Decision Theory and Evidence
Topics in Microeconomic Theory - 2090
Spring 2015
Brown University
Instructor: Mark Dean

Background

At the heart of almost every modern economic model lies a model of how people make decisions. The study of how these decisions are made is one of the main lines of enquiry in microeconomic theory. Decision theory (and the related field of revealed preference theory) is the use of formal (and usually axiomatic) modeling techniques to capture the observable implications of models of behavior. These techniques are central to attempts to incorporate behavioral and psychological insights into economics. On the one hand, decision theory tells us how we can test psychologically inspired models of economic behavior. On the other, it tells us what implications new behavioral insights have for our existing models, thus providing a link between behavioral economics and the rest of the economic universe.

In recent years, decision theory has been enlivened by an explosion of new data on how people make decisions. Much of this evidence has come from laboratory experiments, but increasingly field data is being used to understand economic behavior. More recently still, researchers have started thinking about how non-choice data, in the form of eye tracking, brain scanning, decision time and so on, can inform economic models This new emphasis on data has set up exciting new interactions between theorists and experimentalists – theorists are adapting their models to take into account the findings from experiments, while experimenters are running experiments to test the new theory. The resulting models are having a major impact in many areas of economics and policy, including finance, macro, development and marketing.

Course Overview

The aim of this course is to study behavioral economics through the lens of decision theory. We will study the tools that decision theorists use to model choices over different types of objects (for example risky and uncertain prospects, menus, consumption streams, stochastic choice). We will use these tools to study some of the key topics in behavioral economics. The focus will be on models of bounded rationality and rational inattention, but we will also cover other important topics: temptation and self control, violations of expected utility, ambiguity aversion, non-exponential discounting and reference dependence. We will study the experimental evidence that has been brought to bear on these topics, and show how decision theory acts as an important interface between theory and data. Finally we will look at applications of these models to questions of economic interest.

The course has five main aims.

1. Teach you the technical skills necessary to understand and begin research in decision/revealed preference theory

2. Provide an insight of the main topics that behavioral economists and decision theorists are currently interested in
3. Provide an overview of the experimental evidence related to these topics, and give you the tools necessary to conduct experimental research into the validity of behavioral economic models
4. Show how behavioral economic models have been applied more widely in the literature
5. Give a guide to some of the open questions in the literature, where research may fruitfully undertaken

Assessment

Assessment for the course will be based on three strands, each of which will receive roughly equal weight:

1. **Problem sets:** Decision theory is a technical subject, and there is no way to properly understand the concepts without working through some problems for yourself. There will be up to four problem sets spaced throughout the course.

2. **Presentations:** Starting from week 5, the class will be divided into two groups each week. Each group will be responsible for preparing a 20 minute presentation on an assigned paper. The next week, one member of the group will be selected at random to give the presentation in class.

3. **Research Proposal:** One of the jobs throughout the semester will be to come up with a research proposal. You will come and discuss this proposal with me once or twice during the course of the semester. In the last class everyone will present their research proposal, and produce a 15-20 page report identifying the research question, the related literature and the steps that you would take to answer the question

While it is not part of your formal assessment, I would also STRONGLY encourage all of you to come to the Theory seminar that takes place of Mondays at 4pm, and the theory lunch which takes place on Thursdays at 12.00. In fact, if you are thinking of having micro theory as one of your fields, I would say it is pretty vital for you to start attending these as soon as possible. They are a great way to start to survey the types of work that are currently being done in micro theory, and what the state of the art currently is. They are also, in general, pretty interesting.

Prerequisites

The course is primarily designed for graduate students who have taken the 1st year microeconomics sequence. However, it is also possible for others to take the course if they are keen, and have a decent technical background (particularly in real analysis).

While I am happy for people to take the course on a 'not for credit' basis, I will expect anyone who Is sitting in on the course to also make a good faith attempt at the various assignments. There is simply no point otherwise.

