Yellow Vests, Carbon Tax Aversion, and Biased Beliefs

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Are French people ecologist?

Figure: Some Yellow Vests

What happened to the French "carbon tax"?

1. Tax on fossil fuels introduced in 2014, should have increased progressively until 100€/tCO_2 in 2022
2. Yellow Vests protested against rising fuel prices, for more purchasing power and more democracy
3. The government froze the tax at 50€/tCO_2

Motivations

How to avoid regressivity of carbon tax?

→ **Tax & Dividend**: redistributing equally the revenues. Makes it:

- progressive *(e.g. West & Williams, 2004; Bento et al., 2009; Williams et al., 2015; Douenne, 2020)*.
- supported by 3,354 economists in *The Wall Street Journal (2019)*, "To maximize the fairness and political viability of a rising carbon tax".

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With a design ensuring desirable properties, a policy should be supported.

But is it really sufficient?

This paper

Based on a large survey representative of the French population, we show that:

1. Most people oppose a Tax & Dividend
2. They hold biased (pessimistic) beliefs about it
   - e.g. 70% expected to win, only 14% think they would
3. These beliefs are partially formed through motivated reasoning
4. Rejection is driven by biases: correcting them would suffice to generate large majority approval

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$\rightarrow$ *Example of a welfare-improving policy rejected due to inaccurate reasoning.*

Contributions

- **Political economy of the carbon tax:**

  Three key motives for acceptance:
  (See review by Carattini et al. (2018) or synthesis by Klenert et al. (2018))
  - self-interest *(Thalmann, 2004)*
  - environmental effectiveness *(Bristow et al 2010; Brannlund & Persson 2012)*
  - progressivity *(Kallbekken & Sælen, 2011; Baranzini & Carattini, 2017)*

  → We are the first to:

  1. Estimate objective net gain from the reform
  2. Acknowledge and quantify biases in perceptions
  3. Estimate causal effects of motives on acceptance

- **Beliefs formation:**

  1. Add new evidence on link between beliefs and preferences for policies *(e.g. Alesina & Angeletos, 2005; Bénabou & Tirole, 2006; Alesina et al., 2018)*
  2. Bi-directional causality identified through directional motivated reasoning *(e.g. Kunda, 1990; Kahan, 2013; Bénabou & Tirole, 2016; Druckman & McGrath, 2019; Little, 2019)*

Survey data collection

- 3002 responses collected on-line in February/March 2019
- Representative along: gender, age, education, profession, size of town, region
- Median duration: 19 min, important questions in the first half
- We exclude: 4% of respondents answering in less than 7 min, 9% who fail test of quality
- We flag 273 inconsistent answers, such as too high fuel economy or incomes: they are not correlated with our main variables of interest

▸ See the questionnaire

Tax & Dividend: *ex ante*

- Description of our Tax & Dividend reform:
  - Both partial reforms combined: $+50€/tCO_2$
  - Revenues from households redistributed lump-sum: 110€/year by adult
  - Tax incidence: borne at 80% by consumers
  - Elasticities: -0.4 for transport, -0.2 for housing

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- Do you think this reform would be effective in reducing pollution and fight climate change?
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- Would you lose, win or be unaffected by the reform?
- Expected loss (or gain) among 6 (or 5) intervals?
- Would you approve this reform?
  - 10% 'Yes': approval
  - 19% 'PNR' (I don't know, I don't want to answer): acceptance
  - 70% 'No': disapproval

French households surveys

- We estimate net gains of respondents using another Insee survey:
  - *Enquête Logement 2013* (EL): 27,000 HH, good on housing
  - increase in housing expenditures $= \beta_0 + \beta_f$ fuel $+ \beta_g$ gas $+ \beta_s$ surface
    ▸ See regressions
  - increase in transport energy expenditures computed directly from HH characteristics
- We estimate the revenues of the reform with the database of Douenne (2018) that matches two Insee surveys:
  - *Budget de Famille 2011* (BdF): 10,000 HH, good on housing, not on transport
  - *Enquête Nationale Transports et Déplacements 2008* (ENTD): 20,000 HH, used for transport
- In 83.4% of cases, we predict correctly the winning category (win/lose) on out-of-sample (BdF) data
- Similar (or higher) error rates with other specifications or methods (e.g. regression tree, matching). Adding variables barely improves prediction.

Biased perception of net gain (1/2)

PDF of objective vs. subjective net gains from Tax & Dividend (in € per year per c.u.). Mean reported in captions:

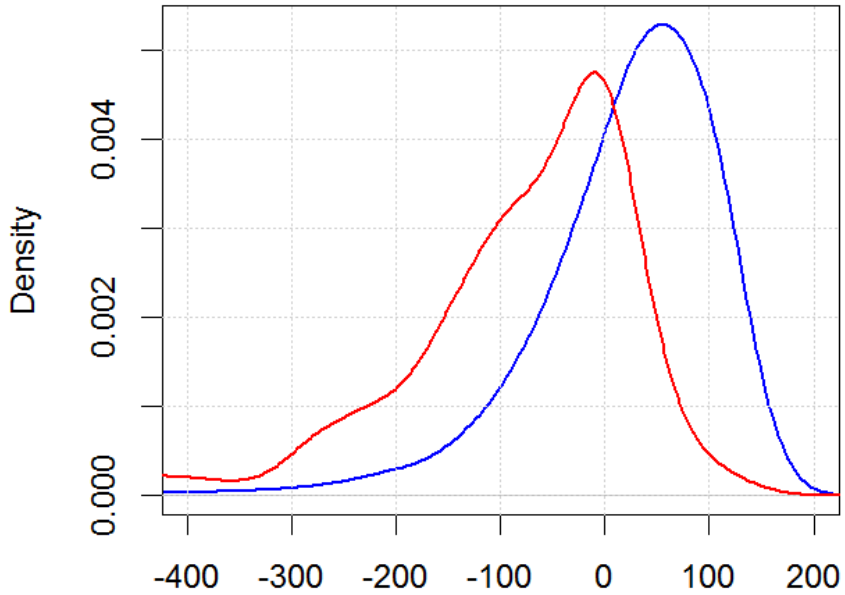

Figure: Net gain. Mean: -89/+24

- Objectively, 70% expected to win, but only 14% think they would (64% think they lose, 21% PNR);
- 89% underestimate their gain, 53% by more than 110€;
- in relative terms: 60% think they lose more than average (>35% much more), 10-15% that they lose less.

Biased perception of net gain (2/2)

Objective vs. subjective net gains from Tax & Dividend (in € per year per c.u.):

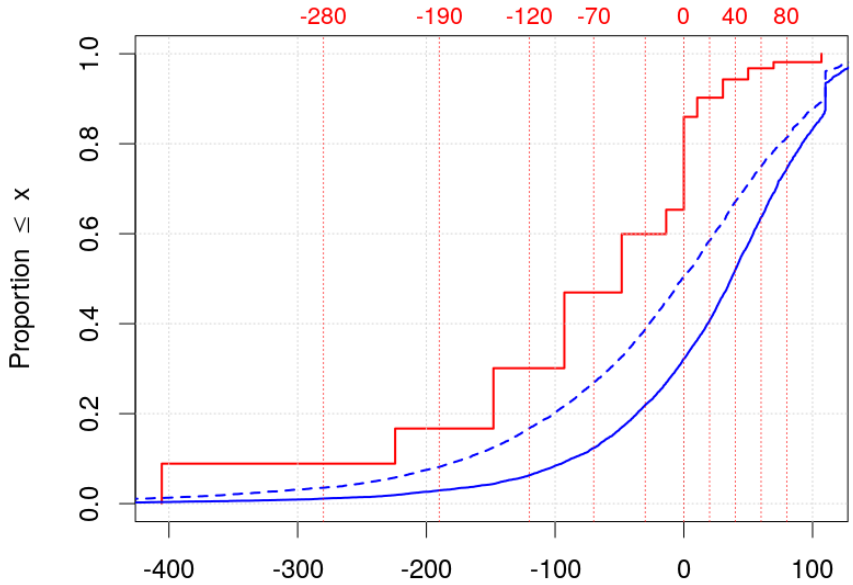

Figure: Net gain. Mean: -89/+24

NOTE: - - - -: case of inelastic expenditures.

Assuming that everyone's fossils consumption is totally inelastic:

- 77% underestimate their gain, 37% by more than 110€.
- Median gap: 80€.

Beliefs over environmental effectiveness

Reform effective to "reduce pollution and fight climate change"?
17% 'Yes', 66% 'No' and 18% 'PNR'.

→ Tempting interpretation: people perceive aggregate consumption as inelastic
(Kallbekken & Sælen, 2011; Carattini et al., 2018)

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Table: Effect of subjective elasticities on perceived environmental effectiveness

	Environmental effectiveness: not 'No'			
	(1)	(2)	(3)	(4)
Price elasticity: Housing	−0.062*		−0.055*	
	(0.032)		(0.032)	
Price elasticity: Transports		−0.056*		−0.060**
		(0.030)		(0.030)
Controls: Socio-demographics, energy			✓	✓
Observations	1,501	1,501	1,501	1,501
R^2	0.003	0.002	0.089	0.090
Note:				*p<0.1; **p<0.05; ***p<0.01

Effect **too small to explain the beliefs**.
Yet maybe, insufficient impact of the reform: –0.8% of *French* GhG emissions.

Beliefs over progressivity

Reform would benefit poorer households? 19% 'Yes', 60% 'No', 21% 'PNR'.

Yet, the tax is progressive:

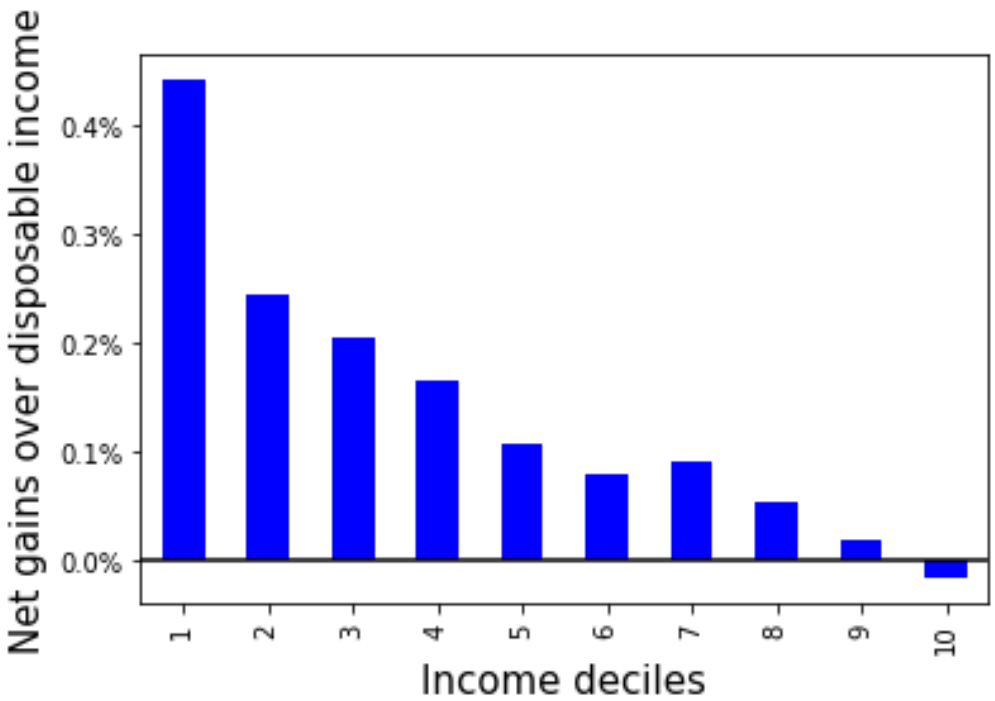

Figure: Average gain of Tax & Dividend by income decile as a share of disposable income.

