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Understanding Effectiveness Skepticism

Jan Willem Bolderdijk, Linda Steg, Edwin Woerdman,
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Policy makers have proposed various incentive programs to curb consumption-related problems, such as traffic congestion and carbon emissions. While experts consider such programs effective in reducing those problems, consumers are more skeptical. Although this “effectiveness skepticism” is currently viewed as an important cause of public opposition, the authors argue that it may also arise as a consequence of opposition. Specifically, consumers oppose policies they consider personally unattractive or unfair. This opposition motivates them to also be skeptical about the potential effectiveness of such policies. Three studies that include a variety of methods, policies, and samples provide empirical support for this reasoning: perceptions of expected effects can be biased by consumers’ perceptions of personal attractiveness and fairness. In line with this causal ordering, the authors find that offering optimistic effectiveness estimates, although successful in reducing effectiveness skepticism, did not boost policy support. Policy makers aiming to boost support prior to implementation should thus not only communicate a policy’s effectiveness, but also address other causes of opposition.

Keywords: incentive programs, policies, skepticism, fairness, effectiveness

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Many environmental problems—including air pollution and water scarcity—are directly related to individuals’ consumption decisions. Left unrestrained, the increasing rate at which we consume has the potential to jeopardize the well-being of current and future generations (Prothero et al. 2011). Consequently, calls have increasingly emerged for regulatory policies that discourage specific types of environmentally harmful behaviors or encourage environmentally friendly behaviors. A particularly popular notion is that consumers can be swayed to behave differently by employing (consumption-based) incentive programs. Examples include subsidies for solar panels, taxes on energy-inefficient vehicles, and weight-based fees for garbage collection. These programs incentivize consumers to change

their behavior by increasing the attractiveness of proenvironmental behavior (“pull” measures; Geller 2002) or decreasing the attractiveness of environmentally harmful behaviors (“push” measures).

Although researchers believe that incentive programs could be an effective and cost-efficient means to reduce environmental problems, these strategies are often met with public opposition (e.g., Gaunt, Rye, and Allen 2007). This opposition forms a major barrier to implementation, considering that politicians are unlikely to implement measures that could cost them votes (Bristow et al. 2010; Harrington 2001).

Studies have shown that many factors affect consumers’ support for incentive programs, including whether they believe such policies are fair (Fitzgerald, Lamberton, and Walsh 2016; Schuitema, Steg, and Van Kruining 2011), whether they anticipate financially benefiting from implementation (Schuitema, Steg, and Rothengatter 2010), and whether implementation will limit their freedom of choice (Jones 2003). Another important aspect in public debates on pricing policies is their supposed effectiveness: opponents are often concerned that incentive programs will not solve the problems they are supposed to address (e.g., Gärling and Schuitema 2007; Harwatt 2008). This “effectiveness skepticism” stands in sharp contrast to a host of scientific studies demonstrating that incentive programs could effectively help reduce environmental problems such as traffic congestion (Verhoef et al. 2004), traffic accidents (Bolderdijk et al. 2011) and climate change (Hahn and Stavins 2011).

An obvious solution to increase policy support would be to inform skeptics of the scientific evidence suggesting that incentive programs *would* be effective in solving specific problems. Indeed, research has been issued (e.g., Verhoef et al. 2004) with the goal of developing exact estimates of the effects

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of incentive programs (e.g., in terms of a numerical estimation of the reduction in carbon dioxide emissions). This information could counter opponents' effectiveness skepticism and increase their support for incentive programs, ultimately paving the way for implementation (for a related argument, see Eliasson and Jonsson 2011).

Thus, while experts consider incentive programs an effective tool to reduce environmental problems, consumers are often more skeptical. The current study does not focus on the question whether incentive programs, when implemented, will actually be effective in reducing environmental problems. Rather, we are interested in understanding another question: where does consumers' effectiveness skepticism stem from?

Effectiveness Skepticism as an Antecedent to Opposition

The consumer research literature defines consumer skepticism as distrust or disbelief regarding the truthfulness of claims or statements. According to traditional accounts, skepticism is an information problem; consumers are more skeptical of a certain claim when the information offered is not supported by empirical proof or when it comes from a suspect source (e.g., Darley and Smith 1993; Ford, Smith, and Swasy 1990; Foreh and Grier 2003). Although studies in this line of research have typically focused on skepticism about claims expressed by commercial organizations (e.g., information presented in advertisements; Ford, Smith, and Swasy 1990), consumers can be skeptical of any claim, including claims made by celebrities, government officials, and scientists. Other strands of literature define skepticism more broadly, referring to any questioning attitude toward specific pieces of knowledge, opinions, or beliefs. For instance, in the context of sustainability, consumers can be skeptical about the safety of carbon capture and storage (Terwel, Ter Mors, and Daamen 2012), the benign intentions of producers of environmentally friendly alternatives (Pomeroy and Johnson 2009), or the effectiveness of incentive programs in reducing environmental problems—the focus of the current study (Gärling and Schuitema 2007; Harwatt 2008).

Researchers have argued that effectiveness skepticism plays an important role in determining public support for incentive programs (Harwatt 2008; Schuitema, Steg, and Rothengatter 2010). Specifically, various studies have associated consumer beliefs regarding the effectiveness of incentive programs with consumers' levels of support. For instance, Harwatt (2008) asked 60 respondents during face-to-face interviews to reflect on fuel price increases and personal carbon trading as competing transport policy instruments. Participants considered personal carbon trading more acceptable and more effective in reducing environmental problems. Schuitema, Steg, and Rothengatter (2010) asked survey participants (regular car users) to evaluate toll charges. Participants who expected toll charges to result in a larger reduction of traffic congestion tended to be more supportive.

Although insightful, these and related studies employed one-off qualitative or correlational research methods, therefore making it difficult to draw inferences as to the causality of the relationship. It is therefore possible that causality is reversed; effectiveness skepticism may also be a *consequence* of opposition. Is there any theoretical rationale for the latter conceptualization?

Effectiveness Skepticism as a Consequence of Opposition

Before implementation, it is difficult for individual consumers to judge whether a given program will actually be effective in solving environmental problems. Many relevant variables cannot be predicted beforehand. For example, whether a tax on polluting cars will result in a noticeable reduction of smog will depend on the response of fellow drivers, and those fellow drivers may not be ready to give up their cherished vehicles. Yet, as discussed previously, policy makers and researchers sometimes prompt consumers to evaluate whether policies would be effective. How do consumers navigate such questions?

When confronted with a question one has not thought about before, different things come to mind spontaneously, depending how accessible they are (Feldman and Lynch 1988). In the case of a to-be-implemented incentive program, for instance, consumers may immediately consider whether implementation will be attractive to them personally. People who drive large SUVs may readily anticipate that a tax on energy-inefficient cars would be unattractive for them personally, and drivers who regularly are stuck in traffic jams may immediately realize that congestion fees would affect them financially.

Previous research has shown that such perceptions of personal attractiveness can lead consumers to support or oppose to-be-implemented policies (Schuitema, Steg, and Rothengatter 2010). Importantly, we argue further that these initial judgments of support can subsequently bias consumers' perceptions of other policy attributes, such as whether the program, when implemented, would be effective in solving environmental problems. Among other factors, this tendency to harmonize one's perceptions on a topic with prior positions is brought forth by people's desire to appear consistent (Cialdini and Goldstein 2004) and to view the world as just (Feinberg and Willer 2011). This tendency is so potent that it can lead consumers to dismiss statistics that imply an ideologically unattractive outcome (Campbell and Kay 2014). Conservative participants, for instance, were most skeptical about global warming statistics when those numbers implied government interference (a strategy conservatives find unattractive) rather than a free-market solution (an ideologically attractive outcome for conservatives).

