Lecture 5: Environmental policies: public support

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Objective of the lecture

During the first sessions, we have studied how a planner, a government, or a set of independent entities could decide on a given environmental target to reach.

Last week, we have seen how policymakers could choose between different policy instruments to reach this target, focusing on two considerations: **equity and efficiency**.

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Last week, we have seen how policymakers could choose between different policy instruments to reach this target, focusing on two considerations: **equity and efficiency**.

This week, we explore another aspect of the design of environmental policies: their **public support**.

- We put the free-rider problem aside (already discussed in the 3rd lecture).
- Our focus is on the mis-match between what is best for society, and what people think is best.
- Thus, we do not focus on preferences, but on **beliefs**.

$\rightarrow$ The objective is to understand how incorrect beliefs about environmental problems, or about the solutions proposed to tackle them, can slow down the implementation of ambitious environmental policies.

Road map

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Scientific facts and citizens' beliefs

Millner & Ollivier (2016): "The beliefs of the general public are "ground zero" for the battle to implement environmental policies."

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Millner & Ollivier (2016): "The beliefs of the general public are "ground zero" for the battle to implement environmental policies." → Yet, people's beliefs about major environmental problems usually appear inconsistent with scientific evidence. A few examples:

- in 2019, 66% of U.S. citizens believe global warming is caused by human activities (Gallup);
- 65% of them say most scientists believe global warming is occuring (Gallup);
- these beliefs are also very unstable: in 2006, 78% of U.S. citizens believed that the global climate has been warming over the past few decades, against 57% in 2009 (Shapiro, 2014).

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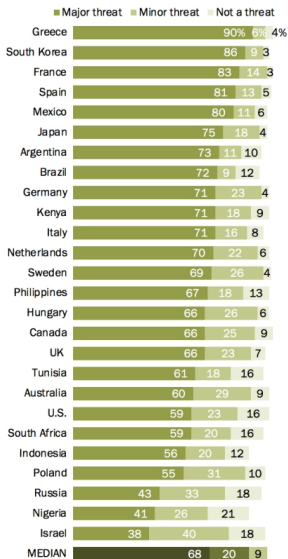
Question: how do people form their beliefs about major environmental problems, and should we expect this process to eventually converge towards a view consistent with the current state of scientific knowledge?

In most surveyed countries, majorities see climate change as a major threat

Global climate change is a ___ to our country

■ Major threat ■ Minor threat ■ Not a threat

Country	Major threat	Minor threat	Not a threat
Greece	90%	6%	4%
South Korea	86	9	3
France	83	14	3
Spain	81	13	5
Mexico	80	11	6
Japan	75	18	4
Argentina	73	11	10
Brazil	72	9	12
Germany	71	23	4
Kenya	71	18	9
Italy	71	16	8
Netherlands	70	22	6
Sweden	69	26	4
Philippines	67	18	13
Hungary	66	26	6
Canada	66	25	9
UK	66	23	7
Tunisia	61	18	16
Australia	60	29	9
U.S.	59	23	16
South Africa	59	20	16
Indonesia	56	20	12
Poland	55	31	10
Russia	43	33	18
Nigeria	41	26	21
Israel	38	40	18
MEDIAN	68	20	9

Source: Spring 2018 Global Attitudes Survey. Q22d.

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Perception of climate change in France

Figure: Perceived cause of climate change by French people in 2019 (from Douenne & Fabre, 2020a).
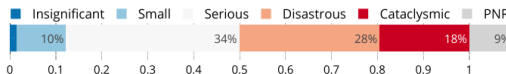

Figure: Perceived gravity of climate change by French people in 2019 (from Douenne & Fabre, 2020a).

$\rightarrow$ Overall, people seem aware and concerned about climate change. But are they concerned enough? Do they correctly link this problem with their own every-day actions?

Mis-understanding of a complex problem

Millner & Ollivier (2016): several characteristics make major environmental problems difficult to grasp:

- they are long term trends whose consequences are often not fully salient;
  - ▶ people do not see the climate changing. At best, they receive pieces of noisy information (such as weather fluctuations) that they have to process;

- the sources being so diffuse, and the consequences so largely spread, there are no well identified victims and villains;

- understanding these problems requires to follow a long chain of causal reasoning;
  - ▶ e.g. from driving a car in the Netherlands to increasing number of conflicts in sub-saharian Africa.

