

# PONTIFICIA JAVERIANA UNIVERSITY

## Macroeconomics with Heterogeneous Agents: Theory and Applications

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<b>Time:</b>	Summer 2019	<b>Instructor:</b>	Luis E. Rojas
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**Course Description and Objectives:** This course presents state-of-the-art models used in modern macroeconomics. We will study the quantitative macroeconomic literature that focuses on household heterogeneity, with a special emphasis on the standard incomplete markets models and its modern applications. Most of the material will be studied from a theoretical perspective, emphasizing both the general picture and the technical aspects of the models. We will begin with an introduction to recursive methods and dynamic programming techniques. We will apply those methods to study the consumption and saving decisions of households in a partial equilibrium setting, emphasizing the role of precautionary behavior and liquidity constraints. We will also use the partial equilibrium approach to study different models of investment behavior, including the relationship between firms and financial markets. It turns out that investment theory is very relevant for modern debates on inequality. Then we will turn our attention to general equilibrium models. In particular, we will study the standard incomplete markets model, which is the main workhorse for studying heterogeneity and inequality in macroeconomics, and we will learn how to solve it. The second part of the course will focus on five important and policy-relevant topics in order to illustrate the applicability and the greater realism of heterogeneous agents models: i) taxation, ii) recessions and stabilization policy, iii) firm heterogeneity, iv) long-run macro trends and v) social security.

**Prerequisites:** Advanced Macroeconomics I

**Class Material:** We will lecture using our own slides. Material from the following books will be used in this course but you are not required to buy any of them. We will indicate which of the books we are following more closely in each of the topics. Some additional readings/papers will be announced as the course progresses.

- Jerome Adda and Russell W. Cooper, *Dynamic Economics*. The MIT Press, 2003. (AC)
- Tullio Jappelli and Luigi Pistaferri, *The Economics of Consumption: Theory and Evidence*. Oxford University Press, 2017. (JP)
- Lars Ljungqvist and Thomas Sargent, *Recursive Macroeconomic Theory*. The MIT Press. 3rd Edition. (LS)
- Jianjun Miao, *Economic Dynamics in Discrete Time*. The MIT Press, 2014. (M)

**Class Policy:**

- Our class meetings are on TBD. You are expected to attend all lectures. If you are not able to attend a lecture, please email us in advance.

**Grading Policy:**

- Home assignments (50 %), Paper Proposal (50 %).

**Home assignments:** There will be several assignments throughout course. The assignments will consist of some modelling, analytical and basic numerical tasks. You are encouraged to work in groups. However, each of you must hand in his own independently written answers (hard copy or via email).

**Technology in the classroom:** The use of laptops and tablets is allowed, but NOT the use of cell phones. Laptops and tablets can be used ONLY for educational purposes (i.e. to take notes). Note that the use of electronics for other purposes is highly disruptive to the instructor and other students, and distracts from course discussions.

## **COURSE OUTLINE:**

### *Theory (week 1):*

#### **Introduction to Dynamic Programming**

*Sequential problems. The Bellman equation and solution methods. Blackwell's conditions. Euler equations.*

#### **Consumption.**

*Intertemporal choice under certainty. The age profile of consumption and wealth. The precautionary savings model. The response of consumption to income risk.*

#### **Investment.**

*The Neoclassical Model of Investment. The Q-Theory of Investment. Financial Markets and Firms Behaviour. The Modigliani-Miller theorem. Market Power.*

#### **Equilibrium with Complete Markets**

*The Neoclassical growth model. Decentralized equilibrium with Arrow securities. Recursive competitive Equilibrium*

#### **Incomplete Markets**

*Self-insurance. Bewley models. Computation of the Wealth Distribution. Over-accumulation of capital. Constrained efficient allocations.*

### *Applications (week 2):*

#### **Taxation**

*Optimal Capital Income Taxation. Distributional Effects of Tax Reforms. Dividend and Capital Gains Taxation. Welfare Analysis.*

#### **Recessions and Stabilization Policy**

*Aggregate Demand and Incomplete Markets. Liquidity Traps. Aggregate and Distributional Effects of Monetary Policy and Fiscal Policy.*

#### **Firm Heterogeneity**

*Firms with heterogenous productivity. Equilibrium dynamics of the firm size distribution. Firms' uncertainty over the business cycle.*

#### **Inequality and Long-run Macro Trends**

*Wage Inequality and the Macroeconomy. Asset Prices and Wealth Accumulation. Financial Development.*

#### **Social Security**

*Wealth Inequality in Life-Cycle Models. Intergenerational Transfers. Social Security Reforms. Pensions*