



# Behavioral and Experimental Economics

Session 3: Consumer behavior: rationality, biases & behavioral change

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But first: **let's revise**



## Session 1: how experiments work

Experiments are the workhorse for unearthing causal relations in science

- ▶ Observe and measure the phenomenon of interest [how do you do it?]
- ▶ Formulate *testable hypotheses* [what's that?]
- ▶ Control all possible confounding factors [what's that?]
- ▶ *Ceteris paribus*: keep *all* things equal, but *one* [it means ALL]
- ▶ Systematically vary the *one* variable of interest [how?]
- ▶ Compare results with hypothesis: rejected or not? [how?]
- ▶ Compare results to the real world: do they matter? [how?]

If the world does not accord with you, **you** are wrong, not the world.  
[and that's fine. we learn.]



## Session 1: some principles of Experimental Economics

ExEc is the use of the experimental method in economics

- ▶ Usually relies on simple abstraction of real problems (k.i.s.s – *keep it simple, stupid!*)
- ▶ Usually does *not* trust subjects to tell the truth unless properly incentivized to do so
- ▶ Usually relies on giving full knowledge to participants
- ▶ Never lies and always tells subjects the truth, *never deceiving them*



## Session 2: Risk attitudes

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**risk attitudes can be elicited, but we are not so good at it**

- ▶ A plethora of risk tasks
- ▶ With differing and not reconcilable results
- ▶ Potential problems: hypothetical bias, task-specific bias, risk perception...
- ▶ Still an open research area



## Lecture plan

1. Consumer as a rational decision maker
  - ▶ Axioms
  - ▶ Consequences
  - ▶ Expected behavior
2. Consumer as a human being
  - ▶ *Biases*: predictable deviations from rationality
  - ▶ (several) examples
3. Choice architecture & behavioral change
  - ▶ nudge
  - ▶ boost
  - ▶ sludge

The consumer as a **rational decision maker**

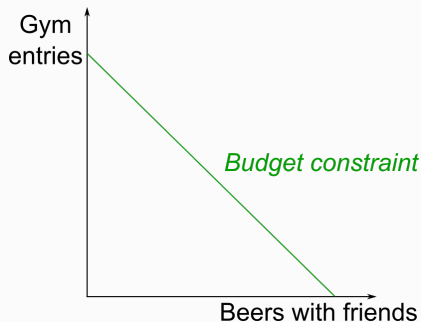


## Budget constraint

Consumer = budget constraint + preferences

### Budget constraint

- ▶ Consumers have limited resources: they face a budget constraint
- ▶ This means that they face *trade-offs*
- ▶ i.e. not all is available, typically there is more on offer than the amount a consumer can buy







## (Rational) preferences

Consumer = budget constraint + preferences

### Preferences

- ▶ Preferences are the economic equivalent of consumer *taste*. Economists assumes they are *fixed* – you are sort of born with them.

- ▶ Formally, having preferences means that, for **any** pair of goods A, B:

**Completeness** The consumer *can* say if  $A \succ B$  (read: *A is preferred to B*), or  $B \succ A$  or  $A \sim B$  (read: *is indifferent to*).

**Transitivity** If  $A \succ B$  and  $B \succ C$ , then  $A \succ C$

**Local non-satiation** For any bundle that the consumer buys, we can find another bundle that the consumers likes even more.

**Independence** If  $A \succ B$ , then adding a third alternative *C* cannot make the consumer invert her choice (and hence  $B \not\succ A$ )

