Behavioral economics

Varian: Intermediate Microeconomics, 8e, chapter 30
Goolsbee, Levitt, Syverson: Microeconomics, chapter 17

The disease dilemma

You are the head of public health office. An unusual flu-like disease breaks out. Estimates: 600 people die if you don't take any action.

The choice is between two responses, each of which costs the same:

- Response A: You save 200 people with certainty.
- Response B: You save 600 people with 1/3 chance and no one with a 2/3 chance.

The choice is between two responses, each of which costs the same:

- Response C: 400 people will die for certain.
- Response D: There is a 2/3 chance that 600 dies and a 1/3 change that no one dies.

Dilema nemoci (pokračování)

If you have chosen responses A and C or B and D, the choice was rational.
They have the same outcomes, but different descriptions.

Tversky and Kahneman (Science, 1981) – a student sample:

- 72% choose A
- 78% choose D

This outcome should not happen in a standard economic model.
The choice should not depend on a description of a problem.

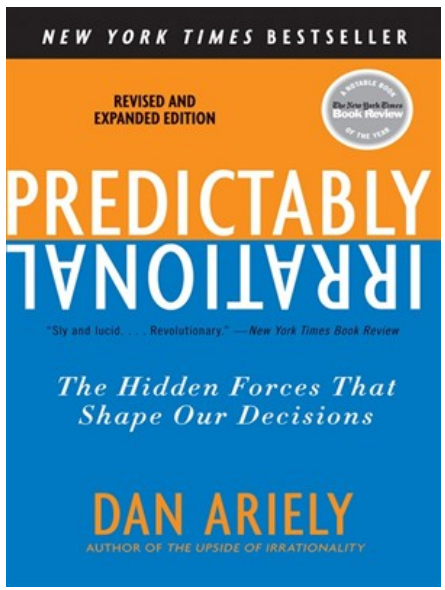
Behavioral economics

The assumption of rational decision-makers fails in some situations.

It is not a problem if these are random errors: standard economic model might be still the best we have.

Many authors find systematic departures from rationality – we need a more complex theory.

Behavioral economics branch of economics that incorporates insights from human psychology into models of economic behavior.



In this lecture we examine...

...the following systematic departures from rational behavior:

1. hyperbolic discounting and self-control problems
2. falling pray to framing
3. sunk-cost fallacy
4. overconfidence

We also discuss whether people are altruistic and have a sense of fairness.

Finally, we have a look at how economist test economic theory using experiments.

1. Hyperbolic discounting and self-control problems

You are in a Christmas market – imagine your favourite drink:

Choice A: Choose one option:

1. 1 drink today
2. 2 drinks tomorrow

Choice B: Choose one option:

1. 1 drink in a year
2. 2 drinks in a year and a day

Many people probably choose this way:

- choice A: 1 drink today
- choice B: 2 drinks in a year and a day

$\Longrightarrow$ The discount rate differs today and in a year from now.

Exponential vs. hyperbolic discounting

Standard economics:

People discount future at a constant discount factor $\delta < 1 \implies$ They use **exponential discounting**.

Utility from consumption in periods 1 through n:

$$u = u(c_1) + \delta u(c_2) + \delta^2 u(c_3) + ... + \delta^{n-1} u(c_n)$$

Behavioral economics:

People prefer immediate payoffs to later payoffs, even if the later payoff is much greater $\implies$ They use **hyperbolic discounting**.

A possible formula for hyperbolic discounting:

$$u = u(c_1) + \delta^* u(c_2) + \delta^* \delta u(c_3) + ... + \delta^* \delta^{n-2} u(c_n),$$

where the discount factor $\delta^* < \delta$.

Example – purchase of a mobile phone

Two payment options:

- 10,000 CZK now
- 4 monthly payments of 3,000 CZK each (1. payment next month)

Exponential discounting: the monthly rate of 5%

Hyperbolic discounting: 1st month – 25%; every following month – 5%

Which payment option will be chosen?

Exponential discounting (NPC = net present cost):

$$NPC = \frac{1}{1.05}3{,}000 + \frac{1}{1.05^2}3{,}000 + \frac{1}{1.05^3}3{,}000 + \frac{1}{1.05^4}3{,}000 = 10{,}761 \text{ CZK}$$

$NPC > 10,000 \implies$ The consumer pays now.

