Econ 562 Topics in Microeconomics
Course Outline

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Note: All information regarding the course material, including the computer programs, homeworks, data, and other pertinent information are placed in my home page, http://www.bilkent.edu.tr/~yeldane/courses.html

You can follow the course in due sequence…

DESCRIPTION

The course will aim at introducing the basic tools for constructing and implementing large-scale, applied general equilibrium modeling techniques for policy analysis. Following an overview of the relevant theoretical foundations of the open economy general equilibrium system, we focus on issues of data implementation, calibration, and the solution algorithm for numerical policy simulation exercises.

We first work on the software for the solution algorithm, the General Algebraic Modeling System (GAMS). GAMS is a powerful non-linear optimizing solver which can handle large scale systems of simultaneous equations.

Next we will utilize 2x2 data from the Turkish economy to a Ricardo-Viner general equilibrium model to illustrate the workings of the neoclassical tradition. In this framework, we will study the workings of the price system in an open system; study how macroeconomic data is organized in the social accounting matrix format; and conduct a series of simulation exercises to mock the main theorems such as Samuelson-Stolper, Rybczynski, and Haberler.

We will next complete the general equilibrium system of the Turkish model by introducing a public sector along with a central government. We will study the applications of applied general equilibrium modeling on trade policy instruments, measures of nominal versus effective protection, microeconomic efficiency, and macro-closure.

In the second half of the course, we will focus on "applied comparative dynamics". The small open economy neoclassical tradition is known to contain certain "anomalies" on capital accumulation and transitional dynamics. Thus, we will first study how these anomalies are treated theoretically. The main reading here will be Rogoff and Obstfeld (1996) Chapters 1 and 2. Here, we will extend the Ramsey-Cass-Koopmans exogenous growth model to include the behavioral equations of a small open economy. This theoretical framework will then be applied to the 2x2 Turkish data.

The Dynamics of the Turkish model will be extended to cover a public sector and government taxation behavior. Here numerous problems surface, such as the Ricardian equivalence (Barro, 1974, 1979), and dynamics of arbitrage on assets, investments, and consumption.

The second extension of the dynamic models will be the fully endogenous world model. The theoretical background will be laid from chapters 4 and 7 of Rogoff and Obstfeld. The main issue here is the choice of the numeraire, the specification of the real exchange rate, the interest rate, and the closure of the "world" markets.

Final topics of the class will be directed towards applications of endogenous growth modeling. We will exclusively focus on the Grossman-Helpman-Romer type of endogenous growth based on R&D formation. Here we will study the underlying

apparatus from chapters 3 and 6 of Grossman and Helpman (1993); next apply this model to real world data.

I intend to prepare a series of short projects for you throughout the semester. These will typically involve applications of the GAMS software, managing data and running simulations. Thus, access to a PC of the sensible size is a must.

COURSE OUTLINE and SELECTED READING LIST

Week 1. Complete Description of a Two-Sector Ricardo-Viner Model and Its Solution Algorithm

1. Production sector and the neoclassical properties of an applied two-sector general equilibrium system.
2. The social accounting matrix, calibration of data.
3. The GAMS Syntax
4. Policy Exercises in the Ricardo-Viner two sector model.
5. The Walras' Law; normalization; the *real* exchange rate.

Readings:

Brooke, Kendrick and Meeraus (1988) *GAMS: A User's Guide*, Redwood City, CA: The Scientific Press.

Bandara, j. (1991) "Computable General Equilibrium Models for Development Policy Analysis in LDCs" *Journal of Economic Surveys*, 5(1): 1-69.

Kehoe, P. & T. Kehoe (1994) "A Primer on Static Applied General Equilibrium Models" *Federal Reserve Bank of Minneapolis Quarterly Review*, Spring.

Robinson, S. (1989) "Multisectoral Models" chp 18 in Chenery & Srinavasan (eds) *Handbook of Development Economics*, Elsevier.

Homework:

1. Re-calibrate the simple 2x2 model, assuming Cobb-Douglas production technology.
2. Simulate the adjustments of the simple Ricardo-Viner model in response to a Productivity shock of –10% in industry. That is A("N") = 0.90*A("N").

Week 2. The Structure of Neoclassical General Equilibrium System: Samuelson-Stolper and Rybczynski Theorems.