Extending this line of reasoning, we predict the following:

H₁: Consumers are more skeptical of policies that result in a personally unattractive outcome.

Push (e.g., taxes) and pull measures (e.g., subsidies) can both be used to incentivize consumers to exhibit environmentally friendly behavior. While experts consider push measures more effective than pull measures (Deslauriers and Everett 1977; Falconer and Hodge 2001), we predict that consumers will think otherwise: they are typically less supportive of push measures, as the former are more unattractive to them personally. Consequently, we argue they may also be inclined to perceive push measures as being less effective than pull measures.

While consumers will typically agree that pull measures are more attractive than push measures, other incentive programs entail a more skewed redistribution of costs and benefits. The implementation of a weight-based fee system for garbage collection, for instance, implies that consumers who produce relatively little waste will ultimately pay less in municipal taxes

Figure 1. Conceptual Model

than before. Consumers who produce relatively more waste, however, will face additional costs. Thus, depending on specific features of an incentive program (fixed fee vs. usage based) and the individual consumption levels of the consumer (high vs. low use), implementation will be personally attractive or not. We argue that such individual perceptions of personal attractiveness may not only determine consumers' support levels, but, importantly, may also cause shifts in consumers' pre-implementation effectiveness beliefs—"losers" (i.e., consumers who will be worse off after implementation) are inclined to be more skeptical of the same policy than "winners" (i.e., consumers who will be better off after implementation).

Another inference that consumers may spontaneously make is whether the program, when implemented, would result in a subjectively fair distribution of cost and benefits. Such fairness judgments are often automatically triggered (Tyler 2000), and require few cognitive resources (e.g., Leliveld et al. 2009). In interpersonal settings, fairness judgments are oftentimes spurred by more mundane, individualistic concerns: a specific outcome is deemed less fair when it is unattractive to the recipient (Handgraaf et al. 2003). However, fairness perceptions can also be driven by people's concern for collective interests (Fitzgerald, Lamberton, and Walsh 2016; Schuitema, Steg, and Van Kruining 2011). Specifically, consumers tend to view a proposed distribution as fairer when the costs and benefits of a policy are distributed proportionally to one's contribution to the problem (the equity principle) and when the rights of those who cannot fend for themselves (future generations) are protected (and thus whether a sense of "environmental justice" is maintained; Clayton 2000). We hypothesize the following:

H₂: Consumers, regardless of whether they anticipate ending up as losers or winners, are more supportive, and consequently also less skeptical, of policies that result in a subjectively fair distribution of costs and benefits.

Some incentive programs feature elements that match the "polluter pays" principle of fairness (Birnie and Boyle 2002). For instance, some congestion fee programs feature carbon dioxide differentiation: cars causing fewer emissions, and thus contributing less to pollution, pay a lower congestion charge than cars that emit more emissions than average. We expect that consumers will consider the same policy fairer, and therefore more effective, when its features clearly map onto collectivistic fairness principles. More specifically, we expect that they will consider the same policy more effective when it is designed in accordance with the commonly accepted "polluter pays" principle.

Conceptual Model

Although effectiveness skepticism is typically viewed as an important *cause* of public opposition, we argue that it may also arise as a *consequence* of opposition. Before implementation, consumers may be inclined to base their support levels on attributes that are accessible to them, such as whether implementation would be attractive for them personally and whether implementation would result in a subjectively fair distribution of costs and benefits across individuals. Importantly, such initial judgments of support may subsequently bias consumers' perceptions of attributes that are less accessible to them prior to implementation—notably, whether those policies would actually be effective in reducing environmental problems. In other words,

H₃: Effectiveness skepticism can follow support in the causal chain.

Figure 1 summarizes our reasoning.

Overview of Studies

We systematically tested this conceptual model across three empirical studies. We used a multimethod approach, including correlational and experimental research designs, exposing participants to a wide range of policies with different features. Study 1 employs a correlational design to test the process leading up to effectiveness skepticism, following the paths outlined by our conceptual model. Next, we systematically manipulated the personal attractiveness of the same incentive program (Study 2) to test H₁ experimentally: consumers will be less skeptical of policies that result in an outcome that is attractive to them personally. In Study 3, we manipulated fairness perceptions to test H₂: consumers will be less skeptical of policies that are considered fair. All studies test H₃ via mediation. In Study 3, we additionally tested a logical implication of this hypothesis: if effectiveness skepticism indeed follows from, and does not necessarily cause opposition, refuting skepticism may not be sufficient to boost support among opponents of a policy.

Study 1: The Prevalence of Effectiveness Skepticism

While experts regard push measures as more effective and necessary for solving environmental problems than pull measures (McKittrick 2011), we anticipated that consumers would disagree: they may be less supportive of push than pull measures, given the former may be perceived as more unattractive and unfair. As a result of this initial opposition,

consumers might become skeptical about the effectiveness of push measures.

Method

We conducted an online survey in 2010 among representative population samples of France, Greece, Hungary, the Netherlands, Norway, Switzerland, and the United Kingdom. We drew participants from an Advanced Market Research panel, selected on the basis of several stratification criteria, including gender, age, household income, education level, marital status, and household composition, to aim for representative subsamples.

Approximately 1,100 participants completed the questionnaire in each country, for a total of 7,701 participants. After removing participants who (1) answered more than two-thirds of all questions from one question battery identically or (2) filled out improbable answers in quality-control questions, our sample consisted of 6,045 participants (France, $N = 881$; Greece, $N = 918$; Hungary, $N = 856$; the Netherlands, $N = 758$; Norway, $N = 843$; Switzerland, $N = 940$; and the United Kingdom, $N = 849$). We performed all analyses exclusively on this sample.

The data set used herein was part of a large questionnaire aimed at examining barriers and opportunities for reducing household energy use (see www.barenergy.eu). We focus on the section of the survey that asked participants to evaluate six policy measures (see Table 1): "Please indicate for each of the following policy measures to what extent you find them acceptable and fair, to what extent you expect them to be effective in reducing environmental problems, and to what extent you feel you would be positively or negatively affected by the policy measure." Participants denoted their evaluations of each policy measure on seven-point Likert scales ("unacceptable/very acceptable," "unfair/very fair," "very ineffective/very effective," and "affects me negatively/affects me positively"). We collapsed the scores for the policies onto aggregate scores along the push and pull dimension.

Results

Table 1 displays the descriptive statistics of all individual items. Participants were less supportive of the three push measures (a 30% increase in car use costs, stricter norms on energy efficiency, and a 20% increase in the price of nonsustainable energy) than of the three pull measures (subsidies on insulation and solar panels and improvements in public transportation). Consistent with our reasoning, we found that participants also rated the three push measures ($M = 3.90$, $SD = 1.27$) as being less effective in solving environmental problems than the three pull measures ($M = 5.58$, $SD = 1.10$; $F(1, 6,044) = 8,387.44$, $p < .001$). This pattern is robust across all the investigated countries, as Figure 2 shows.

