Nazarbayev University

The School of Social Sciences and Humanities

ECON 341

Economic Simulation Modeling

Syllabus

Spring 2016

Instructor
Zhanna Kapsalyamova
(zhanna.kapsalyamova@nu.edu.kz)

Lectures

Monday, Wednesday

2:00 pm - 3:15 pm

Room 8.422

ECON 341 Tentative Schedule

Disclaimer: This syllabus is subject to change. Changes, if any, will be announced in class.

Aug 15	Mon	L1	Introduction and Overview of general equilibrium theory and CGE modeling	Ch. 2, GGS, Ch. 1, Burfisher
Aug 17	Wed	L2		
Aug 22	Mon	L3	The Simple CGE model: Theory	Ch. 2, HSH; Ch. 3 GGS, Ch. 1, Markusen
Aug 24	Wed	L4		
Aug 29	Mon	L5	Introduction to GAMS syntax (hands-on session). Transportation problem	Ch. 2, Rothenthal,
Aug 31	Wed	L6		
Sep 5	Mon	L7	Simple CGE model in GAMS: hands-on session	Ch. 2, Markusen
Sep 7	Wed	L8		
Sep 12	Mon	L9	MPS/GE subsystem of GAMS: hands-on session	Ch. 2, Markusen
Sep 14	Wed	L10		
Sep 19	Mon	L11	Variations of the basic model: intermediate inputs and nesting (hands-on session)	Ch. 2, Markusen, Ch. 6, HGH Ch. 5, Burfisher
Sep 21	Wed	L12	Review Session	
Sep 26	Mon	L13	**Midterm exam** (tentatively scheduled)	
Sep 28	Wed	L14	The use of specific factors	Ch. 2, Markusen Ch. 6, Burfisher
Oct 3	Mon	L15		
Oct 5	Wed	L16	Labor supply or labor/leisure choice activity	Ch. 2, Markusen
Oct 10-14			**Fall break**	
Oct 17	Mon	L17	Two households with different preferences and endowments	Ch. 2, Markusen
Oct 19	Wed	L18	Non-homothetic demand	Ch. 2, Markusen
Oct 24	Mon	L19	Modeling taxes and public goods	Ch. 3 Markusen Ch. 6, HGH Ch. 8, Burfisher
Oct 26	Wed	L20		
Oct 31	Mon	L21	Modeling open economy	Ch. 4, Markusen Ch. 6, HGH Ch. 7, Burfisher
Nov 2	Wed	L22	Imperfect competition, increasing returns (optional)	Ch. 5, Markusen
Nov 7	Mon	L23	Dataset construction (SAM)	
Nov 9	Wed	L24		
Nov 14	Mon	L25		
Nov 16	Wed	L26	Static IFPRI model	Lofgren et al., 2012
Nov 21	Mon	L27		
Nov 23	Wed	L28	**Term paper presentations**	
Nov 28-…			**Final Exam week**	

Course objectives

This course aims to introduce the principles of computable general equilibrium (CGE) modeling and present some applications of CGE models in trade, environmental and energy economics. CGE models are widely used in international organizations (World Bank, IMF) and research institutions.

The idea behind the course is to strengthen a student's understanding of economic processes by translating economic theory and economic models into the computable models. The course will teach the theory of CGE modelling; principles of calibration and modeling in GAMS/MPSGE and GAMS/MCP and conduct exercises and scenario analysis.

Learning outcomes

The student at the end of the course should:
1) know how to write a simple CGE model in GAMS/MCP and/or GAMS/MPSGE;
2) interpret the results obtained from CGE models;
3) apply and be able to extend multisector CGE models.

