

Failures of Utility Maximization

Behavioral Economics:
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Failures of Utility Maximization

- This presentation gives a (non-exhaustive) list of documented failures of utility maximization
- Will use this to motivate our study of bounded rationality (part 1) and reference dependence (part 3)
- See also Mike's class

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Failures of Utility Maximization

- Choice mistakes
- Stochastic choice
- Too much choice
- Status quo bias
- Endowment Effect
- Framing effects
- Asymmetric dominance/Compromise effects

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Choice Mistakes

- Claim: People often fail to choose the best alternative
- However, identifying 'choice mistakes' in the field can be challenging
- Hard to tell whether someone has chosen the best option
- Can be confounded with tastes...
 - a seemingly bad choice could in fact maximize preferences
 - observing violations of WARP can take a lot of data
- ...or with lack of available information
 - ex post bad choices could have been rational given ex-ante information
- Though see (for example) Abaluck and Gruber [2011]

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Choice Mistakes

- The lab offers the opportunity to observe choice while controlling preferences and information
- Makes 'mistakes' obvious and easy to observe
- Can measure how mistakes change with the environment

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Example 1: Caplin, Dean and Martin [2011]

- Subjects presented with a *large* number of alternatives
- *Small* cognitive cost to understanding the value of each alternative
 - E.g. Choosing which flight to take
- Generate an environment in which subjects systematically fail to choose the highest value alternative

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Leaving Money on the Table

Which of the following would you choose?

4	2
3	13
20	11
15	8
8	10

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Leaving Money on the Table

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

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Example 1: Caplin, Dean and Martin [2011]

- Subjects choose between sums
- Dollar value of option is the value of the sum
- 'Full information' ranking obvious, but uncovering value takes effort
- 6 treatments
 - 2 x complexity (3 and 7 operations)
 - 3 x choice set size (10, 20 and 40 options)
- 22 Subjects, 657 choices
- No time limit

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Caplin, Dean and Martin [2011]



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Caplin, Dean and Martin [2011]

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

Set size	Average Loss (\$)	
	Complexity	
	3	7
10	0.41	1.69
20	1.10	4.00
40	2.30	7.12

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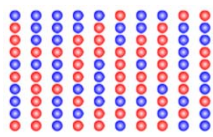
Example 2: Caplin and Dean [2014]

- Subjects presented with a *small* number of alternatives
- *Large* cognitive cost to understanding the value of each alternatives
 - e.g. choosing which of two available jobs to take
- Generate an environment in which subjects systematically fail to choose the highest value alternative

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Choice Environment

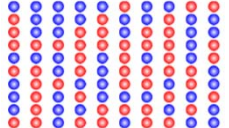
- Subjects presented with 100 red and blue balls on a screen



- Must choose between 'acts'
- Payout of act depends on number of red balls on the screen
- 'Full information' ranking obvious, but uncovering value takes effort
- No time limit

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Choice Environment



Act	Payoff 49 Red Dots	Payoff 51 Red Dots
a	10	0
b	0	10

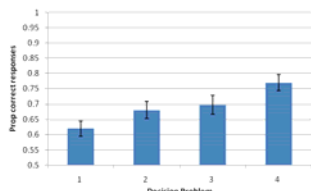
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Treatments

Decision Problem	U(a(49))	U(a(51))	U(b(49))	U(b(51))
1	2	0	0	2
2	10	0	0	10
3	20	0	0	20
4	30	0	0	30

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Aggregate Results



- Things to note (also true at the individual level)
 - Choice is stochastic (they make the correct choice some of the time)
 - Subjects do better than chance
 - Accuracy increases as incentives change
- Implies
 - Subject gather some information, but this information is imperfect
 - The amount of information gathered is endogenous to reward

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- Too much choice
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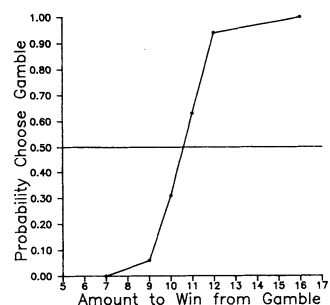
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Random Choice

- If a decision maker is maximizing a stable utility function they should always choose the same thing from any choice set

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Nogee [1951]



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Random Choice

- As the quality of the lottery is increased, the probability of choosing it increases
- But it increases smoothly, not discretely as the utility maximization model would suggest
- Reminiscent of perceptual experiments
 - Which of two weights is heavier?

