

# Introduction to Behavioral Economics

ADEC781001: Empirical Behavioral Economics

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## WHAT IS BEHAVIORAL ECONOMICS?

## THE PERFECT ANNIVERSARY GIFT?

Opinion | OP-ED CONTRIBUTOR

### The Best Present Money Can Buy

By VIVIANA A. ZELIZER JAN. 6, 2011



Topos Graphics

## THE PERFECT POLICY?

Since some parents have been coming in late we (with the approval of the Authority for Private Day Care Centers in Israel) have decided to impose a fine on parents who come late to pick up their children. As of next Sunday a fine of NIS 10 will be charged every time a child is collected after 16.10 (p. 189).

"A Fine is a Price"

## THE PERFECT TEAM?



## NEOCLASSICAL ECONOMICS ASSUMPTIONS ABOUT HUMAN BEHAVIOR

People:

1. are rational
2. are purely self-regarding
3. are consistent over time and uncertainty
4. respond as we expect to incentives

## BRIEF HISTORY OF ECONOMICS: A FORK IN THE ROAD

- ▶ “How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it, except the pleasure of seeing it.” (Adam Smith, Theory of Moral Sentiments, 1760)
- ▶ “The first principle of economics is that every agent is actuated only by self-interest.” (Edgeworth, Mathematical Psychics, 1881)
- ▶ For the next century or so it was Edgeworth's influence that won out

## WHAT WE HAVE LEARNED ABOUT THOSE ASSUMPTIONS

People:

1. are not always rational!
2. care about others, too!
3. are not consistent over time and uncertainty!
4. do not respond as we expect to incentives!

## LIMITATIONS OF MARKETS

- ▶ Old argument: people may be weird decision makers in a vacuum, but markets set them straight, because markets provide optimal incentives
- ▶ New argument: not really, because people don't always respond to incentives as we expect

*"Hand waving is required because there is nothing in the workings of markets that turns otherwise normal human beings into Econs. For example, if you choose the wrong career, select the wrong mortgage or fail to save for retirement, markets do not correct those failings. In fact, quite the opposite often happens. It is much easier to make money by catering to consumers' biases than by trying to correct them." ("Unless You Are Spock, Irrelevant Things Matter in Economic Behavior" by Richard Thaler for the NY Times)*

## EXAMPLE: CLIMATE CHANGE

- ▶ Beliefs are not always swayed by data
- ▶ What explains this? Bounded rationality.
  - ◊ Thinking "fast" is cheaper than thinking "slow"
    - e.g. heuristics (rules of thumb), easier to reason about stuff familiar vs novel, etc
    - cost-minimization via "attribute substitution" (use easy-to-access but biased information) "recency weighting" (overreact to recent events; magnitude decays over time), anchoring when processing new information
    - confirmation bias, backfire effect, and many other biases
  - ◊ Reinforcement learning: requires feedback
    - Difficult to come by in climate change (damages asymmetrically distributed, large time frames)
  - ◊ Even though climate is not weather, weather systematically influences beliefs
    - i.e. beliefs are biased by local, short-term events
  - ◊ Preferences for personal experiences, even if they are not representative
- ▶ Why? Social learning: ability to reason likely emerged to deal with human threats
  - ◊ e.g. know who to trust; cooperation essential to group life but unstable

## UTILITY FUNCTIONS

- ▶ For a long time the field coordinated around simple utility functions that described a rational, selfish individual with unlimited cognition
- ▶ Nobody believed people were like this – it was just a convenient assumption when model building
- ▶ Utility functions capture an important detail: people generally behave in a way that suggests they are *optimizing*
- ▶ We can think of BE as modifying the standard utility function to capture human quirks and biases
- ▶ Viewed in this light, BE is not replacing economics, it is simply a natural extension based on new evidence
  - ◊ that is, neoclassical and BE are *compliments* not substitutes
  - ◊ "Behavioral economics should complement, not substitute for, more substantive economic interventions. If traditional economics suggests that we should have a larger price difference between sugar-free and sugared drinks, behavioral economics could suggest whether consumers would respond better to a subsidy on unsweetened drinks or a tax on sugary drinks." George Loewenstein & Peter Ubel (2014)