Prerequisites

- Intermediate Microeconomics

Grading

- Assignments – 40%
- Midterm exam – 25%
- Term paper or Final exam–25%
- Attendance – 10%

Term paper requirements:

A typical term paper should include the following sections:
1) Introduction
2) Technical specification of a CGE model
3) Model calibration
4) Results
5) Summary and conclusions

Final Grade:

A	$100 \geq \text{grade} \geq 95$
A-	$94.9 \geq \text{grade} \geq 90$
B+	$89.9 \geq \text{grade} \geq 85$
B	$84.9 \geq \text{grade} \geq 80$
B-	$79.9 \geq \text{grade} \geq 75$
C+	$74.9 \geq \text{grade} \geq 70$
C	$69.9 \geq \text{grade} \geq 65$
C-	$64.9 \geq \text{grade} \geq 60$
D+	$59.9 \geq \text{grade} \geq 55$
D	$54.9 \geq \text{grade} \geq 50$
F	$\text{grade} < 49.9$

Additional Policies

Private conversations, using the phones to browse the web or check emails are not appropriate. If you do it during the class, you will be cold called.

Attendance Policy

You are expected to attend every class and arrive on time. Excessive absences will affect your participation grade, and limit your ability to succeed in the course. If you miss class for any reason, it is your responsibility to collect notes from other students for the class session. If you are more than 10 minutes late to class, you will be counted as absent.

Important Note: Any cases of academic misconduct will be handled in accordance with the procedures of Nazarbayev University

Administrative Details

- Lecture notes will be posted on Moodle after each class.

- Office hours are 5-6 pm Monday and 5-6 pm Wednesday. For courtesy reasons please send an e-mail to request the time to meet if you would like to meet the instructor.

- Feel free to use emails for asking questions. The instructor will make the best effort to respond within 72 hours.

Textbooks

Most of the resources for the course are taken from different sources and the ones that we will mostly rely on include:

Mary E. Burfisher (2011). Introduction to Computable General Equilibrium Models. Cambridge University Press.

(HGH) Nobuhiro Hosoe, Kenji Gasawa and Hideo Hashimoto (2015). Textbook of Computable General Equilibrium Modelling. Palgrave Macmillan.

(GGS) Manuel Alejandro Gardenete, Ana-Isabel Guerra, Ferran Sancho (2012). Applied General Equilibrium An introduction.

J. Markusen Examples on CGE modeling. Available at: http://www.mpsge.org/tutorial.pdf

Kapsalyamova, Z. (2010). Effects of the Oil Export Price Increase on the Economy: Theoretical and Empirical Issues – A CGE Analysis of the Case of Kazakhstan. VDM Verlag.

The GAMS software could be downloaded from the website: www.gams.com

Outline

1. **Introduction and Overview of general equilibrium theory and CGE modeling**

Varian, H.R. (1992). Microeconomic Analysis, New York: Norton.
McKitrick R. R. (1998). The Econometric Critique of Computable General Equilibrium Modeling: The Role of Functional Form Choice. Economic Modelling 15:543-573.
Shoven, J.B., and J. Whalley (1984). Applied General Equilibrium Models of Taxation and International Trade: An Introduction and Survey. J. of Econ. Literature 22: 1007-1051.
Shoven, J. B. and J. Whalley (1998). Applying General Equilibrium. Surveys of Economic Literature, Chapters 2 and 3.
Ch. 2, GGS,
Ch. 1, Burfisher

2. **The Simple CGE model: Theory**

Markusen ch. 2, 3.
Devarajan, S., J. Lewis and S. Robinson (1990). Policy Lessons from Two-Sector Models, Journal of Policy Modeling, 12(4): 625-657.
Devarajan, S., D. Go, J. Lewis, S. Robinson, and P. Sinko (1997). Simple General Equilibrium Modeling, in J. Francois and K. Reinert, eds., Applied Methods for Trade Policy Analysis, Cambridge University Press.
Lofgren, H. (2003). Exercises in General Equilibrium Modeling Using GAMS. IFPRI.

3. **Introduction to GAMS syntax (hands-on session).**

Rothenthal, ch. 2

4. **Simple CGE model in GAMS: hands-on session**

Markusen ch. 2, 3.