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Too Much Choice

- Example: Iyengar and Lepper [2000]
- Set up a display of jams in a local supermarket
- Two treatments:
 - Limited choice – 6 Jams
 - Extensive choice – 24 Jams
- Record what proportion of people stopped at each display
- And proportion of people bought jam conditional on stopping

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Iyengar and Lepper [2000]

- Slightly more people stopped to look at the display in the extensive choice treatment:
 - 60% Extensive choice treatment
 - 40% Limited choice treatment
- Far more people chose to buy jam, conditional on stopping, in the Limited choice treatment
 - 3% Extensive choice treatment
 - 31% Limited choice treatment

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Iyengar and Lepper [2000]

- Clear Violation of IIA
 - If ‘don’t buy’ was chosen in the 24 jam set, should also have been chosen in the 6 jam set choice
- Interpretation:
 - Large choice sets are ‘demotivating’
 - People do not want the effort of making a decision
 - Therefore ‘opt out’ of making a choice altogether

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Other Examples

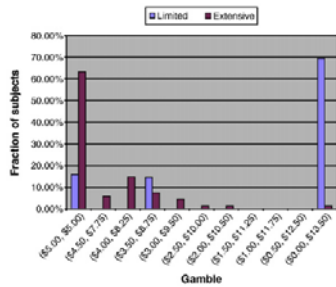
- Iyengar and Kamenica [2010]
 - Subjects offered choice between Lotteries
 - 120 subjects, 2 Conditions

Gamble #	If heads	If tails
Extensive condition		
1	\$5.00	\$5.00
2	\$4.50	\$7.75
3	\$4.00	\$8.25
4	\$3.50	\$8.75
5	\$3.00	\$9.50
6	\$2.50	\$10.00
7	\$2.00	\$10.50
8	\$1.50	\$11.25
9	\$1.00	\$11.75
10	\$0.50	\$12.50
11	\$0.00	\$13.50
Limited condition		
1	\$5.00	\$5.00
2	\$3.50	\$8.75
3	\$0.00	\$13.50

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Iyengar and Kamenica 2010

- Results



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Iyengar and Kamenica 2010

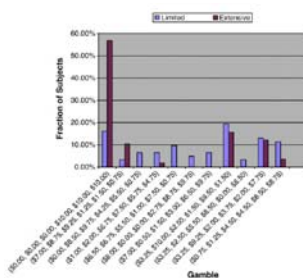
- Risk Aversion or Simplicity?

Gamble #	If \square	If \square	If \square	If \square	If \square	If \square
1	\$0.00	\$0.00	\$0.00	\$10.00	\$10.00	\$10.00
2	\$1.50	\$0.25	\$8.75	\$7.00	\$0.75	\$1.25
3	\$4.25	\$5.50	\$9.75	\$8.50	\$0.00	\$0.75
4	\$1.00	\$2.00	\$6.75	\$7.50	\$5.75	\$4.75
5	\$5.50	\$1.00	\$0.75	\$6.50	\$7.50	\$6.75
6	\$0.00	\$0.00	\$8.75	\$2.75	\$9.75	\$8.00
7	\$9.75	\$3.00	\$7.00	\$6.50	\$0.50	\$1.50
8	\$9.50	\$1.50	\$1.50	\$2.50	\$3.25	\$10.00
9	\$5.50	\$8.50	\$3.25	\$0.00	\$8.50	\$2.50
10	\$9.25	\$7.75	\$3.75	\$2.00	\$3.25	\$2.00
11	\$1.25	\$4.50	\$8.50	\$8.75	\$4.50	\$0.75

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Iyengar and Kamenica 2010

- Results



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Too Much Choice

- Some debate over replicability
 - See Chernev, Alexander, Ulf Böckenholt, and Joseph Goodman. "Choice overload: A conceptual review and meta-analysis." *Journal of Consumer Psychology* 25.2 (2015): 333-358.

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Status Quo Bias

- Idea: more likely to choose an object because it is the 'status quo'
- What is a 'status quo'?
 - Something that you have chosen before
 - The way things currently are (status quo bias)
 - What happens if you do nothing (inertia/omission effect)

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Example: Madrian and Shea [2001]

- Observe behavior of workers in firms that offer 401k plans
 - Tax free pension savings
 - Generally considered to be a Good Thing
- Two types of plan:
 - Opt in: if no action is taken when joining firm, then do not take part in the plan
 - Opt out: if no action is taken when joining firm, then are automatically enrolled in scheme
- Compare uptake in different plans

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Madrian and Shea [2001]

- Many more employees take part in 401k plan under automatic enrollment
 - 86% Opt out
 - 37% Opt in
- Effect reduced with tenure
- Also, people are more likely to take up the default fund, and invest the default amount

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Madrian and Shea [2001]

- Interpretation: Violation of rationality, as choice over {enroll, not enroll} is dependent on initial position
- Status quo bias: stick with what you are initially given