Next, we examined the process leading up to effectiveness skepticism, following the paths outlined by our conceptual model. We tested our model in two steps. In step 1, we tested for parallel mediation: we analyzed whether the within-subject differences in support between push and pull measures were driven by participants' assessments of perceived attractiveness and fairness. In step 2, we tested for simple mediation: we tested whether the within-subject differences in effectiveness between push and pull measures indeed stem from the within-subject differences in support. It is not possible to test for parallel and serial mediation simultaneously in repeated-measures mediation models (Montoya and Hayes 2017); therefore, we tested each step in a separate regression.

Step 1

We included within-subject differences in attractiveness and fairness as parallel mediators in a repeated-measures mediation model, using the MEMORE macro provided by Montoya and Hayes (2017). Specifically, we tested whether within-subject differences in support between push and pull (Y_{diff}) were indeed mediated by within-subject differences in perceived personal attractiveness ($M1$) and within-subject differences in perceived fairness ($M2$).

Figure 2. Effectiveness Beliefs Across Seven Countries for Push Versus Pull Measures

Notes: Error bars denote 95% CIs.

Table 1. Means and Standard Deviations

	Type	Support	Fairness	Effectiveness	Personal Impact
Public transport improvements	Pull	6.08 (1.17)	5.93 (1.26)	5.69 (1.39)	5.67 (1.43)
Solar subsidies	Pull	5.89 (1.34)	5.68 (1.40)	5.63 (1.42)	5.49 (1.46)
Insulation subsidies	Pull	5.66 (1.43)	5.40 (1.50)	5.41 (1.45)	5.28 (1.50)
Stricter building norms	Push	4.94 (1.81)	4.57 (1.81)	4.86 (1.74)	4.54 (1.70)
Energy tax	Push	3.71 (1.80)	3.49 (1.76)	3.81 (1.72)	3.50 (1.71)
Car tax	Push	2.55 (1.66)	2.52 (1.62)	3.01 (1.74)	2.64 (1.66)

As Figure 3 shows, both meditational paths were statistically significant: within-subject differences in both perceived personal attractiveness and perceived fairness accounted for the within-subject differences in support. The 95% bias-corrected confidence intervals (CIs) (5,000 bootstrap samples) of the indirect effects of push versus pull via personal attractiveness (95% CI: [-.4558; -.3611]) and fairness (95% CI: [-1.4611; -1.3426]) did not contain zero.

Step 2

Next, we examined whether the within-subject differences in support could subsequently account for differences we found in effectiveness skepticism. Using the MEMORE macro, we tested whether within-subject differences in perceived effectiveness between push and pull (Ydiff) were mediated by within-subject differences in support (Mdiff). As Figure 4 illustrates, the meditational path was statistically significant. Specifically, the within-subject differences in support drive the within-subject differences in effectiveness beliefs: the 95% bias-corrected CIs (5,000 bootstrap samples) of the indirect effect of push versus pull via support did not contain zero (-1.6655; -1.5597). In other words, the notion that push measures are considered less effective is accounted for by the notion that push measures receive less support.¹ This pattern is consistent with the causal order outlined by our conceptual model: effectiveness belief can follow from support levels (H₃).

Discussion

Employing a large and culturally diverse sample, we found initial evidence for H₁ and H₂: participants considered policies they deemed unattractive and unfair as being less effective in solving environmental problems. Moreover, this study provides initial meditational evidence for the underlying process: participants were less supportive of push measures because they considered those policies more unattractive and unfair. These differences in support, in turn, explain why participants also evaluated such programs as being less effective in reducing environmental problems (H₃). Skepticism about the effectiveness of push policies contradicts the opinion of experts (Deslauriers and Everett 1977; Falconer and Hodge 2001) but is in line with our hypotheses. Lacking firsthand experience with the actual effects of a policy, consumers' effectiveness judgments may be biased.

Although we observed relationships consistent with our hypotheses, we obtained them in a correlational design. Therefore, we cannot rule out that the causality is reversed. For instance, consumers may actually believe that push measures will be less effective in reducing environmental problems, and this causes them to consider push measures as being less personally attractive than pull measures. To test our model more rigorously, we systematically manipulated perceptions of personal attractiveness (in Study 2 to test H₁) and perceptions of fairness (in Study 3 to test H₂) and examined whether these manipulations—by affecting participants' support levels—would subsequently result in changes in participants' effectiveness beliefs (H₃).

We also note that the relationships we observed among constructs may be inflated by this study's specific format: the items gauging attractiveness, fairness, support, and effectiveness were

¹ We also tested the reverse order and found that the 95% CI of the indirect effect of push versus pull via effectiveness on support excludes zero as well (95% CI: [-1.2784, -1.1905]).

Figure 3. Step 1: Pathway Leading Up to Support

** $p < .01$.

*** $p < .001$.

presented in a fixed format in the questionnaire, allowing for common method variance (Podsakoff et al. 2003). Moreover, the three specific pull and push measures differed on more dimensions than personal attractiveness and fairness exclusively, allowing for potential confounds.

We address these methodological limitations in Study 2. We not only randomly order the items of interest but, more importantly, employed a between-subjects design: different groups of participants evaluated different versions of the same incentive program, thus avoiding confounds.

Study 2: Testing the Impact of Perceived Attractiveness on Effectiveness Skepticism

Similar to other “cap-and-trade” systems for organizations, the notion of personal carbon trading (Parag and Fawcett 2014; Woerdman and Bolderdijk 2015) requires consumers to hand in “carbon allowances” whenever they purchase goods (e.g., fuel, gas, electricity) that require the consumption of fossil energy (and thus emit carbon). Households under this system receive a restricted amount of allowances, to motivate them to reduce their emissions relative to the status quo. They can purchase additional allowances if their share of allowance is depleted and can sell their excess allowances. Thus, this incentive program motivates consumers to act environmentally friendly: consumers who exhaust their share of allowances will face additional financial costs, whereas consumers who stay under their share of allowance can not only save, but even earn money.

Personal carbon trading is considered a promising policy to promote reductions in carbon emissions (Parag and Strickland 2011). However, some research shows consumers are skeptical about the effects of personal carbon trading on emission reductions (Harwatt 2008). Thus, personal carbon trading presents a suitable backdrop to test our reasoning.

Personal carbon trading can feature different allocation keys (Bird and Lockwood 2009): all households can receive the same, fixed amount of allowances (“one-size-fits-all”), or allowances can be allocated according to each household’s

Figure 4. Step 2: Simple Mediation

*** $p < .001$.

historical share of carbon output (“individually tailored”). The one-size-fits-all allocation key would be unattractive for households that currently emit relatively high levels of carbon: they would not have enough allowances to cover their larger-than-average share of carbon output. In the same vein, the individually tailored allocation key would be particularly unattractive for households that currently emit relatively little carbon: they would receive a smaller share of allowances than households that currently emit high levels of carbon.

We experimentally tested H_1 by systematically varying whether personal carbon trading would feature a one-size-fits-all or individually tailored allocation key and measuring participants’ current carbon footprint. This allowed us to keep the type of policy constant while systematically varying personal attractiveness across participants. We expected that consumers would be more skeptical of carbon trading when it featured an allocation key that would be unattractive given their current carbon footprint—that is, losers will be more skeptical than winners. Moreover, we tested the underlying process (H_3). We expected that perceptions of personal attractiveness could affect participants’ effectiveness beliefs by changing their support levels.

