Introduction to Environmental Economics 20/07/2023

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Roadmap

- Intro to Environmental Economics
- Some basics on what economists can bring to the table
- Scarce resources, public goods and externalities
- Behavioural Environmental Economics
- Nudges: pros and cons

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Access: sli.do

Meeting ID: #60388

Let’s play a game

participant login

The participants have three possibilities to log in 1) By calling the classEx page in the browser, selecting the course and entering the password. 2) By scanning the QR code. 3) By clicking on a link.

1) login

1. go to: https://classex.uni-passau.de
2. choose: Warwick University
3. choose: Behavioural Economics
4. choose: participant
5. enter password: *******

The participant password can be changed in the course settings.

If 1) enter the password: m7vC

2) QR code

3) automatic link for login

https://classex.uni-passau.de/bin/index.php?automatic=kdXE-eDtj4VzCueBLczudw

If you add "&logout" at the end of the link, participants will be logged out of the course in which they are currently logged in. Otherwise they will remain in the old course.

You can also a personalized code to the URL. Just add &tic= to the URL. It is saved to the participant data and can be retrived as $tic; in the game. In this example the ticket is 12345: https://classex.uni-passau.de/bin/index.php?automatic=kdXE-eDtj4VzCueBLczudw&tic=12345

Game

Main Rules

- All of you are fishermen and you are fishing in a local pond. The pond is public so everyone can fish there without any costs.
- Each round of the game you decide upon how many fish you want to catch: 0, 1, 2, 3 or 4 fish.
- You will receive one point for each fish you catch. Your aim is to have as many points by the end of the game as possible.
- At the beginning the following amount of fish is in the pond: **5 * the number of players.**
- **The game will be played for six rounds**.
- Each round the amount of fish in the pond doubles. So at the end of each round there will be two times the amount of fish in the pond that you left in the previous round. **But:** The amount of fish in the pond cannot exceed the initial amount. If 0 fish is left, the game ends.

Punishment

Additionally, you can punish other players. After catching fish, you can decide to give up one fish in order to punish fishermen who caught more than 2 fish.

As a punishment those catching more than 2 fish will be deducted the following amount of fish: **number of punishers minus 1.**

So, a minimum of two punishers is required for it to work. A maximum of 4 fish can be deducted.

What is environmental economics?

- Economics is the study of the allocation of scarce resources.
- Environmental problems/challenges arise from resource **scarcity** and accumulating pollutants.
- Thus environmental economics helps us understand how much money society should spend on environmental quality and how environmental policies should be structured.
- This doesn't come without costs…

What is environmental economics (Cont'd)?

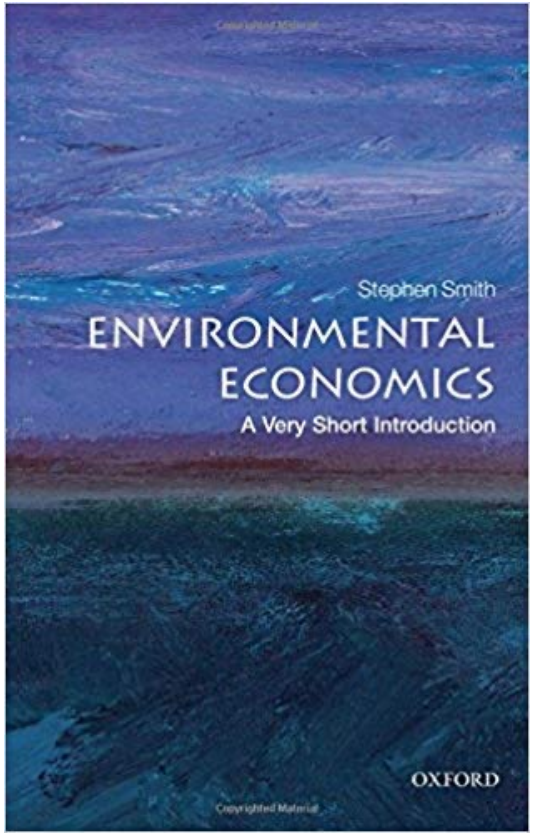
And the central questions in environmental economics concern with this **trade-off** –i.e., investment in environmental quality and the cost of doing so:

1) If environmental protection is costly, how much should we spend on pollution control? Is it worth reducing pollution to zero, or is there any optimal level of pollution?

2) In making these decisions, how can we measure the benefits of reducing pollution?

3) What sort of environmental measure should the Government adopt? Should we adopt market-based instruments or command-and-control instruments?

What is environmental economics?



A primer…

Kate Raworth, Doughnut Economics

Can economics help us think about solutions to climate change?

- Economists → measurement and identification (establishing causal relationships):

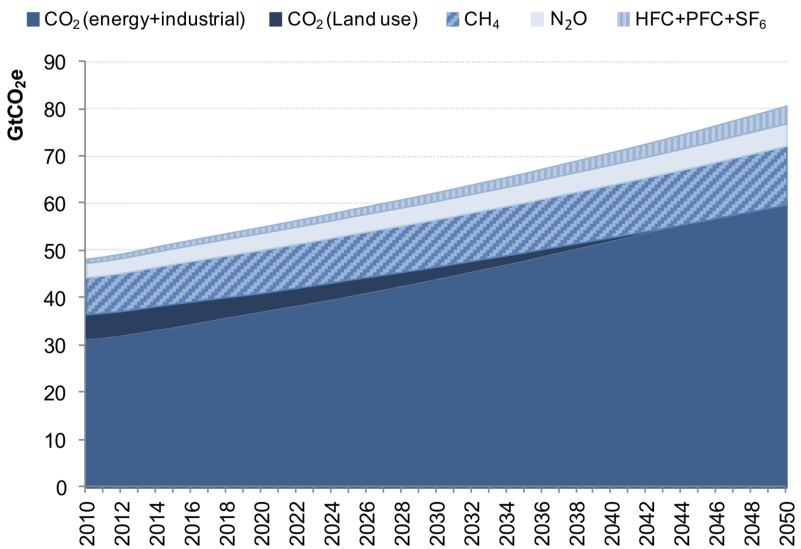
✓ Tracking changes in temperature and sea levels over time