Heterogeneity in bias

Table: Determinants of a large bias in subjective gains.

	Large bias ($\lvert\hat{\gamma} - g\rvert > 110$)		
	OLS	*logit*	*OLS*
Initial tax: PNR (I don't know)			-0.179^{***}
			(0.023)
Initial tax: Approves			**-0.284^{***}**
			(0.031)
Sex: Female	0.036^{*}	0.030	0.042^{**}
	(0.020)	(0.020)	(0.019)
Ecologist	**-0.064^{**}**	-0.061^{**}	-0.025
	(0.026)	(0.026)	(0.026)
Yellow Vests: PNR	0.039	0.035	0.024
	(0.036)	(0.035)	(0.036)
Yellow Vests: understands	0.081^{***}	0.062^{***}	0.041^{*}
	(0.025)	(0.024)	(0.025)
Yellow Vests: supports	0.108^{***}	0.103^{***}	0.051^{*}
	(0.026)	(0.025)	(0.026)
Yellow Vests: is part	**0.202^{***}**	0.193^{***}	**0.147^{***}**
	(0.048)	(0.040)	**(0.047)**
Controls: Socio-demo, political leaning	✓	✓	✓
Observations	3,002	3,002	3,002
R^2	0.061		0.098

*p<0.1; **p<0.05; ***p<0.01

→ The more opposed to the tax, the more biased? Or opposite direction of causality?

Asymmetric beliefs' revision

Table: Share of respondents with new beliefs aligned with feedback

	Aligned with feedback: $G^F = \hat{\Gamma}$	
	$\hat{\Gamma} > 0$ (75.8%)	$\hat{\Gamma} < 0$ (24.2%)
Initial belief: winner ($G > 0$) (14.0%)	78.8% [73.2% ; 83.4%]	**81.5%** [65.0% ; 91.3%]
Initial belief: unaffected ($G = 0$) (21.7%)	21.6% [17.6% ; 26.2%]	44.9% [33.5% ; 56.8%]
Initial belief: loser ($G < 0$) (64.3%)	**12.2%** [10.3% ; 14.5%]	93.9% [90.9% ; 96.0%]
Initial belief: affected ($G \neq 0$) (78.3%)	26.1% [23.7% ; 28.7%]	92.9% [89.8% ; 95.1%]
All (100%)	25.1% [23.0% ; 27.3%]	85.7% [82.2% ; 88.7%]

NOTE: The 95% confidence intervals for binomial probabilities is given in brackets.

Conservatism and pessimism

Two main results:

1. Losers update correctly (on average): 86% align with feedback
2. Winners do not update enough: only 25% align

▸ See regressions

Possible interpretations:

- Respondents think our feedback is biased (upwards).
- Respondents give too much value to their (biased) private information.
- Respondents are uncertain and loss (or risk) averse: they don't report the expected outcome but something more pessimistic.

Evidence of motivated reasoning

Table: Asymmetric updating of winning category

	Correct updating (U)			
	(1)	(2)	(3)	(4)
Constant	0.120***	−0.035	−0.146	−0.116
	(0.012)	(0.179)	(0.178)	(0.179)
Winner, before feedback ($\dot{G}$)	**0.695*** **	0.685***	0.646***	0.659***
	(0.078)	(0.080)	(0.080)	(0.080)
Initial tax: PNR (I don't know)			0.163***	0.165**
			(0.031)	(0.067)
Initial tax: Approves			**0.158*** **	−0.056
			(0.046)	(0.115)
Diploma (1 to 4)		0.015	0.016	0.011
		(0.013)	(0.013)	(0.014)
Diploma × Initial tax: PNR				−0.001
				(0.025)
Diploma × Initial tax: Approves				**0.074** **
				(0.037)
Yellow Vests: PNR		−0.048	−0.043	−0.044
		(0.047)	(0.047)	(0.047)
Yellow Vests: understands		−0.090***	−0.063*	−0.064*
		(0.034)	(0.034)	(0.034)
Yellow Vests: supports		−0.101***	−0.059*	−0.060*
		(0.035)	(0.036)	(0.036)
Yellow Vests: is part		−0.172***	**−0.137** **	−0.138**
		(0.062)	**(0.062)**	(0.062)
Among invalidated	✓	✓	✓	✓
Includes controls		✓	✓	✓
Observations	1,365	1,365	1,365	1,365
R^2	0.055	0.111	0.133	0.136

*p<0.1; **p<0.05; ***p<0.01

The more opposed to the tax, the less beliefs are correctly revised. ▸ Robustness

→ Motivated reasoning. Even more true among educated people.

Beliefs over environmental effectiveness

Information randomly displayed about climate change / air pollution / scientific consensus over effectivenes.

Table: Effect of primings on beliefs about environmental effectiveness

	Environmental effectiveness			
	not "No"			"Yes"
	OLS		*logistic*	*OLS*
	(1)	(2)	(3)	(4)
Info on Environmental Effectiveness (Z_E)	0.043**	0.063***	0.052***	0.059***
	(0.017)	(0.018)	(0.018)	(0.014)
Info on Climate Change (Z_{CC})	0.044*	0.041*	0.043*	0.029
	(0.024)	(0.024)	(0.024)	(0.018)
Info on Particulate Matter (Z_{PM})	0.039	0.029	0.037	0.017
	(0.024)	(0.024)	(0.024)	(0.019)
$Z_{CC} \times Z_{PM}$	−0.040	−0.033	−0.042	−0.005
	(0.035)	(0.034)	(0.033)	(0.027)
Controls: Socio-demographics		✓	✓	✓
Observations	3,002	3,002	3,002	3,002
R^2	0.003	0.047		0.075

*p<0.1; **p<0.05; ***p<0.01

→ *Significant effect, but small (≃ 5 p.p., not significant for air pollution).*

Beliefs over progressivity

Correlation between belief that tax is regressive and seeing the information that it is progressive: 0.006% ! How come?

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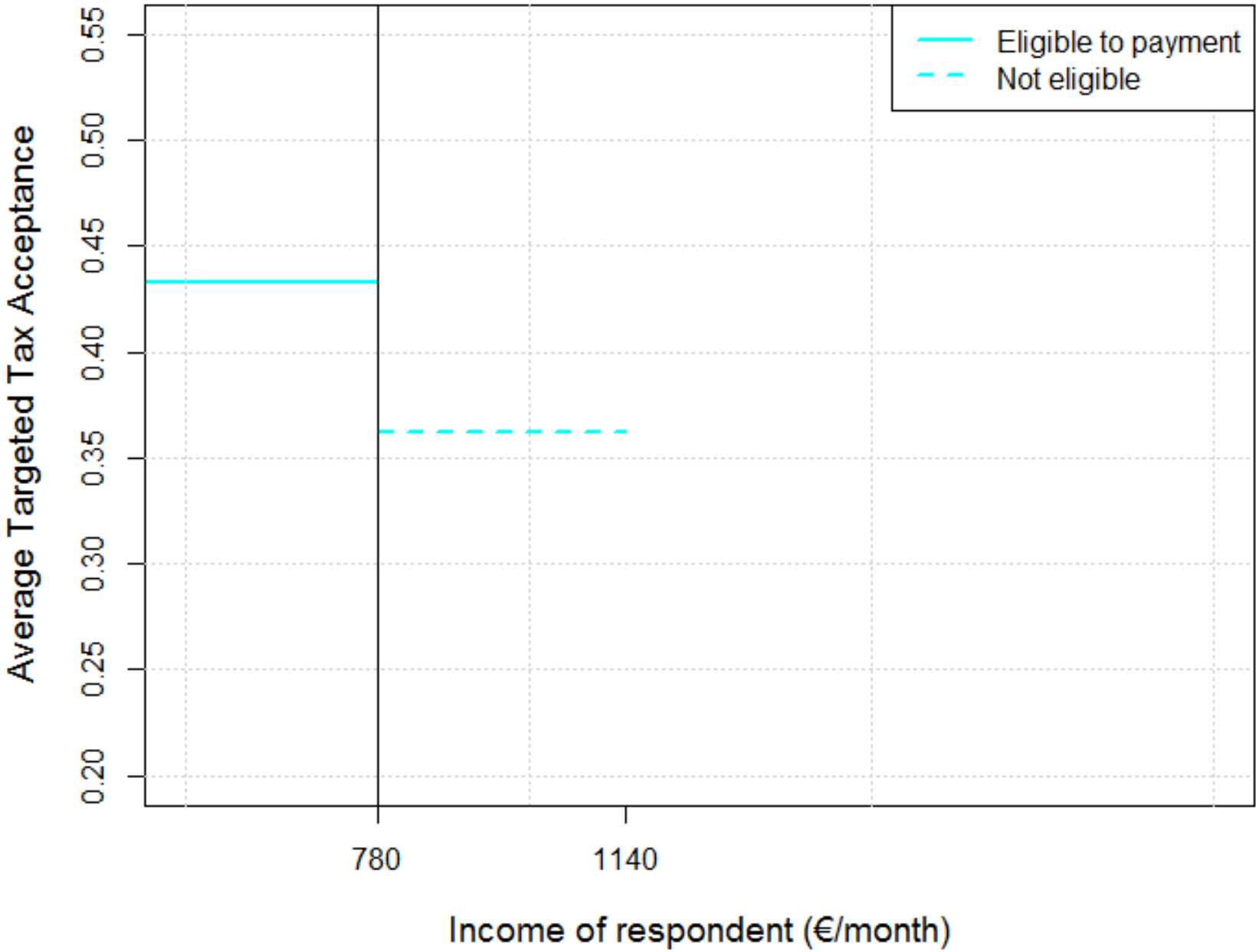
Table: Effect of information on perceived progressivity

