

Behavioural & Experimental
Economics

Decision-making under Certainty

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Course Outline

- Choice under Certainty
 - Rational Choice under Certainty
 - **Decision-making under Certainty**
- Judgement under Risk & Uncertainty
- Choices under Risk & Uncertainty
- Intertemporal Choice
- Strategic Interaction

Think of the following case

Suppose you buy a plot of land for €50,000 and sell it after 10 years for €60,000. You are happy because you made a profit.

You knew that you would have made more money investing that money in the stock market.

Still think that buying the plot was a good investment, because you didn't lose any money.

Is this rational?



Second Case

- Imagine one night that you are considering going to the movies.
- What should you think about to be rational?
 - The price of the ticket : explicit cost
 - The other opportunities such as preparing the meal for tomorrow or studying for the next exam. Opportunity cost.



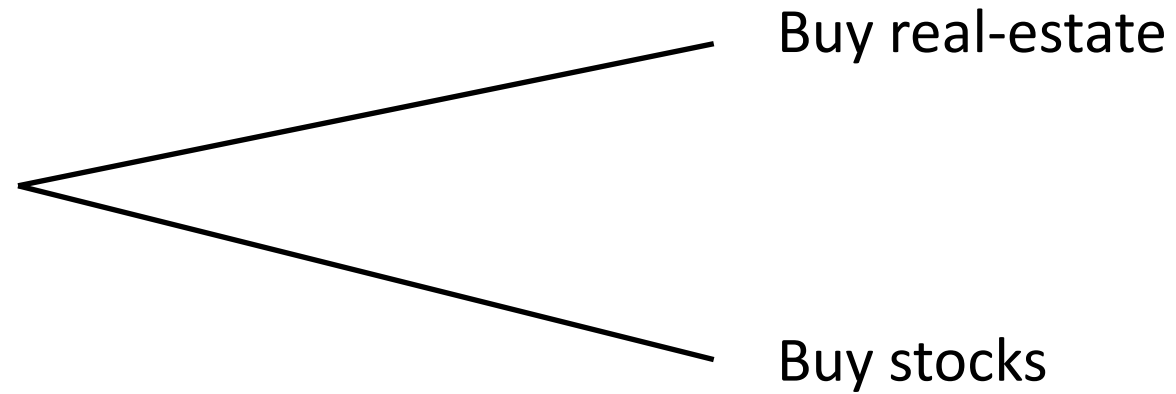
Opportunity cost

- **Explicit cost:** What you have to pay out of pocket (e.g., in dollars) to get something.
- **Opportunity (Implicit) Cost:** The value of the best option forgone.
- Example: If you watch a movie with friends, the explicit cost is the price of the ticket; the opportunity cost is the best thing you could have done with the time and money if you didn't watch the movie.

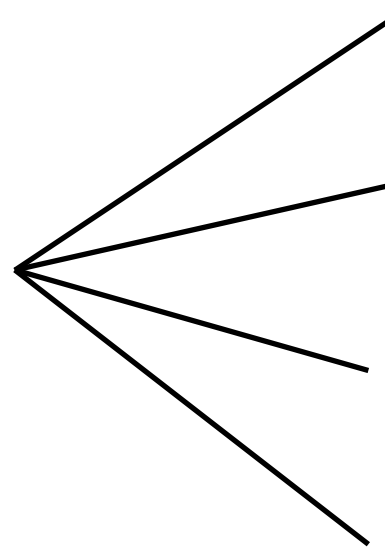
Opportunity cost

- **Economic profit:** Benefit of your choice minus the opportunity cost.
 - Suppose watching a movie gives you 10 units of utility while studying gives you 4 units of utility. When going to the movies, your economic profit is $10 - 4 = 6$ units of utility.
- When you make a rational choice, the opportunity cost never exceeds the benefits.

Decision tree



Example



| | <i>acts</i> | <i>utility</i> | <i>Opportunity cost</i> |
|--|------------------------------|-----------------------|------------------------------------|
| | Go to the movies (a_1) | $u(a_1) = 7$ | $c(a_1) =$ |
| | Study for exam (a_2) | $u(a_2) = 1$ | $c(a_2) =$ |
| | Manage investments (a_3) | $u(a_3) = 3$ | $c(a_3) =$ |
| | Go to work (a_4) | $u(a_4) = 4$ | $c(a_4) =$ |

Formally

- Opportunity costs:
 - $c(a_i) = \max\{u(a_1), u(a_2), \dots, u(a_{i-1}), u(a_{i+1}), \dots, u(a_n)\}$
 - $c(a_i)$ is the opportunity cost of a_i
 - $u(a_i)$ is the utility of a_i
- Rational choice:
 - A choice a_i is rational if and only if $u(a_i) \geq c(a_i)$

Exercise

- The following question was famously asked of 200 professional economists at the 2005 meeting of the American Economic Association (AEA).