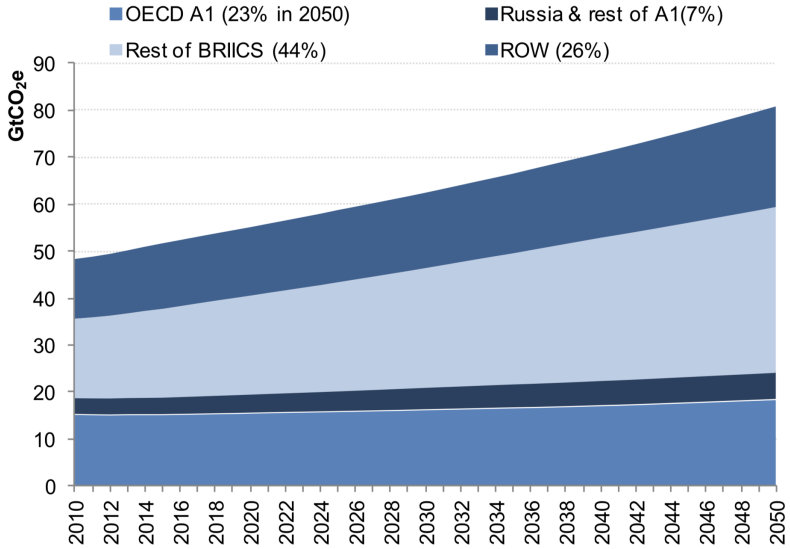
✓ What are the potential damages as a result of changes in these variables?

✓ How much would it cost to avoid these damages?

✓ How changes in climate affect humans and ecosystems?

