Macroeconomic Theory II

Selected Topics

GOALS

The primary goal of this course is to motivate and initiate innovative research in the field of macroeconomics. You will find that we focus heavily on issues, models, and quantitative work at the intersection of different important topics:

- How do movements in the distribution of income and wealth affect the Macroeconomy?
- What effects do business cycles have on the distributions of income, wealth, consumption, and, especially, welfare across different types of consumers?
- Are disadvantaged consumers--for example, the poor and the unemployed--more exposed to business cycle risk than the rich and the employed?
- Even though physical capital and more advanced technologies are now regarded as the relative complements of human capital, were they so in the more distant past?
- If technological advance and human skill were not relative complements in the distant past but are today, when did they become so?
- What does the unemployment rate vary over time and across countries?
- What is the behavior of aggregate labor market variables such as job destruction, job creation and unemployment?
- How do different labor market policies affect aggregate outcomes? Are they desirable?

Answers to such questions are the subject of this course.

EVALUATION

Students will complete five problem sets throughout the semester which will be graded and returned. Some of the problems will require written and mathematical analysis; others will involve numerical and computational analysis. I will assign them once the appropriate material has been covered, and you will have one week to complete them. There is no need to type your answers but if I can't read them, you won't get credit, so make sure they are legible. Homework problems are going to be difficult and long, and they will involve computer programming in some cases. Answers will either be provided in TA discussion sessions, or in answer guides that will be made available on my website.

I encourage you to cooperate as much as possible with your classmates and to talk to me whenever you get stuck on an assignment or have questions about the material. However, each problem set submitted for grading must ultimately be a student's own work.

There will be a midterm examination and a final examination which is held during the regular examination period. If you cannot attend the midterm due to a verifiable medical emergency, then the weight of the midterm will be added to the final examination. Otherwise, a grade of 0 will be assigned to the midterm. If you cannot attend the final examination due to a verifiable medical emergency, then a makeup examination will be set as soon as possible. Otherwise, a grade of 0 will be assigned to the final exam.

Your final grade in the class will be determined as the following weighted average of your work throughout the semester

Problem Sets	30%
Midterm	30%
Final Exam	40%

BOOKS

Heer, Burkhard and Maussner, Alfred. *Dynamic general equilibrium modeling: computational methods and applications*. Berlin; New York, NY: Springer, 2005.

Ljungqvist, Lars and Sargent, Thomas J. *Recursive Macroeconomic Theory*. Cambridge, MA: MIT Press, 2004.

Pissarides, Christopher A. *Equilibrium Unemployment Theory*. Cambridge, MA: MIT Press, 2000.

Stokey, Nancy L.; Lucas, Robert E., Jr. and Prescott, Edward C. *Recursive Methods in Economic Dynamics*. Cambridge, MA: Harvard University Press, 1989.

COURSE OUTLINE

I Asset Pricing

The Arrow-Debreu model of an economy seems to describe a static world without time or uncertainty. Hicks (1939), in his 'Value and Capital' already criticized the steady-state analysis of Walras as a highly deceptive way of analyzing the intertemporal economy we live in. Arrow and Debreu, it seems, merely formalized the highly deceptive model developed by Walras. However, as Chapter 7 of Debreu's 'Theory of Value' shows a simple redefinition of a commodity allows one to obtain a theory of time and uncertainty which is formally identical to the static general equilibrium theory. Modeling time in the Walrasian tradition seems fairly straightforward. Even before Arrow and Debreu's work, Irving Fisher (1930) wrote about the theory of interest and developed (a somewhat imprecise) dynamic general equilibrium model.

The main idea is that a tomato in summer is a different good than a tomato in winter. A commodity is not only identified by its physical characteristics (i.e. a tomato) but also by the date. The relative price between goods today and goods tomorrow is the interest rate. Fisher's model becomes interesting if one makes additional assumptions on preferences and if one examines models with infinite time horizon. As early as 1953 Arrow found a brilliant way to incorporate uncertainty into the model. He introduced 'states of the world' as a complete description of a date-event. A contract for the transfer of a commodity specifies now, in addition to its physical properties, its location and its date, an event of occurrence (state of the world) of which the transfer is conditional (so a tomato when it rains tomorrow is a different good than a tomato when the sun shines).

Once uncertainty and time is incorporated into the model one has to ask, however, if it is realistic to assume that at time zero there are markets for all commodities and agents buy their consumption bundles for the (possibly infinite) future. Instead, Arrow suggested that agents trade financial assets instead. This was the birth of modern asset pricing. In 1978 Lucas published a paper on asset pricing that proved highly influential in macro-economics mainly because it provided a simple way to bring the basic general equilibrium model to data.

Ljungqvist and Sargent, Chapter 13

Jermann, Urban J. "Asset Prices in Production Economies" *Journal of Monetary Economics,* April 1998, 41(2), pp. 257-275.

Mehra, Rajnish and Prescott, Edward C. "The Equity Risk Premium: A Solution?" *Journal of Monetary Economics,* July 1988, 22(1), pp. 133-136.

Mehra, Rajnish and Prescott, Edward C. "The Equity Premium: A Puzzle" *Journal of Monetary Economics*, March 1985, 15(2), pp. 145-161.

Lucas, Robert E. "Asset Prices in an Exchange Economy." *Econometrica,* November 1978, 46(6), pp. 1429-1445.