Exercise

You won a free ticket to see an Eric Clapton concert (which has no resale value). Bob Dylan is performing on the same night and is your next-best alternative activity. Tickets to see Dylan cost \$40. On any given day, you would be willing to pay up to \$50 to see Dylan. Assume there are no other costs of seeing either performer. Based on this information, what is the opportunity cost of seeing Eric Clapton?

- a. \$0
- b. \$10
- c. \$40
- d. \$50

- Only 21.6 percent of the professional economists in the study got the answer right, which is particularly embarrassing if you reflect on the fact that they could have done better had they simply picked their answers randomly.

Cab Drivers

“Labor Supply of New York City Cab drivers: One day at a time”

by C. Camerer, L. Babcock, G. Lowenstein, & R. Thaler



Cab Drivers

The authors of the study estimate that holding the total number of hours constant, drivers could increase their earnings by as much as 5 percent by working the same number of hours every day, and as much as 10 percent by working more on more profitable days.

Discussion

Why do people sometimes ignore opportunity costs?

- Considering the opportunity cost of ALL possible alternatives might be extremely demanding.
- In fact, in some cases it might be even rational to not consider the entire set of alternatives.
- Not ignoring opportunity cost can lead to “the paradox of choice”
- Sometimes people are not ignoring opportunity cost, but staying with a “safe option” because of risk and uncertainty.

