

University of Alicante
Department of Economics
Macroeconomics II
2011/12

Lectures: Wednesday and Friday, 3:00pm-5:00pm, Aula A1/1-49P

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Recitations: by students' request

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Course webpage: available within CampusVirtual (www.ua.es/en/univirtual)

Course description

This is a graduate course in dynamic macroeconomics. The course covers dynamic general equilibrium concepts, the neoclassical growth model, and real business cycles.

The ultimate objective of the course is studying tools to answer macroeconomic questions. Our tools are economic models. We will start with the pure exchange economy that we use to introduce theoretical concepts of dynamic general equilibrium such as Arrow-Debreu competitive equilibrium and sequential markets equilibrium. We apply the concepts to the deterministic neoclassical growth model with infinitely lived agents in discrete time and further extend them to the stochastic neoclassical growth model. Our main theoretical results include the first and second welfare theorems for a general vector space. These theorems allow us to solve for competitive equilibrium by solving a social planner's problem. In turn, we study a number of approaches to solve the social planner's problem. We learn to derive Euler equations and transversality condition and we further learn to compute approximate solutions by linearization and loglinearization. Dynamic programming is an appealing alternative. Based on the principle of optimality, we formulate the social planner's problem in a functional form known as Bellman equation, and equipped with the contraction mapping theorem we learn to solve the Bellman equation by value and policy function iterations.

As practical applications, we briefly study a few growth and real business cycle models, covering solution methodologies, calibration, propagation mechanisms, and dynamics. We end the course with introduction to economic policy covering Ramsey problem, Ricardian equivalence and the optimal capital tax.

Textbooks

The required texts for the course are

1. Krueger, Dirk, *Macroeconomic Theory*, University of Pennsylvania, manuscript, 2007. (DK)
2. Ljungqvist, Lars and Thomas J. Sargent, *Recursive Macroeconomic Theory*, 2nd edition, MIT Press, 2004. (LS)
3. Stokey, Nancy L. and Robert E. Lucas, with Edward C. Prescott, *Recursive Methods in Economic Dynamics*, Harvard University Press, 1989. (SLP)

Supplemental textbooks include

1. Michael Wickens, *Macroeconomic Theory*, Princeton University Press, 2008 (MW)
2. George McCandless, *The ABCs of RBCs: An Introduction to Dynamic Macroeconomic Models*, Harvard University Press, 2008 (ABC)
3. Romer, David, *Advanced Macroeconomics*, 4th edition, McGraw-Hill, 2011 (DR)
4. Barro, Robert J. and Xavier Sala-i-Martin, *Economic Growth*, 2nd edition, 2003 (BX)
5. Cooley, Thomas, editor, *Frontiers of Business Cycle Research*, Princeton University Press, 1995 (TC)

Course requirements and grading

- **Six** problem sets (4 points each, the lowest score is dropped, 20 points total)
- **One** midterm exam (30 points)
- **Comprehensive** final exam (50 points)

When calculating the total score for the course, the lowest score among the scores for problem sets will be excluded from the calculation.

Policies

Students will be given at least one week to solve each problem set. All assignments will be distributed in class and posted on the class website. Students' solutions are due on Wednesday by the beginning of class. Solutions submitted later will only be accepted under legitimate circumstances supported by appropriate documentation. Problem sets will be graded and returned back to students the following week. Solutions to the problem sets will be explained by a teaching assistant in recitations. Under no circumstances will late problem sets be accepted once solutions were provided.

Students are encouraged to discuss together the problem sets. However, each student is required to write down solutions independently. Contributions of others with whom an assignment was discussed should be clearly acknowledged.

All exams are closed book written examinations. There will be no make-up midterm exam. Scholastic dishonesty will not be tolerated.

Tentative course schedule

1. A simple dynamic exchange economy
 - Microfounded macroeconomic modeling
 - Competitive equilibrium and social planner problem
 - Nagishi's method of computing equilibria
 - Sequential markets equilibrium

References:

- DK Ch. 2, LS Ch. 8.
- Kehoe, Timothy, Intertemporal General Equilibrium Models, in Frank Hahn, editor, *The Economics of Missing Markets, Information and Games*, Clarendon Press, 1989, p.92-97 (also in Spanish in *Cuadernos Económicos de I.C.E.*, 37, 1987, p.95-126).
- Negishi, Takashi, Welfare Economics and Existence of an Equilibrium for a Competitive Economy, *Metroeconomica*, 12, 1960, p.92-97.