	Progressivity: not No (P)		
	(1)	(2)	(3)
Constant	0.419***	0.435***	0.386**
	(0.022)	(0.033)	(0.186)
Information on progressivity	−0.021	0.050	0.014
	(0.027)	(0.040)	(0.239)
Large bias		−0.028	−0.019
		(0.045)	(0.045)
Large bias × Information		−0.130**	−0.126**
		(0.055)	(0.055)
Controls: Socio-demo, politics			✓
Observations	1,444	1,444	1,444
R^2	0.0004	0.018	0.100

*p<0.1; **p<0.05; ***p<0.01

→ *Evidences of psychological reactance from biased people (boomerang effect, see Hovland, 1953):*

Acceptance of Tax & Targeted Dividend



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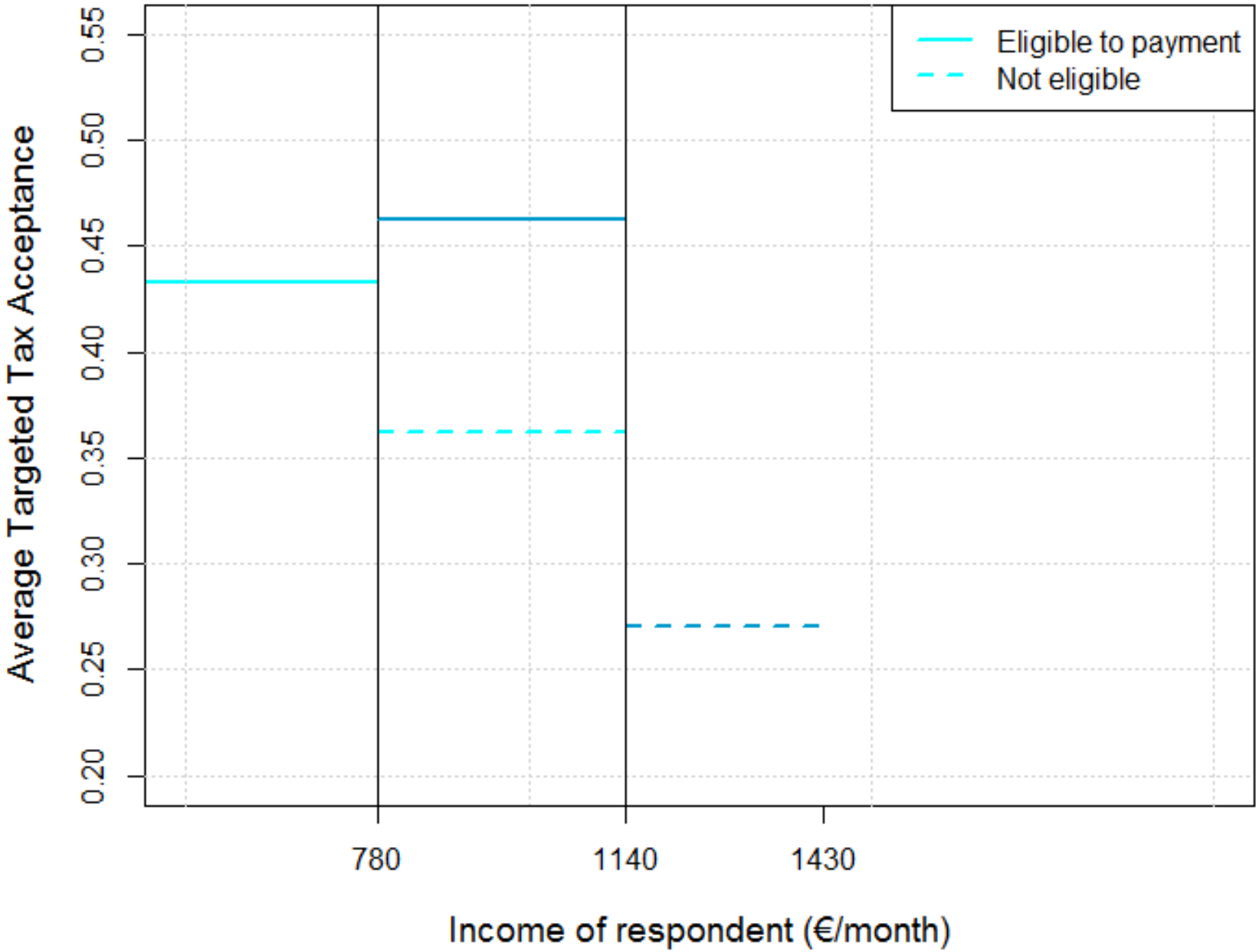

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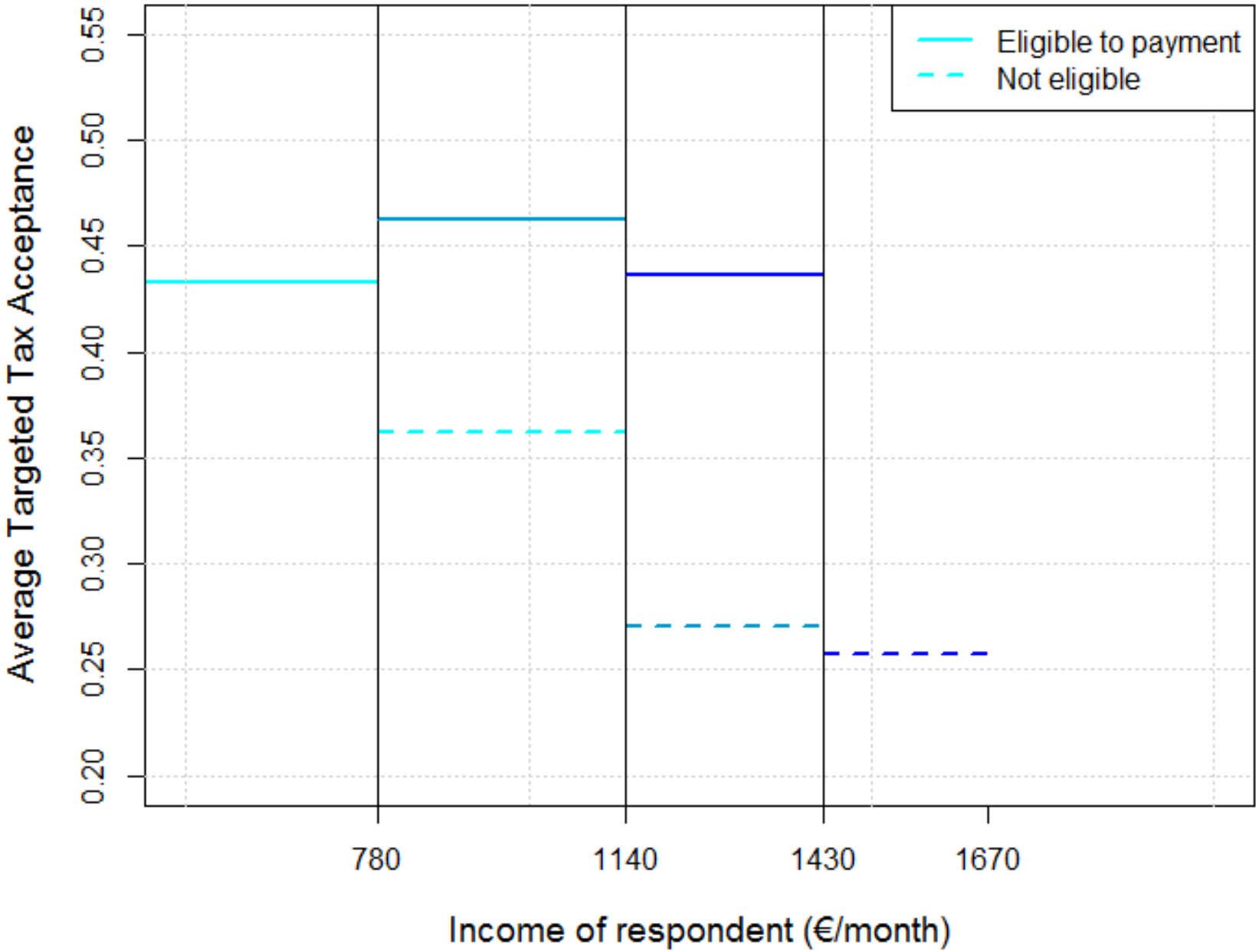

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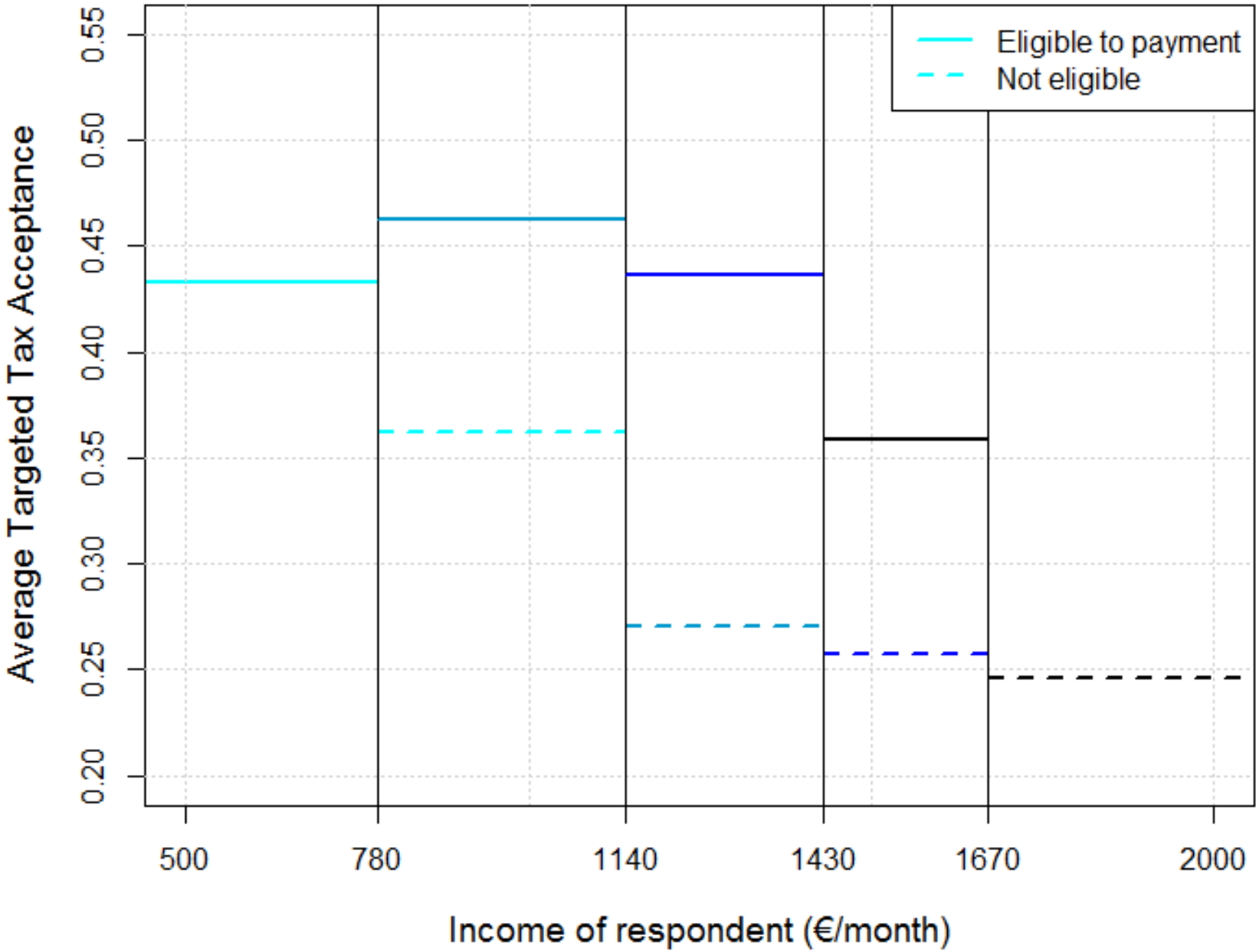

