



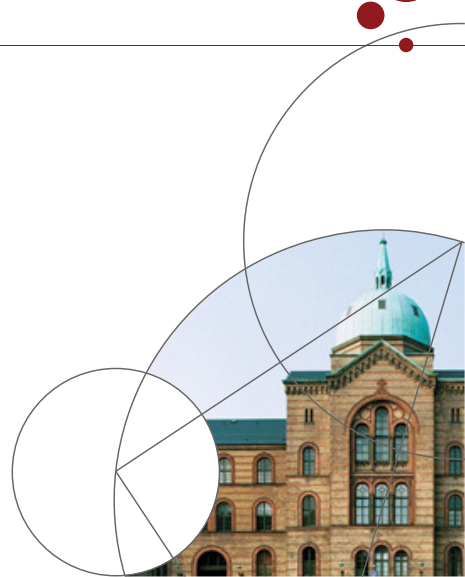
UNIVERSITY OF COPENHAGEN



Mikro II, lecture 13a

Behavioral Economics

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Plan for the lecture

- 1 Examples of violations of the “rational neoclassical model”
- 2 Criticism of “behavioral economics” (and answers)
- 3 Challenges of “behavioral economics”
- 4 “Behavioral economics” and welfare analysis



Intro

- Our next topic is behavioral economics
- (Very) loosely it is about recognizing and introducing that humans are not as "rational" as our models assume (more later)
- Behavioral economics is a large and relatively new field: This lecture gives a loose introduction
- Disclaimer: More disagreement among economists about what is right and wrong or how useful behavioral economics is compared to previous subjects; lecture slides based on views shared by Nikolaj Harmon and Johannes (we are both behavioral economists).



Primer on language

- The language used when it comes to “behavioral economics” is quite unfortunate
- All economics is about “behavior”! And rationality / irrationality is also a tricky thing:
 - In Micro I + II, rationality is formally something with transitivity and total (complete) preferences; Behavioral economics is not specifically about non-transitive, non-total preferences
 - The broader meaning is also unclear: Is it rational to buy a good on discount if you love to save money?
- A better suggestion (perhaps) is that behavioral economics is about incorporating insights from psychology into economics.



Four important points on behavioral economics

- 1 Behavioral economics can (and will) often be seen as “common” economics where people just have a special utility function.
- 2 “Behavioral” economic behavior can in practice be difficult to distinguish from “common” economic behavior
- 3 A challenge in behavioral economics is that its predictions can be extreme and / or will depend a lot on some difficult assumptions
- 4 Insights from behavioral economics give rise to some major problems for welfare analysis



Example 1: Default (status quo) bias

- Example: Participants in a survey are awarded with DKK 100 which they can either get themselves or can donate
- The first half of the contestants will see a screen that says:
"Your winnings are set to be donated; do you want to change this?"
- The other half of the participants will see a screen where it says:
"Your winnings are set for go directly to yourself; do you want to change this?"
- Typical result: The first half ends up donating significantly more money



Default bias

- People tend to stick to the “default choice” or status quo
- More related phenomena, e.g. people tend to choose the first option on a list
- Immediately fits poorly with our Micro I-II models: People should just maximize utility and defaults should not play a role.



A standard model

- An agent must choose between two options A and B
- Standard model, utility function:

$$U(x) = \begin{cases} u_A & \text{for } x = A \\ u_B & \text{for } x = B \end{cases}$$

- Utility maximization (discrete): $\max_{x \in \{A, B\}} U(x)$
- Assume $u_A = 2$ and $u_B = 1$; then $u_A > u_B$, hence the solution is $x^* = A$



Default bias in the model I

- Let y specify which option is the default (A or B)
- Utility function as before, but now a utility cost c by not choosing the default, i.e. the utility depends on both the choice and the default, so new utility function is $U(x, y)$, where:

$$U(x, A) = \begin{cases} u_A & \text{for } x = A \\ u_B - c & \text{for } x = B \end{cases}$$
$$U(x, B) = \begin{cases} u_A - c & \text{for } x = A \\ u_B & \text{for } x = B \end{cases}$$

- Utility maximization *given* the default y :

$$\max_{x \in \{A, B\}} U(x, y)$$



Default bias in the model II

- Assume as before $u_A = 2$ and $u_B = 1$ and otherwise assume $c = 2$
- If A is the default $U(A,A) > U(B,A)$ ($2 > 1 - 2$), so A is selected
- If B is the default $U(A,B) < U(B,B)$ ($2 - 2 < 1$), so B is selected
- The model here captures exactly the default bias phenomenon



Default bias in the model III

- This behavioral economics phenomenon fits (as is often the case) into the standard model, just with a special utility function
- Is this rational / irrational?
 - Formally, the preferences here are rational (transitive, total)
 - Is it irrational to try to avoid an active choice?



