ECONOMICS 171: DECISIONS UNDER UNCERTAINTY

Winter 2009 **Lectures: Tu,Th 8:00-9:20am** **York 2622**

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DATE	TOPIC	TEXT CHAPTER / HANDOUT
Jan. 6	Introduction: Aspects of Decision Making Under Uncertainty	Ch.1, H1
Jan. 8	Preliminary Concepts in Probability Theory I	Chs.2&3, H2
Jan. 13	Preliminary Concepts in Probability Theory II	Ch.6, H2
Jan. 15	Expected Utility Preferences under Objective Uncertainty I	Ch.4, H3
Jan. 20	Expected Utility Preferences under Objective Uncertainty II	Ch.4, H3
Jan. 22	Expected Utility Preferences under Subjective Uncertainty I	H4
Jan. 27	**(Tuesday) First Midterm Exam 8:00-9:20am**	
Jan. 29	Expected Utility Preferences under Subjective Uncertainty II	H4
Feb. 3	Risk and Risk Aversion I	Ch.5, H5
Feb. 5	Risk and Risk Aversion II	Ch.5, H5
Feb. 10	Risk and Risk Aversion III	Ch.5, H5
Feb. 12	Techniques for Assessing Risk Preferences and Beliefs	Ch.9, H6
Feb. 17	**(Tuesday) Second Midterm Exam 8:00-9:20am**	
Feb. 19	Evidence on the Shape of the Utility Function I	H7
Feb. 24	Evidence on the Shape of the Utility Function II	H7
Feb. 26	Evidence on the Underlying Assumptions of the Model I	Ch.10, H8
Mar. 3	Evidence on the Underlying Assumptions of the Model II	Ch.10, H8
Mar. 5	Non-Expected Utility Models of Preferences I	H9
Mar. 10	Non-Expected Utility Models of Preferences II	H9
Mar. 12	Intertemporal Choice and Dynamic Consistency	Ch.7&8, H10
Mar. 19	**(Thursday) FINAL EXAM 8:00-11:00am (location to be announced)**	

TEXT & READINGS: *Making Decisions*, 2nd Edition, D. V. Lindley, John Wiley & Sons. You are responsible for all the material in the assigned chapters. I will also distribute additional required reading (Handouts 1–10) in class.

EXAMS: The course grade is determined on the basis of two Midterms and a Final Exam.

COURSE WEB PAGE: The course web page is at:

www.econ.ucsd.edu/~mmachina/courses/ECON_171/ECON_171.html

This web page contains useful information and materials about the course, including Old Exam Questions and information about the exams.

ECON 171: COURSE OUTLINE

This course will examine how economic agents make decisions under conditions of uncertainty. It will examine the various ways in which economists represent the phenomenon of uncertainty, the fundamental principles of choice under uncertainty, the concepts and measurement of "risk" and "risk aversion," and the analysis of how these features influence economic behavior.

In the process of presenting this material, we will examine laboratory methods for eliciting and testing hypotheses about attitudes toward risk, the representation and elicitation of uncertain beliefs, intertemporal choice under uncertainty, psychological evidence and other "paradoxes" that attack the economic approach, and current research in light of this evidence.

Prerequisites: Econ 120A and Math 20F (Econ 100A or 170A also highly recommended).

I. INTRODUCTION: ASPECTS OF DECISION MAKING UNDER UNCERTAINTY

- **a. Positive Decision Theory versus Normative Decision Theory**
- **b. The Representation of Uncertainty**
  - Objective Uncertainty: Outcomes, Probabilities, Lotteries, and Decision Trees
  - Subjective Uncertainty: States, Events, Acts, and Payoff Tables
  - Mixed Subjective-Objective Uncertainty: "Horse/Roulette Lotteries"
- **c. Criteria for Choice under Uncertainty**
  - First Order Stochastic Dominance Preference
  - The Expected Value Criterion
  - The Mean-Variance Criterion
  - Minimax and "Safety First" Criteria
  - The Expected Utility Criterion

II. PRELIMINARY CONCEPTS IN PROBABILITY THEORY

- **a. Probability Distributions and Cumulative Distribution Functions**
- **b. Expected Value, Variance and Skewness**
- **c. Concave Functions, Convex Functions and Jensen's Inequality**
- **d. Conditional Probability and Bayes' Law**
- **e. Compound Lotteries and Probability Mixtures**

III. EXPECTED UTILITY RISK PREFERENCES UNDER OBJECTIVE UNCERTAINTY

- **a. Expected Utility Preferences over Objective Lotteries**
  - von Neumann-Morgenstern Utility Functions and the Expected Utility Formula
  - Properties of von Neumann-Morgenstern Utility Functions
  - Properties of Expected Utility Preferences
  - The Triangle Diagram
- **b. The Axioms of Expected Utility Theory**
  - Completeness and Transitivity
  - Mixture Continuity
  - The Independence Axiom
- **c. The Expected Utility Representation Theorem**
- **d. Expected Utility Preferences over Unbounded Probability Distributions**