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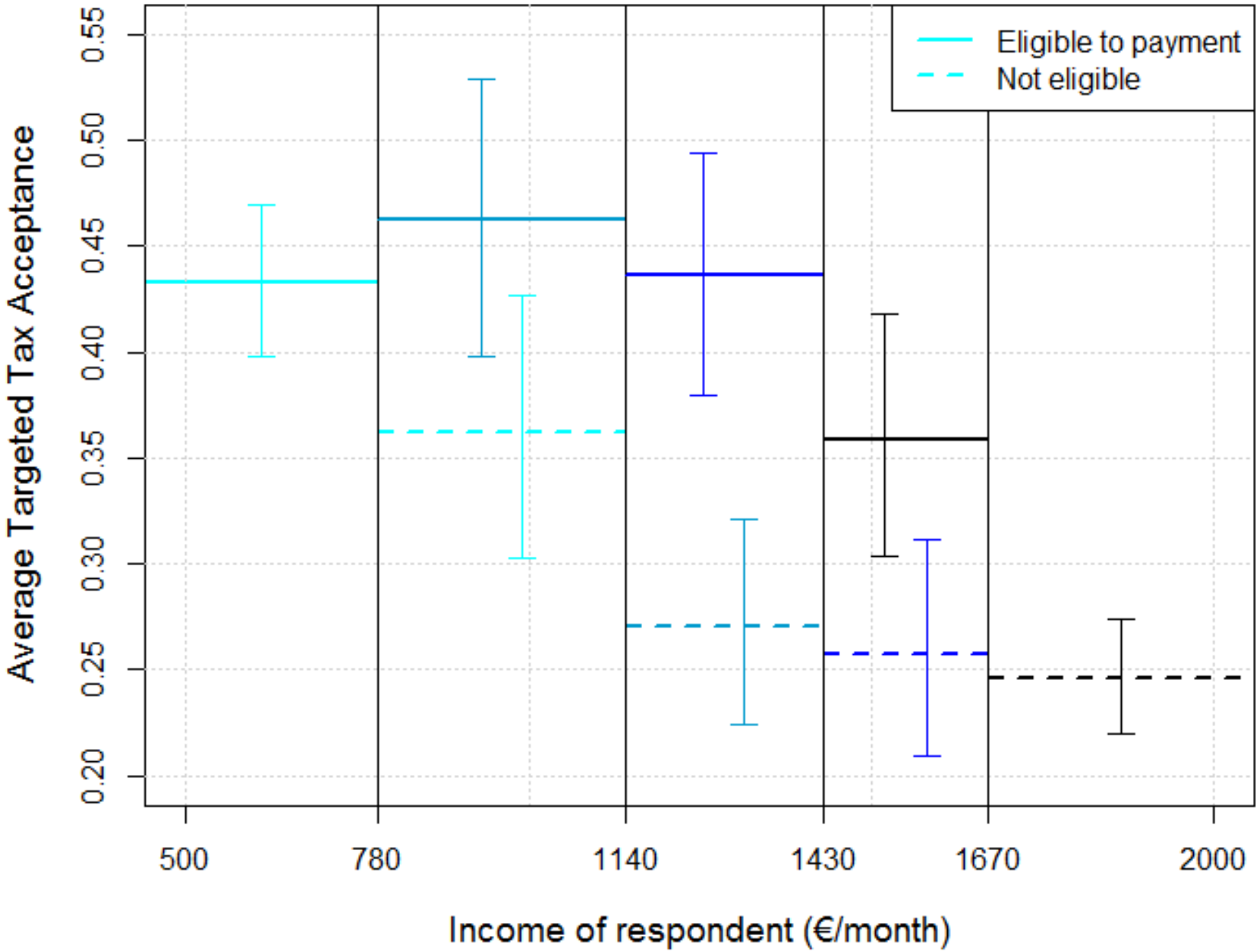

Self-interest – Results

Table: Effect of self-interest on acceptance

	Targeted Acceptance (A^T)				Feedback Acceptance (A^F)	
	IV		*OLS*	*logit*	*IV*	
	(1)	(2)	(3)	(4)	(5)	(6)
Believes does not lose	**0.571*** **	0.567***	**0.443*** **	0.431***	0.517***	0.434***
	(0.092)	(0.092)	**(0.014)**	(0.018)	(0.170)	(0.135)
Initial tax Acceptance (A^I)		0.339***	0.360***	0.342***		0.428***
		(0.033)	(0.026)	(0.034)		(0.055)
Controls: Incomes	✓	✓	✓	✓		✓
Controls: Estimated gain		✓	✓	✓	✓	✓
Controls: Target of the tax	✓	✓	✓	✓		
Controls: Socio-demo, other motives		✓	✓	✓		✓
Observations	3,002	3,002	3,002	3,002	1,968	1,968
R^2	0.033	0.302	0.470		0.044	0.526

*p<0.1; **p<0.05; ***p<0.01

NOTE: (Standard errors). For logit, average marginal effects are reported.

→ LATE around 57 p.p. > ATE around 44 p.p. Very large effect of self-interest!

▸ First stage results

Nuances result of *Anderson et al., 2019* that ideology matters more than self-interest for the U.S. carbon tax.

Environmental effectiveness – Results

Table: Effect of believing in environmental effectiveness on acceptance

	Tax Acceptance (A^I)				Tax Approval ($\dot{A}^I$)	
	IV	*IV*	*OLS*	*logit*	*IV*	*IV*
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental effectiveness: not "No"	**0.479****	0.515	**0.391*****	0.370***		
	(0.230)	(0.344)	**(0.015)**	(0.018)		
Environmental effectiveness: "Yes"					0.505**	0.416**
					(0.242)	(0.168)
Instruments: info E.E. & C.C.	✓	✓			✓	✓
Controls: Socio-demo, other motives	✓		✓	✓	✓	✓
Observations	3,002	3,002	3,002	3,002	3,002	3,002
R^2	0.218	0.001	0.390		0.218	0.161

*p<0.1; **p<0.05; ***p<0.01

NOTE: (Standard errors). For logit, average marginal effects are reported.

→ LATE around 50 p.p. > ATE close to 40 p.p.

▸ First stage results

Progressivity

Table: Effect of beliefs over progressivity on acceptance. Covariates refer either to broad (1-4) or strict (5-6) definitions of the beliefs, where strict dummies do not cover "PNR" or "Unaffected' answers.

	Acceptance (A^P) on *not "No"*				Approval ($\dot{A^P}$) on *"Yes"*	
	OLS			*logit*	*OLS*	
	(1)	(2)	(3)	(4)	(5)	(6)
Progressivity (P)	0.223***	0.237***	0.560***	0.544***	0.228***	0.482***
	(0.038)	(0.044)	(0.023)	(0.019)	(0.041)	(0.023)
Winner (G^P)	0.332***	0.332***			0.303***	
	(0.020)	(0.020)			(0.019)	
Effective (E)	0.258***	0.259***			0.244***	
	(0.023)	(0.023)			(0.020)	
($G^P \times E$)	0.127***	0.127***			0.126***	
	(0.034)	(0.034)			(0.037)	
Interaction: winner ($P \times G^P$)	0.183***	0.183***			0.098**	
	(0.050)	(0.050)			(0.048)	
Interaction: effective ($P \times E$)	0.172***	0.172***			0.281***	
	(0.057)	(0.057)			(0.059)	
Income (I, in k€/month)	0.017	0.018			0.037**	
	(0.022)	(0.022)			(0.018)	
Interaction: income ($P \times I$)		−0.008			−0.019	
		(0.013)			(0.014)	
$P \times G^P \times E$	−0.400***	−0.399***			−0.314***	
	(0.072)	(0.072)			(0.083)	
Controls: Socio-demo, incomes, estimated gains	✓	✓			✓	
Observations	3,002	3,002	3,002	3,002	3,002	3,002
R^2	0.460	0.460	0.162		0.391	0.130

*p<0.1; **p<0.05; ***p<0.01

→ Marginal effect of Progressivity at the sample mean: +27 p.p.

Combined effects

Question: do these effects complement or substitute?

Effects of beliefs on approval (strict definitions):

- Three motives: +97 p.p.
- Self-interest & Progressivity: +64 p.p.
- Self-interest & Effectiveness: +69 p.p.
- Effectiveness & Progressivity: +74 p.p.

Altruistic motives matter!

$\Rightarrow$ Correcting all beliefs (i.e. accounting for the 30% of objective losers): approval rate would go up to 90%!

Key results

1. French people would largely reject a carbon tax policy with uniform lump-sum transfer

2. Their perceptions about the properties of the scheme are biased:
   - they over-estimate the negative impact on their purchasing power;
   - they do not think it is environmentally effective;
   - they wrongly perceive it as regressive.

3. These biases are formed endogenously from their initial attitude:
   - people give little weight to new information;
   - they tend to trust more negative news about the tax than positive ones;
   - the more they oppose, the more likely such a behavior;
   - even more true among more educated people.

4. Nonetheless: if one could convince them, the scheme would reach majority acceptance.
   - High causal effect (LATE) of beliefs about self-interest and environmental effectiveness on acceptance;
   - Considering ATE: high complementarity between motives, especially altruistic ones.

