

# French Attitudes over Climate Change and Climate Policies

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## Abstract

The objective of this paper is to assess the prospects for French climate policies after the Yellow Vests crisis halted the planned increase in the carbon tax. From a large representative survey, we elicit knowledge, perceptions and values over climate change, we examine opinions relative to carbon taxation, and we assess the support for other climate policies. Specific attention is given to the link between perceptions of climate change and attitudes towards policies. The paper also studies in details the determinants of attitudes in terms of political and socio-demographic variables. Among many results, we find limited knowledge but high concern for climate change. We also document a large rejection of the carbon tax but majority support for stricter norms and green investments. Our study entails policy recommendations, such as an information campaign on climate change. Indeed, knowledge, perceived danger, and support for policies are all positively correlated, suggesting that better access to science could foster support for the ecology, as we find no evidence for the formation of opinion through partisan cues like in the US.

*Keywords:* Climate Policy; Carbon tax; Preferences; Acceptability; France

**Disclaimer.** This is a work in progress. Please, do not cite without the authors' permission.

**Acknowledgments.** We are grateful to Mouez Fodha, Fanny Henriet and Katheline Schubert for their comments and their help to get funding. We also thank seminar participants at the Paris School of Economics. We would also like to show our gratitude to Stefanie Stantcheva, Michael I. Norton and the Harvard Business School for allowing us to use their Qualtrics account. We acknowledge financial support from the Cepremap, EUR PGSE (ANR-17-EURE-0001), ANR (ANR16-CE03-0011), and Université Paris 1 Panthéon-Sorbonne economics doctoral school (ED 465).

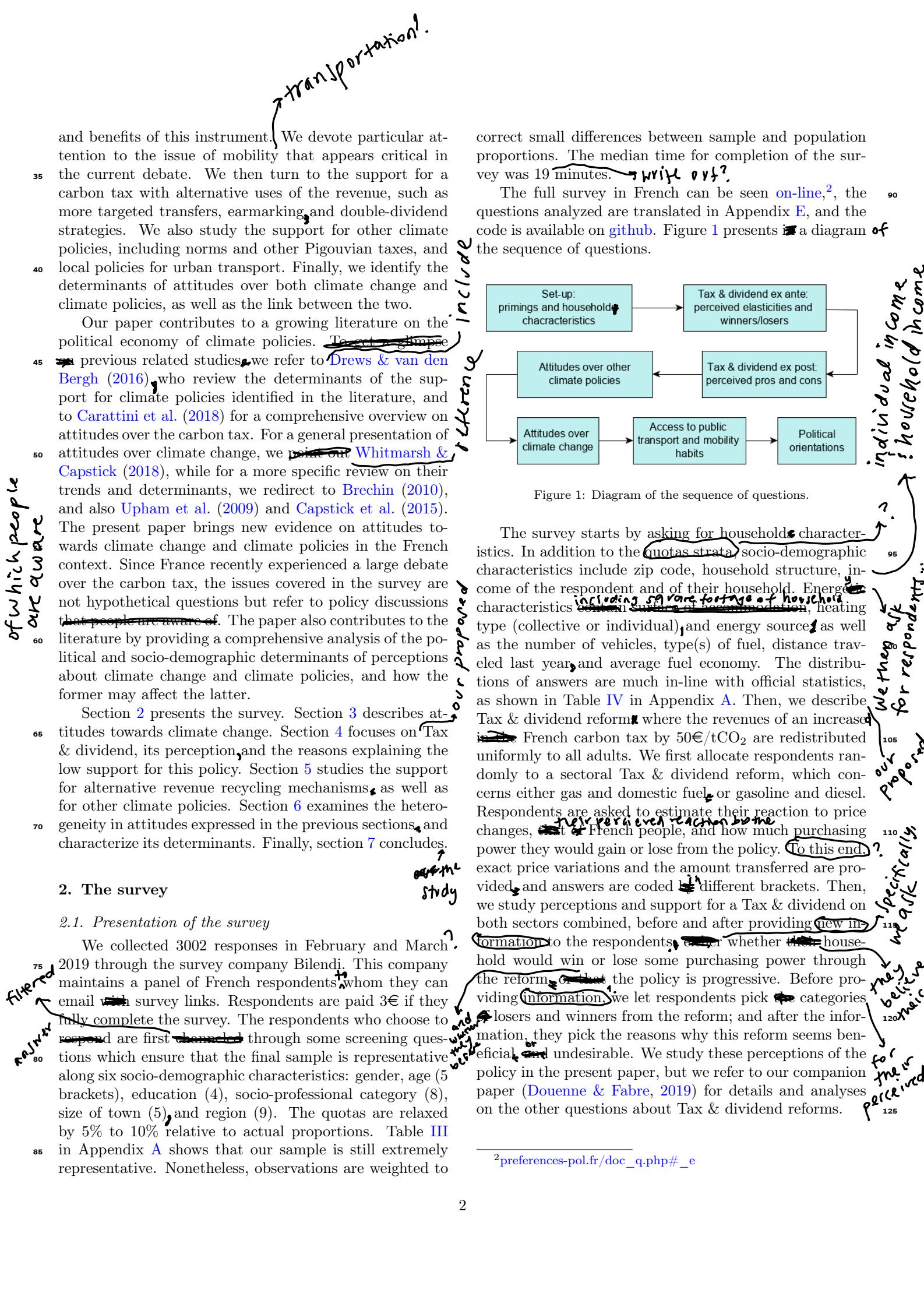
*JEL classification.* D78; H23; Q54; Q58

## 1. Introduction

The French government is currently facing a double challenge on climate policies. On the one hand, the protest of the Yellow Vests that originated in November 2018 against the planned doubling in the carbon tax — from 44.6 to 86.2€/tCO<sub>2</sub> in 2022 — led the government to halt the increasing trajectory. On the other hand, a large campaign called “*Affaire du siècle*” started in December 2018 against its inaction for the environment, gathering over two millions signatories in a month. It is so far unclear how the tension between these two *a priori* antagonistic objectives will be resolved. In particular, one may wonder whether the two movements involve distinct groups with opposite interests, or rather reflect a commonly perceived inadequacy of the solution proposed by the government to address the climate threat.

This paper aims at understanding French perceptions over both climate change (CC) and the policies that should be implemented to tackle it. To do so, we conducted a new survey on a sample of 3,002 respondents representative of the French population. Our survey contains questions to assess respondents' knowledge about CC, and their perceptions over its causes, consequences and the timing of its effects. As the paper was primarily motivated by the failed attempt to increase the French carbon tax, we examine in detail attitudes towards this instrument. To do so, we propose respondents a Tax & dividend policy, i.e. a carbon tax whose revenue would be returned lump-sum uniformly to all adults. This policy differs from the one proposed by the government, since the revenue would have been used to fund the general budget instead. We identify respondents' expected winners and losers, and the perceived problems

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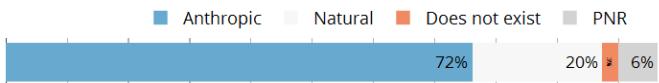


Figure 2: Perceived cause of climate change.

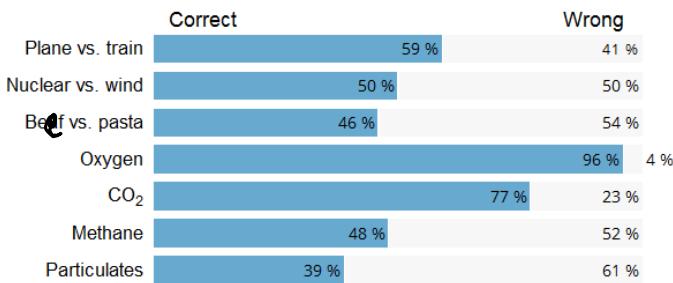


Figure 3: Perceived factors of climate change.

## 2.2. Eliciting attitudes towards climate change and climate policies ~~about respondents are~~

After inquiring ~~the~~ support for Tax & dividend, we ask to assess (on a Likert scale) different ways to recycle the revenues of a carbon tax. On another Likert scale, we ~~summarize~~ opinions on other climate policies, notably new norms or Pigouvian taxes. We then measure ~~the~~ knowledge about climate change, by asking its origin (anthropic or natural), its causes (in terms of gases and activities), which region it will most affect (between India and the European Union), and what reduction of emissions is needed ~~by~~ 2050 to respect the +2°C target. At the same time, we assess attitudes over climate change by asking respondents the frequency ~~with~~ which they talk about it, the gravity of its consequences, the generations it will severely affect, and the entities responsible for it ~~stepping~~. We ~~analyze~~ by surveying if and how climate change influences one's decision to have a child, under which conditions one would be ready to change their lifestyle to fight climate change, and whether one would be ready to adopt a sustainable lifestyle if ~~all~~ policies were aligned to this goal. We conclude the assessment of environmental attitudes by asking ~~questions~~ ~~on~~ the exploitation of shale gas. Then, we evaluate ~~the~~ respondent's access to public transport, their mobility habits, and the room for change ~~in~~ these habits. Finally, we ask political preferences, including the positioning in relation to the Yellow Vests. The survey ends with a text box where the respondent can ~~express any comment~~.

## 3. Attitudes over Climate Change

### 3.1. Knowledge

As shown in Figure 2, the share of French people who do not believe in climate change (CC) is marginal (4%), and the proportion who prefer not to respond (PNR) is small (6%). Overall, knowledge that CC is anthropic is widespread (72%), despite ~~the~~ wording expected to provide a lower bound on this figure (Motta et al., 2019). The level of knowledge on the anthropic origin of CC is similar

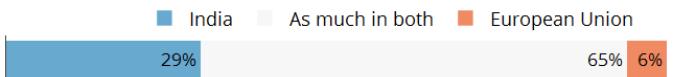


Figure 4: Perceived region where climate change impacts will be the most serious.