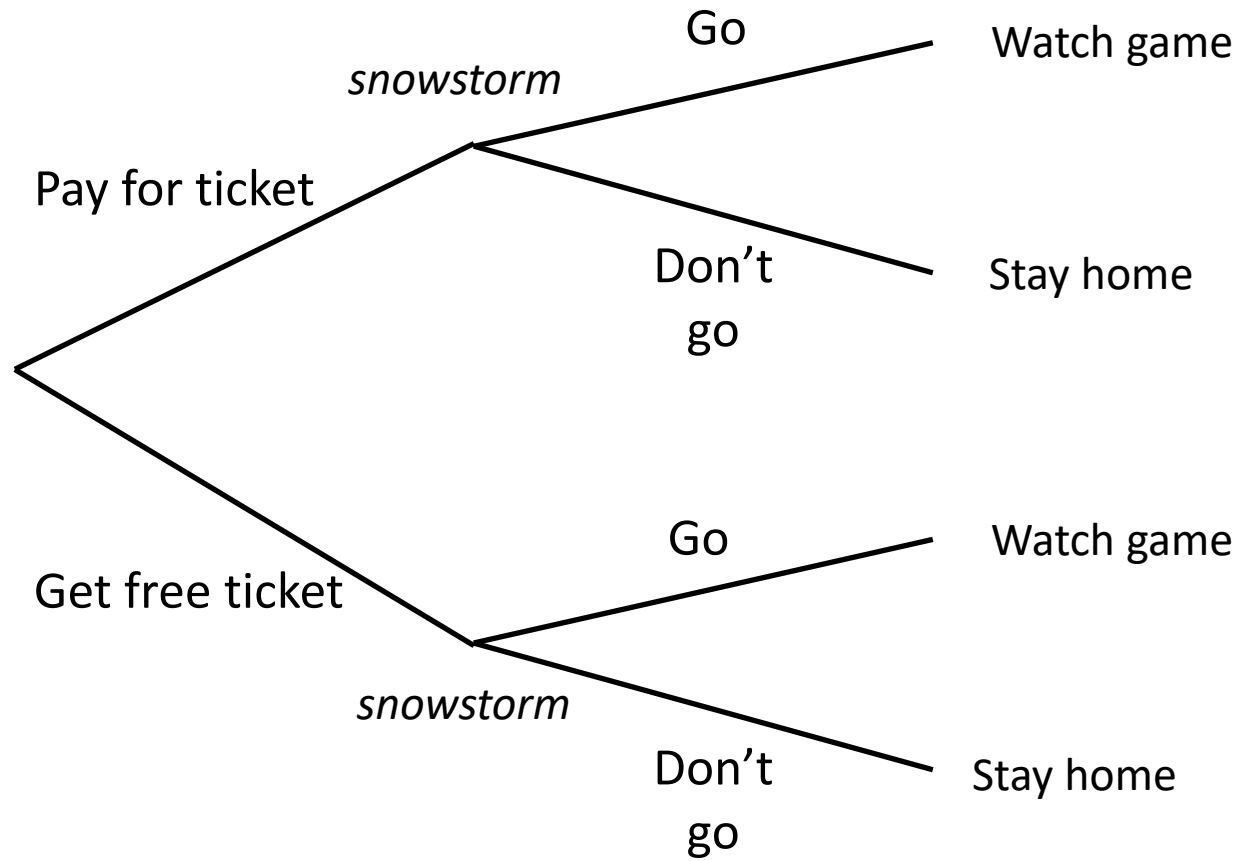




80\$ or Free



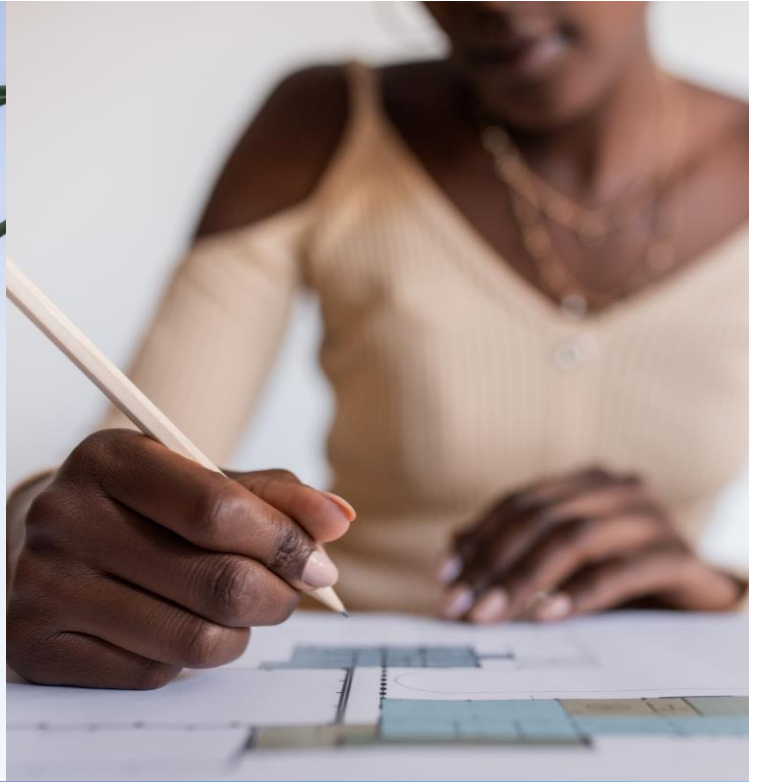
Example



Sunk cost fallacy

Sunk cost: a cost that cannot be recovered at the time when the decision is made.

If you honor sunk costs, you are committing **the sunk-cost fallacy**



Other examples

- According to a survey, 38.1% of readers say they will finish a book they started reading no matter what – even if they hate it.
- Students at an expensive private university may take courses at a nearby public university at no additional charge. One of their professors tells them that it would make no sense to do so, since they would be losing money they paid for tuition at the private uni. Given that a student has already paid tuition at the private uni, but considers that the courses offered at the public university are better for her, where should she sign up?
- One reason outlet malls are located far away from where people live is that executives want shoppers to think of the sunk cost of a long drive to the mall as an investment that will be lost if they do not shop enough.
- Revenge?

What would you choose?



| | | |
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Menu Dependence

- The inclusion of an option that nobody in their right mind would choose can affect people's preferences over the remaining options.





Menu dependence

Rationality implies the **expansion condition**:

If x is chosen from the menu $\{x, y\}$ assuming that you are not indifferent between x and y , you must not choose y from the menu $\{x, y, z\}$.

If this condition does not hold, then we have ***menu dependence***.

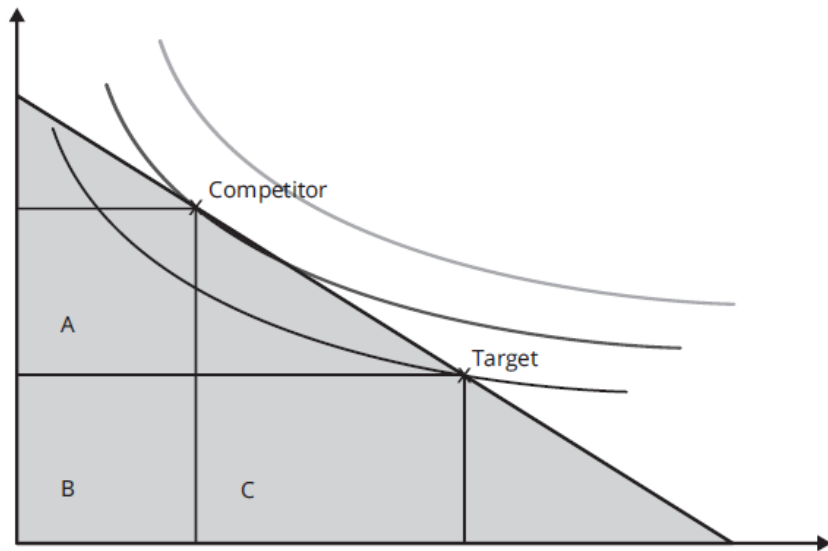
In other words, menu dependence occurs when people's revealed preferences are influenced by the menu.