Discussion

Our results leave us with two critical challenges for the future:

- **In the short run:**
  - Carbon taxation unlikely to be extended in France
  - Need to find an alternative package of policy instruments
  - Trade-off efficiency for public support

  → How to? See our companion paper ▸ Main results

- **In the long run:**
  - Need to restore trust in governements and institutions
  - Necessary to show strong commitment to fight climate change

  → How to? More transparency, more redistribution, deliberation?
  Need to learn from the Yellow Vests movement!

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Thank you!

Knowledge about climate change

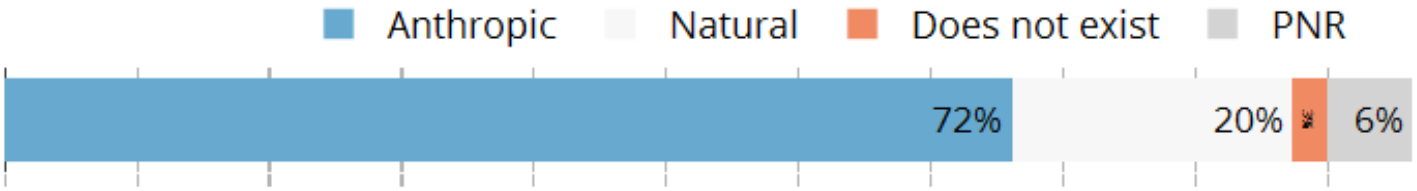


Figure: Perceived cause of climate change.

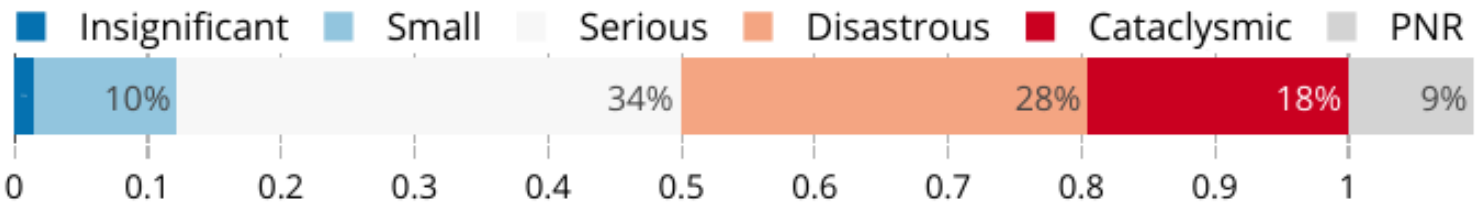


Figure: Perceived gravity of climate change.

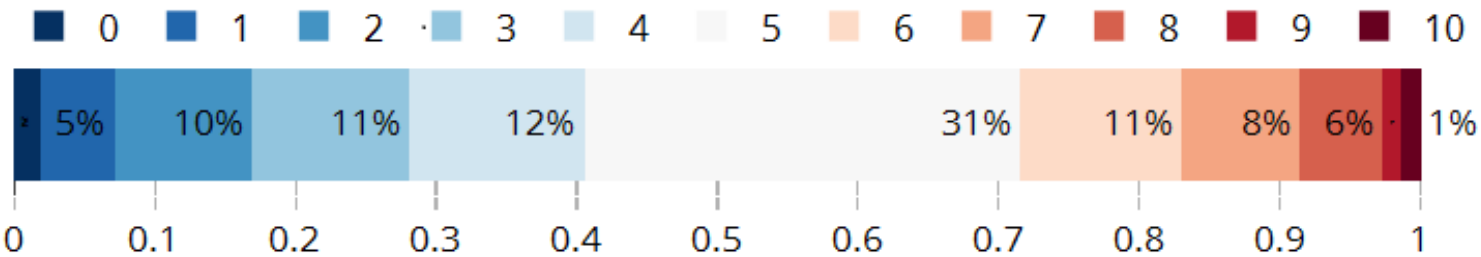
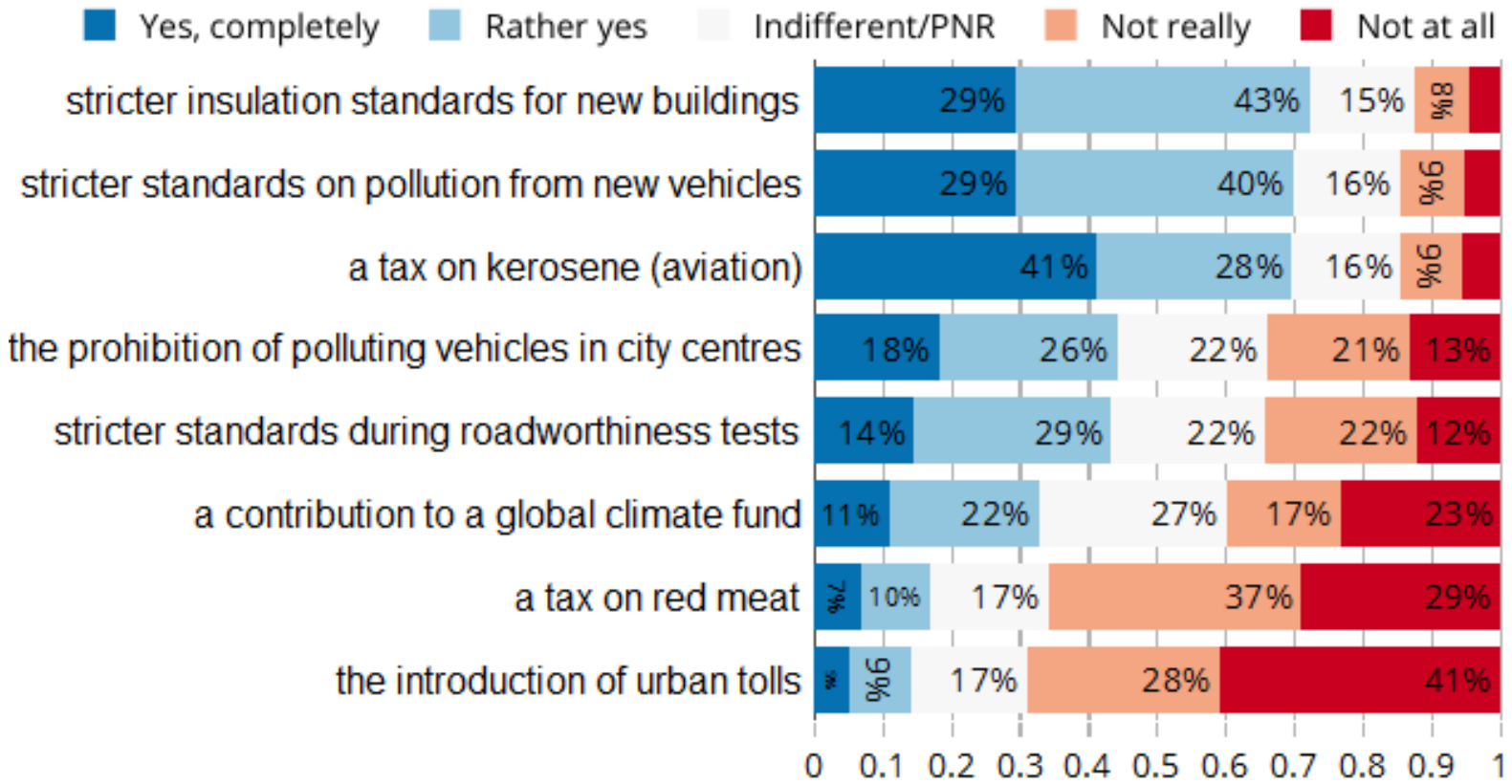


Figure: Perceived GHG emission p.c. required in 2050 to limit global warming to +2°C (in tCO_2eq/yr), given that it is now 10.

Preferred climate policies



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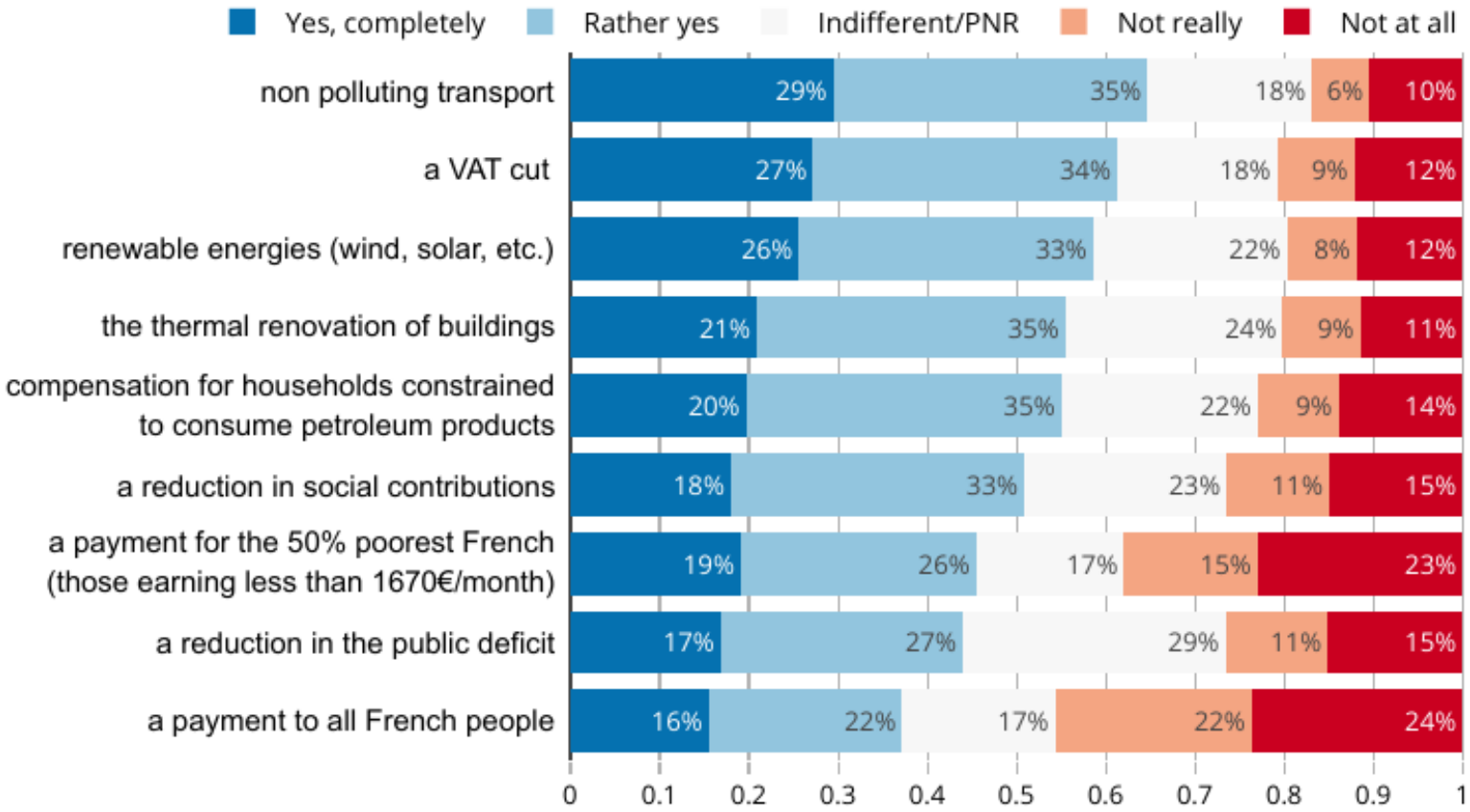
Preferred revenue-recycling



