

Yellow Vests, Carbon Tax Aversion, and Biased Beliefs

Thomas Douenne & **Adrien Fabre**

Paris School of Economics, Université Paris 1

February 2020

Are French people ecologist?



Figure: Some Yellow Vests

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".

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".

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

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

→ *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; Kahn, 2013; Bénabou & Tirole, 2016; Druckman & McGrath, 2019; Little, 2019)

1 Survey and data

2 Perceptions

3 Are beliefs persistent?

4 Motives for acceptance

5 Conclusion

1 Survey and data

2 Perceptions

3 Are beliefs persistent?

4 Motives for acceptance

5 Conclusion

Tax & Dividend: *ex ante*

- Description of our Tax & Dividend reform:
 - ▶ +13% on gas (resp. +15% on domestic fuel) redistributed
 - ▶ +0.11€/L on gasoline (resp. +0.13€/L on diesel)
 - ▶ 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
- 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

Biased perception of net gain

PDF of **subjective** vs. **objective** net gains from Tax & Dividend (in € per year per consumption unit).

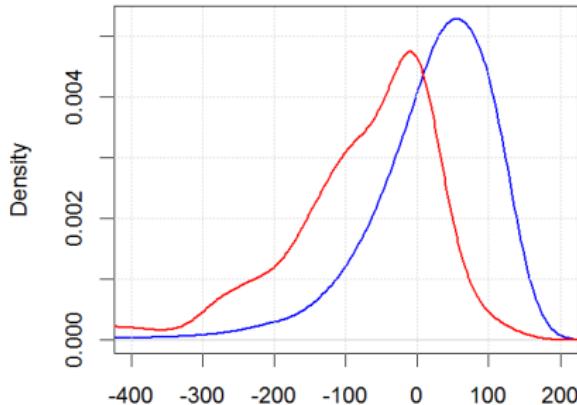


Figure: Net gain. Mean: -89/+24

- 64% think they lose; only 14% think they win
- Objectively, 70% win
- 89% underestimate their gain, 53% by more than 110€.
- Median gap of 116€.

Beliefs over environmental effectiveness

Reform effective to “reduce pollution and fight climate change”?
17% ‘Yes’, 66% ‘No’ and 18% ‘PNR’.

► See subjective elasticities

Those can be due to low objective impact of the reform: –0.8% of *French* GhG emissions, vs. official goal of *carbon neutrality*.

Beliefs over progressivity

Reform would benefit poorer households? 19% 'Yes', 60% 'No', 21% 'PNR'.
Yet, the tax is progressive:

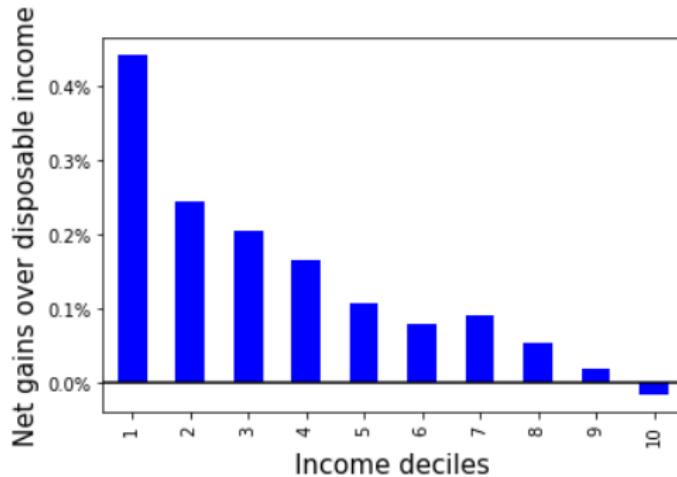


Figure: Average gain of Tax & Dividend by income decile as a share of disposable income

1 Survey and data

2 Perceptions

3 Are beliefs persistent?

4 Motives for acceptance

5 Conclusion

Tax & Dividend: after knowledge

- Information on the effect of the reform
 - ▶ Feedback: "In five cases over six, a household with your characteristics would [win/lose] through the reform. (The characteristics taken into account are: heating using [energy source] for an accommodation of [surface] m²; [distance] km traveled with an average consumption of [fuel economy] L for 100 km.)" (1/2)
 - ▶ Progressivity: "this reform would increase the purchasing power of the poorest households and decrease that of the richest, who consume more energy" (1/3)
 - ▶ or both (to 1/6 of respondents)
- Is the reform beneficial to the poorest? (1/2)
- Would you lose, win or be unaffected by the reform?
- Would you approve this reform?

Conservatism and pessimism

Two main results:

- ❶ Losers update correctly (on average): 86% align with feedback
- ❷ 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 risk (or loss) averse: they don't report the expected outcome but something more pessimistic.