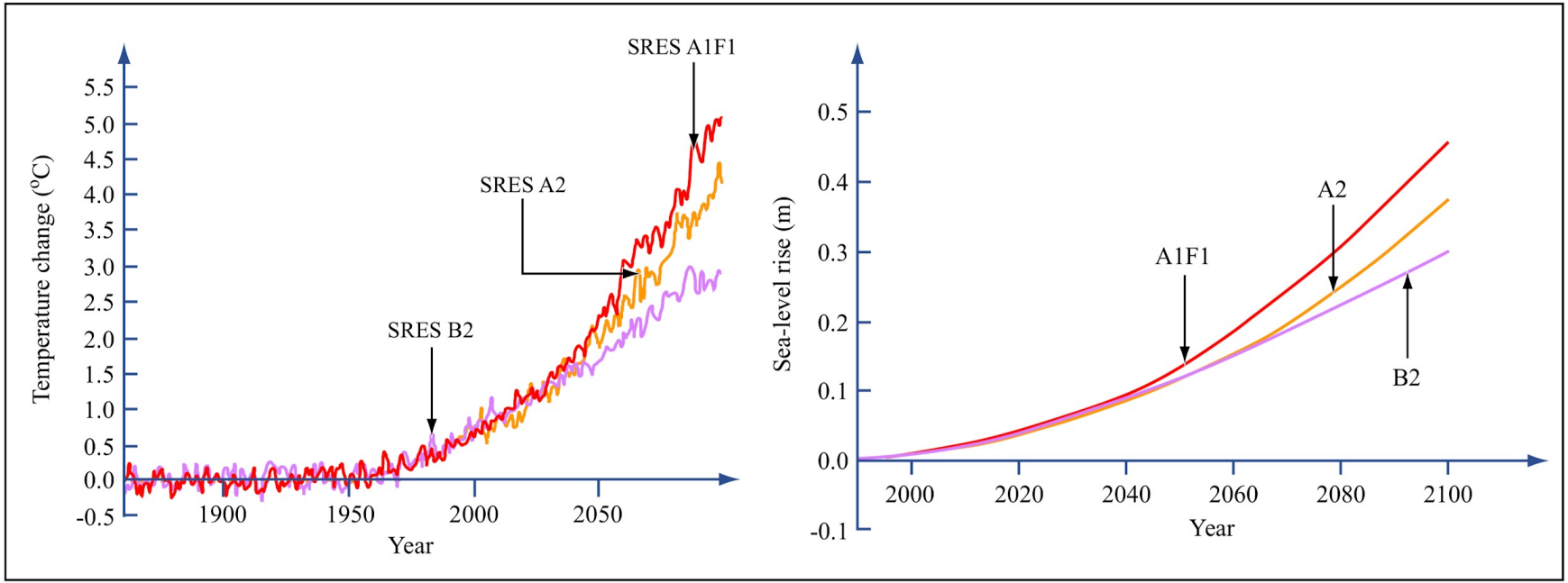
GGE projections





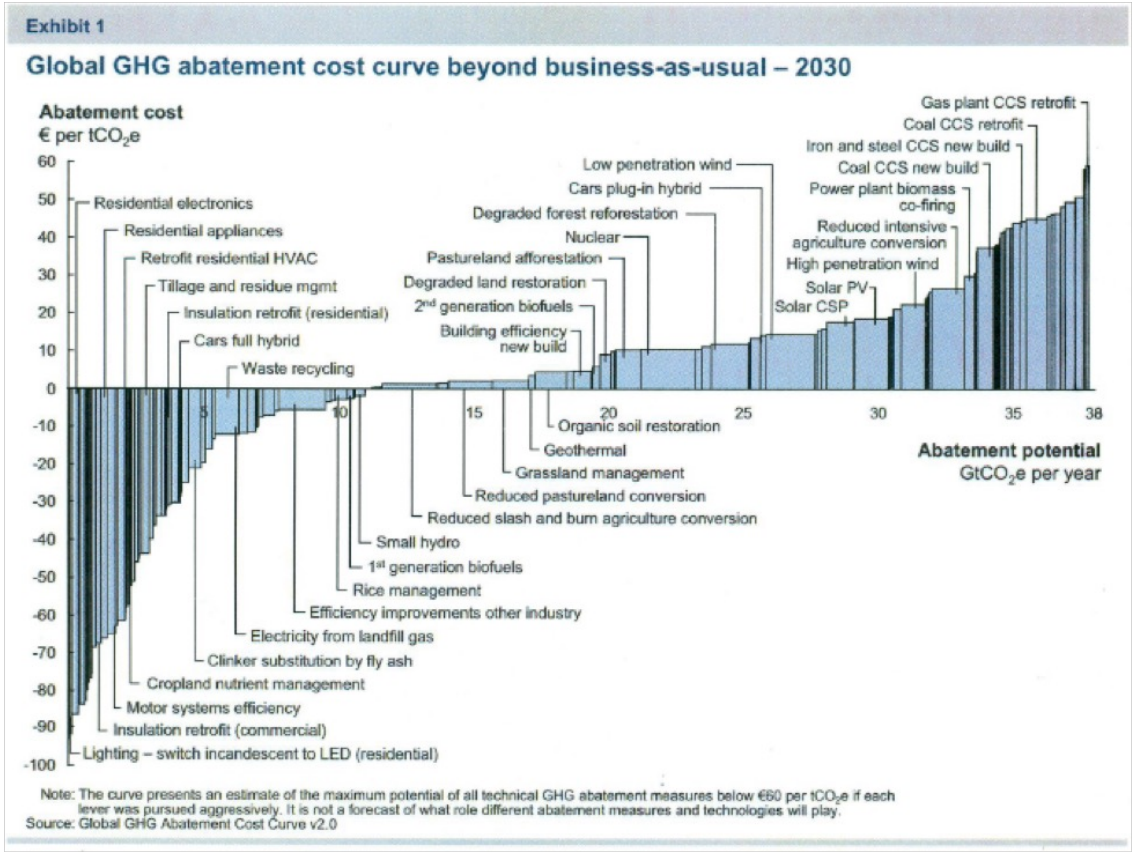
Source: OECD data

Predicted impact on global climate

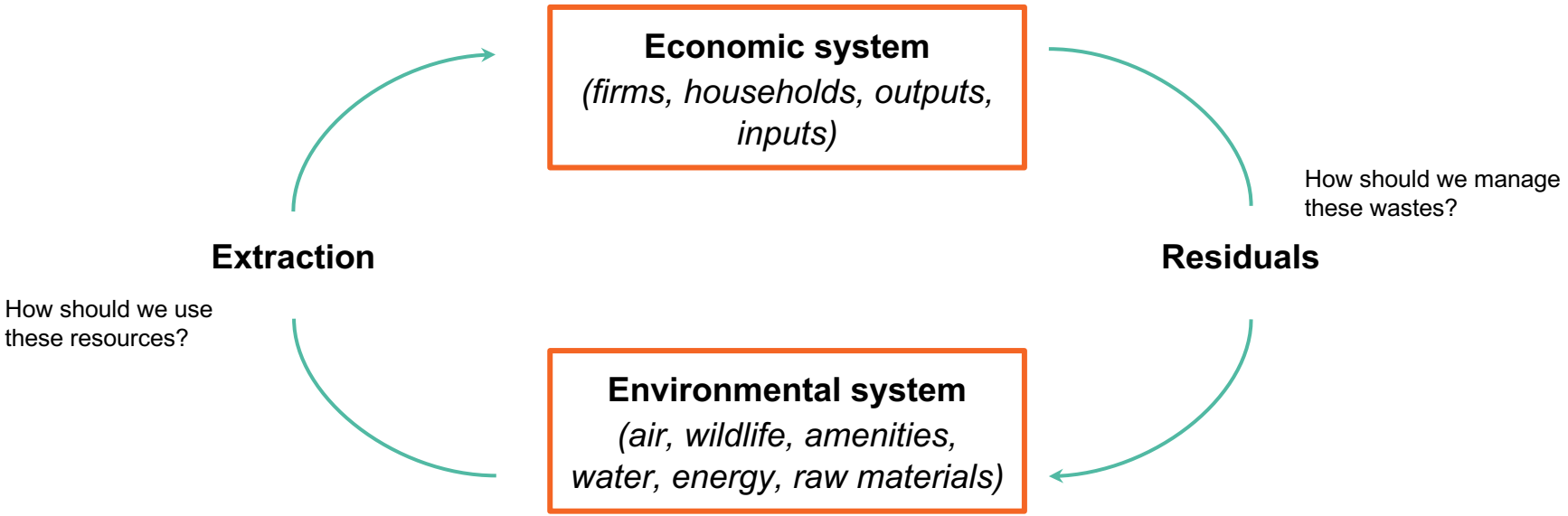


Source: Met Office Hadley Centre for Climate Science and Services, UK

Global carbon abatement curve, 2030



Economy-environment interactions



Externalities

- An externality exists when the consumption or production choices of one person or firm enter the utility or production function of another entity without that entity's permission or compensation
    - **Negative externality:** imposes external costs on society, e.g. my neighbour blasts Ed Sheeran on repeat, air pollution
    - **Positive externality:** imposes external benefits on society, e.g. my neighbour plants a beautiful flower garden, immunisation

Can you think of an example of a good that creates no external effects in the consumption or production of it?

A note on Externalities

Two conceptually different environmental externalities:

- **Global externalities** affect everyone on earth regardless of where the activity is located.

  GHG lead to climate change, a global externality.

- **Local externalities** affect people more the closer they are to the activity.

  Most air pollution is local: production in India doesn't affect particulate matters in Coventry

A note on Externalities (Cont'd)

Policy/political responses differ.

- **Global externalities** need a global solution (world-wide Coase theorem).

- **Local externalities**: polluters and those affected are closer, often belong to same political entity ⇒ easier to solve?
  Maybe. But risk of shifting pollution just over political borders (Lipscomb and Mobarak 2016).

In practice major pollutants (eg most GHG) typically have both global and local externalities.

- But important to remember that all costs of e.g. CO2 emissions are not equally shared.

Public goods

- Goods that are shared by all and owned by no one -e.g., biodiversity.
- Two fundamental characteristics:
  - **Non-rival**: one agent's consumption of a unit does not preclude or impinge on another agent's consumption of that *same* unit.
  - **Non-excludable**: once units are provided to one agent no other agent can be excluded from consuming those *same* units.

Public goods

A taxonomy of Public Goods		
	Non-Rival	**Rival**
Non-excludable	A	B
Excludable	C	D

A = Pure Public Goods (e.g., national defense, public radio, public TV, clean air, scientific knowledge)
B = Open-access resources → *''Tragedy of the commons''* (e.g., collective action problems, fish stock)
C = Club Goods (e.g., gym, swimming pool, car-sharing service, cable TV, private Wi-fi)
D = Pure Private Goods (e.g., shoes, clothes, food)

Why do markets fail to provide public goods?