These are the **rationality axioms**



## Completeness

**Completeness** Just assumes that you *know* what you like and dislike – else you should know that you are indifferent.

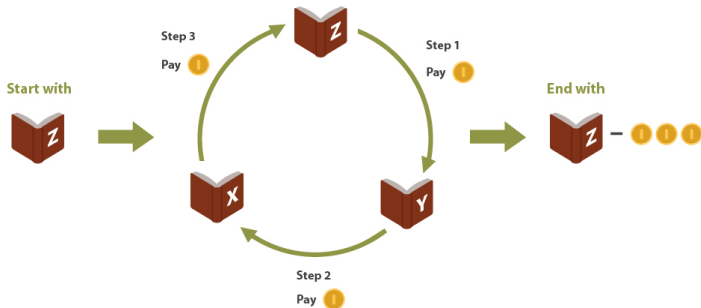
- ▶ Do you prefer pasta or pizza?
- ▶ A trip to Paris or to Madrid?
- ▶ A trip to Paris or a pizza?
- ▶ An iphone or a samsung smartphone?
- ▶ (but also): a day with your family ten days from now or three days with your family now?
- ▶ A day with your family now or 10 shares of Apple, inc.?
- ▶ two hour of master's class or one hour exam?
- ▶ ...and so on, for *any* two goods



## Transitivity

**Transitivity** Just asks you a minimal level of consistency: you cannot enter loops in which you are money-pumped

- ▶ Do you prefer pasta to pizza?
- ▶ Do you prefer pizza to kebab?
- ▶ *then you must* prefer pasta to kebab.
- ▶ Else, you can be money-pumped!





## Local non-satiation

**Local non-satiation** Just assumes that you cannot have a *global satiation point*. i.e.: you will *always* want something more

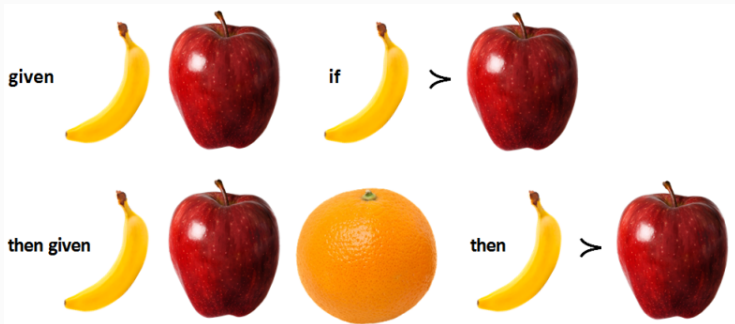
- ▶ Even if this seems absurd...
- ▶ Try to imagine you are the richest person on the planet. You have it all.
- ▶ Still, surely there is something you want *more* or in *exchange* or you want *back* or...



## Independence

**Independence** assumes that if I give you an *irrelevant* alternative, you *shouldn't change* your order of preferences

- ▶ Do you prefer pasta to pizza?
- ▶ If I add kebab in the choice set, you should *still* prefer pasta to pizza.





## Consequences

...if all these axioms hold, then...

- ▶ Consumer choice should be stable over time
- ▶ It should be impacted only by *relevant additional information* (e.g. getting to know that smoking causes cancer)
- ▶ Consumers should maximise their well-being (utility) subject to the budget constraint
- ▶ hence resulting in *optimal consumption* at all times (or as much as current information allows)
- ▶ *If* consumers can be described as rational,
- ▶ *then* all usual Micro 101, 102, 201... consequences apply: substitution and income effects, downward-sloping demand functions, market equilibria, perfect competition, etc...

...but do these axioms really hold?

## The consumer as a **human being**





## (predictably) irrational

(real) consumers deviate from the axioms in *predictable ways*

- ▶ That is, not only they make mistakes (which would be OK: random mistakes on average cancel out)
- ▶ But they *consistently* make mistakes, in precise directions, and according to one or another precise rule
- ▶ The rules followed by consumers to simplify the choice problems are called *heuristics*
- ▶ consistent deviations from the rationality axioms are called *biases*

In the rest of this lecture we will cover some important *biases* and their possible *application* to energy & environment