Hyperbolic discounting:

$$NPC = \frac{3{,}000}{1.25} + \frac{3{,}000}{1.25 \times 1.05} + \frac{3{,}000}{1.25 \times 1.05^2} + \frac{3{,}000}{1.25 \times 1.05^3} = 8{,}936 \text{ CZK}$$

Consumer prefers payments (he spends money saved now on other things).

Time consistency of exponential discounting

January: The utility from consumption in Febuary (c_2) + March (c_3):

$$u^{\text{Jan}} = \delta u(c_2) + \delta^2 u(c_3)$$

$$\text{MRS}_{23}^{\text{Jan}} = -\frac{\delta MU(c_2)}{\delta^2 MU(c_3)} = -\frac{MU(c_2)}{\delta MU(c_3)}$$

February: The utility from consumption in February and March:

$$u^{\text{Feb}} = u(c_2) + \delta u(c_3)$$

$$\text{MRS}_{23}^{\text{Feb}} = -\frac{MU(c_2)}{\delta MU(c_3)}$$

The same decision in Jan and Feb – the consumer is willing to exchange the same number of c_3 for one unit of c_2 (the same MRS_{23}).

The decision-making is **time consistent**.

Time consistency of hyperbolic discounting

January: The utility from consumption in Febuary (c_2) + March (c_3)

$$u^{\text{Jan}} = \delta^* u(c_2) + \delta^* \delta u(c_3)$$

$$\text{MRS}_{23}^{\text{Jan}} = -\frac{\delta^* MU(c_2)}{\delta^* \delta MU(c_3)} = -\frac{MU(c_2)}{\delta MU(c_3)}$$

February: The utility from consumption in February and March:

$$u^{\text{Feb}} = u(c_2) + \delta^* u(c_3)$$

$$\text{MRS}_{23}^{\text{Feb}} = -\frac{MU(c_2)}{\delta^* MU(c_3)}$$

The consumer decides differently in Jan and Feb – willing to give up more of c_3 for 1 unit of c_2 in Feb ($|\text{MRS}_{23}^{\text{Feb}}| > |\text{MRS}_{23}^{\text{Jan}}|$, as $\frac{1}{\delta^*} > \frac{1}{\delta}$).

Difference between what he thinks he does in one month and what he really does. The decision-making is **time inconsistent**.

How markets take advantage of our self-control problems

Firms may take advantage of our need to consume **now**.

Example:

mKreditka (2015 conditions):

- 1% refund from each payment till the end of 2015
- interest-free period up to 54 days
- free issue and zero fees (if transactions more than 500 CZK monthly)
- automatic 100% transfer

Why does mBank offer CC when there is no refund from debit cards?
My guess: Some people use CC for borrowing (at rates above 20%).

2. Falling pray to framing

Framing = choices depend on the presentation of the choice problem
$\Longrightarrow$ incompatible (irrational) decisions.

Example: the disease dilemma (positive vs. negative framing)

Framing biases:

1. **endowment effect** – possessing a good makes it more valuable = the possessor must be paid more to give up the good than he would have paid to buy it in the first place.
2. **anchoring effect** – decision is influenced by specific pieces of information given (unrelated to the decision problem at hand).
3. **mental accounting** – people divide their assets into isolated groups instead of basing their decision on their assets as a whole.
4. **loss aversion** – loss (relative to reference point) cannot be compensated by a same-sized gain.

2.1 Endowment effect – experiment

Experiment Kahneman, Knetsch and Thaler (JPE, 1990):

A randomly selected half of the group gets a mug (value \$6).

- If you have a mug – at what price are you willing to sell it?
- If you don't have it – for what price are you willing to buy it?

