

ECONOMICS 171: DECISIONS UNDER UNCERTAINTY

Fall 2005

Lectures: Tues, Thurs 2:00-3:20pm

York Hall 2622

Review Session: Tues 7:00-7:50pm

Center Hall 115

Prof: Mark Machina

Office: Economics Bldg 217

Office Hours: Tues 10-2

TA's: Michael Madrid

Sequoyah Hall 208

M, W 4-5

Adam Sanjuro

Economics Bldg 128

Th 3:30-5

Bryan Tomlin

Economics Bldg 125

Th 10:30-12

DATE	TOPIC	READING*
Sep. 22	Introduction: Aspects of Decision Making Under Uncertainty	Ch.1, H1
Sep. 27	Preliminary Concepts in Probability Theory I	Chs.2&3, H2
Sep. 29	Preliminary Concepts in Probability Theory II	Ch.6, H2
Oct. 4	Expected Utility Preferences under Objective Uncertainty I	Ch.4, H3
Oct. 6	Expected Utility Preferences under Objective Uncertainty II	Ch.4, H3
Oct. 11	Expected Utility Preferences under Subjective Uncertainty I	H4
Oct. 13	Expected Utility Preferences under Subjective Uncertainty II	H4
Oct. 18	(Tuesday) First Midterm Exam (Mandeville Auditorium) 2:00-3:20pm	
Oct. 20	Risk and Risk Aversion I	Ch.5, H5
Oct. 25	Risk and Risk Aversion II	Ch.5, H5
Oct. 27	Risk and Risk Aversion III	Ch.5, H5
Nov. 1	Techniques for Assessing Risk Preferences and Beliefs	Ch.9, H6
Nov. 3	Evidence on the Shape of the Utility Function I	H7
Nov. 8	Evidence on the Shape of the Utility Function II	H7
Nov.10	(Thursday) Second Midterm Exam (Mandeville Auditorium) 2:00-3:20pm	
Nov.15	Evidence on the Underlying Assumptions of the Model I	Ch.10, H8
Nov.17	Evidence on the Underlying Assumptions of the Model II	Ch.10, H8
Nov.22	Non-Expected Utility Models of Preferences I	H9
Nov.29	Non-Expected Utility Models of Preferences II	H9
Dec. 1	Intertemporal Choice and Dynamic Consistency	Ch.7&8, H10
Dec. 6	(Tuesday) FINAL EXAM 3:00-6:00pm (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.

LECTURES & REVIEW SESSIONS: You are responsible for all the material in the lectures.

If you miss a lecture, borrow someone's notes. Review Sessions are optional, but recommended.

EXAMS: Your grade will be determined on the basis of two Midterm Exams and the Final Exam.

PRACTICE QUESTIONS: Practice questions will be distributed in class throughout the quarter.

We will go over these questions in office hours and review sessions, but your best practice for the exams is to *try these questions yourself first*.

Course Web Page (including e-mail links): <http://weber.ucsd.edu/~mmachina/courses/171/171.html>

* "Ch" denotes chapters in the textbook, "H" denotes handouts that will be distributed in class.

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

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

ECON 171 – HANDOUTS

Handout 1 Objective versus Subjective Uncertainty

Handout 2: Preliminary Concepts in Probability Theory

Handout 3: Expected Utility Preferences under Objective Uncertainty

Handout 4: Expected Utility Preferences under Subjective Uncertainty

Handout 5: The Theory of Risk and Risk Aversion

Handout 6: Assessing Risk Preferences and Beliefs

Handout 7: Evidence on the Shape of the Utility Function

Handout 8: Evidence on the Underlying Assumptions of the Expected Utility/
Subjective Probability Model

Handout 9: Non-Expected Utility Models of Preferences

Handout 10: Intertemporal Choice and Dynamic Consistency