## Why?

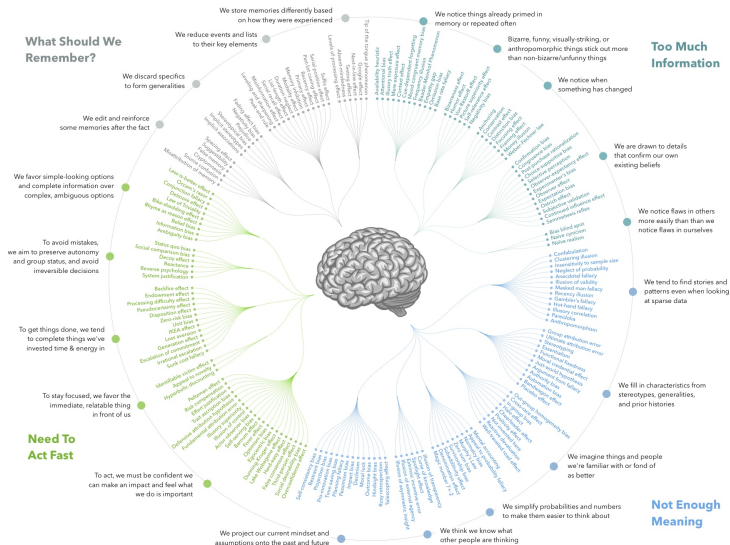
### Consider evolution

- ▶ evolution is not top-down, but bottom-up
- ▶ it solves local problems, one at a time
- ▶ the end result *might* approach rationality (because it's better for you) but might as well not
- ▶ it's a *good enough* dynamics

### Consider AI

- ▶ also bottom-up
- ▶ impressively good at some things, impressively bad at others
- ▶ approaching rationality rather than assuming it ex-ante

# COGNITIVE BIAS CODEX





## Navigating the codex

- ▶ What should we remember?  
*Biases that affect our memory for people, events, and information*
- ▶ Too much information  
*Biases that affect how we perceive certain events and people*
- ▶ Not enough meaning  
*Biases that we use when we have too little information and need to fill in the gaps*
- ▶ Need to act fast *Biases that affect how we make decisions*

## An anthology of biases



## Confirmation bias

*Looking for or overvaluing information that confirms our beliefs or expectations*

**...have you got examples?**



## False consensus bias

*Thinking that our characteristics are widespread in the population, whereas they are not*

**...have you got examples?**



## Gambler's fallacy

*Tendency to believe that something will happen because it hasn't happened yet*

**...have you got examples?**



## Group attribution error

*Tendency to overgeneralize how a group of people will behave based on an interaction with a few persons from that group*

**...have you got examples?**





## The Monty Hall problem /1

*You see three doors. Behind one of these doors there is a prize. Behind the other two, nothing.*  
**please choose a door**





## The Monty Hall problem /2

*Now Monty opens a door you have not chosen and that does not hide the prize*

**Now, would you**

- ▶ Switch to the other door
- ▶ Stick to the door you chose
- ▶ Are indifferent between switching and sticking

Tell me what you'd do here: <https://forms.gle/TyiM9pmzBhGQY1a68>



## A little explanation

- ▶ try with a 100 doors
- ▶ consider what *you* know and what *Monty* knows.
- ▶ consider the codex: what kind of bias is this?

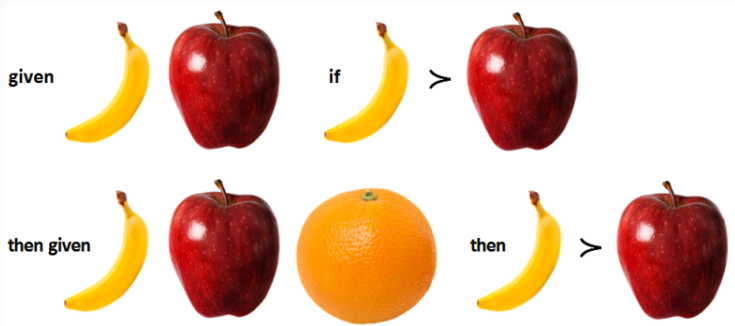
Failure of the *independence axiom*: the **Attraction Effect**



# Independence

**Independence** assumes that if I give you an *irrelevant* alternative, you *shouldn't change* your order of preferences

- ▶ Do you prefer pasta to pizza?
- ▶ If I add kebab in the choice set, you should *still* prefer pasta to pizza.





