BEHAVIORAL ECONOMICS · LECTURE 14

Reference-dependent preferences

Niels Boissonnet – Bielefeld University

Master Economics – Winter 2026/27

Before we start: a mug

Look at this mug (a plain university coffee mug, worth about EUR 6 in the shop).

Left half of the room

The mug is **yours**: you take it home after class.
What is the lowest price at which you would sell it?

Right half of the room

You do **not** own the mug.
What is the highest price you would pay to buy it?

Write down one number. We come back to it in the second part of the lecture.

Learning objectives

By the end of this lecture you should be able to:

- State the assumptions of a **reference-dependent value function** and draw it.
- Explain the **endowment effect** and **status quo bias** with loss aversion, and derive WTP and WTA.
- Define a **personal equilibrium** (Kőszegi–Rabin) and compute it in a simple purchase problem.
- Show how **narrow bracketing** turns loss aversion into excessive risk aversion.
- Assess field evidence: equity premium, disposition effect, taxi drivers, tax filing.

Roadmap

Reference dependence and loss aversion

Endowment effect and status quo bias

Expectations as reference points: Kőszegi–Rabin

Narrow bracketing

Applications in the field

Wrap-up

Where we are in the course

The assumptions of the Robinson model

0. **Consistent preferences:** Robinson's choices can be described by a utility function u
1. **Costless optimization:** he always finds the option that maximizes u
2. **Correct beliefs & expected utility:** he knows p and maximizes expected utility
3. **Absolute, self-regarding consumption:** only his own (b, y) enters u
4. **Stable tastes:** the same u in both periods

Today we relax Assumption 3a: utility depends on outcomes **relative to a reference point**, not only on absolute levels of consumption. (3b, self-interest, is the topic of the course "Social Preferences".)

1

Reference dependence and loss aversion

Outcomes are coded as gains and losses relative to a reference point, and losses loom larger than gains.

Gains and losses, not levels

Levels vs. changes

- So far, outcomes were valued on an **absolute scale**: $u(x)$ depends on the level x only.
- In practice it is often easier to compare an outcome to a benchmark: the **reference point** r. Gains and losses are defined relative to r.

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It depends on. . .

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- what you got **last time**: *past experience, adaptation*;
- what the **people around you** got: *social comparison*.

Two ingredients

Two regularities

Separating gains from losses allows us to describe two regularities:

1. **Diminishing sensitivity:** the marginal impact of a change falls with its distance from r. People are **risk averse over gains** and **risk seeking over losses**.
2. **Loss aversion:** losses loom larger than commensurate gains.

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Prospect theory = **probability weighting** (Lectures 10–11) + **reference dependence** (today). The two can be studied separately: most of today involves no probabilities at all.

Diminishing sensitivity: the disease problem again

Recall Lecture 1 (Tversky and Kahneman, 1981): 600 people are expected to die.

Lives saved (reference: 600 die)

- A: 200 saved (72%)
- B: $\frac{1}{3}$ all 600 saved, $\frac{2}{3}$ none (28%)

Lives lost (reference: no one dies)

- C: 400 die (22%)
- D: $\frac{1}{3}$ nobody dies, $\frac{2}{3}$ 600 die (78%)

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Worked example

$v(z) = \sqrt{z}$ for gains, $v(z) = -2\sqrt{-z}$ for losses (no probability weighting):

- Gain frame:
  $v(A) = \sqrt{200} \approx 14.1 \; > \; v(B) = \frac{1}{3}\sqrt{600} \approx 8.2 \Rightarrow$ **A**.

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Same final outcomes, different reference point: concave over gains, convex over losses.

Same final wealth, different reference point

Kahneman and Tversky (1979), Problems 11 and 12 (in Israeli pounds):

Problem 11

You have been given 1000. Choose:

- $[\frac{1}{2} : +1000;\ \frac{1}{2} : 0]$ (16%)
- $+500$ for sure (84%)

Problem 12

You have been given 2000. Choose:

- $[\frac{1}{2} : -1000;\ \frac{1}{2} : 0]$ (69%)
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Both problems are the same choice:
$[\frac{1}{2} : 2000;\ \frac{1}{2} : 1000]$ vs. 1500 for sure.