Socrative Quiz Question

How important do you think default effects are in practice? Madrian and Shea (2001, *Quarterly Journal of Economics*) study a change made by a large US corporation, where the default was that employees are not enrolled in a 401k retirement saving plan. Before the change, 37.4 percent enrolled for the plan, which was available to all employees. The corporation then changed the default to automatic enrolment, but employees could actively opt out at no cost. How many employees do you think enrolled after the change?

- a) 45 percent
- b) 52 percent
- c) 64 percent
- d) 73 percent
- e) 85 percent



Example II: Loss aversion

- Thought experiment: Survey participants must choose whether they will spend an extra hour answering additional questions
 - The first half of the participants were paid DKK 100.
 - When they reach the extra questions, the first half is told that if they say no to answer the questions then they have to pay back the DKK 100.
 - The other half is told that if they say yes then they will get paid DKK 100.
- Typical result: Significantly more say yes to answer the questions in the first group



Loss aversion

- Note that the overall monetary gains are the same for the two groups:
 - If they answer the extra questions, they go home with DKK 100, otherwise nothing
- This is typically attributed to *loss aversion*
 - The pain of the loss of something is greater than the joy (benefit) of getting the same thing
 - Those who lose DKK 100 by saying no are more likely to agree to answer the questions
- This does not fit our standard Micro models at all: Either it gives more utility to spend the extra time and go home with DKK 100 or it doesn't.



Loss aversion in the model I

- Our agent's utility depends on whether he makes extra efforts, $e = 1$, or not, $e = 0$, and on the *change* in his income x
- The utility is (c is the utility cost of effort):

$$U(x, e) = u(x) - c \cdot e$$

- Note that if $u(x)$ is linear then this is completely standard (does not matter that x is net *change*)
- Loss aversion occurs if $u(x)$ “breaks” when x is 0:

$$u(x) = \begin{cases} x & \text{for } x \geq 0 \\ k \cdot x & \text{for } x < 0 \end{cases}, \quad k > 1$$



Loss aversion in the model II

- The agent will be willing to make an extra effort to get a net benefit of y if (assume $u(0) = 0$):

$$U(y, 1) \geq U(0, 0) \iff u(y) - c \geq 0 \iff y \geq c$$

- The agent will be willing to make extra efforts to avoid a net loss of y if (suppose $u(0) = 0$):

$$U(0, 1) \geq U(-y, 0) \iff u(-y) - c \geq 0 \iff k \cdot y \geq c$$

- Because $k > 1$, the last expression will hold more often than the first: The agent is more likely to make efforts to avoid a loss



Loss aversion in the model III

- Loss aversion is also similar to regular utility maximization with a particular utility function; 2 ingredients:
 - ① The utility is defined in relation to changes relative to the existing level (reference-dependent preferences)
 - ② The marginal utility of changes in income changes (breaks) at zero
- (Note that point 2 also occurs to a lesser extent in a common concave utility function; the difference is that the effect will disappear for small changes in income in the case of a common concave utility function but not here)



Socratic Quiz Question

Think about experiments where people are asked what would be the lowest possible win in a lottery that leads to a loss of 100 USD in 50 percent of the cases such that they would be willing to play this lottery. How high of a payment in case of a win do you think people on average demand to accept this lottery in such experiments? Note that the rational prediction would be close to 100 USD, given that the local curvature of the utility function will be close to zero, predicting risk-neutral behavior.

- a) 130 USD
- b) 150 USD
- c) 200 USD
- d) 250 USD
- e) 300 USD



Example III: Present bias

- Thought Example: Participants in a study must choose between two different rewards:
 - The first half can either get DKK 100 or get DKK 110 in a year
 - The second half can either get DKK 100 in one year or get DKK 110 in two years
- Typical result: In the first group, significantly more people choose the quick payout



Present bias

- The behavior here may not immediately seem “strange”
- But note that for both groups the choice is to wait an extra year for an extra DKK 10 (i.e. 10 % in interest)
- It is therefore very surprising that there is such a big difference
- Present bias: People weigh things that happen “right now and here” especially high in their decisions (i.e. payout now is particularly attractive)



Present bias in the model

- Present bias can also be compared to and put into a (modified) “standard” model
- Since you have not seen a lot on the standard model on how to maximize utility over time we skip it (see Nechyba)
- But similar point as before: The “irrational” behavior here can be modelled using a particular, slightly special utility function



Present bias and procrastination

- Another example: A present-biased agent has to make a really difficult Micro hand-in on Friday:
 - Monday evening: It seems particularly difficult to do the task now, I clean today and do the task tomorrow
 - Tuesday night: It seems particularly difficult to do the task now, I wash clothes today and do the task tomorrow
 - ...
 - Thursday night (and late): It seems particularly difficult to do the task now, but the deadline is tomorrow so I just have to stick on all night



Socratic Quiz Question

Which of the following phenomena do you think is **not** among the most important consequences of present bias documented by the literature?

