



Ruhr Graduate School in Economics

University of Duisburg-Essen

Essen, Germany, October 8-12, 2007

3rd Ruhr Graduate Summer School

Introduction to Computable General Equilibrium Modeling with GAMS and MPSGE

Objective:

The seminar will provide an introduction to general economic equilibrium models and their construction using GAMS and MPSGE. No previous knowledge of GE modeling is assumed. The intended audience is economists and students who want to do policy analysis with real data and economists who are more interested in using numerical modeling for simulation analysis of theoretical models. The seminar is taught in English.

The teaching technique consists of three steps repeated each half day: (1) a brief lecture, (2) examination and discussion of techniques via the use of simple template models, (3) exercises for the participants. Instructors will be available in the seminar room for individual consultation beginning at 8am each day, and the course will then run from 9am to 4pm with a one hour break at lunch.

Instructors:

David Tarr

The World Bank, Washington, DC, USA

Sergey Paltsev

Massachusetts Institute of Technology, USA

Volker Clausen

University of Duisburg-Essen, Germany

Course Coordinator:

Sebastian Rausch

Ruhr Graduate School in Economics, Essen, Germany

Workshop Topics and Schedule:

Day 1: October 8, Monday

Morning Session: Introduction to a computable general equilibrium (CGE) approach (Tarr).

- Equations and economics of a constant-returns-to-scale CGE model
- Economics of the cost of trade restrictions

Afternoon Session: Introduction to GAMS and MPSGE (Paltsev)

- Install, discuss, and explain software
- Basic GAMS syntax: SETS, TABLES, PARAMETERS, EQUATIONS, MODELS, DISPLAY, etc.
- Basic CGE structure: consumers, producers, market clearance, zero profit, income balance
- Functional forms in MPSGE: technology and preferences
- Exercises

Day 2: October 9, Tuesday

Morning Session: CGE Models of Free Trade Areas and Multilateral trade liberalization (Tarr)

- Free trade areas
- Evaluating the Uruguay round

Afternoon Session: Structure of CGE models in MPSGE (Paltsev)

- Structure of SAM
- Examination of simple template models
- Taxation and International Trade in a simple model
- Exercises

Day 3: October 10, Wednesday

Morning Session: Trade and Poverty (Tarr)

- Trade policy and poverty reduction in Brazil

- Trade, exchange rate, and energy pricing reform in Iran
- Poverty effects of Russia's WTO accession

Afternoon Session: Building Blocks of Applied Economic Equilibrium Analysis: Input-Output Tables (Paltsev)

- Structure of Input-Output Tables, balancing, coding and replication checks
- Examination of simple template models
- Development and calibration of a multi-sector CGE model
- Exercises

Day 4: October 11, Thursday

Morning Session: Models of accession to the World Trade Organization. Application to Russia (Tarr)

- Lessons from CGE analysis of an accession to WTO

Afternoon Session: From Input-Output Tables to a CGE Model (Paltsev)

- Development and calibration of a multi-sector CGE model
- Integrating GAMS and Excel
- Transferring source data into GAMS
- Using Excel for displaying GAMS output
- The GAMS GDX viewer and related tools
- Generating tables and figures from model output
- Exercises

Day 5: October 12, Friday

Morning Session: Building a Multi-Sector Model (Paltsev)

- Exercise on building a model on Russian 2001 data
- Assessment of changes in taxes on macroeconomic variables

Afternoon Session: An Introduction to Dynamic GE Modeling (Clausen)

- Fundamentals of dynamic modeling
- The Solow-Swan model
- The Ramsey model

For further information on course content, please contact Sergey Paltsev.

The instructors:

David Tarr is a Consultant in the Development Research Group of the World Bank, where he has been working for the past 19 years. Dr. Tarr has a Ph.D. in Economics from Brown University. Prior to his work in the World Bank, he was a Senior Economist in the US Federal State Commission and an Assistant Professor at Ohio State University. Dr. Tarr is an author of over 50 professional journal articles and 10 books. Since joining the World Bank in 1988, Dr. Tarr has provided trade policy advice to governments in about twenty countries, focusing especially on economies in transition, countries in the Middle East, North Africa and Latin America. His present research interests include the link between trade policy changes and poverty; quantifying the importance of endogenous productivity improvements from trade and foreign direct investment liberalization; trade and WTO accession issues in transition economies; and regional trade integration.