Method

Participants

Using a snowball sampling procedure (the fourth author shared the survey among his social network, and these people were asked to share the survey in their social network), 167 individuals from the Netherlands and Belgium received an e-mail. Most ($N = 132$, 57% male, $M_{\text{age}} = 43.6$ years, $SD_{\text{age}} = 14.4$) filled out the questionnaire. Compared with average Dutch and Belgian citizens (Organisation for Economic Co-operation and Development 2009), participants were relatively highly educated (68% received some form of higher education). The net income levels of participants who chose to share this information ($N = 78$, 65% fell in the €1,000–€2,500 per month range) were comparable to national averages of the Netherlands (€1,950 per month) and Belgium (€1,453 per month). We performed all analyses on this full sample.

Carbon Footprint Calculator

First, we measured participants’ current carbon footprint. The carbon footprint calculator we used was modeled after earlier carbon footprint calculators (see, e.g., Franz and Papyrakis 2011) and featured a series of questions gauging participants’ car usage, use of public transportation, size of home, and household size. We used participants’ answers to calculate their carbon footprint scores and presented them to participants with a legend to help them determine whether they used relatively high or low levels of energy (see Web Appendix 1). For instance, at the low end, participants could read that “a carbon footprint of 80 or less ... signifies you use much less energy than the average Dutch/Belgian person.” A score between 100 and 110 was characterized as indicative that they “consume about as much energy as the average Dutch/Belgian person.” On the high end, participants read that “a carbon footprint of 130 or more ... signifies you use much more energy than the average Dutch/Belgian person.” Carbon footprint scores in our sample ranged from 43 to 163, with an average score falling in the 100–110 category ($M = 109.20$, $SD = 22.86$; see Web Appendix 2).

Personal Carbon Trading Scenario

Subsequently, participants read a general description of personal carbon trading² that explained the basic mechanism (e.g., “The government will allocate a limited amount of allowances to all consumers at no charge. These allowances will need to be surrendered whenever you purchase, for example, electricity, gas or petrol”; for the complete texts, see Web Appendices 3 and 4). The descriptions of the two allocation methods were identical, except the way in which allowances were distributed. For the sake of brevity, we only discuss the differences between the conditions here.

Participants in the one-size-fits-all condition read the following: “Every individual receives an equal amount of allowances, regardless of their current level of energy consumption.” Their text continued by illustrating the consequences of this specific allocation method: people who currently use relatively little energy can get by with their share of allowances, while others may have to change their behavior or purchase additional allowances. Note that in this program, particularly those with a relatively large carbon footprint would end up among the losers: the fixed amount of allowances would likely not cover their larger-than-average carbon output.

Participants in the individually tailored condition read the following: “The amount of allowances that an individual receives is determined based on their current level of energy consumption.” Their text continued by explaining the potential consequences of this specific allocation method: only people who can decrease their energy consumption can get by with their share of allowances, and others will have to purchase additional allowances. Note that in this program, particularly households with a relatively small carbon footprint would end up being the losers: the fact that they currently use little energy actually means they would receive fewer allowances than those with a larger-than-average carbon output.

Both scenarios ended with the same text, which repeated the goal of carbon trading: people who have too few allowances can purchase additional allowances, and people with spare allowances can sell them, ending with, “In sum, the less energy you consume, the less CO₂ you emit, the more money you can earn.”

Dependent Variables

Before participants proceeded to the questions about the personal carbon program, we asked them to reinspect their own carbon footprint scores so that they would consider the personal attractiveness of carbon trading and thus determine whether they would be among the winners or losers. We then asked participants to rate the carbon trading system on several attributes. Participants indicated their level of agreement with items on a seven-point scale, which ranged from negative ($-3 =$ “completely disagree”) to positive ($+3 =$ “completely agree”). The focal items, gauging personal attractiveness of the system, fairness, support, and perceived effectiveness to solve environmental problems, were intentionally presented in random order across a battery consisting of 14 items, to reduce the chance of common method variance (see also Web Appendix 5).

²To ensure that participants would not skim but actually read the full text, we kept the explanation relatively short and only explained the essence of two allocation methods to participants. This choice had another advantage: in real life, many consumers likely do not have the time or interest to be completely informed about every aspect of a new incentive program prior to forming a preference and would instead likely base their preference on salient cues.

We measured personal attractiveness with an average of three items: “I expect financial benefits from the carbon trading system”; “Given my current use of energy, I think I will be forced to purchase additional allowances” (reverse scored); and “The carbon trading system is more attractive for me than for the average Dutch/Belgian person” ($M = -.13$, $SD = 1.20$, Cronbach’s $\alpha = .64$). We measured fairness with the item “I think the emissions trading system is fair” ($M = .21$, $SD = 1.63$). We assessed perceived effectiveness by averaging participants’ scores on the following two items: “The introduction of carbon trading will cause people to use less energy” and “I expect carbon trading to have beneficial effects on the environment” ($M = .21$, $SD = 1.31$, Cronbach’s $\alpha = .72$). We measured support with an average of the following items: “I think the emissions trading program is a good system,” “I would vote in favor of the emissions trading program in a referendum,” and “I think the emissions trading program is acceptable” ($M = .13$, $SD = 1.54$, Cronbach’s $\alpha = .92$). The battery also included items measuring environmental concern, using two items (“I worry about climate change” and “I feel responsible for climate change”; $M = .84$, $SD = 1.34$, Cronbach’s $\alpha = .67$), and an item gauging perceived threat to freedom (“I think the emission trading system violates my sense of freedom”; $M = .17$, $SD = 1.60$). The latter items allowed us to check whether random assignment across conditions was successful (individual differences in environmental concern), and to examine the role of alternative accounts (perceived freedom). We included the item “The description of the carbon trading system is clear” ($M = 1.73$, $SD = .92$) to detect potential confounding effects of text clarity across conditions. Finally, participants responded to items pertaining to socio-demographic information (e.g., gender, age, income).

Results

Before testing our hypotheses, we first examined the associations between different constructs included in the battery to verify whether random assignment was successful. We found no indication of confounds across conditions. Participants’ environmental concern scores, for instance, did not differ across conditions (see Web Appendix 6, Table 2). We found no theoretically suspicious correlations among items: clarity ratings, for instance, did not correlate with any of the other constructs measured in the same battery (see Web Appendix 6, Table 1), suggesting that common method variance did not have a major impact on the results.

Manipulation Check

Next, we verified whether our manipulation of personal attractiveness succeeded. Using the PROCESS macro for SPSS (model 1) developed by Hayes (2013), we regressed personal attractiveness onto the predictors allocation method (0 = individually tailored, and 1 = one-size-fits-all) and carbon footprint score (mean-centered), as well as their interaction term. The regression model was statistically significant ($R^2 = .27$, $F(3, 128) = 15.39$, $p < .001$).³ On average, participants found the

³We find that the regression model including allocation method, carbon footprint, and their interaction, also explains participant’ fairness perceptions; $F(3, 128) = 5.70$, $p = .001$, $R^2 = .12$. Importantly, the same model explains much more variance in target construct; personal attractiveness; $F(3, 128) = 15.39$, $p < .001$, $R^2 = .27$. Thus, while we cannot rule out that our manipulation of attractiveness also affected people’s fairness perceptions to some extent, it has a stronger effect on the target construct; personal attractiveness.

one-size-fits-all method more attractive for them personally (one size: $M = .05$, $SD = 1.26$; tailored: $M = -.31$, $SD = 1.12$; $b = .44$, $t(128) = 2.44$, $p = .02$). Importantly, we found the expected interaction between allocation method and carbon footprint score for personal attractiveness ($b = -.03$, $t(128) = -3.82$, $p < .001$). An analysis of the Johnson–Neyman regions of significance (Spiller et al. 2013) suggests that our manipulation of attractiveness was successful: participants with carbon footprint score of 146 and higher considered carbon trading significantly less attractive to them personally when a one-size-fits-all key would be used, and participants with a footprint score of 112 and lower considered carbon trading less attractive to them personally when an individually tailored key would be used.

