Designing an acceptable and fair carbon tax: the role of mental accounting

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Abstract

Despite its potential for curbing greenhouse gas emissions, carbon taxation encounters strong public resistance. However, acceptability heavily depends on how tax revenues are used. We test the hypothesis that mental accounting theory can both explain systematic patterns in citizens' preferences, such as the support for environmental earmarking, and help design a carbon tax scheme that is both acceptable and fair. Across six experiments conducted in the United Kingdom and in France ($N_{\text{total}} = 7100$), we show that (a) citizens support using carbon tax revenues for green projects because they use a mental accounting heuristic, by which people create mental budgets where the origin of revenues is matched thematically with their domain of use, (b) carbon tax support remains high even when not all of tax revenues is dedicated to green projects, (c) an innovative and fairer carbon tax scheme, in which most revenues are earmarked for green projects and the rest is redistributed to low-income households to be spent on sustainable expenses, receives most support.

Keywords: carbon taxation, earmarking, mental accounting, acceptability, public support, tax psychology, redistribution

Despite its potential for curbing CO₂ emissions¹⁻³, carbon taxation encounters strong public resistance⁴⁻⁷, which greatly limits its actual impact. Several studies have demonstrated that the acceptability of carbon taxation can be significantly increased by the design of the policy⁸⁻¹². In particular, people strongly prefer carbon taxation schemes in which revenues are earmarked for environmental purposes¹³⁻¹⁹. Earmarking is a budgeting practice by which all or a portion of tax revenues is dedicated to a particular sector or program chosen in advance, rather than subjected to the typical budget procedure of revenue-pooling. However, not all earmarking is created equal, and public support varies greatly depending on which earmarking scheme is implemented. A study showed that a carbon taxation scheme in which the revenues were earmarked to replace the value-added tax (VAT), which had been rejected by 92% of Swiss voters in 2015, would have had a higher chance of being adopted if the tax revenues had been earmarked for environmental purposes instead²⁰. Focus groups among French citizens also suggest that earmarking energy tax revenues for environmental purposes is seen as the most acceptable solution for almost all participants, whereas using tax revenues to reduce the VAT or labor taxes is perceived negatively in most groups²¹. Finally, several studies showed that policy support is much higher when carbon tax revenues are earmarked for environmental purposes rather than redistributed to households, despite the fact that redistribution contributes to reducing social inequalities introduced by the tax^{16,22,23}.

Understanding why some types of expenditure domains lead to stronger public support than others is crucial to inform policy making, for the carbon tax in particular, and for tax policy more generally. Taking tax psychology into account, more acceptable tax policies can be designed. In the case of the carbon tax, two hypotheses can explain the variation in acceptability across expenditure domains. First, this variation may simply reflect people's preferences between different expenditure domains, independently of the revenue source (e.g., always preferring environmental expenses to other uses). Second, this variation may stem from a preference for tax designs in which there is a thematic correspondence between the revenue source (e.g., an environmental tax) and the

expenditure domain (e.g., environmental projects). Here, we argue in favor of the second hypothesis, based on mental accounting theory. Mental accounting is a “set of cognitive operations used by individuals and households to organize, evaluate, and keep track of financial activities”²⁴ that plays a significant role in the way people deal with their personal finances. One feature of mental accounting is that revenue sources and personal expenses are processed thematically and grouped into distinct mental accounts. For example, when households are given a £100 cash transfer that they can spend freely, they spend £47 on average on fuel if the transfer is labeled as “Winter Fuel Payment”, whereas if the same transfer is named neutrally, only £3 is spent on fuel²⁵. These results show that the source of revenue influences how people think revenues should be spent.

In this paper, we test the hypothesis that citizens apply the same type of mental accounting heuristic to the state budget, and that this heuristic can be leveraged to design a more acceptable and fairer carbon tax. We first show that, compared to a baseline condition in which revenues come from a generic tax, and thus cannot be matched thematically, people are more supportive of a tax scheme in which the earmarking domain matches the revenue source than of a tax scheme in which they do not (Studies 1A and 1B). Mental accounting can thus explain why people favor the earmarking of carbon taxes for green projects over the earmarking of the same taxes for unrelated goals (see also Hahnel et al.²⁶). We then show that the mental accounting heuristic is elicited even when only a fraction of carbon tax revenues is directed towards the environmental domain (Studies 2A and 2B), which could allow policy makers to use the remaining revenues to meet other policy goals, such as compensating social inequalities created by the tax. Finally, we test support for an innovative and fairer carbon tax scheme based on mental accounting theory, in which most revenues are earmarked for green projects, and the rest redistributed to low-income households for sustainable expenses. This carbon tax scheme, combining two thematic elements, garners most support (Studies 3A and 3B).

