the Center for Global Trade Analysis, with sponsorship provided by the World Bank and the United States International Trade Commission.

### ***2017 Conference (West Lafayette IN, United States)***

The Center for Global Trade Analysis will host the 2017/20<sup>th</sup> Annual GTAP Conference on their home campus of Purdue University in West Lafayette, Indiana. Ginger Batta will present an update to the board on this conference.

### ***2018 Conference (Proposed: Cartagena, Colombia)***

The Economics and Social Research Department, Faculty of Economic Sciences, Universidad de Cartagena prepared and submitted a proposal for the 2018 conference to be held in Cartagena. This proposal was circulated to the board in November 2015 for comments. Further information on this proposal will be presented at the board meeting followed by a formal vote.

### ***2019 Conference (tbd)***

Dominique van der Mensbrugge has been actively seeking potential hosts for the 2019 conference. If anyone has interest in hosting, or knows of a potential partnership, please contact Dominique.

## **Research Fellows**

At the 2014 Advisory Board Meeting, it was decided to open the nomination process for GTAP Research Fellows to also accept submissions from network members who, in the past five years, have contributed to the GTAP Data Base, and/or presented a paper at the annual conference. In March 2016, Ginger Batta issued a call for nominations, which was sent to 572 GTAP Network members. The criteria for nomination remained unchanged from previous years. At the Advisory Board Meeting, Kenichi Kawasaki, GTAP Research Fellows Committee Chair, will report on the committee's recommendations for awardees and invite a vote from the board. The GTAP Research Fellow Committee includes: Kawasaki (Chair), Tom Hertel and Stephen Karingi.

## **GTAP Network, Website and Usage Reports**

Reports on the GTAP Network, website and usage may be found at:

[https://www.gtap.agecon.purdue.edu/events/Board\\_Meetings/2016/supp\\_material.asp](https://www.gtap.agecon.purdue.edu/events/Board_Meetings/2016/supp_material.asp)

# **Center Finances and Staffing**

## **Finances**

To be discussed at the meeting.

## **Staffing**

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

## **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 detailed below. As you see, many of the Center's staff are externally funded (not supported by consortium funds or data base sales).

Staff Member	Status	Allocation						
Angel Aguiar	100% core	Work with I-O contributors	Documentation	I-O Educational Materials	Data Base (macro data, dwellings, I-O disaggregation, protection, trade, APT)	Oversee release schedule	Research and Courses	
Zeynep Akgul	100% projects	Heterogeneous firms	Research Projects					
Uris Baldos	100% projects	Satellite data (Land use and Land cover)	Research on Food-Land-Water Nexus					
Ginger Batta	100% core	Event Management (proposals, finances, logistics, participant relations, execution)	Product Management (sales, distribution, licensing, reporting)	General GTAP Network Communication	Promotional Materials	General Center administrative duties		
Erwin Corong	100% core	Integration of domestic trade, transport, wholesale and retail margins into data base and model	Data Base (running build programs for GTAP 9.1 Data Base)	Satellite Data (GMig2)				
Jeremy Douglas	100% core	Website						
Alla Golub	100% projects	Dynamic Model GTAP-E Model PE land use model in GAMS	Energy and Environ research	Satellite data	Grad student supervision	Document GTAP-E Model	Short Courses	
Thomas Hertel	25% core	Assist with Conference and Short Course	Research	Grad Student Supervision	Assist/guide development of land use data and models for GTAP	Development of GTAP-HET, the Melitz version of GTAP	Editing the Journal of Global Economic Analysis	Assist in Recruitment of Board Members
Wendy Kincaid	100% core	Assist with grants	Staff visas and hiring	Budgeting and finances	General Center administrative duties	Consortium memberships and invoicing		
Jing Liu	100% projects	SIMPLE-on-a-Grid	Grid-level cropland supply elasticity	Property damage caused by extreme weather events	Contributing to two versions of SIMPLE-on-a-Grid model	Estimating fine-scale cropland supply elasticity for the Americas and Africa	Research on economic impacts of extreme weather events	
Robert McDougall	100% core	Data Base Issues (Taxes, Energy and FIT)	Mentoring of data team	Documentation	Document GTAP-E Model	Research and Courses		
Dominique van der Mensbrugge	50% core	Managing the Center and relations with the Advisory Board	Model development	Research	Scenario development	Grad student supervision	Short Courses	
Graduate Students	various	Data Base (Agr Production Targeting, macro, Elasticities, Electricity Disaggregation)	Short Courses	Special data Projects (Skills)	Research Projects CGE Envisage, OECD ENV-Linkages	Satellite data projects (Land use, CO2)		