Determinants of correct updating

▶ See prediction's precision

Table: Asymmetric updating of winning category

	Correct updating (U)		
	(1)	(2)	(3)
Constant	0.120*** (0.012)	-0.041 (0.190)	-0.150 (0.189)
Winner, before feedback (\dot{G})	0.695*** (0.078)	0.685*** (0.080)	0.646*** (0.080)
Initial tax: PNR (I don't know)			0.163*** (0.031)
Initial tax: Approves			0.158*** (0.046)
Retired		0.143* (0.080)	0.146* (0.079)
Active		0.165*** (0.055)	0.175*** (0.054)
Student		0.249*** (0.076)	0.234*** (0.075)
Yellow Vests: PNR		-0.048 (0.047)	-0.043 (0.047)
Yellow Vests: understands		-0.090*** (0.034)	-0.063* (0.034)
Yellow Vests: supports		-0.101*** (0.035)	-0.059* (0.036)
Yellow Vests: is part		-0.172*** (0.062)	-0.137** (0.062)
Among invalidated	✓	✓	✓
Controls: Socio-demo, politics, estimated gains		✓	✓
Observations	1,365	1,365	1,365
R ²	0.055	0.111	0.133

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

Beliefs over environmental effectiveness

Table: Effect of primings on beliefs about environmental effectiveness

	Environmental effectiveness			
	not "No"		"Yes"	<i>OLS</i> (4)
	<i>OLS</i> (1)	<i>logistic</i> (3)		
Info on Environmental Effectiveness (Z_E)	0.043** (0.017)	0.063*** (0.018)	0.052*** (0.018)	0.059*** (0.014)
Info on Climate Change (Z_{CC})	0.044* (0.024)	0.041* (0.024)	0.043* (0.024)	0.029 (0.018)
Info on Particulate Matter (Z_{PM})	0.039 (0.024)	0.029 (0.024)	0.037 (0.024)	0.017 (0.019)
$Z_{CC} \times Z_{PM}$	-0.040 (0.035)	-0.033 (0.034)	-0.042 (0.033)	-0.005 (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

⇒ Primings do increase beliefs about effectiveness, but the effect remains limited.

Beliefs over progressivity

Correlation between

- belief that tax is regressive, and
- seeing the information that it is progressive

0.006% !

