

Behavioral Economics

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CAS Seminar Topics

- ▶ Predictive modeling
 - ▶ Demand modeling and price optimization
- ▶ New product development
 - ▶ Usage based insurance and consumer behavior
- ▶ Social network analysis

Agenda

- ▶ Research themes in behavioral economics
- ▶ Research applications to insurance markets
- ▶ Practical applications to insurance markets

...not necessarily in this exact order

Are Consumers “Rational”?

- Rational economic model of consumer decisions under uncertainty over time:
 - Make consumption choices (\mathbf{x}_t) to maximize the discounted sum of Expected Value of Utility $EU(\mathbf{x}_t)$ subject to a set of resource constraints (\mathbf{y}_t)
 - $\text{Max } EU(\mathbf{x}_t) = \sum r_t p_t U(\mathbf{x}_t)$
 - Consumers have consistent preferences [$U(\cdot)$]
 - Consumers have rational beliefs about p_{it}
 - Consumers expectations are stable or Bayesian-updated
 - Consumers discount at a constant rate over time
 - Consumers are risk-averse

Behavioral Economics

- The use of social, cognitive and emotional factors in understanding the economic decisions of individuals and institutions
- Early work focused on identifying anomalies (departures from rational model)
 - There is ample and growing evidence that rational decision theory in economics does not capture many important aspects of consumer decision-making
- Field has progressed a great deal
 - Theoretical modeling (formalization)
 - Empirical testing