2. Deterministic neoclassical growth model in discrete time
 - Social planner problem in recursive formulation

- Value function iterations. Policy function iterations
- Euler equation. Linearization and loglinearization
- Competitive equilibrium growth

References:

- DK Ch. 3-5, SLP Ch. 2-4, LS Ch. 3-4.
- Cooley, Thomas and Edward Prescott, Economic Growth and Business Cycles, in Thomas Cooley, editor, *Frontiers of Business Cycle Research*, Princeton University Press, 1995.
- Kamihigashi, Takashi, Necessity of Transversality Conditions for Infinite Horizon Problems, *Econometrica*, 69, 2001, p.995-1021.
- Prescott, Edward and Rajnish Mehra, Recursive Competitive Equilibrium: The Case of Homogeneous Households, *Econometrica*, 48, 1980, 1356-1379.

3. Models with uncertainty

- Markov processes
- Stochastic neoclassical growth model
- Stochastic Bellman equation
- Stochastic Euler equation

References:

- DK Ch. 6, SLP Ch. 7, LS Ch. 8.
- King, Robert and Sergio Rebelo, Resuscitating real business cycles, in Taylor and Woodford, editors, *Handbook of Macroeconomics*, Elsevier, Ed. 1, Vol. 1, Ch. 14, 1999, p.927-1007.

4. Welfare theorems

- Neoclassical growth model in Arrow-Debreu language
- First welfare theorem
- Second welfare theorem
- Market's failure: externalities, incomplete markets, distortionary taxation

References:

- DK Ch. 7, SLP Ch. 15.
- Debreu, Gerald, Valuation equilibrium and Pareto optimum, *Proceedings of the National Academy of Sciences*, 40, 1954, p.588-592.
- Kehoe, Tim and David Levine, Liquidity Constrained Markets versus Debt Constrained Markets, *Econometrica*, 69, 2001, p.575-598.
- Krueger, Dirk and Fabrizio Perri, Does Income Inequality Lead to Consumption
- Inequality? Evidence and Theory, *Review of Economic Studies*, 73, 2006, p.163-193.
- Krueger, Dirk and Fabrizio Perri, Public versus Private Risk Sharing, *Journal of Economic Theory*, 146, 2011, p.920-956.

5. Introduction to economic policy

- Ramsey problem
- Ricardian equivalence
- Distortionary taxation
- Time consistency
- Zero optimal capital tax

References:

- DK Ch. 8.2, LS Ch. 10-11.
- Barro, Robert, Are government bonds net wealth? *Journal of Political Economy*, 82, 1974, p.1095-1117.

- Chamley, Christophe, Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives, *Econometrica*, 54, 1986, p.607-22
- V. V. Chari and Patrick J. Kehoe, Modern Macroeconomics in Practice: How Theory Is Shaping Policy, *Journal of Economic Perspectives*, 20, 2006, p.3-28.

6. Introduction to growth models

- Accounting for population growth
- Balanced growth path
- Endogenous growth models: AK model, Romer model, Lucas model

References:

- DK Ch. 9, LS Ch. 14, DR Ch. 3, BX Ch. 1-4, MW Ch. 3
- Barro, Robert, Government Spending in a Simple Model of Endogenous Growth, *Journal of Political Economy*, 98, 1990, p.103-125.
- Chari, V.V., Patrick Kehoe, and Ellen McGrattan, The Poverty of Nations: A Quantitative Investigation, Federal Reserve Bank of Minneapolis Staff Report No.204, 1997.
- Lucas, Robert, On the Mechanics of Economic Development, *Journal of Monetary Economics*, 22, 1988, p.3-42
- Romer, Paul, Endogenous Technological Change, *Journal of Political Economy*, 98, 1990, p.71-102.

7. Introduction to business cycles

- Shocks: technology, demand
- Solution methodologies and calibration
- Propagation mechanisms, labor market dynamics

References:

- LS Ch. 10-11, DR Ch. 4, MW Ch. 5-6
- Hansen, Gary, Indivisible labor and the business cycle, *Journal of Monetary Economics*, 16, 1985, p.309-327.
- Uhlig, Harald, A toolkit for analyzing nonlinear dynamic stochastic models easily, Discussion Paper / Institute for Empirical Macroeconomics, 101, Federal Reserve Bank of Minneapolis, 1995.
- Hodrick, Robert and Edward Prescott, Postwar U.S. Business Cycles: An Empirical Investigation, *Journal of Money, Credit and Banking*, 29, 1997, p.1-16
- Kydland, Finn and Edward Prescott, Time to Build and Aggregate Fluctuations, *Econometrica*, 50, 1982, p.1345-1370.
- Gali, Jordi, Technology, Employment, and the Business Cycle: Do Technology Shocks Explain Aggregate Fluctuations? *American Economic Review*, 89, 1999, p.249-271.
- King, Robert and Sergio Rebelo, Resuscitating real business cycles, in Taylor and Woodford, editors, *Handbook of Macroeconomics*, Elsevier, Ed. 1, Vol. 1, Ch. 14, 1999, p.927-1007.
- Baxter, Marianne and Robert King, Measuring Business Cycles: Approximate Band-Pass Filters for Economic Time Series, *Review of Economics and Statistics*, 81, 1999, p.575-593.