

Research Seminar: Macroeconomics

Aim of the course:

The goal of this course is twofold. At first, students are introduced to using state of the art computational techniques for quantitative macroeconomic research. They will learn about the programming language FORTRAN and how to solve standard dynamic programming problems in that language. We will then use the techniques learned to study some standard macroeconomic models. While part of the course will cover models with a representative agent, the focus will lie on heterogeneous agent models, specifically the overlapping generations model with idiosyncratic labor productivity shocks. In all models we investigate the efficiency and redistribution consequences of fiscal policy (like taxation, social security and public debt). We will learn how such policies redistribute between different generations and also within generations, how they may improve risk sharing when markets are incomplete and how they can trigger distortions and therefore hurt the aggregate economy. Ideally at the end of the course, students will be able to develop their own ideas and conduct their own research project using the acquired techniques.

Outline:

The course will consist of a series of lectures and a do-it-yourself part. The teaching sequence is divided into three units:

1. In the first unit, students learn how to program in FORTRAN and acquire some basic skills in applying numerical methods. FORTRAN is a free, fast and easy to learn programming language that is used quite frequently in modern quantitative macroeconomic research.
2. Unit 2 will be concerned with solution techniques to dynamic programming problems and how to apply them to macroeconomic models with a representative agent.
3. In Unit 3 we will learn how we can conduct reliable policy analysis in the overlapping generations model with idiosyncratic labor productivity shocks. To this end, we also study how to calculate welfare effects of such policy changes and how to aggregate them within and across generations.

Grading:

At the end of units one and two, students are given homework tasks that they will have to solve themselves using FORTRAN. Working in groups is explicitly encouraged. Ideally students will form groups of two people. After unit 3 students should be ready to start their own little research project. I will be available for consultation, to give ideas and to assess the feasibility of the project. Towards the end of the semester, students have to submit their project in the form of a program they wrote and a couple of pages of writing about how they solved things and what they found.

Grades are based on students' participation in the course as well as the project they submit.

Prerequisites:

Students that attend this course should know about basic macroeconomics. Knowledge of heterogeneous agent models will be helpful. It is not required to already have programming skills. Yet, students should know how to use a computer. In addition, they should bring along the willingness to learn programming (which requires that they will program a lot themselves). Ideally, if available, students should bring their own computer to class. This is however not a requirement.

Course materials:

There will be ample course material on how to program in FORTRAN, which compilers to use, numerical techniques, etc. In addition to a couple of chapters on these topics, there will be FORTRAN codes available for everything we do. There is no book, but lecture notes will be provided in pdf format.