► More on this

1 Survey and data

2 Perceptions

3 Are beliefs persistent?

4 Motives for acceptance

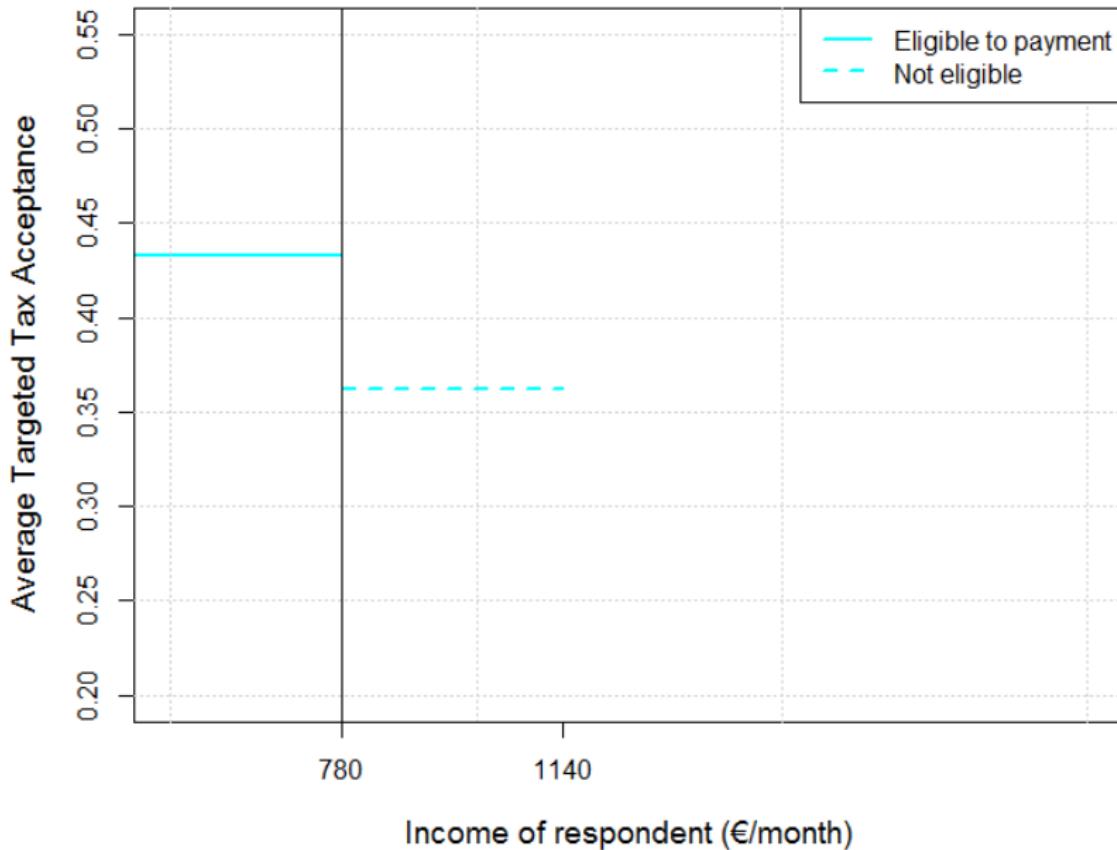
5 Conclusion

Tax & Targeted Dividend: questions

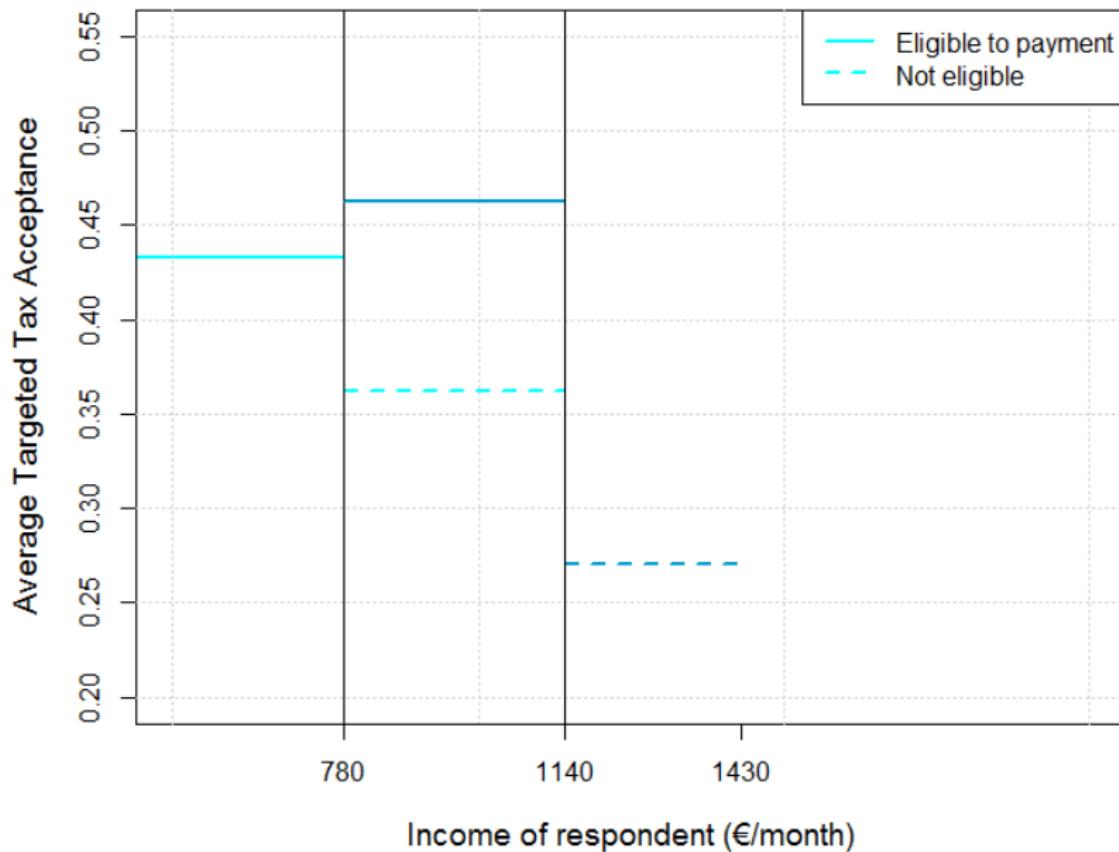
- +50€/tCO₂
- Revenues distributed equally among adults below some income threshold
- Respondents allocated to different thresholds: bottom 20, 30, 40 and 50%
 - ▶ Randomly between two thresholds if respondent's income is within them
 - ▶ When income close to only one threshold (i.e. percentile < 20 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?

