Allievi Program, Master in Economics, and Ph.D. in Economics

ADVANCED DECISION THEORY
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Introduction
This is an advanced course in decision theory, focusing specifically on models of ambiguity and their consequences for economic behavior. Knowledge of basic decision models, at the level of Chapters 1-9 of David Kreps’s Notes on the Theory of Choice (Westview Press, 1988), as for instance in my Master’s course “Decisions and Uncertainty,” is taken for granted. The course will devote all of the time to one of the many areas of great development in decision theory in the last two decades, which is the models of ambiguity-sensitive preferences, as well as some of the implications of such preferences for Economics and Finance.

The plan is that I will teach (for about 18-20 hours) Part I of the course, presenting the earlier contributions as well as the more recent modelling efforts. In Part II, each student will do one class presentation of one (or a set of) paper(s) on the applications (particularly masochistic students are also allowed to present additional theoretical papers, if they so wish). Students will be graded based on their presentation, as well as on their class participation in lectures and, more importantly, in the fellow students’ presentations.
I have collected all the papers that are mentioned and used during the course in a Dropbox directory. Please contact me to receive a link. The papers indicated in parentheses below are not required reading; rather, they are suggestions for further reading. (I may mention them in class, but only briefly.)

As to Part II, what we will cover there will be mostly dictated by the students’ interest, as it will be based on student presentations. The list given for that part is a collection of possible topics and papers for student presentations. Please contact me to arrange yours.

Prerequisites
This class builds on prior exposure to mathematical reasoning and to the fundamental models used in Decision Theory. As a guide, traditional mathematics sequences in multivariable calculus and some real analysis should suffice (but some exposure to Measure Theory and Functional Analysis is also helpful). An understanding of Decision Theory at the level of an introductory course (such as the Decision and Uncertainty course that I teach for the Master’s in Quantitative Finance and Insurance) is, instead, a necessary background.

Detailed Syllabus
Part I: Theory
1. Ellsberg’s “paradoxes” and the empirical evidence. Here we “define” ambiguity attitudes (starting from Ellsberg’s classical paper), and discuss its normative and descriptive relevance. (I try to convince you that it is normatively relevant.)

   Reading:
   • C. Fox and A. Tversky, “Ambiguity aversion and comparative ignorance,” QJE, 1995. (JSTOR)

2. Two basic preference models with ambiguity. The Choquet expected utility (CEU) model and the maxmin expected utility with multiple priors (MEU) model are introduced. Their intersection: convex capacities and their cores. A special case of CEU: The rank-dependent EU model.

   Reading:
3. A more general preference approach. We start by looking at Bewley’s model, and show how it can provide the background to unify all the theories seen so far, to obtain invariant biseparable preferences (and the $\alpha$-MEU model).

Reading:


4. Some recent popular models. We look at some more recent models, which violate the Certainty Independence axiom. The “smooth ambiguity” model of Klibanoff-Marinacci-Mukerji and the “Variational Preferences” model of Maccheroni-Marinacci-Rustichini.

Reading:


Reading:

- (L. Epstein and M. Le Breton, “Dynamically consistent beliefs must be Bayesian,” JET, 1993.)

**Part II: Applications**

1. Games with ambiguity averse players. Equilibrium in beliefs. Definitions of equilibrium in games with ambiguity averse players, in both the CEU and MEU world. The support problem.

**Reading:**


**Reading:**


**Reading:**


• (Z. Chen and L. Epstein, “Ambiguity, risk and asset returns in continuous time,” *Econometrica*, 2002.)


4. **Job search and other dynamic applications.** The job search problem. Irreversible investments.

   **Reading.**


5. **Contracts, mechanism design and other economic applications.** Incomplete contracts. Auctions and other optimal mechanisms with ambiguity averse agents. Entrepreneurial innovation. Agency problems with ambiguity averse agents. Insurance.

   **Reading:**


6. Applications to politics. Selective abstention in multiple elections.

**Reading:**