1. Production sector and the neoclassical properties of the Ricardo-Viner general equilibrium system over long run adjustment.
2. Simulation of the Rybczynski and Samuelson-Stolper Theorems under sluggish capital adjustment.

Readings:

Your favorite microeconomics text book, relevant chapters…

Yeldan, A. Erinc (1991) "The Pure Theory of Trade in a Dynamic Open Economy with Sluggish Physical Capital" *METU Studies in Development*. 18(3):283-305.

Homeworks:

1. Study the Rybczynski Theorem in the context of the simple 2x2 general equilibrium model, with sluggish capital adjustment. For your simulations, increase the capital installed in each sector by 10%. Follow the (sluggish) adjustments of the capital across sectors over time.
   Check the initial and the final period factor rental rates. Explain why they have to be exactly equal after capital adjustment is completed.
   For running this simulation, you will need to work with the program CGE0RYB.

2. Consider fix wage specification of the simple 2x2 model. Introduce a new variable UNEMPLOYED. Rewrite the sources of household income, and labor market equilibrium to accommodate wage fixity. Discuss its effects.
   Note: What do we mean by wage fixity in this model? Wages are fixed in terms of what? Be sure to clearify your numeraire of your system.

Week 3:The traded sector in applied general equilibrium models

1. Imperfect substitution in Foreign Trade.
2. The Simple 1-2-3 Archetype model economy.
3. Policy implications of the simple archetype model.

Readings:

Armington, P. (1969) "A Theory of Demand for Products Distinguished by Place of Origin" *IMF Staff Papers* Vol. 16: 159-176.

Deverajan, S., J. Lewis & S. Robinson (1990) "Policy Lessons from Trade Focused, Two-Sector Models" *Journal of Policy Modeling* 12(4): 625-657.

Devarajan, S., J. Lewis & S. Robinson (1994) *Getting the Model Right: The General Equilibrium Approach to Adjustment Policy*, Cambridge University Press, forthcoming. Chps. 2, 3.

Whalley, L. and B. Young (1984) "External Sector 'Closing'Rules in Applied General Equilibrium Models" *Journal of International Economics*, 16(1-2):123-138.

Homeworks:

1. Study the effects of an 20% increase in the relative price of agriculture in the 2x2 Turkish model (TRK2x2).
2. Now trace the effects of an exogenous 20% decline in foreign capital inflows, FSAV.

Note: Again be sure to specify your numeraire clearly.

Week 4: Static Applied General Equilibrium: Social Accounting Matrix and Macro Closure

1. Structure of disaggregated applied general equilibrium models.
2. The Social Accounting Matrix and Input output accounts.
3. Model Calibration, GAMS syntax.
4. Walras' Law, normalization and homogeneity of prices.
5. Macro closure.

Readings:

Rattso, J. (1982) "Different Macro Closures of the Original Johanssen Model and Their Impact on Policy Valuation" *Journal of Policy Modeling*, 4(1): 85-79.

Taylor, L. and F. Lysy (1979) "Vanishing Income Redistributions: Keynesian Clues about Model Surprises in the Short Run" *Journal of Development Economics*, 6: 11-29.

Kose, A. and E. Yeldan (1996) "Çok Sektörlü Hesaplanabilir Genel Denge Modellerinin Veri Tabaný Üzerine Notlar: Türkiye 1990 Sosyal Hesaplar Matrisi" *METU Studies in Development*, 23(1): 59-83.

Maechler, A. & D. Rolandt-Holst (1995) "Empirical Specifications for A General Equilibrium Analysis of Labor Market Policies and Adjustments" *OECD Development Centre, Technical Papers.* no. 106, May.

Dewatripont, M. & G. Michel (1987) "On Closure Rules, Homogeneity and Dynamics in Applied General Equilibrium Models" *Journal of Development Economics*, 26: 65-76.

Gibson, Lustig and L. Taylor (1986) "Terms of trade and Class Conflict in a Computable General Equilibrium Model for Mexico" *Journal of Development Studies*, 23(1):40-59, October.

Cardoso, E. and L. Taylor (1979) "Identity-Based Planning of Prices and Quantities: Cambridge and Neoclassical Models for Brazil" *Journal of Policy Modeling*, 1:83-111.