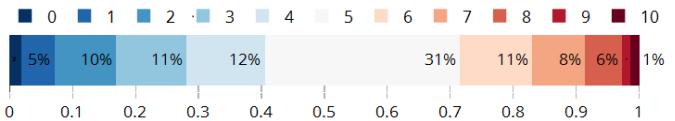


Figure 5: Perceived GhG emission per capita required in 2050 to limit global warming to +2°C (in t/CO<sub>2</sub>eq), given that it is now 10.

to that of other Western countries (Leiserowitz, 2007): it is ~~for example~~ 66% in the U.S. (Gallup, 2019). However, knowledge on climate science appears limited. Although 77% of people correctly tick "CO<sub>2</sub>" as a greenhouse gas (GhG), Figure 3 shows that almost as many people tick particulate matter (39%) as methane (48%). This mistake likely reflects a common confusion between air pollution and climate change, both conflated to the broader notion of "pollution". Admittedly, understanding the impacts of activities is more useful than erudition about chemical factors, but here again, knowledge is quite low. We assess such awareness using pairs of comparable activities whose GhG footprint differ by a factor 20 (beef steak vs. pasta, plane vs. train) or whose footprint are similar (nuclear vs. wind power).<sup>3</sup> We ask whether it is true that one activity emits 20 times more GhG than the other, as a way to express precisely that one is "much more" polluting than the other. For each pair, around half of the sample is correct. The bulk of respondents pick two correct answers out of three (44%), but more get ~~them~~ all wrong (19%) than all right (15%). Figure 4 shows that, although five times more people (correctly) believe that India will face more serious climate impacts than the European Union, 65% still think that both regions will face as much damage. Not only do most people fail to fully understand the factors and consequences of CC, but they also fail to grasp the degree of reaction needed to tackle it. When ~~told~~ that "each French person emits on average the equivalent of 10 tons of CO<sub>2</sub> per year" and asked what should be the figure in 2050 to "hope to contain global warming to +2°C in 2100 (if all countries did the same)", 59% answer 5 or more (see Figure 5). Only 17% select a correct answer: 0, 1 or 2 (see Appendix B for why these are correct).

Millner & Ollivier (2016) propose several mechanisms to explain people's lack of understanding about climate change: in addition to the difficulty to ~~grasp~~ ~~gradual~~ ~~changes~~, they emphasize the complexity of drawing a causal link between ~~diffuse~~ causes and distant consequences. Failing to assimilate the underlying ~~channels~~ may blur the link between people's own behavior and consequences for the climate. One related element that may

<sup>3</sup>Appendix B.1 details how the figures were obtained.

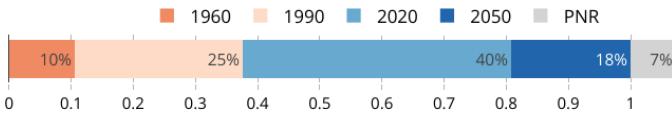


Figure 6: Perceived date of birth of first generation severely affected by CC.

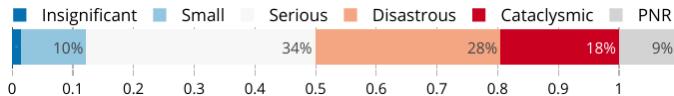


Figure 7: Perceived gravity of climate change.

explain why people ignore the basics of climate science is that they do not feel directly affected by CC. In fact, 62% think that the first generation seriously affected by CC is yet to be born (Figure 6).

### 3.2. Opinions

Even though many French people might not think they will suffer themselves from CC, a vast majority foresee worrying consequences if humanity does nothing to limit it. Figure 7 shows that 19% see the impacts as “cataclysmic, humankind would disappear”, 18% as “disastrous, lifestyles would be largely altered”, 28% as “grave, because there would be more natural disasters”, while only 11% think damages would be “small, because humans would be able to live with it” or “insignificant, or even beneficial”. These results echo a survey from ADEME (2018) which shows that 63% of French people think that “living conditions will be extremely harsh” in France in 50 years and that 57% do not think CC “will be limited to acceptable levels by the end of the century”. Despite –or perhaps due to– broad hopelessness, 34% almost never talk of CC (Figure 8), 27% talk of CC several times per month, which can give a sense of the share of people who regularly engage in long-term thinking. The relatively low amount of discussion of an issue largely perceived as a serious threat may be a way to flee from one’s moral duty and to protect one’s lifestyle. Indeed, 63% acknowledge that “each one of us”



Figure 8: Frequency at which respondents talk about climate change.

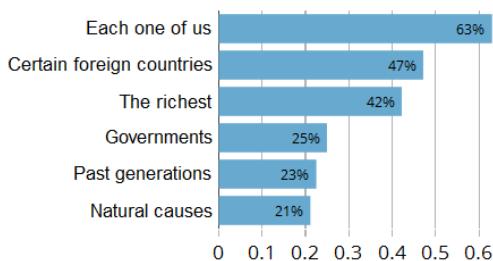


Figure 9: Perceived responsible for climate change.

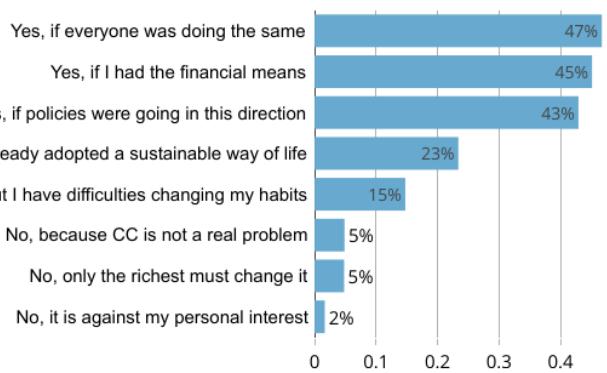


Figure 10: Respondent could change their lifestyle under a condition.

is responsible for CC, and less people ~~think~~ the responsibility ~~lies~~ “certain foreign countries” (47%), ~~on~~“the richest” (42%), or ~~any~~ other agent (see Figure 9).

Overall, these results indicate that most people understand the fundamentals of climate issues, including the root causes and the scale of the problem, but that only a minority has ~~thought~~ ~~about~~ CC deeply enough to ~~know~~ its factors and the pathways to tackle it.

### 3.3. The Reaction Needed

Given that many people may not realize the extent of the transition needed to reach sustainability, and that others may be discouraged precisely by the sheer ~~size~~ of such a transition, ~~we~~ we wonder how willing people are to contribute to its success. An encouraging finding for the transition is that 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”, while only 17% answer “No” (the others do not take a side). While the phrasing removed most grounds against a change in lifestyle, we inquired under which conditions would people be willing to adopt such a change (see Figure 10). It may be a manifestation of ~~warm glow~~ or ~~a~~ a lack of knowledge ~~on~~ regarding the efforts needed, but 36% affirm that they have “already adopted a sustainable way of life” and/or that they “try to do so”, while only 11% refuse to change their lifestyle (and barely 2% justify it by their self-interest). 82% of respondents 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 ~~of people's behavior~~ (about 45% each). Other French representative surveys find similar results, and indicate which efforts people are most ready to make.<sup>4</sup> ADEME (2018) shows that the efforts people ~~make~~ are currently making

<sup>4</sup> OpinionWay survey was conducted in March 2019 on a representative sample of 1,042 French adults, and ADEME (2018) in September 2018 on a representative sample of 1,557 French adults.

or could easily make are also the least efficient to reduce GhG emissions: most cite waste sorting (89%) or buying seasonal vegetables (87%), but fewer mention walking or cycling (55%) or using public transport (49%) instead of driving. Logically, 62% think that "only legislative constraint is effective in making a successful transition and forcing everyone to change their consumption habits" (OpinionWay, 2019). The extent to which people support such legislation is documented by Bréchon et al. (2019): 50% favour the protection of the environment at the expense of the economy and employment. In the U.S., Gallup surveys show that this prioritization depends largely on the conjuncture, in accordance with Brulle et al. (2012) and Shum (2012): the figure is 65% in 2019 but was 38% in 2010.

Finally, a substantial fraction of people integrate ecological constraints in their choices. Indeed, 15% call themselves ecologist (the most picked political identity outside of the left-right spectrum, see Appendix D), 23% claim they already adopted a sustainable way of life, and 20% say the CC "has had or will have an influence in their decision to have a child". Among them, 86% justify it because they "don't want [their] child to live in a devastated world", and 37% "because each additional human aggravates climate change".

#### 4. Attitudes over Carbon Tax and Dividend

Most French people are aware and concerned about climate change, and claim to be willing to exert efforts to fight it. Yet, the government's attempt to introduce a carbon tax to deal with French emissions resulted in a widespread popular protest. To understand this paradox, our survey presents respondents a Tax & dividend policy: an increase of 50€/tCO<sub>2</sub> of the current French carbon tax, with a uniform lump-sum redistribution of the additional revenue to all adults. This policy differs from the official one whose revenue was mostly used to fund the general budget. Respondents are given the associated increase in energy prices so that the direct costs are salient: +13% (resp. +15%) for gas (resp. domestic fuel), and +0.11€ (resp. +0.13€) for a liter of gasoline (resp. diesel). They are also told that the transfer would amount to 110€ per adult and per year.

##### 4.1. Massive rejection widespread

French people would largely reject the proposed policy. Only 10% of our respondents declare they would approve it, while 70% say they would not (see Figure 11). As shown in our companion paper (Douenne & Fabre, 2019), this massive rejection can be explained by erroneous perceptions about the policy's outcome, such as an overestimation of its impact on one's purchasing power. For instance, 30% think their household would lose from an increase in taxes on gas and domestic fuel redistributed to all, among those who use neither of these. Interestingly, of people who use neither gas nor domestic fuel believe their household would lose from an increase in taxes on these goods.

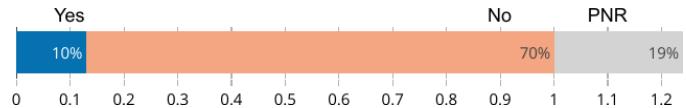


Figure 11: Approval of Tax & dividend.

the salience of costs appears critical in people's answer. At a later stage of the survey, we ask respondents whether they would agree to increase the carbon tax if the revenue was returned to all households, without mentioning the impact on prices. The question is asked along with a package of other environmental policies (see section 5). In this case — where the benefits are more salient than the costs — we find a much higher approval rate of 37%. Another survey conducted in March 2019 (OpinionWay, 2019) assesses acceptance for a return of the increase of the carbon tax by 2021. They find intermediary results, with 21% of people approving against 77% opposing it (2% "PNR").

The low level of acceptance observed partly follows from the recent experience. In July 2018, before the protests of the Yellow Vests, ADEME (2018) found that 48% of French people thought it was desirable to increase the carbon tax, a figure similar to those of other countries (Brechin, 2010). At that time, the carbon tax had been in place for more than four years, but low oil prices made its existence little known. Few months later, in a context of higher barrel prices, the tax was put under the spotlight, and its associated costs became more salient, fostering the strong opposition.

##### 4.2. Perceived winners and losers

Figure 12 represents the share of respondents who expect different household categories to win or lose from the policy. Income appears to be the most critical divide, with a non-monotonic relationship. 30% of respondents expect the richest to win while only 2% think they would lose. On the contrary, 40% more people think that the poorest would lose rather than win, a difference even higher for the middle class — the category most expected to lose — at 53%. To half of respondents, we framed the question about winners and losers specifically in terms of "purchasing power". The objective was to see if some categories were commonly seen as losing in welfare although they could gain in monetary terms, or conversely. The results look very much alike for both formulations, except that the shares of people expecting poorer households to gain (5.8%) and richer households to lose (0.9%) are significantly larger than purchasing power: 10.2% and 2.1%, respectively. Overall, respondents perceive Tax & dividend as regressive. As shown by a large body of literature (e.g. West & Williams, 2004; Bento et al., 2009; Williams et al., 2015), and more specifically in our companion paper (Douenne & Fabre, 2019), these beliefs are at odds with the true distributive effects of this proposed policy.

