Lecture 4
Individual choice – heuristics and biases

- Reading
  - Camerer, Colin (1995), chapter 8 in Kagel and Roth Handbook
- Learning outcomes
  - Be familiar with classical anomalies of individual choice
  - Understand the discussion on the robustness of these anomalies
  - Be aware of methodological differences between psychologists and experimental Economists
  - Understand how consumer theory can be tested in experiments
  - Understand the notions of the "endowment effect" and loss aversion

Heuristics and Biases in Decision Making

- Economists frequently refer to results from psychology when they incur "anomalies"
  - People often employ **heuristics** (simple decision rules that work well in certain contexts but produce errors in others)
  - Results in **biases** (systematic deviations from rationality)

- Examples for famous observed biases:
  - overconfidence
  - false consensus effect
  - "Three-door problem"

- Psychology results often of limited use for economists:
  - no (material) incentives
  - problematic interpretation (see false consensus below)
  - too often "one effect for one result", little generality

Allais paradox

- Maurice Allais (1911-2010!), 1998 Nobel prize
- Set of prizes S = {0, 100, 500}
- Which lottery do you prefer?
  - L1 has p=(0 , 1 , 0)
  - L2 has p=(0.01 , 0.89, 0.1)
- Which lottery among L3 and L4?
  - L3 (0.90, 0.00, 0.10)
  - L4 (0.89, 0.11, 0.00)

Allais paradox: results

- Most say L1>L2 and L3>L4
  - Inconsistent with expected utility!
- L1>L2 means
  - U(100)> 0.01u(0) + 0.89 u(100) + 0.1 u(500)
  - 0.11u(100) – 0.01 u (0) > 0.1 u(500)
  - 0.11u(100) + 0.89 u (0) > 0.1 u(500) + 0.9 u(0)
- So L4>L3
- (independence of irrelevant alternatives)

Framing

- Kahneman and Tversky
- A disease is expected to kill 600 people. Two alternative programs have been proposed:
  - Program A: 200 people will be saved
  - Program B: probability 1/3: 600 people will be saved probability 2/3: no one will be saved
- Which Program Would you favor?

Framing pt 2

- A disease is expected to kill 600 people. Two alternative programs have been proposed:
  - Program C: 400 people will die
  - Program D: probability 1/3: no one will die
    probability 2/3: 600 will die
- Which Program Would you favor

Framing: results

- Kahneman and Tversky found:
  - 72% chose A over B.
  - 22% chose C over D
- But if 200 people will be saved out of 600 is the same to the decision-maker as 400 people will die out of 600, and so on, then A and C are identical and so are B and D.

Conjunction fallacy

- Again KT
- Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations. Which is more probable?

  1. Linda is a bank teller.
  2. Linda is a bank teller and is active in the feminist movement.

- 85% of subjects chose the second option.

Overconfidence

- When estimating own and others' abilities, people too often estimate to be better than average
  - "overconfidence"
  - e.g. >50% believe to be better than average drivers
- Why important for economics?
- Important economic application: business failures
  - Camerer & Lovallo (AER, 1999): market entry experiment

Camerer & Lovallo 1999

- Lots of businesses fail (61.5% exit within 5 years)
- Possible explanations:
  - entry pays in short run (hit-and-run entries)
  - success may promise high return
  - managers are overconfident
- hard to distinguish in field
- hence experiment
- experimental design needs to isolate overconfidence explanation

Camerer & Lovallo

- Design:
  - market entry game
  - payoffs decreasing in number of entrants
  - payoffs depend on **rank**: **random** or **skill-dependent**
  - subjects are selected (recruited) randomly or **self-selected** (knowing that payoffs were **skill-dependent**)
  - between periods feedback only on number of entrants
- Hypotheses:
  - if subjects are **overconfident** regarding their skill, entry should be higher and profits lower when ranks are **skill-dependent** (compared to random ranks)
  - if subjects neglect reference group (i.e. that others have self-selected as well and should hence be more skilled) effect should be stronger for self-selection

Camerer & Lovallo

- Design issue:
  - excess entry could also be a sign of **risk-seeking**
  - hence need to compare periods with random ranks with those with skill-dependent ranks
  - to control for individual preferences, all subjects do both treatments
  - BUT: in order to avoid confusing sequencing effects and treatment effects, need to balance order: half of groups do random ranks first, half do skill-dependent ranks first
- Important general design rule:
  - Do not change **several** things **at the same time**
  - i.e. treatments should if possible only differ by the one variable in focus (e.g. random vs. skill-dependent ranks but not also by sequence)
  - here the design is balanced in terms of the sequence
  - alternatively, each group could do only one treatment