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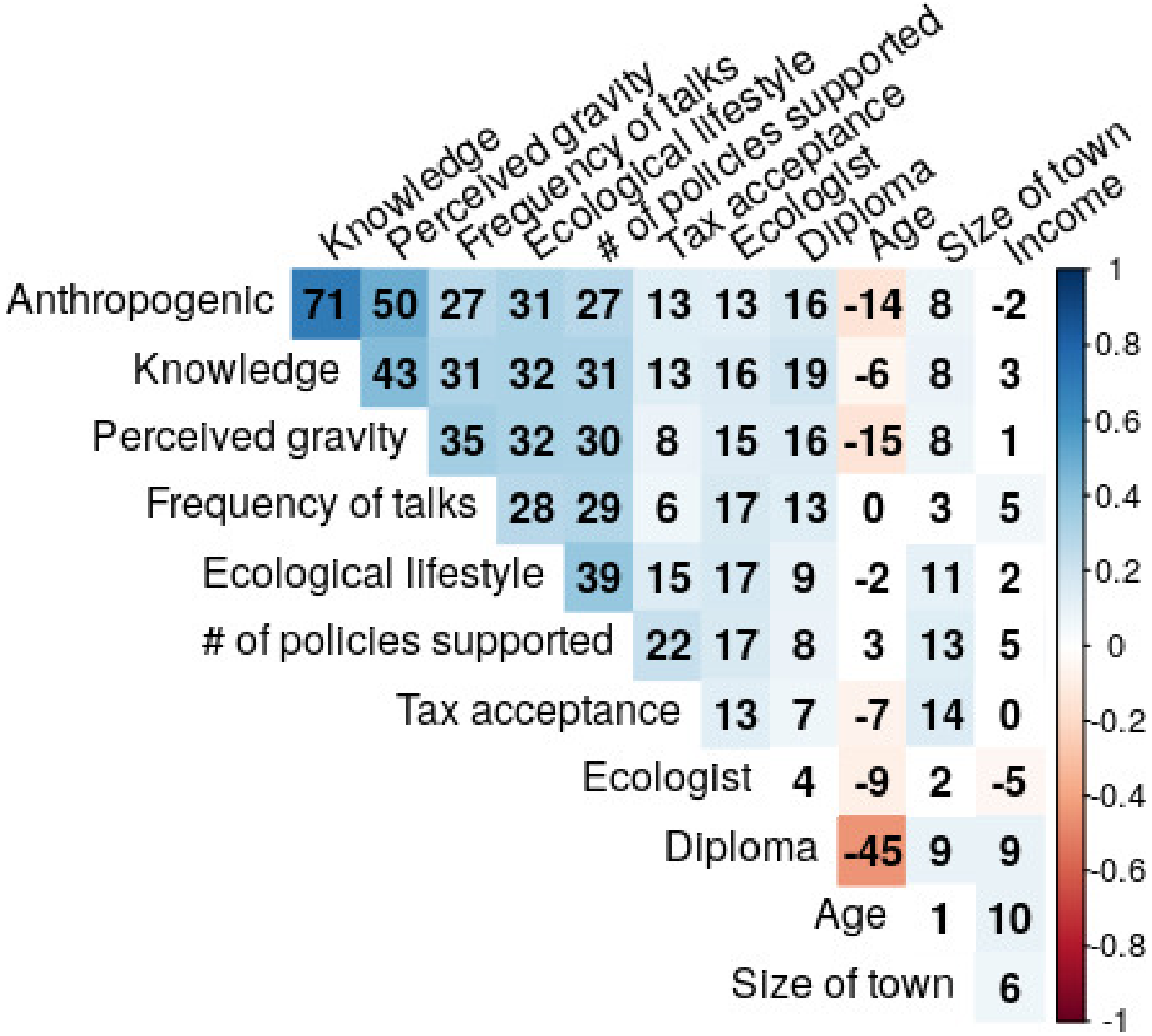
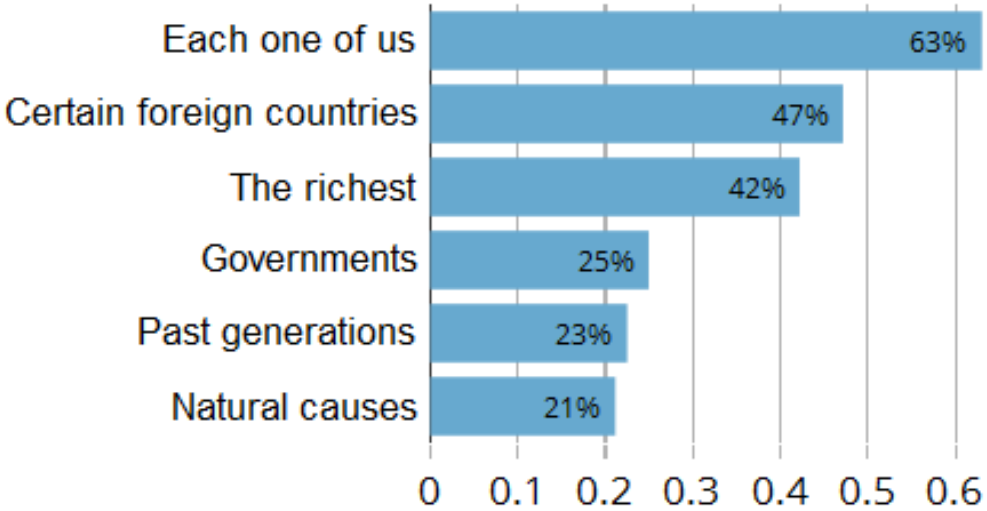


Figure: Correlations between attitudes over climate change, climate policies and socio-demographics (in %).

Attitudes over Climate Change

Figure: Entities perceived responsible for climate change.



- 65% are "willing to adopt an ecological lifestyle (i.e. eat little red meat and make sure to use almost no gasoline, diesel nor kerosene)", assuming that "all states in the world agree to firmly fight climate change, notably through a transition to renewable energy, by making the richest contribute, and imagining that France would expand the supply of non-polluting transport very widely" (17% "No")
- 82% would be willing to change their lifestyle under at least one of the three conditions proposed: sufficient financial resources, an alignment of policies to this goal, or an adjustment of others' behavior (about 45% each)

Perceptions on Tax & Dividend

Figure: Winners

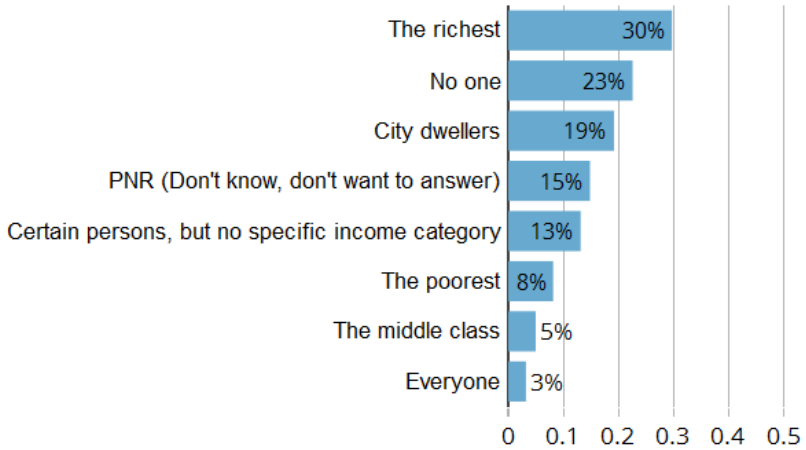


Figure: Benefits

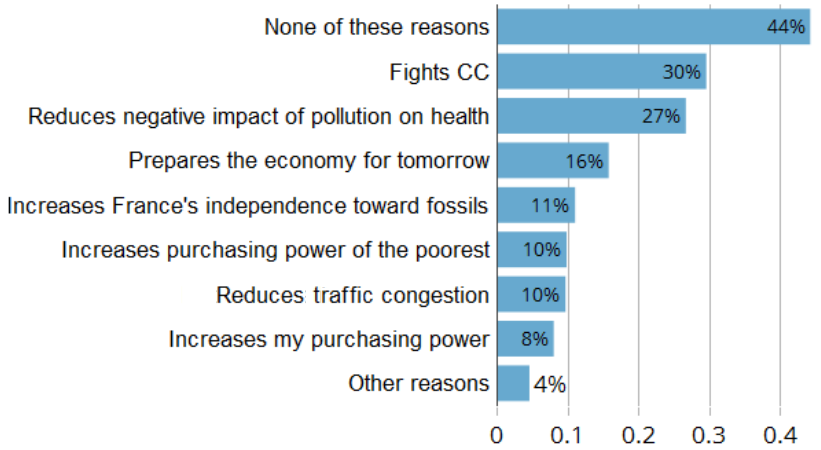


Figure: Losers

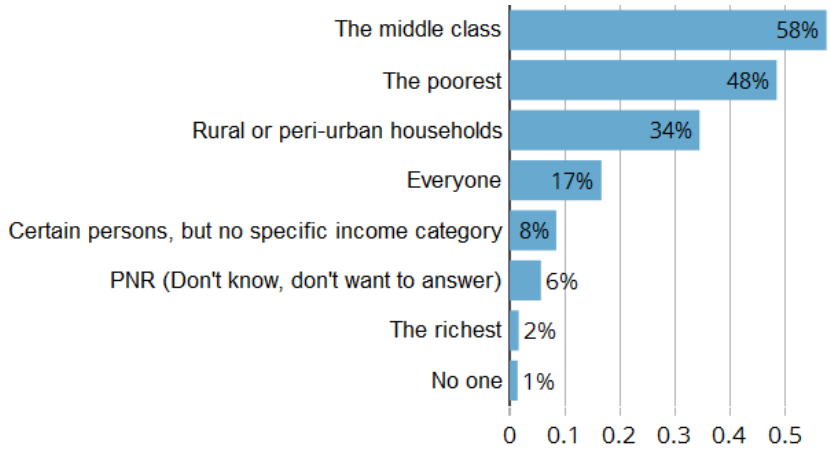


Figure: Problems

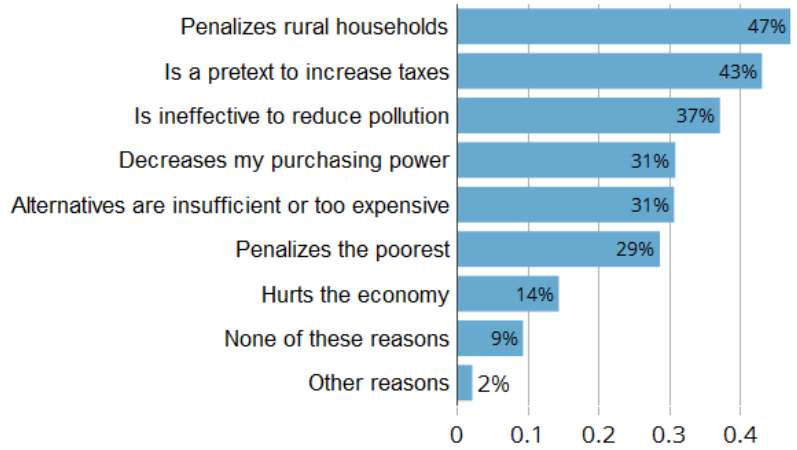


Table: Positioning towards Yellow Vests, per category (1/2)