Beyond the income dimension, people tend to identify

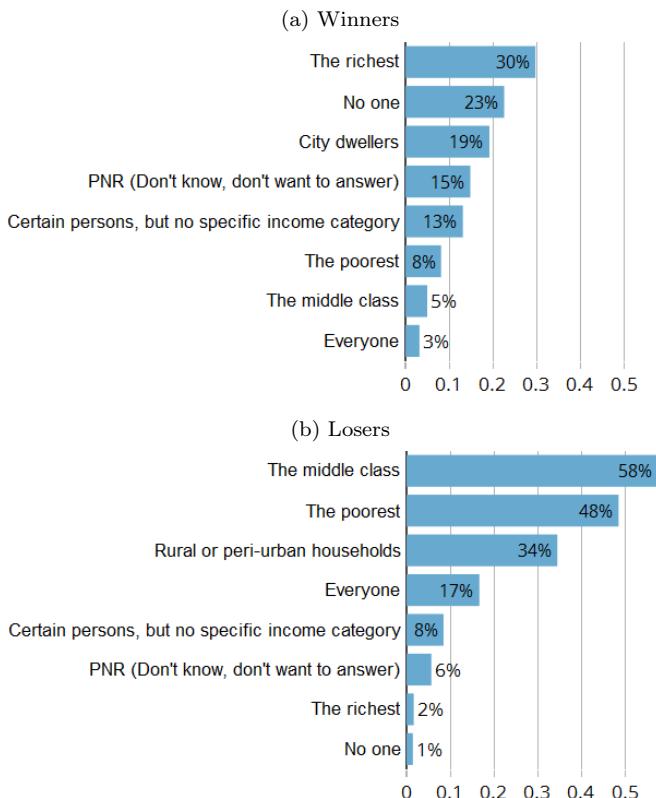


Figure 12: Perceived winners and losers from Tax & dividend

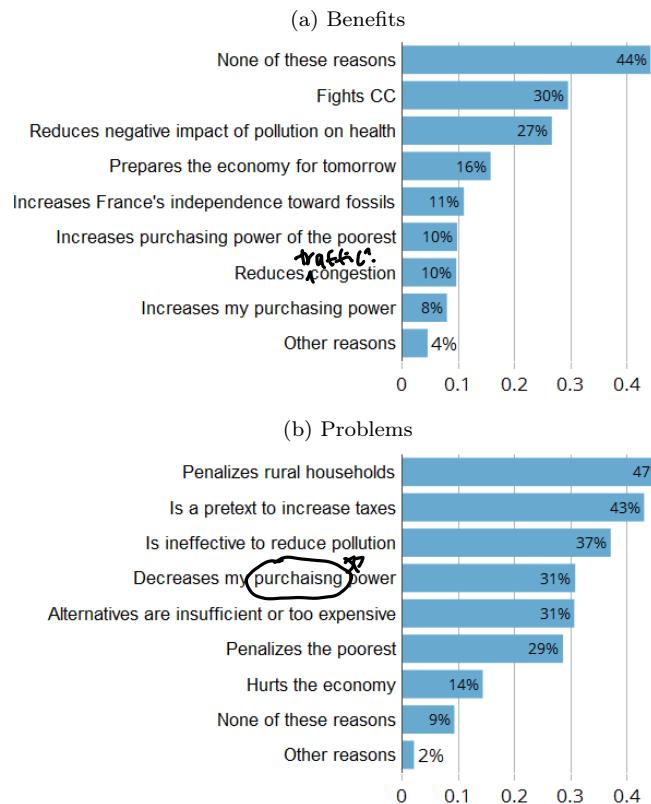


Figure 13: Perceived benefits and problems from Tax & dividend

city dwellers as potential winners from Tax & dividend (third position at 23%), while rural and peri-urban households are ~~expected~~ expected to lose (third position at 34%). We also see that people report on average more categories for expected losers than winners: 1.74 vs. 1.16. The high ranks of "no one" for winners (second) and of "everyone" for losers (fourth) further suggest that ~~people~~ do not see our policy as a zero-sum game.

respondents

#### 4.3. Perceived pros and cons

Previous studies have highlighted that distributive effects are a critical determinant of carbon tax acceptance (e.g. Kallbekken & Sælen, 2011; Brannlund & Persson, 2012; Gevrek & Uyduranoglu, 2015). When asked about the ~~main~~ problems associated with Tax & dividend, the ~~first~~ answer coming up is that the tax would penalize rural households (47%). Interestingly, this concern comes before the threat that the tax could penalize the poorest (sixth position with 29%), although more people report the poorest as ~~the~~ category of people expected to ~~lose~~. The second and third concerns are that the policy is ~~not~~ a pretext to increase taxes (43%) — a worry documented by Dresner et al. (2006) and Klok et al. (2006) — and ~~that it~~ be ineffective to reduce pollution (37%). Related to this last point is the perceived lack of alternatives seen as insufficient or too expensive (31%). This problem has been previously stressed by Kallbekken & Aasen (2010) in a focus group study: people do not see the point of taxing

fossil fuels if they cannot substitute for other technologies. This last reason is stated as frequently as concerns over the impact on one's own purchasing power (fourth with 31%). As shown in Douenne & Fabre (2019), self-interest largely affects acceptance of Tax & dividend, but this concern could sound too egoistic when stated in a direct way. While previous studies have pointed out concerns about the negative impact of carbon taxation on the economy (e.g. Thalmann, 2004; Carattini et al., 2017), this problem comes last (14%) and does not seem to represent an important obstacle for public support in the current context. Respondents are suggested to pick at most three answers among ~~the~~ problems and benefits. On average, respondents pick 2.36 problems — and 53% pick at least 3 — against 1.14 benefits, excluding the most popular: "None of these reasons" (44%). This option comes ~~way~~ ahead of the second and third, "fight climate change" (30%) and "reduces negative impact of pollution on health" (27%). Still, environmental ~~concerns~~ are much more cited than economic ones. This result is likely due to people's pessimism about the outcome of the policy but might also translate ~~the limited importance given to economic consequences of the carbon tax, as already suggested by~~ for potential problems ~~that people perceive with the tax~~.

#### 4.4. Consumption and mobility constraints

The perceived problems identified above suggest a rationale for people's opposition towards carbon taxation: if

to fossil  
fuels

Compared  
to whom?

what causes respondent to not choose it?

self interest

tax significantly?

shame?

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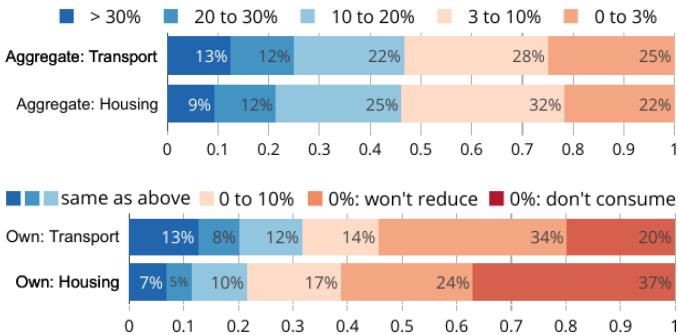


Figure 14: Perceived aggregate and own elasticities.

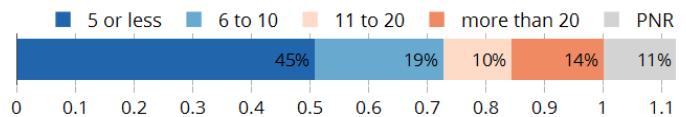


Figure 16: Walking distance to the nearest stop, in minutes.

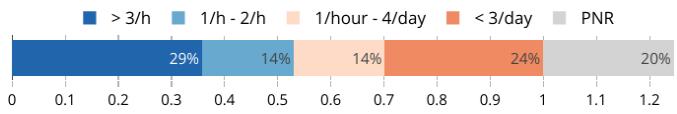


Figure 17: Frequency of public transport at the nearest stop.

would be

people think the tax is ineffective because their consumption is constrained and affordable alternatives are lacking, then taxing carbon would be perceived as a pretext to increase taxes.

Cool

#### 4.4.1. Perceived elasticities

In order to understand to what extent people feel constrained with respect to their energy consumption, we elicit their subjective price elasticity for transport and domestic energies. To do so, we adopt the phrasing of Baranzini & Carattini (2017) and ask the expected decrease in energy consumption that would follow an increase in prices. To avoid dealing with small percentages, which people usually find more difficult to compare, we ask for the reaction to a 30% increase in the price of heating (or equivalently, an increase of 0.50€ per liter in fuel prices). Although sufficiently high to foster a significant response on demand, these changes are realistic in the medium run, and should not lead people to report long-term elasticities. Respondents may select their answer among 5 brackets. They are asked to estimate their own reaction, as well as that of French people. Figure 14 presents the results.

54% (resp. 61%) of respondents consider that such increase in prices would not lead them to reduce their transport (resp. domestic) energy consumption. This expected inelastic behavior is mainly due to mobility constraints for transport (64% of cases) while it mostly reflects a non-fossil heating type for housing (61%). Excluding people reporting inelastic behavior because of low initial consumption, about 40% of people feel constrained and expect not to lower their consumption following price increases. Still, respondents perceive transport fuel price elasticity of French people at -0.43 on average, and their

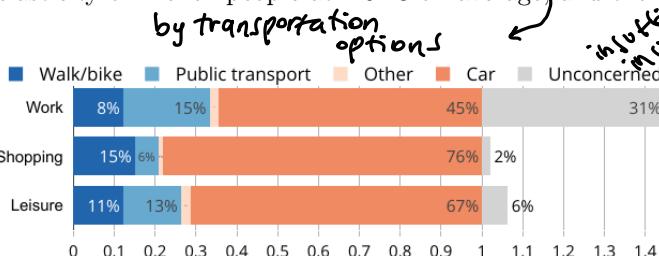


Figure 15: Mode of transportation by activity.

own elasticity at a consistent -0.36 (after re-weighting by fuel expenditures). Concerning housing energies, aggregate and personal subjective elasticities are respectively -0.41 and -0.33. Overall, these subjective elasticities compare well to the ones found in the literature for French households: around -0.45 for transport fuel (Clerc & Marcus, 2009; Bureau, 2011; Douenne, 2018) and -0.2 for housing (Douenne, 2018; Clerc & Marcus, 2009).

