Greenwashing and public demand for government regulation

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Author(s):
Kolcava, Dennis

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Dennis Kolcava

ETH Zurich, Zürich, Switzerland
E-mail: dennis.kolcava@ir.gess.ethz.ch

Abstract

Environmental governance in many high-income democracies relies to some extent on self-regulation by the private sector. Yet, this policy mode is contested and proponents of top-down government regulation argue that voluntary corporate sustainability commitments remain shallow and rarely are more than greenwashing. I assess to what extent firms' business conduct is subject to societal checks and balances, in particular, whether public support for regulation constitutes a control mechanism of corporate contributions to environmental goods. I rely on an original survey experiment (N = 2112) conducted with a representative sample of the Swiss voting population. The analysis shows that accusing firms of greenwashing reduces both citizens' perceived effectiveness of self-regulation and perceived synergy of corporate profits and environmental protection. However, this attitudinal shift only translates into modest updates in respondents' policy preferences. As a result, short-run shifts in public support for regulation are an unlikely societal control mechanism of business conduct.

Efforts by political leaders in many high-income democracies of the Global North to move the environmental impacts of human economic activity back to within planetary boundaries remain deficient to this day (Biermann et al. 2022). Among the main reasons for political leaders' inertia are distributional conflicts over societal costs of policy interventions (Aklin and Mildenberger 2020), not least due to private-sector actors' reluctance to shoulder some of these costs (Kinderman 2016). For example, corporate lobbying against enforceable legislation to reduce the environmental impacts of business activity likely contributes to entrenched political debates (Vesa et al. 2020). Thus, as the lowest common denominator, policymakers in many countries rely on voluntary environmental action by the private sector (Lambin and Thorlakson 2018). However, self-regulation delegates the task of reducing environmental externalities from economic activity directly to firms, even though extant literature shows that voluntary measures might not result in

substantial improvements (LeBaron and Lister 2021), and partly deserve to be dismissed as "greenwashing" (Lyon and Montgomery 2015).

The reliance on self-regulation by firms raises the question of what mechanisms can lead to an expansion of top-down accountability enforced by the government if companies fail to contribute to environmental goods. This study examines whether public opinion constitutes such a mechanism. Hence, it speaks to previous research, which has examined to what extent corporate business conduct is subject to societal 'checks and balances' (Druckman and Valdes 2019). Prior literature has categorised these societal checks and balances as either 'private politics' (such as product boycotts) or 'public politics' (such as petitions to politicians) (King and McDonnell 2015). Against this backdrop, I assess one specific public politics mechanism by investigating whether denunciations of 'shallow' voluntary corporate measures (meaning measures exceeding regulatory floor standards only by a small margin) as greenwashing affects citizens' public support for top-down regulation of business activity. Thereby, I build on arguments from an emerging literature on how public opinion connects business conduct to political decision-makers' policy choices (Kolcava and Bernauer 2021).

Essential theoretical arguments distinguish between the effects of 'depth' (the extent of private-sector commitments) and 'breadth' (the extent of private-sector collective action) on citizens' regulatory preferences. Malhotra et al. (2019) argue that even shallow commitments can crowd out public support for top-down regulation by the government. This holds for as long as firms in a given sector are able to uphold collective action (breadth). Hence, from that perspective, shallow yet coordinated measures are the most efficient equilibrium for firms within a specific industry. After all, this scenario secures a level playing field within the industry whilst shielding firms from political pressure – that 'shield' being a club good (Potoski and Prakash 2013). Consequently, I test whether the likely shallowness of private-sector self-regulation might expose such equilibria to a political backlash by citizens if the lack of environmental ambition – or even willful disclosure of false information – is publicly denounced.