Homeworks:

1. Study the *Kaldorian* closure in the static 2x2 Turkey model. Do a simulation, and contrast its effects on the macro economy with the closure alternatives discussed in class.

Week 5. Static Applied General Equilibrium: The Turkey 1990 Model, TURK90

1. The 1990 Turkey Model.
2. Commercial policy instruments: nominal versus effective rates of protection.
3. Public Sector accounts, modeling the fiscal deficit.

Readings:

Yeldan, A. Erinc "On Structural Sources of the 1994 Turkish Crisis: A CGE Modeling Analysis" *International Review of Applied Economics*, forthcoming.

Yeldan, A. Erinç (1996) "Türk Ekonomisinde Krizin Oluþumu: Bir Genel Denge Analizi" *METU Studies in Development*.

Celasun, M. (1986) "A General equilibrium Model of the Turkish Economy, SIMLOG-1" *METU Studies in Development*, 13(1-2).

Term Project:
Construct and analyze the Turkey, 1987 model. (Data placed to the home-page).

Weeks 6-7. Modeling Intertemporal Dynamics

1. Structure of dynamics in applied general equilibrium based on intertemporal optimization.
2. The neoclassical theory of exogenous growth.
3. The Ramsey model of neoclassical growth.
4. 2x2 Turkey model of neoclassical (exogenous) growth.

Readings:

Rogoff and Obstfelt (1996) *Foundations of International Macroeconomics* MIT Press. Chapters 1 and 2.

Devarajan, S. & D. Go (forthcoming) "The Simplest Dynamic General Equilibrium Model of An Open Economy" *Journal of Policy Modeling*.

X. Diao, T. Roe and E. Yeldan "The Basics of Intertemporal General Equilibrium" Chapter II, in *Modeling Dynamic Applied General Equilibrium*, mimeograph.

X. Diao, T. Roe and E. Yeldan "The Simple Dynamic CGE Model of a Small Open Economy" Chapter III, in *Modeling Dynamic Applied General Equilibrium*, mimeograph.

X. Diao, E. Yeldan and T. Roe "A Simple Dynamic Applied General Equilibrium Model of a Small Open Economy: Transitional Dynamics and Trade Policy" Bilkent University Department of Economics, Discussion Paper no. 96-3, May.

Kehoe, T. (1993) "Towards a Dynamic General Equilibrium Model of North American Trade" Federal Reserve Bank of Minneapolis, mimeo.

McKibbin, W. (1993) "Integrating Macroeceonometric and MultiSector Computable General Equilibrium Models" *Brookings Discussion Papers in International Economics* No 100.

Week 8. Multi-Region General Equilibrium Modeling with Intertemporal Dynamics

Readings:

Diao, Xinshen and Erinc Yeldan (1997) "On the Construction of An Intertemporal World Model of Growth, Accumulation and Trade: Transitional Dynamics, Calibration Strategy and Simulation Analysis" *METU Studies in Development*, forthcoming.

Hertel, T., E. Iancovichina, and B, McDonald "Multi-Region General Equilibrium Modeling" Chp. 9 in Kohler et.el (ed) *Dynamic General Equilibrium Modeling*, forthcoming.

Keuschnigg, C. and W. Kohler "Dynamics of Trade Liberalization" Chp 13. in Kohler et.el (ed) *Dynamic General Equilibrium Modeling*, forthcoming.

Kehoe, P. and T. Kehoe (1994) "Capturing NAFTA's Impact with Applied General Equilibrium Models" Federal reserve Bank of Minneapolis, *Quarterly Review*, 18(2): 17-34.

Homework:

Study the closure of 3x4MRGMS model (GAMS Program is in the Home-Page). In particular comment on the real exchange rate specification. Consider a 50% decline in the foreign capital inflows to the Middle Income Region, as a simulation exercise for analyzing South Asia-type of a financial breakdown (of September 1997). Discuss analytically tracing out the effects on real output, income distribution, and welfare on all three regions of the world. Suggest at least one policy alternative to combat the repercussions of the crisis, and simulate your proposition with the aid of this model. Rely on the supporting literature as much as possible.