5. **MPS/GE subsystem of GAMS: hands-on session**

Markusen, Ch. 2

6. **Intermediate inputs and nesting (hands-on session)**

Markusen, Ch. 2
HGH, Ch. 6
Burfisher, Ch. 5

7. The use of specific factors

Markusen, Ch. 2
Burfisher, Ch. 6

8. Labor supply or labor/leisure choice activity

Markusen, Ch. 2

9. Two households with different preferences and endowments (optional)

Markusen, Ch. 2

10. Non-homothetic demand (optional)

Markusen, Ch. 2

11. Modeling taxes and public goods

Ch. 3 Markusen
Ch. 6, HGH
Ch. 8, Burfisher

Babiker, M. H. , G. E. Metcalf and J. Reilly (2001). Distortionary Taxation in General Equilibrium Climate Modeling. Fourth Annual Conference on Global Economic Analysis Purdue University W. Lafayette, IN. Available at: https://www.gtap.agecon.purdue.edu/resources/download/502.pdf

Paltsev, S., Jacoby, D., Reilly, J., Viguier, L., Babiker, M., (2005). Modelling the Transport Sector: the Role of Existing Fuel Taxes. In: Loulou, R.,Waaub, J., Zaccour, G. (Eds.), Climate Policy. Energy and Environment: 25th Anniversary of the Group for Research in Decision Analysis, vol. 3. Springer-Verlag, New York Basic CGE model: scale economies and imperfect competition

12. Modeling open economy

Markusen, Ch. 4
HGH, Ch. 6
Burfisher, Ch. 7
Devarajan, S. & D. Go (forthcoming) "The Simplest Dynamic General Equilibrium Model of An Open Economy" Journal of Policy Modeling.
Lofgren, H., Harris, R. L. and Robinson, S. (2002). A Standard Computable General Equilibrium Model (CGE) in GAMS. Microcomputers in Policy Research 5. Washington: IFPRI.

13. Dataset construction (SAM)

Kapsalyamova, Z. (2010). Effects of the Oil Export Price Increase on the Economy: Theoretical and Empirical Issues – A CGE Analysis of the Case of Kazakhstan. VDM Verlag. Ch. 6.
Keuning, S. J. and W. A. de ruijter (1988). Guidelines to the Construction of a Social Accounting Matrix. Review of Income and Wealth Volume 34, Issue 1, pages 71–100, March 1988.
King, B. (1985). What is a SAM? in J.G. Pyatt and J.I. Round (eds.), Social Accounting Matrices: A Basis for Planning, Washington D.C.: World Bank, 1-15.
Round, J. (2003): Constructing SAMs for Development Policy Analysis: Lessons Learned and Challenges Ahead. In: Economic Systems Research, 15(2).
Thorbecke, E. (1997) Social Accounting Matrices and Social Accounting Analysis. Chapter prepared for inclusion in Walter Isard (Editor), Methods of Regional Analysis: An Introduction to Regional Science, (1997), section 2.

14. Functional forms in CGE models and calibration (optional)

Annabi, N., J. Cockburn, B. Decaluwé (2006). Functional Forms and Parametrization of CGE Models. MPIA Working Paper. Available at: http://www.un.org/en/development/desa/policy/mdg_workshops/entebbe_training_mdgs/ntbtraining/annabi_cockburn_decaluwe2006.pdf
Deaton, A. and Muellbauer, J. (1980) An Almost Ideal Demand System. The American Economic Review, Vol. 70 (3): 312-326
Femenia, F. (2012). Functional Forms Commonly Used in CGE Model. AGRODEP Technical Note TN-02. November. Available at: http://www.agrodep.org/sites/default/files/Technical_notes/AGRODEP-TN-02.pdf