Sergey Paltsev is a Research Scientist in Economics at the Joint Program on the Science and Policy of Global Change at Massachusetts Institute of Technology, where he has been working for the past 5 years. Dr. Paltsev holds a Ph.D. in Economics from the University of Colorado at Boulder, and a Diploma in Radiophysics and Electronics from Belarusian State University. Dr. Paltsev is an author of 15 articles in professional journals and books. Prior to his work at MIT, he worked as a Consultant for International Management and Communication Corporation and the World Bank and as an Executive Director of the Program in Economics and Management of Technology at Belarusian State University.

Volker Clausen is Professor of International Economics, University of Duisburg-Essen, Campus Essen since 2001. He holds a Ph.D. in Economics from the University of Kiel, Germany, and a Master of Science in Economics from the London School of Economics and Political Science. Prior to this he worked at the Universities of Kiel and Bonn in Germany and at Indiana University, in Bloomington, Indiana (USA). His current research interests include general equilibrium modeling with a focus on ageing in open economies. His publications have a focus on international topics and appeared in, among others, the Journal of International Money and Finance, the Journal of Economic Integration and the Review of World Economics.

Note the following disclaimer and limited liability: The program and the list of instructors are confirmed and correct at the time of publication. In case of any serious circumstances or acts of nature beyond control of the organizers, such as for example illness, death, cancellation of flights etc., the organizers aim for an adequate substitution. In the very unlikely, but still possible case, the maximum liability of the organizers is limited to the tuition. The organizers do not cover any other costs of the participants, such as travel bookings, visa fees etc.

Payment and Registration:

The fee for participating in the training workshop is 2,500 Euro and includes lectures, course material and lunches. **Participants are required to bring a laptop with a CD-ROM drive.**

Academic participants from accredited universities or research institutions will be admitted on a space-available basis for a discount of 20%. Graduate students from accredited academic institutions are likewise admitted on a space-available basis for a discount of 50%. Please fax a copy of your student ID to get the discount. There will be a limited number of scholarships (*excluding travel and subsistence expenses*) that have been set aside for talented participants from developing countries. Deadline for the application for a scholarship is May 18, 2007. Preference will be given to applicants who have documented previous experience in general equilibrium modeling with GAMS. To apply for a scholarship, send your CV and a research paper via email to [Sebastian Rausch](mailto:Sebastian.Rausch@uni-essen.de). A decision on the allocation of scholarships will be made until June 1, 2007, in order to allow for an early arrangement of flights, visa etc.

To register by phone, fax, or e-mail, contact:

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The registration deadline is September 1, 2007. The maximum number of participants is restricted to 16.

Slots are guaranteed only upon full payment of fees (by check or credit card) through the GAMS Course Coordinator. Cancellations will be fully refunded if made prior to September 1, 2007. No refunds will be made after the registration deadline.

Venue and Accomodation:

Workshop participants must make their own arrangements for accomodation. The workshop will be held at the Department of Economics at the University of Duisburg-Essen, [Campus Essen](#): *University of Duisburg-Essen, Campus Essen, Universitätsstraße 12, 45117 Essen, Germany.* Here is a [PDF-file](#) with venue information.

Information on nearby hotels and links to maps of Essen can be found [here](#). Very close to the university is the following hotel:

*Welcome Hotel(****), Schützenbahn 58, 45127 Essen, T: +49 201 1779-0, F: +49 201 1779-199, <http://www.welcome-to-essen.de/>, 95€ per night.*

Slightly further away and somewhat less expensive:

*Ibis Hotel Essen, Hollestrasse 50, 45127 Essen/Germany, +49/201/24280,
<http://www.ibishotel.com/ibis/index.html>, 68,50-74,50€ per night.*

A number of rooms has been reserved for course participants until September, 1, 2007. Please quote GAMS when making a reservation.

How to Prepare:

No previous knowledge of GE modeling is assumed. We recommend, however, that minimal preparation for this course would be rigorous first year graduate courses in microeconomics and macroeconomics. Workshop participants can do a number of things to prepare for the workshop. Here are some suggestions:

- Download the [GAMS User's Guide](#).
- Download the [Demonstration Version of GAMS](#) . The GAMS software including a workshop license will be provided on the first day of the workshop.
- Study background material provided over the web, including the [MPSGE home page at GAMS](#).