Course Materials

By and large, the course will be based on academic papers (which are available online) and lecture notes (which I will make available). However, there are two books that you may find useful. The first is "Notes on the Theory of Choice" by David Kreps, which is a deceptively simple book that provides a fantastic introduction to classical decision theory. The second is "Real Analysis with Economic Applications" by Efe Ok. This is primarily a maths text book, but has some excellent decision theoretic applications.

Administrative Details

The class will meet on Tuesdays between 5.30 and 7.50 (possibly later if we are still going strong) in 301 Robinson Hall. Office hours will be 2.00-4.00 on Wednesdays, though I will be available outside these times if you contact me in advance.

My contact details are as follow:
Office: 303c
Telephone: 401 863 2907
Email: mark_dean@brown.edu
Website: www.econ.brown.edu/fac/Mark_Dean/ (lecture notes will be posted here)

Topics

The course will be split into three sections. The first (3rd Feb to 3rd March) will cover the main tools of decision theory. The second (10th March -31st March) will cover bounded rationality and rational inattention. The third (7th April-May 5th) will cover other key areas of behavioral economics.

3rd Feb: Introduction, Mathematical Preliminaries (Order Theory):

- *Readings:*
  - 'Elements of Order Theory' Efe Ok, Chapter A
  - 'Real Analysis with Economic Applications', Efe Ok, Chapter B
- *Assignments*
  - Problem set

10th Feb: Choice, Utility Maximization and Revealed Preference: Non-Parametric tests for utility maximizing behavior, and measures of how far people are from satisfying these restrictions

- *Readings*
  - "Notes on the Theory of Choice", David Kreps, Chapter 1-3
  - "Revealed Preference" Varian, H. In Samuelsonian Economics and the Twenty-First Century, 2006
  - "The Money Pump as a Measure of Revealed Preference" Fede Echenique, SangMok Lee and Matt Shum, Journal of Political Economy 2011
  - "Who Is (More) Rational?," American Economic Review, American Economic Association, vol. 104(6), pages 1518-50, June. Syngjoo Choi, Shachar Kariv, Wieland Mueller, Dan Silverman, 2011

- *Assignments*
    - Problem set

24th Feb: Mathematical Preliminaries (Measure Theory), Expected Utility for Risk, Expected Utility under Uncertainty: Covering the basics of measure theory (which is useful of modelling uncertain events) and the axiomatic structure underlying the expected utility model for risk and uncertainty

- *Readings*
    - Probability Theory with Economic Applications', Efe Ok Chapter B
    - 'Real Analysis with Economic Applications', Efe Ok, Chapter F
    - Notes on the Theory of Choice", David Kreps, Chapter 4-9
- *Assignments*
    - Problem set

3rd March: Choice over Menus and Stochastic Choice: Extending the revealed preference method to the case of menu preferences, stochastic choice and the link between the two *Readings*

- "A Representation Theorem for Preference for Flexibility," David Kreps, Econometrica, Econometric Society, vol. 47(3), pages 565-77, May 1979
- "Representing Preferences with a Unique Subjective State Space," Eddie Dekel, Bart Lipman and Aldo Rustichini, Econometrica , July 2001.
- "Revealed Stochastic Preference", McFadden, D. and M. Richter, mimeo, Department of Economics, MIT, 1970.
- "The Choice Axiom after Twenty Years," Luce, R. D., Journal of Mathematical Psychology, 15: 215-233 1977
- "Random Expected Utility" Faruk Gul and Wolfgang Pesendorfer. Econometrica, 74(1):121–146, 2006.
- "Preference for Flexibility and Random Choice" David Ahn and Todd Sarver, Econometrica, January 2013
- "Preference for Flexibility and Random Choice: An Experimental Analysis " Mark Dean and John McNeill, Memo, 2014

10th March: Bounded Rationality with Limited Attention: We begin our study of bounded rationality by considering what we can say about behavior if we do not know what information a decision maker has processed