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$\rightarrow$ Requires significant cognitive efforts that people may avoid, especially if they think it will not make a big difference whether they are well-informed or not (rational inattention).

Perceived responsibility for climate change in France
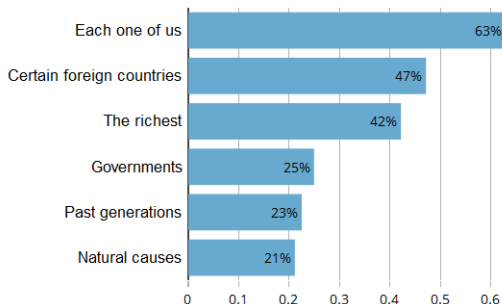

Figure: Entities perceived responsible for climate change by French people in 2019 (from Douenne & Fabre, 2020a).

Although specific entities are pointed out, a majority of French citizens acknowledge that each one of us is to some extent responsible for climate change. Is this just cheap talk? In any case, it shows a certain level of awarness.
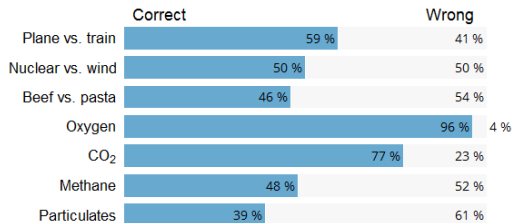
Scientific knowledge of climate change in France

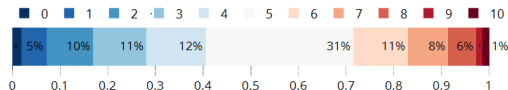Figure: Perceived factors of climate change by French people in 2019 (from Douenne & Fabre, 2020a).

Figure: Perceived GHG emission p.c. required in 2050 to limit global warming to $+2°C$ (in tCO_2eq/yr), given that it is now 10. Representative sample of French people in 2019 (from Douenne & Fabre, 2020a).

$\rightarrow$ Overall, people have a poor knowledge of the causes of climate change, and underestimate the reaction needed.

Information and inference: the Bayesian framework

A critical issue is whether these inconsistent beliefs come from a lack of information about the topic, or from a biased processing of existing information.

The standard framework used in economics for the formation of beliefs is the Bayesian model.

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The standard framework used in economics for the formation of beliefs is the Bayesian model. In this model:

- agents start with certain subjective probabilistic beliefs about different hypotheses;
- over time, they receive new information about these hypotheses;
- these signals are used to update their prior beliefs;
- this updating process follows Bayes' rule:

$$P(H|E) = \frac{P(E|H)P(H)}{P(E)}$$

$\rightarrow$ With such learning process, if people acquire sufficient information, they should eventually converge towards the same, correct belief about the hypothesis.

Overreacting to information

A typical deviation from this framework comes from people over-reacting to information. One example of such bias is the "base-rate neglect" leading people to give too much weight to new signals relative to prior beliefs.

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Standard example:

- let's imagine that a disease has infected a country;
- the share of the population infected is 1%;
- a test has been designed: when someone is infected, it is positive in 95% of cases (false negative);
- when someone is not infected, it is positive in 5% of cases (false positive);
- a given person takes a test: it is positive.

Question: what is the probability that this person is infected?

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Answer: applying base rule, with $P(H) = 1\%$, $P(E|H) = 95\%$, and $P(E) = 1\% \times 95\% + 99\% \times 5\% = 5.9\%$, we get:

$$P(H|E) = \frac{0.95 \times 0.01}{0.059} \approx 16\%$$

Overreacting to information

This kind of bias is often unintentional, but it is very widespread and can have critical implications for decision-making.

