Quantitative Macroeconomics

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Overview

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The goal of these notes is to learn how to formulate, solve, and analyze macroeconomic models and bring them to the data to answer quantitative questions. The emphasis is to arrive at the current frontier of research as quickly as possible. A basic knowledge of stochastic processes, dynamic optimization, difference and differential equations is assumed.

Chapter 1: Complete markets and growth.

I. Complete markets models.

1. Deterministic models.
2. Risk, consumption insurance, and asset pricing.

II. The neoclassical growth model in discrete time.

III. The neoclassical growth model in continuous time.

Chapter 2: Life-cycle and overlapping generations.

I. Life-cycle models.

II. Overlapping generations models.

1. Two-period OLG models.
2. Multi-period OLG model.

Chapter 3: Solution methods for macro models.

I. Numerical methods.

1. Numerical differentiation and integration.
2. Nonlinear systems.
3. Numerical optimization.
4. The functional equation problem.

II. Local methods.

1. Perturbation methods.
2. Linearization.
3. Solving linear dynamic systems with aggregate risk.

III. Global methods.

1. Projection methods.
2. Value function and Euler equation algorithms.
3. Error analysis.

Chapter 4: New Keynesian models.

I. Neoclassical monetary models.

1. Fiscal and monetary policy.
2. Local determinacy and global multiplicity.

II. Monopolistic competition and sticky prices.

1. Monopolistic competition models.
2. Sticky price models.

III. New Keynesian models.

1. The basic NK model.
2. Solving the model locally.
3. Monetary policy shocks.
4. A medium-scale NK model.

Chapter 5: Heterogeneous agents.

I. Idiosyncratic risk.

II. The heterogeneous agent model in discrete time.

1. Equilibrium.
2. Numerical solution.
3. Transition dynamics and "MIT shocks".
4. Endogenous grid method.

III. The heterogeneous agent model in continuous time.

1. Equilibrium.
2. Numerical solution.

IV. Idiosyncratic and aggregate risk.

1. Numerical algorithms.

V. OLG model with idiosyncratic risk.