► Descriptive stats

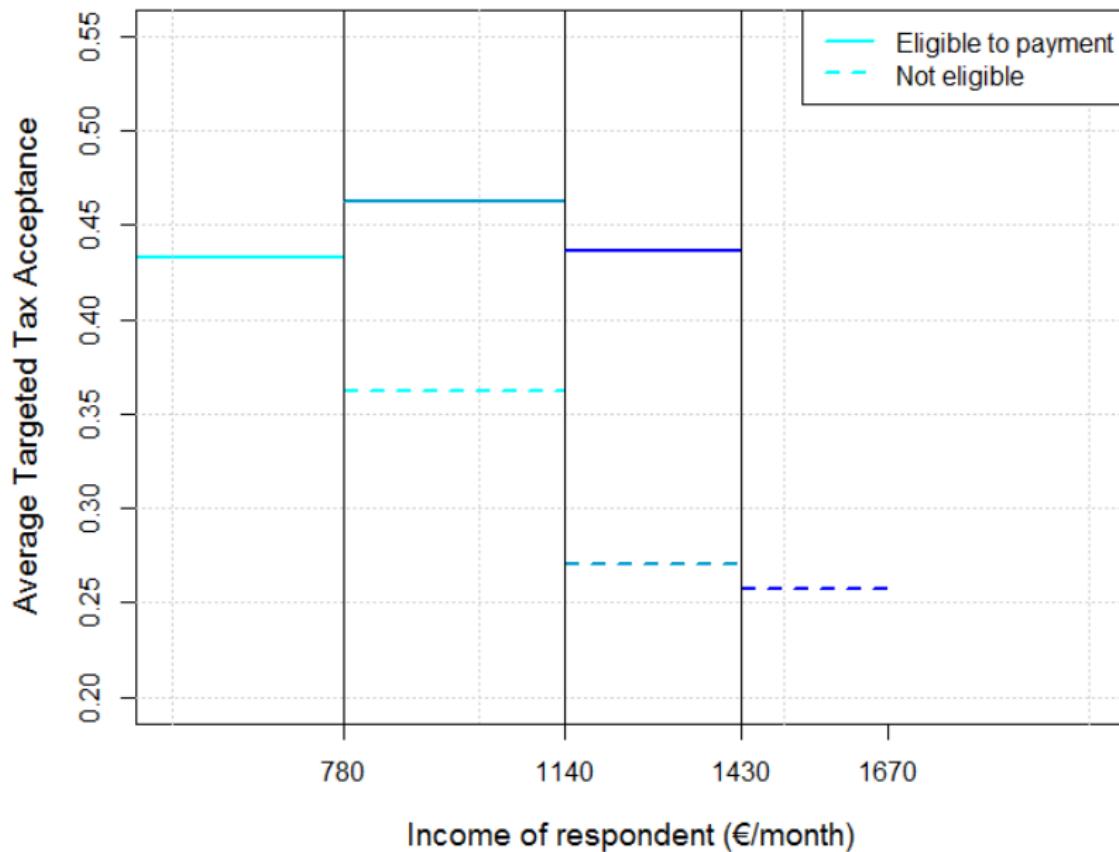
Tax & Targeted Dividend: a primer



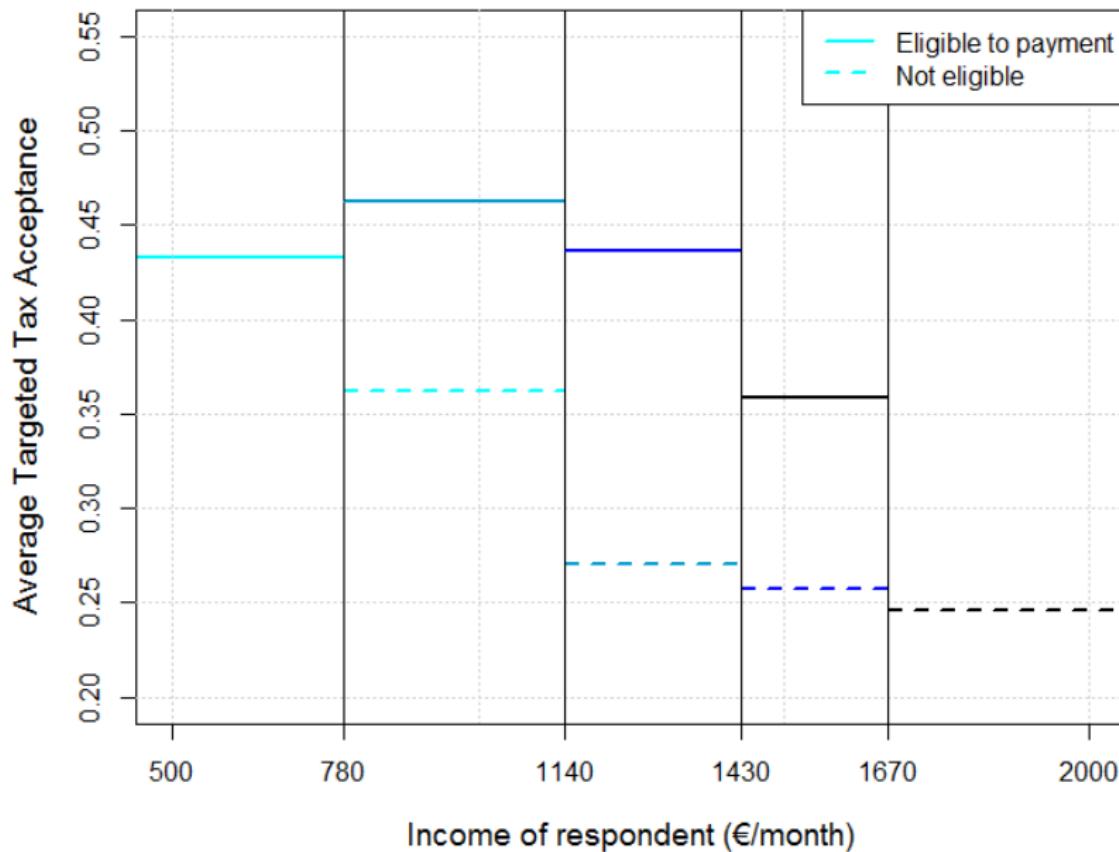
Tax & Targeted Dividend: a primer



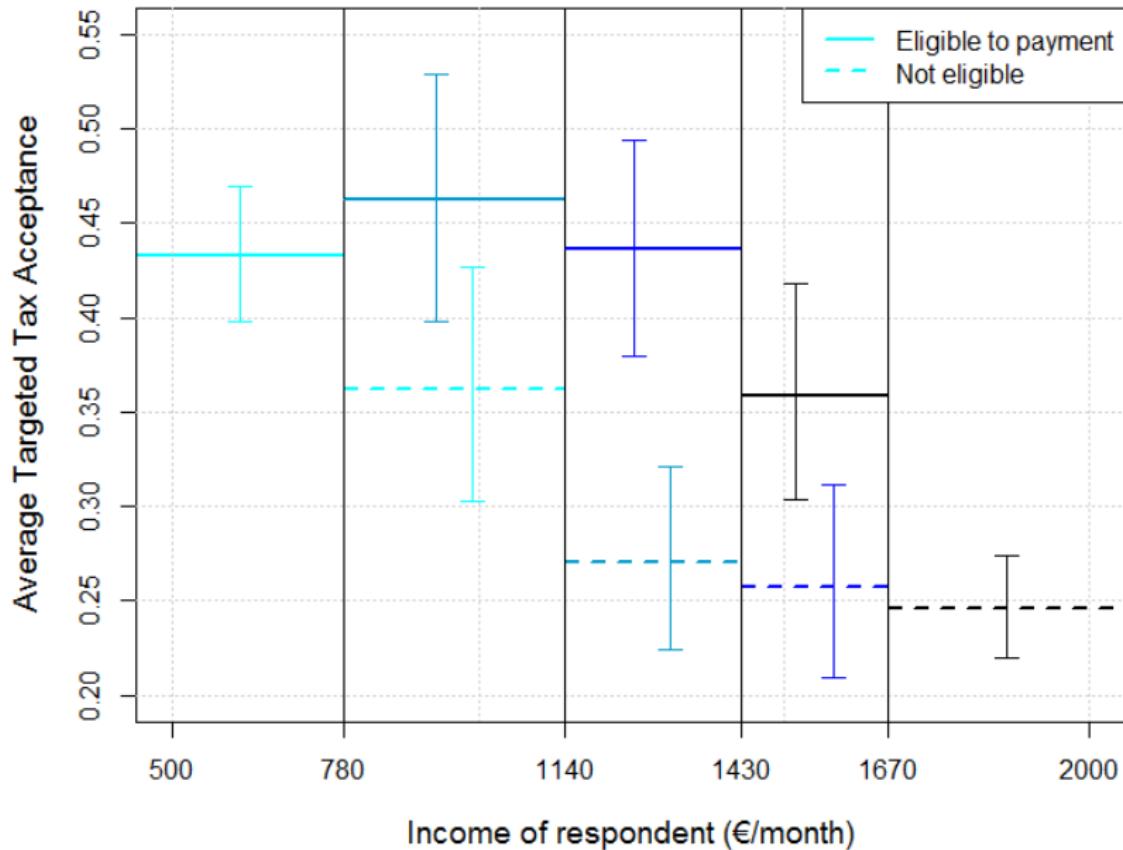
Tax & Targeted Dividend: a primer



Tax & Targeted Dividend: a primer



Tax & Targeted Dividend: a primer



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*** (0.092)	0.567*** (0.092)	0.443*** (0.014)	0.431*** (0.018)	0.517*** (0.170)	0.434*** (0.135)
Initial tax Acceptance (A^I)		0.339*** (0.033)	0.360*** (0.026)	0.342*** (0.034)		0.428*** (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.

