

**Syllabus for**  
**HETEROGENEOUS AGENTS AND MACROECONOMICS:**  
**A SHORT COURSE**

**Instructor:** Professor Tony Smith, Department of Economics, Yale University.

**Location and Dates:** Central Bank of Chile, Santiago, Chile, March 9 to March 12, 2015.

**Course Objectives:** Modern macroeconomic theory relies on microfoundations: the behavior of various economic agents (consumers, firms, etc.) is described from first microeconomic principles, and markets are described explicitly, so that welfare analysis can be carried out using standard methods. However, the vast majority of models used in practice (e.g., at central banks) to study applied questions builds on the representative-agent framework, i.e., these models abstract from the reality of consumer heterogeneity. Similarly, they treat firms as largely identical. These assumptions were natural and attractive simplifications during the development of modern macroeconomic theory. A large number of theoretical and empirical investigations, however, have cast doubt on these simplifications and instead study the implications of heterogeneity among consumers (and firms) along with incomplete insurance markets. The development of this alternative modelling framework began a quarter-century ago and has continued unabated through many refinements and extensions. The resulting models can now be implemented quantitatively and compared systematically to the representative-agent model. Several such comparisons in recent years argue, for example, that the recent financial crisis and ensuing Great Recession cannot be well understood without a heterogeneous-consumer perspective.

This short course will review these theoretical developments, beginning with a core model and building up toward recent advanced models aimed at full-fledged quantitative analysis. Because quantitative heterogeneous-agent modelling requires some investment in computational methods, the course will also briefly describe such methods. Throughout this intense course, the participants will thus accumulate some basic theoretical knowledge as well as programming skills and then implement these in order to analyze some simple examples. This part of the course will require students to carry out some hands-on computation using Matlab code provided during the course. The course will also cover the empirical literature on inequality in income and wealth, partly to examine causes of inequality and partly in order to be able to calibrate, or estimate, key parameters in the heterogeneous-consumer model. This part of the course will also briefly discuss Thomas Piketty's recent work on trends in, and causes behind, inequality.

**Course Schedule:** The course will consist of four 2.5-hour sessions, each subdivided (approximately) into two halves as described below. This description lists only key references;

additional references will be provided during the course as needed. The subsections on computation will involve students running Matlab code to solve the various models.

1. *Session 1*

- (a) Introduction and facts on income and wealth heterogeneity.
  - i. Díaz-Giménez et al, “Facts on the Distributions of Earnings, Income, and Wealth in the United States: 2007 Update,” *Federal Reserve Bank of Minneapolis Quarterly Review*, 2011.
  - ii. “Cross-Sectional Facts for Macroeconomists,” *Review of Economic Dynamics*, Special issue, 2010.
- (b) Recursive competitive equilibrium, aggregation with complete markets.
  - i. Chatterjee, “Transitional Dynamics and the Distribution of Wealth in a Neoclassical Growth Model,” *Journal of Public Economics*, 1994.

2. *Session 2*

- (a) Bewley-Huggett-Aiyagari models: theory.
  - i. Bewley, “The Permanent Income Hypothesis: A Theoretical Formulation,” *Journal of Economic Theory*, 1977.
  - ii. Huggett, “The Risk-Free Rate in Heterogeneous-Agent Incomplete-Insurance Economies,” *Journal of Economic Dynamics and Control*, 1993.
  - iii. Aiyagari, “Uninsured Idiosyncratic Risk and Aggregate Saving,” *Quarterly Journal of Economics*, 1994.
- (b) Computation of the Huggett and Aiyagari models.

3. *Session 3*

- (a) Transitional dynamics and aggregate shocks: theory.
  - i. Krusell and Smith, “Income and Wealth Heterogeneity in the Macroeconomy,” *Journal of Political Economy*, 1998.
  - ii. Krusell and Smith, “Income and Wealth Heterogeneity, Portfolio Choice, and Equilibrium Asset Returns,” *Macroeconomic Dynamics*, 2007.
  - iii. Krusell and Smith, “Revisiting the Welfare Effects of Eliminating Business Cycles,” *Review of Economic Dynamics*, 2009.
- (b) Transitional dynamics and aggregate shocks: computation.

4. *Session 4*

- (a) Applications: entrepreneurs, the Great Recession, monetary economics.

- i. Covas and Fujita, “Private Equity Premium and Aggregate Uncertainty in a Model of Uninsurable Investment Risk,” *B.E. Journal of Macroeconomics*, 2011.
  - ii. McKay, “Time-Varying Idiosyncratic Risk and Aggregate Consumption Dynamics,” working paper (Boston University), 2014.
  - iii. McKay et al, “The Power of Forward Guidance Revisited,” working paper (Boston University), 2015.
  - iv. Gornemann et al, “Doves for the Rich, Hawks for the Poor? Distributional Consequences of Monetary Policy,” working paper (Federal Reserve Bank of Philadelphia), 2014.
- (b) Multiplicative shocks and wealth inequality.
- i. Piketty, *Capital in the Twenty-first Century*, Belknap Press, 2014.
  - ii. Piketty and Saez, “Inequality in the Long Run,” *Science*, 2014.
  - iii. Piketty and Zucman, “Wealth and Inheritance in the Long Run,” *Handbook of Income Distribution*, Volume 2 (Chapter 15), 2015.
  - iv. Benhabib et al, “The Distribution of Wealth and Fiscal Policy in Economies with Finitely Lived Agents,” *Econometrica*, 2011.