

Prof. Luigi Paciello
EIEF
RoME: Dynamic Macroeconomics
Module VII
E-mail: gigipaciello@gmail.com

Material: <https://sites.google.com/site/gigipaciello/macro-dynamics-2024>

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. The course will build on the material covered by Prof. Michelacci in the first semester on Business Cycles with competitive labor markets.

Problem sets There will be 5 homework. 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

Weeks 1-2: 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.

Anderson, G. and Moore, G. (1985), "A Linear Algebraic Procedure for Solving Linear Perfect Foresight Models", *Economics Letters*, 17.

Klein, P. (2000), "Using the generalized Schur form to solve a multivariate linear rational expectations model", *Journal of Economic Dynamics and Control* 24(10), September 2000, pages 1405-1423.

Assignment 1: Solving the RBC model by linearization

Topic 2: Representative agent New Keynesian models

Weeks 3: The 3-equations New-Keynesian model

*King, R. (2000), "The New IS-LM Model: Language, Logic and Limits," in Federal Reserve Bank of Richmond, *Economic Quarterly*, 86(3): Summer 2000, 45-103, available at:

*McCallum, B. and Nelson B. (1997), "An Optimizing IS-LM Specification for Monetary Policy and Business Cycle Analysis," National Bureau of Economic Research Working Paper 5875.

Chari, V. , Kehoe, P. and Ellen McGrattan, E. (2000) "Sticky Price Models of the Business Cycle: Can the Contract Multiplier Solve the Persistence Problem?," *Econometrica*, 68 (5), pp.1151-1179.

Clarida, R., Galí, J. and Gertler, M. (1999), "The Science of Monetary Policy: A New Keynesian Perspective" *Journal of Economic Literature*, vol. 37 (4), 1661-1707

*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.

- Galí, J. (2003), “New Perspectives on Monetary Policy, Inflation, and the Business Cycle in *Advances in Economic Theory*,” edited by: M. Dewatripont, L. Hansen, and S. Turnovsky, vol. III, 151-197, Cambridge University Press 2003
- 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
- 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.
- Wolman, A. (1999), “Sticky Prices, Marginal Cost, and the Behavior of Inflation,” in Federal Reserve Bank of Richmond, *Economic Quarterly*, Fall 1999: Vol. 85, No. 4,
- Woodford, M. (2003): *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press.
- Rotemberg, J. J. (1982): “Monopolistic Price Adjustment and Aggregate Output,” *Review of Economic Studies*, 49 (4), 517–531,

Assignment 2: Solving the New Keynesian model by linearization

Week 4: Monetary policy in the representative NK 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.
- *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.
- 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

Assignments 3 & 4: Solving for optimal monetary policy

Topic 3: Heterogeneous agents New Keynesian models

Weeks 5-6: A primer on Heterogeneous Agents New Keynesian (HANK)

- *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.
- Auclert, A. (2019): “Monetary Policy and the Redistribution Channel,” *American Economic Review*, 109 (6), 2333–2367.
- Auclert, A., M. Rognlie, and L. Straub (2018): “The Intertemporal Keynesian Cross,” Technical Report.
- Bilbiie, F. O., T. Monacelli, and R. Perotti (2013): “Public Debt and Redistribution With Borrowing Constraints,” *Economic Journal*, 123 (566), F64–F98.
- Broer, T., N.-J. Harbo Hansen, P. Krusell, and E. Öberg (2019): “The New Keynesian Transmission Mechanism: A Heterogeneous-Agent Perspective,” *Review of Economic Studies*.
- Carroll, C. D., M. B. Holm, and M. S. Kimball (2019): “Liquidity Constraints and Precautionary Saving,” Technical Report.
- Challe, E., J. Matheron, X. Ragot, and J. F. Rubio-Ramirez (2017): “Precautionary Saving and Aggregate Demand,” *Quantitative Economics*, 8 (2), 435–478.
- Christelis, D., D. Georgarakos, T. Jappelli, and M. van Rooij (2020): “Consumption Uncertainty and Precautionary Saving,” *Review of Economics and Statistics*, 102 (1), 148–161.
- Debortoli, D., and J. Galí (2018): “Monetary Policy With Heterogeneous Agents: Insights From TANK Models,” Technical Report.
- Guvenen, F., S. Ozkan, and J. Song (2014): “The Nature of Countercyclical Income Risk,” *Journal of Political Economy*, 122 (3), 621–660.

Assignment 5: HANK models