When it comes to environmental issues, it may lead people to:

- give too much weight to their personal experience relative to scientific studies providing results from large samples;
- give too much credit to anecdotal evidence;
- be more likely to take-up home insurances right after their region has been exposed to an environmental disaster, and then forget about the event so that their take-up rate reverts back to its former level (Gallagher, 2014);
- be more likely to think that climate change is happening in warmer days (see Zaval et al, 2014);

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There exists other forms of overreactions that affect how people deal with environmental issues. For example, the bias known as "probability neglect": people's WTP for the mitigation of rare / high impact events (such as nuclear disasters) is little sensitive to the probability of these events.

A typical example of base-rate neglect

"It's really cold outside, they are calling it a major freeze, weeks ahead of normal. Man, we could use a big fat dose of global warming!"

"Wow, 25 degrees below zero, record cold and snow spell. Global warming anyone?"

"Ice storm rolls from Texas to Tennessee - I'm in Los Angeles and it's freezing. Global warming is a total, and very expensive, hoax!"

Figure: A few basic illustrations.

Selective responses to new information

- While people are subject to unintentional cognitive mistakes in their reasoning, some other forms of biases are motivated: when processing information, people do not only seek to reach accurate conclusions, but also conclusions that they prefer (Kunda, 1990).

- Through motivated reasoning, people have a tendency to make their beliefs consistent with their worldviews, or avoid conclusions that make them uncomfortable.

Selective responses to new information

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- Through motivated reasoning, people have a tendency to make their beliefs consistent with their worldviews, or avoid conclusions that make them uncomfortable.

- One specific case of such bias is the so-called "confirmation bias": people tend to give more weight to information that confirms their prior belief.
  $\rightarrow$ Leads to over-confidence (as one's beliefs appear confirmed more than they should), and even an infinite amount of noisy but unbiased information does not guarantee convergence towards an accurate belief.

Republicans and democrats about scientific consensus over climate change

Scientists' Beliefs About Global Warming, by Political Party

Just your impression, which one of the following statements do you think is most accurate -- most scientists believe that global warming is occurring, most scientists believe that global warming is NOT occurring, or most scientists are unsure about whether global warming is occurring or not?
% Scientists believe global warming is occurring
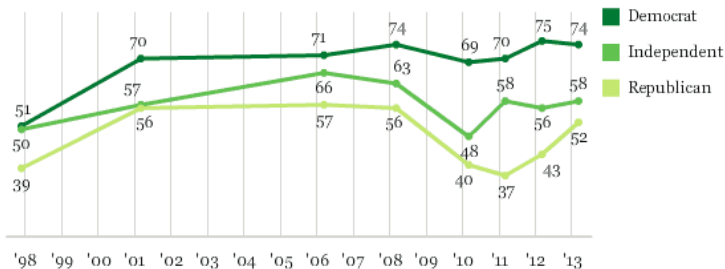
GALLUP

$\rightarrow$ Beliefs about a fact (the state of scientific consensus) depend on people political views, as well as the current context: sharp drop among republicans at the time of the economic crisis.

Republicans and democrats about climate change media coverage

Percentage Saying the Seriousness of Global Warming Is Generally Exaggerated in the News

by Party ID*
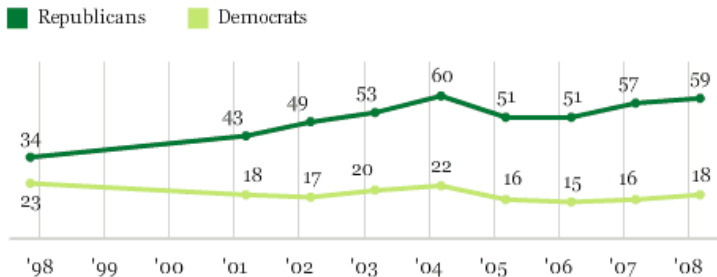
* Results for political independents not shown

GALLUP POLL

$\rightarrow$ While republicans are more likely to follow media that are dismissive of climate change, they are also more likely to perceive media as overly concerned about it.
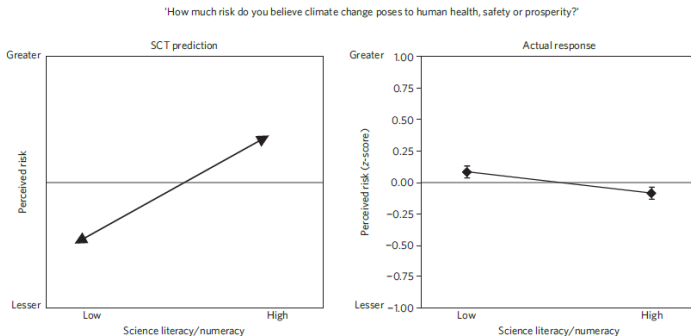
Education and polarization about climate change (Kahan et al, 2012)

'How much risk do you believe climate change poses to human health, safety or prosperity?'

