Behavioral Economics

Topic 1: Choice under Uncertainty

Lecture 7: Applications of Prospect Theory, continued

Professor Bushong

MICHIGAN STATE UNIVERSITY

Taking Stock

Last class:

- Applications of Prospect Theory

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Today:

- Applications of Prospect Theory, continued

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Logistics:

- Problem Set 2 is due Thursday — before the start of class
  - Detailed solutions posted after class Thursday — read them before the exam
- Exam 1 is Tuesday, September 29 (in class) — covers everything through Thursday's lecture

Prospect Theory: A Quick Reminder

A person evaluates a prospect $(x_1, p_1; \ldots; x_n, p_n)$ according to:

$$V(x_1, p_1; \ldots; x_n, p_n) = \sum_{i=1}^{N} \pi(p_i)\, v(x_i)\,.$$

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A commonly assumed form of $v(\cdot)$ is

$$v(x) = \begin{cases} x^{\alpha} & \text{if } x \geq 0 \\ \lambda(x)^{\beta} & \text{if } x \leq 0 \end{cases}$$

Example (Similar to PS2 #4)

- Andy is a risk-averse EU maximizer, Beth evaluates gambles according to prospect theory
- **Remember:** a risk-averse EU maximizer is balancing two objectives: (1) maximize EV, (2) minimize variance
  - Beth is risk averse over lotteries with only gains, yet risk loving over lotteries with only losses

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- Choice 4: $(-180, 1)$ vs. $(-100, 0.75; -400, 0.25)$
- Note: these options were from previous problems: PS1 #3 and beginning of Lecture 3

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- Suppose Heidi is an EU maximizer with $u(x) = \ln(x)$ and $w = 12,0000$
- For what values of Y will she reject a single play of this bet?
- For what values will she accept two independent plays of this bet?

Applications of Prospect Theory

Our Outline

1. The Samuelson Bet
2. Risk Aversion
3. The Equity Premium Puzzle
4. Non-Linear Probabilities in Gambling
5. The Disposition Effect
6. Price Targeting in Housing
7. Is Tiger Woods Loss Averse?
8. The Endowment Effect
9. Homeowner's Insurance

Application #4: Non-Linear Probabilities in the Wild

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Point: If all odds were appropriate, every horse would have equal expected value and thus equal expected returns.

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Betting on a horse with 1/3 odds yields returns of only -5.5%

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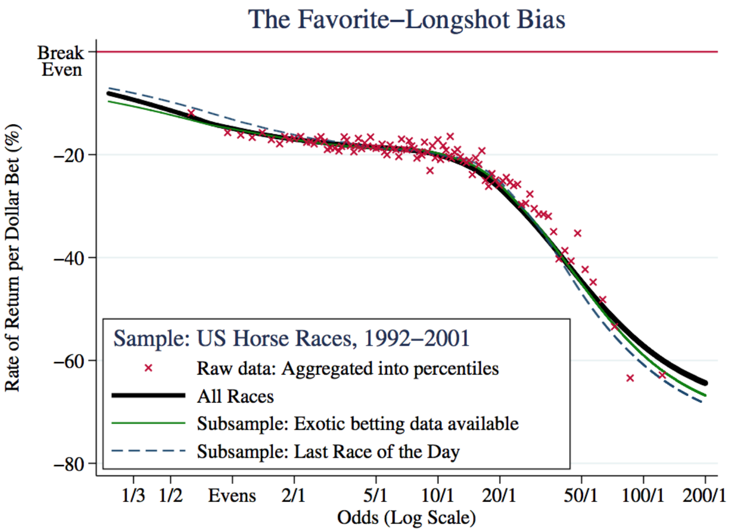

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Odean (1998) provides a nice empirical test, and assesses several potential explanations.

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- Big question: What's the explanation?

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Odean's suggested explanations:

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- Irrational belief in mean reversion.

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Should it matter whether you initially paid $350,000 vs. $450,000 when you bought the house?

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- Loss aversion combined with a mental-accounting assumption that you experience gain-loss utility from (nominal) financial gains and losses upon selling your house.

Application #7: Professional Golf

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Question: Suppose I face a 10-foot putt? Should my effort and concentration on this putt, or my strategy on this putt (i.e., being aggressive vs. safe) depend on whether the putt is for "par" vs. whether the putt is for one better than "par" ("birdie")?

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- Data from all golfers who attempted at least 1000 putts (421 golfers and over 2.5 million putts).
- Data also contain exact location of the ball and the hole.

Pope & Schweitzer (AER, 2011)

Main finding: Controlling for the distance of the putt, on average golfers are about 2 percentage points more likely to make a par putt than they are to make a birdie putt.

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- Under the assumption that golfers care only about their tournament results (and earnings), this behavior is inconsistent with the standard model — again, whether a putt is for par vs. birdie is irrelevant to tournament results.