Camerer & Lovallo

- Results:
- clear evidence for overconfidence
  - industry profit with random ranks positive in 77% of rounds
  - with skill-dependent ranks only in 40%, negative in 42%
  - matched-pair t-test: industry profits lower under skill-dependent ranks ($p < 0.0001$)
  - prediction of entry rates about correct, so excess entry not driven by expectation of little competition, but overconfidence
- and for reference group neglect
  - difference between random condition and skill condition three times as large with self-selection

"False" Consensus Effect

- Estimates concerning other people's behaviour or preferences tend to be **biased** in the direction of estimator's own

- e.g. Ross, Green & House (1977)
  - students asked whether they would walk around campus with "repent" sign
  - then estimate how many would agree
  - those who agree guess 63.5% would
  - those who disagree guess only 23.3% would agree
  - clearly not both can be right
  - hence called **false consensus effect**

"False" Consensus Effect

- Dawes: term is misleading:
  - if I have only information about myself, it is ok for a Bayesian to use that, so estimates **should** be biased
  - effect is false only if they are biased "too much"
  - specifically, if own choice has more impact than other information
- How to test whether a consensus effect is false?
  - fancy econometrics
  - clever design

Engelmann & Strobel (2000)

- Design
  - 5 sessions, 16 subjects per session
  - make binary choices (e.g. earnings now or in a month with 10% interest)
  - then guess how 11 randomly chosen others in the session have chosen
  - before giving guess get informed how **remaining** 4 have chosen
  - we can assess now **false consensus** by comparing subjects with **different own choice** but **same total information**
  - e.g. person 1 chooses A and gets info A,A,B,B
  - person 2 chooses B and gets info A,A,A,B, same **total** info as 1
  - if person 1 guesses more A than person 2, we have FCE
  - can asses **consensus effect** by comparing subjects with different choice but same info about others

Engelmann & Strobel (2000)

- Results
  - generally clear consensus effect
  - but it is not false consensus
  - regression $E = \beta O + \gamma I + \varepsilon$
  - O: own choice, I: information about others
  - in all five sessions $\beta > 0$ (consensus effect)
  - but also in all five sessions $\beta < \gamma$
    - $\beta = 1.33$ *and* $\gamma = 1.73$ ➔ $\gamma/4 = 0.43 < \beta$
  - Conclusion
    - ES conclude that subjects **underweight** own choice, contrary to FCE
- Design issue:
  - psychologists typically do not pay subjects based on **accuracy** of guesses, we do
  - giving **incentives** for beliefs is potentially a tricky issue
  - not an issue in the present experiment

Exchange Experiments

- Exchange experiment is classical test of consumer theory
  - Some subjects are provided with an object, some not. Experimenters ask how much money they want to part with the good, how much to buy. Trade follows.
  - If consumer is indifferent between a good and certain money amount, this money amount should be equal both to willingness to pay (**WTP**) to get this good and willingness to accept (**WTA**) to part with it
  - experiments consistently find WTA>>WTP (see e.g. Kahneman et al., 1991)
  - income effect could matter theoretically, but effect is typically too large and survives control for income effect.

Knetsch's (1989) Exchange Experiment

- Even simpler test (Knetsch, 1989)
  - group A gets one objects (coffee mug)
  - group B gets another (bar of chocolate)
  - in each group they can exchange for the other good with the experimenter
  - if allocation to groups is random, **average** exchange rate should be 50% (independent of which good is more popular)
  - Exchange rates in both groups are only about 10%
  - In group that can choose, about equal shares prefer A and B

The "Endowment Effect"

- Both effects have been labelled "Endowment Effect"

- Explanations:
  - subjects feel "attachment" to their endowment
  - "loss aversion": giving away an objects is perceived as a loss, getting other object as gain, and losses are weighted higher than gains ("Prospect theory", Kahneman and Tversky, Econometrica 1979)

- Implications:
  - Theoretical: Indifferences curves are not reversible, but have "kink" at the current endowment
  - Applications: results of valuation surveys depend on whether they ask for WTA or WTP

