## Report to the GTAP Advisory Board 2009

The Agricultural Economic Research Institute (LEI) has been a member of the GTAP consortium since November 1996. We use GTAP for a variety of research activities related to international trade in agri-food products. The following presents a summary of our activities over 2008/9

### Consortium related

Le Chen has attended the 2008 GTAP short course.

### People

We currently have nine researchers involved in GTAP work: Martin Banse, Lindsay Chant, Torbjörn Jansson, Marijke Kuiper, Le Chen, Hans van Meijl, Jeff Powell, Andrzej Tabeau and Geert Woltjer.

### Strategy

The sizeable group of researchers involved with GTAP work makes it worthwhile to exploit potential economies of scale, overcoming limits posed by project-driven research as done at LEI.  To consolidate and develop the LEITAP model, monthly meetings are used for discussing technical details of ongoing modeling work. For focused, joint work 'Noordwijk meetings' of multiple days are organized, allowing researchers to step back from the day-to-day project issues and work jointly on issues of longer term strategic relevance. For example, in 2008 a Noordwijk meeting was organized with Peter Dixon and Maureen Rimmer to work on LEITAP and its baseline.

Next to the meetings, project funds are invested in consolidating and further developing the LEITAP model.  By pooling together funds from several projects a sizeable investment can be made. In 2008, these investments resulted in a cleaned-up version of LEITAP that incorporates (in a modular fashion) specifics of GTAP-E, GTAP-AGR and GTAP-DYN next to extensions developed at LEI.  A complementary data aggregation program was developed to allow the same flexibility in aggregation for LEITAP as available through GTAPagg.

### Research involving GTAP in 2008/09

LEI's activities with GTAP described by area.

*Model development*
- *Dynamic international capital flows*. The mechanism involved in GTAP-DYN has been replaced by a more intuitive version that can, in principle, be econometrically based. Regional households decide where to invest their wealth (internationally in the global trust or in domestic firms). The international trust decides in which countries to invest, while national investment is the result of these decisions.
- *Dynamic mobile factor markets* between agricultural and non-agricultural sectors. The CET function used in GTAP-AGR is replaced by a dynamic function with a gradual adjustment process towards equilibrium. It is based on econometric estimates.
- *Land supply*.
  - o Correction for differences between marginal and average productivity on newly developed land. Based on results for the IMAGE land productivity and land use model.
  - o Calibration procedure for land supply functions depending on the strictness of environmental policies. Information about available land for agriculture in the different environmental scenarios is supplied by the IMAGE  land allocation model.
- *Dynamic consumption function* calibration, where a CET consumption function is calibrated in each simulation step by a function where income elasticities depend on PPP corrected real GDP per capita.
- *Modeling EU agricultural policy*:
  - o Introducing explicit real budgets for EU agricultural policy.

- o Opportunity to stabilize subsidies per hectare instead of ad valorem subsidies
- o Modeling of decoupling in different ways. An equal rate per hectare didn't work out because it would imply enormous changes in current land rents. Equal tariff rates for each sector. Lump sum gifts to farmers without economic consequences. Distributing subsidies over labor, capital and land in a fixed proportion. The correct way to model decoupling requires more theoretical and empirical research.
- o Modeling vintage effects of investment subsidies in physical and human capital (second pillar EU-policy)
- o Distributing payments of Less favored Areas and Agro-Environmental schemes.
- Automatic generation of a pfactwld shock to have zero gdp world inflation in the simulations. Also automatic swap after a calibration with exogenous GDP to one where technology is exogenous and GDP endogenous.
- Generalization of the implementation of biofuels targets.
- Generalization of the implementation of output quota.

## Data and model management software

- *DSS (Dynamic Steering System) – interface for running LEITAP to assure replicability & consistency*:
  - o Automatic checks on model inconsistencies (Walras slack, percentage changes of less than -100%, etc.)
  - o Flexible system to design scenarios with combinations of shocks, closures and parameter files.
  - o Method to base one scenario on the update files from another scenario
  - o Method to delete parts of a scenario from which you inherit.
  - o Options to compare scenario definitions
  - o Opportunity to run a batch job of a lot of scenarios, organized in a systematic way.
- *GEMSE analyst - interface for quickly analyzing and displaying results*:
  - o Generalized way to view scenarios with flexible period definitions
  - o Method to derive one scenario from another
  - o Improved reading of different scenarios.
  - o Certification procedure for variable definitions.
  - o Improved graph and mapping facilities
  - o Possibility to read standard graphs, tables and maps including or excluding period settings
  - o More flexible way to choose periods to be presented
  - o Opportunity to group graphs, tables and maps into presentations
  - o Easier methods to compare scenarios
  - o Export tool to export zipped text files to be used directly into the IMAGE land allocation model
  - o Export tool to export scenario results in zipped files for use in other directories
  - o Opportunity to show absolute changes next to relative changes
- GTAP comparison program: simple GEMPACK program that compares any two GTAP databases that have the same dimensions to detect key differences for example between different database releases
- *LEITAPagg*: an aggregation program is developed to aggregate the additional data needed by LEITAP to any aggregation to supplement the aggregation done with GTAPagg
- *Tariff-tool*: work on a tool to generate tariffs at GTAP level (or any other aggregation of the 6 digit codes) from the MacMAp dataset is still ongoing. Data aggregation rules are programmed in GAMS and user-changeable. Several problems were encountered with both software and issues with the MacMap database obtained through WITS.