IV. EXPECTED UTILITY PREFERENCES UNDER SUBJECTIVE UNCERTAINTY

- **a. The State-Preference Framework**
  States, Events, Outcomes and Acts
- **b. Expected Utility Preferences over Subjective Acts**
  v-M Utility, Subjective Probability and Expected Utility Formulas
- **c. The Hypothesis of Probabilistic Sophistication**
- **d. Properties of Expected Utility Preferences Over Subjectively Uncertain Acts**
  Statewise/Eventwise Monotonicity
  The Comparative Likelihood Relation over Events
  Separability across Mutually Exclusive Events: The Sure-Thing Principle
- **e. Savage's Joint Characterization of Subjective Probability and Expected Utility**
- **f. State-Dependent Expected Utility Preferences**
- **g. Expected Utility Preferences under Mixed Subjective-Objective Uncertainty**

V. RISK AND RISK AVERSION

- **a. Certainty Equivalents, Risk Premiums and Attitudes Toward Risk**
- **b. The Arrow-Pratt Characterization of Comparative Risk Aversion:**
  Comparative Risk Aversion
  Risk Aversion and Wealth
- **c. Comparative Risk and the Theory of Stochastic Dominance:**
  First Order Stochastic Dominance
  Comparative Risk
  Second Order Stochastic Dominance
  Skewness Preference and Third Order Stochastic Dominance
- **d. Comparative Statics of Risk and Risk Aversion:**
  Results for Specific Functional Forms
  General Results
- **e. The Theory of Certainty Equivalence**
- **f. The Ross Characterization of Comparative Risk Aversion**
- **g. Multivariate Risk and Risk Aversion**
- **h. Risk and Risk Aversion in the State-Preference Framework**

VI. TECHNIQUES FOR ASSESSING RISK PREFERENCES AND BELIEFS

- **a. Methodological Issues and Basic Techniques:**
  Verbal versus Choice-Based Elicitation
  Elicitation of Truthful Responses
  Income Effects
- **b. Assessing von Neumann-Morgenstern Utility Functions:**
  Univariate Assessment Methods
  Recovery from Asset Demand Functions
  Multivariate Assessment Methods
- **c. Assessing Subjective Probabilities:**
  Betting Odds and "Coherence"
  Scoring Rules

VII. EVIDENCE ON THE SHAPE OF THE UTILITY FUNCTION

a. Laboratory Evidence:
- Typical Findings
- "Biases" in Utility Assessment

b. Field Evidence:
- The Friedman-Savage Hypothesis
- Skewness Preference, Decreasing Absolute/Increasing Relative Risk Aversion
- Estimates of the Magnitude of Risk Aversion

c. Asymptotic Properties of the Utility Function

VIII. EVIDENCE ON THE UNDERLYING ASSUMPTIONS OF THE MODEL

a. Evidence on the Independence Axiom:
- The "Allais Paradox" and the Common Consequence Effect
- The Common Ratio Effect
- Oversensitivity to Changes in the Probabilities of Low Probability Events
- The Utility Evaluation Effect
- Evidence on Betweenness

b. Evidence on Transitivity:
- Threshold and Cyclic Effects
- The Preference Reversal Phenomenon

c. Evidence on the Stability of Preferences:
- Invariance of Risk Preferences to Initial Wealth
- Framing Effects
- Response Mode Effects

d. Evidence on the Existence and Use of Subjective Probabilities:
- Heuristics in the Manipulation of Probabilities
- The "Ellsberg Paradox" and its Implications

e. The Validity of the Evidence: Objections and Responses

IX. NON-EXPECTED UTILITY MODELS OF PREFERENCES

a. Non-Expected Utility Preference Functions: An Introduction

b. Separable Functional Forms

c. Higher Moments of Utility

d. Weighted Utility

e. "Expected Utility with Rank-Dependent Probabilities"

f. Expected Regret

g. Generalized Expected Utility Analysis
- Local Utility Functions
- Generalizations of Expected Utility Theorems
- "Fanning Out" and Violations of the Independence Axiom

X. INTERTEMPORAL CHOICE AND DYNAMIC CONSISTENCY

a. Static, Dynamic and Intertemporal Choice Situations

b. Dynamic Arguments Against Non-Expected Utility Preferences

c. The Hidden Assumption in these Arguments: Consequentialism

d. Dynamically Consistent Non-Expected Utility Maximizers