The free-rider problem

The free rider problem explained in a video

Tragedy of the commons

- Non-excludable but rival goods (Garret Hardin, 1968).
- Two conditions:
  - Access to the resource must be unrestricted
  - Diminishing marginal returns (rivalry)

The fish pond as a tragedy of the commons

1) Tragedy of the commons and externalities

2) Tragedy of the commons and collective action problems

3) Global environmental issues and climate change

Climate change collective action problem

COUNTRY A	COUNTRY B		
		Contribute	Shirk
	Contribute	-4.8%; -4.8%	-7.3%; -3.5%
	Shirk	-3.5%; -7.3%	-6%; -6%

If both countries contribute, the Intergovernmental Panel on Climate Change (IPCC) suggests climate change damages of 1% of GDP, for a cost of 3.8% of GDP.
If only one country contributes, then it will still incur the costs of 3.8% of GDP, but the damage due to climate change in that case is 3.5% of GDP.
If both do nothing, then the costs will be 6% of GDP.

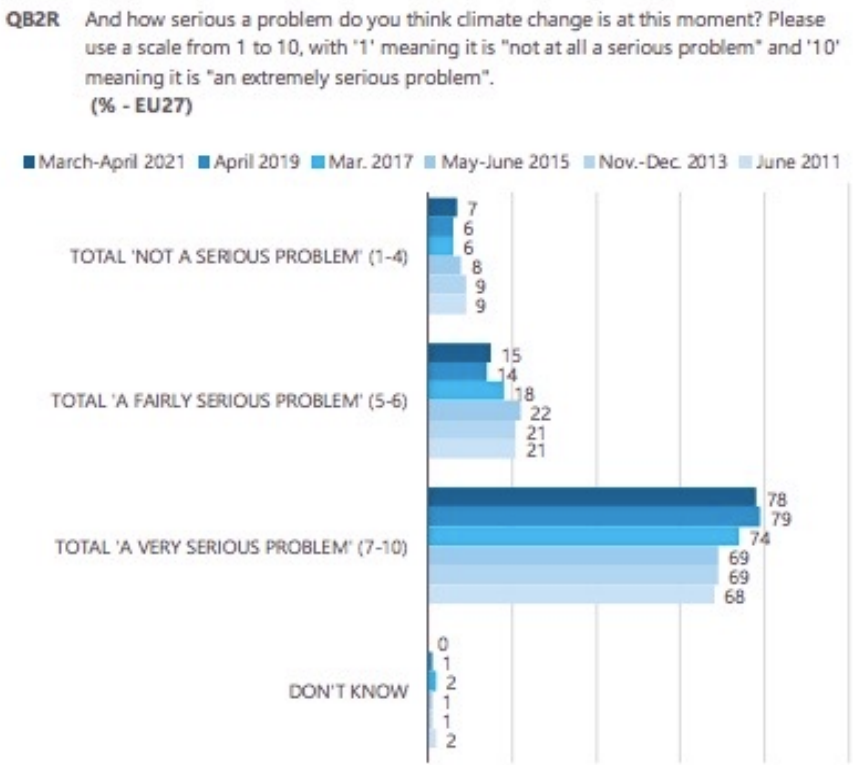

TIME
FOR A
BREAK

How can Governments meet their commitments to reduce CO2 (and more generally GHG) emissions? Pricing policies and regulation!

How do we get people more engaged with climate change and get them engaged to tackle the problem? – for discussion now!!!

Why behaviour Change?

Source: European Commission (2021). Climate Change, Special Eurobarometer Report No. 513, March-April 2021. Accessible from: https://europa.eu/eurobarometer/surveys/detail/2273



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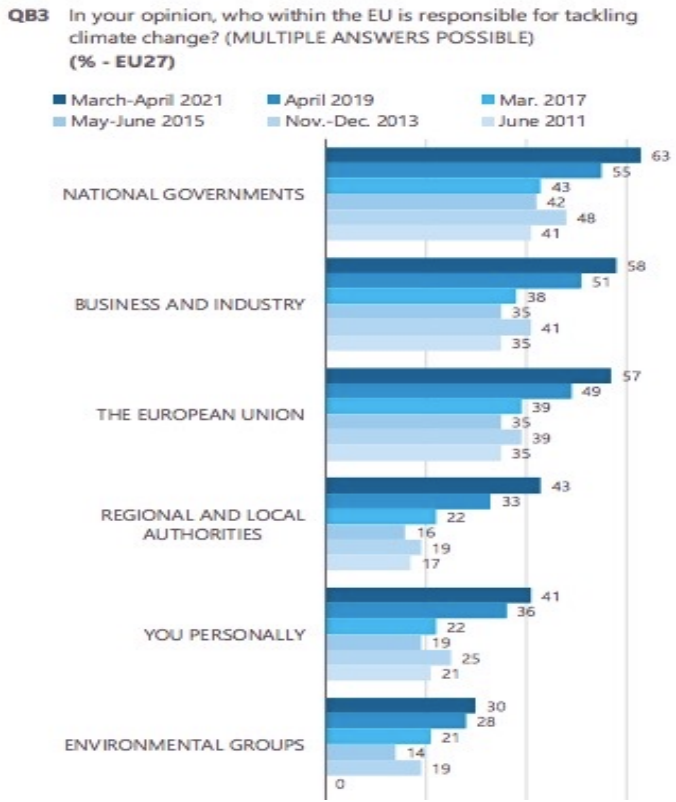

