Behavioral Economics

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Aim of the Course

- An introduction to the main topics in behavioral economics
  - Theories of economic behavior that fall outside the 'standard model' of a decision maker who is
    - Perfectly rational
    - Self interested
    - Internally consistent
    - Cognitively unconstrained
    - Utility maximizing
- And to the related fields of:
  - Decision Theory
  - Experimental Economics
  - Economics and Psychology
  - Neuroeconomics

Why Are We Here?

1. Behavioral Economics is *Important*
   - 'Standard model' captures a lot, but misses out some important pieces
   - Understanding these pieces has high rates of return
2. Behavioral economics is a *growth industry*
   - 30 years ago, mainly done by weirdos and psychologists
   - Now it is *everywhere*
     - Every major department does some behavioral economics
     - Most have experimental labs
     - Most cited economics paper ever is behavioral
   - Impacting other areas
     - Macroeconomics
     - Finance
     - Development Economics
     - Policy
3. Behavioral Economics is *Fun!*
   - Lots of interesting and important questions
   - Lots of cool effects
   - Lots of fun toys

Why are *you* Here?

- Three categories
  1. You need one more mathematical econ course to complete your concentration, and this looked more interesting than General Equilibrium Theory
  2. You read 'Predictably Irrational' over the winter break, and you thought it was simply *fascinating*
  3. You have become worried that the standard economic model of the way people behave is obviously wrong and you would like something better

Some Things to Bear In Mind

1. The standard model is better than you think
   - People *do* respond to incentives and constraints
   - Many times, these are the most important determinants of behavior
   - Often, predictions of the standard model are at least qualitatively correct
2. It's not enough to prove the standard model wrong
   - It's trying to sum up the richness of all human experience in two or three equations
   - OF COURSE it's wrong
   - Is it importantly wrong?
3. You can't beat something with nothing
   - Can we come up with better models?
   - Models need to be usable as well as accurate
4. Behavioral Economics is not Psychology

Positive vs Normative Economics

- Economists play two different roles:
  - Economists as Scientists
    - "If we increase the fiscal deficit, unemployment will fall"
  - Economists as Therapists
    - "We should increase the fiscal deficit to lower unemployment"
- Behavioral economics has important implications for both economic scientists….
  - Different observable implications
- …..and therapists
  - Choice not equal to utility
- Do not confuse the two
  - This course will largely about the former

An Example

A Problem

- Decision Maker (Doris) lives for two periods
- In each period she will receive some income.
- In the first period does not know what income in second period will be
- In each period will spend money on two goods
  - Bourbon (b) or Yoga classes (y)
- Can borrow and save between periods at interest rate r, but cannot die in debt

A Solution: Period 2

- Decision maker has a utility function
$$u(b_2, y_2)$$
- Say they arrive in period 2 with savings s, and receive income I_2
- They will choose their consumption to solve

$$\max_{b_2, y_2} u(b_2, y_2)$$
$$\text{subject to}$$
$$b_2 p_b + y_2 p_y \leq s + I_2$$

  - Tells us the b_2^*, y_2^* Doris will buy as a function of $s + I_2$
  - Also the utility of having $s + I_2$ in period 2

$$v(s + I_2) = u(b_2^*, y_2^*)$$

A Solution: Period 1

- Income in period 2 can be I_2^H with probability p and I_2^L with probability (1-p)
- Decision maker will maximize utility in period one plus the expected utility of period 2, given their savings

$$\max_{b_1, y_1} u(b_1, y_1) + pv(I_2^H + s) + (1-p)v(I_2^L + s)$$
$$\text{subject to}$$
$$b_1 p_b + y_1 p_y + s = I_1$$

- Solution tells us what they will consume in period one, and how much they will save

What Assumptions is this Model Making (that you don't like)?

- Period 1

$$\max_{b_1, y_1} u(b_1, y_1) + pv(I_2^H + s) + (1-p)v(I_2^L + s)$$
$$\text{subject to}$$
$$b_1 p_b + y_1 p_y + s = I_1$$

- Period 2

$$\max_{b_2, y_2} u(b_2, y_2)$$
$$\text{subject to}$$
$$b_2 p_b + y_2 p_y \leq s + I_2$$

The Assumptions

The Assumptions

1. Doris makes optimal choices – i.e. maximizes her utility
2. Doris's tastes do not change between period 1 and 2
3. Doris forms the correct expectations about income in period 2, and makes choices based on expected utility
4. The only thing that appears in Doris's utility function is the amount of bourbon and yoga consumed
   - No 'reference points'
   - Not other people's consumption

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Utility Maximization

- Choose the optimal Bourbon

Utility Maximization

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Utility Maximization

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Utility Maximization

Which of the following would you choose?