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The initial gift is ignored: subjects evaluate the *changes*. Expected utility over final wealth cannot produce this pattern, a reference-dependent value function can.

Your turn: a mixed gamble

Group 1

You are given EUR 3500. Choose between

- a sure gain of $+500$;
- $[\frac{1}{2} : +1500;\ \frac{1}{2} : -500]$.

Group 2

You are given nothing. Choose between

- EUR 4000 for sure;
- $[\frac{1}{2} : 5000;\ \frac{1}{2} : 3000]$.

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What loss aversion predicts

- Final wealth is again identical in both groups.
- Group 2 only sees **gains**. Group 1's risky option contains a **loss**.
- Prediction of loss aversion: the risky option is chosen **less often in Group 1**.

A model of reference dependence

Model

Outcome $x \in \mathbb{R}$, reference point $r \in \mathbb{R}$. A lottery $L = [p_1 : x_1; \ldots; p_n : x_n]$ is valued by

$$V(L \mid r) \;=\; \sum_{i=1}^{n} p_i \, v(x_i - r).$$

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Assumptions on the value function

$v : \mathbb{R} \to \mathbb{R}$, continuous and strictly increasing:

1. *Reference point is neutral:* $v(0) = 0$.

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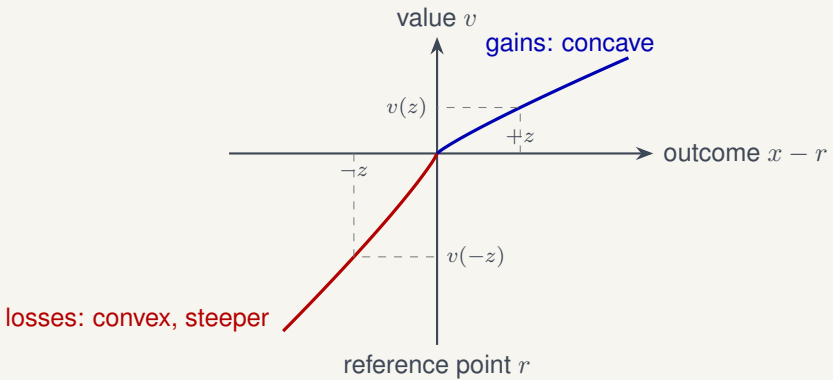
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Parametrization

Workhorse parametrization (Tversky and Kahneman, 1992): $v(z) = z^{\alpha}$ for $z \geq 0$, $v(z) = -\lambda(-z)^{\alpha}$ for $z < 0$, with median estimates $\alpha \approx 0.88$, $\lambda \approx 2.25$.

The value function



$v(z) = z^{0.88}$, $v(-z) = -2.25\, z^{0.88}$: a loss hurts about twice as much as an equal gain pleases.

Loss aversion in risky choice

Setup

Take the simplest version: **linear** value with a kink, $v(z) = z$ for $z \geq 0$, $v(z) = \lambda z$ for $z < 0$, $\lambda > 1$.

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Only gains, so CE $= \frac{1}{2} \cdot 10 = 5$.
Risk neutral.

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Expected value 0, but

$$V = \tfrac{1}{2} \cdot 5 + \tfrac{1}{2} \cdot \lambda(-5) = -\tfrac{5}{2}(\lambda - 1) < 0.$$

The CE $y < 0$ solves $\lambda y = V$, so $y = -\frac{5}{2}\,\frac{\lambda - 1}{\lambda}$. With $\lambda = 2$: $y = -1.25$.

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Loss aversion is **not** risk aversion: the agent is risk neutral over pure gains, yet rejects fair (and even favorable) mixed gambles. It creates **first-order risk aversion** at the reference point.