- a) Over-borrowing on credit cards
- b) Smoking
- c) Over-spending
- d) Under-investment in stocks
- e) Under-investment in education



Criticism: Other explanations of “irrational” behavior?

- Behavioral economics has been, and is still, to some extent, met with criticism from “traditional” economists (like most new theory).
- A classic criticism is that much of the “behavioral economic” behavior can in fact be well explained by a more “traditional” model
- Very often you can explain behavioral economic phenomena with a version of a standard model



Default bias as rational behavior

- Suppose a fully “rational” agent has to choose from some options, but has imperfect information on which option is the best
- He observes that one of the options has been set by default and this information he uses (mathematically) to assess the expected utility of the various options
- If the agent believes that the default is set because it is the best option for the average person then he will completely “rationally” select it
- This may explain default bias



Present bias as rational behavior

- One can also explain present bias by fully rational behavior:
 - When being paid right now, the agent is sure he will get the money
 - As soon as the payment is made in the future, the agent perceives that there is a positive probability of him being cheated and getting nothing
- One can (try) to design empirical studies in a way that remove / minimizes the above concern (and present bias generally still holds if you do)



Criticism: Is Behavioral Economics important?

- Another classic criticism is that the point of our standard models is not that we think humans are actually rational utility-maximizing agents
- Milton Friedman's "as-if" defense for utility maximizing models:
The models are useful because in practice people behave *as if* they were maximizing their utility



The “As if”-idea, a version

- People are not rationally maximizing utility, but have some things they like more than other things
- If at one point there is a (financial) choice that could make people better off, but is not made ...
- ... then it is extremely likely that some will discover it at some point (possibly by chance)
- Over time, more and more will do (and those who do may tell their friends)
- The predictions of the rational utility-maximizing model therefore work well in practice

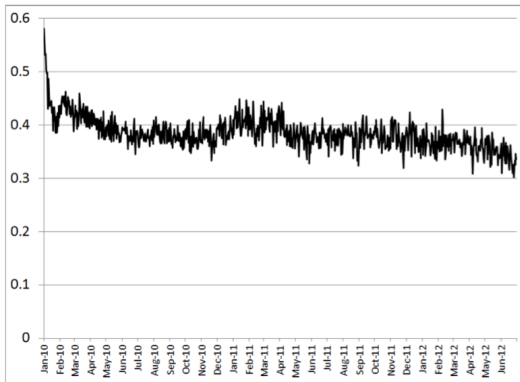


“As-if” and behavioral economics

- Under the “as-if” mindset, behavioral economics is only relevant if it is necessary / useful to explain important economic behavior in practice.
- Behavioral economic behavior has historically been documented in small, special studies / experiments
- Classical criticism: People make “mistakes” in small (strange) experiments, but (largely) not in the important economic decisions we are typically interested in
- (One variant of the argument is that “irrational” agents / companies would be driven out and disappear from the market)



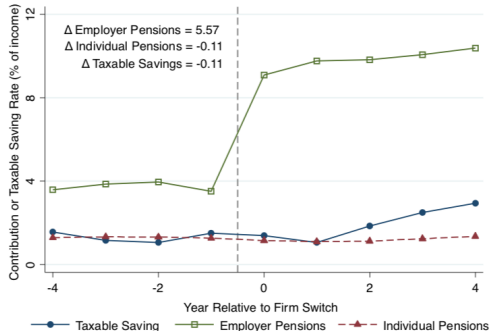
Homonoff (2018)



- January 2010, Supermarkets in Washington, DC:
 - Before: small discounts on plastic bag recycling
 - Now: small tax on the purchase of a new plastic bag
- Transition from bonus to loss:
HUGE drop in purchase of new bags
Loss aversion!



Chetty et al (2014)



- Danes who switch jobs to an employer with high default pension savings save significantly more
- Default bias!
- (Great study by Søren Leth-Petersen and Torben Heien Nielsen, et. al.)