II Heterogeneous Agents Models

There are many questions in economics for which heterogeneous-agent dynamic models have to be used to provide answers. Examples of these questions where the desired answer is quantitative are as follows:

- What changes in the distribution of wealth will occur if the tax system is changed from progressive to proportional?
- What increases in taxation are needed to maintain the current level of US social security benefits under current population patterns?
- What type of policy changes can be expected from changes in constitutions?

All these questions require models where the households that populate are not identical. With respect to the first question, note that the key property of progressivity of the tax system is that different households face different tax rates. For the second question, the age distribution of the population determines the amounts collected and paid by the administrators of social security. Finally, the determinants of policy should be affected by the relations between different groups of households that do not have the same preferences over policies.

Computation of equilibria in these models is usually substantially more difficult than in standard representative agent models, as equilibrium laws of motion become functions not only of aggregate variables, but also of the distribution of these variables across different types of agents. Solving for the laws of motion of such distributions is a nontrivial task.

General Surveys

Heathcote, Jonathan; Storesletten, Kjetil and Violante, Giovanni L. "Quantitative Macroeconomics with Heterogeneous Households." *Annual Review of Economics,* 2009, 1, pp. 319-354.

Computation of Stationary Distributions

Heer and Maussner, Chapter 5

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

Huggett, Mark. "The Risk-Free Rate in Heterogeneous-Agent Incomplete-Insurance Economies." *Journal of Economic Dynamics and Control,* September-November 1993, 17(5-6), pp. 953-69.

Dynamics of the Distribution Function

Heer and Maussner, Chapter 6

Krusell, Per and Smith, Anthony A., Jr. "Income and Wealth Heterogeneity in the Macroeconomy." *Journal of Political Economy,* October 1998, 106(5), pp. 867-96.

Ríos-Rull, José-Víctor. "Computation of Equilibria in Heterogeneous-Agent Models." In Ramon Marimon and Andrew Scott eds., *Computational Methods for the Study of Dynamic Economies*, Oxford University Press, 1999, pp. 238-264.

III Unemployment, Labor Market Fluctuations, Search and Matching

In the 1970s, European unemployment started increasing. It increased further in the 1980s, to reach a plateau in the 1990s. It is still high today, although the average unemployment rate hides a high degree of heterogeneity across countries.

The unemployment rate in the U.S. fluctuates around six percent, and is strongly countercyclical, sometimes with large fluctuations. Vacancies (measured either as help-wanted ads in the United States, or as job openings in other countries) are even more strongly procyclical, so that vacancy-unemployment ratio is procyclical. Short-run fluctuations in vacancies and unemployment correspond to a Beveridge curve, with a downward sloping relationship

Ljungqvist and Sargent, Chapter 6, 26

Ljungqvist, Lars and Sargent, Thomas "Understanding European Unemployment with a Representative Family Model." *Journal of Monetary Economics,* November 2007, 54(8), pp. 2180-2204.

Ljungqvist, Lars and Sargent, Thomas "Understanding European Unemployment with Matching and Search-Island Models." *Journal of Monetary Economics,* November 2007, 54(8), pp. 2139-79.

Mortensen, Dale T. and Pissarides, Christopher A. "Technological Progress, Job Creation, and Job Destruction." *Review of Economic Dynamics,* October 1998, 1(4), pp. 733-53.

Nickell, Stephen. "Unemployment and Labor Market Rigidities: European versus North America." *Journal of Economic Perspectives*, Summer 1997, 11(3), pp. 55-74.

Pissarides, Christopher A. *Equilibrium Unemployment Theory*. Cambridge, MA: MIT Press, 2000.

Rogerson, Richard; Shimer, Robert and Wright, Randall. "Search-Theoretic Models of the Labor Market: A Survey." *Journal of Economic Literature*, December 2005, 43(4), pp. 959-88.

IV Changes in the Structure of Wages and Models of Technology

Wage and income inequality have increased considerably in the U.S. over the past 25 years. This makes an analysis of changes in the wage structure interesting in its own right. Moreover, changes in the wage structure also imply changing labor market prices of different types of skills. Therefore, studying changes in the wage structure will be informative about the changes in the demand for different types of skills and technological developments. Finally, changes in the wage structure will also lead to different incentives for human capital investments, which we might want to understand.

Recent technological advances and a widening of the wage structure have led many to conclude that technology and human capital are relative complements. Over the past 60 years, the U.S. relative supply of skills has increased, but: a) there has also been an increase in the college premium, and b) this increase accelerated in the late 1960s, and the skill premium increased very rapidly beginning in the late 1970s.

Acemoglu, Daron. "Why Do New Technologies Complement Skills? Directed Technical Change and Wage Inequality." *Quarterly Journal of Economics*, November 1998, 113(4), pp. 1055-89.

Acemoglu, Daron. "Directed Technical Change." *Review of Economic Studies*, October 2002, 69(4), pp. 781-809

Acemoglu, Daron. "Patterns of Skill Premia." *Review of Economic Studies*, April 2003, 70(2), pp. 199-230.

Acemoglu, Daron and Shimer, Robert. "Wage and Technology Dispersion." *Review of Economic Studies*, October 2000, 67(4), pp. 585-607.

He, Hui and Liu, Zheng. "Investment-Specific Technological Change, Skill Accumulation, and Wage Inequality." *Review of Economic Dynamics*, April 2008, 11(2), pp. 314-34.

Krusell, Per; Ohanian, Lee E.; Rios-Rull, Jose-Victor and Violante, Giovanni L. "Capital-Skill Complementarity and Inequality: A Macroeconomic Analysis." *Econometrica*, September 2000, 68(5), pp. 1029-53.