Testing the mental accounting hypothesis

To test whether people’s preferences towards earmarking domains are shaped by a mental accounting heuristic (Studies 1A and 1B), we conducted pre-registered online survey experiments on

representative samples of the adult population in two countries (the United Kingdom and France, $N_{\text{total}} = 3500$). Mental accounting makes thematic matching between revenues and expenses cognitively intuitive and mismatched policies less attractive. We thus predicted that participants' preferences would vary across earmarking domains depending on whether the earmarking domain is matched or mismatched with the revenue source.

To test this hypothesis, we created different hypothetical tax policy schemes in which we varied both: (a) the revenue source, with revenues originating either from a carbon tax or a generic tax increase, and (b) the expenditure domain, with revenues either earmarked towards the environmental domain, earmarked towards a non-environmental domain, or not earmarked (i.e. pooled into the general government fund). In the carbon tax conditions, variations in expenditure domains created a matched tax scheme (carbon tax revenues earmarked to the environmental domain), and a mismatched tax scheme (carbon tax revenues earmarked to a non-environmental domain). By contrast, in the generic tax conditions, variations in expenditure domains resulted in tax schemes that are neither matched nor mismatched, as the revenue source is not tied to a particular domain. Generic tax conditions allowed controlling for participants' baseline preferences for the different expenditure domains. The non-environmental domain corresponded to each participant's self-declared preferred policy domain (e.g., health, education; see Methods and Supplementary Table 1). Since the preferred policy domain varies between participants, it would not be possible to actually implement such a tax scheme, but including this condition allowed us to experimentally study an extreme case of mismatched earmarking that opposes people's preferences to the mental accounting heuristic.

Participants were randomly allocated to reading about one tax scheme among the six conditions (Fig. 1; see Methods for the wording of the schemes). Our main dependent variable was participants' level of support for the tax scheme, measured on a ten-point Likert scale.

Figure 1. Illustration of the experimental design. This is a 2 (revenue source) x 3 (expenditure domain) between-participants design, with participants randomly allocated to one of six conditions. When carbon tax revenues are earmarked towards the environmental domain, it is a “matched earmarking” scheme. When carbon tax revenues are earmarked towards participants’ preferred policy domain, it is a “mismatched earmarking” scheme.

This design allowed us to test the following predictions:

- (1) Citizens prefer a carbon tax earmarked for environmental purposes rather than not earmarked, in line with previous research^{16,22}.
- (2) Citizens’ preferences follow a mental accounting heuristic. This heuristic will give rise to an interaction between the revenue source and the expenditure domain, with the effect of the expenditure domain being stronger in the carbon tax conditions (where earmarking is either matched or mismatched) than in the generic tax conditions (where earmarking is neither matched nor mismatched).

The specific preference for matched earmarking

First, we showed that people prefer a carbon tax earmarked for environmental protection rather than not earmarked, both in the UK (meta-analysis on two samples, $SMD = 0.24$, $SE = 0.08$,

95% CI [0.09; 0.39], $z = 3.18$, $p = 0.0015$, $I^2 = 0\%$), and in France, $t(427) = 7.38$, $p < 0.001$, $d = 0.71$, 95% CI [1.47, 2.53] (Fig. 2).

Figure 2. Bar graphs representing policy support for a carbon tax increase when revenues are either earmarked for environmental protection ('matched earmarking') or not earmarked, for each study ($N_{1A} = 706$, $N_{1B} = 429$). Data points from the two British samples are combined. Plotted are 95% CIs.

We then tested for a potential interaction effect between the four earmarked conditions. . A two-way ANOVA showed a main effect of both the revenue source, and the earmarking domain on policy support (see Supplementary Note 1 for full results). In line with the mental accounting hypothesis, we found a significant interaction between the revenue source and the expenditure domain on policy support, both in the French study, $F(1,683) = 18.48$, $p < 0.001$, $\eta^2 = 0.03$, and in the British study (SMD = 0.33, SE = 0.06, 95% CI [0.22, 0.44], $z = 5.87$, $p < 0.001$, $I^2 = 0\%$, $n = 2$) (Fig. 3). By design, earmarking towards participants' preferred policy domain is favored over environmental earmarking, but this relative advantage shrinks considerably (and nearly disappears in the French sample) when the revenue source is a carbon tax. This suggests that, once we control for participants' baseline preferences for different expenditure domains, participants favor tax schemes in which the revenue source and the expenditure domain are matched, as predicted by mental accounting theory.