Recap: reference dependence

Recap

- Outcomes are coded as **gains and losses** relative to a reference point r (status quo, expectations, past, others).
- Value function: $v(0) = 0$, concave for gains, convex for losses, **steeper for losses** ($\lambda \approx 2$).
- Evidence: disease problem, Problems 11–12, rejection of mixed gambles.
- Loss aversion $\neq$ risk aversion: a kink at r gives first-order risk aversion for mixed gambles.

Next: the same logic without any risk.

2

Endowment effect and status quo bias

Ownership and defaults move the reference point: giving something up is a loss, acquiring it only a gain.

Riskless choice: a two-dimensional model

Model

Tversky and Kahneman (1991): goods are evaluated **dimension by dimension** relative to a reference bundle.

- Bundles (c, g): cash c and mugs g; reference bundle (r_c, r_g).
- Utility of a bundle: $U(c, g \mid r) = v_c(c - r_c) + v_g(g - r_g)$.
- In each dimension $k \in \{c, g\}$, with u_k increasing and $u_k(0) = 0$:

$$v_k(z) = \begin{cases} u_k(z) & \text{if } z \geq 0 \quad \text{(gain)} \\ -\lambda\, u_k(-z) & \text{if } z < 0 \quad \text{(loss)}, \qquad \lambda > 1. \end{cases}$$

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Example

Get \$1 and give up 1 mug:
$U = u_c(1) - \lambda\, u_g(1)$.

Key point: utility depends on **changes** relative to r, not on levels.

Endowment effect: the experiment

Kahneman et al. (1990; summarized in Kahneman et al., 1991):

Design

- 44 students; **22 randomly given a coffee mug**, the other 22 nothing.

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Prediction of the standard model

Mugs are assigned at random, so about half of the 22 “mug lovers” (valuation above the median) do not own one and buy from the 11 “mug haters” who do: **about 11 trades** expected.

Endowment effect: the results

Kahneman et al. (1990)

- Trades in 4 sessions: 4, 1, 2, 2 (vs. 11 predicted).
- Median selling price: **$5.25**.
- Median buying price: **$2.25–$2.75**.
- Ratio WTA/WTP ≈ 2.

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Our room

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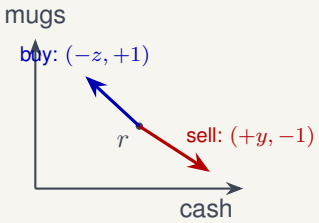
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Willingness to accept (WTA) exceeds **willingness to pay** (WTP) for the same object: whether the reference point includes the mug changes the valuation.

WTP and WTA with loss aversion

Setup

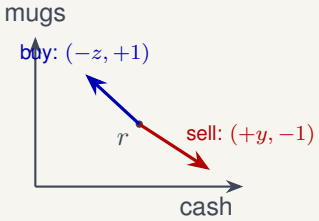
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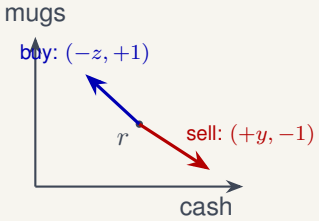
Pay z for a mug. Gain a mug, lose cash:

$$\theta - \lambda z = 0 \;\Rightarrow\; \text{WTP} = \theta/\lambda.$$

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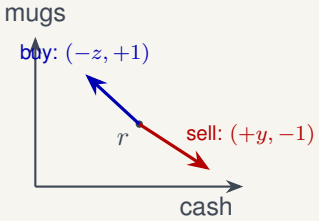
Sell for y. Gain cash, lose a mug:

$$y - \lambda\theta = 0 \;\Rightarrow\; \text{WTA} = \lambda\theta.$$

WTP and WTA with loss aversion

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WTA (own a mug, $r = (r_c, r_g + 1)$)

Sell for y. Gain cash, lose a mug:

$$y - \lambda\theta = 0 \;\Rightarrow\; \text{WTA} = \lambda\theta.$$

$$\frac{\text{WTA}}{\text{WTP}} = \lambda^2 > 1. \qquad \text{Example: } \theta = 6,\ \lambda = 2 \;\Rightarrow\; \text{WTP} = 3,\ \text{WTA} = 12.$$

Status quo bias and defaults

Definition

Status quo bias (Samuelson and Zeckhauser, 1988): people stick to the current option more than its merits justify.