Additional reading materials include:

Day 1:

Jaime de Melo and David Tarr (1992), *A General Equilibrium Analysis of US Foreign Trade Policy*, Cambridge, MA: MIT Press.

Jaime de Melo and David Tarr (1990), "Welfare Costs of US Quotas in Textiles, Steel and Autos," *Review of Economics and Statistics*, August;

GAMS User's Guide (available at: <http://www.gams.com/docs/gams/GAMSUsersGuide.pdf>)

MPSGE Users Guide (available at <http://www.gams.com/solvers/mpsge/index.htm>)

James Markusen and Thomas Rutherford (2004) "Getting Started with GAMS/MCP", University of Colorado (available at: <http://www.mpsge.org/gettingstarted.pdf>)

Day 2

Constantine Michalopoulos and David Tarr (1997), "The Economics of Customs Unions in the Commonwealth of Independent States," *Post-Soviet Geography and Economics*, Vol. 38, No. 3, 125-143.

Thomas Rutherford, Elizabeth Rutstrom and David Tarr (1997), "Morocco's Free Trade Agreement with the EU: A Quantitative Assessment," *Economic Modelling*, Vol. 14, No. 9, 237-269, April.

Glenn Harrison, Thomas Rutherford and David Tarr (1996), "Increased Competition and Completion of the Market in the European Union: Static and Steady State Effects," *Journal of Economic Integration*, Vol 11, No. 3, 332-365, September 1996.

Glenn Harrison, Thomas Rutherford and David Tarr (1997), "Quantifying the Uruguay Round," *Economic Journal*, Vol 107, No. 444, 1405-1430, September 1997.

Markusen's examples (<http://www.mpsge.org/tutorial.pdf>)

Sergey Paltsev (2004), "Moving from Static to Dynamic General Equilibrium Models (Notes for a Beginner in MPSGE)," MIT Joint Program on the Science and Policy of Global Change, 2004, Technical Note 4, Cambridge, MA.

Day 3

Glenn Harrison, Thomas Rutherford and David Tarr (2003), "Trade Liberalization, Poverty and Efficient Equity," *Journal of Development Economics*, Vol. 71 (1), June, 97-128.

Jesper Jensen and David Tarr (2003), "Trade, Exchange Rate and Energy Pricing Reform in Iran: Potentially Large Efficiency Effects and Gains to the Poor," *Review of Development Economics*, Vol. 7, Number 4, November, 543-562.

Glenn Harrison, Thomas Rutherford, David Tarr and Angelo Gurgel (2004), "Trade Policy and Poverty Reduction in Brazil," *The World Bank Economic Review*, Vol. 18, 289-317.

Thomas Rutherford, David Tarr and Oleksandr Shepotylo (2005), "Poverty Effects of Russia's WTO accession: modeling real households and endogenous productivity effects." World Bank Policy and Research Working paper.

Thomas Rutherford and Sergey Paltsev (1999), "From an Input-Output Table to a General Equilibrium Model: Assessing the Excess Burden of Indirect Taxes in Russia," Mimeo, Department of Economics, University of Colorado (available at: <http://web.mit.edu/paltsev/www/docs/russia.html>).

Day 4

Jesper Jensen, Thomas Rutherford and David Tarr (2007), "The Impact of Liberalizing Barriers to Foreign Direct Investment in Services: The Case of Russian Accession to the World Trade Organization," forthcoming in *Review of Development Economics*.

Day 5

Glenn Harrison, Thomas Rutherford and David Tarr (2002), "Trade Policy Options for Chile: The Importance of Market Access," *World Bank Economic Review*, Vol. 16, Number 1, 2002.

James Markusen, Thomas Rutherford and David Tarr (2005), "Trade and Direct Investment in Producer Services and the Domestic Market for Expertise," *Canadian Journal of Economics*, Vol. 38 (3), 758-777.

Sergey Paltsev (2004), "Moving from Static to Dynamic General Equilibrium Models (Notes for a Beginner in MPSGE)," MIT Joint Program on the Science and Policy of Global Change, 2004, Technical Note 4, Cambridge, MA.

Robert J. Barro and Xavier Sala-i-Martin (2004), "Economic Growth", 2nd ed., The MIT Press, Cambridge, MA, Chapter 1 and 2.