Figure 1 | SCT prediction versus actual impact of science literacy and numeracy on climate change risk perceptions. Contrary to SCT predictions, higher degrees of science literacy and numeracy are associated with a small decrease in the perceived seriousness of climate change risks. Derived from Supplementary Table S4, Model 1. Low and high reflect values set at −1 s.d. and +1 s.d. on the composite Science literacy/numeracy scale (see Supplementary Information). Responses on the 0–10 risk scale ($M = 5.7$, s.d. = 3.4) were converted to z-scores to promote ease of interpretation. Confidence intervals reflect the 0.95 level of confidence.

$\rightarrow$ Among U.S. citizens, the more educated, the less likely to be concerned about climate change. Composition effect where more educated people are also more polarized on the topic.

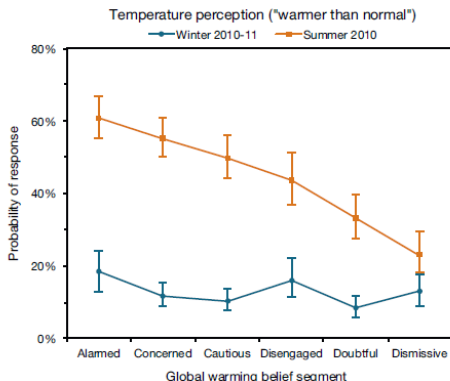# Motivated beliefs about past summer's temperature (Howe & Leiseirowitz, 2013)

Fig. 4. Predicted probability of responding that winter 2010–2011 and summer 2010 were warmer than normal, by global warming belief segment and holding all other variables constant at their sample medians. Based on model A2 (winter 2010–2011) and model B2 (summer 2010). Error bars represent 95% confidence intervals.

→ Different views about climate change, different memories about last summer's temperatures.

# Motivated beliefs about the covid pandemic (Allcott et al, 2020)
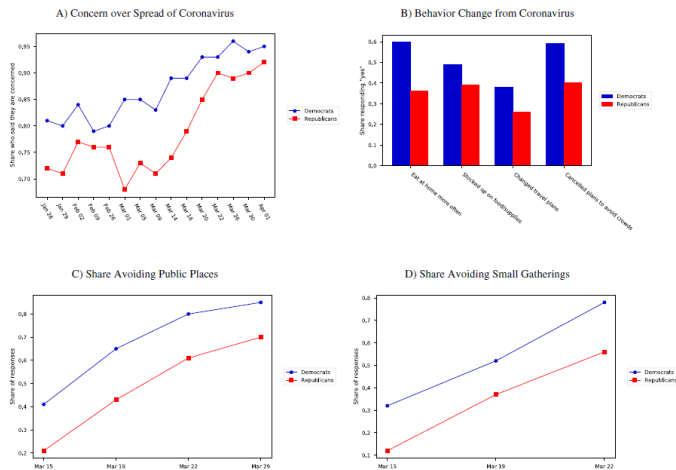
Fig. 1. Partisan differences in perceived risk and social distancing. Note: Figure shows responses to nationally representative polls by political affiliation. Panel A shows the share of people concerned about coronavirus spreading to the United States (Piacenza, 2020). Panel B shows self-reported behavior change as of March 13–14 (Marist, 2020). Panel C shows the share of people avoiding public places, such as stores and restaurants (Saad, 2020). Panel D shows that share of people avoiding small gatherings, such as with friends and family (Saad, 2020).

$\rightarrow$ Polarized beliefs are not just cheap talk: significant implications on high-stake decisions.