#### 4.4.2. Mobility and public transport

To assess the level of dependence on automobile, which we include as a determinant for preferences in Section 6, we study mobility habits and access to public transport. Figure 15 indicates that 65% of employed people drive to work, and that use of car is even more common for grocery shopping or leisure activities. This figure is confirmed by the national transport survey ENTD (2008) conducted by Insee and analyzed in Pappalardo et al. (2010), which reveals that majority still uses car for trips of 1 to 2 km. Even though 73% live within 10 minutes walk to a public transit stop (Figure 16), coverage and frequency of public transport is often too low (Figure 17) to compete with the speed, comfort, and flexibility of automobile. Indeed, 58% of those who commute by car could neither substitute it to public transport nor walking or cycling, and only 15% could use one of these alternative without difficulties (Figure 18). Further evidence indicates that the lack of alternatives is a main factor for the use of car, besides a latent desire for a vehicle that remains a symbol of freedom. Figure 19 shows that 52% of respondents state that supply of public transport where they live is "insufficient" or "decent, but should be increased", while 40% find it "satisfactory" or "limited, but sufficient". From this perspective, "green public investments and carbon taxes appear to be complementary, and in the timing of climate

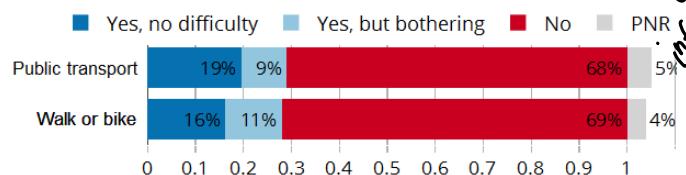


Figure 18: Among those who commute to work by car, possibility to change the transportation mode, depending on the alternative.

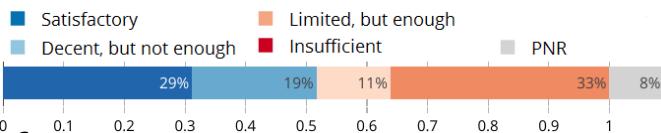


Figure 19: Supply of public transport where the respondent lives.

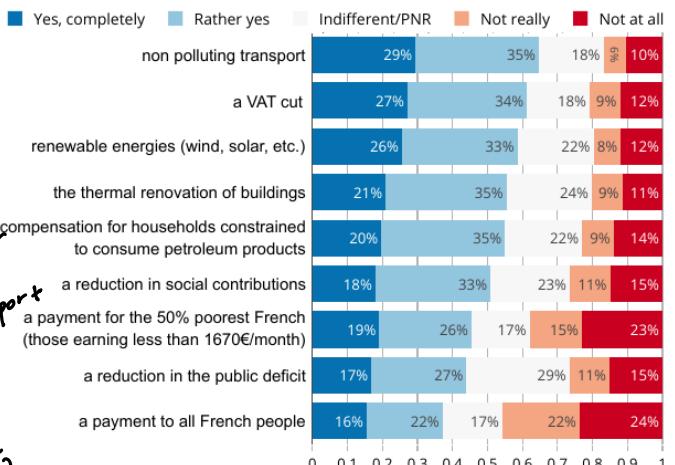


Figure 20: Approval of a carbon tax if its revenue finances...

policy it would be justified to carry out the former before implementing the latter", as Bureau et al. (2019) put it. Together with an increase in the supply of alternative climate policies could also address the demand for mobility, e.g. by revitalizing town centers and limiting urban sprawl.

**495 5. Attitudes over Other Policies** *over more specific name?*

The previous section has shown that Tax & dividend was largely rejected by French people. As climate policies are urgently needed, it appears necessary to assess whether other designs and instruments would ~~be better with~~ higher support. This section first examines public opinion about several alternative uses ~~of~~ the carbon tax revenue, and then turns to other environmental and climate policies.

*Suggested?*

### 5.1. Preferred Revenue Recycling

We asked respondents to what extent they would accept an increase ~~in~~ the carbon tax ~~for~~ different uses ~~for~~ the revenue. As the exact cost of the tax was not specified, the benefits of the revenue recycling were made relatively more salient, ~~explaining the~~ higher acceptance rate ~~as~~ compared to our Tax & dividend. Still, this question enables us to compare answers relative to one another.

#### 5.1.1. Investments in energy transition

Figure 20 reports people's responses ~~to~~ each proposed scenario. Overall, the preferred revenue recycling are the ones investing in the energy transition. This result is consistent with many papers showing that earmarking the revenue of the tax for environmental purposes largely increases public support (for a review of the literature, see for instance Kallbekken & Aasen, 2010; Carattini et al., 2018). As people tend to see carbon taxation as effective only if it finances green investments (Sælen & Kallbekken, 2011), these mechanisms legitimate the implementation of a tax and increase acceptance. In addition, the large approval for a policy investing in non-polluting transport can be explained by people's ~~want~~ for mobility alternatives, the lack of which was identified as an important problem with Tax & dividend (see section 4).

#### 5.1.2. Transfers to households

While the literature has shown that distributive concerns affect carbon tax approval, the common tools proposed by economists to address this issue — lump-sum transfers — do not meet a large support. Out of the nine proposed mechanisms, the standard flat recycling comes

*are not met with resounding*

last (with 37% approval), and a transfer targeted to the bottom 50% comes seventh (46%). Consistent with our previous finding that people are concerned that the carbon tax may penalize rural and peri-urban households, the preferred "lump-sum" transfer is the one targeted to people constrained with respect to their consumption of petroleum products (fifth with 55% approval). These results echo the findings of Kallbekken et al. (2011) who showed that people tend to prefer more narrowly targeted revenue recycling, possibly because of distributional concerns.

The relatively low support for compensation mechanisms should however not be understood as a lack of concern about purchasing power or distributive effects. As shown in section 4, the distributive properties of lump-sum transfers are not well understood. Perhaps surprisingly, the second preferred mechanism for revenue recycling is a reduction in the VAT rate (61% approval). The main rationales for this support are the benefits ~~for~~ one's purchasing power and the perceived distributive effects. As the VAT is known to be a regressive tax, people may ~~feel~~ to compensate an increase in the regressive carbon tax ~~with~~ a decrease in the VAT. Although such mechanism would be ~~less~~ favorable to poorer households, ~~who~~ who spend less in VAT in absolute value, and would therefore receive less than from a uniform transfer, ~~but~~ it may not be perceived ~~as so.~~ as so. (I think)

#### 5.1.3. Double dividend and public deficit

The last two options propose to use the carbon tax revenue to reduce social contributions, or the public deficit. These mechanisms come respectively in sixth and eighth position with 51% and 44% of approval. These results can be linked to the low level of concerns regarding the impact of a carbon tax on the economy documented in section 4. They are also consistent with previous focus group studies (e.g. Kallbekken & Aasen, 2010), including in France where Deroubaix & Lévéque (2006) found that people did not understand why the revenue of an environmental tax

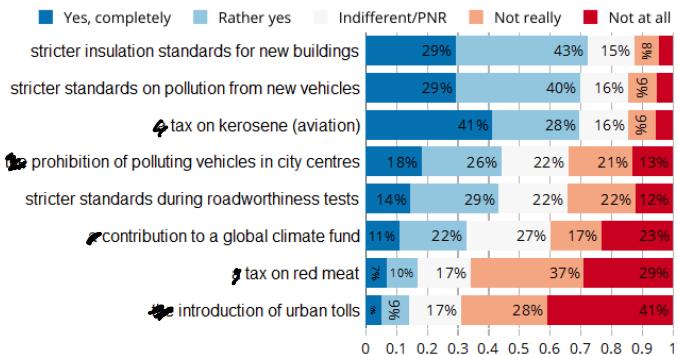


Figure 21: Approval of different climate policies.

reform should be used to tackle unemployment.

## 5.2. Other Instruments

Although economists have shown that alternative instruments are usually less cost-effective than Pigouvian taxes (Goulder & Parry, 2008), they may become relevant in a context where there is a binding acceptability constraint. To elicit people's preferred environmental policies, we ask respondents whether they would support eight different propositions. To ease the answer to these questions, the exact mechanisms and their associated costs and benefits are unspecified. The answers reported should therefore be taken cautiously as people could change their minds if faced with clear trade-offs. Still, this exercise is informative about people's first reactions to different proposals.

### 5.2.1. Other Pigouvian taxes

Figure 21 shows that among the eight options, the third most approved (70%) is a tax on kerosene. It is also by far the option receiving the strongest support (41% of "Yes, completely"). The main rationale could be the high perceived effectiveness of the tax, if people view aviation as an important source of emissions, and the distributive effect of such policy since richer people fly more.<sup>5</sup> In sharp contrast, only 17% of our survey respondents approve a tax on red meat, a policy ranked second-to-last. One can explain this lower acceptance rate by the belief that such policy would be ineffective, as we have shown in section 3 that less than half of respondents know that beef has a high carbon footprint. Additional motives of rejection could be the perceived negative impact on purchasing power, and the feeling that the policy is too coercive and targets a behavior difficult to change (de Groot & Schuitema, 2012). Overall, the evidence confirms that people are not opposed to Pigouvian taxes *per se*, and that acceptance varies much depending on the target and the perceived outcome of the instrument.

<sup>5</sup> In France in 2008, people in the top income decile travelled by plane about seven times more than the bottom 50% of the income distribution (CGDD).

### 5.2.2. Norms

Among all proposed instruments, the two most approved are norms: 72% and 70% of respondents declared being in favor of stricter standards for the insulation of new buildings and for the pollution of new vehicles, respectively. It is unclear to what extent people are aware of the "hidden costs" of such policies. For instance, fuel economy standards in the US have been estimated at three to six times more costly than a tax on gasoline for similar abatement levels (Jacobsen, 2013). In addition to their efficiency costs, these standards are also regressive, possibly more than gasoline taxes (Jacobsen, 2013; Davis & Knittel, 2019; Levinson, 2019). The exact properties of these instruments are of course specific to their design, but it is likely that their popularity partly reflects the underestimation of their costs.

The comparison between standards and price instruments for urban transport policies, ~~confirms the~~ preference for the former. While the prohibition of polluting vehicles in city centers comes fourth in the list of preferred options with 44% approval, the introduction of urban tolls comes last with only 14%. In a survey on urban road pricing, Jones (1998) identifies the main deterrent for these mechanisms. ~~While some are specific to congestion charges, the other perceived problems are very much alike those identified for our Tax & dividend: ineffectiveness, unfairness, and feeling that it is just another tax.~~

### 5.2.3. Diesel taxation

The strong opposition of the Yellow Vests against energy taxes did not only lead the government to reverse the planned carbon tax trajectory. The additional tax increases initially scheduled for diesel (+0.026€/L) have also been abandoned. Diesel price was ~~initially~~ supposed to rise more rapidly in order to progressively catch up with the currently higher tax imposed on gasoline. This historical advantage was considered by the government as a bad signal given the social costs of diesel from air pollution. In our survey, we therefore ask respondents whether they would accept an increase in diesel taxes to catch up with gasoline. As illustrated by Figure 22, 59% of survey respondents answer they would not, while 29% say they would (12% "PNR"). Among the 58% of households who own a diesel vehicle, the proportion opposed goes up to 81%. The geographic difference is also striking as 73% of rural households would be opposed, against only 40% of those living in the Paris agglomeration. As shown in Table ?? in Appendix ??, these two determinants persist when controlling for many other criteria and clearly appear, ~~along~~ with political orientation, as the most important

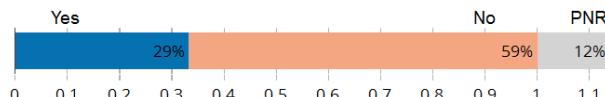


Figure 22: Approval of a catch-up of diesel taxes.

energies is rarely used - ask prof never say having energies maybe!