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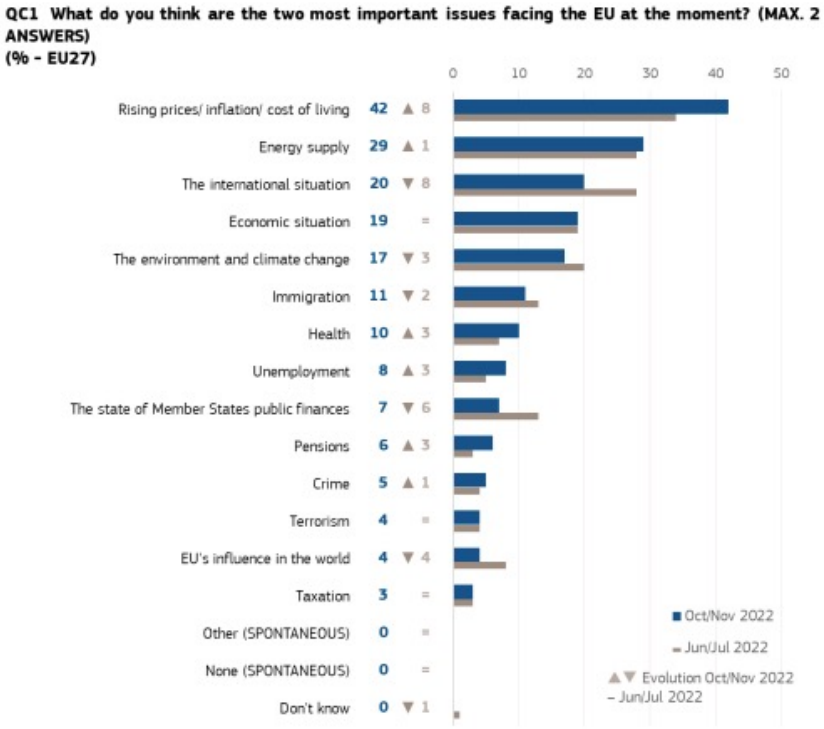
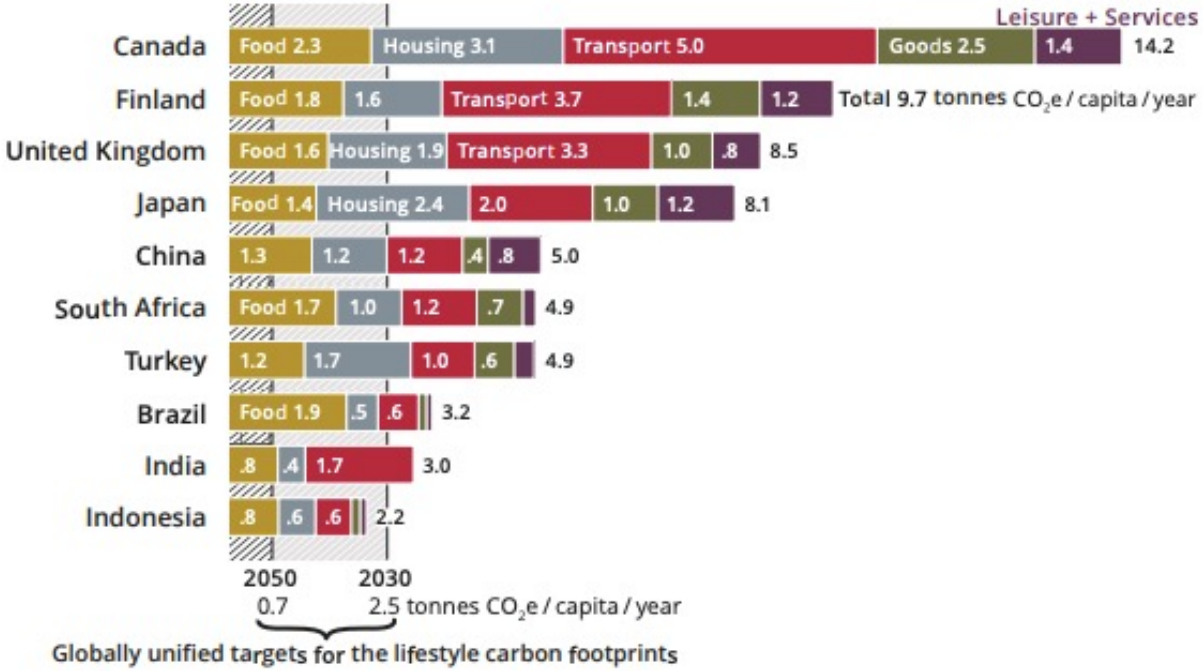


Source: Eurobarometer Survey (2022).

Why behaviour Change?

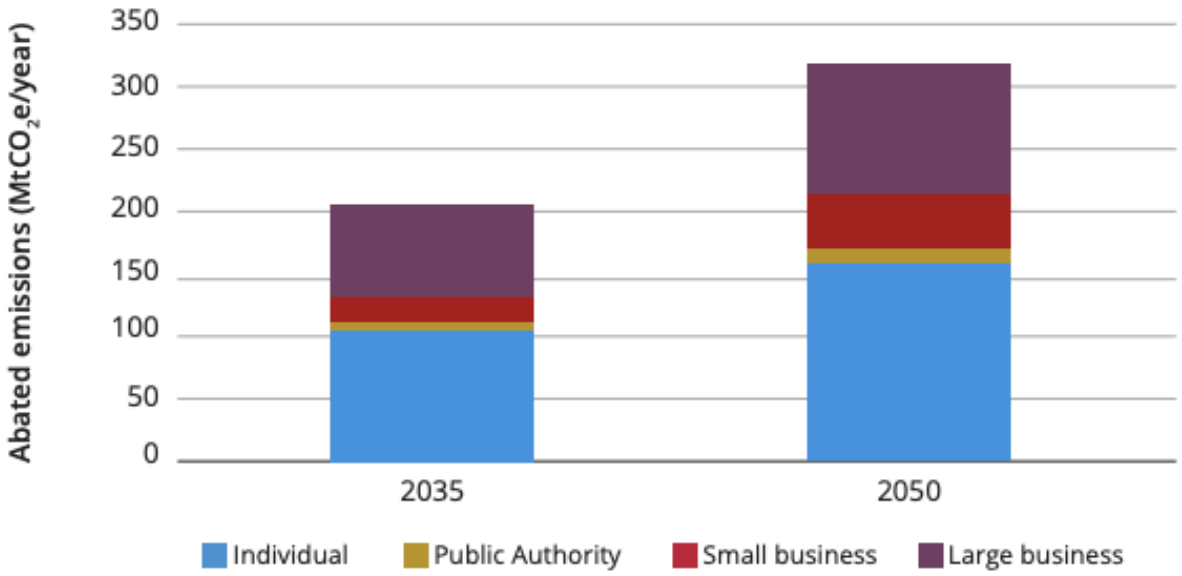
Figure 1: Average lifestyle carbon footprints by consumption domain



Source: CCC, (2022).