- Any change from the status quo brings gains *and* losses; the losses weigh more.
- Result: **inertia**, even when switching is (almost) costless.

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Field evidence: defaults (Madrian and Shea, 2001)

- A US firm switched its 401(k) savings plan from opt-in to **automatic enrollment**.
- Participation of new employees: from about 37% to about 86%.
- Most kept the default contribution rate and fund.

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- A US firm switched its 401(k) savings plan from opt-in to **automatic enrollment**.
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- Most kept the default contribution rate and fund.

The default becomes the reference point: a powerful and cheap policy tool (a *nudge*).

Is the endowment effect really loss aversion?

Skeptics

- Plott and Zeiler (2005): with training, practice rounds, anonymity and a clear incentive-compatible elicitation, the **WTA–WTP gap disappears** (for mugs).
- Gap may reflect subjects' **misconceptions** about the elicitation mechanism.

Supporters

- Dean and Ortoleva (2019) measure, in the **same subjects**, loss aversion in gambles and the WTA–WTP gap for a lottery $[\frac{1}{2} : \$10;\ \frac{1}{2} : \$0]$.
- WTP \$3.76, WTA \$4.59; the two measures are positively **correlated** (about 0.6).

If one parameter λ explains both risky and riskless anomalies, they should move together across people: a testable prediction of the model.

Recap: endowment effect and status quo bias

Recap

- Ownership moves the reference point: giving up the mug is a **loss**, acquiring it a **gain**.
- With loss aversion in each dimension: WTA/WTP $= \lambda^2$ ($= \lambda$ if money spent is not coded as a loss).
- Status quo bias and the power of **defaults** follow from the same logic.
- The size of the effect depends on procedures (Plott–Zeiler), but it correlates with risky loss aversion.

Open question so far: where does the reference point come from?

3

Expectations as reference points: Kőszegi–Rabin

If the reference point is what you expect, expectations and choices must be consistent: a personal equilibrium.

Where do reference points come from?

The problem

- So far we **assumed** that we observe r: the status quo, the endowment.
- But who is “endowed” when you walk into a shop expecting to buy?
- Candidates: current consumption, the status quo, others’ consumption, contracts (Hart and Moore, 2008)...

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The Kőszegi–Rabin model

Utility

Outcome $c = (c^1, \ldots, c^K)$, reference $r = (r^1, \ldots, r^K)$, one coordinate per good. Utility

$$u(c \mid r) = \sum_{k=1}^{K} \Big[\underbrace{m_k(c^k)}_{\text{consumption utility}} + \underbrace{\mu\big(m_k(c^k) - m_k(r^k)\big)}_{\text{gain-loss utility}} \Big], \qquad \mu(z) = \begin{cases} \eta z & z \geq 0 \\ \eta \lambda z & z < 0 \end{cases}$$

with $\eta > 0$ (weight of gain-loss utility) and $\lambda > 1$ (loss aversion).

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Stochastic reference points

If the outcome is drawn from F and expectations are G:

$$U(F \mid G) = \iint u(c \mid r)\, dG(r)\, dF(c) :$$

each outcome is compared with every outcome one expected.

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Example

You expect a bonus $[\frac{1}{2} : 1000;\ \frac{1}{2} : 0]$, $m(c) = c$, $\eta = 1$, $\lambda = 2$.

- Get 1000: gain-loss $= \frac{1}{2}\mu(0) + \frac{1}{2}\mu(1000) = +500$. Get 0: $\frac{1}{2}\mu(-1000) = -1000$.
- Expected gain-loss utility: $\frac{1}{2}(500) + \frac{1}{2}(-1000) = -250 < 0$: **uncertainty itself hurts**.