## Linking of models

- *Linking CAPRI and GTAP:* as part of the SEAMLESS project (which ended March 2009) CAPRI and GTAP have been linked such that GTAP runs as part of CAPRI with production decisions at aggregated level in GTAP reflecting the behavior of CAPRI.
- *Changes in China's agriculture:* a project is ongoing to analyze the impact of changes in China's agriculture on the world economy and the EU in particular. In this project GTAP runs provide the basis of estimating trade response functions that will be included a detailed model of China's agriculture (CHINAGRO developed by SOW and CCAP) and to a model of EU's agriculture (FEA). This work is part of CATSEI, an EU FP6 project.
- *Linking LEITAP with biophysical models*: In EUruralis LEITAP is linked with the biophysical IMAGE model of PBL and the land allocation model CLUE-s of WUR-LAD.

## Bioenergy

- *In the area of bioenergy we extended the scope of our analysis from a more focused approach on biofuel to a wider analysis of biomass use in petrol, electricity and fine chemicals.*
  - o This work has been done in a joint project with Andre Faaij and members of his team at the Copernicus Institute of Utrecht University (Netherlands).

o For this project we linked the LEITAP model with a bottom-up model indicating the demand for biomass uses in the three bio-based industries. The outcome of the study is also available on the LEI web-site (www.lei.nl).
o For DG Environment several biofuel scenario's will be done with a focus on land use.

## Land use
- *Agro-ecological zones*: as part of the SEAMLESS project AEZ data are included in a modified version of GTAP-AGR to capture differences in production potential, especially water and temperature limitations. The impact of this modification is assessed though an analysis of a possible Doha agreement without the AEZs.

## Future of (EU) agriculture
- LEI is one of the partners in the SCENAR2020 II project for the EC (DGAgri). In this project the future of EU agriculture and rural development is central. GTAP will be used in combination with two EU agricultural models (ESIM and CAPRI). The future of the Common Agricultural Policy after 2013 is a central theme in this study.
- EUruralis 2.0 is ready. EUruralis is a policy discussion instrument with regard to the future of EU agricultural markets and rural areas. Next to four SRES type scenarios, policy makers can play with policies to obtain an idea of the impact of these policies on people, planet and profit indicators within the four scenarios. The policies are domestic support, border support and the EU biofuel directive. In 2009 LEI is leading the consortium of Alterra, PBL and WUR-LAD. In 2009 the future of the CAP will be a central theme, next to biofuels and process quality issues.
- Modeling work for OECD Environmental Outlook to 2030.

## Common Agricultural Policy:
- In the study on modulation (i.e. shifting money from first pillar to second pillar of CAP) for DG Agri of EC LEI made an innovative contribution by modeling second pillar or rural development policy. Special attention was devoted to human and physical capital investments of axis 1, LFA and agri-environmental payments of axis 2 and regional investments of axis 3. There will be a presentation at the conference on this subject.
- In 2009 an impact study on the Dutch proposal for the future of the CAP ("Houtskoolschets") will be performed for the Dutch government.

## Other activities
- Started development of a national CGE model for the Netherlands (ORANGE) that can in the future be linked to LEITAP

## GTAP-related publications

Banse, M. A. Faaij, R Hoefnagels and  V. Dornburg (2009) Analysis of the Economic Impact of Large-Scale Deployment of Biomass Resources for Energy and Materials in the Netherlands. Study commissioned by the Dutch Ministry of Agriculture, Nature and Food Quality. The Hague, Netherlands. http://www.lei.wur.nl/NL/nieuwsagenda/nieuws/Gevolgen_toename_biomassagebruik_op_de_economie

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Eickhout, B., H. van Meijl, A. Tabeau and E. Stehfest, (2008). The impact of environmental and climate constraints on global food supply. In: "Economic Analysis of Land Use in Global Climate Change Policy", edited by T. Hertel, S. Rose and R. Tol, Routledge, USA. (in press)

Jansson T., M. Kuiper, M. Adenaeuer (2009) Linking CAPRI and GTAP. SEAMLESS D3.8.3 (www.seamless-ip.org).

Kuiper, M (2009) Test Scenarios for Global and Country Level Analysis, including baseline. SEAMLESS D3.8.6 (www.seamless-ip.org). Note: contains results of Doha assessment with and without AEZs

Kuiper, M. (2009) Documentation of procedures and model components. SEAMLESS D3.8.7 (www.seamless-ip.org). Note: technical description of model changes to include AEZs

OECD, 2008, OECD Environmental Outlook to 2030, Paris. (member of modeling team)

Rienks, W.A., A. Balkema, M. Banse, B. Eickhout, I. Geijzendorffer, H. van Meijl, H. van den Heiligenberg, K. Overmars, A.G. Prins, I. Staritsky, A. Tabeau, P. Verburg, P. Verweij, W. Vullings, H. Westhoek, G. Woltjer, 2008. Eururalis: an integrated impact assessment framework to support policy discussion about the future of Europe's rural areas.

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