The Impact of Differences in Personal Attractiveness on Effectiveness Skepticism

Next, we experimentally tested H_1 . Given that the PROCESS macro does not as yet allow testing whether a given interaction is mediated by a series of variables, we tested our reasoning in two steps. In Step 1, we examined whether our manipulation of personal attractiveness affects the dependent variable, effectiveness beliefs. In Step 2, we examined the underlying process via simple mediation: do changes in effectiveness indeed stem from changes in support levels (H_3)?

Step 1

We regressed the key dependent variable, perceived effectiveness, onto allocation method (0 = individually tailored, and 1 = one-size-fits-all), carbon footprint score (mean centered), and their interaction term. The regression model was statistically significant ($R^2_{\text{adjusted}} = .10$, $F(3, 128) = 4.61$, $p = .004$). Overall, participants did not believe that either of the two allocation keys would be more effective than the other ($b = .20$, $t(128) = .93$, n.s.; tailored: $M = .10$, $SD = 1.28$; one size: $M = .33$, $SD = 1.33$). In addition, participants with a higher carbon footprint score were not more skeptical than participants with a lower footprint score ($b = .01$, $t(128) = 1.15$, n.s.). Importantly, as predicted, we found the predicted interaction: participants’ skepticism depended on the combination of allocation method and the size of their individual carbon footprint ($b = -.03$, $t(128) = -3.36$, $p = .001$).⁴ Participants with a carbon footprint score of 132 or higher considered carbon trading significantly less effective when a one-size-fits-all key was used. Participants with a footprint of 86 or lower, conversely, considered carbon trading less effective when an individually tailored key would be used. In other words, as expected, participants are most skeptical when carbon trading features an allocation key that would be (financially) unattractive for them personally, given their current carbon footprint. Using an Excel macro (www.jeremydawson.co.uk/slopes.htm), we plotted this interaction in Figure 5. The results are identical when including environmental concern and perceived threat as covariates into the regression.

To verify whether differences in personal attractiveness resulting from the allocation method $\times$ carbon footprint interaction indeed drive the differences we found in skepticism ratings (H_1), we employed by Hayes’s (2013) PROCESS macro, model 7. A bias-corrected 95% CI (5,000 bootstrap samples) for the

⁴We also included income as a moderator (78 participants shared this information). The pattern of results is not more pronounced for lower income participants.

indirect effect of the interaction between type of allocation method and carbon footprint score through personal attractiveness did not include zero $[-.0155, -.0004]$; see also Figure 6). The same holds when including environmental concern and threat to freedom as covariates in the regression. In other words, we find evidence for conditional mediation.⁵ This pattern suggests that the documented differences in effectiveness skepticism across cells indeed stem from perceptions of personal attractiveness. Thus, whether carbon trading is deemed effective in reducing environmental problems depends on whether the same policy is perceived as personally attractive (i.e., whether the participant anticipates ending up among the losers or winners), in support of H_1 .

Step 2

Next, we tested whether differences in support could account for the differences we found in skepticism (H_3). We regressed effectiveness beliefs onto perceived attractiveness and support (model 4, Hayes 2013). A bias-corrected 95% CI (5,000 bootstrap samples) for the indirect effect of personal attractiveness on effectiveness beliefs through support did not include zero $[.1009, .3472]$; see Figure 7). Moreover, the direct effect of perceived attractiveness on effectiveness beliefs is no longer significant when including support in the mediation model ($b = .00$, n.s.), which implies that differences in support indeed caused changes in effectiveness beliefs.

Discussion

We expected that participants would be more skeptical of the effectiveness of the same incentive program (carbon trading for households) when they were under the impression that implementation would harm them personally—that is, when they would end up among the losers instead of winners. We varied whether carbon trading would be financially attractive for individual participants by exposing participants with large and small carbon footprints to one of two allocation keys. As expected, we found that participants with larger footprints were most skeptical when a one-size-fits-all allocation would be used. Participants with smaller footprints, conversely, were most skeptical when an individually tailored allocation method would be used. As predicted, these differences in effectiveness skepticism were driven by individual differences in perceived attractiveness. In other words, these data provide further evidence for H_1 : consumers are more skeptical of policies that result in a personally unattractive outcome.

A simple mediation analysis (step 2) additionally suggests that these differences are driven by changes in support; the effect of attractiveness on effectiveness is no longer statistically significant when including support in the regression. This pattern is consistent with the causal order outlined by our conceptual model: effectiveness beliefs can follow from support levels, in support of H_3 . However, mediation, in and of itself, does not prove a given causal order. We address this shortcoming in Study 3 by systematically manipulating participants' effectiveness

⁵The 95% CI of the indirect effect of allocation method on effectiveness via perceived personal attractiveness is different for participants with a relatively large carbon footprint (+1 SD; 95% CI: $[.0185, .5427]$), relative to those with a relatively small carbon footprint (−1 SD; 95% CI: $[-.2622, .0444]$).

Figure 5. The Joint Impact of Carbon Footprint and Allocation Key on Effectiveness Beliefs

skepticism and examining how it affects their support levels. Moreover, in this study we manipulated the second mediator in our conceptual model—perceived fairness.

Study 3: The Impact of Information and Perceived Fairness on Skepticism

Research suggests usage-based vehicle taxation (e.g., kilometer charging) could be a highly effective means of reducing mobility-related problems, such as traffic congestion (e.g., Verhoef et al. 2004), a problem that plagues many motorists daily. However, consumers have expressed the concern that kilometer charging would not be effective in reducing congestion and related environmental problems. This skepticism has been identified as an important barrier to public support (Schuitema, Steg, and Rothengatter 2010). Thus, the context of kilometer charging was a suitable backdrop to test our reasoning.

To test H_2 experimentally, we systematically varied whether the kilometer charge would be designed in accordance to the “polluter pays” fairness principle. Specifically, participants

Figure 6. Conditional Mediation

* $p < .05$.

*** $p < .001$.

Figure 7. Simple Mediation

*** $p < .001$.

learned either that the kilometer charge would be based on a fixed fee (which did not take into account the extent to which individual drivers contribute to pollution), or that the kilometer charge would feature carbon dioxide differentiation: cars that emit relatively few greenhouse gases would pay a lower fee per kilometer. We expected that participants would consider kilometer fairer when it included carbon dioxide differentiation, making them more supportive, which in turn would lead them to view kilometer charging as being more effective.

In addition, we examined the causal order implied by our conceptual model (Figure 1). Kilometer charging was presented as having either a substantial or a modest impact on traffic congestion levels. If effectiveness skepticism indeed follows from (as outlined by H_3) rather than causes support levels (as commonly assumed), we expected that offering such information, although perhaps successful in reducing skepticism, might not be sufficient to boost support.