- *Readings*
    - "Revealed Attention" Y. Masatlioglu, D. Nakajima and E. Ozbay, American Economic Review, 2012
    - "Search, Choice and Revealed Preference" Andrew Caplin and Mark Dean, Theoretical Economics, January 2011, 6: 19-48

- “Search and Satisficing” Andrew Caplin, Mark Dean and Daniel Martin, American Economic Review, 2011
- “A Testable Theory of Imperfect Perception” Andrew Caplin and Daniel Martin, Economic Journal, 2014

- *Assignments (presentations)*
  - "Stochastic Choice and Consideration Sets," Paola, Manzini & Marco, Mariotti, SIRE Discussion Papers 2013-28, 2013
  - "Consideration Sets and Competitive Marketing,", Kfir Eliaz & Ran Spiegler Review of Economic Studies, 2011

17st March: Rational Inattention: Models in which decision makers choose optimally what information to gather in the face of costs

- *Readings*
  - “Revealed Preference, Rational Inattention, and Costly Information Acquisition” Andrew Caplin and Mark Dean, Mimeo, 2014
  - “Foundations for optimal attention.” Andrew Ellis. Mimeo, Boston University,2012.
  - Rationally Inattentive Preferences (December 20, 2014). de Oliveira, Henrique and Denti, Tommaso and Mihm, Maximilian and Ozbek, Kemal Available at SSRN

- *Assignments (presentations)*
  - Salience and Consumer Choice", Pedro Bordalo, Nicola Gennaioli and Andrei Shleifer, Mimeo, 2012
  - “Testing models of consumer search using data on web browsing and purchasing behavior.” Babur De Los Santos, Ali Hortacsu, and Matthijs R. Wildenbeest. American Economic Review, 2012

31st March: Entropy: Using entropy as a measure of information costs

- *Readings*
  - "Rational Inattention to Discrete Choices: A New Foundation for the Multinomial Logit Model." Matêjka, Filip, and Alisdair McKay. 2015. American Economic Review, 105(1): 272-98.
  - “Revealed Preference, Rational Inattention, and Costly Information Acquisition” Andrew Caplin and Mark Dean, Mimeo, 2014
  - “Foundations for optimal attention.” Andrew Ellis. Mimeo, Boston University,2012.

- *Assignments (presentations)*
  - An Optimizing Neuroeconomic Model of Discrete Choice. Woodford, Michael. No. w19897. National Bureau of Economic Research, 2014.
  - Rationally inattentive seller: Sales and discrete pricing”, Filip Matejka, CERGE-EI Working Papers wp408, The Center for Economic Research and Graduate Education - Economic Institute, Prague, March 2010.

7th April: Temptation and Self Control: Approaches to modeling decision makers who suffer from temptation and self control problems

- *Readings*
  - "Temptation and Self-Control" Faruk Gul and Wolfgang Pesendorfer, Econometrica, 2001
  - "A Dual-Self Model of Impulse Control," David K. Levine & Drew Fudenberg American Economic Review, American Economic Association, vol. 96(5), pages 1449-1476, December 2006
- *Assignments (presentations)*
  - "Self-Control at Work", Supreet Kaur, Michael Kremer and Sendhil Mullainathan, Mimeo, 2013,
  - "Commitment vs Flexibility" Manuel Amador & Iván Werning & George-Marios Angeletos, 2006. Econometrica, Econometric Society, vol. 74(2), pages 365-396, 03.

14th April: Violations of Expected Utility: Introducing common violations of expected utility in cases of risk and uncertainty

- *Readings*
  - "A Theory of Disappointment Aversion," Gul, Faruk, Econometrica, Econometric Society, vol. 59(3), pages 667-86, May. 1991
  - "A Genuine Rank-Dependent Generalization of the Von Neumann-Morgenstern Expected Utility Theorem,", Abdellaoui, M. , 2002,Econometrica, 70, 717{736.
  - "Ambiguity Aversion, Robustness, and the Variational Representation of Preferences," Maccheroni & Massimo Marinacci & Aldo Rustichini, 2006. Econometrica, Econometric Society, vol. 74(6), pages 1447-1498, November
  - "Maxmin expected utility with non-unique prior," Gilboa, I. and D. Schmeidler (1989): Journal of Mathematical Economics, 18, 141{153.