Socratic Quiz Question

Akepanidaworn et al (2019, R&R at *Journal of Finance*) study the trading decisions of financial market experts, employees of a large institutional investor. They find that these experts have clear skills in buying stocks. How do you think their *selling* decisions compare to a **random** selling strategy?

- a) The experts earn about 200 basis points more.
- b) The experts earn about 100 basis points more.
- c) The experts earn about the same
- d) The experts earn about 100 basis points less.
- e) The experts earn about 200 basis points less.



Challenges in behavioral economics

- Modern consensus: Behavioral economics IS relevant in practice
- Now we dive into some other issues using behavioral economics; two points:
 - ① Predictions of behavioral economics can depend a lot on some difficult assumptions
 - ② Behavioral economics can make pretty wild (unrealistic?) predictions



Loss aversion, the reference point? I

- Back to our thought experiment on Loss aversion: Answer extra questions to gain / avoid loss of DKK 100.
- Remember our Loss aversion model, the crucial new one: income is assessed as a change relative to the already existing (reference point)
- The reference point (what you already have) is absolutely crucial ...
- ... but in practice it can be difficult to define / determine what this reference point is (where it comes from)



Loss aversion, the reference point? II

- Think about the following variations of the previous situation in the study
 - ① Participants will get DKK 100 in hand at the beginning, which they will lose if they do not answer additional questions
 - ② Participants are initially promised DKK 100 which will be paid at the end and are told that they will not get paid if they do not answer additional questions
 - ③ Participants entered the survey with an expectation of earning DKK 100, but are told that they will only receive them by answering additional questions
- In which of these cases is the DKK 100 perceived as a potential loss and in which case is it a gain?



Naive vs. sophisticated agents

- For both loss aversion and present bias, agents have (perhaps) *time-inconsistent* preferences:
 - Loss aversion: If I sell something today I will own more money and thus have a new reference point tomorrow
 - Present bias: My assessment of a one-year vs two-year payout changes once the time has passed
- Question: When agents make decisions today, are they aware that their preferences (might) change tomorrow?
- Hard to answer but can mean a lot to model predictions (say no thanks to income today to avoid losing the money later? make a decision today that forces me to do something specific tomorrow?)



Wild predictions I

- Consider an agent who has a present bias as before: DKK 100 today strictly better than DKK 110 in a year, but DKK 110 in two years better than 100 in a year
- Consider the following trade with the agent:
 - You offer a binding agreement that the agent gives you DKK 100 in a year in exchange for paying him DKK 110 in 2 years; he says yes
 - Once a year has passed, you offer the agent DKK 100 right away in exchange for getting DKK 110 + ε back from the agent a year later; he says yes if ε is not too big
- The net result of the above transaction is that you receive ε in two years: repeat the transaction many times and earn a fortune



Wild predictions II

- The present bias model indicates that the agent says yes to some trades that may ruin him
- There are plenty of reasons why this might not necessarily happen in practice ...
- ... but note that we may quickly get some wild predictions if we put such agents into our models
- Imagine, for example, a principal agent model with a present-biased agent: the optimal contract will easily ruin the agent (and perhaps yield infinite profits)



Behavioral economics and welfare economics

- Finally, we note that behavioral economics causes major problems for welfare economics (efficiency, social utility, social preferences)
- The whole point of welfare economics:
 - People have a utility function that they maximize and this results in behavior
 - We can use the utility to evaluate how well people are doing (efficiency, social utility, social preferences)
 - This avoids paternalism (where we tell other people what they like)



Behavioral economics

- Behavioral economics:
 - People behave as if they are maximizing a utility that contains "mistakes"; can we use it to say something about how well off people are?
 - Very specific example: For Loss Aversion and Present Bias, the utility function differs over time - what function should we use when evaluating welfare?
- A commonly used method is to specify / select a "cold self" utility function (as opposed to "hot self" which makes mistakes), but this is in principle arbitrary (paternalistic)
- Great challenge for how to think about what is the "right" policy and regulation



Nudging I

- Despite the problems, behavioral economics has become very popular with policymakers; is largely attributed to the book “Nudge” by Dick Thaler and Cass Sunstein
- Thaler and Sunstein’s “Libertarian Paternalism”:
 - We need insights from behavioral economics to “push” people in the right direction
 - We often make policy choices that we (now) know will affect what people choose, so let’s use it actively (defaults!)
 - Thaler and Sunstein also set a number of Nudge principles including: any nudge should be easy / cheap to counter



Nudging II



What have we learned?

- Three concepts of behavioral economics
- Traditional criticisms of behavioral economics
- More nuanced criticisms of behavioral economics
- Behavioral economics in practice

