

Advanced Macroeconomics I

University of Alicante
Master in Economics, 2nd year
Fall 2011
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Credits: 6 ECTS

I.-OBJECTIVES

In this course, we concentrate on applications of the standard neoclassical stochastic growth model with infinitely-lived agents. First, we study how to calibrate macroeconomic models with the data and solve them by using numerical methods, and subsequently, we review several research topics such as heterogeneous-agent economies, monetary policy, endogenous growth and cycles and time-inconsistency. The problem sets will include both theoretical and computer exercises. The programming language is MATLAB.

II.-LIST OF TOPICS

Introduction. Background.

Part I. Quantitative analysis of equilibrium in macroeconomic models

1. Time series of actual economies. Growth and cycles. Hodrick-Prescott filter. First and second moments. The stylized facts.
2. Calibration of macroeconomic models.
3. Numerical methods for computing the equilibrium:
 - stochastic simulation methods;
 - log-linearization and perturbation methods;
 - value-iterative methods;
 - projection methods.

4. What our benchmark models can and cannot explain.

References

- [1] Cooley, T., 1996, *Frontiers of business cycle research*, Princeton University Press.
- [2] Christiano, L., and J. Fisher, 2000, Algorithms for solving dynamic models with occasionally binding constraints, *Journal of Economic Dynamics and Control*, 24, 1179-232.
- [3] Judd, K., 1998, *Numerical methods in economics*, The MIT Press.
- [4] Judd, K., Maliar, L. and S. Maliar, 2010, A Cluster-grid projection algorithm: solving problems with high dimensionality, NBER 15965.
- [5] Judd, K., Maliar, L. and S. Maliar, 2011, Numerically stable and accurate stochastic simulation approaches for solving dynamic economic models. *Quantitative Economics* 22, 173-210.
- [6] Hansen, G., 1985, Indivisible labor and the business cycle, *Journal of Monetary Economics* 16, 309-328.
- [7] Kollmann, R., Maliar, S., Benjamin M. and P. Pichler, 2011, Comparison of solutions to the multi-country real business cycle model, *Journal of Economic Dynamics and Control* 35(2), pp. 186-202.
- [8] Kydland, F. and E. Prescott, 1982, Time to build and aggregate fluctuations, *Econometrica* 50, 1345-1370.
- [9] Ljungqvist, L., and T. Sargent, 2000, *Recursive macroeconomic theory*, The MIT Press.
- [10] Maliar, L., and S. Maliar, 2003, Parameterized expectations algorithm and the moving bounds, *Journal of Business and Economic Statistics*, 21/1, pp. 88-92.

- [11] Maliar, L., and S. Maliar, 2005a, Solving nonlinear stochastic growth models: an algorithm iterating on value function by simulations, *Economics Letters*, 87, pp. 135-140.
- [12] Maliar, L., and S. Maliar, 2005b, Parameterized expectations algorithm: how to solve for labor easily, *Computational Economics*, 25, pp. 269-274.
- [13] Maliar, S., Maliar, L., and K. Judd, 2011, Solving the multi-country real business cycle model using ergodic set methods, *Journal of Economic Dynamics and Control* 35(2), pp. 207-228.
- [14] Marimon, R., and A. Scott, 1999, *Computational methods for the study of dynamic economies*, Oxford University Press.
- [15] Miranda, M., and P. Fackler, 2004, *Applied Computational Economics and Finance*. MIT Press.
- [16] Schmitt-Grohé S. and M. Uribe, 2007, Optimal simple and implementable monetary fiscal rules. *Journal of Monetary Economics* 54, 1702-1725.
- [17] Uhlig, H., 1999, A toolkit for analyzing non-linear dynamic stochastic models easily, in: Marimon, R., Scott, A., eds., *Computational methods for study of dynamic economies*, (Oxford University Press, New York) 30-61.

Part 2. Heterogeneous-agent economies

1. Complete-market economies.
 - Solving for welfare weights.
 - Perfect Gorman's aggregation.
 - Imperfect aggregation.
2. Incomplete-market economies.
 - Aiyagari's (1994) model: idiosyncratic uncertainty.
 - Krusell and Smith's (1998) model: idiosyncratic and aggregate uncertainty.