The decoy effect

The **decoy effect** occurs when the introduction of a subpar option causes individuals to change their preferences.

The decoy effect

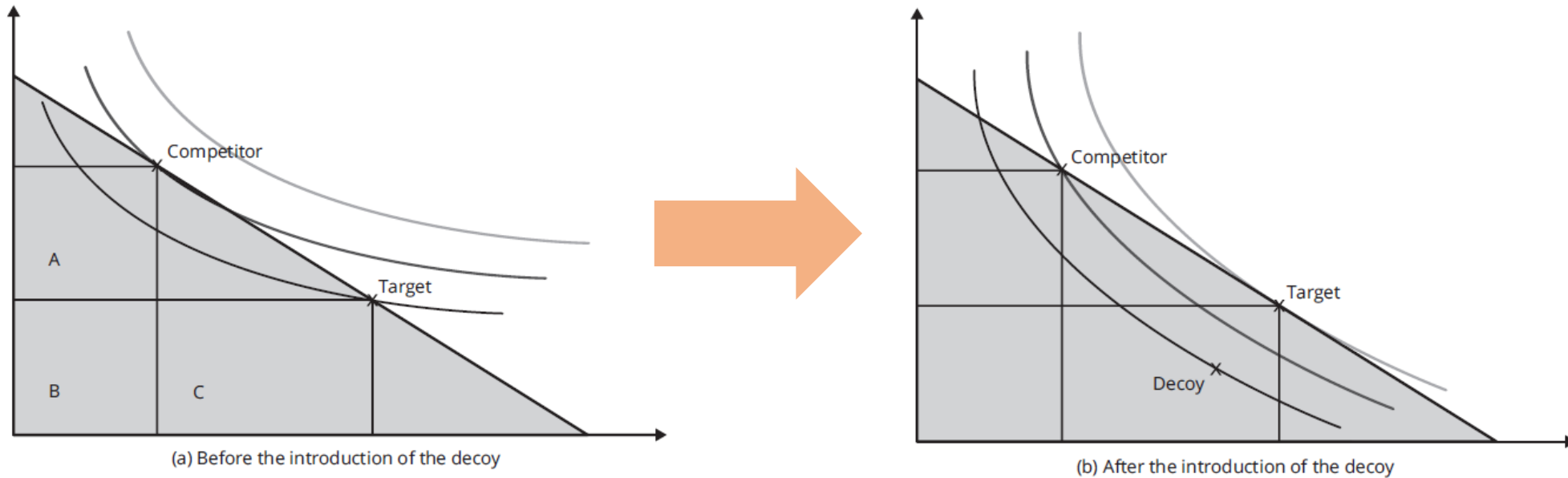
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(a) Before the introduction of the decoy

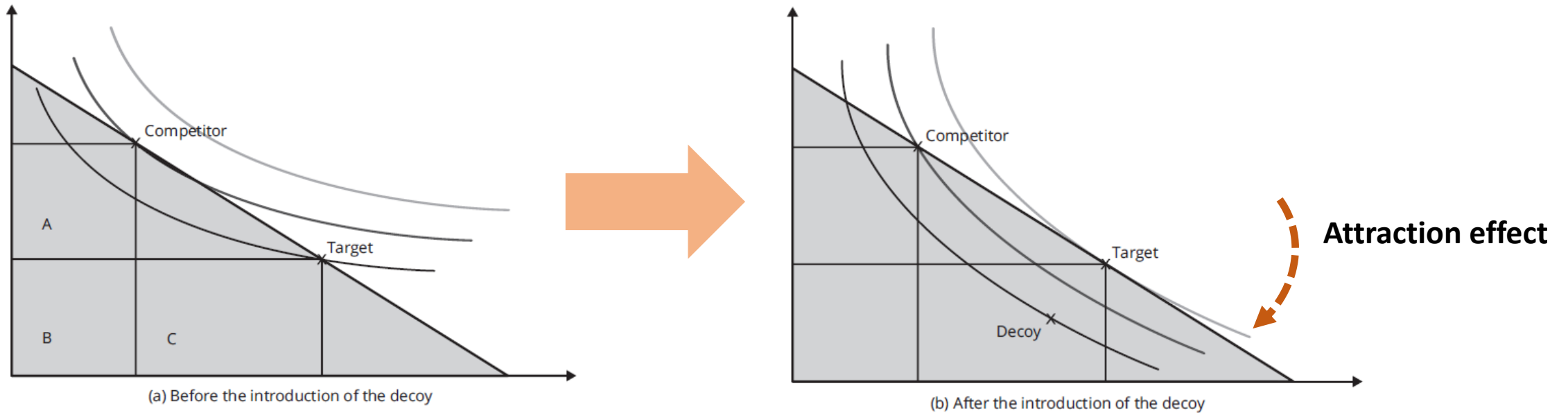
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The decoy effect