Participants and Procedure

The study was part of a larger online questionnaire on transport policy evaluations. A professional panel survey agency (NIPO.com) recruited and paid participants drawn from a representative sample of Dutch citizens. In total, 1,500 invitations were sent out, with 946 participants (49.9% male; $M_{\text{age}} = 50.2$ years, $SD_{\text{age}} = 17.06$, range 18–92) completing the questionnaire. We excluded participants who did not appear to be answering the questionnaire seriously using four preestablished criteria: no variation in answers, completing the full questionnaire (assessed to take 15 minutes) in less than 5 minutes, answering a check question incorrectly, or spending less than 10 seconds on the screen on which the expected effectiveness of the kilometer charge was explained. The final sample consisted of 710 participants.

Participants read a scenario that described a usage-based vehicle taxation system (kilometer charging) (see Web Appendix 7). After reading this scenario, participants provided their evaluations of this system. In addition to varying whether kilometer charging would feature carbon dioxide differentiation (our manipulation of fairness) and providing information about the supposed effectiveness of kilometer charging, we also varied the purported goal of the study (see the following subsections).⁶ Participants were thanked and carefully debriefed after finishing the experiment.

Fairness Manipulation: Carbon Dioxide Differentiation

The kilometer charging scenario began by explaining that the Dutch government was planning on abolishing fixed vehicle

taxes and implementing instead a time-dependent tax based on car use called the kilometer charge. The scenario also explained that kilometer charges would be higher during rush hours to stimulate drivers to drive outside busy hours (and thus combat traffic congestion).

We subsequently varied whether the charge per kilometer would vary depending on the car's emissions standards and thus would match the "polluter pays" principle. Specifically, participants in the carbon dioxide differentiation scenario read that "the kilometer charge will depend on the type of car: efficient cars—cars that emit relatively little CO_2 per kilometer travelled—pay less than other cars." Participants in the fixed charge condition read there would be no relation between the car's emission standards and the fee: "The kilometer charge will not depend on the type of car: efficient cars—cars that emit relatively little CO_2 per kilometer travelled—pay as much as other cars."

Manipulation of Expected Effectiveness

We also varied the expected effects of this kilometer charge on traffic congestion levels. We randomly assigned participants to one of the following three conditions. The first group of participants read that kilometer charging would have a substantial effect on traffic congestion: "According to recent scientific research, implementation of the kilometer charge may result in 11.7% less cars on the road during rush hours, which will cut congestion in half." A second group of participants read that kilometer charging would have modest effect on traffic congestion: "According to recent scientific research, implementation of the kilometer charge may result in 2.4% less cars on the road during rush hours, which will reduce congestion levels somewhat." These numbers were determined in consultation with traffic engineers to represent the bandwidth of pessimistic and optimistic estimations of the actual effectiveness of kilometer charging. A third group of participants acted as a control group and did not receive any information regarding expected effects on traffic congestion.

Purported Rationale for the Study

Although unlikely, we additionally wanted to examine the possibility that participants' answers would be driven by strategic considerations—for example, they may hope that by dismissing kilometer charging, they could decrease the likelihood of kilometer charging actually being implemented. We therefore systematically varied the purported goal of the study, introducing the study as either a means to develop scientific insights ("the results from this survey will be used by Dutch scientists to develop new scientific insights"), in which case participants would have little incentive to engage in strategic answering, or a basis for future policy ("the results from this

⁶We also varied whether the system was introduced to improve versus to maintain the current state of affairs. As this variation is beyond the scope of the current paper, we collapsed the data across these categories.

survey will be used by Dutch policymakers to shape future transport policy”), in which case participants would perceive a stronger incentive to engage in strategic answering. Many participants, regardless of our manipulation, thought that the survey was meant to “inform future policy” ($N = 362$, 64.4%), implying our manipulation of the purpose of the study was too subtle to override participants’ own expectations. Thus, we did not examine this factor in the subsequent analyses.

Dependent Variables

Participants then answered a battery of questions (see Web Appendix 8). They indicated their level of agreement with different statements regarding the kilometer charge, using a seven-point scale (“completely disagree/completely agree”). To avoid common method variance, we included in this battery randomly ordered items that measured perceived personal attractiveness (“I think this measure will benefit me financially” and “This measure will result in financial costs for me” [reverse coded]; $M = 4.05$, $SD = 1.73$, Cronbach’s $\alpha = .72$), items measuring perceived fairness (“I think this measure is unfair” [reverse coded] and “I feel that the proposed measure is fair”; $M = 4.34$, $SD = 1.74$, Cronbach’s $\alpha = .82$), support levels (“I think it would be good if this measure were to be implemented” and “I think this measure is acceptable”; $M = 4.09$, $SD = 1.85$, Cronbach’s $\alpha = .95$), and perceived effectiveness of the kilometer charge (“I think this measure will be effective in reducing congestion,” “I think this measure will reduce traffic noise,” and “I think this measure will improve air quality”; $M = 3.58$, $SD = 1.46$, Cronbach’s $\alpha = .87$). Note that we intentionally included not only items measuring traffic congestion, but also items gauging beliefs pertaining to related environmental problems caused by car use, notably air quality and traffic noise.

The battery also included items measuring whether participants found the presented effectiveness estimates credible (“I think this measure will indeed lead to the estimated reduction in congestion” and “I don’t think this measure will lead to the estimated reduction in congestion” [reverse coded]; $M = 3.74$, $SD = 1.57$, Cronbach’s $\alpha = .80$). We randomized the order of items in this battery to counter common method variance (Podsakoff et al. 2003). Web Appendix 9 presents the inter-construct correlations. Finally, we included a manipulation check at the end of the questionnaire asking for recall the expected effects (A: “2.4% less traffic during rush hours,” B: “11.7% less traffic during rush hours,” and C: “don’t recall”).

Results

Most participants ($N = 563$, 79.7% of the 706 completing this question) correctly recalled whether, and if so, which effectiveness estimate (i.e., 2.4% vs. 11.7% less traffic during rush hours) was presented in their scenario, confirming they had actually read and understood the information presented in the scenario. We limited our subsequent analyses to these 563 participants. Unless mentioned explicitly, however, the results are the same when including the larger sample.

The Impact of Differences in Fairness on Effectiveness Skepticism

We expected participants to consider kilometer charging fairer when it featured carbon dioxide differentiation, and our data confirm this expectation: participants considered kilometer charging fairer when it did ($M = 4.55$, $SD = 1.68$) versus did not

($M = 4.05$, $SD = 1.78$), ($b = .25$, $p < .05$) feature carbon dioxide differentiation. Thus, we conclude that our fairness manipulation was successful.⁷

We moved on to testing H_2 . As in Study 1, we tested our reasoning in two steps: In Step 1, we examined whether our manipulation of fairness resulted in changes in the dependent variable, effectiveness beliefs, and in Step 2, we examined the underlying process: do changes in effectiveness indeed stem from changes in support levels? The two steps imply serial mediation. The PROCESS macro allowed us to test this directly, using model 6.