## Choosing pop-corn, 1

Please choose



\$7



\$3



## Choosing pop-corn, 2

Please choose *again*



\$7



\$7



\$3



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*Dan Ariely, Predictably Irrational*

- ▶ When presenting only two choices

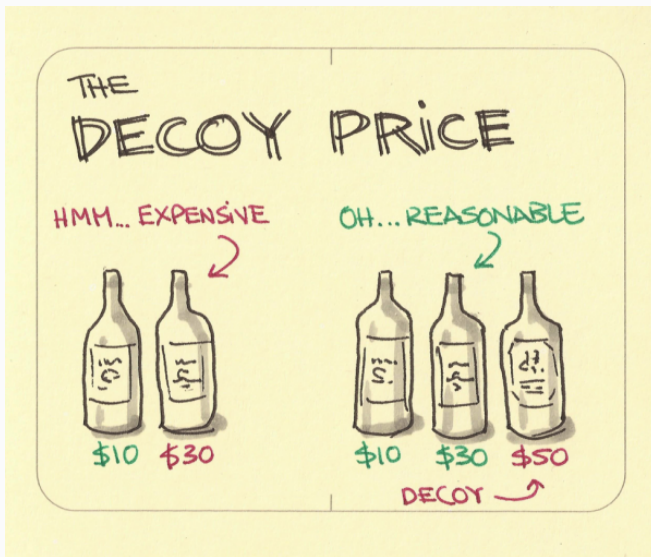
Option	Online only	Online & Print	Print only
Price	59	125	–
Choice %	68%	32%	–

- ▶ When presenting all three choices

Option	Online only	Online & Print	Print only
Price	59	125	125
Choice %	16%	84%	0%



## The decoy/attraction/asymmetric dominance effect





## A simple experiment on retirement plans

Consider this situation:

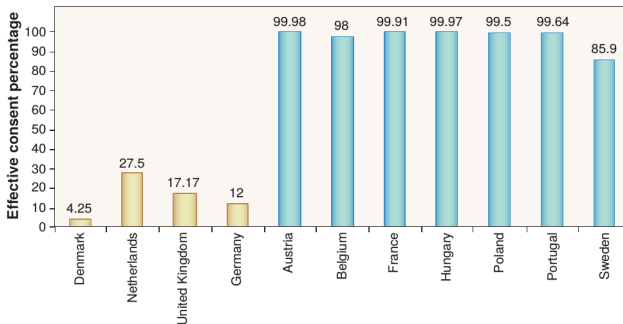
You are an employee and you have signed a **contract** of employment with an annual gross salary of 48.000 €. Your employer offers you a **yearly bonus**, if you sign up for a **company retirement plan**. You will get an **additional 500 € per year** and **agree to save 5.000 € per year**. These savings will be used for the expansion of the firm and pay a **fixed interest rate of 1.5%** per year and are hedged by a renowned insurance company in case of bankruptcy of the firm.

Do you **refuse** or **accept** the plan? (ClassEx)



## The power of the default

% of consent to organ donation across countries



How to explain this? Culture? Economic development? Religion?  
**this is due to the default option (opt-in vs. opt-out [Johnson and Goldstein, Science 2003])**



## Default bias: why?

- ▶ inertia and laziness : the *status quo* is the choice that takes the least amount of effort
- ▶ uncertainty: when we are not sure what to do and lack expertise in the area in question, we consider the default as a form of advice
- ▶ loss aversion: switching away from the default requires a willful action: it might bring to mind what we could lose by switching, which may make us reluctant to change
- ▶ procrastination: I'll do it for sure tomorrow...



## A simple set of trivia quiz

on ClassEx, we will have fun with trivia!



## Anchoring effect







## A simple chocolate question

on ClassEx, we will have a say about chocolate!



## Nutri-Score and Bio products





## Halo-effect

**Halo effect:** when *one* trait of a product is used to derive an overall judgment of the product – or a judgment on *other* unobserved traits of the product.

- ▶ Sweets sold in pharmacies
- ▶ Junk food at Naturalia
- ▶ Good-looking people also thought to be smarter
- ▶ ...