Why behaviour Change?

Figure 2: Abatement by person/organisation making decisions in Sixth Carbon Budget



Source: CCC, (2022).

What are behavioural economists trying to achieve?

1. Get people understanding the anthropogenic nature of climate change

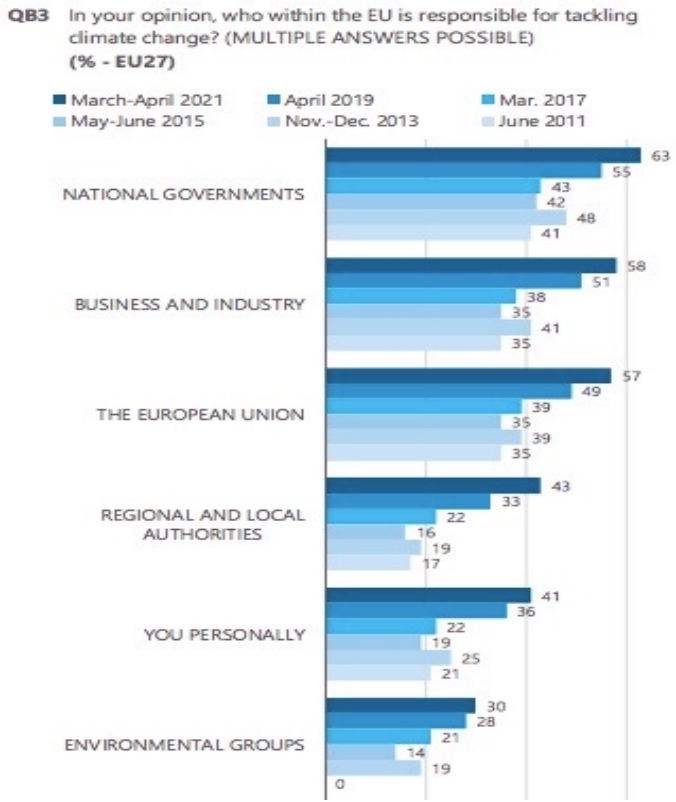
2. Monetary vs non-monetary incentives?

What type of Behavioural Biases?

Cognitive/Attentional/Perception biases . . .

Complexity (people dislike negative feelings/information)	Present bias (people focus on the here and now)	Negative footprint illusion
Bystander effect	Framing effect	Status quo bias (people dislike changes, e.g., Hartman et al, 1991) Sunk costs fallacy
Salience (climate change is invisible)	No identifiable perpetrator	Loss aversion (WTP/WTA)
Licensing effect (e.g., Geng et al., 2016)	Overconfidence	Confirmation bias (climate deniers)

Why behaviour Change?



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The bystander effect.

How do we get people more engaged?

How do we get people more engaged?

- Cooperation ("Climate Clubs") is crucial → COP26 & COP27.
- How should nations go about bringing the reduction of
- emissions that is required?
- Pricing policies and regulation essential to reduce emissions.
- Are monetary incentives always desirable?

➢ 'Carrot & stick' (Andreoni et al., 2002).

➢ When and why [monetary] incentives (don't) work to modify behavior? (Gneezy et al., 2011).

➢ A fine is a price? (Gneezy and Rustichini, 2000).

➢ Could nudge be an alternative approach?

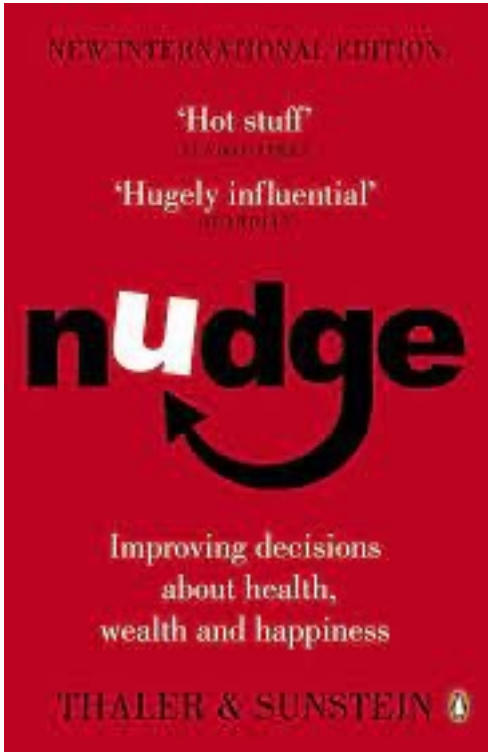
Monetary vs non-monetary incentives?

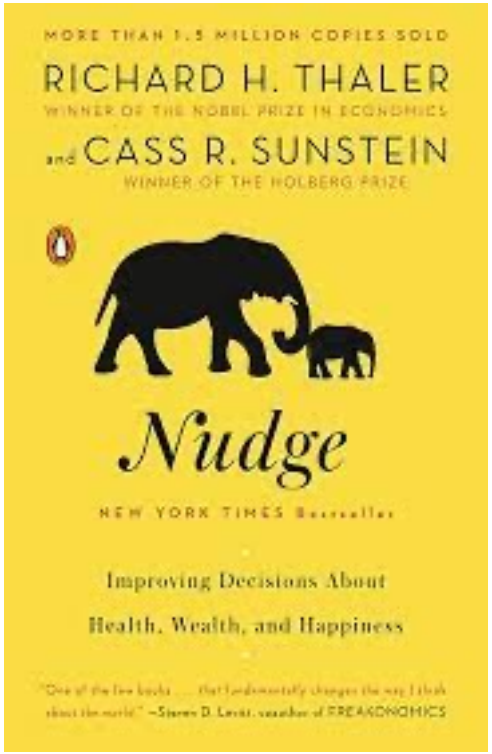
Nudge theory

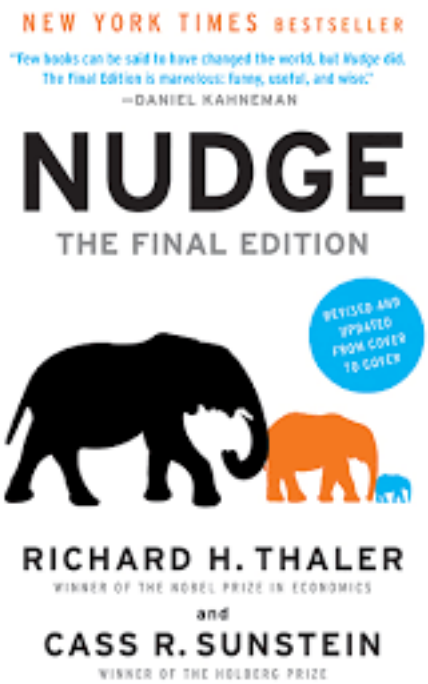
Libertarian Paternalism (Thaler and Sunstein, 2008)