- The decoy must be **asymmetrically dominated** by the target, meaning dominated by the target but not by the competitor.
- The decoy effect might be due to **reason-based choice**: consumers looking for a reason to choose one of the options rather than the other.

Exercise

Suppose that you are a real-estate agent showing two properties to potential customers. The one is in good shape but far from the client's office; the other is only in decent shape but close to the office.

- a) If you want the customers to choose the former, what third property would you show?
- b) If you want the customers to choose the latter, what third property should you show?

The compromise effect

The **compromise effect** is another form of menu dependence. It is peoples' tendency to choose an alternative that represents a compromise or middle option in the menu.

Exercise:

How can a restaurant set up its wine menu to take advantage of the compromise effect?

A possible explanation

Reason-based choice

Perhaps, when making a choice, individuals try to come up with a *reason* for it in order to feel better about their decision:

- A *decoy* may provide a good excuse to reject the competitor and choose the target.
- An extreme option gives a good reason to choose an option in the middle.

Caution:

Menu expansion & information revelation

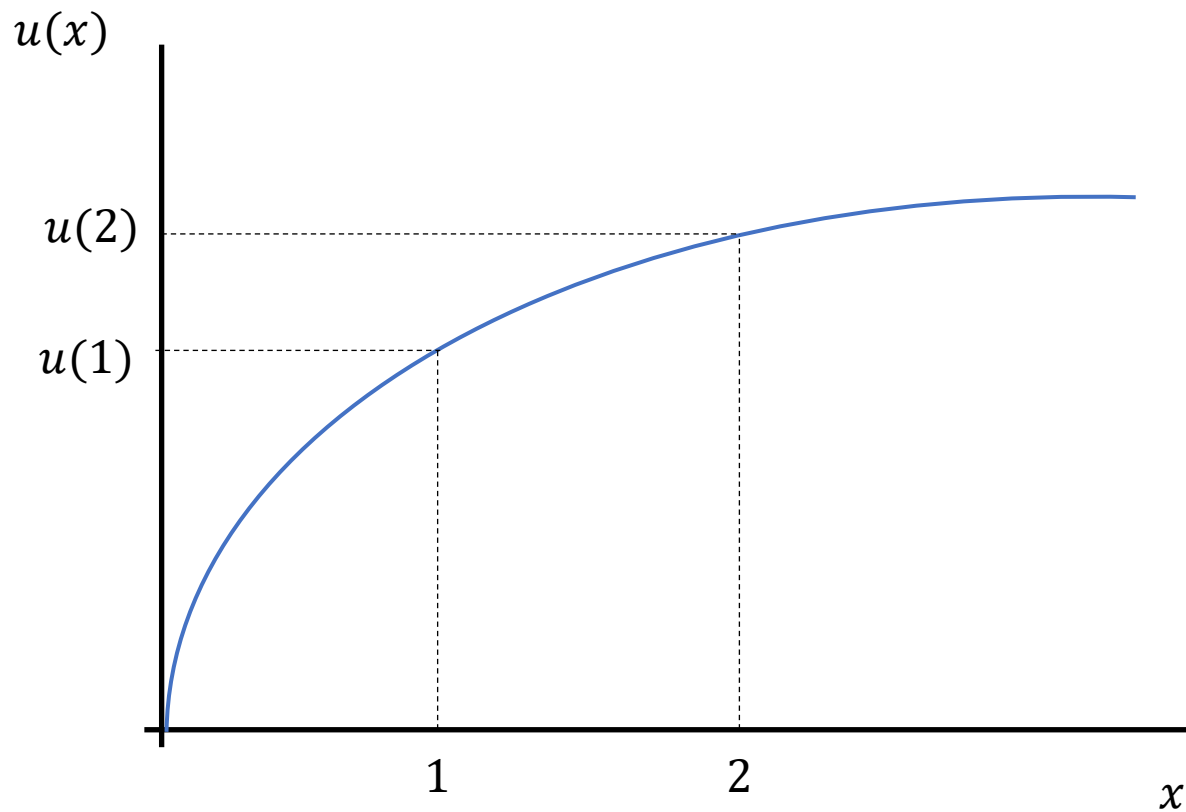
If the options in a menu also provide information, then changing the menu may change ones beliefs and, hence, their preferences.