## Rational decision makers and timed consumption

Imagine a phone subscription

- ▶ Do you prefer to pay day-by-day according to your consumption (sms, calls, internet)
- ▶ Or to have a flat fee?

think again: do you *really* use up your flat fee? If not, then you are *paying not to use your phone*.



## Paying not to go to the gym

- ▶ Study of data from three American Gyms
- ▶ Type of tickets:
  - ▶ Single entry 12\$
  - ▶ 10 entries 100\$ (10\$ each)
  - ▶ Monthly fee 85\$
  - ▶ Yearly fee 850\$
- ▶ Cancellation policy:
  - ▶ Single and 10x no cancellation
  - ▶ Monthly: need to cancel by the 10th of the month, else pay next month as well
  - ▶ yearly: automatically cancels at the end of the year

A rational decision maker should go for monthly only if he visits at least 7 times a month; monthly gives the freedom to opt-out should one fail to do so, so we should see things adjust after a few months.



## Paying more to go less!

TABLE 1. Price per average attendance at enrollment

	Sample: No subsidy, all clubs		
	Average price per month (1)	Average attendance per month (2)	Average price per average attendance (3)
Users initially enrolled with a monthly contract			
Month 1	55.23 (0.80) <i>N</i> = 829	3.45 (0.13) <i>N</i> = 829	16.01 (0.66) <i>N</i> = 829
Month 2	80.65 (0.45) <i>N</i> = 758	5.46 (0.19) <i>N</i> = 758	14.76 (0.52) <i>N</i> = 758
Month 3	70.18 (1.05) <i>N</i> = 753	4.89 (0.18) <i>N</i> = 753	14.34 (0.58) <i>N</i> = 753
Month 4	81.79 (0.26) <i>N</i> = 728	4.57 (0.19) <i>N</i> = 728	17.89 (0.75) <i>N</i> = 728
Month 5	81.93 (0.25) <i>N</i> = 701	4.42 (0.19) <i>N</i> = 701	18.53 (0.80) <i>N</i> = 701
Month 6	81.94 (0.29) <i>N</i> = 607	4.32 (0.19) <i>N</i> = 607	18.95 (0.84) <i>N</i> = 607
Months 1 to 6	75.26 (0.27) <i>N</i> = 866	4.36 (0.14) <i>N</i> = 866	17.27 (0.54) <i>N</i> = 866
Users initially enrolled with an annual contract, who joined at least 14 months before the end of sample period			
Year 1	66.32 (0.37) <i>N</i> = 145	4.36 (0.36) <i>N</i> = 145	15.22 (1.25) <i>N</i> = 145



## Paying not to go to the gym: main results

- ▶ Users who choose (...) a flat-rate contract pay a price per average attendance of over \$17 in the monthly contract and over \$15 in the annual contract.
- ▶ The average forecasted number of monthly visits, 9.50 (s.e. 0.66), is more than twice as large as average attendance, 4.17.
- ▶ On average, 2.31 full months elapse between the last attendance and contract termination for monthly members, with associated membership payments of \$187.
- ▶ The survival probability after 14 months for the monthly contract is 17 percent higher than for the annual contract.



## Paying not to go to the gym: why?

- ▶ Risk aversion
- ▶ Overconfidence over future attendance
- ▶ Procrastination / default bias for monthly ticket holders





## Social norms

Choices do not happen in a vacuum! Others are around

- ▶ You might care about what the others think of you [social conformity]
- ▶ You might care about what example you want to set
- ▶ You might want to be at least as good as someone else [keeping up with the Jones's]
- ▶ You might want to keep your face, show high morals, be a good citizen [social norms vs. market norms]
- ▶ You might have little information, and use other people's choices as cues [information-driven conformism]
- ▶ You might just like to do like the others do [preference-driven conformism]
- ▶ ...



## Social norms vs. market rules

- ▶ School close at 4pm, but parents are frequently late
- ▶ Delays are costly for the school: need to pay teachers, etc
- ▶ what can be done?

