University of Maryland **Enrique G. Mendoza**
Department of Economics **Spring 2003**
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ECONOMICS 602 (PART I)
PRINCIPLES OF RECURSIVE MACROECONOMIC THEORY

Our task as I see it is to write a Fortran program that will accept specific economic policy rules as 'input' and will generate as 'output' statistics describing the operating characteristics of time series we care about, which are predicted to result from these policies...It must be taken for granted that simply attempting various policies that may be proposed on actual economies and watching the outcome must not be taken as a serious solution method: Social Experiments on the grand scale may be instructive and admirable, but they are best admired at a distance."
(Robert E. Lucas Jr, "Methods and Problems in Business Cycle Theory," Journal of Money,Credit and Banking, 1980).

This course covers the essential elements of recursive dynamic macroeconomic theory, which is the foundation to analyze a large class of intertemporal equilibrium models with applications in different areas of macroeconomics, international macroeconomics and finance (including business cycles, asset pricing, self insurance, current-account determination, international capital flows, currency crises, etc). The key aspects of recursive dynamic modeling commonly used to conduct positive and normative analysis with quantitative methods in macroeconomics are given particular attention. The main goal of the course is to build foundations that are an essential part of the toolbox in modern macroeconomics, with a view to providing students with a solid basis to proceed to advanced courses in several different areas inside and outside macroeconomics in which the tools covered in this class are being used.

The first lectures of the course develop the motivation for the use of recursive dynamic methods in macroeconomics, and review principles of discounted dynamic programming, Bellman's optimality principle, and Markov processes (some of which were covered in the Math refresher class and in Economics 601). The rest of the lectures build and extend on these principles. First we study classic applications of these principles to real-business-cycle theory, savings under uncertainty, and the time-inconsistency problem of economic policy. Then we explore the formulation of competitive and non-competitive equilibria as recursive equilibria, and the properties of competitive equilibria in stochastic environments with complete contingent-claims markets (including asset pricing implications). Finally, we examine the main properties of competitive equilibria with incomplete asset markets and compare them with those obtained under complete markets.

The course will be graded with an exam that will count as the midterm exam for the full Economics 602 course, as in previous years. Two problem sets will be assigned as preparation for the exam. Office hours will be held by appointment.

Textbook:

LS Ljungqvist, Lars and Sargent, Thomas J., *Recursive Macroeconomic Theory,* MIT Press, 2000.

you can also refer to

TS Sargent, Thomas, J. *Dynamic Macroeconomic Theory*, Harvard Univ. Press, 1987,

for some of the material in the first part of the course on principles of dynamic programming.

Suggested additional readings:

RL Lucas Jr., Robert E., *Models of Business Cycles*, Basil-Blackwell, 1987 (out of print)

TC Cooley, Thomas F. *Frontiers of Business Cycle Research*, Princeton Univ. Press 1995

NL Stokey, Nancy and Robert E. Lucas Jr., (with Ed Prescott) *Recursive Methods in Economic Dynamics*, Harvard University Press, 1989.

Topics and Related Readings (asterisks denote required readings):

I.- Economic Policy Analysis and Recursive Macroeconomics
RL Chapters I to IV.

II.- Dynamic Programming Fundamentals
* **LS** Chapter 2
TS Chapter 1

III.- Modeling Uncertainty with Markov Processes and Stochastic Dynamic Programming
* **LS** Chapter 1 (pp. 1-7)

IV.- The Basics of Practical Dynamic Programming
* **LS** Chapter 3

V.- Recursive Rational Expectations Equilibrium
* **LS** Chapter 6

VI.- Competitive Equilibria with Complete Markets and Principles of Asset Pricing
* **LS** Chapter 7
TS Chapter 3 (3.1-3.5)

VII.- Incomplete Markets with One Example from International Macroeconomics
* **LS** Chapter 14
Backus, D. "Interpreting Comovements in the Trade Balance and the Terms of Trade," *Journal of International Economics*, 1993.