Macroeconomics – part I (G. Femminis / D. Delli Gatti)

The first part of this module deals with the basics in intertemporal optimization. The instructor (Gianluca Femminis) shall lecture for 12 hours.

The second part examines how financial frictions shape aggregate fluctuations and the transmission of monetary and credit policy. The instructor (Domenico Delli Gatti) shall lecture for 8 hours.

Course Content

Part I

Basic growth theory (5 hours). After a quick reprise of the Solow model, the classic Ramsey model will be analyzed in some details. Attention will be devoted both to the economic intuition for the results and to the embedded analytical issues.

An introduction to the dynamic programming approach to growth theory (2 hours). The 'Bellman principle' will be introduced and illustrated through examples based on the classic growth models.

Endogenous growth theory (1 hour) A basic endogenous growth will be succinctly illustrated.

Dynamic investment model (2 hours). A simple framework, based on Tobin's *q,* will be used to add persistence to the model.

Competitive equilibrium with complete markets (2 hours). A stochastic consumption model will be analyzed, and extended to competitive economy, to highlight the role of complete markets and the meaning of a "representative agent".

Part II

This part introduces three foundational frictions (asymmetric information and costly state verification, incentive constraints in financial intermediation, and collateral constraints) and explores financial amplification in macroeconomic models.

The Financial Accelerator in a New Keynesian Model (3 hours) An agency problem arises when borrowers privately observe investment returns and lenders can verify them only at a cost. Bernanke-Gertler-Gilchrist incorporate this friction in a New Keynesian macroeconomic model. This model will be presented in detail, focusing on the relationship between entrepreneurial net worth, the external finance premium and the transmission mechanism of shocks.

Financial intermediation, asset diversion, and credit policy (2 hours) An agency problem arises when bankers may divert assets that may limit their ability to attract external funding. This friction links banks' funding capacity to their net worth. Using the Gertler–Kiyotaki model, the effects of this friction on credit supply and the design of the central bank's credit interventions will be analyzed.

Borrowing constraints, collateral, and credit cycles (1 hour) Costly enforcement of debt contracts leads to the emergence of borrowing constraints. The macroeconomic consequences of the borrowing constraint will be explored within the Kiyotaki-Moore model, emphasizing the interaction between asset prices, borrowing capacity, and investment.

Financial frictions in agent-based macroeconomics (2 hours). An introduction to the role of financial frictions in model economies populated by heterogeneous, interacting firms and banks. The emphasis is on the structure and economic logic of the models.

Textbooks: Despite its introductory nature, there is no single textbook for this module. However, lectures will refer to textbooks such as G. McCandless (2008), *The ABC of RBC*, Harvard University Press; D. Acemoglu (2009), *Introduction to Modern Economic Growth,* Princeton University Press, L. Ljungqvist and T. Sargent (2012), *Recursive Macroeconomic Theory* (3rd edition), M.I.T. Press; B. Heijdra (2018), *Foundations of Modern Macroeconomics*, Oxford University Press.

Essential readings for part I

Mc Candless, Chapters 1 and 3

Acemoglu, Chapters 2 and 3 (Solow model), 8 (Ramsey model), 11 (simple endogenous growth models).

G. Femminis, "From simple growth to numerical simulations: A primer in Dynamic Programming", (2016) available at: https://ideas.repec.org/p/ctc/serie1/def050.html

Heijdra, Chapter 13,14, 4, 17 (section 4 in particular).

Ljungqvist and Sargent, Chapter 8.

Further readings for part I

Abel, A. B. (1982). Dynamic effects of permanent and temporary tax policies in a *q* model of investment, *Journal of Monetary Economics*, 9, pp. 353-373.

Aghion, P., E. Caroli, and C. García-Peñalosa (1999). Inequality and economic growth: The Perspective of the New Growth Theories, *Journal of Economic Literature*, 37, pp. 1615–1660.

Akgit, U. and W. Kerr (2018) Growth through Heterogeneous Innovations, *Journal of Political Economy*, 2018, 126 pp. 1374-1443.

Blanchard O. J. and C. M. Kahn (1980). The solution of linear difference models under rational expectations. *Econometrica*, 48, pp. 1305-1311.

Farboodi M. and L. Veldkamp (2020), Long Run Growth of Financial Technology, *American Economic Review* 110 (8), pp. 2485-2523.

Peretto, P. (2021). Through scarcity to prosperity: Toward a theory of sustainable growth. *Journal of Monetary Economics* 117, 2021 pp. 243 - 257.

Glomm, G. and B. Ravikumar (1994). Public investment in infrastructure in a simple growth model, *Journal of Economic Dynamics and Control*, 18, pp. 1173-1187.

Jones, C. (1995). R&D-based models of economic growth, *Journal of Political Econo*my 103, pp. 759–84.

Lucas, R. J. (1988). On the mechanics of economic development, *Journal of Monetary Economics*, 22, pp. 3-42.

Mankiw, N., Romer, D. and D. Weil (1992). A contribution to the empirics of economic Growth, *Quarterly Journal of Economics*, 107, pp. 407 – 437.

Riekhof, M.C. and Noack, F. (2024) Nature's decline and recovery — Structural change, regulatory costs, and the onset of resource use regulation, *Journal of Environmental Economics and Management* 125*,* Article 102947

Saint-Paul, G. (2021) Secular satiation. *Journal of Economic Growth* 26, pp. 291–327.

Broad overview readings for part II

For an "appetizer" that succinctly presents the main issues in the macro-finance literature see

Brunnermeier, Markus, Ricardo Reis *A Crash Course on Crises. Macroeconomic Concepts for Run ups, Collapses and Recoveries* Princeton: Princeton University Press, 2024

For an encompassing (albeit slightly outdated) survey, see

Brunnermeier, Markus K, Thomas Eisenbach, and Yuliy Sannikov. "Macroeconomics with Financial Frictions: A Survey". Advances in Economics and Econometrics, Tenth World Congress of the Econometric Society. New York: Cambridge University Press, 2013 (freely downloadable).

Essential readings for part II

Bernanke, Ben, Mark Gertler and Simon Gilchrist (1999) "The Financial Accelerator in a Quantitative Business Cycle Framework", in Taylor, John and Michael. Woodford, eds., *Handbook of Macroeconomics*, Elsevier, 1999.

Gertler, Mark and Nobuhiro Kiyotaki (2010): "Financial Intermediation and Credit Policy in Business Cycle Analysis" in Friedman, Benjamin M., and Michael. Woodford, eds., *Handbook of Monetary Economics*, Elsevier

Dawid, H. and Delli Gatti, D. (2018). Chapter 2 - Agent-based macroeconomics. In Hommes, C. and LeBaron, B., editors, *Handbook of Computational Economics*, volume 4, pages 63-156. Elsevier

N. Kiyotaki and J.Moore (1997), "Credit Cycles", *Journal of Political Economy*.

Further readings for part II

Christiano, L., R. Motto, and M. Rostagno (2014), "Risk shocks", *American Economic Review* Vol.104, No. 1, pp. 27-65

Curdia, V., and M. Woodford (2010), "Credit Spreads and Monetary Policy", *Journal of Money, Credit and Banking*, 42, 3-35.

Iacoviello, M. (2005) "House Prices, Borrowing Constraints, and Monetary Policy in the Business Cycle", *American Economic Review*

Quadrini, V. (2011), "Financial Frictions in Macroeconomic Fluctuations", FRB Richmond, Economic Quarterly, Volume 97, Number 3, 209–254