### Experiment (Gneezy et Loewenstein 2000)

#### Control group

- ▶ Observations over 20 weeks
- ▶ No intervention

#### Treatment

- ▶ 4 weeks: no intervention
- ▶ 12 weeks: fine of 10 NIS (3 euro)
- ▶ 4 weeks: no intervention



## Results, I

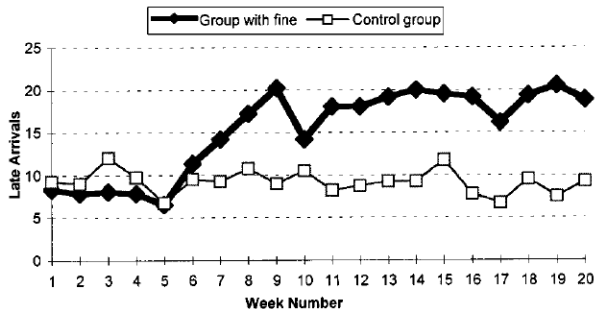


FIGURE 1.—Average number of late-coming parents, per week



## Results, II

The fine has pushed the numbers of parents arriving late *up*. Why?

### *A fine is a price*

- ▶ *Crowding out*: l'argent déplace la norme sociale
  - ▶ On passe de 'il faut le faire'...
  - ▶ ...à 'je vais le faire mais c'est OK: je vais payer'
- ▶ *Information*: l'amende est un prix
  - ▶ Avant l'amende, les parents avaient des croyances relatives à l'ampleur du cout généré par leur retard
  - ▶ L'amende (qui n'est pas énorme, à 3 euros) donne une valeur au retard
  - ▶ Cette valeur est assez basse: on peut donc bien croire que notre temps à nous vaut plus que ça

**Take-home: faites payer assez, ou ne faites pas payer du tout**



## Keeping up with the others

Many people care about being *not too different from the others*

- ▶ Especially upwards: if everyone has a sporty nice car, you want one too
- ▶ *Keeping up with the Joneses*: keep your social status near to the one of the people you want to be associated to

This can (and has been) used to move people towards lower energy consumption

- ▶ Opower in the UK: compare consumption to the one of others  
<https://goo.gl/G4FyRg>

# Behavioral change



## Exploiting biases to *nudge* change

These (and other!) biases exist. Can they be exploited for policy purposes?

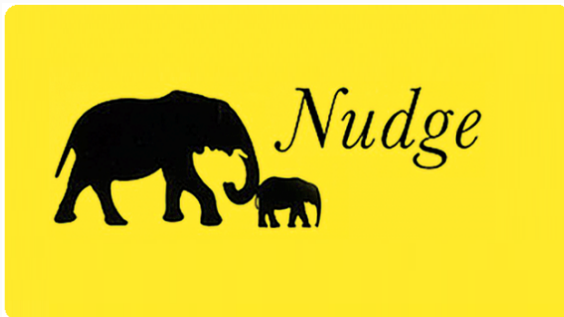
- ▶ The list is long: [https://en.wikipedia.org/wiki/List\\_of\\_cognitive\\_biases](https://en.wikipedia.org/wiki/List_of_cognitive_biases)
- ▶ they have largely been used by marketing and advertisement
- ▶ could they be used for policy?

Biases can allow a new policy instrument

- ▶ Old: prohibition
- ▶ Old: tax and regulate
- ▶ Old: cap and trade
- ▶ New: *behavioral change*



# Nudging



**'soft paternalism'**

- ▶ A nudge is not a formal regulation but a small change in the context, the setup, the choice environment that makes people change behavior
- ▶ It is often not perceived as limiting the freedom of choice in a formal way – it just exploits our biases for policy purposes
- ▶ the 'choice architect' can 'nudge' choice towards a desirable outcome





## Some famous examples

- ▶ Organ donation defaults
- ▶ Cafeteria position of meals
- ▶ Opower 'see what the others do' energy meter
- ▶ Study in the UL (London) about gas / energy consumption and social norm nudging (moodle)
- ▶ To incentivise public transport: lottery but not for car riders (regret)
- ▶ ...