Example

Suppose you go to a restaurant and they offer {fish, meat, nothing}. You pick fish. Then the waiter comes and tells you that they also offer crack-cocaine. You now prefer to get nothing and leave. Is that menu dependence?

The utility of a Mug.

Utility over M&M packs (or mugs, or...)

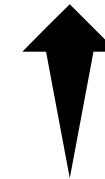


The Endowment Effect

\$5.25



\$2.25 to \$2.75



Endowment effect

Frequently people require a lot more to give up something that they already own, than they would be willing to pay to get it when they do not own it.

This is known as the **endowment effect** and also sometimes called the “*Willingness to Pay (WTP) – Willingness to Accept (WTA) Gap*”.

It is a type of *reference-point phenomenon*: individuals’ assessment of different options depends on a reference point.

These are all instances of **framing effects**. Other examples of framing effects include the *money illusion*: someone’s choices might depend on the currency used, even if real prices are the same.

- Imagine that the US is preparing for the outbreak of an unusual contagious disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:
 - If Program A is adopted, 200 people will be saved;
 - if Program B is adopted, there is a $1/3$ probability that 600 people will be saved, and a $2/3$ probability that no one will be saved.
- Which of the two programs would you favor?

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- Which of the two programs would you favor?

When this problem was first presented to participants, 72 percent chose A and 28 percent chose B.

- Imagine that the US is preparing for the outbreak of an unusual contagious disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:
- if Program C is adopted 400 people will die;
- if Program D is adopted there is a $1/3$ probability that nobody will die, and a $2/3$ probability that 600 people will die.
- Which of the two programs would you favor?

- Imagine that the US is preparing for the outbreak of an unusual contagious disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:
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- Which of the two programs would you favor?

When this problem was first presented to participants, only 22 percent chose C and 78 percent chose D.

Loss aversion

People tend to dislike losses more than they like gains.

Problem 1 ($N = 152$): Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:

72%

If Program A is adopted, 200 people will be saved. [72 percent]

28%

If Program B is adopted, there is $1/3$ probability that 600 people will be saved, and $2/3$ probability that no people will be saved. [28 percent]

If Program C is adopted 400 people will die. [22 percent]

22%

If Program D is adopted there is $1/3$ probability that nobody will die, and $2/3$ probability that 600 people will die. [78 percent]

78%

Which of the two programs would you favor?

Prospect Theory

An alternative theory to rational choice theory:

Use a *value function* $v(\cdot)$, instead of utility function. Two critical features:

First

- Utility function ranges over *total* endowments
- Value function ranges over *changes* in endowments.

Second

- Value function has a *kink at the reference point*: $v(|-1|) > v(|+1|)$

Prospect Theory

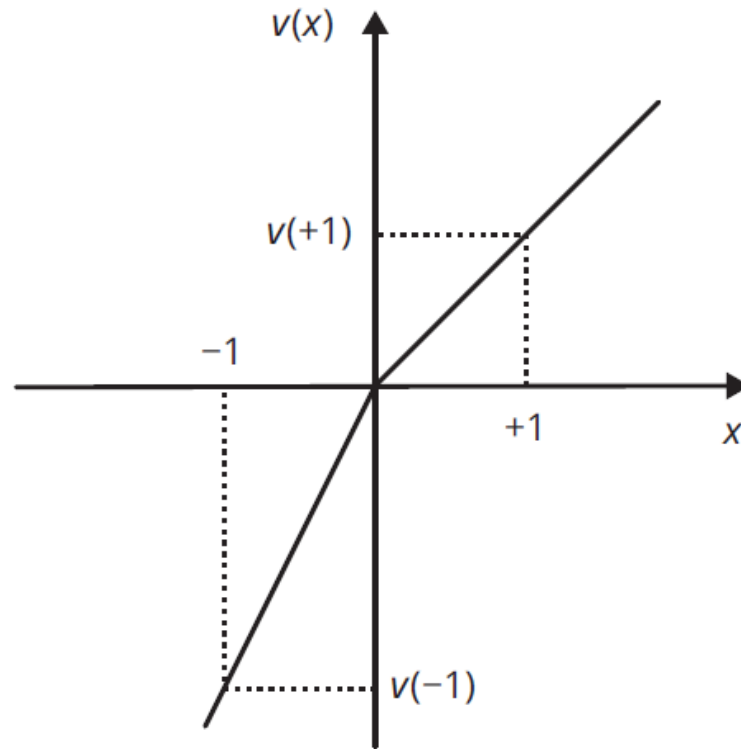


Figure 3.11 Value function

Prospect Theory

- Captures loss aversion
- If you gain something and then lose it, you might be worse off!
- Value function example:

$$v(x) = \begin{cases} x & \text{for gains } (x \geq 0) \\ -2x & \text{for losses } (x < 0) \end{cases}$$

- You have a bill of 10€ in your pocket, you walk and then you find that you lost the bill.
- You feel sad
- Then you find a bill on the street. What should be the amount of the bill to make you feel better?

Prospect Theory

Alicia, Benice and Charlie own stock in the same company. When they bought the stock, it was worth \$10. It later rose to \$17, but then dropped to \$12 before they sold it. The three have the same value function: $v(x) = x/2$ for gains and $v(x) = 2x$ for losses.

- a. Alicia uses the selling price (\$12) as her reference point.
 - b. Benice uses the peak price (\$17) as her reference point.
 - c. Charlie uses the buying price (\$10) as her reference point.
1. If you ask them, how much would each one of them say that they lost in terms of value when the price dropped from \$17 to \$12?
 2. Who was more disappointed when the price dropped?

Prospect Theory

Evaluate the change in value when price went from \$17 to \$12

- For Alicia (reference point \$12) we have a change from +5 to 0:

$$v(0) - v(+5) = 0 - 2.5 = -2.5$$

- For Benice (reference point \$17):

$$v(-5) - v(0) = -10 - 0 = -10$$

- For Charlie (reference point \$10):

$$v(2) - v(7) = 1 - 3.5 = -2.5$$

Exercise 3.39 (a) Given her reference point of \$ 12, Alicia thinks of the price drop from \$17 to \$12 as a change from +5 to 0. The change in value terms is $v(0) - v(+5) = 0 - 2.5 = -2.5$, meaning a loss of 2.5. (b) Given her reference point of \$17, Benice thinks of the price drop as a drop from 0 to -5. The change in value terms is $v(-5) - v(0) = -10 - 0 = -10$, meaning a loss of 10. (c) Given her reference point of \$10, Charlie thinks of the price drop as a change from +7 to +2. The change in value terms is $v(2) - v(7) = 1 - 3.5 = -2.5$, meaning a loss of 2.5. (d) Benice is most disappointed.

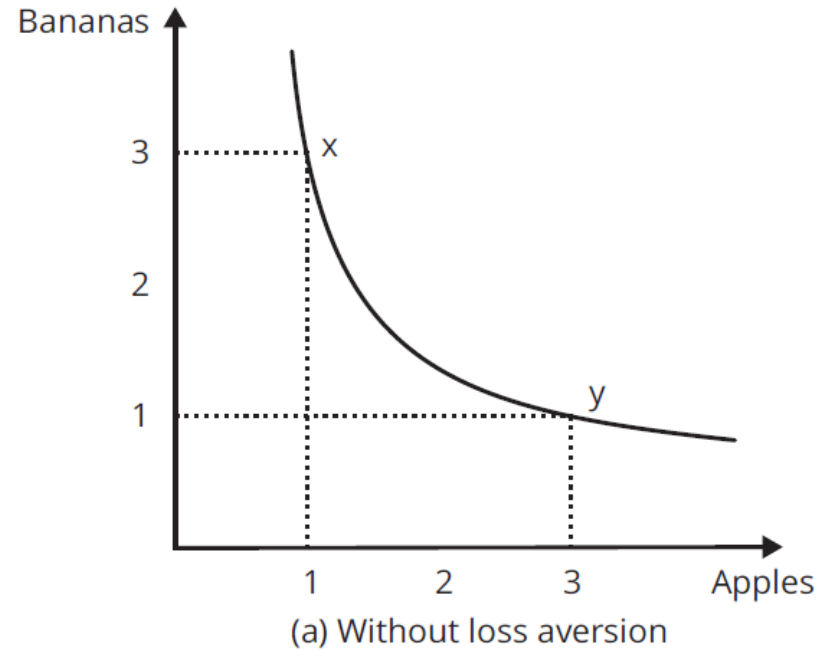
The power of prospect theory

- “30-day-no-questions-asked return policy”.
- ‘Cancelling tax cuts’ vs. ‘raising taxes’.
- Negotiation failure even when mutually beneficial agreements are possible.
- Discount for ‘bring your own coffee mug’ instead of extra charge for not doing so.