Figure 3. Mean policy support when tax revenues, coming from a generic tax or a carbon tax increase, are either earmarked towards participants' preferred policy domain or towards environmental protection, in each study ($N_{1A} = 1250$, $N_{1B} = 687$). Data points from the two British samples are combined. Plotted are 95% CIs. Graphs with the additional no earmarking conditions are presented in Extended Data Fig. 1.

Robustness analyses

Perceptions of carbon tax ineffectiveness cannot explain our results. Support for environmental earmarking of carbon tax revenue had previously been explained as stemming from a misperception of the effectiveness of the tax²². If citizens underestimate the power of carbon taxation to modify people's behavior, then it is crucial that its revenues are earmarked towards environmental projects for the tax to have a beneficial impact. This hypothesis and the mental accounting hypothesis are not mutually exclusive, but to test the validity of the mental accounting hypothesis, it is important to demonstrate that this alternative hypothesis does fully account for our results.

In our studies, participants were asked to rate the effectiveness of the carbon tax to change people's behavior (see Supplementary Table 2 for descriptive statistics). If the preference for

environmental earmarking were purely driven by the low perceived effectiveness of the carbon tax, it should not be observed among those participants who think that the carbon tax is effective. By contrast, mental accounting predicts that the preference should also hold among those participants. We thus tested whether the interaction between the revenue source and the expenditure domain persisted in the subsample of participants who believed the carbon tax to be effective in changing behaviors (see Methods). Among British participants, the interaction effect remained significant ($SMD = 0.33$, $SE = 0.08$, $z = 4.03$, $p < 0.001$, 95% CI [0.17, 0.49], $n = 2$). In the French sample, there was not enough power to detect a significant interaction in the subsample analysis, given that too few participants believed the carbon tax to be effective ($n = 261$). However, the effect goes into the same direction as in the British sample ($d = 0.16$). Together, these results suggest that the perceived ineffectiveness of the carbon tax does not fully account for people's preference towards environmental earmarking.

The mental accounting heuristic affects every relevant subgroup. If the preference for environmental earmarking of carbon tax revenues were driven by a specific subsample of the population, it might be more difficult to leverage this preference to guide policy design. While some individual characteristics (e.g., gender, education) have been shown to moderate the extent to which people engage in mental accounting²⁷, the effect of mental accounting can be observed in most socio-demographic groups²⁸, which highlights its robustness. In line with these findings, the interaction effect (revenue source x expenditure domain) did not vary among French participants as a function of gender ($p = 0.99$), age ($p = 0.57$), education ($p = 0.64$), political ideology ($p = 0.28$), the priority given to the environment ($p = 0.21$), perceived income level ($p = 0.95$), residence area ($p = 0.51$), political trust ($p = 0.80$) or social trust ($p = 0.47$) (see Extended Data 2 for a visualization). Among British participants, the only exception to this pattern was the effect of political ideology ($p = 0.02$), and of the priority given to environmental protection ($p = 0.004$), such that the interaction between the revenue source and the expenditure domain (i.e. the effect of mental accounting) was stronger for individuals who are more right-wing, and those who prioritize the environment to a lesser extent. Nevertheless, even among participants for whom the effect was weaker, the interaction term remained significant ($p < 0.001$ in both cases, Fig. 4; see Supplementary Note 2 for full results). These results underline the

robustness of the mental accounting heuristic in explaining variations of acceptability levels across earmarking domains, and point towards a generalized cognitive mechanism shaping policy support.

Figure 4. Mean policy support in the British study for four earmarked tax schemes (revenue source: generic tax or carbon tax; expenditure domain: preferred policy domain or environmental domain), when splitting the sample according to the priority given to environmental protection, political trust, social trust, political ideology, highest education level, gender, age, perceived relative income level and residence area (see Supplementary Note 2 for the detailed procedure). Data points from the two British samples are combined ($N_{\text{total}} = 1250$). Plotted are 95% CIs.

