



Ruhr Graduate School in Economics
University of Duisburg-Essen
Essen, Germany, March 15-19, 2010

6th Ruhr Graduate Summer School

Energy and Climate Policy Modeling with GAMS and MPSGE

Instructors:

Professor Dr. Christoph Böhringer, University of Oldenburg, Germany
Professor Dr. Volker Clausen, University of Duisburg-Essen, Germany

Objectives:

Energy markets are a primary target for policy regulation since they play a key role in the provision of basic services and account for major environmental hazards such as global warming or nuclear waste. The justification and design of regulatory policies require insights into the potential trade-offs between overall economic performance, distributional considerations, and environmental quality: Accomplishing one objective frequently means backpedaling on another. Against this background, numerical methods to quantify the implications of policy interference are essential for decision support.

The workshop provides an introduction into partial and general equilibrium models for the state-of-the-art impact assessment of energy and climate policies. Drawing on basic microeconomic theory, the course will follow model-based peer-reviewed publications in international journals to cover contemporary issues in energy and climate policy such as the promotion of renewable energies, the phase-out of nuclear power, the implementation of environmental tax reforms or the design of international emissions trading schemes.

The workshop will provide an introduction to applied (numerical) general equilibrium models constructed using GAMS and MPSGE. The workshop addresses beginners, no previous knowledge of GE modeling is assumed, but knowledge of intermediate microeconomics (master's level) is important. This workshop is intended for economists who are interested in using numerical modeling for simulation analysis of theoretical models and those who want to do policy analysis with real data.

The teaching technique we will follow 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. Both instructors are available during the entire workshop.

Background of Instructors:

Christoph Böhringer
University of Oldenburg

Christoph Böhringer is Professor of Economic Policy at the University of Oldenburg. His research for the last years has focused on the quantitative analysis of environmental and energy policies based on numerical optimization models. Since 1994, he has been regularly conducting workshops on applied analysis in the fields of environmental, energy, fiscal and trade policies. He has widely published in international journals, including Applied Economics, Canadian Journal of Economics, Computational Economics, Ecological Economics, Energy Economics, Energy Journal, Energy Policy, Environmental and Resource Economics, European Economic Review, European Journal of Political Economy, Journal of Economic Dynamics and Control, Journal of Environmental Economics and Management, Journal of Policy Modeling, Journal of Regulatory Economics, Kyklos, Oxford Review of Economic Policy, Scandinavian Journal of Economics, The World Economy.

Volker Clausen
University of Duisburg-Essen, Campus Essen

Volker Clausen is Professor of International Economics, University of Duisburg-Essen, Campus Essen since 2001. Previously he worked at the Universities of Kiel and Bonn in Germany and at Indiana University, in Bloomington, Indiana (USA). 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. His current research interests include general equilibrium modeling with a focus on ageing in open economies and also in development economics. 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”.

Course Coordinator:

Ute Volz
Ruhr Graduate School in Economics, Essen, Germany
University of Duisburg-Essen, Campus Essen

Workshop Topics and Schedule:

Day 1: March 15, Monday

Introduction to General Equilibrium Modeling: Some Basics

- Welcome and overview
- Installation of software
- Getting started with GAMS and MCP
- Formulating economic equilibrium as a Mixed Complementarity Problem (MCP)
- *Hands-on session:* Assessing the effects of taxation

Day 2: March 16, Tuesday

Introduction to Partial Equilibrium Analysis of Energy and Climate Policies

- Reduced-form models of emission abatement based on marginal abatement cost curves
- *Hands-on session:* Assessing the compliance costs to National Allocation Plans within the EU
- Partial equilibrium modeling of multi-regional electricity markets (production, transmission, consumption)
- *Hands-on session:* Green quotas versus feed-in tariffs on electricity markets

Day 3 – March 17, Wednesday

Introduction to General Equilibrium Analysis

- Applied general equilibrium modeling (“Opening a black box”)
- Calibration of functional forms to observed economic data
- *Hands-on session:* Stylized CGE models formulated as MCP
- Introduction to MPSGE: a meta-language under GAMS for efficient implementation of (large-scale) CGE models
- *Hands-on session:* Stylized CGE models implemented with MPSGE

Day 4 – March 18, Thursday

General Equilibrium Analysis of Energy Policies

- Integration of bottom-up and top-down in energy policy analysis
- *Hands-on session:* green quotas and subsidies for renewables
- *Hands-on session:* nuclear phase-out
- *Hands-on session:* carbon emission constraints (carbon taxes) and environmental tax reform

Day 5 – March 19, Friday

General Equilibrium Analysis of Climate Policies (Part 2)

- Open economy models
- Multi-sector, multi-region CGE modeling using the GTAP6 data base of global trade and energy use
- Hands-on session: Assessing the economic consequences of carbon emission constraints under Kyoto and Post-Kyoto climate policy regimes

Note: Depending on the previous experience of participants with GAMS, MPSGE and CGE modeling, the program might be covered more quickly at the beginning of the workshop which allows for more discussion and implementation of recent research toward the end of the workshop. This will be decided on the basis of the actual list of participants who will be asked about their previous experience in the field before the workshop starts.