American "Belief in a Just World" versus European "Pessimism" (Alesina & Angeletos, 2005)

Percentage who believe that luck determines income
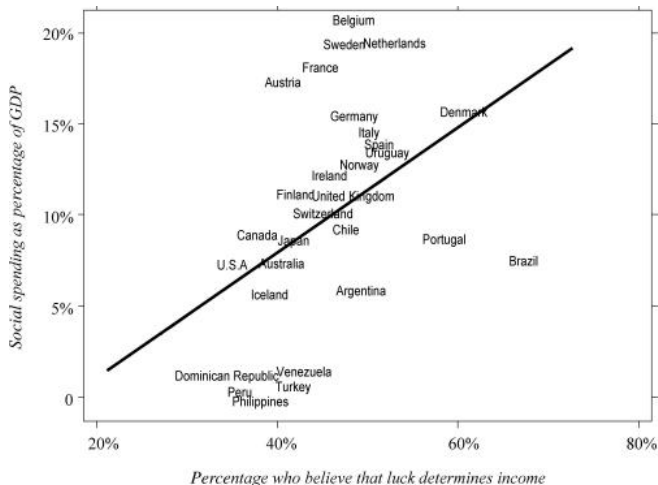
→ (Sometimes biased) beliefs about the opportunities of economic success have also been related to preferences for redistribution (see Cruces et al, 2013; Kuziemko et al, 2015; Alesina et al, 2018).

Beliefs about animal minds and edibility (Bastian et al, 2012)
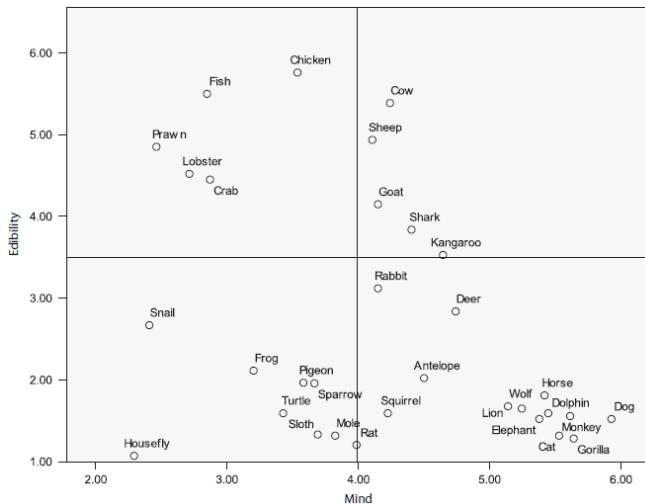
$\rightarrow$ Humans often tend to underestimate the mind of species they eat. Some causal evidence in the lab (see Bastian et al, 2012).

Social learning

- When individuals attempt to form a judgment about a given hypothesis, they do not only process information on their own: they also learn through their interaction with other people.

- Optimistic view: if people have independent biases centered around zero, social interactions should lead to more accurate beliefs, and eventually to reach the truth (from the law of large numbers).

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- Optimistic view: if people have independent biases centered around zero, social interactions should lead to more accurate beliefs, and eventually to reach the truth (from the law of large numbers).

- However, in most situations:
  - people have correlated biases and correlated information;
  - they can be strategic and not necessarily reveal their information truthfully, nor simultaneously (thus creating a path dependence);

- Then, there is no guarantee that social learning will lead to more accurate beliefs. It can instead lead to herding, free-riding on the cost of information acquisition, overconfidence, or polarization.

- Example: correlation neglect is a bias leading people to ignore the correlation between the differnet signals they receive. Together with homophiliy, can for example drive over-confidence in political views and extremism (see Glaeser & Sustein, 2009).

The supply side of beliefs: the role of media

Media play a key role in people's beliefs, as they represent a significant share of the information supplied.

- Increasing competition across media may improve quality: more difficult to hide information, incentive for media to put more efforts to provide quality information, etc (see Gentzkow & Shapiro, 2006).

- However, as shown by Cagé (2014), competition between media creates an incentive to entertain rather than inform, leading to a decrease in the quality and quantity of news provided.

- Media's willingness to remain neutral can lead to an incorrect perception about the actual scientific consensus about climate change.