Highly matched earmarking is enough to elicit mental accounting

In line with past studies^{16,22}, the results above suggest that to maximize support for carbon taxation, the optimal solution is to earmark all tax revenues for environmental protection. However, to meet other policy goals, such as reducing the inequalities introduced by the carbon tax, policy makers may wish to split the generated revenues into multiple expenditures. From a practical standpoint, it is therefore important to investigate if and how acceptability is affected when only a fraction of tax revenues is directed towards the matched category (environmental protection in the case of the

carbon tax). Mental accounting theory makes no clear prediction regarding these “partial matching” situations: any use of funds for expenditures that are not matched might cause the mental accounting heuristic not to be triggered at all, or on the contrary the strength of the heuristic could vary proportionally to the share of expenditures dedicated to matched earmarking. We thus conducted two additional experiments in the United Kingdom and in France ($N_{\text{total}} = 2200$) to investigate this question.

In Studies 2A and 2B, the schemes only featured a carbon tax earmarked for environmental protection. The proportion of earmarked funds was experimentally manipulated (0%, 25%, 50%, 75%, 100%), with participants randomly allocated to one of these five hypothetical tax schemes. The experiment was otherwise identical to the previous experiment. As we were mainly interested in the variation of acceptability for tax designs with earmarking, we restrained our analysis to the four earmarked conditions (see Supplementary Note 3 for full results). Both among British and French participants, the proportion of earmarked funds significantly affected policy support, $F_B(3,797) = 2.85$, $p_B = 0.04$, $np^2_B = 0.01$; $F_F(3,821) = 6.99$, $p_F < 0.001$, $np^2_F = 0.02$ (see Fig. 5). Post-hoc tests revealed that British participants preferred a full earmarking tax scheme to 25% earmarking ($p = 0.04$), and tended to prefer full earmarking to 50% earmarking ($p = 0.09$). Among French participants, both full earmarking and 75% earmarking were preferred to 25% earmarking ($p < 0.001$ and $p = 0.001$). In both samples, there was no significant difference in support between the full earmarking and 75% earmarking tax schemes ($p_B = 0.57$ and $p_F = 0.99$). Together, these results suggest that the acceptability of carbon taxation increases with the proportion of revenues earmarked for environmental protection, and that a highly matched earmarking scheme (75%) garners a strong level of support, close to that of a full earmarking scheme.

Figure 5. Mean policy support in the British study ($N_{2A} = 801$) and in the French study ($N_{2B} = 758$) when either 25%, 50%, 75% or 100% of carbon tax revenues are earmarked for environmental protection. Policy support was rated on a ten-point Likert scale. Plotted are 95% CIs.

Green and fair: a policy with the most support

Mental accounting helps understand why citizens are more likely to support a carbon tax when its revenues are mostly or completely directed to green projects. However, without mechanisms by which tax revenues are redistributed (“revenue-recycling”), the carbon tax is often regressive and risks increasing fuel poverty, and is thus likely to exacerbate social inequalities²⁹. Several studies estimated that the regressive effects of the carbon tax can be countered if at least 18% of the carbon tax revenue is redistributed to the first three income deciles^{29,30}.

Given that citizens in France and in the UK still display high levels of support for carbon taxation when only 75% of its revenues is earmarked for green projects (Studies 2A and 2B), a straightforward solution to tackle the anti-redistributive effects of the carbon tax could be to incorporate redistribution in the taxation scheme using the 25% of tax revenues that are left un-earmarked. Such

a tax design might render the carbon tax both acceptable and fair by combining environmental earmarking (of most of the revenues) and redistribution (of the remaining of the revenue).

The mental accounting heuristic, however, should also apply to the redistributed part of the revenue. Standard revenue-recycling schemes in which poorer households receive compensation (e.g., a reduction in other taxes, an increase in social transfers, or cash transfers) could be perceived as mismatched earmarking, since an environmental tax is used to achieve a social outcome. In line with this suggestion, several studies report that while citizens appear concerned over the distributional consequences of the carbon tax, they tend to prefer using carbon tax revenues for environmental purposes instead of compensating inequitable outcomes^{16,18,22,23,30}.