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Endowment Effect

- Kahneman, Knetsch and Thaler [1990]
 - 44 subjects
 - 22 Subjects given mugs
 - The other 22 subjects given nothing
 - Subjects who owned mugs asked to announce the price at which they would be prepared to sell mug
 - Subjects who did not own mug announced price at which they are prepared to buy mug
 - Experimenter figured out 'market price' at which supply of mugs equals demand
 - Trade occurred at that market price using Becker-DeGroot-Marschak procedure

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Endowment Effect

- Kahneman, Knetsch and Thaler [1990]
- Prediction: As mugs are distributed randomly, we should expect half the mugs (11) to get traded
 - Consider the group of 'mug lovers' (i.e. those that have valuation above the median), of which there are 22
 - Half of these should have mugs, and half should not
 - The 11 mug haters that have mugs should trade with the 11 mug lovers that do not
- In 4 sessions, the number of trades was 4,1,2 and 2
- Median seller valued mug at \$5.25
- Median buyer valued mug at \$2.75
 - Willingness to pay/willingness to accept gap

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Endowment Effect

- Violation of rationality in the sense that value of object changes with ownership
 - E.g. If seller, choose {mug} from {mug, \$4}
 - If buyer, choose {\$4} from {mug, \$4}
- Interpretation: Subjects place extra valuation on an object simply because they own it
- Related to 'Loss Aversion'
 - Losses loom larger than gains

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Framing Effects

- Framing effects refer to changes in the choices people make based on 'inconsequential' changes in the options
- We describe these as violations of rationality because we think really of these are the same object
 - Under one frame x is chosen from A
 - Under another y is chosen from A
- Depends on the definition of 'inconsequential'

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Example 1: Chetty et al. [2009] Salience and Taxation

- Prices are usually posted net of sales tax
- Price is added at register
- Adding a tag that includes the post tax price should be an 'inconsequential' change in the product
- Does it affect choice?



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Experiment 1

- Take 1 large supermarket
 - 30% of products have sales tax of 7.375% added at register
- Take three ‘impulse purchase’ product categories
 - Cosmetics, hair care accessories, deodorants
 - 750 products in total
- Add tags which displayed post tax price (as well as pre tax price)
 - Experiment lasted 3 weeks

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Experiment 1

- Empirical strategy: ‘Difference in Difference’
 - Compare change in demand for treated goods to that of control groups
 - Control group 1: Different toiletries in same aisle of same store
 - Control group 2: All toiletries sold in two similar stores
 - Analysis performed at the ‘category level’
 - 13 categories in treatment group
 - 95 in the control group

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Results

TABLE 3
Effect of Posting Tax-Inclusive Prices: QDD Analysis of Mean Quarterly Cost

Period	TREATMENT STORES		
	Control Categories	Treated Categories	Difference
Baseline	26.48	26.57	-1.21
Q2008-1 ^a	(0.22)	(0.27)	(0.43)
Q2008-3	(0.310)	(0.4)	(0.204)
Equipment	27.32	23.87	-3.45
Q2008-1 ^b	(0.87)	(1.03)	(0.16)
Q2008-3	(0.8)	(0.7)	(0.1)
Difference over time	0.94	-1.30	DD ₁ = 2.14
	(0.75)	(0.82)	(0.68)
	(0.70)	(0.7)	(0.00)
CONTROL STORES			
Period	Control Categories	Treated Categories	Difference
Baseline	30.87	27.84	-3.03
Q2008-1 ^a	(0.24)	(0.20)	(0.22)
Q2008-3	(1.420)	(1.00)	(1.230)
Equipment	30.76	28.19	-2.57
Q2008-1 ^b	(0.72)	(1.0)	(0.28)
Q2008-3	(0.7)	(0.7)	(0.0)
Difference over time	0.19	0.25	DD ₂ = 0.06
	(0.84)	(0.82)	(0.0)
	(1.10)	(1.00)	(0.10)
		QDD Estimate	-1.28
			(0.59)
			(0.74)

Notes: Each cell shows mean quarterly cost per category per store, for various subsets of the sample. Standard errors (shown in *it*) are in parentheses. Number of observations in square brackets. Experimental period starts when *it* = 2008:01 or *it* = 2008:03. Baseline period starts when *it* = 2008:01 or *it* = 2008:03. Linear panel effects subtracted across the two control stores.