- On the demand side of media, confirmation bias may lead people to select those whose editorial line is consistent with their own views.

- Since people give more credit to information that confirm their beliefs, media have an incentive to confirm people's view in order to signal their quality (Gentzkow & Shapiro, 2006).

$\rightarrow$ Again, numerous reasons to believe that the supply of information is biased.

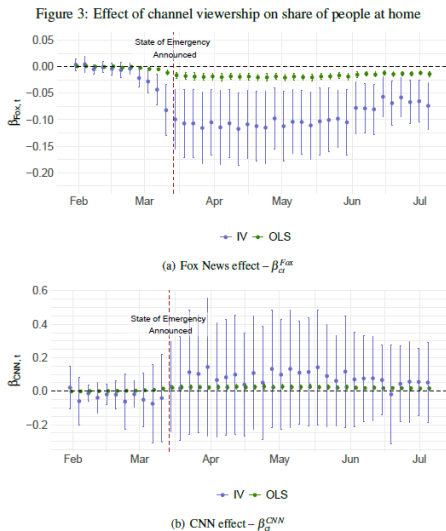# Heterogeneity in media coverage about climate change (Feldman et al, 2011)
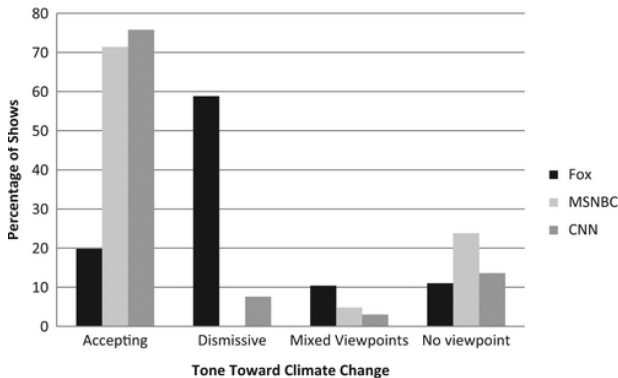
Over 269 cable news transcripts of the three Americans channels that discussed climate change or global warming in 2007-2008, the authors found very heterogeneous positions on the issue.

Heterogeneity in media coverage about climate change (Feldman et al, 2011)
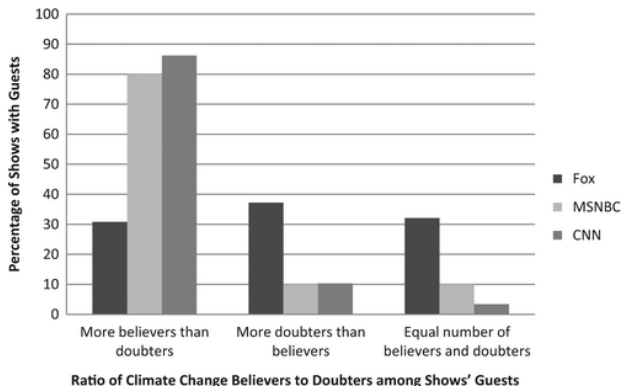
Over 117 shows that featured at least one guest with a determinate stance on climate change, again very heterogeneous positions on the issue.

The "Fox News effect" on social distancing behavior (Simonov et al, 2020)

Figure 3: Effect of channel viewership on share of people at home

(a) Fox News effect – β_{ct}^{Fox}

(b) CNN effect – β_{ct}^{CNN}

The authors find that a 10% increase in Fox News cable viewership reduces by 1.3 p.p. the propensity to stay at home during the covid pandemic.

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Citizens' opposition to environmental policies: an example

In 2014, France has implemented a carbon tax on fossil fuels. In 2018 the tax was at 44,6€/tCO_2, and was scheduled to reach 86.2€/tCO_2 by 2022, and above 150€/tCO_2 by 2030.

Citizens' opposition to environmental policies: an example

In 2014, France has implemented a carbon tax on fossil fuels. In 2018 the tax was at $44,6€/tCO_2$, and was scheduled to reach $86.2€/tCO_2$ by 2022, and above $150€/tCO_2$ by 2030. But in november 2018:

Figure: Yellow Vests protesting against taxes

Beyond the French carbon tax

The rejection of the carbon tax observed in France is one example, but in many other countries policymakers have tried and failed to implement it (e.g. Australia, Washington State).