	Opposed	Understands	Supports	Is part	PNR
Extreme-left (2%)	6%	26%	51%	12%	5%
Left (20%)	17%	36%	36%	5%	7%
Center (13%)	49%	30%	15%	2%	6%
Right (16%)	40%	32%	20%	3%	6%
Extreme-right (9%)	11%	28%	47%	10%	5%
Indeterminate (40%)	19%	32%	30%	4%	13%
Liberal (5%)	48%	26%	18%	2%	6%
Conservative (2%)	22%	28%	30%	10%	11%
Humanist (11%)	21%	35%	29%	5%	10%
Patriot (8%)	21%	27%	39%	7%	6%
Apolitical (21%)	21%	31%	32%	4%	12%
Ecologist (15%)	17%	39%	27%	5%	12%
Rural (21%)	20%	31%	34%	6%	9%
<20k (17%)	24%	28%	34%	6%	9%
20-100k (14%)	22%	33%	32%	4%	9%
>100k (31%)	29%	34%	26%	3%	8%
Paris (17%)	28%	33%	25%	4%	11%
No diploma or *Brevet* (30%)	21%	29%	34%	5%	10%
CAP or *BEP* (24%)	23%	28%	36%	6%	7%
Baccalauréat (17%)	22%	35%	29%	4%	11%
Higher (29%)	32%	8%	36%	21%	3%
Average	*25%*	*32%*	*30%*	*5%*	*9%*

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Table: Positioning towards Yellow Vests, per category (2/2)

	Opposed	Understands	Supports	Is part	PNR
Age: 18–24 (12%)	23%	34%	27%	4%	12%
Age: 25–34 (15%)	21%	33%	28%	7%	11%
Age: 35–49 (24%)	25%	32%	29%	5%	9%
Age: 50–64 (24%)	21%	32%	36%	4%	7%
Age: $\geq$ 65 (25%)	32%	30%	28%	3%	7%
Income decile: 1	25%	33%	26%	3%	14%
Income decile: 2	18%	31%	35%	5%	11%
Income decile: 3	17%	31%	32%	7%	12%
Income decile: 4	15%	33%	37%	6%	9%
Income decile: 5	21%	29%	36%	5%	8%
Income decile: 6	26%	33%	29%	6%	7%
Income decile: 7	25%	36%	28%	4%	7%
Income decile: 8	31%	31%	28%	3%	8%
Income decile: 9	39%	32%	20%	3%	6%
Income decile: 10	47%	29%	15%	3%	6%
Female (52%)	21%	34%	29%	5%	12%
Male (48%)	29%	30%	31%	5%	6%
Average	*25%*	*32%*	*30%*	*5%*	*9%*

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Willingness to pay

Our results are also indicative of a WTP for an effective policy:

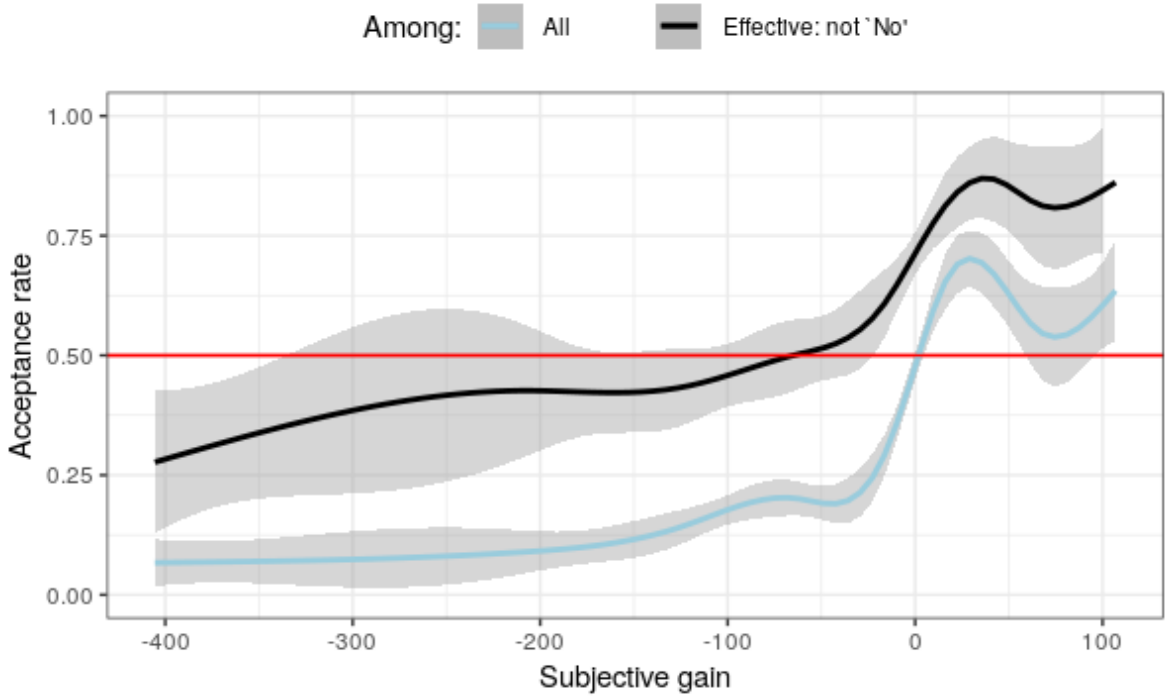

Figure: Acceptance rate by subjective gain, informing on the willingness to pay for climate mitigation.

Results suggest a WTP of 60€ per c.u. (i.e. about 100€ per household) in the typical range of the literature (Jenkins, 2014; Streimikiene et al., 2019).

6 Additional material – Companion paper

7 Additional material – Appendix

Sample characteristics: quotas stratas

	Population	Sample
gender		
woman	*0.52*	0.53
man	*0.48*	0.47
age		
18-24	*0.12*	0.11
25-34	*0.15*	0.11
35-49	*0.24*	0.24
50-64	*0.24*	0.26
>65	*0.25*	0.27
profession		
farmer	*0.01*	0.01
independent	*0.03*	0.04
executive	*0.09*	0.09
intermediate	*0.14*	0.14
employee	*0.15*	0.16
worker	*0.12*	0.13
retired	*0.33*	0.33
inactive	*0.12*	0.11

	Population	Sample
education		
No diploma or *Brevet*	*0.30*	0.24
CAP or *BEP*	*0.25*	0.26
Bac	*0.17*	0.18
Higher	*0.29*	0.31
size of town		
rural	*0.22*	0.24
<20k	*0.17*	0.18
20-99k	*0.14*	0.13
>100k	*0.31*	0.29
Paris area	*0.16*	0.15
region		
IDF	*0.19*	0.17
Nord	*0.09*	0.10
Est	*0.13*	0.12
SO	*0.09*	0.09
Centre	*0.10*	0.12
Ouest	*0.10*	0.10
Occ	*0.09*	0.09
ARA	*0.12*	0.13
PACA	*0.09*	0.09

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Sample characteristics: households' characteristics

	Population	Sample
Household composition (mean)		
Household size	*2.36*	2.38
Number of adults	*2.03*	1.93
c.u.	*1.60*	1.61
Energy source (share)		
Gas	*0.42*	0.36
Fuel	*0.12*	0.09
Accomodation surface (m^2)		
mean	*97*	96
p25	*69*	66
p50	*90*	90
p75	*120*	115
Distance travelled by car (km/year)		
mean	*13,735*	15,328
p25	*4,000*	4,000
p50	*10,899*	10,000
p75	*20,000*	20,000
Fuel economy (L/100 km)		
mean	*6.39*	7.25
p25	*6*	5
p50	*6.5*	6
p75	*7.5*	7

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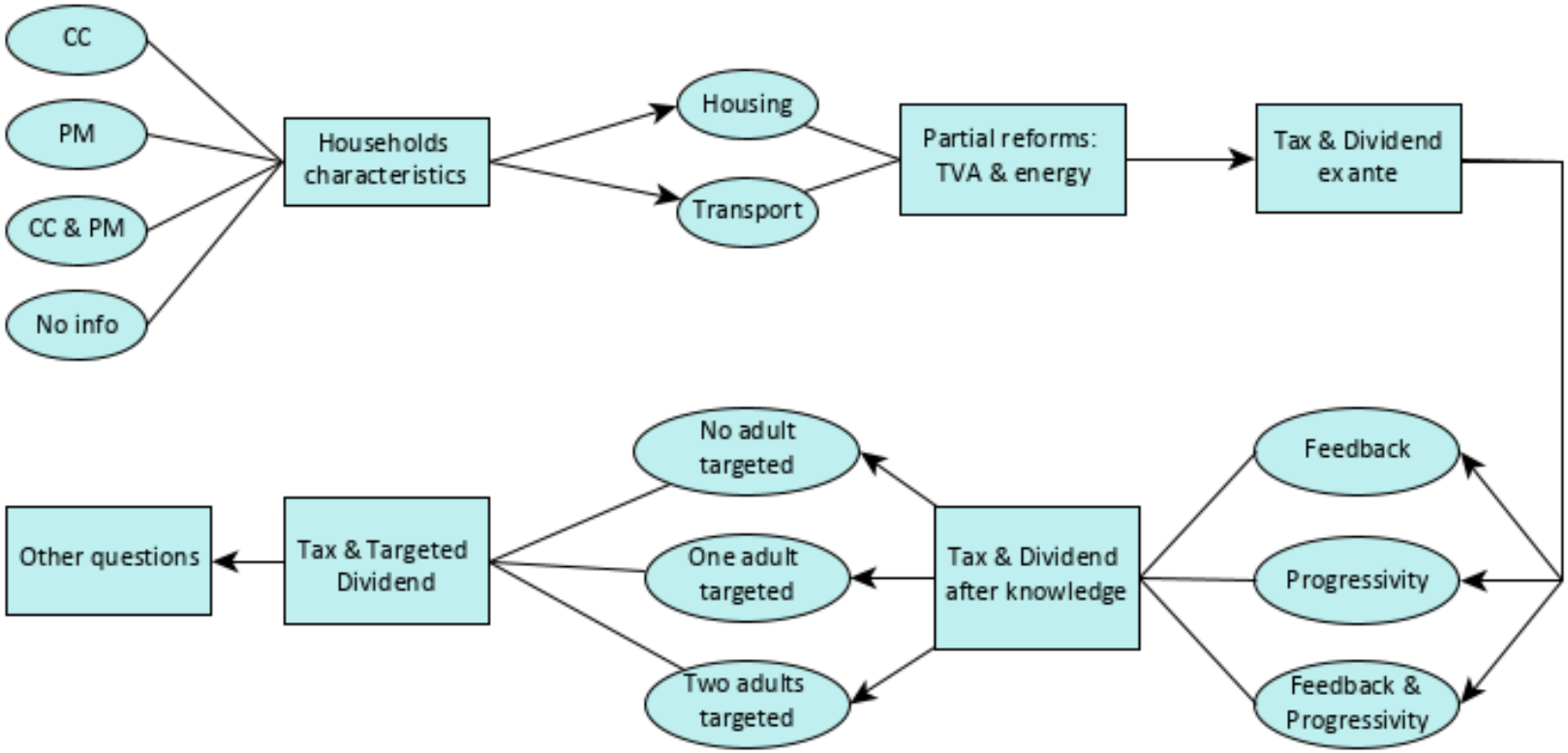
Survey diagram