- Possible to 'nudge' people to decisions that are better for their health/wealth/happiness (paternalistic)
- Without restricting their choices (libertarian) simply by changing the framework in which they are made (choice framework)
- Can "choice architecture" help the environment?
- Incentives, feedback and information
- Nudges **exploit behavioural biases** to correct human behaviour

Nudge theory







Information and Feedback Matter!

Other examples

- Ambient orbs, labelling, smart meter readings

Hubbub – reducing cigarette litter in the street of London

Salience and attention!!!

Nudges and Social Norms

Subtle cues of observability and recycling (Lotti, Barile and Manfredi, 2023)

- Declining recycling rates over the past few years in many different sectors.
- Inefficient waste collection systems or individuals' behaviour?

  1) UK recycling rate for waste from households ↓ to 44.4% in 2020 from 46% in 2019 (Defra, 2023).

  2) UK recycling rate for HE sector ↓ to 70% 2020/2021 from 80% 2019/2020.
- How can we motivate people to recycle more?

  1) Barile et al. (2015) → a nudge might be more effective.

Nudges and Social Norms

This paper:

- Provides further evidence on the efficacy of nudging tools.
- Focuses on actual behaviour in a field experiment conducted in a University campus in the UK.
- Tests the effect of a visual nudge as a way to foster recycling
- behaviour:

1) Subtle cues of observability → effective to boost compliance (e.g., littering literature and/or bicycle theft).

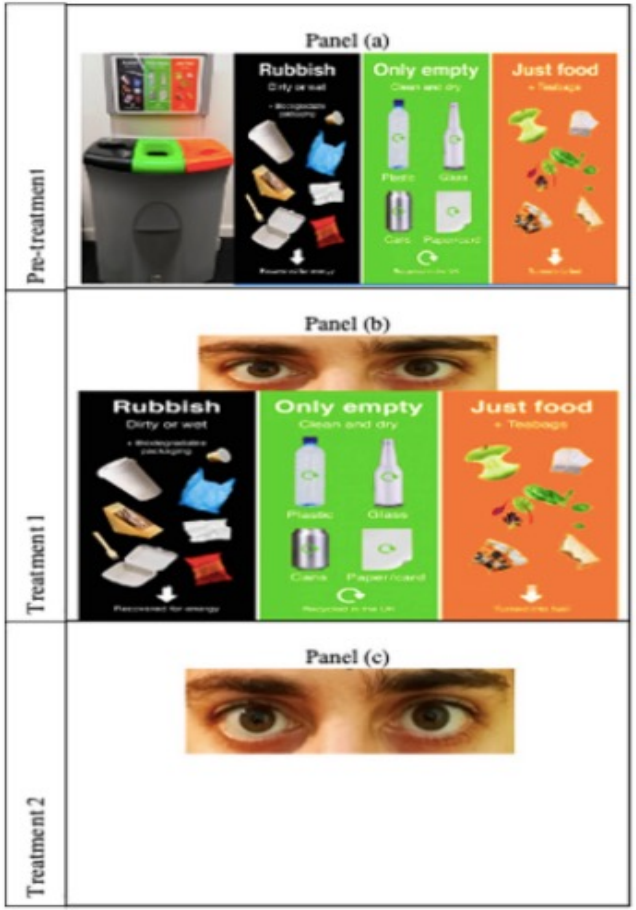
2) Internalise *injunctive norms* by means of reputational or surveillance effect (see e.g., Gangl et al., 2022).

Nudges and Social norms

Why subtle cues of observability?