Carattini et al (2018): "In 2016, 18 countries and two Canadian provinces have implemented a carbon tax (...). In comparison, 176 countries had policy targets for renewable energy and/or energy efficiency".

Thus, one may wonder:

- whether there exists specific designs of the carbon tax more likely to succeed than others;
- whether there are other environmental and climate policies that gather a larger public support;
- whether public opinion about environmental policies is homogeneous, or instead polarized within society;
- whether the lack of public support is associated to specific beliefs about climate change.
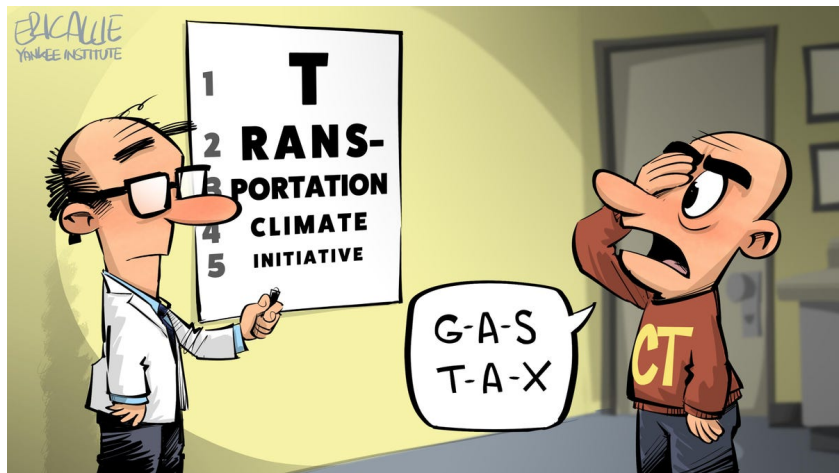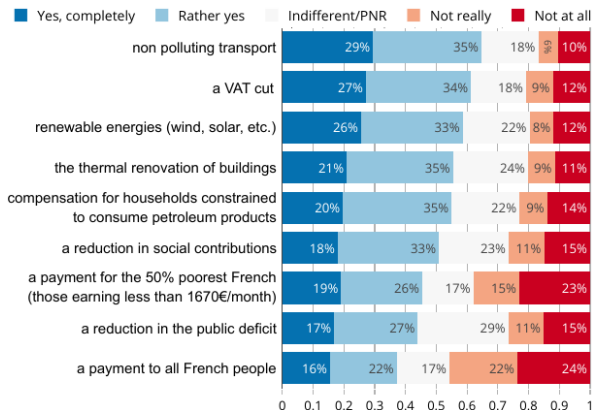
Preferred revenue-recycling for carbon taxation

Figure: Approval of a carbon tax by French people in 2019, if its revenue finances: (Douenne & Fabre, 2020)

$\rightarrow$ Clear preference for earmarking the tax revenue for green spending.

The use of environmental tax revenues matters

Several reasons:

- because people perceive environmental taxes as little effective to change behavior, they consider them as environmental only to the extent that their revenue is used to finance environmental spending;

- because the incentive purpose of taxes is not fully understood, redistributing through lump-sum transfers sometimes appears like a pointless transfer of money.

- the preference for earmarking the revenue to environmental spending can also reflect an anticipated commitment problem from the government.

- The perceived distributive properties of policies matters:
  - people tend to favor more progressive policies;
  - they also care about horizontal equity (e.g., avoid large burden on rural households).