Perroni, C. and Rutherford, T. F (1998), A Comparison of the Performances of Flexible Functional Forms for Use in Applied General Equilibrium Modelling, Computational Economics 11(3), 245-63.
Wing, I.S. (2004).Computable General Equilibrium Models and Their Use in Economy-Wide Policy Analysis. Technical Note No. 6. MIT Joint Program on the Science and Policy of Global Change
Boehringer, C., T.F. Rutherford and W. Wiegard (2003). Computable General Equilibrium
Analysis: Opening a Black Box, ZEW Discussion Paper No. 03-56, Mannheim, Germany
Bergman, L. (1990), The Development of Computable General Equilibrim Modeling, in: L. Bergman, D.W. Jorgenson and E. Zalai (eds.): General Equilibrium Modeling and Economic
Policy Analysis, Cambridge, 3-30.

15. Variations of the basic model: industrial organization (optional)

Markusen, ch. 4
Roson, R. (2006). Introducing Imperfect Competition in CGE Models: Technical Aspects and Implications. Computational economics 28: 29-49.
Francois, J. (2008). Scale Economies and Imperfect Competition in the GTAP Model, GTAP Technical Paper No. 14, Center for Global Trade Analysis, Purdue University.
Hoffman, A. N. (1999). Imperfect Competition in General Equilibrium Models – A Primer, Mimeo, MobiDK project, University of Copenhagen and Ministry of Business and Industry, Denmark.
Balistreri E. J. and T. Rutherford (2011). Computing General Equilibrium Theories of
Monopolistic Competition and Heterogeneous Firms. In Handbook of Computable General Equilibrium Modeling edited by Peter B. Dixon and Dale W. Jorgenson

16. Dynamic CGE modeling (optional)

Babiker, M., A. Gurgel, S. Paltsev, and J. Reilly (2009). Forward Looking versus Recursive Dynamic Modeling in Climate Policy Analysis: A Comparison. *Economic Modelling*, 26(6), 1341-1354.
Diao, X., T. Roe and E. Yeldan "The Simple Dynamic CGE Model of a Small Open Economy" Chapter III, in Modeling Dynamic Applied General Equilibrium, mimeograph.
Paltsev, S. (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, Technical Note 4, Cambridge, MA.

17. Sensitivity and uncertainty (optional)

Arndt C. (1996). An introduction to Systematic Sensitivity Analysis
Saltelli A., S. Tarantola, F. Campolongo and M. Ratto, (2004) Sensitivity Analysis in Practice – A Guide to Assessing Scientific Models, John Wiley & Sons Ltd.
Saltelli A., Ratto M., Andres T., Campolongo F., Cariboni J., Gatelli D., Saisana M., Tarantola S., (2008) Global Sensitivity Analysis. The Primer, Eds. John Wiley and Sons, Ltd.
De Vuyst E.A. and Preckel P.V. (1997). Sensitivity analysis revisited: A quadrature-based approach, Journal of Policy Modeling 19(2): 175-185.

18. CGE modeling: applications in trade, environmental and energy economics (optional)

Jacoby, H. D. and I. S. Wing. (1999). Adjustment Time, Capital Malleability and Policy Cost. In The Costs of the Kyoto Protocol: A Multi-Model Evaluation, John Weyant (ed.), special issue of The Energy Journal, 1999.
Bretschger, L., R. Ramer and F. Schwark (2010). Impact of Energy Conservation Policy Measures on Innovation, Investment and Long-term Development of the Swiss Economy; Results from the Computable Induced Technical Change and Energy (CITE) Model. Final Report prepared for the Swiss Federal Office of Energy, *Bern*.
Paltsev, S., J.M. Reilly, H.D. Jacoby, R.S. Eckaus, J. McFarland, M. Sarofim, M. Asadoorian and M. Babiker (2005). The MIT Emissions Prediction and Policy Analysis (EPPA) Model: Version 4. Joint Program Report Series (5-Aug).
Maskus, Keith E., and Denise Eby Konan. 1997. Trade liberalization in Egypt. Review of Development Economics 1 (3), pp.: 275-293.