## SOLUTIONS?

- ▶ Default environmental policy
  - ◊ enroll by default into clean energy programs with opt-out option
  - ◊ exploit observation that people tend to stick with defaults (e.g. 401(k) opt-in versus opt-out)
- ▶ Reduce discount rates by promoting forward-thinking
  - ◊ anchor decision makers in the future
- ▶ Re-frame existing information
  - ◊ "climate change" is a contentious term - but people, all else equal, prefer clean air to dirty air
  - ◊ Framing: how information is presented matters
    - people prefer "carbon offset" to "carbon tax"
    - information that is "true" (statistically) but inconsistent with audience values more likely to be rejected

## MORE SOLUTIONS?

- ▶ Exploit social context
  - ◇ people care about what others think: only about 1% of charitable donations are anonymous
  - ◇ “Ariely et al. (2009) note that buying a hybrid car or installing solar panels provide more social prestige than indoor energy-efficient investments like water heaters, and thus the former behavior is expected to be more prevalent” (Croson & Treich 2014)
  - ◇ if you signal to hotel guests that re-using towels is a local norm, they are more likely to comply (compared to informing them that re-use is good for environment)
  - ◇ use utility bills to show consumers how their electricity consumption compares to their peers
  - ◇ corporate environmental responsibility: firms “go green” because their consumers have environmental preferences that are often socially motivated (people would rather be seen as “green” than “greedy”)

## BEYOND NUDGES

- ▶ However, not all problems can be solved with tiny interventions
- ▶ Climate change: need popular support to pass meaningful legislation
  - ◇ US: convince over a hundred million people they are wrong about how we affect the environment
  - ◇ even if you do, climate change is a *public goods problem* meaning people can *freeride*
- ▶ Requires a combination of traditional policy levers like incentives (taxes/subsidies) alongside BE policies
- ▶ Example: The plastic bag tax in Ireland
- ▶ Broader idea: economies don't just literally produce more people, they also produce *types of people*
- ▶ Policies can go a long way towards determining what types of people you get: “good governance” goes hand-in-hand with “good habits”
- ▶ That is why monetary incentives must often be combined with public consultation and buy-in and appropriate messaging

## NUDGES

- ▶ Coined by Richard Thaler and Cass Sunstein
  - ◇ “any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives” (Thaler and Sunstein 2008, p. 6)
- ▶ Main idea: a tiny intervention can produce big changes in behavior
  - ◇ people tend to stick with defaults so put all employees into 401(k) by default and then give them choice to opt-out
  - ◇ cheaper and more effective than a public information campaign or tax breaks (extreme example: 99% of savings increases in Denmark study due to nudges, only 1% due to tax break)
  - ◇ rearranging choice sets (e.g. placing fruit sooner in the lunch line at schools)
  - ◇ social comparisons (e.g. utility bills)
  - ◇ framing (e.g. “carbon offset” to “carbon tax”, the “food plate” instead of the “food pyramid”)
  - ◇ the “last mile problem” in medicine: getting patients to follow through on treatments (e.g. medication, exercise, post-op recovery)

## EXPERIMENTAL PROCEDURES: ECON VS PSYCH

## OVERVIEW

- ▶ BE can be thought of as a marriage of economics and psychology
- ▶ many similarities between these fields and many others like epidemiology (e.g. randomization and estimation of ATEs)
  - ◊ worth pointing out: psychologists have been running experiments longer than economists
- ▶ but there are important differences in methods discussed in Croson (2015)<sup>1</sup>

1. Incentives
2. Context
3. Subject pools
4. Deception

<sup>1</sup>Croson, Rachel. "The method of experimental economics." International Negotiation 10, no. 1 (2005): 131-148.

## CONTEXT

- ▶ Since econ experiments are designed to test abstract theories they are usually context-free
- ▶ Often this is achieved by *framing* decisions neutrally
  - ◊ Example: instead of "contribute to a public good" you are asked to "allocate tokens to a shared account"
  - ◊ Allows experimenter to explore the effects of different frames
- ▶ Three reasons for this:
  1. allows results to extend to any general setting with the same features and payoffs as experiment
  2. reduces added noise to data since subjects bring unobserved context with them
  3. reduces systematic bias and/or demand effects

## INCENTIVES

- ▶ Both econ and psych compensate subjects, but in different ways
- ▶ Psych: flat participation fees (e.g. cash, course credit)
- ▶ Econ: flat fee + marginal payments based on decisions in the experiment consistent with the theory being tested
  - ◊ Economic theories are about tradeoffs, taking one action or another (or many others)
  - ◊ To see how subjects navigate tradeoffs you need to attach salient costs and benefits to those actions
- ▶ Payments are usually adjusted so subjects are compensated accordingly based on local laws (e.g. the minimum wage rate)