Steps 1 and 2

We regressed effectiveness beliefs onto carbon dioxide differentiation, including perceived fairness and support as serial mediators. Figure 8 illustrates the individual pathways. The only statistically significant mediational path was that running via from carbon dioxide differentiation $\rightarrow$ fairness $\rightarrow$ support $\rightarrow$ effectiveness. The bias-corrected 95% CI (5,000 bootstrap samples) for this serial mediation did not include zero (.0597; .2296). In other words, participants considered kilometer charging fairer when it includes carbon dioxide differentiation, which in turn makes them more supportive. This increase in support explains why consumers become less skeptical about the effects of the charge, and it is consistent with the notion that differences in support cause changes in effectiveness beliefs.⁸

The Impact of Optimistic Effectiveness Information on Support

Next, we tested a logical implication of H_3 : if effectiveness skepticism arises as a consequence of opposition, reducing such effectiveness skepticism may not be sufficient to decrease opposition. First, we checked whether our manipulation of expected effectiveness was successful in influencing participants’ effectiveness beliefs. Participants who learned that kilometer charging would “cut congestion in half” were somewhat less skeptical about the effectiveness of kilometer charging ($M = 3.81$, $SD = 1.51$) than those who received no information ($M = 3.55$, $SD = 1.51$). Participants who learned that kilometer charging “would reduce congestion somewhat” became even more skeptical about the effectiveness of kilometer charging ($M = 3.30$, $SD = 1.42$) relative to those who received no information at all.⁹ We

⁷We also ran a 2 (carbon dioxide differentiation: yes/no) $\times$ 3 (effectiveness information) analysis of variance with perceived fairness as the dependent variable. The fairness manipulation did ($F(1, 557) = 12.11$, $p < .001$), but the manipulation of expected effectiveness did not ($F(2, 557) = .75$, n.s.) affect participants’ perceptions of fairness. The two manipulations did not interact ($F(2, 557) = .06$, n.s.).

⁸We conducted two additional simple mediations, in which we reversed the role of support and effectiveness. We did not find that the effect of carbon dioxide differentiation on support is mediated by effectiveness beliefs (.10; 95% CI: [−.0045, .2101]), whereas the indirect of carbon dioxide differentiation on effectiveness is significant when support is entered as the mediator (.13; 95% CI: [.0460, .2195]).

⁹We find somewhat stronger effects when analyzing the impact of our manipulation of expected effectiveness on the single item “I think this measure will be effective in reducing congestion,” rather than the composite score including questions about air quality and traffic noise ($F(2, 560) = 9.01$, $p < .001$, $\eta^2 = .031$). The effect of the manipulation of expected effectiveness on participants’ composite effectiveness beliefs is no longer statistically significant when controlling for perceived credibility of the estimates.

Figure 8. Serial Mediation

** $p < .01$.
 *** $p < .001$.

conclude that our manipulation of expected effectiveness has a small, but discernable impact on participants' own effectiveness beliefs ($F(2, 560) = 5.65, p < .01, \eta^2 = .020$).¹⁰

Next, we tested whether our manipulation of expected effectiveness would impact participants' support levels. We ran an analysis of variance with effectiveness information as the independent variable, and support as the dependent variable. As expected, we found no main effect of our information manipulation on support levels ($F(2, 560) = .91, n.s., \eta^2 = .003$). Participants who learned that kilometer charging would "cut congestion in half" were no more supportive of kilometer charging ($M = 4.11, SD = 1.77$) than those who received no information ($M = 4.09, SD = 1.86$). Those who heard that kilometer charging only resulted in modest effects on congestion were least supportive ($M = 3.88, SD = 1.92$), but this result was not statistically different from the other groups. In sum, although our manipulation of expected effectiveness reduced skepticism, we found no evidence that it increased support.¹¹

Alternative Ways to Boost Support

These results bring up the question: how *can* support be boosted? Although our key focus of this paper is on understanding the cause of skepticism, this study also allowed us to explore this question. Our conceptual model implies that policymakers should focus on addressing the underlying cause

opposition (i.e., addressing a perceived lack of fairness) rather than exclusively addressing its consequence (i.e., refuting effectiveness skepticism with information). To test this reasoning, we regressed support onto carbon dioxide differentiation, including fairness and attractiveness as parallel mediators (PROCESS macro model 4). Figure 9 illustrates the individual pathways. Kilometer charging received more support among participants who learned that the kilometer charge would be based on the carbon dioxide emissions of one's car ($M = 4.26, SD = 1.85$), relative to those who heard there would be no such differentiation ($M = 3.78, SD = 1.83$); $F(1, 557) = 10.29, p = .001, \eta^2 = .018$). Furthermore, the fact that participants considered kilometer charging fairer when it featured carbon dioxide differentiation made participants more supportive: (carbon dioxide differentiation → perceived fairness → support; 95% CI: [.0815, .2994].

Unexpectedly, participants also considered kilometer charging more attractive to them personally when it did versus did not feature carbon dioxide differentiation (differentiated: $M = 4.17, SD = 1.69$; not differentiated: $M = 3.85, SD = 1.72$). Although carbon dioxide differentiation had a stronger impact on the target construct—participants' fairness perceptions ($b = .25, p < .001$; see Figure 9)—the effect on perceived attractiveness was statistically significant as well ($b = .16, p < .05$). In addition, the sense that carbon dioxide differentiation would render the kilometer charge more attractive to them personally made participants more supportive (carbon dioxide differentiation → perceived personal attractiveness → support; 95% CI: [.0063, .0749]).¹²

Discussion

Study 3 manipulated the second mediator of our basic model—perceived fairness. As expected, carbon dioxide differentiation caused participants to view kilometer charging as being fairer. In turn, this perception of fairness reduced participants' effectiveness skepticism, thus supporting H_2 . The relation between perceived fairness and effectiveness beliefs is mediated by support, which is consistent with the notion that effectiveness skepticism follows from support, rather than vice versa, in support of H_3 .

We also varied effectiveness information. We found that providing optimistic estimates on the effectiveness of the charge, although successful in reducing participants' effectiveness skepticism, did *not* increase their support for the charge. The awareness that the kilometer charge would take into account the emissions standards of one's car, however, not only increased participants' fairness perceptions, but also increased

¹⁰We additionally ran a 2 (carbon dioxide differentiation: yes/no) $\times$ 3 (effectiveness information) analysis of variance with effectiveness as the dependent variable. Both the effectiveness ($F(1, 557) = 4.97, p < .05$), and the fairness manipulation ($F(2, 557) = 6.19, p < .01$) influenced people's skepticism levels: participants became less skeptical when they were exposed to optimistic information, and when they heard kilometer charging would feature carbon dioxide differentiation. The two manipulations did not interact ($F(2, 557) = .35, n.s.$).

¹¹To evaluate the relevance of this null finding, we also estimated a Bayes factor (BF; Kass and Raftery 1995) for the main effect of our manipulation of expected effectiveness on support. Social scientists are increasingly using BFs to assess the relevance of null findings (see, e.g., Mulder and Wagenmakers 2016). Specifically, a BF allows researchers to compare the fit of the data under the null hypothesis (in our case, our manipulation of expected effectiveness does not affect participants' support) and alternative hypothesis (in our case, our manipulation of expected effectiveness changes participants' support). The BFs are especially relevant when calculated in the context of well-powered studies, which we ensured by employing a relatively large sample ($N = 563$). Our analysis yielded a BF10 of .048 (and a BF01 of $1/.048 = 20.83$), suggesting our data were 20.83 times more likely to occur under a model without including an effect of our manipulation of expected effectiveness (BF01) than under a model including it (BF10). In other words, these data strongly favor (Kass and Raftery 1995) the null hypothesis that our manipulation of expected effectiveness, though it decreased participants' effectiveness skepticism, did not increase their overall support.