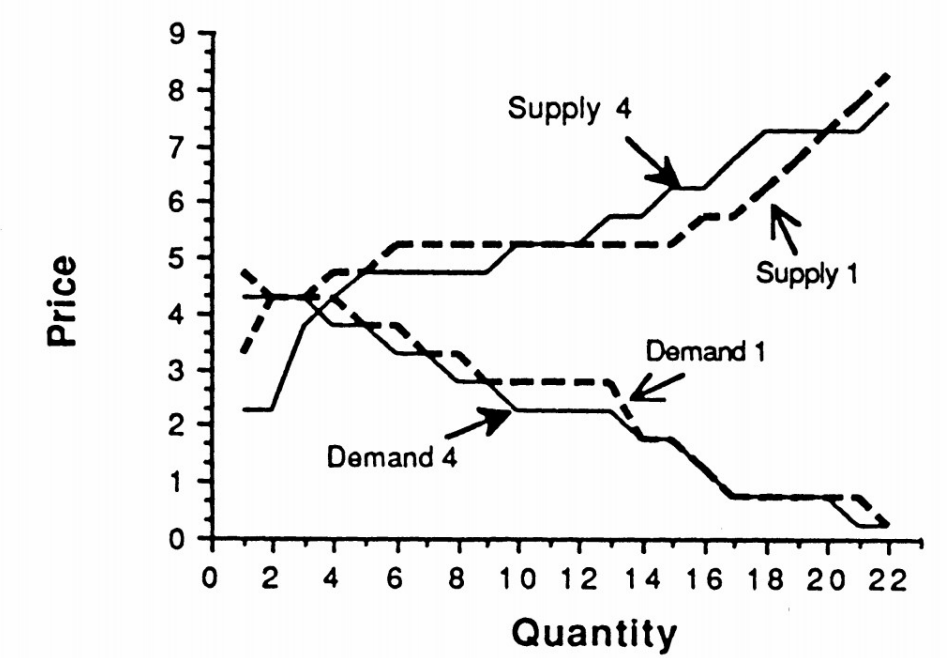
What share of the mugs trades if we pair buyers with sellers?

Theory: If transaction costs are 0, half of the mugs is sold.

But are transaction costs 0?

Control experiment – trading money tokens: 1/2 of the tokens traded.

Result: only roughly 15% traded



2.2 Anchoring effect

How many people live in Venezuela? More or less than X millions?

Tversky and Kahneman (Science, 1974) asked two questions:

1. Are more or less than Y% African countries in the UN?
   (people saw a roulette wheel that chose Y as 10% or 65 %)
2. What is the percentage of African countries in the UN?

Y = anchor that influences responses – the average answer to Q2:

- 25% – people with $Y = 10\%$.
- 45% – people with $Y = 65\%$.

Venezuela has roughly 29 million inhabitants. X in the first question was an anchor that probably misled you.

2.3 Mental accounting

You go to Špalíček to se you favourite movie for 100 CZK.
(You have 300 CZK in your pocket and 10,000 CZK in your account.)

Situation 1:

In the cinema, you find out that you have lost 100 CZK.

What do you do? Do you go on and buy the ticket anyway?

Situation 2:

You buy the ticket and go for a quick beer. After coming back to the cinema you found out that you lost the ticket.

What do you do? Do you buy the ticket again?

Mental accounting (cont'd)

You should make the same choice in both situations (the same BL).
People more often buy the ticket after losing money. Why?

According to behavioral theory, people split money into "mental accounts". It is difficult to transfer money among them.

Explanation: mental account with "cinema" with 150 CZK per month

- losing the ticket $\Longrightarrow$ balance in the account "cinema" $= 50$ CZK $\Longrightarrow$ you don't go to see the movie
- loss of money is debited to a different account (e.g. savings $= 9{,}900$) $\Longrightarrow$ the account „cinema" $= 150$ CZK $\Longrightarrow$ go on and buy the ticket

Consequence: People may buy suboptimal bundles.

Advantage: Mental accounting saves the decision time.

Mental accounting (cont'd)

Other examples (see also Thaler, Marketing Science, 1985):

- Mr X finds 100 CZK on a sidewalk. $\rightarrow$ He spends it.
  Other day Mr X gets a tip of 100 CZK. $\rightarrow$ He saves it.
- Mr K looks for a discounted bottled beer, but at the same time he is willing to buy any number of beers in a pub for prides 3-5times higher.
- Mr and Mrs L saved 500,000 CZK for a summer cottage (interest rate $= 2\%$) and buy car for 300,000 CZK on leasing (IR $= 10\%$).
- Mrs. N likes a Chanel dress, but does not buy it – too expensive for 20,000. When she gets the dress as a birthday present from Mr. N, she is very happy, even though they have shared money with Mr. N.

2.4 Loss aversion

Example – toss of a coin:

- head – you get 140 CZK
- tail – you get 100 CZK

Who would accept this offer?