References

- [1] Aiyagari, R., 1994, Uninsured idiosyncratic risk and aggregate saving, *Quarterly Journal of Economics*, 109:3, 659-684.
- [2] Carroll, C., and M. Kimball, 1996, On the concavity of the consumption function, *Econometrica*, 64:4, 981-92.
- [3] Huggett, M., 1997, The one-sector growth model with idiosyncratic shocks: steady states and dynamics, *Journal of Monetary Economics*, 39, 385-403.
- [4] Gaspar, J. and K. Judd, 1997. Solving large-scale rational-expectations models. *Macroeconomic Dynamics* 1, 45-75.
- [5] Krusell, P., and A. Smith, 1998, Income and wealth heterogeneity in the macroeconomy. *Journal of Political Economy*, 106:5, 868-96.
- [6] Ljungqvist, L., and T. Sargent, 2000, *Recursive macroeconomic theory*, The MIT Press.
- [7] Maliar, L. and Maliar, S., 2001, Heterogeneity in capital and skills in a neoclassical stochastic growth model, *Journal of Economic Dynamics and Control*, 25, 1367-1397.
- [8] Maliar, L., and S. Maliar, 2003, The representative consumer in the neoclassical growth model with idiosyncratic shocks, *Review of Economic Dynamics*, 6, pp. 362-380.
- [9] Maliar, L., Maliar, S., and F. Valli, 2009, Solving the incomplete markets model with aggregate uncertainty using the Krusell-Smith algorithm, *Journal of Economic Dynamics and Control* 34, pp. 42-49.

Part 3. New Keynesian model

1. The basic new Keynesian model.
2. Extensions of the basic new Keynesian model.

References

- [1] Del Negro, M., F. Schorfheide, F. Smets and R. Wouters, 2007. On the fit of new Keynesian models. *Journal of Business and Economic Statistics* 25 (2), 123-143.
- [2] Christiano, L., M. Eichenbaum and C. Evans, 2005. Nominal rigidities and the dynamic effects of a shock to monetary policy. *Journal of Political Economy* 113/1, 1-45.
- [3] Christiano, L., M. Eichenbaum and S. Rebelo, 2009. When is the government spending multiplier large? NBER Working Paper 15394.
- [4] Galí, J., (2008). *Monetary Policy, Inflation, and the Business Cycle*. Princeton University Press: Princeton, New Jersey. Chapter 3.
- [5] Judd, K., Maliar, L. and S. Maliar, 2010, A Cluster-grid projection algorithm: solving problems with high dimensionality, NBER 15965.
- [6] Smets, F. and R. Wouters, 2003. An estimated dynamic stochastic general equilibrium model of the Euro area. *Journal of the European Economic Association* 1(5), 1123-1175.
- [7] Smets, F. and R. Wouters, 2007. Shocks and frictions in US business cycles: a Bayesian DSGE approach. *American Economic Review* 97 (3), 586-606.

Part 4. Fiscal policy

1. The government taxes in the neoclassical growth model.
2. The Ramsey problem of the optimal taxation in a deterministic environment and the optimality of zero tax on capital.
3. The role of government shocks in the business cycle.

References

- [1] Chamley, C., 1986, Optimal taxation of capital income in general equilibrium with infinite lives, *Econometrica* 54 (3), pp. 607-622.
- [2] Chari V.V., Christiano, L., and P. Kehoe, 1994, Optimal fiscal policy in a business cycle model, *Journal of Political Economy* 102(4), pp. 617-652.
- [3] Christiano, L., and M. Eichenbaum, 1992, Current real business cycle theories and aggregate labor market fluctuations, *American Economic Review* 82 (3), pp. 430-450.
- [4] Cooley, T., 1996, *Frontiers of business cycle research*, Princeton University Press.
- [5] Ljungqvist, L., and T. Sargent, 2000, *Recursive macroeconomic theory*, The MIT Press.

Part 5. Time inconsistency in preferences

1. Quasi-geometric (hyperbolic) consumers.
2. Multiplicity of equilibrium in quasi-geometric economies.
3. Quasi-geometric discounting in heterogeneous-agent economies.

References

- [1] Aiyagari, R., 1994, Uninsured idiosyncratic risk and aggregate saving, *Quarterly Journal of Economics* 109(3), 659-684.
- [2] Asheim, G., 1997, Individual and collective time-consistency, *Review of Economic Studies* 64, 427-443.
- [3] Collado, M. D., L. Maliar, and S. Maliar, 2002, Heterogeneous quasi-geometric consumers: panel data evidence, IVIE WP #AD2003-09.