Personal equilibrium

Definition (Kőszegi and Rabin, 2006)

Choice set D of lotteries over outcomes. $F \in D$ is a **personal equilibrium** (PE) if

$$U(F \mid F) \geq U(F' \mid F) \qquad \text{for all } F' \in D.$$

Given that she *expects* F, she *wants* to choose F.

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Expectations are self-fulfilling: several PE may coexist, and **what you expected to do** determines what you do.

Example: buying earmuffs

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- B is a PE iff $1 - p \geq \eta(p - \lambda) \iff p \leq \dfrac{1 + \eta\lambda}{1 + \eta}$.

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Expect not to buy (r: nothing, 0)

- N: 0. B: $1 - p + \eta \cdot 1 - \eta\lambda p$ (gain earmuffs, lose the money).
- N is a PE iff $0 \geq (1 + \eta) - (1 + \eta\lambda)p \iff p \geq \dfrac{1 + \eta}{1 + \eta\lambda}$.

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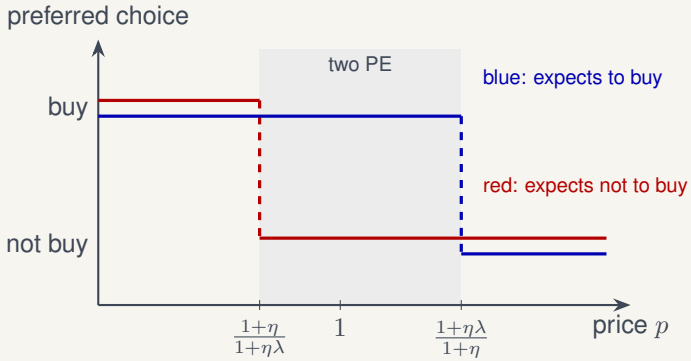
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Numbers: $\eta = 1$, $\lambda = 2$: buy is a PE for $p \leq \frac{3}{2}$, not buying for $p \geq \frac{2}{3}$. Both are PE for $p \in [\frac{2}{3}, \frac{3}{2}]$. Standard consumer: buy iff $p \leq 1$.

Personal equilibria in the earmuff example



PPE: compare $U(B \mid B) = 1 - p$ with $U(N \mid N) = 0$: buy iff $p \leq 1$, the standard answer **in this deterministic case**.

Recap: expectations as reference points

Recap

- Kőszegi–Rabin: r = rational **expectations** of outcomes, possibly stochastic.
- Utility = consumption utility + gain-loss utility μ with $\eta > 0$, $\lambda > 1$.
- **Personal equilibrium**: the plan is optimal given the expectations it creates.
- Multiple PE are typical ($p \in [\frac{1+\eta}{1+\eta\lambda}, \frac{1+\eta\lambda}{1+\eta}]$ for earmuffs): expectations shape behavior.
- Expected uncertainty is costly in itself: $-q(1-q)\eta(\lambda-1)B$.

4

Narrow bracketing

Evaluating risky decisions one at a time, together with loss aversion, leads to dominated choices and excessive risk aversion.

Two decisions at once (Tversky and Kahneman, 1981)

Imagine you face both of the following concurrent decisions.

Decision I

Choose between

- A: a sure gain of $240 (84%)
- B: 25% chance to gain $1000, 75% nothing (16%)

Decision II

Choose between

- C: a sure loss of $750 (13%)
- D: 75% chance to lose $1000, 25% nothing (87%)

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Choices

73% chose **A and D**; only 3% chose **B and C**. But combined:

- A & D: $[\frac{1}{4} : +240;\ \frac{3}{4} : -760]$
- B & C: $[\frac{1}{4} : +250;\ \frac{3}{4} : -750]$ dominates A & D!

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- B & C: $[\frac{1}{4} : +250;\ \frac{3}{4} : -750]$ dominates A & D!

Each decision is evaluated **in isolation** (risk averse over gains, risk seeking over losses), and the combination is dominated: **narrow bracketing**.

Narrow vs. broad bracketing

What is it?