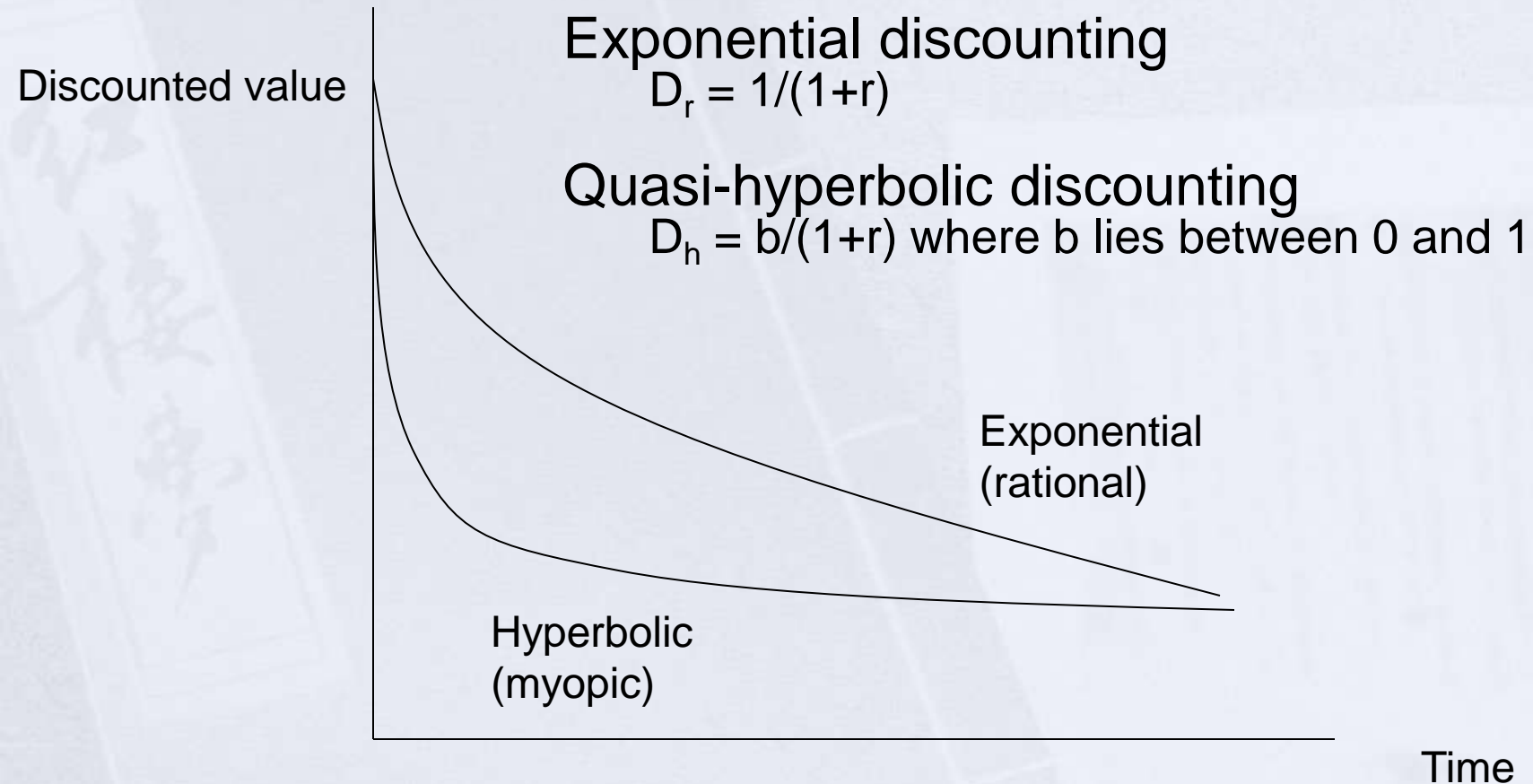
Areas of Research

- Non-standard discounting
 - Myopia and impatience
- Non-standard beliefs or expectations
 - Probabilities and forecasts
- Non-standard decision-making
 - Cognitive limitations
- Social and psychological mediators

Nonstandard Discounting

- A “self-control” problem can lead to short-term or impulsive decisions that you later regret
 - Self-control problems can be conceptualized as discounting more steeply in the immediate future
- Economically “rational” discounting assumes an exponential discount function
- Time-inconsistent discounting incorporates a hyperbolic or quasi-hyperbolic discount function
 - Value of consumption in the near future is discounted sharply relative to consumption today
 - Value of consumption in the distant future is not discounted sharply relative to consumption in the nearly-distant future

Discounting the future



Self Control Problems

- Self control problems arise when the immediate payoff from a decision is negative but the long term payoff is positive
 - Saving (impulsive credit card use)
 - Eating (health, obesity)
 - Exercising (health, obesity)
 - Financial planning (retirement security)
- Insurance purchase (risk security)

Example

- Suppose the immediate payoff from healthy diet is -5 today and the delayed payoff is +10 next period
- Consumer's discount rate $r=0.10$
- Consider a “rational” discounter:
 - The consumer's discount rate is $1/(1.1) = .9091$
 - Choose the healthy food if $-5 + (.9091)(10) > 0$
 - $= 4.09 \Rightarrow$ Eat healthy food!
- Consider a discounter with “impatience constant” = 0.5:
 - The consumer's discount rate is $.5/(1.1) = .4545$
 - Choose the healthy food if $-5 + (.4545)(10) > 0$
 - $= -0.45 \Rightarrow$ Eat what you want today!

Example, cont.

- Why is this a “self control” problem?
 - Rational economics assumes that consumers make decisions by $\text{Max EU}(x) = \sum r_t p_{it} U(x_{it})$
- If the “impatient” consumer could make a choice for himself in a *forward-looking manner* (e.g. at $t=0$) to maximize the sum of discounted utility across both periods he would choose the healthy food:
 - Deciding at $t=0$, choose healthy food if
$$(0.5/1.1)(-5) + (0.5/1.1)^2(10) > 0$$
$$0.4545(-5) + 0.4132(10) = -2.2725 + 4.132 = 1.857$$

Nonstandard Expectations

- Non-Bayesian Updating:
 - An earlier literature has shown that consumers tend to overweight priors or overweight new information – depending on emotional context
- Projection Bias:
 - Consumers expect future preferences or states of the world to be closer to their present ones than they will actually be

Projection Bias

- ▶ Projection bias can be modeled as a failure to fully update “tastes” in a model in which utility can be written as $u(c,s)$, where c is consumption and s is a “state” that parameterizes tastes
 - ▶ the person’s prediction of her own future preferences, $u\tilde{(c,s)}$ lies somewhere “in between” her true future tastes $u(c,s)$ and her current tastes $u(c,s')$
- ▶ Projection bias can lead to dynamic inconsistency

Projection Bias Examples

- **Example: Food choice experiment**
- Subjects are either given a snack or not given a snack while performing an experimental task
- All subjects are offered a choice of a filling snack or fruit, to be delivered in one week
 - Subjects who are hungry today are nearly twice as likely (78% to 42%) to choose the filling snack
- **Example: Catalog orders**
- Consumers are more likely to order cold weather wear during fall cold snaps than during warmer weather
 - Orders of cold weather wear made during cold snaps are more likely to be returned later

Nonstandard Decision Making

- ▶ Limited Attention
 - ▶ Some elements of a decision may not be as easy to observe and will receive less attention
- ▶ Menu Effects
 - ▶ Individuals who face a large set of choices face difficulties in choosing optimally
- ▶ These effects can be modeled as arising *from fixed resource limits* on attention or mental processing capacity: individuals must choose to allocate