To avoid this mismatch effect, we tested the acceptability of a matched revenue-recycling scheme in which poorer households receive a cash transfer that can only be used on sustainable goods and services (“matched redistribution”). In this scheme, 75% of revenues is earmarked for environmental protection, and the remaining 25% of revenues is redistributed to the first three income deciles as a conditional cash transfer that can only be spent on sustainable goods and services (e.g., home insulation, heating system change, green transportation). We predict that this policy scheme is more acceptable to citizens than a similar scheme in which redistribution takes the form of an unconditional cash transfer to the same target population (as it would constitute a mismatch from the point of view of mental accounting).

To test this hypothesis, we conducted two additional experiments in the United Kingdom and in France ($N_{\text{total}} = 1400$). In Studies 3A and 3B, participants were asked to rank three imaginary schemes of an increase in the carbon tax, varying in their allocation of revenues: a) 100% of tax revenues are earmarked for environmental protection (“*no cash transfer*”), b) 75% of tax revenues are earmarked for environmental protection and 25% are redistributed to the first three income deciles as a cash transfer (“*unconditional cash transfer*”), c) 75% of tax revenues are earmarked for environmental protection and 25% are redistributed to the first three income deciles as a cash transfer that can only be spent on sustainable goods and services (“*environmental cash transfer*”). The presentation order of schemes was randomized.

Among both British and French participants, ranking scores of the three schemes varied significantly, $\chi^2_B(2) = 36.30$, $p_B < 0.0001$, $w_B = 0.03$; $\chi^2_F(2) = 45.76$, $p_F < 0.0001$, $w_F = 0.04$ (Fig. 6). In line with our hypothesis, post-hoc comparisons revealed that participants ranked higher the tax scheme in which the redistributive component was matched (“*environmental cash transfer*”, $M_B = 1.81$, $SD_B = 0.68$; $M_F = 1.80$, $SD_F = 0.68$) compared to the tax scheme in which it was mismatched (“*unconditional cash transfer*”, $M_B = 2.13$, $SD_B = 0.84$; $M_F = 2.17$, $SD_F = 0.82$), $p_B < 0.0001$; $p_F < 0.0001$, and compared to the tax scheme without any redistribution (“*no cash transfer*”, $M_B = 2.06$, $SD_B = 0.88$; $M_F = 2.03$, $SD_F = 0.89$), $p_B < 0.0001$; $p_F < 0.0001$. These results suggest that a carbon tax scheme combining environmental earmarking and a redistributive component that is thematically matched with the revenue source (i.e. a cash transfer that can only be used on pro-environmental goods and services) is the most acceptable policy option for citizens.

Figure 6. Frequency in ranking scores (1 = most preferred scheme, 3 = least preferred scheme) when (a) 75% of carbon tax revenues are earmarked for environmental protection and 25% redistributed as a cash transfer to the three lowest income deciles, that can only be spent on pro-environmental expenses (“*environmental cash transfer*”), (b) 75% of carbon tax revenues are earmarked for environmental protection and 25% redistributed as an unconditional cash transfer to the three population deciles with lowest income (“*unconditional cash transfer*”),

or (c) 100% of carbon tax revenues are earmarked for environmental protection (“no cash transfer”). Results are plotted for each study ($N_{3A} = 649$, $N_{3B} = 643$).

Subgroup analyses revealed that, in the British sample, the environmental cash transfer scheme was ranked higher than the alternatives by all subgroups when splitting the sample according to age, gender, highest education level, political ideology, residence area, perceived income level, environmental concern, social and political trust. In the French sample, the only exception to this pattern was respondents displaying a low level of environmental concern, who ranked the unconditional cash transfer scheme as highly as the environmental cash transfer scheme. Full results and figures are reported in Supplementary Note 4. Interestingly, participants who believed their income to be lower than average, and who would thus be the likely beneficiaries of the cash transfer, also ranked the environmental cash transfer higher than the unconditional cash transfer scheme. From a purely economic point of view, this preference can be surprising as there is a loss of freedom in the environmental cash transfer scheme, which is conditional, compared to the unconditional cash transfer scheme. From a psychological perspective, however, mental accounting theory can account for this result.

Conclusion and discussion

The success of public policies depends on their acceptability. In this article, we probed the mechanisms underlying the support (or lack thereof) for one of the most important climate related policies: the carbon tax. Past studies have shown that the acceptability of the carbon tax varies greatly as a function of whether its revenues are earmarked, and of the domain to which they are earmarked, with a clear preference for environmental earmarking. We suggest that this preference is due to the application of a mental accounting heuristic, a cognitive mechanism that relies on the thematic matching between the origin of revenue and its spending. The results obtained with well-powered pre-registered experiments conducted in the United Kingdom and France validate the mental accounting hypothesis (Studies 1A and 1B). Relative to tax designs where earmarking is neither matched nor mismatched with the revenue source, participants displayed a strong and specific

preference for matched earmarking schemes (here a carbon tax earmarked for environmental protection).