4	2
3	13
20	11
15	8
8	10

Utility Maximization

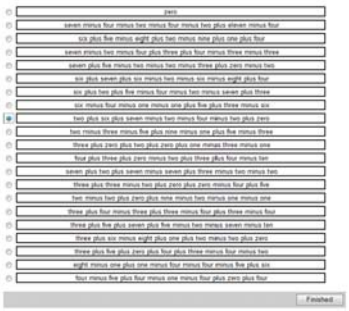
Which of the following would you choose?

4+6+10-11-23+9	2+3+6-11-14+9+10
3+9-17-99+102-6+15	6+18-19-55+70
20-27+7-19+2+3-5	11+2-5+7-8-9+10
15-5-5+6+16+17-20-9	8+9+10-11+8+2+6-32
8+8+9-13-9-6+7	10-9+17-23+10+2+15

Caplin, Dean and Martin [2011]

- 22 Subjects, 657 choices
- 6 treatments
  - 2 complexity levels: 3 or 7 operations
  - 3 choice set sizes: 10, 20, 40 options

Caplin, Dean and Martin [2011]



Caplin, Dean and Martin [2011]

Failure rate

	Complexity	
Set size	3	7
10	7%	24%
20	22%	56%
40	29%	65%

Average Loss ($)

	Complexity	
Set size	3	7
10	0.41	1.69
20	1.10	4.00
40	2.30	7.12

Bounded Rationality

- Maximizing utility, takes cognitive effort
  - e.g. at need to at least identify all the objects in their choice set
- Sometimes it may be necessary or sensible to take 'short cuts'
  - Identifying all the bourbons in the bar is time consuming and not worth it
- How can we model choice when people have cognitive costs or other constraints?
- This is the study of bounded rationality
- Models of bounded rationality used to understand
  - Price setting by firms
  - Consumption choices by buyers
  - Marketing and Advertising

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Preferences don't change

- We assumed that the utility function that Doris used was the same in the first and second period

$$u(b_1, y_1)$$
$$u(b_2, y_2)$$

- Just allowing the utility function to change is not very interesting
  - For example it could be that Doris likes Bourbon less and Yoga more as she gets older

Preferences don't change

- Much more interesting is the possibility that Doris in period 1 doesn't like the choices that she thinks that she will make in period 2
  - For example, Doris is worried that she is turning into an alcoholic
  - If she leaves herself lots of money in period 2, then she will spend it on booze
- Period 1 Doris's preference over what happens in period 2 may be different from period 2 Doris's preference
- These are problems of temptation and self control

Read and van Leeuwen [1998]

- Choice 1: What would you like to eat in 1 week's time
  - Fruit (74%)
  - Chocolate (26%)
- Choice 2: What would like to eat today?
  - Fruit (30%)
  - Chocolate (70%)

Temptation and Self Control

- These issues are addressed with models of Temptation and Self Control
- These have been used to address many issues
  - Addiction
  - Low savings rates
  - Credit card borrowing
  - Obesity

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Expectations

- Doris makes decisions about uncertain events in the following way
  - For each action, figure out the utility that action will give in each state of the world
    - e.g. for each s figure out $v(I_2^H + s)$ and $v(I_2^L + s)$
  - Correctly figure out the probability of each state of the world
    - e.g. figure out p
  - Calculate the expected utility of each action using these probabilities
    - e.g. $pv(I_2^H + s) + (1-p)v(I_2^H + s)$
- Two possible problems with this

1: People are not Expected Utility Maximizers

A | 100% $3000 | vs | 80% $4000 | $0 | B

1: People are not Expected Utility Maximizers

C | 25% $3000 | 75 % $0 | vs | 25% $4000 | 80% $0 | D

1: People are not Expected Utility Maximizers

A | 100% $3000 | vs | 80% $4000 | $0 | B

C | 25% $3000 | 75 % $0 | vs | 20% $4000 | 80% $0 | D

- Most People Choose A over B and D over C
- (As we shall see) this is impossible with expected utility