655 divides with respect to diesel taxation.

#### 5.2.4. Shale gas exploitation

The energy transition implies a shift away from fossil fuels, but it is sometimes argued that, at least in the short run, a substitution from coal to shale gas would reduce emissions as the former pollutes less than the latter. As France holds some of the largest reserves of shale gas in Europe, its exploitation could be exported and possibly substitute for more carbon intensive energies.<sup>6</sup> Before asking for approval of the exploitation, we first respondents with trade-offs between the possible climate benefits relative to coal and the potential negative effects on water quality at the local level. Then, using respondents' zipcode, we inform them whether their department would possibly be concerned by shale gas exploitation.<sup>7</sup> Overall respondents, 59% are opposed to exploitation, while 16% are in favor. As shown in the table ?? in Appendix ?? acceptance (defined as approval or "PNR") appears higher by 5 p.p. *ceteris paribus* when the department is not concerned. When asked about the main benefit of shale gas exploitation, 26% answer it would "create jobs and boost employment in the departments concerned", 18% that it would limit climate change, and none of these reasons for the other 56%. Finally, 25% of respondents think it is valid to say that shale gas exploitation would limit climate change, as "any decrease in emissions goes in the right direction", while 43% think it is not, as "emissions should be stopped, not just slowed down".

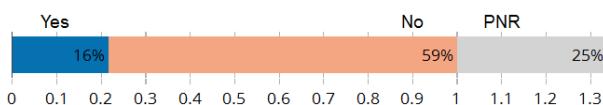


Figure 23: Approval of shale gas extraction in France.

## 6. Determinants of Attitudes

To understand what factors foster environmentally-friendly attitudes, we explore the socio-demographic determinants of attitudes over CC, the correlations between knowledge and perception of CC, and how these attitudes over CC as well as socio-demographics shape preferences for policies.

<sup>6</sup>See EIA/AIE (2013) for an assessment of recoverable reserves, and Saussey (2018) for a nuanced view on the prospects for such exploitation in France.

<sup>7</sup>Source: exploitation and exploration permits, exploration permit applications in 2011, as reported by *Le Figaro*, as well as the associations Non au gaz de schiste and Stop gaz de schiste. Original source is Direction Générale de l'Énergie et du Climat, but the archive is not accessible.

### 6.1. Attitudes over climate change

Table I shows the main socio-demographic determinants of different attitudes towards CC: the knowledge that CC is anthropic (columns 1-3), an index of knowledge over CC (4) and the perception that CC is "disastrous" or "cataclysmic" (5-6). To build the index of knowledge, we first compute a score for the question asking the emission target p.c. required to limit CC (see section 3.1). With  $t$  the respondent's answer (from 0 to 10 tCO<sub>2</sub>/yr), we define the score as:

$$\text{score emission target} = \begin{cases} 3 & \text{if } t \leq 2 \\ 2 & \text{if } t \in [3; 4] \\ 1 & \text{if } t \in [5; 6] \\ 0 & \text{if } t \geq 7 \end{cases} \quad (1)$$

and we then aggregate this score with other answers:

$$\text{knowledge} = \text{score factors} + \text{score emission target}$$

$$+ 3 \cdot (\text{CC anthropic} - \text{CC doesn't exist}) \\ + \text{India most affected} \quad (2)$$

where "score factors" is the sum of correct answers to factors of CC (see Figure 3); and the remaining variables in the formula are dummies. The original index ranges from -3 (no respondent) to +13 (22 respondents), and has quartiles of 6, 8 and 9. In the following, we normalize this index by subtracting the mean (7.6) and dividing by the standard deviation (2.5). Finally, we run OLS regressions of three attitudes over CC on various socio-demographics, household characteristics, and political orientation. We report only the most relevant variables, but describe the entire list of covariates in Appendix C.1. We confirm that logistic regressions yield similar results.

The best predictors of attitudes over CC belong to the political orientation, and in particular the identification to ecologists, the positioning towards the Yellow Vests, and the left-right leaning. Political orientation shapes different attitudes in a consistent manner: being ecologist, more left-wing, or less supportive of the Yellow Vests is always associated with better knowledge and higher pessimism. Interest into politics (measured on a scale "almost not"/"a little"/"a lot") also leads to higher "concern over CC", but to a lesser extent. Two observations on the left-right leaning deserve comment. First, the 40% of people indeterminate relative to this cleavage (see Appendix D for the descriptive statistics) have attitudes close to the center-right. Second, the variations predicted in the dependent variables are as high across the Yellow Vests positionings than across the traditional left-right spectrum. For instance, knowledge on CC is *ceteris paribus* lower by 0.52 standard deviation (sd) for people part of the movement than for those who oppose it, which is comparable to the spread of 0.39 sd between extreme-right and extreme-left people (4).

Table I: Determinants of attitudes towards climate change (CC).

	CC is anthropic (1)	CC is anthropic (2)	Knowledge on CC (3)	Knowledge on CC (4)	CC is disastrous (5)	CC is disastrous (6)
Interest in politics (0 to 2)	0.032** (0.013)			0.346*** (0.071)	0.051*** (0.014)	
Ecologist	0.135*** (0.024)			1.007*** (0.134)	0.192*** (0.027)	
Yellow Vests: PNR	-0.098*** (0.033)			-0.355** (0.179)	-0.093*** (0.036)	
Yellow Vests: understands	-0.038* (0.022)			-0.251** (0.122)	-0.051** (0.024)	
Yellow Vests: supports	-0.098*** (0.024)			-0.570*** (0.130)	-0.061** (0.026)	
Yellow Vests: is part	-0.207*** (0.043)			-1.308*** (0.236)	-0.105** (0.047)	
Left-right: Extreme-left	0.111** (0.056)			0.694** (0.309)	0.075 (0.062)	
Left-right: Left	0.074*** (0.027)	-0.038		0.338** (0.149)	0.099*** (0.030)	-0.028 (0.065)
Left-right: Center	0.013 (0.030)	-0.069		0.245 (0.165)	0.021 (0.033)	-0.091 (0.076)
Left-right: Right	-0.029 (0.029)	-0.123		-0.098 (0.158)	-0.023 (0.032)	-0.142 (0.089)
Left-right: Extreme-right	-0.014 (0.034)	-0.128		-0.288 (0.187)	0.025 (0.037)	-0.088 (0.103)
Diploma: CAP or BEP	0.040* (0.022)	0.011		-0.002 (0.124)	-0.014 (0.025)	-0.004 (0.031)
Diploma: Baccalauréat	0.065** (0.027)	0.122*** (0.033)		0.376** (0.147)	0.030 (0.029)	0.165*** (0.036)
Diploma: Higher	0.086*** (0.027)	0.152*** (0.027)		0.666*** (0.151)	0.096*** (0.030)	0.236*** (0.030)
Diploma × Left-right		-0.005 (0.008)				-0.005 (0.009)
Age: 25 – 34	0.050 (0.041)	-0.030 (0.032)		0.334 (0.227)	0.021 (0.045)	
Age: 35 – 49	0.002 (0.041)	-0.088*** (0.029)		0.249 (0.225)	0.032 (0.045)	
Age: 50 – 64	0.009 (0.044)	-0.092*** (0.029)		0.199 (0.244)	-0.032 (0.049)	
Age: ≥ 65	-0.106** (0.053)	-0.197*** (0.029)		-0.094 (0.290)	-0.092 (0.058)	
Income (k€/month)	-0.008 (0.008)			-0.051 (0.043)	-0.012 (0.009)	
Sex: Male	-0.023 (0.018)			0.368*** (0.098)	-0.004 (0.020)	
Size of town (1 to 5)	0.004 (0.008)			-0.010 (0.043)	0.006 (0.009)	
Frequency of public transit	0.016** (0.007)			0.118*** (0.041)	0.007 (0.008)	
Additional covariates	✓			✓	✓	
Observations	3,002	3,002	1,813	3,002	3,002	1,813
R <sup>2</sup>	0.104	0.021	0.042	0.154	0.118	0.065

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

NOTE: Standard errors are reported in parentheses. Interaction term is computed using numeric variables. Omitted modalities are: *Yellow Vests: opposes*, *Left-right: Indeterminate*, *Diploma: Brevet or no diploma*, *Age: 18 – 24*. Additional covariates are defined in Appendix C.1.

Two socio-demographics are also consistently related to attitudes over CC: age and level of education. In general, the younger and the more educated, <sup>one is</sup> ~~he or she is~~ concerned by CC. People aged 18-24 may appear to have slightly lower knowledge and lower pessimism than people of prime age, <sup>holding all else equal</sup> other things equal, in columns (1,4,5); ~~but~~ <sup>one is</sup> this is because their concerned attitudes are mostly captured by the employment status modality "student", not shown in the table. Overall, <sup>the</sup> generations with the least concerned attitudes are undeniably those over 65 years old. For instance, without any control, they are 20 percentage points (p.p.) less likely to believe that CC is anthropic than young adults (2) — though most of this effect is explained by a lower level of education (1). Another finding is that men have a higher knowledge than women by 0.15 ~~sd~~ *ceteris paribus* (4), but their perception of severity of CC is virtually the same (5). Finally, other characteristics have small ~~or~~ or even insignificant effects.

755 Although the determinants we find are broadly consistent with those elicited in the literature (Whitmarsh, 2011; ADEME, 2018), we do not ~~have~~<sup>find same</sup> the political polarity which characterizes the United States. Indeed, Kahan et al. (2012) argue that American people “tend to form perceptions of societal risks that cohere with values characteristic of groups with which they identify” (this is the cultural cognition thesis), rather than through an assessment of the scientific evidence they encounter (the science comprehension thesis). It is crucial to know whether people neglect climate science in such a way, as this would mean that ~~a~~ media campaign would have little effect on people’s ~~assimilation~~ climate science. Kahan et al. (2012) and McCright & Dunlap (2011) provide evidence for cultural cognition by showing that education has little effect on ~~perceived risk or on knowledge of~~, while the interaction between education and political orientation ~~is~~<sup>is</sup> We assess whether such interaction appears in the French context by studying the interaction between the higher degree obtained and the left-right political leaning (columns 4, 6). We find no significant ~~interaction~~ and obtain the same nil result when replacing the traditional left-right scale by the Yellow Vests positioning, and/or (in 6) the higher degree by knowledge on CC. This lack of evidence suggests that the public debate over CC is less polarized in France than in the US, and that the knowledge and perception of ~~many~~ French people could change ~~but they~~ access to ~~more~~ information over CC. ~~With~~ <sup>With</sup> ~~their~~ <sup>their</sup>

Figure 24 gives a sense of the shift in perception and support for climate policies that could follow an information campaign, as it shows the correlations between attitudes over CC, climate policies and socio-demographics.