Subgroup analyses revealed that the preference for matched earmarking was not conditional on participants' age, gender, education level, residence area, political ideology, perceived income level, trust towards others and the government, the priority given to environmental protection, and the perception of the tax effectiveness. Even in subgroups that are initially more opposed to carbon taxation (e.g., citizens who prioritize environmental protection to a lesser extent, or who display low levels of trust³²), using matched earmarking greatly increases support for a carbon tax. Our results thus point to a generalized cognitive mechanism shaping policy support, in line with the mental accounting heuristic.

A tax scheme in which all of the generated revenues are earmarked for environmental protection might thus seem ideal in terms of acceptability. However, to dampen the likely regressive effects of the carbon tax²⁹, policy makers may wish to use some of the revenues for redistribution. In Studies 2A and 2B, we thus investigated public support when only a fraction of carbon tax revenues is earmarked towards environmental protection. Results showed that acceptability increased with the proportion of funds earmarked towards environmental protection, and that it remained high when using a scheme in which only 75% of the revenues for the carbon tax are earmarked to this end.

Consequently, in Studies 3A and 3B, we tested the acceptability of carbon tax policies in which a small fraction (25%) of revenues was used for redistributive purposes (as a cash transfer for low-income households), while the majority of revenues (75%) was kept for environmental protection. We hypothesized that if the redistribution scheme is matched with the revenue source (i.e. a cash transfer that can only be spent on pro-environmental expenses in the case of the carbon tax), it should garner more support than a mismatched scheme. Results indicate that a carbon tax with a matched redistribution scheme is not only rated more favorably than a mismatched scheme, but also than a carbon tax entirely earmarked for environmental protection, with no redistribution scheme. It therefore appears as the ideal carbon tax scheme, addressing both acceptability and fairness concerns.

A limitation of our work is that it involved hypothetical scenarios. It is difficult to assess whether citizens would show the same preferences if governments were to implement different carbon tax designs. Moreover, even if the mental accounting hypothesis was validated across two countries, it remains to be tested elsewhere.

The effects documented in the present studies could generalize to other taxation policies. Previous research has established that compared to a tax design without earmarking, people are more supportive of tobacco taxes earmarked for health care and tobacco control³³, and of inheritance taxes earmarked for projects that promote social justice or equality of opportunity in education³⁴. In both cases, the expenditure domain appears matched with the revenue source, suggesting a generalized preference for tax policies with matched earmarking, in line with mental accounting theory. The present studies offer policy makers powerful tools to create more acceptable tax schemes, including fairer ones, across multiple domains.

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Methods

Studies 1A and 1B. We carried out the first survey experiment in two countries, the United Kingdom and France. Only participants who succeeded the attention check (detailed in the *Design and Procedure* section) were included in the analyses. The distributions of sociodemographic characteristics are reported in Supplementary Table 3.

United Kingdom samples. British participants were recruited through the online platform Prolific Academic and compensated with pay for their participation in the study. The experiment was conducted on representative samples of the adult population stratified according to age, gender and ethnicity. The experiment was conducted identically on two British samples, the second study being a direct replication of the first. Responses from the first sample were recorded from the 8th to the 10th of February 2021 and responses from the second sample from the 5th to the 7th of March 2021. For the first sample, 900 participants were recruited based on a power analysis using effect sizes obtained in a pilot study. A detailed account of the pilot study is reported in Supplementary Note 5. The final number of respondents after exclusion of inattentive respondents was 852 (440 females; mean age = 46.0). For the second sample, 1300 participants were recruited and the final number of respondents after exclusion of inattentive respondents was 1244 (633 females; mean age = 46.9).

French sample. French participants were recruited through the online platform CrowdPanel and compensated with pay for their participation in the study. The study used a representative sample of the adult population stratified according to age and gender¹. Responses were recorded from the 10th

¹ Due to recruitment difficulties on the part of the platform, the category of people above 60 is under-represented in our sample.

of May to the 5th of September 2021. As with the second British sample, 1300 participants were recruited and the final number of respondents after exclusion of inattentive respondents was 1271 (661 females; mean age = 40.3).