Week 9: Fiscal Debt Management and Dynamics

1. An open economy model of fiscal debt.
2. The "Ricardian equivalence".
3. Dynamics of arbitrage under Ricardian Equivalence

Readings:

X. Diao, T. Roe and E. Yeldan (1996) "Fiscal Debt Management, Accumulation and Transitional Dynamics in a CGE Model for Turkey" Bilkent University Department of Economics, Discussion Paper no. 96-9, November.

Goulder, L. & L. Summers (1989) "Tax Policy, Asset Prices and Growth: A General Equilibrium Analysis" *Journal of Public Economics* 38: 265-296.

Barro, R. (1979) "On the Determination of the Public Debt" *Journal of Political Economy* 87:940-979, October.

Barro, R. (1974) "Are Government Bonds Net Wealth?" *Journal of Political Economy* 82:1095-1117, November/December.

Homework: Construct a one-agent, one-sector open economy macro model with intertemporal optimizing behavior and a government. Suppose that the agent is infinite lived and has perfect foresight. Suppose that any excess of government expenditures over its revenues are financed by issues of debt instrument which are perfect substitutes with private and foreign assets. Since the economy is small it takes all prices, including asset prices and the interest rate, as given.

Study the proposition of Ricardian Equivalence held by Barro in the framework of this model. Suggest at least three modifications analytically, such that the Ricardian Equivalence would fail.

Week 10: Imperfect Competition, Increasing returns, and the New Trade Theory

Readings:

Mercenier, J. (1995) "An Applied Intertemporal General Equilibrium Model of Trade and Production with Scale Economies, Product Differentation and Imperfect Competition" University of Minnesota and Federal Reserve Bank of Minneapolis, mimeo.

Mercenier, J. and E. Yeldan (1997) "On Turkey's Trade Policy: Is a Custom's Union with Europe Enough" *European Economic Review*, 41(3-5):871-880.

Weeks 11-12: The New Growth Theory and Modeling R&D-Driven Growth
Readings:

X. Diao, T. Roe and E. Yeldan (1998) "Strategic Policies and Growth: An Applied Model of R&D-Driven Endogenous Growth" Bilkent University Department of Economics, Discussion Paper no. 98-1, January.

Romer, P. (1990) "Endogenous Technological Change" *Journal of Political Economy* 98(5): S71-S102.

Grossman, G.M. & E. Helpman (1991) *Innovation & Growth in the Global Economy* Cambridge Mass. & London: The MIT Press. Chp. 3.

Coe, D. and E. Helpman (1995) "International R&D Spillovers" *European Economic Review,* 39:859-887.

Coe, D., E. Helpman and A. Hoffmister (1997) "North-South R&D Spillovers" *The Economic Journal*, 107:134-149, January.

Keller, W. (1997) "Trade and The Transmission of Technology" *NBER Working Papers, No. 6113*, July.

Grossman, G. and E. Helpman (1990) "Comparative Advantage and Long Run Growth" *American Economic Review* 80(4): 796-815.

De Melo & S. Robinson (1992) "Productivity and Externalities: Models of Export-led Growth" *Journal of International Trade and Economic Development* 1(1): 41-68.

Homework: The literature on the extent and nature of R&D Spillovers is a burgeoning area of research. Starting from the contributions listed above, provide a critical review of this literature of no more, and no less than 5 double-spaced pages.

Week 13 : Financial CGE Modeling
Readings:

Taylor, L. (1990) *Socially Relevant Policy Analysis: Structuralist Computable General Equilibrium Models for the Developing World*, Cambridge: The MIT Press.

Bourguignon, F. de Melo and A. Suwa (1991) "Modeling the Effects of Adjustment Programs on Income Distribution" *World Development* 19(11): 1527-1544.

Yeldan, A. Erinc (1997) "Financial Liberalization and Fiscal Repression in Turkey: Policy Analysis in a CGE Model with Financial Markets" *Journal of Policy Modeling,* 19(1):79-117.

Bourguignon, F., W. Branson and J. de Melo (1992) "Adjustment and Income Distribution: A Micro-Macro Model for Counterfactual Analysis" *World Development*.

Week 14: Overview and Assesments
Reading:

Srinivasan, T. (1982) "General Equilibrium Theory, Project Evaluation, and Economic Development" in M. Gersowitz, C.F. Diaz-Alejandro, G. ranis, and M. Rosenzweig (eds.) *The Theory and Experience of Economic Development*, London: George Allen and Unwin.