- A major concern is the availability of (affordable) alternatives:
  - people don't like being "trapped" and having to bear a burden for a behavior they feel they cannot change.
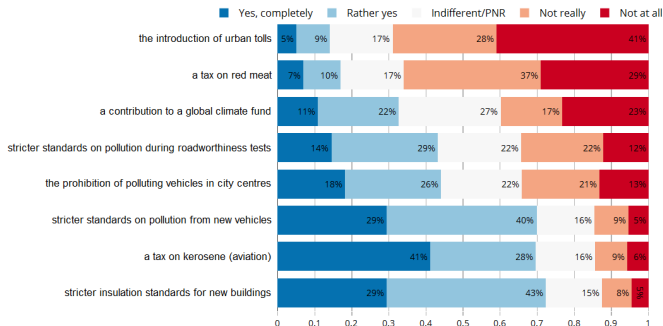
Preferred policies

Figure: Approval of different climate policies by French people in 2019: (Douenne & Fabre, 2020)

→ Standards are generally preferred over taxes (e.g. prohibition of polluting vehicles in city centers ≻ urban tolls), although taxation can also be strongly supported when targeted towards goods perceived as more luxury and polluting (e.g. aviation).

The salience of costs matters

Subsidies or standards are often preferred to taxes. This could be because:

- the revenue effect is not well-understood;

- the distributive effects of these policies appear more ambiguous because the losers are not well identified;

- these measures are often perceived as more effective to change behaviors.

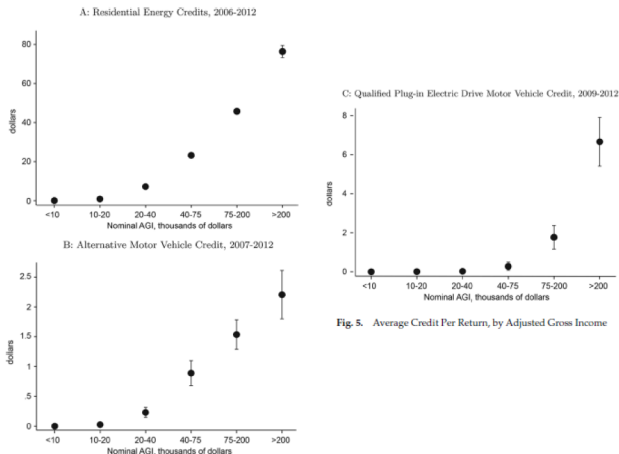# Yet, environmental subsidies can be quite regressive...

Figure: The distributional consequences of US clean energy tax credits (from Borenstein & Davis, 2016).

→ For electric vehicles, the top quintile has received 90% of tax credits
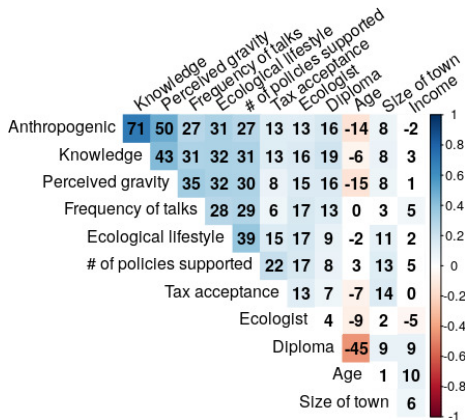
Correlation attitudes and socio-demographics

Figure: Correlations between French attitudes over climate change, climate policies and socio-demographics in 2019 (in %).

$\rightarrow$ Knowledge and concern about climate change correlated to support for environmental policies. Controlling for many respondents' characteristics, this relation seems to hold.

Ways forward

Despite the free-rider problem, many citizens appear aware and concerned about the environment, and willing to make a certain level of effort to protect it. Still, there are significant disagreements about the best way to proceed with the environmental transition.

- The key challenge on which economists have mostly focused is the design of effective instruments that enable to reach a given environmental target at low cost (efficiency) without undesirable distributive properties (equity).

- However, a second challenge faced by policymakers is how these instruments are perceived by the public. If beliefs over the source of environmental problems and the nature of the solutions proposed to tackle them are biased, designing efficient and fair policies is not sufficient to guarantee an effective transition (see tutorial).

Ways forward

How to overcome this challenge?

- Remain critical about our own assessment of equity and efficiency;

- increase deliberation: the top-down approach has not yet succeeded at the international level, and seems to also meet with some difficulties at the national level. Could the bottom-up approach bring new solutions?

$\rightarrow$ In France, after the Yellow Vests movement, creation of the Citizen Assembly for the Climate (Convention Citoyenne pour le Climat): 150 citizens randomly drawn to learn, debate, and propose solutions to combat climate change. Rather successful deliberation process, let see how their propositions succeed!