<sup>8</sup>Funk & Kennedy (2016) also report that Republicans are equally distrustful of climate scientists' integrity whatever their level of education, while the distrust vanishes for Democrats with higher degrees. The mechanism of the interaction is documented by Ehret et al. (2018) and Van Boven et al. (2018): people form beliefs through partisan cues, by adopting views expressed by political figures of the party they identify and rejecting positions from the other party.

Knowledge is highly correlated with perceived gravity (correlation of 0.43), and both of these variables are in turn well correlated with the readiness to adopt an ecological lifestyle and to the number of climate policies (of Figure 21) supported (correlations around 0.3). The acceptance of a tax & dividend is less correlated with attitudes (at 0.1-0.2), as the support for this policy is already low. Still, the positive correlation between knowledge and support for other climate policies is encouraging. An information campaign over CC, even more so than we did not find evidence that partisanship would lead people to dismiss scientific ~~concern~~. Finally, as previously seen, diploma and age are quite correlated with attitudes, though these correlations are below those between attitudes over CC and ~~any~~ policies, at 0 to 0.2.

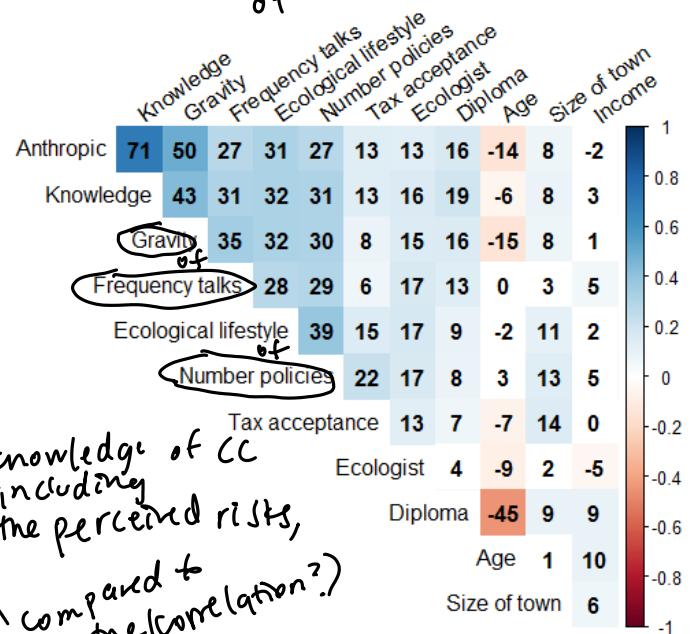


Figure 24: Correlations between attitudes over climate change, climate policies and socio-demographics (in %).

## 6.2. Attitudes over policies

To better understand the heterogeneity in people's support, we regress several indicators of attitudes towards climate policies on respondents' characteristics. Table II reports the results for the acceptance of our Tax & dividend (columns 1-2) and the readiness to adopt an ecological lifestyle (6) in the case ~~the~~ <sup>that the</sup> richest were contributing, efforts were shared globally, and alternatives were developed. We also use the eight policies proposed in Figure 21 in our dependent variables: column 3 studies the share of policies approved, while column 4 features the preference for norms vs. taxes within the policies. Similarly, column 5 uses six measures of Figure 20 to define an index of preference for earmarking vs. transfers. Indexes for these preferences are constructed as follows:

$$\text{Norms vs. taxes} = \sum_{p \in \text{norms}} \text{score}_p - \sum_{p \in \text{taxes}} \text{score}_p \quad (3)$$

where the score of each measure corresponds to a grade between -2 (for a “Not at all” answer) and 2 (for “Yes, completely”). We proceed similarly for earmarking vs. transfers, and describe the categorization of measures in Appendix C.2. Again, we normalize these two indexes by subtracting the mean (2.8 for norms vs. taxes, 1.4 for earmarking vs. transfers) and dividing by the standard deviation (3.3 and 3.1 respectively).

Overall, the two most critical determinants appear to be the positioning towards ecologists and towards the Yellow Vests. Everything else equal, ecologists are more likely to accept Tax & dividend by 13 p.p., and more willing to approve other environmental policies by about 9 p.p. Conversely, holding other variables constant, people supporting the Yellow Vests are 22 p.p. more likely to reject Tax & dividend relative to people opposed to the movement. As shown in column 3, higher affinity with the Yellow Vests is also associated with less support for other climate policies. Ecologists being more favorable to environmental taxes, their relative preference for norms vs. taxes is lower than for other respondents. Ecologists also display a higher relative preference for earmarking, consistent with a will to increase environmental spending in general. Open possibility, because Yellow Vests supporters are overall less likely to accept environmental policies including norms, their relative preference for norms against taxes is lower than average. They also have a higher relative preference for transfers over earmarking compared to other households, consistent with a lower willingness to pay to protect the environment and/or more concerns regarding purchasing power. Finally, ecologists’ attitude towards environmental policies translate into a higher willingness to adopt an ecological lifestyle (by 17 p.p.), but the opposite does not hold for the Yellow Vests, who are not significantly less inclined to adopt an ecological lifestyle. Although this could signal some warm glow, it also suggests that their strong rejection of environmental policies does not simply reflect from lower concerns about the environment. The situation of fairness embedded in our question could be critical if Yellow Vests are to accept sacrifices. Their rejection could also reflect a deeper rejection of policies in general, due to a high distrust in government — documented in Algan et al. (2019). This interpretation echoes large literature on the importance of trust for climate policies’ support, as reviewed in Drews & van den Bergh (2016).

A clear message from Table II is that the standard left-right spectrum is hardly relevant to understand attitudes towards environmental policies. None of our five left-right dummy variables are significantly correlated with the share of policies approved. With respect to Tax & dividend, the only significant effect is for the extreme-left, with a positive coefficient of 0.1, which partly compensates for the

higher share of people supporting the Yellow Vests in this category (63% support or are part), and whose attitude towards the environment might differ from other supporters of the movement. This result somewhat contrasts with literature that has shown evidence of stronger support for climate policies from people on the left of the political spectrum (see Drews & van den Bergh, 2016, for a review). Without controlling for other variables, we find that people most likely to accept Tax & dividend in France are the ones affiliated to the center (+8 p.p. relative to “Indeterminate”), and the less likely are those on the extreme-right (-15 p.p.), which may be driven by rejection of the current government who tried to increase the carbon tax. Our results also show that people on the extreme-left and at the center are the most likely to approve other environmental policies (+8 p.p. and +7 p.p. respectively), the less likely those on the extreme-right (-7 p.p.). Still, these differences become small and not statistically significant when covariates are included.

Besides political attitudes, we also observe heterogeneity in people’s responses along socio-demographic characteristics. As in attitudes over CC, age plays a role, as 18-24 are about 10 p.p. more likely to accept Tax & dividend (column 2). Still, controlling for knowledge, political attitudes and other variables, this effect is reduced by half. Similarly, more educated people tend to be more favorable to environmental policies (as previously found by Thalmann, 2004), but this effect becomes insignificant once age dummies are included as covariates. Furthermore, we find little effect of income on attitudes towards climate policies, a result that confirms Thalmann (2004) for Switzerland. Using our full set of controls, the most significant variables differ from the main factors of attitudes over CC: these significant variables are size of town (city dwellers being more favorable to environmental policies, as in Thalmann, 2004), and sex (males being less favorable). This shows that despite the positive correlation between knowledge and support for policies, the latter has its own determinants, which may act in the opposite direction than the former. The most compelling case is that of sex: although men have on average a higher knowledge over CC than women, this does not translate into higher pessimism (see section 6.1), and it even coincides with lower support for climate policies. This phenomenon is consistent with the findings of Stern et al. (1993) and Hampel et al. (1996) that women are more attentive to links between the environment and things they value, even if they share the same values and beliefs as men. Difference in perception of the impact on oneself could thus explain higher support given o for climate policies, even lower factual knowledge.

## 7. Conclusion

Despite a social movement against the carbon tax, French people appear mostly aware and concerned about climate change. Their rejection should therefore not be

Table II: Determinants of attitudes towards climate policies

	Acceptance of Tax & dividend (1)	Share of policies approved (2)	Norms vs. taxes (4)	Earmarking vs. transfers (5)	Ecological lifestyle (6)
Knowledge on CC	0.033*** (0.008)	0.056*** (0.005)	0.049** (0.019)	0.155*** (0.019)	0.126*** (0.009)
Interest in politics (0 to 2)	-0.018 (0.013)	0.037*** (0.007)	-0.007 (0.029)	0.058** (0.028)	0.031** (0.013)
Ecologist	0.129*** (0.024)	0.093*** (0.013)	-0.119** (0.055)	0.270*** (0.054)	0.169*** (0.025)
Yellow Vests: PNR	-0.022 (0.032)	-0.057*** (0.018)	-0.002 (0.073)	-0.122* (0.072)	-0.090*** (0.033)
Yellow Vests: understands	-0.144*** (0.022)	-0.031** (0.012)	-0.059 (0.050)	-0.097** (0.049)	-0.018 (0.023)
Yellow Vests: supports	-0.222*** (0.023)	-0.050*** (0.013)	-0.134** (0.054)	-0.146*** (0.052)	-0.027 (0.024)
Yellow Vests: is part	-0.213*** (0.043)	-0.085*** (0.024)	-0.252*** (0.097)	-0.177* (0.095)	-0.039 (0.044)
Left-right: Extreme-left	0.113** (0.055)	-0.027 (0.031)	0.154 (0.126)	-0.160 (0.123)	-0.015 (0.057)
Left-right: Left	0.089 (0.058)	-0.017 (0.032)	0.231* (0.132)	-0.123 (0.128)	0.041 (0.059)
Left-right: Center	0.016 (0.057)	-0.022 (0.032)	0.310** (0.130)	-0.113 (0.126)	-0.051 (0.058)
Left-right: Right	-0.002 (0.059)	-0.053 (0.033)	0.343** (0.134)	-0.160 (0.131)	-0.035 (0.060)
Left-right: Extreme-right	0.039 (0.056)	-0.029 (0.031)	0.282** (0.127)	-0.175 (0.124)	-0.054 (0.057)
Diploma (1 to 4)	-0.006 (0.009)	0.008 (0.008)	0.006 (0.005)	0.008 (0.020)	0.019 (0.020)
Age: 25 – 34	-0.047 (0.041)	-0.105*** (0.033)	-0.023 (0.023)	0.038 (0.093)	-0.159* (0.090)
Age: 35 – 49	-0.047 (0.040)	-0.094*** (0.030)	-0.016 (0.022)	0.190** (0.092)	-0.0001 (0.090)
Age: 50 – 64	-0.056 (0.044)	-0.118*** (0.032)	-0.014 (0.024)	0.316*** (0.100)	-0.067 (0.097)
Age: $\geq 65$	-0.068 (0.052)	-0.106*** (0.032)	-0.016 (0.029)	0.359*** (0.118)	-0.071 (0.115)
Income (k€/month)	0.006 (0.008)	0.001 (0.005)	0.008* (0.004)	0.013 (0.018)	0.030* (0.017)
Sex: Male	-0.053*** (0.018)	-0.065*** (0.017)	-0.019** (0.010)	-0.032 (0.040)	-0.007 (0.039)
Size of town (1 to 5)	0.019** (0.008)	0.032*** (0.007)	0.001 (0.004)	0.009 (0.018)	-0.002 (0.017)
Frequency of public transit	-0.003 (0.007)	0.018*** (0.007)	-0.004 (0.004)	0.046*** (0.017)	0.020 (0.016)
Additional covariates	✓		✓	✓	✓
Observations	3,002	3,002	3,002	3,002	3,002
R <sup>2</sup>	0.150	0.036	0.207	0.078	0.117
					*p<0.1; **p<0.05; ***p<0.01