- [4] Harris, C. and D. Laibson, 2001, Dynamic choices of hyperbolic consumers, *Econometrica* 69 (4), 935-959.
- [5] Huggett, M., 1997, The one-sector growth model with idiosyncratic shocks: steady states and dynamics. *Journal of Monetary Economics* 39, 385-403.
- [6] Judd, K., 2004, Existence, uniqueness, and computational theory for time consistent equilibria: a hyperbolic discounting example, manuscript.
- [7] Krusell, P. and A. Smith, 2000, Consumption-savings decisions with quasi-geometric discounting, CEPR discussion paper no. 2651.
- [8] Krusell, P., and A. Smith, 2003, Consumption-savings decisions with quasi-geometric discounting. *Econometrica* 71, 365-375.
- [9] Krusell, P., B. Kuruscu, and A. Smith, 2002, Equilibrium welfare and government policy with quasi-geometric discounting. *Journal of Economic Theory* 105, 42-72.
- [10] Laibson, D., A. Repetto, and J. Tobacman, 1998, Self-control and saving for retirement, *Brookings Papers on Economic Activity* 1, 91-172.
- [11] Maliar, L and S. Maliar, 2005, Quasi-geometric discounting: a closed-form solution under the exponential utility function, *Bulletin of Economic Research* 56/2, 201-206.
- [12] Maliar, L and S. Maliar, 2005, Solving the neoclassical growth model with quasi-geometric discounting: A grid-based euler-equation method, *Computational economics* 26, 163-172.
- [13] Maliar, L. and S. Maliar, 2006, Indeterminacy in a log-linearized neoclassical growth model with quasi-geometric discounting, *Economic Modelling* 23, 492-505.
- [14] Maliar, L and S. Maliar, 2006, The neoclassical growth model with heterogeneous quasi-geometric consumers, *Journal of Money, Credit, and Banking*, 38(3), 635-654.

- [15] Maliar, L. and S. Maliar, 2007, Short-run patience and wealth inequality, *Studies in Nonlinear Dynamics and Econometrics* 11(1), Article 4.
- [16] Quadrini, V., and V. Rios-Rull, 1997, Understanding the US Distribution of Wealth. *Federal Reserve Bank of Minneapolis Quarterly Review* 21, 22-36.

Part 6. Endogenous growth and endogenous cycles

1. AK model.
2. Endogenous growth: learning-by-doing, human capital, R&D.
3. Endogenizing both growth and cycles.

References

- [1] Aghion, P. and P. Howitt, 1992, A model of growth through creative destruction. *Econometrica* 60, pp. 323-351.
- [2] Andolfatto, D. and G. MacDonald, 1998, Technology diffusion and aggregate dynamics. *Review of Economic Dynamics* 1, pp. 338-370.
- [3] Freeman, S., D.-P. Hong, and D. Peled, 1999, Endogenous cycles and growth with indivisible technological developments. *Review of Economic Dynamics* 2, pp. 403-433.
- [4] Grossmann, G. and E. Helpman, 1991, *Innovation and growth in the global economy*. Cambridge: MIT Press.
- [5] Lucas, R., Jr., 1988, On the mechanics of economic development, *Journal of Monetary Economics* 22, pp. 3-42.
- [6] Maliar L., and S. Maliar, 2004, Endogenous growth and endogenous business cycles, *Macroeconomic Dynamics*, 8/5, pp. 1-23.
- [7] Posch, O. and K. Wälde, 2005, Natural volatility, welfare and taxation, manuscript.

- [8] Romer, P., 1986, Increasing return and long-run growth. *Journal of Political Economy* 94, pp. 1002-1037.
- [9] Romer, P., 1990, Endogenous technical change. *Journal of Political Economy* 98, pp. S71-S103.
- [10] Wälde, K., 1999, Optimal savings under Poisson uncertainty, *Journal of Economic Theory* 87, 194-217.

III.-METHODOLOGY

Lectures. The material of the course will be delivered on lectures. Students will also receive handouts, notes and reading materials.

Problem sets. Students will be given problem sets and will have to hand them in on established dates. The problem sets will be graded, and the solutions to the problem sets will be discussed in class.

IV.-ASSESSMENT

The course grade will consist of

- the problem-set grade (30%)
- and the course project (70%).

V.-CONTACT INFORMATION

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