- *Assignments (presentations)*
  - **"**Developments in Non-expected Utility Theory: The Hunt for a Descriptive Theory of Choice under Risk," Chris Starmer, Journal of Economic Literature, 2000
  - Y Halevy. Ellsberg Revisited: An Experimental Study. Econometrica, 75(2):503–536, 2007.

21st April: Time Preferences: Modeling the choices of decision makers faced with choices that have a temporal element

- *Readings*

- "Axiomatization and Measurement of Quasi-hyperbolic Discounting," J.L. Montiel Olea & Tomasz Strzalecki, Working Paper 8367, Harvard University OpenScholar.
- "Golden Eggs and Hyperbolic Discounting", Laibson, David. Quarterly Journal of Economics 1997
- "Never mind the Hyperbolics" Ian Crawford, Mimeo, 2013
- "Credit Constraints and the Measurement of Time Preference"

- *Assignments (presentations)*
  - "Estimating Time Preferences from Convex Budgets," James Andreoni & Charles Sprenger, 2012. American Economic Review, American Economic Association, vol. 102(7), pages 3333-56, December.
  - "Strotz meets allais: Diminishing impatience and the certainty effect." Yoram Halevy. American Economic Review, 98(3):1145–62, 2008.

28th April: Reference Dependence: How do reference points affect choice behavior?

- *Readings*
  - "A Model of Reference-Dependent Preferences," Botond Koszegi and Matthew Rabin, 2006; The Quarterly Journal of Economics, MIT Press, vol. 121(4), pages 1133-1165, November)
  - "Advances in prospect theory: cumulative representation of uncertainty," Tversky, A. and D. Kahneman (1992): Journal of Risk and Uncertainty, 5, 297{323.
  - "Loss aversion in riskless choice: A reference-dependent model." Amos Tversky and Daniel Kahneman. The Quarterly Journal of Economics, 106(4):1039–61, November 1991.
- *Assignments (presentations)*
  - "Rational choice with status quo bias," Masatlioglu, Yusufcan & Ok, Efe A, Journal of Economic Theory, Elsevier, vol. 121(1), pages 1-29, March.
  - "Stochastic Reference Points, Loss Aversion and Choice under Risk", Masatlioglu, Yusufcan and Raymond, Colin, Mimeo

5th May: Neuroeconomics and Non-Choice Data: A quick look into the use of non-choice data and neuroeconomics to test economic models

- *Readings*
  - ""What Can Neuroeconomics Tell us About Economic Decision Making?" Mark Dean, Chapter in Comparative Decision Making, Philip Crowley and Thomas Zentall, eds, 2013

- "Neuroeconomics: How Neuroscience Can Inform Economics," Camerer, C., Loewenstein, G., and D. Prelec., Journal of Economic Literature, American Economic Association, vol. 43(1), pages 9-64, March.
- "Dopamine, Reward Prediction Error, and Economics,"" Caplin, A. and Mark Dean, Quarterly Journal of Economics, 123:2 (2008), 663-702.
- "Measuring Beliefs and Rewards: A Neuroeconomic Approach," Caplin. A, & Mark Dean & Paul W. Glimcher & Robb B. Rutledge, 2010., The Quarterly Journal of Economics, MIT Press, vol. 125(3), pages 923-960, August.
- "Decision field theory: a dynamic cognition approach to decision making." Busemeyer, J.R., Townsend, J.T., 1993. Psychological Review 100, 432–459.
- "Detecting Failures of Backward Induction: Monitoring Information Search in Sequential Bargaining." Johnson, Eric J.; Camerer, Colin; Sen, Sankar and Rymon, Talia. Journal of Economic Theory, 2002, 104(1), pp. 16-47

- *Assignments (presentations)*
  - Prepare presentation of research ideas

12th May: Presentation of Research Ideas