Decisions are evaluated **one at a time**, not as part of the whole set of decisions.

Why?

Limited attention and cognitive capacity; simplification; emotional sensitivity to each gain or loss; mental accounting.

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Setting. An agent takes n risky decisions $i = 1, \dots, n$, each yielding a random payoff X_i.

Broad bracketing

$$\max \ \mathbb{E}\Big[v\Big(\sum_{i=1}^{n} X_i\Big)\Big]$$

Risks are aggregated: correlations and diversification are taken into account.

Narrow bracketing

$$\max \ \sum_{i=1}^{n} \mathbb{E}\big[v(X_i)\big]$$

Each gamble is judged on its own, with its own reference point (here $r_i = 0$).

Loss aversion + narrow bracketing: a worked example

Setup

Linear value with a kink: $v(z) = z$ for gains, $v(z) = \lambda z$ for losses, $\lambda = 2.5$. Gamble $G = [\frac{1}{2} : +200;\ \frac{1}{2} : -100]$, played **twice** (independent).

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Narrow (result reported after each play)

Each play is worth $\frac{1}{2} \cdot 200 + \frac{1}{2} \cdot (-250) = -25$, so

$V^{\text{narrow}} = 2 \times (-25) = -50 < 0 \ \Rightarrow$ reject.

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Broad (result reported only after both plays)

Total payoff $[\frac{1}{4} : 400;\ \frac{1}{2} : 100;\ \frac{1}{4} : -200]$, so

$$\begin{aligned} V^{\text{broad}} &= \tfrac{1}{4} \cdot 400 + \tfrac{1}{2} \cdot 100 + \tfrac{1}{4} \cdot (-2.5 \cdot 200) \\ &= 100 + 50 - 125 = 25 > 0 \quad \Rightarrow \quad \text{accept.} \end{aligned}$$

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Aggregation lowers the probability of a loss (from $\frac{1}{2}$ to $\frac{1}{4}$). With a kink at the reference point, a narrow bracketer rejects favorable gambles that a broad bracketer accepts.

Evaluation periods and information aversion

Evaluation period

With loss aversion and narrow bracketing, risk taking depends on the **evaluation period**: the longer the period, the less risk averse.

Experimental evidence

Gneezy and Potters (1997) let subjects bet on a lottery with feedback either after every round or only every three rounds: subjects **bet more with less frequent feedback**.

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Information aversion

The same argument applies to *looking*:

- If you hold a risky asset, checking it often means seeing losses often, which is unpleasant.
- You would prefer to check your portfolio after two flips rather than after every flip.
- May explain why investors look up their portfolios **less in turbulent times** (Andries and Haddad, 2017).

Reference-dependent narrow bracketing in applications

Model

Often modeled with prospect theory and one reference point per decision:

$$\max \sum_{i=1}^{n} \mathbb{E}\big[v(X_i - r_i)\big].$$

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Applications

- **Finance:** myopic loss aversion and the equity premium (next section).
- **Labor economics:** daily income targets; bonuses evaluated separately from salary.
- **Public policy:** taxes and subsidies framed separately (e.g. balance due at tax filing).
- **Insurance:** over-insurance of small risks (low deductibles, extended warranties).

5

Applications in the field

Loss aversion and narrow bracketing at work in finance, labor supply, tax filing, marketing and policy, and how robust the evidence is.

The equity premium puzzle (Benartzi and Thaler, 1995)

The puzzle

- Average returns on stocks have been **much higher** than on bonds (Mehra & Prescott, 1985).
- Stocks are riskier, but how much risk aversion is needed to explain the gap? Calibrations require a CRRA coefficient around 30 (Mankiw & Zeldes, 1991), which implies

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Myopic loss aversion

In any given year, stocks are much more likely than bonds to **lose** money.

- Benartzi and Thaler (1995): investors with prospect-theory preferences ($\lambda = 2.25$, Tversky and Kahneman (1992)) who **evaluate their portfolio every year** are indifferent between stocks and bonds at the historical premium.