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- Note: This finding is robust to many additional controls: controlling for the specific golfer, the specific hole, whether one has had prior putts on the same green, and the direction of the putt.

How to interpret the main finding?

- Under the assumption that golfers care only about their tournament results (and earnings), this behavior is inconsistent with the standard model — again, whether a putt is for par vs. birdie is irrelevant to tournament results.
- Pope & Schweitzer's suggested explanation is loss aversion:

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  - Loss aversion combined with a mental-accounting assumption that golfers experience gain-loss utility on each hole from performing better or worse than par on that hole.

Application #8: The Endowment Effect

Experiment 5 from Kahneman, Knetsch, & Thaler (1990)

- Subjects: 59 students in business statistics class at Simon Fraser University.

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  - A buyer's *WTP* is the maximum amount she is willing to pay to obtain the object.
  - A seller's *WTA* is the minimum amount she is willing to accept to part with the object.

Application #8: The Endowment Effect

	I will sell [I will buy]	I will keep mug [I will not buy]
If the price is $0.00:		
If the price is $0.50:		
...		
If the price is $9.00:		
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- Inform subjects that one of these prices will be randomly selected and their choice for that price will be implemented.
- Explain to subjects two true facts:
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  - The best thing for them to do is to indicate their true preferences.

Application #8: The Endowment Effect

Reservation prices in Experiment 5:

	Median	Mean
Sellers:	$5.75	$5.78

Application #8: The Endowment Effect

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Endowment Effect (originally coined by Thaler, 1980):

- People tend to value an object more highly when they own it than when they do not.

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- Choosers who indicate for each price whether they want the mug or the money.

Application #8: The Endowment Effect

Reservation Prices in Experiment 6:

	Median
Sellers:	$7.12

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Conclusion: Because sellers and choosers face the exact same choice and yet reservation values are larger for sellers, standard wealth effects cannot explain the endowment effect.

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	N	percent choosing mugs
Endowed with a mug:	76	
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	N	percent choosing mugs
Endowed with a mug:	76	89%
Endowed with candy:	85	10%
Choosers:	55	56%

Suppose you consume mugs and money, where

$$\text{(Total Utility)} = \text{(Mug Utility)} + \text{(Money Utility)}.$$

A Simple Model of Loss Aversion & the Endowment E

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$$\Longrightarrow \text{(Total Utility)} = \text{(Mug Utility)} + m.$$

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$$w(c) = \mu * c \qquad \text{and} \qquad v(x) = \begin{cases} \mu x & \text{if } x \geq 0 \\ \lambda \mu x & \text{if } x \leq 0. \end{cases}$$

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Note: We can represent $u(c, r)$ in a 2x2 grid:

	$r = 0$	$r = 1$
$c = 0$	$(0) + (0) = 0$	$(0) + (-\lambda\mu) = -\lambda\mu$
$c = 1$	$(\mu) + (\mu) = 2\mu$	$(\mu) + (0) = \mu$

Reservation values for the three types:

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[sell if $p > P_S$]

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Note: $\lambda > 1 \implies P_S > P_C = P_B$.

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- The subjects were dealers & non-dealers, and he separates non-dealers into experienced and inexperienced.

Robustness of the Endowment Effect

Results:

	% who trade
Dealers	$\approx$ 45%
Experienced Non-Dealers	46.7%
Inexperienced Non-Dealers	6.8%

Application #9: Homeowner's Insurance

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Deductible	Premium	Choice
\$1000	\$504	
\$500	\$588	X
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- This person chose to pay an extra $84 to reduce his deductible from $1000 to $500.

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$$(-\$588, 1-p; -588-500, p) \succeq (-\$504, 1-p; -504-1000, p)$$

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Above is one observation. What about averages?

Application #9: Homeowner's Insurance

Striking fact: Among those who chose the \$500 deductible (48% of the sample), on average they paid \$99.85 in extra premium to reduce their deductible from \$1000 to \$500.

Moreover, the average claim rate in this group is 4.3%, and so (roughly) the expected value of reducing the deductible is \$21.50 (i.e., .043(1000-500)).

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- For instance, with CRRA utility, initial wealth \$10,000, and \$1000-deductible premium equal to \$500, an EU maximizer with a 4.3% claim rate would choose to pay \$99.85 in extra premium to reduce their deductible from \$1000 to \$500 only if $\rho > 20.29$.

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  - Unexpected payments generate sensations of gains and losses
  - Expected payments don't

Next Class

Today: Applications of Prospect Theory, concluded

Next class: A more modern model of prospect theory: reference-dependent preferences — the last new material before Exam 1

Remember:

- Problem Set 2 due Thursday before class — solutions posted after; review them for the exam
- Exam 1 is Tuesday, September 29 (in class)
- A few additional practice problems will be posted