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Estimation of increase in housing energy expenditures

Table: Determinants of housing energy expenditures

	Increase in housing energy expenditures (€/year)		
	(1)	(2)	(3)
Constant	-55.51^{***}		-0.634
	(1.237)		(1.489)
Housing energy: Gas	124.6^{***}		1.173
	(1.037)		(2.323)
Housing energy: Fuel oil	221.1^{***}	129.8^{***}	130.4^{***}
	(1.719)	(3.752)	(4.002)
Accommodation size (m^2)	0.652^{***}		0.024
	(0.012)		(0.015)
Accommodation size × Gas		1.425^{***}	1.397^{***}
		(0.007)	(0.024)
Accommodation size × Fuel oil		0.945^{***}	0.922^{***}
		(0.029)	(0.032)
Observations	26,729	26,729	26,729
R^2	0.545	0.716	0.599
Error rate	0.166	0.155	0.155
Note:			*p<0.1; **p<0.05; ***p<0.01

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Prediction's precision

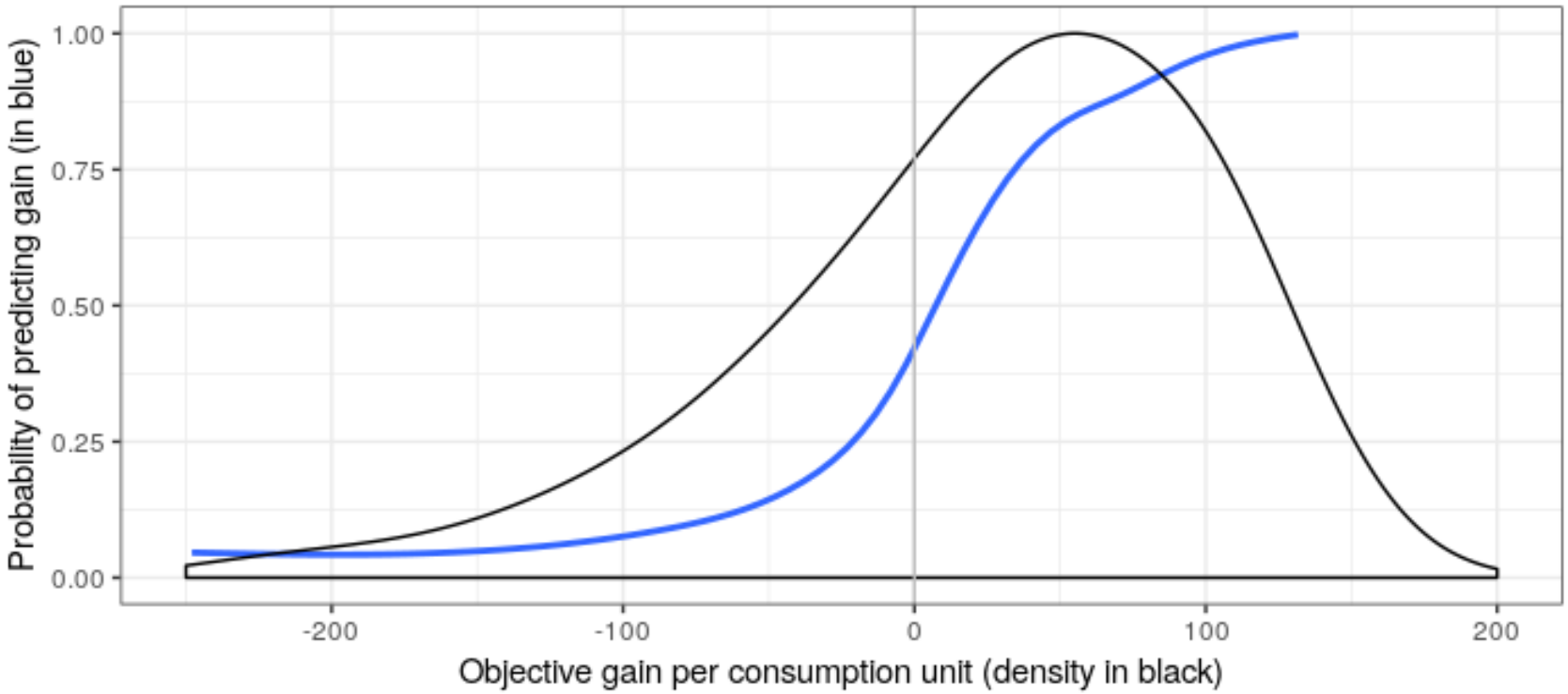

Figure: Probability that our estimation of net gains correctly predicts the winning category.

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Tax & Targeted Dividend: questions

We propose the same policy as before, except that transfers are now targeted to adults below some income threshold:

- Respondents allocated to different thresholds: bottom 20, 30, 40 and 50%
  - Randomly between two thresholds if respondent's income is within them
  - When income close to only one threshold (i.e. percentile < 20 or in $[50; 70]$), allocated to that one
  - When percentile is > 70, threshold determined by spouse's income
  - If no spouse or if both have high incomes, threshold allocated randomly
- Would you lose, win or be unaffected by the reform?
- Would you approve this reform?

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Descriptive statistics on income targets

Table: Characteristic of the targeted reform by target of the payment.

Targeted percentiles (c)	≤ 20	≤ 30	≤ 40	≤ 50
Income threshold (€/month)	780	1140	1430	1670
Payment to recipients (€/year)	550	360	270	220
Proportion of respondents	.356	.152	.163	.329
Expected proportion of respondents	*.349*	*.156*	*.156*	*.339*

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First stage self-interest

Table: First stage regressions results for self-interest

	Believes does not lose			
	Targeted tax (G^T)		After feedback (G^F)	
	(1)	(2)	(5)	(6)
Transfer to respondent (T_1)	0.268***	0.227***		
	(0.028)	(0.027)		
Transfer to spouse (T_2)	0.180***	0.174***		
	(0.031)	(0.030)		
$T_1 \times T_2$	−0.190***	−0.161***		
	(0.038)	(0.037)		
Initial tax Acceptance (A^I)		0.163***		0.333***
		(0.033)		(0.038)
Simulated winner ($\widehat{\Gamma}$)			0.217***	0.210***
			(0.036)	(0.035)
Controls: Incomes	✓	✓		✓
Controls: Estimated gain		✓	✓	✓
Controls: Target of the tax, single	✓	✓		
Controls: Socio-demo, other motives		✓		✓
Effective F-Statistic (Montiel & Pflueger, 2013)	44.093	40.834	37.966	57.866
Observations	3,002	3,002	1,968	1,968
R^2	0.082	0.177	0.131	0.319

*p<0.1; **p<0.05; ***p<0.01

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First stage environmental effectiveness

Table: First stage regressions results for environmental effectiveness

	Environmental effectiveness		
	not "No"		"Yes"
	(1)	(2)	(5,6)
Info on Environmental Effectiveness (Z_E)	0.062***	0.043**	0.059***
	(0.017)	(0.017)	(0.014)
Info on Climate Change (Z_{CC})	0.030*	0.024	0.028**
	(0.017)	(0.017)	(0.013)
Controls: Socio-demo, other motives, incomes, estimated gains	✓		✓
Effective F-Statistic (Montiel & Pflueger, 2013)	5.866	2.523	11.145
Observations	3,002	3,002	3,002
R^2	0.121	0.003	0.123

*p<0.1; **p<0.05; ***p<0.01

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Evidence of motivated reasoning – robustness heterogeneous priors

Table: Asymmetric updating of winning category (complementary results).

	Correct updating (U)	
	(1)	(2)
Constant	−0.146	−0.039
	(0.178)	(0.179)
Winner, before feedback ($\dot{G}$)	0.646***	0.551***
	(0.080)	(0.083)
Initial tax: PNR (I don't know)	0.163***	0.179***
	(0.031)	(0.032)
Initial tax: Approves	0.158***	**0.176*** **
	(0.046)	**(0.046)**
Subjective gain (g)		**0.0004** **
		(0.0002)
Subjective gain: unaffected ($g = 0$)		−0.127***
		(0.033)
Bias about gain ($g - \hat{\gamma}$)		−0.00005
		(0.0001)
Diploma (1 to 4)	0.016	0.014
	(0.013)	(0.013)
Retired	0.146*	0.130*
	(0.079)	(0.079)
Active	0.175***	0.166***
	(0.054)	(0.054)
Student	0.234***	0.224***
	(0.075)	(0.075)
Yellow Vests: PNR	−0.043	−0.045
	(0.047)	(0.047)
Yellow Vests: understands	−0.063*	−0.065*
	(0.034)	(0.034)
Yellow Vests: supports	−0.059*	−0.063*
	(0.036)	(0.036)
Yellow Vests: is part	−0.137**	**−0.141** **
	(0.062)	**(0.061)**
Among invalidated	✓	✓
Includes controls	✓	✓
Observations	1,365	1,365
R^2	0.133	0.144

*p<0.1; **p<0.05; ***p<0.01

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