Most people do not accept the offer, even though the EV = 20 CZK.

The reason for this extreme risk aversion might be **loss aversion**
= loss has a larger impact on utility than a same-sized gain.

Loss or gain are relative to a **reference point**.
Example: the reference point is the current wealth.

How markets take advantage of our framing problems

Endowment effect

Money-back guarantee raises the probability that I buy a product to try it out. Then the endowment effect increases the probability that I keep it.

Anchoring effect

- 50% of originally exaggerated price (= anchor) seems a bargain
- first show an expensive product (= anchor) and then cheaper options
- quantity limit („limit of 5 units per person“) increases the demand

Mental accounting

- The question of car salespeople: “How much do you want to pay for a car?” Once you put a number into a mental account, a skilled seller will find a way to withdraw it for you.
- high tourist prices (turists may have an account „holiday spendings“)

3. Sunk-cost fallacy

Sunk costs = the money is already spent and it cannot be recovered.
E.g. fixed costs are sunk – cannot be recovered after a shut down.

Sunk costs should not influence your decision-making. If they do, you have succumbed to the **sunk-cost fallacy**.

Examples:

A season subscription to a theater series:

Arkes and Blumer (1985) – people pay randomly one of prices: \$15, 13, 8.
Whether they go to the theater is independent from the price (sunk costs).
1st half of the season: people paying \$15 went 25% more than others.

Project Concorde:

In the course of the project it was clear that it should be stopped. They finished it (20 airplanes), because there was "too much invested to quit".

APPLICATION: The recession and the housing market

Genesove and Mayer (QJE, 2001) study the Boston housing market.

Prices of ownership homes went down by 40% in the recession in the 1990s, but people were not willing to reduce prices. The average offer price was 35% above the expected value of homes.

Explanation:

Admitting that their homes lost 40% of the value would cause a large loss of utility (loss aversion, sunk-cost fallacy). Rather not selling and waiting for the prices to go up.

The effect of loss aversion and the sunk-cost fallacy

Examples:

- Housing market – rational people sell their houses for a higher price, because people with loss aversion do not want to sell at current prices.
- A common situation in poker – a promising hand (AK); calling first (500 CZK); a minimum chance to win after the flop (8, 8, J); I lose money to rational players if I do not fold and continue betting, because I don't want to accept the loss of 500 CZK (sunk costs).

4. Overconfidence

Overconfidence – a belief that skill and judgment are better than they truly are, or that better outcomes are more likely to happen than their true probability.

Most people think that they are better than average:

- 93% American university students are better-than-average drivers
- 77% people in internet dating service are more attractive than average
- 32% programmers are better than 19 out of 20 colleagues
- 94% university professors think that their intelligence is above average

Economic context:

- financial markets: one side of the transaction thinks they are better informed than the other
- management: self-confident managers make larger and riskier investments

How markets take advantage of our overconfidence

Example: the price of membership offered by gyms looks attractive if people visit the gym regularly.

DellaVigna and Malmendier (AER, 2006) – customers with a monthly membership pay 70% more than if they paid for individual visits. This adds up to a $600 overpayment in the course of their membership.

A test question:
I go to the gym only because I bought the membership. Is it rational?
No, membership is a sunk cost – it should not influence my decision.

Altruism and fairness

Dictator game: player A gets 100 CZK and player B nothing

1. Player A gives player B an amount $X \in \langle 0, 100 \rangle$ CZK.

When player A maximizes his payoff, he should choose $X = 0$.

Experimental results: people often choose $X > 0$.

Ultimatum game: player A gets 100 CZK and player B nothing:

1. Player A offers player B an amount $X \in \langle 0, 100 \rangle$ CZK.
2. Player B can accept or reject the offer. Accepts: player B gets X and player A gets $100 - X$. Refuses: both players get 0 CZK.

Backward induction. Player B accepts $X > 0$. Player A offers $X \to 0$.

Experimental results: Roughly a half of players B refuse $X < 30$.
Players A offer $X = 45$ on average (still refused by 16%).

Altruism and fairness (cont'd)

These results suggest that people are altruistic/care about fairness.

A controversial question: Do experiments capture real preferences?

- People might feel ashamed before the experimenters for behaving selfishly.
- Bardsley (Exp Econ, 2008) shows that the result of *dictator game* might be driven by the framing (game about giving).