Loss aversion plus a short evaluation period (narrow bracketing over time) explains the premium with plausible, experimentally estimated parameters.

The disposition effect (Odean, 1998)

Data

10,000 accounts at a US discount broker, 1987–1993.

- Investors sell **winners** (stocks above purchase price) more readily than **losers**.
- Realized share of gains 0.148 vs. losses 0.098.
- Not justified by later returns: winners sold outperform the losers kept by about 3.4 percentage points over the next year.

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Reference-dependent story (r = purchase price)

- After a gain: concave v, **risk averse** $\Rightarrow$ sell, lock in the gain.
- After a loss: convex v, **risk seeking** $\Rightarrow$ hold, hope to break even.

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For a standard investor the purchase price is a sunk cost and should not matter. With reference dependence it does.

Taxi drivers (Camerer et al., 1997)

Setting

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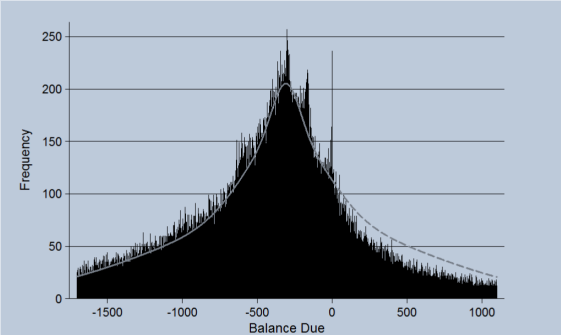
Reference-dependent model

A daily income target r. Below r each dollar is a "reduced loss" (weight λ), above it only a gain (weight 1): drivers stop soon after reaching the target, i.e. **earlier on good days**.

Narrow bracketing (one day at a time) + loss aversion around a daily target.

Tax filing: owing money is a loss (Rees-Jones, 2018)

Data



Distribution of the balance due at filing (US tax returns)

Reference-dependent story

- Reference point: a **zero** balance due.
- Owing money (balance > 0) is a **loss**: by loss aversion the marginal value of reducing the balance is higher there.
- Prediction: more tax-reduction effort just above zero, **bunching** at or just below zero.

A kink in the value function shows up as a kink (bunching) in the distribution of outcomes.

The compromise effect as a reference shift

Setup

A product has quality q and "money saved" $s = 100 - \text{price}$. Three versions: $A = (q, s) = (60, 40)$, $B = (40, 60)$, $C = (20, 80)$.

- Regularity (Lectures 3–4): adding C cannot raise the share of B.
- Yet adding C makes B, now the **middle option**, more popular (Simonson, 1989).

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A reference-dependent explanation

Let R = the minimum available in each dimension; gains $\tilde{X} = X - R$:

- Menu $\{A, B\}$: $R = (40, 40)$, $\tilde{A} = (20, 0)$, $\tilde{B} = (0, 20)$: symmetric.
- Menu $\{A, B, C\}$: $R = (20, 40)$, $\tilde{A} = (40, 0)$, $\tilde{B} = (20, 20)$, $\tilde{C} = (0, 40)$.

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With **diminishing sensitivity** in each dimension, the balanced $\tilde{B} = (20, 20)$ beats $\tilde{A}$ and $\tilde{C}$.

Menus move reference points. Same argument for the decoy effect (Lectures 1 and 4), e.g. $C = (20, 60)$.

Marketing and policy

Marketing

- **Reference prices:** “was EUR 99, now EUR 69”; a *discount* feels like a gain, a *surcharge* like a loss.
- **Free trials** and money-back guarantees create ownership: returning the product becomes a loss.
- **Scarcity** messages (“only 2 left”) frame not buying as a loss.

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Public policy

- **Defaults** in retirement savings, organ donation (Madrian and Shea, 2001).
- **Loss-framed incentives:** penalties often move behavior more than equal rewards.
- **Tax framing:** withholding so that most taxpayers receive a refund rather than owe.

How robust is loss aversion?

Not universal

The estimated λ varies across contexts, stakes and individuals; some people show none.