What determines reference points?

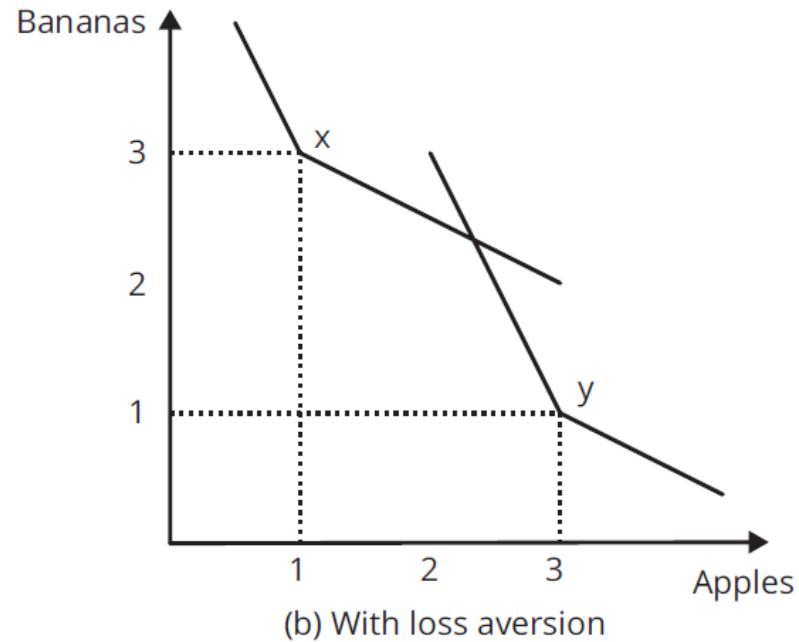
- Aspirations and expectations.
- Social comparisons.

Indifference Curves without Loss Aversion



A bundle of 3 bananas and 1 apple equals 1 banana and 3 apples, irrespective of endowment.

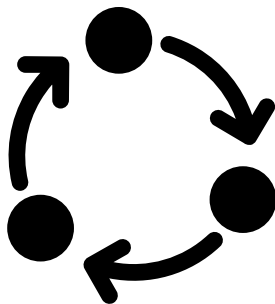
Indifference Curves with Loss Aversion



If you start with 3 bananas and 1 apple, losing 2 bananas will outweigh gaining 2 apples. The curves have kinks.

22 mugs

11



2



Status quo bias

If preferences (i.e. the shape of the indifference curves) depends on the starting point, then *you will tend to prefer the current state of affairs under any circumstances.*

Example



65

A close-up photograph of a person's hands gently cupping a small, colorful globe of the Earth. The globe shows the continents of North America, South America, and parts of Europe and Africa. The text '% of African countries in the UN' is overlaid in white, sans-serif font across the center of the image. The background is a warm, out-of-focus brown.

% of African countries in the UN

10

25%

65

45%

- (correct answer is 28%).

$$1 * 2 * 3 * 4 * 5 * 6 * 7 * 8 = ?$$

$$8 * 7 * 6 * 5 * 4 * 3 * 2 * 1 = ?$$

- $1 * 2 * 3 * 4 * 5 * 6 * 7 * 8 = ?$

- 512

- $8 * 7 * 6 * 5 * 4 * 3 * 2 * 1 = ?$

- 2250

Correct answer is 40 320

Anchoring and Adjustment

A cognitive process used to form judgements
(and sometimes preferences)

Two steps

1. Pick an initial estimate, called the **anchor**.
2. Adjust the initial estimate up or down.

Anchoring and Adjustment

May explain marketing strategies such as saying:

“Used to be \$50, now only \$24.99!”

“Suggested retail price: \$14.99. Now, only \$9.99”

“Limit of 6 per person”

“Buy 10 get 2 for free”

The 'heuristics-and-biases program'

An approach to studying judgement and decision-making

According to this approach, humans do not actually compute probabilities and utilities (or values) when making decisions. Instead, they apply heuristics, i.e. rules of thumb.

Heuristics are

- functional: simple, low effort and approximately correct.
- Not perfect: can lead to systematically and predictably wrong answers: **bias**.

Summary

- Decision making under certainty
 - Opportunity Cost
 - Sunk cost
 - Menu Dependence, Decoy effect and compromise effect
 - Endowment effect
 - Framing effect and Loss aversion
 - Prospect theory and Reference point
 - Status Quo Bias
 - Anchoring and Adjustment
 - Heuristics and Bias

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