▶ First stage results

Environmental effectiveness - Results

Table: Effect of believing in environmental effectiveness on acceptance

	Tax Acceptance (A^I)				Tax Approval (A^I)	
	<i>IV</i> (1)	<i>IV</i> (2)	<i>OLS</i> (3)	<i>logit</i> (4)	<i>IV</i> (5)	<i>IV</i> (6)
	Environmental effectiveness: not "No" Environmental effectiveness: "Yes"	0.479 ** (0.230)	0.515 (0.344)	0.391 *** (0.015)	0.370 *** (0.018)	0.505 ** (0.242)
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

Identification assumption: being displayed information affects approval solely through beliefs over policy's environmental effectiveness.

Progressivity - Results

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 (A^P) on "Yes"	
	OLS		logit		OLS	
	(1)	(2)	(3)	(4)	(5)	(6)
Progressivity (P)	0.223*** (0.038)	0.237*** (0.044)	0.560*** (0.023)	0.544*** (0.019)	0.228*** (0.041)	0.482*** (0.023)
Winner (G^P)	0.332*** (0.020)	0.332*** (0.020)			0.303*** (0.019)	
Effective (E)	0.258*** (0.023)	0.259*** (0.023)			0.244*** (0.020)	
$(G^P \times E)$	0.127*** (0.034)	0.127*** (0.034)			0.126*** (0.037)	
Interaction: winner ($P \times G^P$)	0.183*** (0.050)	0.183*** (0.050)			0.098** (0.048)	
Interaction: effective ($P \times E$)	0.172*** (0.057)	0.172*** (0.057)			0.281*** (0.059)	
Income (I , in k€/month)	0.017 (0.022)	0.018 (0.022)			0.037** (0.018)	
Interaction: income ($P \times I$)		-0.008 (0.013)			-0.019 (0.014)	
$P \times G^P \times E$	-0.400*** (0.072)	-0.399*** (0.072)			-0.314*** (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

Motives for acceptance

23 / 26

Combined effects

Question: do these effects complement or substitute?

Effects of beliefs on approval (strict definitions):

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

Altruistic motives matter!

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

1 Survey and data

2 Perceptions

3 Are beliefs persistent?

4 Motives for acceptance

5 Conclusion

Key results

- ➊ French people would largely reject a carbon tax policy with uniform lump-sum transfer
- ➋ 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.
- ➌ Providing information can hardly help correct these misperceptions:
 - ▶ people give little weight to these information;
 - ▶ they tend to trust more negative news about the tax than positive ones.
- ➍ Nonetheless: if one could convince them, the scheme would reach majority acceptance.
 - ▶ Self-interest, environmental effectiveness and progressivity are critical motives of acceptance: $\simeq + 40$ p.p. in likelihood to accept for the two firsts, $+ 27$ p.p. for the latter.
 - ▶ Motives are complementary: correcting biased beliefs would lead to a 90% approval.
 - ▶ Complementarity particularly strong for altruistic motives (+74 p.p. together).

6 Appendix

Categories of winners and losers

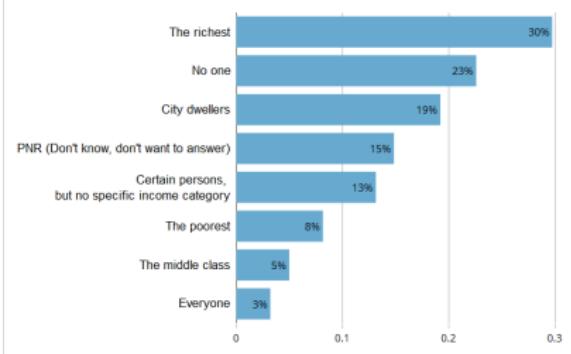


Figure: winners

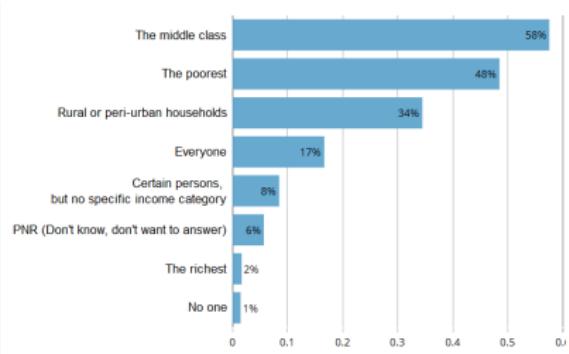


Figure: losers

Go back

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 *** (1.237)		-0.634 (1.489)
Housing energy: Gas	124.6 *** (1.037)		1.173 (2.323)
Housing energy: Fuel oil	221.1 *** (1.719)	129.8 *** (3.752)	130.4 *** (4.002)
Accommodation size (m ²)	0.652 *** (0.012)		0.024 (0.015)
Accommodation size × Gas		1.425 *** (0.007)	1.397 *** (0.024)
Accommodation size × Fuel oil		0.945 *** (0.029)	0.922 *** (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

