Stochastic Dynamic Programing with complete and incomplete markets

Prof. Facundo Piguillem

facundo.piguillem@gmail.com

Syllabus

Version: April 2024

Course Description

This course will review in detail how to analyze models with heterogeneity. We will start reviewing a canonical recursive problem. The goal of the class is to learn "tricks" that it will allows us to study models that can become quickly extremely complex. First, we build a toolbox that allows students to draw general conclusions in less standard models. Then we move to the Aiyagari-Bewley-Hugget economies: uninsured idiosyncratic labor income risk. We analyze in detail the main characteristic and implications of self-insurance standard model using the martingale convergence theorem and show the existence and uniqueness (or not) of a wealth distribution in general equilibrium. The students will learn how to solve numerically these problems using alternative approaches. We'll see that these models are not that good at generating reasonable distributions of wealth and that it is optimal to tax capital income.

Then we study models with heterogeneous returns on investment. These models sometimes allow for analytic aggregation with aggregate uncertainty and deliver more "reasonable" wealth distributions. We'll see that these models are better at generating empirical relevant wealth distributions, but they imply that capital income should subsidized. In this environment we'll review the typical macro-finance framework and see how risk sharing of aggregate shocks can affect equilibria.

Finally, we study another classic set of models with heterogeneity. Here, using some tricks, we can show that is possible to match both the income and wealth distributions. We then analyze some classical and very important questions: the optimality of social security and capital taxation.

Lectures plan.

Week 1: Models with incomplete markets and idiosyncratic labor risk.

Class 1: Partial Equilibrium: The standard Chamberlain and Wilson model.

Class 2: General Equilibrium 1: Aiyagari-Hugget economy and characterization of the equilibrium wealth distribution and optimality of positive capital taxation.

Week 2: Solving incomplete markets economies numerically.

Class 1: First approach: value function iteration and equilibrium distribution of wealth.

Class 2: Alternative approaches: the endogenous grid method. Why these models do not generate an empirically reasonable distribution of wealth?

Week 3: Economies with idiosyncratic investment risk.

Class 1: The Angeleto's economy: exact aggregation and optimality of negative tax on capital.

Class 2: Generating the top 1% of wealth distribution (Pareto tail from the model to the data): Bisin-Benhabid and Di Nardi-Cagetti economies.

Week 4: Aggregate shocks and heterogeneity.

Class 1: Approximate aggregation: Krussel-Smitth method to simulate economies with aggregate uncertainty,

Class 2: The Macro-Finance framework: aggregate risk sharing in economies with idiosyncratic investment risk.

Week 5: OLG economies with heterogeneity.

Class 1: How to get everything right in a Michael Jordan economy.

Class 2: The (non) optimality of social security when there is either aggregate risk or idiosyncratic risk alone.

Week 6: Hyperbolic-discounting models.

Class 1: When agents are present bias and its equivalence to settings with political-social interactions. The problem of lack of continuity.

Class 2: When agents over-borrow and when they under-borrow. Policy prescriptions to correct the problem.

References (some not of all them and in random order)

George-Marios Angeletos, 2007. "*Uninsured Idiosyncratic Investment Risk and Aggregate Saving*," Review of Economic Dynamics, Elsevier for the Society for Economic Dynamics, vol. 10(1), pages 1-30, January.

Jess Benhabib & Alberto Bisin & Shenghao Zhu, 2011. "*The Distribution of Wealth and Fiscal Policy in Economies With Finitely Lived Agents*," Econometrica, Econometric Society, vol. 79(1), pages 123-157, 01.

Marco Cagetti & Mariacristina De Nardi, 2006. "*Entrepreneurship, Frictions, and Wealth*," Journal of Political Economy, University of Chicago Press, vol. 114(5), pages 835-870, October.

Lars Ljungqvist and Thomas Sargent. *Recursive Macroeconomics Theory*. Second Edition. 2004.

Stokey, Lucas and Prescott. *Recursive Methods in Economic Dynamics*. Harvard University Press. 1989.

Aiyagari, S Rao, 1994. "*Uninsured Idiosyncratic Risk and Aggregate Saving*," The Quarterly Journal of Economics, MIT Press, vol. 109(3), pages 659-84, August.

Aiyagari, S Rao, 1995. "*Optimal Capital Income Taxation with Incomplete Markets, Borrowing Constraints, and Constant Discounting*," Journal of Political Economy, University of Chicago Press, vol. 103(6), pages 1158-75, December.

Gary Chamberlain & Charles A. Wilson, 2000. "*Optimal Intertemporal Consumption Under Uncertainty*," Review of Economic Dynamics, Elsevier for the Society for Economic Dynamics, vol. 3(3), pages 365-395, July.

Huggett, Mark. "*The risk-free rate in Heterogenous-Agent, Incomplete insurance Economies*" Journal of Economics Dynamics and Control. Vol 17, 1993.

Ana Castaneda, Javier Diaz-Gimenez and Jose Victor-Rios-Rull. "*Accounting for earnings and wealth inequality*". Journal of Political Economy, Vol. 111, no 4, 818-857, (2003).

Per Krusell and Anthony Smith. *Income and Wealth Heterogeneity in the Macroeconomy*. Journal of Political Economy, 1998