2: People are utility maximizers, but have wrong expectations

- Statistical Errors
  - e.g. Gambler's fallacy: Imagine you are at a roulette table and black comes up 10 times in a row, what do you bet on?
  - Evidence of Gambler's fallacy in lottery play and horse racing
- Over/Underconfidence
  - 93% of US drivers rate themselves as better than average
  - 68% of U. Nebraska professors rated themselves in the top 25%

Choice under Risk and Uncertainty

- These issues fall under the study of choice under risk and uncertainty
- Try to find a descriptive model of choice that takes into account violations of expected utility.
- …and mistaken beliefs
- Has important implications for
  - Finance
  - Insurance
  - Entrepreneurship

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Utility Depends only on Levels of Goods

- In each period, Doris has a utility function that depends only on the level of bourbon and yoga consumed
- Evidence suggests that this might not be the case:
  - We care about consumption relative to some reference point (reference dependent preferences)

Example: The Rare Disease Problem

- The US is expecting an outbreak of a rare disease that is expected to kill 600 people.
- Two alternative programs are considered
  - Program A: 200 people will be saved
  - Program B: 1/3 chance that 600 people will be saved, 2/3 chance that no-one will be saved
- Or: Two alternative programs are considered
  - Program C: 400 people will die
  - Program D: 1/3 chance that nobody will die, 2/3 chance that 600 people will die

Example: The Rare Disease Problem

- The US is expecting an outbreak of a rare disease that is expected to kill 600 people.
- Two alternative programs are considered
  - Program A: 200 people will be saved (72%)
  - Program B: 1/3 chance that 600 people will be saved, 2/3 chance that no-one will be saved (28%)
- Or: Two alternative programs are considered
  - Program C: 400 people will die (22%)
  - Program D: 1/3 chance that nobody will die, 2/3 chance that 600 people will die (78%)

Reference Dependent Preferences

- People's choices depend on their reference point
  - E.g. place higher weight on losses rather that gains
- This is the study of reference dependent preferences
- Try to find a descriptive model of choice that takes this into account
- Has important implications for
  - Finance
  - Labor Economics
  - Public Economics

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Self Interest

- We assumed that Doris's utility depended only on her own consumption of bourbon and yoga
- It is actually pretty easy to adapt the standard model to allow for altruism
  - Just add consumption by Doris's husband as an argument in her utility function
- But what about fairness, spite or envy?

The Ultimatum Game

- Consider the following experiment
  - Player 1 proposes a division of $10 between themselves and player 2
  - Player 2 can either accept the split, or reject, in which case both get nothing
- Standard Model
  - Player 2 accepts all offers
  - Player 1 offers approx $0
- What do you think will happen?
  - Player 1 offers between 25%-50% of pie
  - Player 2 usually rejects offers that are 'too low' (below 20%)
- Cannot be explained by self interest or altruism

Other Regarding Preferences

- We want a model that takes into account:
  - Fairness
  - Spite
  - Envy
- This is the study of other regarding preferences
- Adapt game theoretic models to take these factors into account
- Has important implications for
  - Bargaining
  - Public Goods
  - Economic Growth

The Plan

Topics

- Utility Maximization
- Bounded Rationality/ Rational Inattention
- Temptation and Self Control
- Choice under Risk/ Choice under Uncertainty
- Reference Dependent Preferences
- Other Regarding Preferences

For Each Topic We Will

1. Study the evidence that the Standard Model is missing something important
2. Study the models that have been developed to address these problems
3. Apply these models to economic problems

What Will This Involve?

- Understanding experimental methods and results
  - How can experimental economics help us to improve our models of economic decision making?
  - Make use of academic papers and classroom exercises
- Mathematical modeling
  - We want to update the standard model to include behavioral/psychological phenomena
    - E.g. temptation, over confidence, envy etc
  - We need to know what the predictions of these models are
    - So me can test them
    - So we can apply them to economic problems
  - This is the 'tough' bit of the class
  - Mainly involves understanding how to do proofs
  - Will be covered in homeworks, lectures, TA sections, classroom flipping
- Critical thinking
  - Behavioral economics is still a relatively young discipline
  - Are we modelling behavioral/psychological phenomena in the right way?
  - Where will these models be useful?
  - What are we missing?

Admin
(See syllabus for details)

- Prerequisites
- Assessment
- Course Materiel
- Class, Section, Office Hour and Homework Schedule
- Course website: http://www.econ.brown.edu/fac/Mark_Dean/Behave_15.shtml