Go back

Prediction's precision

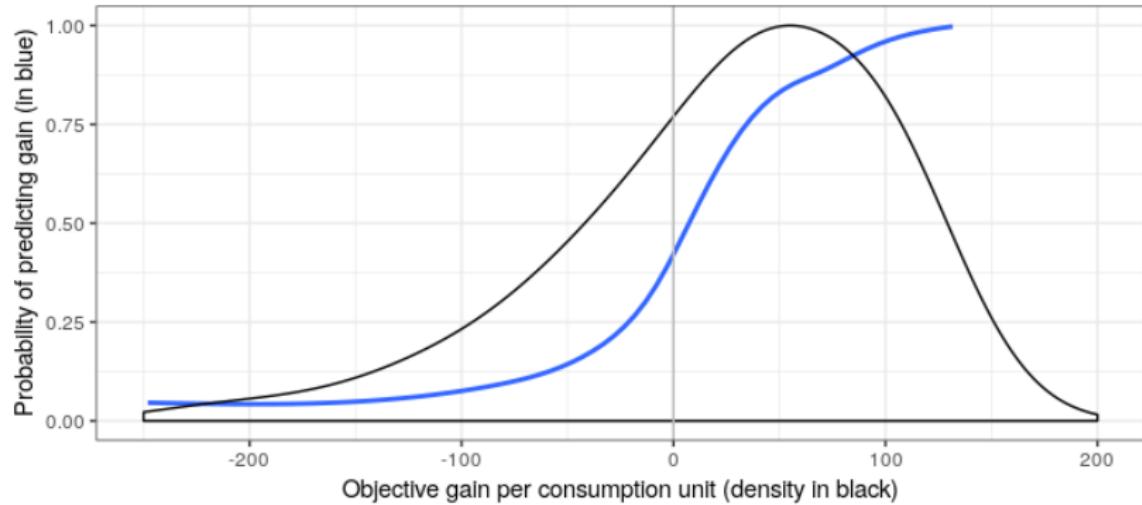


Figure: Probability that our estimation of net gains correctly predicts the winning category.

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*** (0.028)	0.227*** (0.027)		
Transfer to spouse (T_2)	0.180*** (0.031)	0.174*** (0.030)		
$T_1 \times T_2$	-0.190*** (0.038)	-0.161*** (0.037)		
Initial tax Acceptance (A^I)		0.163*** (0.033)		0.333*** (0.038)
Simulated winner ($\widehat{\Gamma}$)			0.217*** (0.036)	0.210*** (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

Go back to second stage

First stage environmental effectiveness

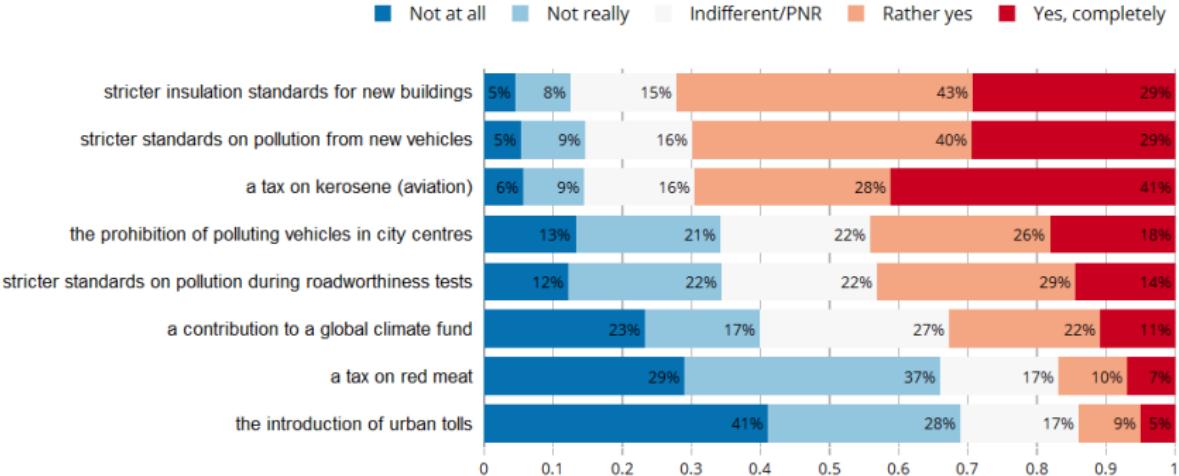
Table: First stage regressions results for environmental effectiveness

