

Program in Applied Economics
The Johns Hopkins University
Spring 2017

Computable General Equilibrium Modeling
ECON 440.624
Course Syllabus

Instructors: Dr. Carolina Diaz-Bonilla and Dr. Valeria Piñeiro

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Class: Wednesdays 6-8:45pm, location: TBA

Office: TBA

Office Hours: Immediately before class, or by appointment

Course Objective

The objective of this course is to develop the ability to understand, interpret, and implement Computable General Equilibrium (CGE) models using the General Algebraic Modeling System (GAMS) software. The course will be primarily applied, however students will also learn basic relevant general equilibrium theory linked to empirical applications of CGE models.

The specific objectives: (1) gain an understanding of the underlying economic theory behind CGE modeling; (2) gain an understanding of the GAMS software; (3) be able to write simple CGE programs in GAMS; (4) be able to use and modify existing CGE programs and interpret results; and (5) be able to analyze public policy with CGE models.

Course Requirements

Course grade will be based on:

- Participation and modeling exercises (20%)
- Midterm group presentation (40%)
- Final paper (40%) (individual)

Prerequisites

440.601 Microeconomic Theory, 440.602 Macroeconomics Theory, 440.606 Econometrics.

Readings

No textbook is required. A list of required and recommended readings are included at the end of the syllabus.

Please note: the software used for the models in this class is not fully compatible with a Mac computer, therefore we recommend using JHU's computer lab for the final project rather than trying to use a Mac.

Tentative Course Outline:

Week 1:

- Introduction and Overview of CGE Modeling
- Introduction to the GAMS software and GAMS IDE, with simple partial equilibrium (PE) models
- Reading: Chapter 1, Burfisher (2011).

Week 2:

- Modeling Exercise “0”: Partial Equilibrium transport model.
- Modeling Exercise “1”: Simple economy, 2 activities- 2 factors- 2 households; begin in class
- Reading: Chapter 2, Burfisher (2011), Gams user’s guide chapter 1, Brook *et al.* (1998).

Week 3:

- Social Accounting Matrices (SAMs)
- Finish Modeling Exercise “1”: Simple economy, 2 activities- 2 factors- 2 households; undertake some simulations, finish as homework
- Reading: Chapter 10, Sadoulet (1995).

Week 4

- Review Simulations for Modeling Exercise “1”
- Modeling Exercise “2”: Intermediate demand; done in class.
- Reading: Chapter 11 and 12, Sadoulet (1995).

Week 5:

- Discussion Wobst (2003).
- Modeling Exercise “3”: Saving- Investment; begin in class, finish as homework
- Reading: Chapter 4 and 5, Burfisher (2011).

Week 6:

- Factor markets and trade
- Modeling Exercise “4”: Government; begin in class, finish as homework
- Reading: Chapter 6 and 7, Burfisher (2011).

Week 7:

- Final details of how to build a CGE model
- Modeling Exercise “5”: Open economy; begin in class, finish as homework
- Reading: Robinson *et al.* (1999).

Week 8 (March 1): MIDTERM GROUP PRESENTATIONS – 15 minutes each

Week 9:

- 1-2-3 model
- Reading: Devarajan *et al.* (1997).
- Example of applied policy model. Discussion Cattaneo *et al.* (1999)

Week 10:

- Introduction to policy models
- Example of applied policy model. Discussion Morley and Piñeiro (2015)

SPRING BREAK (March 20-24)

Week 11:

- Comparative static IFPRI standard CGE model
- Using the excel interface.

- Closures
- Reading: Lofgren *et al.* (2002).

Week 12:

- Comparative static IFPRI standard CGE model
- Run scenarios
- What can be changed in the excel interface
- Write up your own simulations

Week 13:

- TBD (summing up, lecturer, questions)

Final Paper due: Friday, April 14

Week 14 (Wednesday April 19):

- IN CLASS PRESENTATION OF INDIVIDUAL FINAL PAPER

Required readings

- Burfisher, Mary E. (2011). Introduction to Computable General Equilibrium Models. Cambridge University Press. New York.
- Sadoulet, Elizabeth, and Alain de Janvry (1995). Chapter 10: Input-output tables, Social accounting matrices and multipliers; Chapter 11: Multimarket models; Chapter 12: Computable general equilibrium models. In Quantitative development policy analysis, John Hopkins University Press.
- Robinson, Sherman (1991). Macroeconomics, financial variables, and computable general equilibrium models. World Development, Vol.19, No. 11, pp. 1509-1525.
- Devarajan, S.; Go, D. S.; Lewis, J. D.; Robinson, S. and Sinko, P. (1997). Simple General Equilibrium Modeling (1353 KB). En Francois, J. F. and Reinert, K. A. (eds.). Applied Methods for Trade Policy Analysis: A Handbook. Cambridge University Press.
- Lofgren, Hans; Lee Harris, Rebecca and Robinson, Sherman (2002). A Standard Computable General Equilibrium (CGE) Model in GAMS. Microcomputers in Policy Research 5. International Food Policy Research Institute (IFPRI).
<http://www.ifpri.org/pubs/microcom/micro5.htm>
- Robinson, Sherman; Yunez-Naude, Antonio; Hinojosa-Ojeda, Raul; Lewis, Jeffrey and Devarajan, Shantayanan (1999). From Stylized to Applied Models: Building multisector CGE models for policy analysis. North American Journal of Economics and Finance 10. 5-38.
- Cattaneo, Andrea; Hinojosa-Ojeda, Raul and Robinson, Sherman (1999). Costa Rica trade liberalization, fiscal imbalances, and macroeconomic policy: A computable general equilibrium model. North American Journal of Economics and Finance 10. 39-67.
- Wobst, Peter (2003). The impact of domestic and global trade liberalization on five Southern African countries. The journal of Development Studies 40. 70-92.
- Morley, Samuel. and Piñeiro, Valeria (2015). "Adjusting to external shocks in small open economies: the case of Honduras", Markets, Trade and Institutions Division Discussion Paper 1477. International Food Policy Research Institute, Washington, D.C.