Limited Attention Examples

- ▶ Inattention to shipping costs (online purchases)
 - ▶ Studies of consumer purchases online show that consumers make decisions based on quoted price of good, not full price including shipping (which is revealed later)
- ▶ Inattention to complex information (disclosures)
 - ▶ Studies of hospital and college rankings reveal that nominal rankings (#1, #2, etc) are important even if the detailed scores suggest little difference between the differently ranked institutions

Menu Effects

- Choice Avoidance
 - Enrollment in employee retirement savings programs most likely with only 2 fund choices and declines with the number of choices
- Status quo bias
 - Enrollment rates are much higher when default is that new employees are enrolled than when default is non-enrollment
 - Many employees keep their funds invested in the default option chosen by the employer

Other Menu effects

- ▶ Preference for the familiar
 - ▶ Brand loyalty
 - ▶ Familiar looking packaging
- ▶ Preference for the salient
 - ▶ Order of listing on a ballot affects vote percentages
 - ▶ When presented with ordered choices consumers often choose the “middle” one
- ▶ Stress, delay in choosing

Implications for Markets

- ▶ Consumers may make systematic and predictable “mistakes” in consumption choices
- ▶ Firms may profit from learning about common consumer “mistakes”
 - ▶ Taking advantage
 - ▶ Improving

Cautionary Tale

“Today, few of us seriously believe that we have the marketplace that American families deserve ... fine print can obscure important information, and complex terms can confuse even the most diligent consumers. The lender that wins a customer’s business in this market isn’t always the one that offers the product that best matches the consumer’s needs and preferences.”



Social and Psychological Mediators

- Personality characteristics have predictive effects on some behaviors
 - Impatience
 - Cognitive limits
- Social context has mediating effect on behaviors
 - Herding and first-movers
 - Social networks and social norms
 - Not necessarily efficiency enhancing

Consumer Ethics

- In consumer surveys, a consumer's attitude toward various forms of dishonesty are strongly related
 - Insurance claims fraud; underreport income on taxes; remove a quality towel from a hotel; lie on a resume'
- In experimental settings, even people who view themselves as honest often cheat
 - Cheating is usually by small amounts
 - Cheating is more likely if no detection method is apparent
 - Cheating is less likely if ethical reminders are given

Social Norms

- In experimental settings, people are more likely to choose a cooperative action if others have cooperated in earlier rounds
- In experimental settings, people are more likely to cheat if they observe someone else cheating
 - Only if the person is perceived as “in-group”
 - “Out-group” cheaters reduce cheating by others

Research on Insurance

- Insurance is a natural setting in which to test behavioral economics
- Earlier research tended to use experimental methods or aggregated data on insurance ownership or claims
- Recent research adds individual-level data on choices and behaviors
 - Insurance purchase
 - Choice of contract features
 - Contract cancellation
 - Claiming behavior

Insurance Ownership

- ▶ Catastrophe insurance
 - ▶ Analysis of individual data shows more conformity to economic principles than may have been expected
 - ▶ However, unobserved individual heterogeneity is important
 - ▶ Personal risk attitudes appear to be an important element in demand variation (Petrolia 2010)
 - ▶ Risk awareness appears to be important (Knoller 2011)

Deductible Choice

- ▶ Research deductible choice (across multiple contracts) show that risk preferences are not stable across contexts (Cohen and Einav 2007, Barsyghian et al 2011)
- ▶ Unobserved individual heterogeneity appears to explain some differences in preference stability (Anderson and Mellor 2009)

Claiming Behavior

- ▶ Consumer surveys show that the size of deductible reduces perceptions of the fairness of the insurance arrangement and therefore increases the acceptability of claim build-up (Miyazaki 2009)
- ▶ Estimates using individual data show that in Canadian auto insurance a deductible increase from \$250 to \$500 increases the average claim by 14.6%-31.8% (Dionne and Gagné 2001)

Claiming Behavior

- Experiment: subjects pay an insurance premium to a pool; may report a loss (0, low, high); return = individual + share of pool at end of 5 rounds (Lammers and Schiller 2010)
 - If individual payout from pool includes a deductible, over-reporting of loss is significantly more likely than if full payment contract
 - Deductibles are perceived as “unfair”
 - If individual payout from pool includes a bonus-malus scheme for future claims, reporting of loss in last period is not significantly different than if full payment contract

Other Applications

- Underwriting cycles
- Why are credit scores pertinent?
- Pricing models
 - Demand elasticity
 - Contract form



**REFERENCES WILL BE POSTED
ONLINE**