Eliminating the "Endowment Effect": Experience
List (2003, 2004)

- subjects with a lot of **experience** on a sports-card trading market do not show significant EE
  - In sports-card trading (List, 2003)
  - In lab setting with mugs and chocolate bars (List 2004)
- List: 2003 results "may indicate that experienced subjects are more certain of their preferences (or the goods' values) and therefore trade more often than lesser-experienced agents."
  - not convincing for 2004 results (see Engelmann & Hollard, 2009)
- List: 2004 results suggest subjects learn not to be loss averse

Eliminating the "Endowment Effect": Procedure
Plott & Zeiler (2005, 2007)

- EE may be artefact of procedures:
  - In WTA/WTP studies, mechanism difficult to understand
  - proper learning and instructions eliminate effect (PZ 2005)
  - In exchange experiments, **biased signals** (e.g. experimenter chooses good) and social preferences (endowment perceived as a gift)
  - controlling for these, exchange asymmetry disappears

Eliminating the "Endowment Effect": Trade Uncertainty
Engelmann & Hollard (2009) *Econometrica*

- idea: traders affected by
  - "choice uncertainty"
    - (uncertain about own preferences or quality of good)
  - "trade uncertainty"
    - (uncertain about market costs, offending others etc)
- List's original explanation is about choice uncertainty
  - Not convincing
  - In List(2004) experienced traders learn to avoid endowment effect in general
  - spill-over of learning to completely different goods
    - Choice uncertainty still there!
    - You still do not know your own preferences for these goods!

Engelmann & Hollard: experiment

- Experiment:
  - 2 stages: market training and EE test
  - 2 treatments: "free trade" vs "forced trade" in 1st stage
  - forced trade should help overcome trade uncertainty
  - hypothesis: EE smaller after forced trade
- Results:
  - clear EE after free trade
  - no EE after forced trade

Anchoring: Do workers know their disutility of effort?

- Ariely, Loewenstein and Prelec (2004)
- Asked subjects whether they would pay $2 to attend a 15-minute poetry reading
- Asked other subjects whether they would attend if they were paid $2.
- Later, asked whether they would attend for free.
  - Among those who were anchored on *paying*: 33%
  - Among those who were anchored on *being paid*: 8%

Do people perceive inflation correctly?

- Georganas, Healy and Li (2010)
- Present subjects with a basket of goods and instruct them to buy a designated one each period
- Manipulate the speed and frequency of price changes
  - People underestimate inflation if cheap, frequently bought goods have low inflation
  - People overestimate inflation if such goods have high inflation
- This influences their consumption, saving, investment decisions!
- Real life example: The introduction of the euro led to many complaints of high inflation because of rounding etc
- Actually rounding hardly mattered, since 0.95 was rounded to 1 (5% difference) but 999.5 just to 1000 (just 0.05% difference)

Heuristics and Biases in Decision Making

- Lots of other biases that are relevant for economics (see Camerer, 1995)
- BUT: the **robustness** of biases is a contentious issue (within psychology and economics)
- as the Engelmann & Strobel experiment shows, they may not survive under careful scrutiny
- also, Friedman (1998) argues that the famous "three-door anomaly" can be deconstructed by giving proper learning incentives
- see also Gigerenzer (1991)

Problems to think about

1. Can you think of economic behaviour or specific markets where overconfidence and reference group neglect might matter? How can you assess this in an experiment? Think of an appropriate design and how results could be interpreted.
2. Can you think of reasons why it might matter whether subjects are paid for accuracy of guesses, or more generally for their performance? Where might this be irrelevant? When could there be problems if subjects are paid for accuracy of beliefs?
3. Can you think of ways how anomalies such as overconfidence can be reduced or eliminated? How would you set up an experiment to test various possibilities to achieve this?

4. An airport runway shall be built and some precious natural resource would have to be destroyed. Assume you are the airport operator and you want to know how much people in the area value this resource in order to evaluate whether the economic benefit of the runway would outweigh the environmental damage. How would you frame the question? Assume instead that you are an environmental campaigner. How would you frame the question then?
5. Remember the Coase Theorem (in the face of externalities, if property rights are assigned and there are no bargaining costs, then no matter how they are assigned, the efficient outcome will be reached and who owns property rights only affects distribution). How is this affected if people exhibit an endowment effect?
6. Why might people overstate their WTA and understate their WTP if they misinterpret the mechanism?