Boundaries

Money given up in routine transactions, or goods held for exchange (traders), seem not to be coded as losses (Novemsky & Kahneman, 2005).

Procedures matter

WTA–WTP gaps shrink with experience and careful elicitation (Plott and Zeiler, 2005).

Skeptical review

Gal & Rucker (2018) argue that many “loss aversion” results reflect other mechanisms.

Alternative explanations and neural evidence

Other mechanisms that predict similar choices

- **Regret aversion:** fear of regretting a change makes people stick with the status quo.
- **Mental accounting:** separate accounts (salary vs. bonus, each stock) = narrow bracketing.
- **Attention and salience:** losses may simply attract more attention (Part 2).

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Neural evidence

Tom et al. (2007, *Science*): when people evaluate mixed gambles, value-related brain regions respond **more steeply to potential losses than to potential gains**, a neural counterpart of $\lambda > 1$.

Behavior alone often cannot separate these stories: the models differ in their predictions **outside** the original experiment.

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Wrap-up

One kink at the reference point explains many anomalies, in risky and riskless choice, in the lab and in the field.

Recap: one kink, many anomalies

Phenomena and their reference points

Phenomenon	Reference point	Mechanism
Disease problem, Problems 11–12	frame, initial gift	diminishing sensitivity
Rejecting mixed gambles	status quo	loss aversion (kink)
Endowment effect, status quo bias	ownership, default	loss aversion
Earmuffs, taxi drivers	expectations (KR)	personal equilibrium
Concurrent decisions, myopic investors	each decision / each year	narrow bracketing
Equity premium	last year's wealth	loss aversion + narrow bracketing
Disposition effect	purchase price	diminishing sensitivity
Tax balance due	zero balance	loss aversion
Compromise effect	menu minimum	diminishing sensitivity

A single modification of Assumption 3, a value function defined on **changes** and kinked at r, explains anomalies in risky and riskless choice, in the lab and in the field.

Exercises (1/2)

Exercise 1 (Easy)

In the two-dimensional model with linear cash, let $\theta = u_g(1) = 6$ and $\lambda = 2$.

(a) Compute WTP, WTA and their ratio.

(b) Redo (a) assuming that money paid in a purchase is **not** coded as a loss.

(c) The mug data give WTA/WTP $\approx 5.25/2.75$. What λ does each version imply?

Exercise 2 (Intermediate)

Value $v(z) = z$ for gains, λz for losses; $G = [\frac{1}{2} : +200;\ \frac{1}{2} : -100]$.

(a) For which λ does a narrow bracketer reject one play of G?

(b) For which λ are two plays evaluated **together** rejected?

(c) With $\lambda = 2.5$, are three plays evaluated together accepted?

Exercises (2/2)

Exercise 3 (Advanced): Kőszegi–Rabin, linear m

(a) Earmuffs with $\eta = 1$, $\lambda = 3$: for which prices is "buy" a PE? "not buy"? What is the PPE?

(b) You expect a bonus $B > 0$ with probability q, nothing otherwise, and your expectations are correct. Show that expected gain-loss utility equals $-q(1-q)\,\eta(\lambda-1)B$. For which q is it lowest? What does this imply for the demand for insurance against small risks?

Exercise 4 (Discussion)

"The endowment effect proves that people are loss averse." Discuss, using Plott and Zeiler (2005), Dean and Ortoleva (2019), and the class data from today.

Final take-aways

1. People evaluate outcomes as **gains and losses** relative to a reference point, not as levels.
2. **Loss aversion** (a kink at r) is distinct from risk aversion; it explains the endowment effect, status quo bias and the rejection of mixed gambles.
3. Reference points can be the status quo, **expectations** (Kőszegi–Rabin), menus or contracts; with expectations, behavior is a **personal equilibrium**.
4. Combined with **narrow bracketing**, loss aversion has large consequences in the field: equity premium, disposition effect, labor supply, tax filing.
5. The evidence is strong but **context dependent**: be precise about what the reference point is.

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