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Bushong et al. [2010]

- Students presented with a series of snack foods,
- Selling price for each of these goods elicited using the Becker-DeGroot-Marshak mechanism.
- Three conditions that varied in how the snack foods were described.
 1. Written description.
 2. Picture of snack food
 3. Open container of the snack food.
- Average bidding prices were not significantly different in the first two treatments, but were much higher in the third (\$1.16 vs \$0.71)

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Bertrand et al. [2010]

- Field experiment in South Africa.
- A subprime consumer lender randomized both the advertising content and interest rate in direct mail offers to 53,000 former clients.
 - a photograph on the letter,
 - reference to the interest rate as special or low,
 - suggestions for how to use the loan proceeds,
 - a large or small table of example loans,
 - inclusion of the interest rate as well as the monthly payments,
 - a comparison to a competitors’ interest rate,
 - mention of speaking the local African language,
 - and mention of a promotional raffle prize for a cell phone.
- Significant effect on loan take up. Individually, the inclusion of a photo and a table of example loans were the important determinants.

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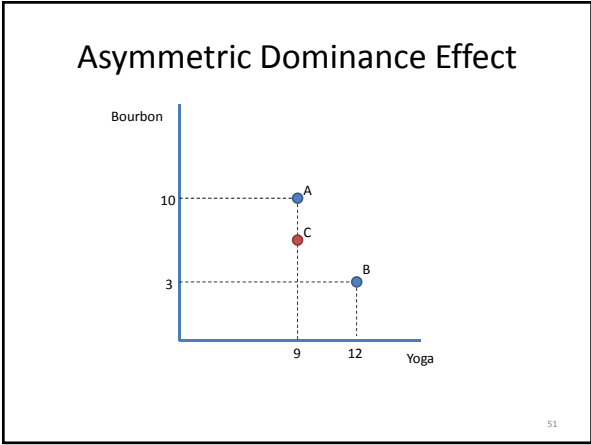
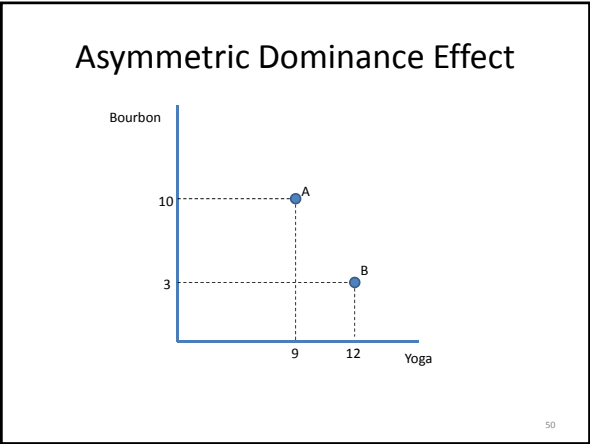
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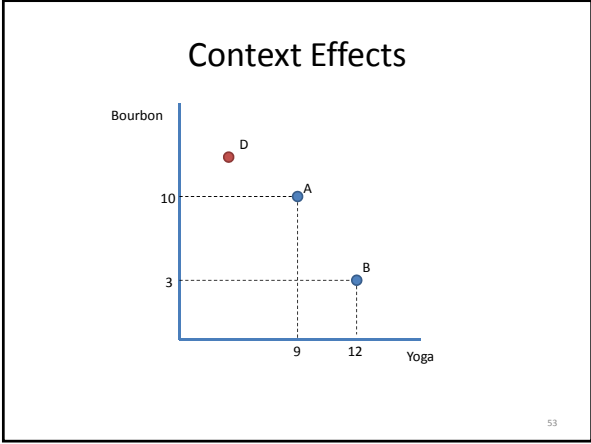
Huber, Payne and Puto [1982]

- Subjects were asked to choose between two types of beer.
 - \$1.80 per six pack, and had a quality rating of 50.
 - \$2.60 per 6 pack, but had a quality rating of 70.
- 43% of people chose the first option and 57% chose the second.
- Third option was added that was dominated by the first option
 - \$1.80 and a quality rating of 40
- Increase the proportion of people choosing this option to 63%



Simonsen [1989]

- Subjects were offered a choice between two types of calculator battery.
 - Lifespan of 12 hrs and a 2% probability of corrosion.
 - Lifespan of 14 hrs and a 4% probability of corrosion.
- 43% chose the second battery.
 - Subjects were then told about a third option,
 - 16 hr life expectancy and a 6% probability of corrosion
- Under this condition, 60% of people chose the 14 hr/4% battery.



Soltani, De Martino and Camerer [2012]

The figure illustrates the experimental design and results. Part A shows the trial sequence: an intertrial interval, an 8-second evaluation period where subjects evaluate two options (D1 and D2) and choose one, and a 2-second selection period where the chosen option is revealed. Part B shows the probability of choosing D1 over D2 for different dimensions (probability and quality). Part C shows the probability of choosing D1 over D2 as a function of decay type (D1, D2, D3, D4, D5, D6). Part D shows the decay effect as a function of decay type.