NOTE: Standard errors are reported in parentheses. Omitted variables are *Yellow Vests: opposes*, *Age : 18 – 24* and *Left-right: Indeterminate*. Additional covariates are defined in Appendix C.1.

*the proposed?*

taken as a low willingness to act for the environment, but rather as a perceived inadequacy between carbon taxation and the fight for climate. As shown in our companion paper [Douenne & Fabre \(2019\)](#), people's beliefs about carbon taxation are largely biased, and these biases are well anchored, making it unlikely that carbon taxation be peacefully reintroduced in the short-run. *paths forward*

Thus, our survey suggests the following ~~pathway~~ for successful reforms. First and foremost, a massive and long-lasting information campaign could be launched to improve knowledge about climate change and climate policies, perhaps by mobilising public television and radio channels. Indeed, higher knowledge is clearly associated with higher concern and ~~higher~~ support for climate policies. Second, as people favor ~~most~~ policies that provide alternatives to fossil fuels, the government could develop investments, subsidies, and regulations in favor of public transport, cleaner vehicles, and thermal ~~home~~. *Finally, if most people are* ~~but at least, once most people would be convinced by the objective of GhG emission neutrality and would trust the government's commitment, but only then, could the cost-effective solution of carbon pricing be implemented with few protest.~~

*Finally, if most people could be convinced by the objective of GhG emission neutrality and could trust the government's commitment, only then could the cost-effective solution of carbon pricing be implemented with little protest.*

*finally, once most people are convinced by the objective of GhG emission neutrality and trust the government's commitment, the cost-effective solution of carbon pricing could be implemented with little protest.*

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## Appendices

### A. Raw data

### B. Sources on GhG emissions

#### B.1. Carbon footprints

*Plane vs. train.* Given that French electricity mix is decarbonized at 93%<sup>9</sup>, the carbon footprint of highspeed train is actually more than 20 times lower than that of an interior flight of the same distance. Hence, we chose Bordeaux - Nice as our case study as the train connection makes a big detour by Paris. Thus, we obtain an emission of 10 kg of CO<sub>2</sub> by train as compared to 180 kg by plane. Our source for train is the French railroad company, [SNCF](#), and is consistent with data aggregated by the official agency [ADEME](#). For the flight, our source is a [carbon footprint calculator](#). [Another calculator](#) provides almost the same result, so we preferred this figure rather than a higher figure from a [third calculator](#).

*Nuclear vs. wind.* AR5 from [IPCC](#) and [Pehl et al. \(2017\)](#) show that nuclear power plants and wind turbines have similar carbon footprint, at 10 gCO<sub>2</sub>eqq/kWh (for comparison, it is 500 for gas combined cycle).

*Beef vs. pasta.* [Poore & Nemecek \(2018\)](#) show that median beef carbon footprint is 60 kgCO<sub>2</sub>eqq/kg (more precisely, 30 kgCO<sub>2</sub>eqq per 100g of protein and 200g of protein per kg); while the carbon footprint of wheat pasta is 1.3 kgCO<sub>2</sub>eqq/kg (0.5 kgCO<sub>2</sub>eqq per 1000 kcal of protein and 2695 kcal per kg). Given that a beef steak [weighs 100-125g](#), its carbon footprint is twenty times that of two servings of pasta of 125g each.

<sup>9</sup>Cf. [RTE - Bilan électrique 2018](#) (p. 32).

Table III: Sample characteristics: quotas stratas.

	<i>Population</i>	<i>Sample</i>
<b>gender</b>		
woman	0.52	0.53
man	0.48	0.47
<b>age</b>		
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
<b>profession</b>		
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
<b>education</b>		
No diploma or <i>Brevet</i>	0.30	0.24
<i>CAP</i> or <i>BEP</i>	0.25	0.26
<i>Baccalauréat</i>	0.17	0.18
Higher	0.29	0.31
<b>size of town</b>		
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
<b>region</b>		
<i>IDF</i>	0.19	0.17
<i>Nord</i>	0.09	0.10
<i>Est</i>	0.13	0.12
<i>SO</i>	0.09	0.09
<i>Centre</i>	0.10	0.12
<i>Ouest</i>	0.10	0.10
<i>Occ</i>	0.09	0.09
<i>ARA</i>	0.12	0.13
<i>PACA</i>	0.09	0.09

Table IV: Households' characteristics.

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

SOURCES: Matched BdF; except for number of adults (ERFS) and domestic fuel ([CEREN](#)).

burden share for France— by relying more heavily on net negative emissions after 2070 through carbon capture and storage. For this reason, we consider a range of answers as correct for the French target emission in 2050: from 0 to 2 tCO<sub>2</sub>eqq p.c.

1150

## C. Details on main regressions

### C.1. Control variables

Our regression Tables I and II display only the most relevant variables, but — when specified — the following additional covariates are included as controls:

1155

**Socio-demographics:** respondent's income; household's income; employment status (9 categories); socio-professional category (8 categories); region of France (10 categories); household size; number of people above 14; number of adults; single; number of c.u.; smokes; favored medium for news (5 categories).

1160

**Political orientation:** conservative; liberal; humanist; patriot; apolitical.

1165

**Energy and exposure to policies:** heating energy: gaz; heating energy: domestic fuel; surface of accommodation; annual distance travelled by car; fuel economy; type of fuel: diesel; type of fuel: gasoline; number of vehicles;

1135

French consumption-based yearly GhG emissions amounted in 2014 to 712 MtCO<sub>2</sub>eqq, i.e. 10.8 tCO<sub>2</sub>eqq p.c., and are roughly stable in recent years ([CGDD, 2019](#)). To stop climate change and stabilize the GhG concentration in the atmosphere, it is required to meet zero net emissions. To meet the Paris agreement, [France National Low-Carbon Strategy](#) aims to achieve carbon (i.e. GhG) neutrality by 2050 ([CGDD, 2015](#)). Given carbon sinks estimated at 85 Mt<sub>2</sub>eqq for 2050 (mainly forest and soil), this strategy requires to reach gross emissions of about 1 tCO<sub>2</sub>eqq p.c. at this date. Admittedly, less stringent scenarios may still allow to keep global warming below +2°C in 2100 with good probability –even considering the same

1140

1145

*simulated net gain from Tax & dividend; opinion on public transports; mode of commuting transport.*

### **1170 C.2. Measures for relative preferences**

We constructed the two indexes of section 6.2 using the following measures:

**Norms:** *insulation standards; pollution standards; roadworthiness standards; prohibition of polluting vehicles.*

**1175 Taxes:** *kerosene; red meat; urban tolls; climate fund.*

**Earmarking:** *renovation; renewables; non polluting transport.*

**Transfers:** *to bottom half; to all; to constrained households.*

## **1180 D. Who are the Yellow Vests**

### **E. Questionnaire**

Hereafter, we only describe questions of the survey that are used in the present paper. The other questions are described and analyzed in our companion paper ([Douenne & Fabre, 2019](#)).

*Socio-demographics.*

1. What is your postal code?

2. What is your gender (in the sense of civil status)?

*Female; Male*

3. What is your age group?

*18 to 24 years old; 25 to 34 years old; 35 to 49 years old; 50 to 64 years old; 65 years old or more*

4. What is your employment status?

*Permanent; Temporary contract; Unemployed; Student; Retired; Other active; Inactive*

5. What is your socio-professional category? (Remember that the unemployed are active workers).

*Farmer; Craftsperson, merchant; Independent; Executive; Intermediate occupation; Employee; Worker; Retired; Other Inactive*

6. What is your highest degree?

*No diploma; Brevet des collèges; CAP or BEP [secondary]; Baccalaureate; Bac +2 (BTS, DUT, DEUG, schools of health and social training...); Bac +3 (licence...) [bachelor]; Bac +5 or more (master, engineering or business school, doctorate, medicine, master, DEA, DESS...)*

7. How many people live in your household? Household includes: you, your family members who live with you, and your dependents.

**1210**

8. What is your net **monthly** income (in euros)? **All income** (before withholding tax) is included here: salaries, pensions, allowances, APL [housing allowance], land income, etc.

**1215**

9. What is the net **monthly** income (in euros) **of your household**? **All income** (before withholding tax) is included here: salaries, pensions, allowances, APL [housing allowance], land income, etc.

10. In your household how many people are 14 years old or older (**including yourself**)?

**1220**

11. In your household, how many people are over the age of majority (**including yourself**)?

*Energy characteristics.*

12. What is the surface area of your home? (in m<sup>2</sup>)

13. What is the heating system in your home?

*Individual heating; Collective heating; PNR (Don't know, don't say)*

**1225**

14. What is the main heating energy source in your home? *Electricity Town gas; Butane, propane, tank gas; Heating oil; Wood, solar, geothermal, aero thermal (heat pump); Other; PNR (Don't know, don't say)*

**1230**

15. How many motor vehicles does your household have? *None; One; Two or more*

**1235**

16. [Without a vehicle] How many kilometers have you driven in the last 12 months?

17. [One vehicle] What type of fuel do you use for this vehicle? *Electric or hybrid; Diesel; Gasoline; Other*

**1240**

18. [One vehicle] What is the average fuel economy of your vehicle? (in Liters per 100 km)

19. [One vehicle] How many kilometers have you driven with your vehicle in the last 12 months?