Design and procedure. Participants were first asked to order from 1 to 8 public policy domains (environmental protection, health care, education, culture, housing, social protection, defense, public order and safety) in which they think public spending should be increased (1 = top priority, 8 = lowest priority). They were then presented with the following attention check: *“The colour test is simple, when asked for your favourite colour you must enter the word bole (or “iris” in the French version) in the text box below. Having read the instructions, what is your favorite color? (text box)”*. Participants were then randomly assigned to one of six conditions. Each condition featured a hypothetical scheme in which some tax revenue (1.5 billion of pounds/euros), either generated by a generic tax increase or by a carbon tax increase, is either earmarked for environmental protection, earmarked for a non-environmental domain, or not earmarked. This was therefore a between-participants 2 (revenue source) x 3 (expenditure domain) design, as shown in Fig. 1. Regarding the non-environmental domain, we used for each participant the top priority policy domain that was picked in the first question (e.g. health, education). This created a stringent test for the mismatched condition, to determine whether the mental accounting heuristic can counteract strong individual preferences.

After reading the scheme, participants were asked how much they would agree with the presented policy (i.e. the tax and the way revenues are spent) on a ten-point Likert scale ranging from “fully disagree” to “fully agree”, which constituted our main dependent variable. Participants were then asked about their general level of trust towards other people and the government, as well as their perceived effectiveness of the carbon tax in changing people’s behavior, using ten-point Likert scales. Finally, participants answered socio-demographic questions on their age, gender, highest education level, perceived relative income level, political ideology, residence area and were thanked. The full survey (with the precise wording of all questions) is available as part of the replication archive for this article at <https://osf.io/5nyve/>.

Stimuli. Each tax policy scheme followed the same structure and varied only in the revenue source (carbon or generic tax increase) and the expenditure domain (green earmarking, preferred policy earmarking, no earmarking):

“Imagine that the government plans to increase [the carbon tax / taxes]. This tax increase will generate £1.5 billions in additional revenue. The government has decided that all this extra revenue will be [allocated to environmental protection / allocated to \$the top priority spending domain indicated at the beginning of the experiment} / distributed across all public spending domains in the same proportion as all other governmental revenues].

How much would you agree with this policy? (ten-point scale)”

For the “no earmarking” condition, we chose not to leave the use of revenues unspecified, to facilitate understanding for participants who may lack information on typical budgetary procedures. Hence, we described a scheme where non-earmarked revenues fit into the usual budgetary procedure of distribution across policy domains, without introducing distortions. Although this methodological choice may yield stronger baseline levels of acceptability compared to previous studies¹⁶, we believed it was a more truthful evaluation of public support towards non-earmarked tax designs.

Data analysis. Respondents who failed the attention check (i.e. who did not enter the right color or close variants with typos) were excluded from the analyses. As the experiment in the United Kingdom was performed on two samples with the same design and sampling methodology (to obtain a direct internal replication), we ran a fixed-effects meta-analysis model to report all results from the two samples. Indeed, more robustness and precision can be derived from meta-analytic results rather than reporting whether each single study succeeded or failed³⁴.

To test whether people prefer a carbon tax scheme where revenues are earmarked for environmental protection rather than not earmarked, an independent-samples t-test was used. To test the hypothesis that policy support between earmarking domains varies depending on the thematic matching between the revenue source and the expenditure domain, a two-way ANOVA model with interaction was used. Before running the model, participants who ranked the environment as their first priority were excluded in order to create distinct conditions between the “environmental earmarking”

and “preferred policy earmarking” schemes. We also excluded the “no earmarking” conditions as we were interested only in the difference in the level of support regarding the two types of earmarks (green vs preferred policy domain). We then ran the two-way ANOVA model, focusing on the interaction term between the revenue source and the expenditure domain.

To test whether the interaction effect is maintained on the subsample of people believing the carbon tax to be effective, we performed the analysis only on participants who had answered above 5 (on a ten-point Likert scale) to the question “*How effective do you think a carbon tax is in changing people’s behavior?*”. Finally, to test whether the interaction effect between the revenue source and the expenditure domain is moderated by other variables collected in the survey, three-way ANOVA models with interaction were used.