  Player A can give and take the money of player B ($X < 0$ possible). Most people offering $X > 0$ in the standard game, now choose $X < 0$.

Real altruistic behavior

But how do we explain real behavior such as charity or volunteering?

Real behavior: one of the following options should be true:

1. People do not maximize utility.
2. Utility influenced by non-monetary factors (remorse, resentment).
3. Utility function has an altruistic element (welfare of others).

Some real behavior is certainly truly altruistic, but:

- Meer and Rosen (AEJ, 2009) find out that alumni with kids donate to universities more probably than their colleagues without them. The donations increase with the age of the child, and fall to the level of alumni without children if the children applied but were rejected.
- DellaVigna, List and Malmendier (QJE, 2012) sent out volunteers to knock on doors and solicit charitable gifts. They collected less in homes where fliers with the date of the fund-raising were distributed.

Is the model based on rational decision-makers useful?

Yes, it is – three arguments:

1. Behavioral economics shows that some people, under certain circumstances, act irrationally. The neoclassical model does a good job describing how the economic world works most of the time – an important advance when we describe human behavior.
2. Market punishes irrationality – adjust behavior or leave the market
   Example: investors (poker players) suffer less from sunk-cost fallacy.
   Experts might help to take complex decisions (e.g. financial advisers).
3. In some situations, simple adjustments to the basic economic model often provide perfectly viable alternative explanations.

   Example: smoking – two explanations:

   - people are irrational (self-control problem)
   - Becker and Murphy (JPE, 1988): „A Theory of Rational Addiction“ can explain why addiction rates respond to prices

Testing theories on data

Behavioral critique $\rightarrow$ more emphasis on testing economic models

How to test economic theory?

1. We build a theory: e.g. consumer theory.
2. We derive a prediction (= causal relationship): e.g. $p \downarrow \rightarrow q_d \uparrow$.
3. Test on data: investigate whether $p \downarrow \rightarrow q_d \uparrow$ (*ceteris paribus*).

Problem: A lot of effects in reality – *ceteris paribus* rarely holds.

A possible solution:

Econometrics = statistical and analytical techniques in economics

E.g. instruments = using supply shocks for demand estimation.

Experimental economics

An alternative solution: testing the predictions directly in experiments.

Laboratory experiment

- randomly selected groups of subjects $\rightarrow$ versions of the same activity – e.g. the disease dilemma (1 version: A or B; 2. version: C or D)
- typically financial motivation: a show-up fee and a result-based reward

Advantage: economists can control all aspects of the test

Disadvantages: the results may apply in reality, because in the lab:

- a different type of scrutiny (people watched by the experimenters)
- a different situation (small rewards, strange and tedious tasks)
- the tasks are new (real decision-makers are typically experienced)
- an experimenter cannot control personal habits and norms (findings that culture influences experimental results)

Experiments in the real world

Laboratory experiments may not study the "real world" – solutions:

1. field experiments
2. natural experiments

Field experiments

- experimental subjects are randomly divided into the experimental and control groups – **randomized control trial (RCT)**
- naturally occurring environments – ideally people do not know that they are participating in an experiment

Example:

The experiment on charitable giving (DellaVigna et al., AER, 2012)

Many firms conduct field experiments – e.g. marketing (A/B testing), testing pricing strategies or recruitment procedures, ...

Experiments in the real world (con't)

Natural experiments

Real data have the property that allows us to eliminate all other factors (= we can observe the causal relationship *ceteris paribus*).

Example:

The US soldiers in the Vietnam era were selected by a draft lottery – similar to RCT = random division of soldiers into the experimental group (drafted) and the control group (not drafted).

Angrist (AER, 1990): veteran status reduces the income by 15%.

Problems of natural experiments:

- they are rare
- sometimes difficult to generalize from a specific situation (do Angrist's conclusions apply to other wars veterans?)

What should you know?

- Behavioral economics: people are predictably irrational in some situations (overconfidence, self-control, sunk-cost fallacy, framing)
- Rational people may take advantage of it.
- Behavioral critique $\Longrightarrow$ more emphasis on how we test theories – the ideal is the RCT.
- The model with rational agents works most of the time, but sometines fails. It is useful to know when people typically behave irrationally.
- Hope that you liked micro and will use it to make the right decisions in the future.