	Environmental effectiveness		
	(1)	not "No" (2)	"Yes" (5,6)
Info on Environmental Effectiveness (Z_E)	0.062*** (0.017)	0.043** (0.017)	0.059*** (0.014)
Info on Climate Change (Z_{CC})	0.030* (0.017)	0.024 (0.017)	0.028** (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

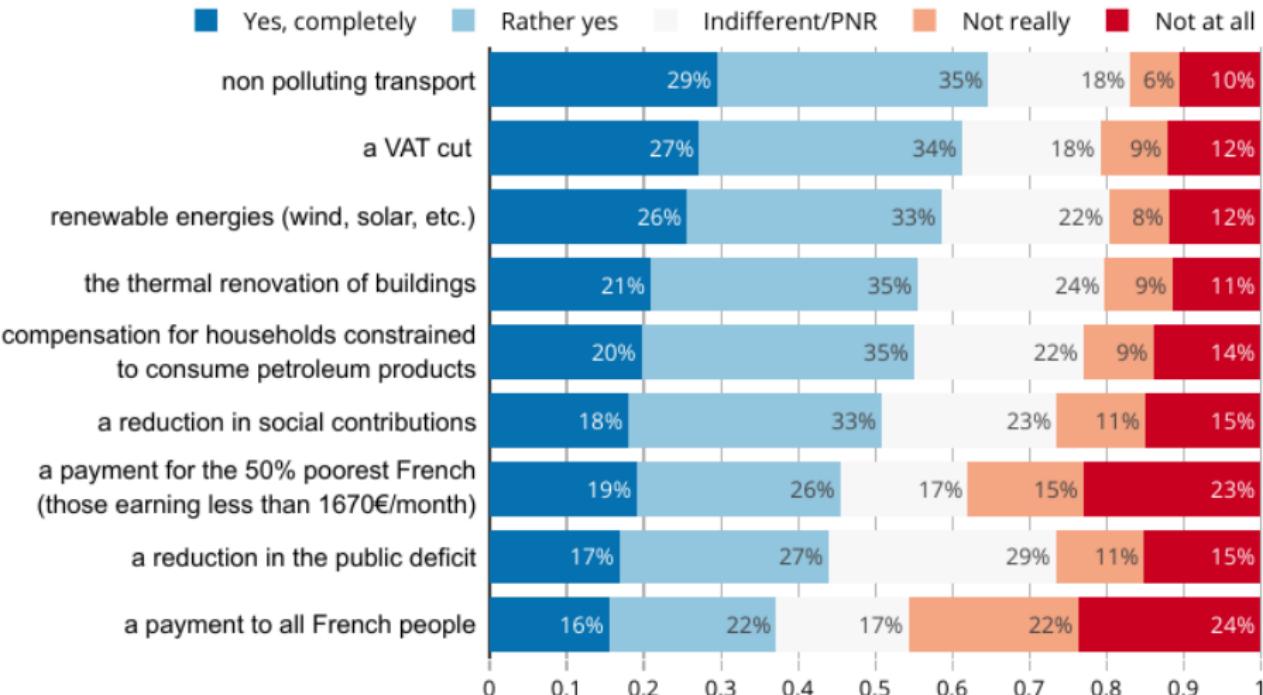
[Go back to second stage](#)

French favored environmental policies



[Go back](#)

French favored redistribution of tax carbon revenue



[Go back](#)

Subjective elasticities

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

Table: Effect of subjective elasticities on perceived environmental effectiveness

	Environmental effectiveness: not 'No'			
	(1)	(2)	(3)	(4)
Price elasticity: Housing	-0.062* (0.032)		-0.055* (0.032)	
Price elasticity: Transports		-0.056* (0.030)		-0.060 ** (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.

▶ Go back

Table: Share of respondents with new beliefs aligned with feedback

	<i>Aligned with feedback: $G^F = \hat{\Gamma}$</i>	
	$\hat{\Gamma} > 0$ (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.

Bias persistence over progressivity

It seems we do not convince people at all here ! How come?

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

Table: Effect of information on perceived progressivity

	Progressivity: not No (P)		
	(1)	(2)	(3)
Constant	0.419*** (0.022)	0.435*** (0.033)	0.386** (0.186)
Information on progressivity (Z_P)	-0.021 (0.027)	0.050 (0.040)	0.014 (0.239)
Large bias ($ \hat{\gamma} - g > 110$)		-0.028 (0.045)	-0.019 (0.045)
Interaction $Z_P \times (\hat{\gamma} - g > 110)$		-0.130** (0.055)	-0.126** (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

▶ go back

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
<i>Expected proportion of respondents</i>	.349	.156	.156	.339

▶ go back