Recommended and more topical readings

Dixon, Peter and Jorgenson, Dale, eds. *Handbook of Computable General Equilibrium Modeling, 1st Edition*. North Holland: Elsevier Press, 2012.

Dervis, Kemal, de Melo, Jaime and Robinson, Sherman (1982). *General Equilibrium Models for Development Policy*. The World Bank.

de Melo, Jaime and Robinson, Sherman (1989). Product Differentiation and the Treatment of Foreign Trade in Computable General Equilibrium Models of Small Economies. *Journal of International Economics* 27 (1-2): 47-67.

Macro closures

Decaluwe, Bernard, Andre Martens, and Marcel Monette (1988). Macroclosures in open economy CGE models: A numerical reappraisal. *International Journal of Development Planning Literature*. Vol 3, No. 2.

Robinson, Sherman (2006). Macro Models and Multipliers: leontief, Stone, Keynes, and CGE Models. In Alain de Janvry and Ravi Kanbur, eds., *Poverty, Inequality and Development: Essays in Honor of Erik Thorbecke*, New York: Springer Science. 205-232.

Labor Markets

Annabi, Nabil (2003). Modeling Labour Market in CGE Models: Endogenous Labour Supply, Unions and Efficiency Wages. PEP Network. Modeling and Policy Impact Analysis (MPIA): Training material.

Imam, M. Hasan and Whalley, John (1985). Incidence Analysis of a Sector-Specific Minimum Wage in a Two-Sector Harris-Todaro Model. *The Quarterly Journal of Economics* 100 (1): 207-224.

Environmental Policy

Bergman, Lars (2004). CGE Modeling of Environmental Policy and Resource Management. *Handbook of Environmental Economics* Vol. 3. Elsevier.

Macro and Income distribution

Bourguignon, François; Branson, William H. and de Melo, Jaime (1989). Macroeconomic Adjustment and Income Distribution: A Macro-Micro Simulation Model. OECD Development Centre Working Papers 1.

Adelman, I., and Sherman Robinson (1988). Macroeconomic adjustment and income distribution. *Journal of development Economics* 29, 23-44. North Holland. 1988.

Value Added Tax

Go, Delfin S.; Kearney, Marna; Robinson, Sherman and Thierfelder, Karen (2005). An Analysis of South Africa's Value Added Tax. World Bank Policy Research Working Paper 3671.

Shoven, John B. and Whalley, John (1984). Applied General-Equilibrium Models of Taxation and International Trade: An Introduction and Survey. *Journal of Economic Literature* 22: 1007-1051.

Trade

Stifel, David C. and Thorbecke, Erik (2003). A Dual-Dual CGE Model of an Archetype African Economy: Trade Reform, Migration and Poverty. *Journal of Policy Modeling* 25 (3): 207-235.

McDonald, Scott (2009). Prices, Social Accounts and Economic Models. Tenth Annual Conference on Global Economic Analysis.

Multi-sector dynamic CGE model for medium- to long-run development policy analysis

Lofgren, Hans, Martin Cicowiez, and Carolina Diaz-Bonilla, 2013. "MAMS – A Computable General Equilibrium Model for Developing Country Strategy Analysis". pp. 159–276 in Dixon, Peter B. and Dale W. Jorgenson, (Eds.), Handbook of Computable General Equilibrium Modeling. North Holland, Elsevier B.V.

Social Accounting Matrix

Fofana, Ismaël; Lemelin, André and Cockburn, John (2002). Balancing a Social Accounting Matrix. Centre de Recherche en Économie et Finances Appliquées (CREFA).

http://www.depeco.econo.unlp.edu.ar/cedlas/guatemala06/pdfs/balancing_a_social_accounting_matrix.pdf

Robinson, Sherman; Cattaneo, Andrea and El-Said, Moataz (2001). Updating and Estimating a Social Accounting Matrix Using Cross Entropy Methods. Economic Systems Research 13 (1): 47-64.

Round, Jeffery (2003). Constructing SAMs for Development Policy Analysis: Lessons Learned and Challenges Ahead. Economic Systems Research 15 (2): 161-183.

GAMS and exercises

Brooke, Anthony; Kendrick, David; Meeraus, Alexander and Raman, Ramesh (1998). GAMS: A User's Guide. GAMS Development Corporation.

<http://www.gams.com/docs/gams/GAMSUsersGuide.pdf>.

Kalvelagen, Edwin. Modeling with GAMS. Chapter 1. GAMS Development Corporation.

<http://www.gams.com/~erwin/book/gamsmodeling.pdf>