## How do nudges work?

### Exploiting your bias

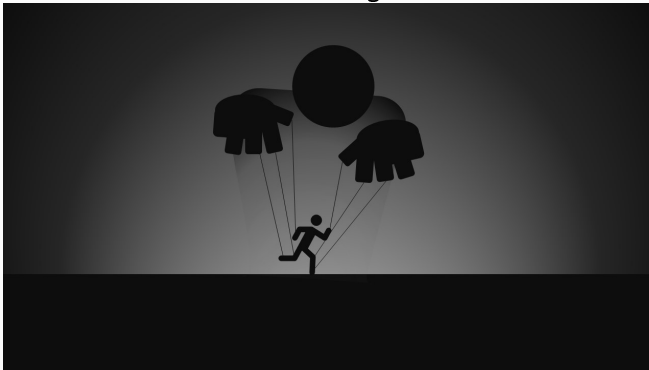
- ▶ unawareness?
- ▶ indifference?
- ▶ long-term effect?





## The bad sides of nudges

The same mechanism that allows *good* can allow *bad* uses...





## Black nudges or sludges

### Some black nudges

- ▶ bad defaults
- ▶ switching costs & hurdles
- ▶ snacks by the cashier
- ▶ nearly *anything* at booking, ryanair...



## Long-term effects: a nudge lullaby

### What happens when the nudges stop?

- ▶ if we nudge people without informing them
- ▶ we get short term change
- ▶ but what happens in the long term?
- ▶ some effect, return to normal, or even worse?



## A nudge lullaby: setup

De Haan and Linde, Economic Journal 2016

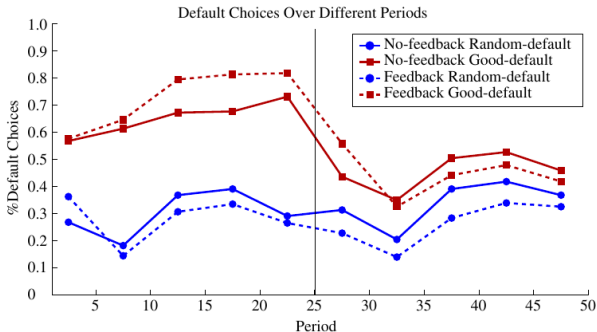
Choice Task 48						
TIME: 39 BONUS: 20						
Choices	Weight = 6	Weight = 5	Weight = 4	Weight = 3	Weight = 2	Price
<input type="radio"/> Option 1	12	8	10	4	3	102
<input type="radio"/> Option 2	1	13	11	28	19	138
<input type="radio"/> Option 3	4	9	29	39	13	122
<input checked="" type="radio"/> Option 4	5	20	49	7	13	271
<input type="radio"/> Option 5	28	5	13	21	12	109
<input type="radio"/> Option 6	42	22	6	4	3	348
Make Choice						

- ▶ find the highest-value row
- ▶ with pre-selected default
- ▶ period 1: default is good or random (treatment)
- ▶ period 2: default is random



## A nudge lullaby: results

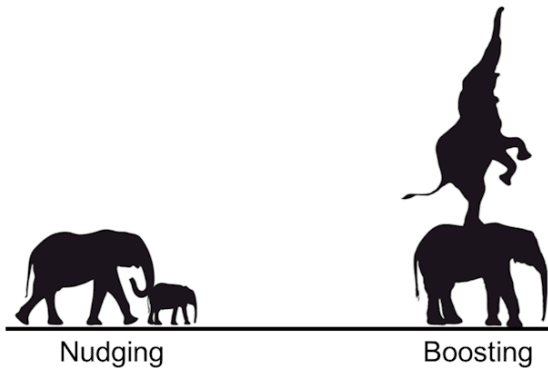
De Haan and Linde, Economic Journal 2016



- ▶ people get used to nudges
- ▶ and stick to them even when it is not informative any more



## An alternative approach: boosts







## Some boosts

### Empower people through simple behavioral rules

- ▶ *"For your health, eat 5 fruits and vegetables a day"*
- ▶ *"Do not trust your first impressions: think twice before deciding"*
- ▶ *"Check your sources"*
- ▶ Simple ways to be a bayesian
- ▶ ...

**Tomorrow: an experiment on the *persistence* of cognitive biases**