Studies 2A and 2B. For this experiment, we recruited 1100 French participants from CrowdPanel and 1100 British participants from Prolific Academic. The survey period was 14 October to 5 November 2021 for the French sample, and 26 October to 28 October 2021 for the British sample. As for Studies 1A and 1B, these studies used representative samples of the adult population in terms of age and gender, as well as ethnicity in the British study. Only participants who succeeded the attention check were included in the analyses. After exclusion of inattentive respondents, the final sample size was 1038 for the French study (529 women, mean age = 39.6) and 995 for the British study (500 women, mean age = 44.8).

Design and procedure. The aim of this second experiment was to study the variation of carbon taxation acceptability with the proportion of funds earmarked towards the matched category. Therefore, presented schemes only featured a carbon tax earmarked for environmental protection, and the proportion of earmarked funds was experimentally manipulated (0%, 25%, 50%, 75%, 100%). The rest of the experiment was identical in all respects to the previous experiment. The only difference in the wording of the stimuli was that in the partially earmarked schemes, the third sentence read “*The government has decided that [25/50/75]% of this extra revenue will be allocated to environmental protection*”. We did not pre-register any hypotheses related to this experiment, as mental accounting

theory makes no prediction with regard to these “partial matching” situations. Only the methodology and the sampling plan were pre-registered.

Data analysis. As we were mainly interested in the variation of social acceptability for tax designs with earmarking, we ran a one-way ANOVA between policy support and the proportion of earmarked funds focusing on the four earmarked conditions. Tukey’s post-hoc tests were then used to determine which group means significantly differ. Results for the condition without earmarking are presented in Supplementary Note 3.

Studies 3A and 3B. For this experiment, we recruited 700 British participants from Prolific Academic based on a power analysis using effect sizes obtained in a pilot study (reported in Supplementary Note 6), and 700 French participants from CrowdPanel. The survey took place on February 24th 2022 for the British sample and from March 1st to March 8th 2022 for the French sample. As for previous studies, representative samples of the adult population in terms of age and gender, as well as ethnicity in the British study, were used. Only participants who succeeded the attention check were included in the analyses. After exclusion of inattentive respondents, the final sample size was 653 for the French study (335 women, mean age = 41.3) and 662 for the British study (340 women, mean age = 45.4).

Design and procedure. Participants were asked to rank, by order of preference, three imaginary schemes of an increase in the carbon tax, varying in their allocation of revenues: a) 100% of tax revenues are earmarked for environmental protection (“*no cash transfer*”), b) 75% of tax revenues are earmarked for environmental protection and 25% are redistributed to the first three income deciles as a cash transfer (“*unconditional cash transfer*”), c) 75% of tax revenues are earmarked for environmental protection and 25% are redistributed to the first three income deciles as a cash transfer that can only be spent on sustainable goods and services (“*environmental cash transfer*”). The presentation order of schemes was randomized. The rest of the experiment (attitudes and sociodemographic questions) was identical to previous studies, the only addition being an environmental concern scale (see full survey with precise wording at <https://osf.io/5nyve/>).

Data analysis. To test whether there was a significant difference in ranking scores between conditions, a Friedman test was used (non-parametric). To determine which conditions statistically differ, post-hoc tests using Nemenyi's procedure were used.

Pre-registrations. All experiments were pre-registered at <https://osf.io/5nyve/>.

Ethical approval. All studies received approval by the CER-Paris Descartes (N° 2019-03- MERCIER).

Data and code availability

Data and analysis code to reproduce the presented analyses are available at <https://osf.io/5nyve/>.

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Author contributions

M.M, C.C and H.M contributed equally to the study design, data collection and interpretation of the results. M.M was in charge of the experiment coding, data analysis and writing of the manuscript under the supervision of C.C. and H.M.. C.C and H.M reviewed and edited the manuscript.

Competing interests

The authors declare no competing interests.

Extended Data Fig 1. Mean policy support when tax revenues, coming from either a generic tax or a carbon tax increase, are either earmarked for environmental protection, for participants' preferred policy domain or not earmarked, in Studies 1A and 1B ($N_{1A} = 2096$, $N_{1B} = 1271$). Data points from the two British samples are combined. Plotted are 95% CIs.

Extended Data Fig 2. Mean policy support in Study 1B (France, N = 687) when tax revenues are either earmarked towards environmental protection or towards participants' preferred policy domain, when splitting the sample according to the priority given to environmental protection, political trust, social trust, political ideology, highest education level, gender, age, perceived relative income level and residence area (see Supplementary Note 2 for the detailed procedure). Plotted are 95% CIs.