Prof. Luigi Paciello
EIEF
RoME: Dynamic Macroeconomics
Semester I 2025/2026
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Course description

The course provides a formal exposition of modern macroeconomic theory and applications using dynamic stochastic general equilibrium (DSGE) models. We will cover techniques used to solve DSGE models, and will learn the basic coding skills required for that. To this aim, we will use MATLAB as our reference software. The course will highlight Real Business Cycle (RBC), and New Keynesian (NK) models. There is no required book for the course.

Problem sets There will be 5 homeworks. Assignments will be a mix of theoretical problems and more applied problems requiring you to code in MATLAB. Problem sets can be handed in teams made of at most 3 students. Problem sets account for 30% of the final grade. Answers should be typed and handed in PDF format or m-files in the case of codes.

Exam The final exam will take place at the end of the class and will be closed books. It will not require a computer, but it may ask questions about computational methods required to solve DSGE models.

Only the notes taken in class are compulsory for the exams. Articles or chapters marked with a "*" are just meant to help you at home.

Useful Textbooks

Cooley, T.F. (1995) *Frontiers of Business Cycle Research,* Princeton, New Jersey: Princeton University Press.

Galí, J. (2015): *Monetary Policy, Inflation, and the Business Cycle: An Introduction to the New Keynesian Framework and Its Applications* (Second Ed.), Princeton University Press.

Ljungqvist, L. and Sargent T., (2000), *Recursive Macroeconomic Theory*, MIT press.

Walsh, K. (2017): *Monetary Theory and Policy*, Princeton University Press.

Woodford, M. (2003): *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press.

Program

Topic 1: Linearization methods

Solving a system of linear equations with rational expectations. Impulse responses, asymptotic variance covariances and estimation of DSGE models using the Kalman filter.

*Sims, C. (2002), Solving Linear Rational Expectations Models", Computational Economics, 20, 1-20.

Blanchard, O. and Kahn, C. (1980) "The Solution of Linear Difference Models under Rational Expectations", *Econometrica*, 48, 1305-11.

Christiano, L. (2002), "Solving Dynamic Equilibrium Models by a Method of Undetermined Coefficients", *Computational Economics,* 20, 21-55.

Assignment 1: `Solving the RBC model by linearization`

Topic 2: Business Cycles and Stabilization Policies

The 3-equations New-Keynesian model

*Galí, J. (2015): *Monetary Policy, Inflation, and the Business Cycle: An Introduction to the New Keynesian Framework and Its Applications* (Second Ed.). Princeton University Press.

Kerr, W and King, R. (1996), "Limits on Interest Rules in the IS Model," (with William Kerr), Federal Reserve Bank of Richmond Quarterly Review, vol. 82, no. 2 (Spring 1996): 47-75

Rotemberg, J. J. (1982): "Monopolistic Price Adjustment and Aggregate Output," *Review of Economic Studies*, 49 (4), 517–531,

Woodford, M. (2003): *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press.

Assignment 2: `Solving the New Keynesian model by linearization`

Monetary policy

*Galí, J. (2015): *Monetary Policy, Inflation, and the Business Cycle: An Introduction to the New Keynesian Framework and Its Applications* (Second Ed.). Princeton University Press.

Pierpaolo Benigno and Woodford M. (2004): "Optimal Monetary and Fiscal Policy: A Linear-Quadratic Approach, in *NBER Macroeconomics Annual 2003*, Volume 18, Gertler and Rogoff.

Pierpaolo Benigno and Woodford M. (2012): "Linear-Quadratic Approximation of Optimal Policy Problems", *Journal of Economic Theory* , Volume 147, Issue 1, January 2012, Pages 1-42

Assignment 3: `Monetary policy`

Topic 3: Heterogeneous agents economies

A primer on Heterogeneous Agents Economies

*Sushant Acharya, Keshav Dogra (2020): "Understanding HANK: Insights From a PRANK," *Econometrica*: may 2020, 88 (3)

*Bilbiie, F. O. (2019b): "The New Keynesian Cross," *Journal of Monetary Economics*.

Aiyagari, S. R. (1994): "Uninsured Idiosyncratic Risk and Aggregate Saving," *Quarterly Journal of Economics*, 109 (3), 659–684.

Assignment 4: `Heterogeneous Agents`

Solving Heterogeneous Agents Economies in the Sequence Space

*Auclert, Adrien, et al. "Using the sequence space Jacobian to solve and estimate heterogeneous agent models." Econometrica 89.5 (2021): 2375-2408.

Auclert, A. (2019): "Monetary Policy and the Redistribution Channel," *American Economic Review*, 109 (6), 2333–2367.

Assignment 5: `Proposal presentations`