## SUBJECT POOLS

- ▶ Econ experiments tend to want to make conclusions about people in general, not specific sub-populations
- ▶ That is why undergraduates at universities are a common source of subjects
- ▶ By contrast, psychologists may be primarily concerned with sub-populations (e.g. people with a specific psychological condition)
- ▶ That does mean economists don't care about demographics
  - ◊ Gender differences receive a lot of attention
  - ◊ Cultural differences regularly investigated
  - ◊ Depends on the study
    - e.g. a study aimed at designing a policy for better conservation practices among fishermen in the developing world is often better done using fishermen instead of undergraduates

## DECEPTION

- ▶ Rule number of one economic experiments: don't deceive subjects (this is a strong norm in the field)
  - ◊ Subjects earn money from their decisions
  - ◊ If you want good data then you want subjects to form a clear link about how their decisions pay off
  - ◊ Deception – particularly by *commission*, or outright lying to subjects – muddles this link and therefore muddles the data
- ▶ Generally speaking the field believes you need a *very* good reason to deceive subjects by commission
  - ◊ Experiments can achieve many of the same outcomes from deception through *omission* (e.g. not telling subjects they were playing a game aimed at understanding contributions to public goods)

## TREATMENT EFFECTS

- ▶ Experiments are about treatments and what they do to behavior
- ▶ Let  $Y$  be some outcome of interest (e.g. effort at work, income, etc.) and  $i$  index an individual
- ▶ We want to know how  $Y_i$  changes due to some treatment  $T$
- ▶ Let  $Y_{i1}$  be the outcome to  $i$  under the treated ( $T = 1$ ) and  $Y_{i0}$  the outcome under the control ( $T = 0$ )
- ▶ The treatment effect for  $i$  is then  $Y_{i1} - Y_{i0}$
- ▶ Of course this may not be consistent across individuals, so instead we calculate the **average treatment effect** (ATE)
  - ◊  $\mathbb{E}[Y_i | T = 1] - \mathbb{E}[Y_i | T = 0]$
  - ◊ also written as  $\mathbb{E}[Y_1 - Y_0]$

## ANALYZING EXPERIMENTAL DATA

## RANDOMIZATION

- ▶ But there is a bigger problem: no individual can receive both the treatment and the control *at the same time*
- ▶ That means we only observe  $\mathbb{E}[Y_i | T = 1]$  **or**  $\mathbb{E}[Y_i | T = 0]$ 
  - ◊ So we can't observe treatment effects at the individual level (i.e. we don't observe the **counterfactual**)
  - ◊ This is often referred to as the "Fundamental Problem of Causal Inference"
- ▶ One solution is to get a bunch of people who are similar in many characteristics and assign them to treatment or control
- ▶ Problem: if propensity to receive treatment is correlated with observed or unobserved subject characteristics, then the ATE will be biased
- ▶ Solution: **randomize** so that a coin flip determines whether  $i$  is assigned to treatment or control
  - ◊ This ensure  $\mathbb{E}(Y_1) \perp \mathbb{E}(Y_0)$  (statistical independence)
  - ◊ Therefore  $\mathbb{E}[Y_1 - Y_0] = \mathbb{E}[Y | T = 1] - \mathbb{E}[Y | T = 0]$
- ▶ You will of course never get completely identical control and treatment groups, but with large enough samples you can appeal to the **asymptotic** properties around your distributions and quantify your uncertainty of the ATE

## CALCULATING ATE WITH REGRESSION

- ▶ What this means is that so long as randomization is properly done we can estimate the ATE by the difference-in-means estimator
- ▶ We can get this estimate using OLS:
  - ◊  $Y_i = \beta_0 + \beta_1 T_i + \varepsilon_i$  where  $\hat{\beta}_1$  is the ATE
- ▶ Regression also makes controlling for other observed variables a breeze:
  - ◊  $Y_i = \beta_0 + \beta_1 T_i + \psi' \mathbf{X} + \varepsilon_i$
- ▶ And look at **heterogenous treatment effects** where the treatment effect varies on some condition (e.g. gender)
  - ◊  $Y_i = \beta_0 + \beta_1 T_i + \beta_2 X_i + \beta_3 (T_i \times X_i) + \varepsilon_i$
- ▶ And much more!