¹²This effect was not statistically significant when including the larger sample ($N = 710$).

Figure 9. Parallel Mediation

* $p < .05$.

*** $p < .001$.

their perception that kilometer charging was more attractive to them personally. This latter finding was unexpected but, in hindsight, makes sense. Consumers are known to exhibit a “better-than-average effect” (Svenson, 1981): many consumers overestimate their own desirable qualities. This mechanism may explain why participants thought that the kilometer charge would be more attractive to them personally when it featured carbon dioxide differentiation; they may have been under the (erroneous) assumption that they cause fewer emissions than the average driver.

General Discussion

Consumers are sometimes skeptical about the effectiveness of incentive programs aimed at addressing societal problems, such as environmental pollution. Although policy makers currently view this effectiveness skepticism as an important impediment preventing implementation, little is known about the causes of this phenomenon. This paper sheds new light on this question.

We argue that effectiveness skepticism can arise as not only a cause but also a consequence of opposition. Before implementation, it is difficult to determine whether a program will actually be effective in reducing environmental problems. However, a policy’s specific features may cause consumers to spontaneously infer whether implementation would be attractive to them personally and whether it would be fair, which may lead them to support or oppose such policies. Importantly, as a result of this initial support judgment, consumers may be motivated to view unattractive (H_1) and unfair (H_2) policies as being ineffective in solving environmental problems.

We systematically tested these hypotheses in three empirical studies. Employing a large and culturally diverse sample, Study 1 yielded initial correlational support for the three hypotheses: perceptions of both personal attractiveness and fairness predicted differences in consumers’ support levels, which in turn account for consumers being more skeptical about push than pull measures. To test our hypotheses experimentally, Studies 2 and 3 employed experimental designs. Study 2 systematically varied whether the same incentive program, carbon trading for households, would be attractive or unattractive to participants. In line with H_1 , we found that participants were most skeptical when they were under the impression they would end up among the losers than among the winners. Study 3 manipulated whether kilometer charging implied a subjectively fair distribution of costs and benefits. We found that participants were less skeptical when kilometer charging featured carbon dioxide differentiation, consistent with H_2 . All studies additionally offered mediational evidence for the notion that skepticism can also follow

from support, rather than vice versa (H_3). In line with this causal ordering, we also found in Study 3 that offering optimistic estimates about the policy’s expected effectiveness, although successful in reducing effectiveness skepticism, did *not* boost support for kilometer charging.

Policy Implications

Policy makers currently view addressing skepticism directly (by communicating that implementation will reduce environmental problems) as an important strategy through which public support can be mustered. While offering such information—as we found in Study 3—may successfully reduce consumers’ effectiveness skepticism, it may not always be sufficient to boost support. Beyond the fact that opponents may consciously recognize such communication attempts as a deliberate attempt to persuade (Friestad and Wright 1994) or control (Clee and Wicklund 1980) them, our research implies such communications may not be sufficient because they might merely address a consequence and not the ultimate cause of opposition: the fact that a policy is perceived as personally unattractive or unfair.

What does this mean in practice? Implementing an incentive program often entails that a subgroup of consumers (e.g., those currently driving energy-inefficient cars) will be exposed to additional costs or inconvenience. Trying to sugarcoat this outcome (e.g., by only highlighting the positive outcomes for winners) in practice will be difficult; losers may intuitively understand that implementation will be unattractive to them personally, which may cause them to become skeptical as well. However, policy makers can explicate how and why their policies, despite going against the individual interests of specific subgroups, allow for a fair redistribution of costs and benefits. The data from Study 3 provide a first hint that this strategy may be able to reduce skepticism and, more importantly, ultimately boost support.

Contribution

We are not the first to argue that perceptions may be biased by prior judgments (see, e.g., Campbell and Kay 2014; Sherif and Hovland 1961). However, to our knowledge, the current study is the first to apply this theoretical lens to a pertinent question that has been puzzling policy makers for years: why do consumers and experts disagree so vehemently about the environmental effects of to-be-implemented incentive programs? Moreover, by identifying a new cause of effectiveness skepticism, our paper provides practical, hands-on advice: in addition to trying to convince skeptics that a certain policy is effective in addressing environmental problems, policy makers aiming to boost public support should also focus on other potential causes of skepticism, such as the notion that implementation could be perceived as unattractive or unfair.

Limitations and Future Research

Across three studies, using a variety of policies and samples, we find mediational evidence suggesting that skepticism can also follow from support. However, we cannot rule out that common method variance inflated these mediations to some extent; although we presented the individual items randomly, they were administered at the same point in time. Moreover, mediation

analysis, in of itself, does not prove causation. As a stronger test of this hypothesis, we exposed participants in Study 3 to pessimistic and optimistic estimates of the likely effects of kilometer charging. This information did reduce participants' skepticism, but it did not boost their support. Although it is impossible to rule out alternative explanations for this nonsignificant result, this particular study provides another empirical hint that effectiveness skepticism need not always be a major impediment to support. However, future research should provide more conclusive evidence.

The results from Study 2 suggest that effectiveness skepticism is likely when consumers realize that implementation could be unattractive to them personally—when they are reminded of their own carbon footprint. Although such inferences of personal unattractiveness may sometimes happen spontaneously (e.g., in the case of energy taxes, consumers will automatically realize that implementation will be unattractive to them personally), they do not have to happen by default. For example, the Dutch media has extensively covered the kilometer charge (Study 3), oftentimes negatively. It is conceivable that such media mentions had an impact: they may have made previously neutral consumers overly pessimistic about the implications for them personally, thereby amplifying effectiveness skepticism.

Such negative biases are, however, not the only possible outcome. As discussed previously, consumers sometimes exhibit a better-than-average effect: they may erroneously believe they pollute less than average and therefore would end up among the winners. Thus, effectiveness skepticism may be influenced by factors that can attenuate (i.e., the better-than-average effect) or amplify (i.e., active reminders of personal unattractiveness) it. Future research should more systematically examine this possibility.

Conclusion

Given the urgency with which environmental problems such as resource depletion and climate change must be addressed, policy makers are looking for ways to secure sufficient public support to implement incentive programs that stimulate environmentally friendly consumer behavior. Many studies have identified effectiveness skepticism as an important impediment preventing public support for such policies. However, much less is known about the cause of this skepticism. We argue that effectiveness skepticism can arise as a consequence of opposition: consumers oppose policies that are (financially) unattractive for them personally or that they consider unfair, and this motivates them to also be skeptical about the (environmental) effectiveness of unattractive or unfair policies.

We caution that this finding does not mean that consumer concerns about the effectiveness of a policy should not be taken seriously. Indeed, research suggests that when consumers personally witness the beneficial effects of an incentive program after implementation (e.g., reduced traffic congestion, decreased smog), they tend to become more supportive (Eliasson and Jonsson 2011; Schuitema, Steg, and Forward 2010). However, as long as a policy has not been introduced, consumers can only envision and cannot experience how effective this policy is going to be. Perceptions of such *expected* effects, as our study suggests, may be biased by more salient perceptions of personal attractiveness and fairness. Policy makers

therefore are well advised to implement these programs using trials and experiments, so that consumers can personally witness the environmental effectiveness of a policy. This strategy will allow consumers to base their own effectiveness beliefs on accessible input, and thus make them less susceptible to biases.

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