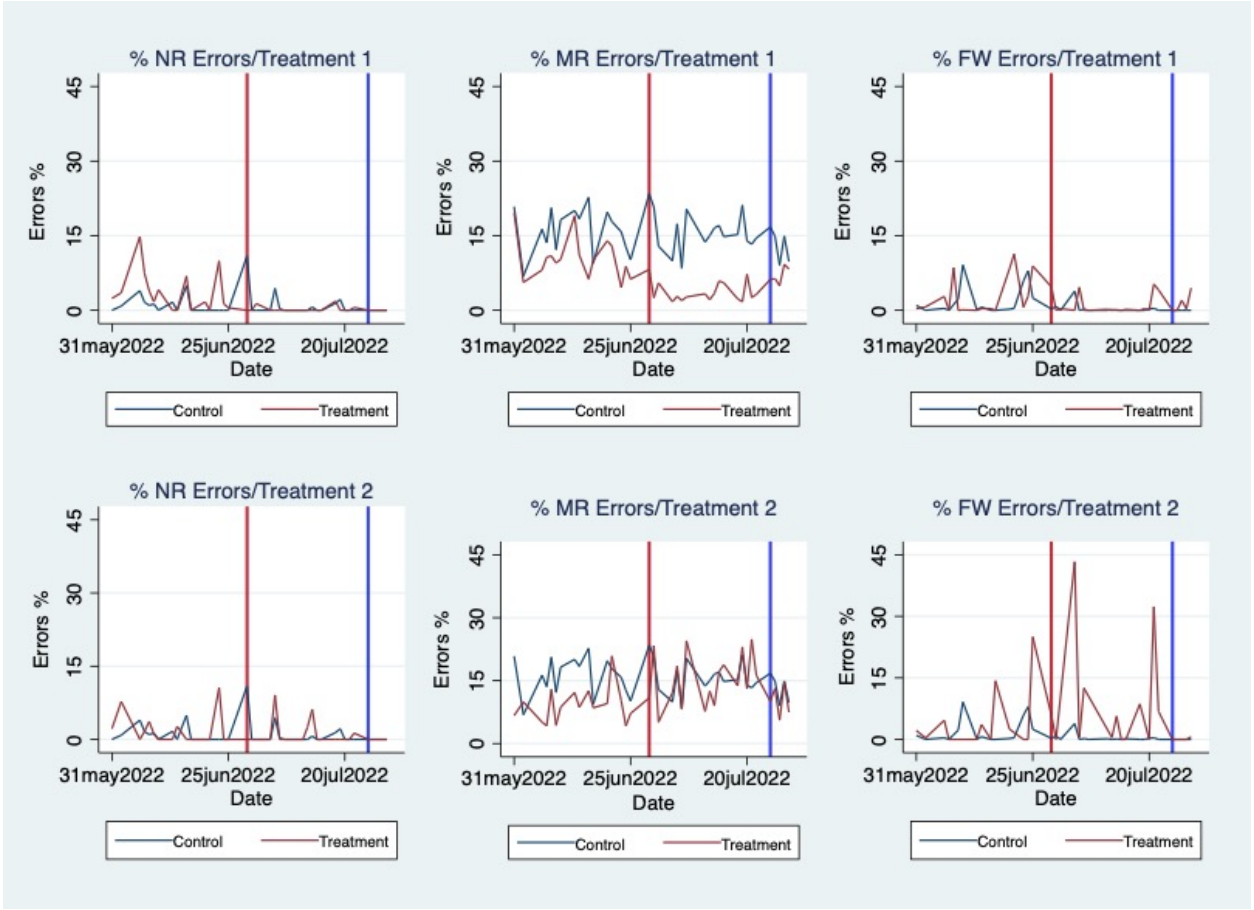
- Neuroscience suggests eyes' proximity to one person impacts the involuntary neuronal system, thus activating human behaviour and economic decision-making processes:
- Positive impact of stylised eyespots on pro-social behaviour and cooperation (see e.g., Ernest-Jones et al., 2011; and Bateson et al., 2006) → mainly due to reputational concerns (rather than their drawing attention to written/verbal instructions).
- When considering recycling, informational programmes have proved to be successful (see e.g., Iyer and Kashyap, 2007; and Vicente and Reis, 2008; Thaler and Sunstein, 2021).

Nudges and Social Norms



- 759 audits of 23 receptacles over 33 days;
- Empty bins not considered;
- Combination of eyes and instructions ↓ sorting errors by 7% points, meaning: errors ↓ by 64%, 95%, and 58% in NR, MR, and FW, respectively.

Nudges and Social Norms



Nudges and Social norms – Follow the herd!!

Energy conservation (Allcott, 2011)

- Price-based policy instruments: Cap-and-trade, carbon taxes and (energy efficiency) subsidies

Three problems

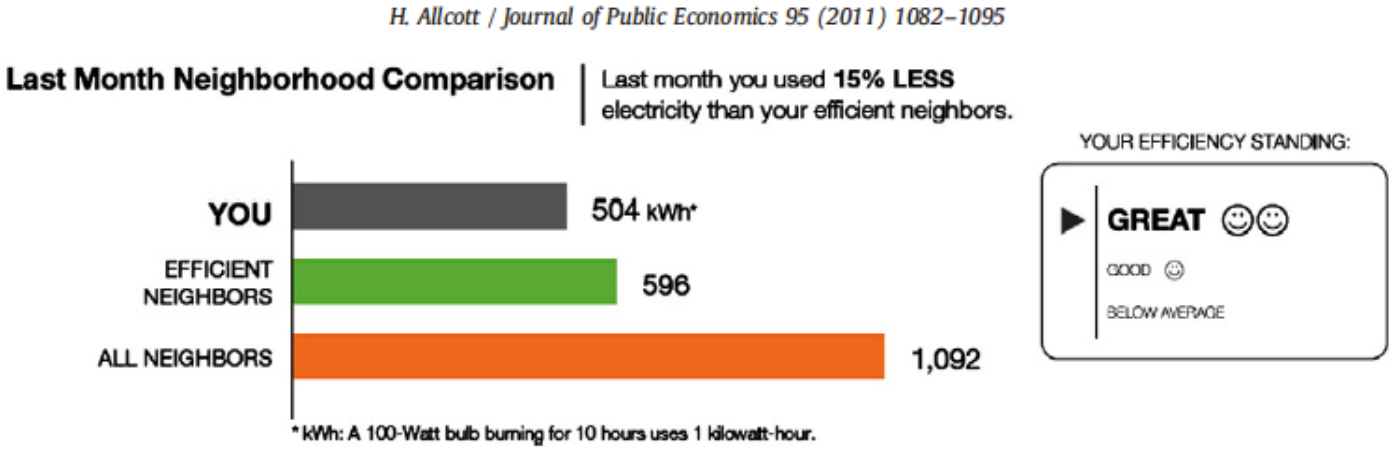
- Political feasibility of carbon taxes
- Savings of energy efficiency measures are typically controversial
- Subsidies, whilst a transfer, can strain limited public funds

Social norms

Non-price energy conservation programmes (Allcott, 2011)

- Carefully crafted psychological cues can have effects on demand comparable to large changes in relative prices
- OPOWER Home Energy Report Letters
- Compares household energy use to that of similar neighbours together with energy savings advice
- 600,000 households in treatment and control groups, covering 47 utilities in 21 states

Social norms



Treatment effects

- Average treatment effect around 2% (equivalent to a 5% increase in the long-run price!!)

Possible limitations

Welfare effects - Allcott and Kessler (2019)

- Are there any costs associated with nudging individuals?
- What are the welfare implications of nudges? Are nudges
- ethical?

Is there any alternative policy/tool we can use?

- Is there any other way to mobilise individuals to act?

    1) e.g., education and persuasion?

- See Oliver (2015), and Bhargava and Loewenstein (2015).

Takeaways

- What environmental economics is and how the environment can be linked to the economy.
- Both efficiency and ethical considerations can guide the desirability of choices involving the allocation of environmental resources
- Widely agreed (by economists, behavioural scientists etc.) that price-based mechanisms are the low-cost, efficient way to reduce emissions
- However, behavioural change can help reduce emissions in the meantime
- Behavioural economics can improve our understanding of consumer behaviour, building on neo-classical economics

THANK YOU!