**1245**

20. [At least two vehicles] What type of fuel do you use for your main vehicle?

*Electric or hybrid; Diesel; Gasoline; Other*

**1250**

21. [At least two vehicles] What type of fuel do you use for your second vehicle?

*Electric or hybrid; Diesel; Gasoline; Other*

**1255**

22. [At least two vehicles] What is the average fuel economy of all your vehicles? (in Liters per 100 km)

**1260**

23. [At least two vehicles] How many kilometers have you driven with all your vehicles in the last 12 months?

*Partial reforms [transport / housing]. (...)*

24. If fuel prices increased by 50 cents per liter, by how  
1255 much would **your household** reduce its fuel consumption?

*0% - [I already consume almost none / I am already not consuming]; 0% - [I am constrained on all my trips / I will not reduce it]; From 0% to 10%; From 10% to 20%; From 20% to 30%; More than 30% - [I would change my travel habits significantly / I would change my consumption significantly]*

- 1260 25. In your opinion, if [fuel prices increased by 50 cents per liter / gas and heating oil prices increased by 30%], by how much would **French people** reduce their consumption on average?

*From 0% to 3%; From 3% to 10%; From 3% to 10%; From 10% to 20%; From 20% to 30%; More than 30%*

*Tax & dividend: initial.*

- 1270 26. The government is studying an increase in the carbon tax, whose revenues would be redistributed to all households, regardless of their income. This would imply:

- an increase in the price of gasoline by 11 cents per liter and diesel by 13 cents per liter;
- an increase of 13% in the price of gas, and 15% in the price of heating oil;
- an annual payment of 110€ to each adult, or 220€ per year for a couple.

1275 (...)

27. [ [empty] / Scientists agree that a carbon tax would be effective in reducing pollution.] Do you think that such a measure would reduce pollution and fight climate change?

*Yes; No; PNR (Don't know, don't say)*

- 1280 28. In your opinion, which categories would lose [ [blank] / purchasing power] with such a measure? (Several answers possible)

*No one; The poorest; The middle classes; The richest; All French people; Rural or peri-urban people; Some French people, but not a particular income category; PNR (Don't know, don't say)*

- 1295 29. In your opinion, what categories would gain purchasing power with such a measure? (Several answers possible)  
*No one; The poorest; The middle classes; The richest; All French people; Urban dwellers; Some French people, but not a particular income category; PNR (Don't know, don't say)*

*Tax & dividend: after knowledge. We always consider the same measure. (...)*

1300

30. Why do you think this measure is beneficial? (Maximum three responses)

*Contributes to the fight climate change; Reduces the harmful effects of pollution on health; Reduces traffic congestion; Increases my purchasing power; Increases the purchasing power of the poorest; Fosters France's independence from fossil energy imports; Prepares the economy for tomorrow's challenges; For none of these reasons; Other (specify):*

1305

- 1295 31. Why do you think this measure is unwanted? (Maximum three answers)

*Is ineffective in reducing pollution; Alternatives are insufficient or too expensive; Penalizes rural areas; Decreases my purchasing power; Decreases the purchasing power of some modest households; Harms the economy and employment; Is a pretext for raising taxes; For none of these reasons; Other (specify):*

1310

(...)

*Attitudes over other policies.*

32. In which cases would you be in favor of increasing the carbon tax? I would be in favor if the tax revenues were used to finance...

1315

- (a) a payment to the 50% poorest French people (those earning less than 1670€ per month)
- (b) a payment to all French people
- (c) a compensation for households forced to consume petroleum products
- (d) a decrease in social contributions
- (e) a decrease in VAT
- (f) a decrease in the public deficit
- (g) the thermal renovation of buildings
- (h) renewable energy (wind, solar, etc.)
- (i) clean transport

1320

*Yes, absolutely; Yes, rather; Indifferent or Don't know; No, not really; No, not at all*

1330

33. Please select "A little" (test to check that you are attentive).

*Not at all; A little; A lot; Completely; PNR (Don't know, don't say)*

1335

34. Would you support the following environmental policies?

1340

- (a) A tax on kerosene (aviation)
- (b) A tax on red meat
- (c) Stricter standards on the insulation of new buildings

1345

- (d) Stricter standards on the pollution of new vehicles  
 (e) Stricter standards on pollution during roadworthiness tests  
 (f) The prohibition of polluting vehicles in city centers  
 1350 (g) The introduction of urban tolls  
 (h) A contribution to a global climate fund

*Yes, absolutely; Yes, rather; Indifferent or Don't know; No, not really; No, not at all*

35. For historical reasons, diesel is taxed less than gasoline.  
 1355 Would you be in favor of raising taxes on diesel to catch up with the level of taxation on gasoline?  
*Yes; No; PNR (Don't know, don't say)*

*Attitudes over climate change.*

36. How often do you talk about climate change?  
 1360 *Several times a month; Several times a year; Almost never; PNR (Don't know, don't say)*

37. In your opinion, climate change...  
*is not a reality; is mainly due to natural climate variability; is mainly due to human activity; PNR (Don't know, don't say).*

38. Which of the following elements contribute to global warming? (Several answers possible)  
*CO<sub>2</sub>; Methane; Oxygen; Particulate matter*

39. In your opinion, which of the following statements are true? (Several answers possible).  
 1370 *Consuming one beef steak emits about 20 times more greenhouse gases than eating two servings of pasta.; Electricity produced by nuclear power emits about 20 times more greenhouse gases than electricity produced by wind turbines.; A seat in a Bordeaux - Nice journey emits about 20 times more greenhouse gases by plane than by high speed train.*

40. In your opinion, how would the effects of climate change be, if humanity did nothing to limit it?  
 1380 *Insignificant, or even beneficial; Small, because humans would be able to live with it; Grave, because there would be more natural disasters; Disastrous, lifestyles would be largely altered; Cataclysmic, humankind would disappear; PNR (Don't know, don't say)*

- 1385 41. In which of these two regions do you think will climate change have the worst consequences?  
*The European Union; India; As much in both*
42. In your opinion, in France, which generations will be seriously affected by climate change? (Several answers possible)  
 1390 *People born in the 1960s; People born in the 1990s; People born in the 2020s; People born in the 2050s; None of the four*

43. In your opinion, who is responsible for climate change?  
 (Several possible choices)  
*Each of us; The richest; Governments; Some foreign countries; Past generations; Natural causes*

1395

44. Currently, each French person emits on average the equivalent of 10 tons of CO<sub>2</sub> per year.

1400

In your opinion, how much must this figure be reduced to by 2050 in order to hope to contain global warming to +2°C in 2100 (if all countries did the same)? In 2050, we should emit at most...

*0; 1; 2; 3; 4; 5; 6; 7; 8; 9; 10 tons*

1405

45. Has climate change had or will it have an influence on your decision to make a child (or children)?

*Yes; No; PNR (Don't know, don't say)*

46. [If Yes] Why does climate change influence your decision to have a child (or children)? (Several answers possible).

*Because I don't want my child to live in a devastated world.; Because each additional human being aggravates climate change.*

1410

47. Would you be willing to change your lifestyle to fight climate change? (Several answers possible)

*Yes, if policies went in this direction; Yes, if I had the financial means; Yes, if everyone did the same; No, only the richest people have to change their way of life; No, it is against my personal interest; No, I think climate change is not a real problem; I have already adopted a sustainable way of life; I try, but I have trouble changing my habits*

1420

48. 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; would you be willing to adopt an ecological lifestyle (i.e. eat little red meat and ensure to use almost no gasoline, diesel or kerosene)?

*Yes; No; PNR (Don't know, don't say)*

1430

*Shale gas (and smoking).*

49. Do you smoke regularly? *Yes; No*

50. The use of shale gas would limit climate change, as gas would be exported and used to produce electricity instead of coal. On the other hand, extraction would risk reducing water quality at the local level. Your department [would possibly be / would not be] concerned by the exploitation of shale gas.

1435

In view of this information, would you be in favor of shale gas exploitation in France?

*Yes; No; PNR (Don't know, don't say)*

1440

51. What would be the main benefit to you from shale gas development?

*This would limit climate change; This would create jobs and boost the department; None of these two reasons*

52. What do you think of the idea that shale gas would limit climate change?

*It is valid: any decrease in emissions goes in the right direction; It is unwelcome: emissions should be stopped, not just slowed down; PNR (Don't know, don't say)*

#### *Access to public transport and mobility habits.*

53. How many minutes walk is it to the nearest public transit stop? (To simplify, you can use the conversion 1 km = 10 min walk).

*in min: ; PNR (Don't know, don't say)*

54. How often does the nearest public transport pass? (excluding school buses)

*Less than three times a day; Between four times a day and once an hour; Once or twice an hour; More than three times an hour; PNR (Don't know, don't say)*

55. What do you think about the availability of public transport where you live? It is...

*Satisfactory; Suitable, but should be increased; Limited, but sufficient; Insufficient; PNR (Don't know, don't say)*

56. What mode of transportation do you mainly use for each of the following trips?

- (a) Home - work (or studies)
- (b) Grocery shopping
- (c) Leisure (excluding holidays)

*Car; Public transport; Walking or cycling; Two-wheeled vehicle; Carpooling; Not concerned*

57. [If Car selected for Work] Would it be possible for you, without changing your home or workplace, to travel from home to work using public transport?

*Yes, it would not be very difficult for me; Yes, but it would bother me; No; PNR (Don't know, don't say)*

58. [If Car selected for Work] Would it be possible for you, without changing your home or workplace, to travel from home to work by walking or cycling?

*Yes, it would not be very difficult for me; Yes, but it would bother me; No; PNR (Don't know, don't say)*

#### *Politics and media.*

59. How much are you interested in politics?

*Almost not; A little; A lot*

60. How would you define yourself? (Several answers possible)

*Extreme left; Left; Center; Right; Extreme right; Liberal; Conservative; Humanist; Patriot; Apolitical; Ecol- ogist*

61. How do you keep yourself informed of current events? Mainly through...

*Television; Press (written or online); Social networks; Radio; Other*

62. What do you think of the Yellow Vests? (Several answers possible)

*I am part of them; I support them; I understand them; I oppose them; PNR (Don't know, don't say)*

*Open field.*

63. The survey is nearing completion. You can now enter any comments, comments or suggestions in the field below.

**1500**

Table V: Positioning towards Yellow Vests, per category

	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 <i>Brevet</i> (30%)	21%	29%	34%	5%	10%
<i>CAP</i> or <i>BEP</i> (24%)	23%	28%	36%	6%	7%
<i>Baccalauréat</i> (17%)	22%	35%	29%	4%	11%
Higher (29%)	32%	8%	36%	21%	3%
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%
<i>Average</i>	25%	32%	30%	5%	9%

NOTE: The percentages in parenthesis express the weighted share of each category from our sample.