Times and Location:

Morning sessions will begin at 9am. Lunch is provided for workshop participants at noon. The afternoon sessions will run from about 1-4pm. In the time between 4 and 5 pm there will be for further individual programming and consultation. All sessions take place in the Casino Gästehaus located in the east of the University of Duisburg-Essen, Campus Essen:

*University of Duisburg-Essen, Campus Essen
Universitätsstraße 12
45117 Essen
Germany*

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 DVD drive. Adapters to German power supply if necessary. The GAMS workshop licence (valid for 2 months) as well as extensive course material will be provided on DVDs and CDs.**

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 or email 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 qualified participants from developing countries. Deadline for the application for a scholarship is January 17, 2010. Preference will be given to applicants who have documented previous experience in general equilibrium modeling with GAMS. To apply for a scholarship in the form of a tuition waiver, send your CV and, if available, a research paper via email to [Ute Volz](mailto:Ute.Volz). A decision on the allocation of scholarships will be made until January 22, 2010, in order to allow for an early arrangement of flights, visa etc.

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

*Course Coordinator
Ute Volz
University of Duisburg-Essen
Department of Economics
45117 Essen, Germany
Telephone: +49 (0)201-183-4507
Fax: +49 (0)201-183-3974
email: rgss@vwl.uni-due.de*

The registration deadline is **March 1, 2010**. The maximum number of participants is restricted to 16.

Slots are guaranteed only upon full payment of fees through the GAMS Course Coordinator. Cancellations will be fully refunded if made prior to March 1, 2010. No refunds will be made after the registration deadline.

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.

Venue and Accommodation:

Workshop participants must make their own arrangements for accommodation. 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](#). Venue information will be provided after reservation.

Information on nearby hotels and links to maps of Essen can be found [here](#). Note that Essen will be the Cultural Capital of Europe in 2010. Hotel rooms will be, depending on dates, scarce and rather expensive.

Eight rooms have therefore been earmarked at very reasonable rates **until February 1, 2010** for potential reservations at:

Bildungshotel im Bfz-Essen e.V., Karolingerstraße 93, 45145 Essen, T: 0201/3204-243, F: 0201/3204-277, bildungshotel@bfz-essen.de, http://www.bildungshotel-essen.de/zimmer_e.htm approx. 43€ per night.

Very close to the university is the following hotel:

*Welcome Hotel(****), Schützenbahn 58, 45127 Essen, T: +49 201 1779-0, F: +49 201 17 79-199, <http://www.welcome-to-essen.de/>, approx. 130€ 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>, approx. 110€ per night.

How to Prepare:

No previous knowledge of GE modeling is assumed. Participants should be familiar with intermediate microeconomics and get acquainted beforehand with GAMS which is the (rather intuitive) programming language used for computer-based model implementation. Some introductory readings and a short do-it-yourself GAMS tutorial will be sent with further workshop information via eMail to participants in mid-February 2010.

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:

- Böhringer, C., Rosendahl, K.E.: "Green Promotes the Dirtiest: On the Interaction between Black and Green Quotas in Energy Markets", *Journal of Regulatory Economics*, (Forthcoming).
- Böhringer, C., Rosendahl, K.E.: "Strategic Partitioning of Emissions Allowances under the EU Emissions Trading Scheme", *Resource and Energy Economics* 31, 2009, 182-197.
- Böhringer, C., Rutherford, T.F.: "Combining bottom-up and top-down", *Energy Economics* 30 (2), 2008, 574-596.
- Böhringer, C., Hoffmann, T., Rutherford, T.F.: "Alternative Strategies for Promoting Renewable Energy in EU Electricity Markets", *Applied Economics Quarterly* 58 Supplement, 2007, 9-26.
- Böhringer, C., Hoffmann, T., Lange, A., Löschel, A., Moslener, U.: "Assessing Emission Allocation in Europe: An Interactive Simulation Approach", *The Energy Journal* 26 (4), 2005, 1-22.
- Böhringer, C., Löschel, A.: "Assessing the Costs of Compliance: The Kyoto Protocol", *European Environment* 12 (1), 2002, 1-16.
- Böhringer, C., Rutherford, T.F., Wiegard, W.: "Computable General Equilibrium Analysis: Opening a Black Box", ZEW discussion paper 03-56 (www.zew.de)
- Rutherford, T.F., "Applied General Equilibrium Modelling with MPSGE as a GAMS Subsystem", *Computational Economics* 14, 1999, 1-46.
- Rutherford, T.F.: "Extensions of GAMS for Complementarity and Variational Problems Arising in Applied Economics", *Journal of Economic Dynamics and Control*, 1995, 1299-1324.
- Rutherford, T.F.: "GTAP6inGAMS: The Dataset and Static Model" (www.mpsge.org)