I test my theoretical arguments using a survey experiment, which I embed in an original survey with a representative sample of the Swiss voting age (18+) population (N = 2112). From a methodological standpoint, studying societal responses to corporate environmentalism using survey experiments can be very useful since survey experiments allow for the identification of causal effects. In contrast, similar work based on observational data is confronted with endogeneity issues (Chrun et al. 2016). Hence, even though there is a need for caution when extrapolating from survey experiments to 'real-world' events (Barabas and Jerit 2010), survey experiments can serve as the equivalent of a simulation by exploring individual responses to hypothetical events. In the experiment, I randomly assign respondents to one of three treatment conditions: a placebo, a text highlighting corporate self-regulation, or a text highlighting corporate self-regulation followed by a greenwashing accusation aimed at those very same self-regulation measures. I exploit two real-world industry cases to contextualise the survey instrument. The empirical design and the survey instrument were pre-registered on Harvard Dataverse (see: Kolcava et al. (2019))

The main finding is that greenwashing allegations change citizens' attitudes towards corporate environmental action. Specifically, accusing firms of greenwashing reduces citizens' perceived effectiveness of firms' actions. Moreover, citizens decrease

their perceived synergy of environmental protection and firms' economic interest. Nonetheless, these accusations do not translate into substantial movements in citizens' regulatory preferences and increased demand for new legislation.

The data analysis suggests two main explanations for the observation that citizens, on average, do not update their policy preferences when confronted with evidence of corporate greenwashing. First, citizens update their support for new legislation in response to information about firms' actions contingent on their political and attitudinal priors. In particular, citizens, whose prior positions contradict new information on greenwashing the most (the political right), are more likely to respond to this information by increasing their policy support. The second reason is that the informational environment, in which citizens form policy preferences, varies by industry context – for example, due to the availability of substitute technologies. Similarly, citizens might hold robust policy preferences anchored in strong beliefs induced by active public debates about a particular environmental context (such as plastic waste).

Hence, this study provides insights relevant to firms and policymakers in Switzerland and other high-income democracies. In particular, it extends our grasp of the volatility of public opinion in sustainable economy politics. A thorough understanding thereof is essential because public opinion is likely an important driver of democratic leaders' decisions on whether to rely on voluntary private-sector measures or whether to push for top-down regulation in environmental governance (Schaffer et al. 2021). The findings underline the importance of maintaining organised forms of public-politics societal control such as petitions and campaigns for policy action rather than relying on broad shifts in public opinion. Finally, in terms of policy design, the findings suggest to advance target-setting by public authorities tied to enforceable provisions, in case firm-led voluntary environmental governance turns out to be ineffective.

Theoretical argument

Above and beyond compliance, firms engage in voluntary environmental action for a wide variety of reasons (Brekke and Pekovic 2018). Besides improving business efficiency, some of the main benefits of environmental (collective) action for firms materialise in the political realm (Fooks et al. 2013) – via increased political access (Werner 2015), more lenient regulatory enforcement (Hong et al. 2019), or regulatory pre-emption (Maxwell et al. 2000). Crucially, if companies engage in industry-wide collective action to reduce political or regulatory pressure, they will probably aim to reduce public scrutiny at the lowest possible cost (Fleckinger and Glachant 2011). Accordingly, broad but shallow environmental commitments appear to be the most likely outcome of that strategic calculus. The relatively high likelihood of shallow private-sector commitments is reflected by an extensive amount of empirical research demonstrating that, without institutionalised oversight, the environmental benefits resulting from voluntary corporate action remain modest (Berliner and Prakash 2015; Sellare et al. 2022; Pye 2019). Yet, by engaging only in shallow environmental commitments, firms expose themselves to reputational risks (McGuire et al. 2022). That is, they expose themselves to being accused of greenwashing – at best overstating marginal environmental improvements, or at

worst willful misinformation and deception (Lyon and Montgomery 2015). However, beyond organised societal control (such as civil society-driven petitions) and its repercussions in public politics, how likely are greenwashing accusations to facilitate policy action by stirring broad public opinion demands for regulation?

I propose that societal control via public opinion could manifest itself in two steps. First, the public denunciation of private-sector measures as greenwashing would have to shift citizens' attitudes towards firms' actions and policy preferences in favour of government regulation. In a second step, these updated policy preferences would have to be translated into actual policy changes. In that regard, extant research indicates that citizens' policy preferences shape governments' agendas (Chu and Recchia 2022), not least in environmental governance (Anderson et al. 2017). Therefore, the following argument and analysis focus on the first step – the required update in citizens' preferences when confronted with greenwashing accusations.

Greenwashing and policy preference formation

In a recent study, Kolcava et al. (2021b) put forth a framework of citizens' policy preference formation $R = R(P(L), M(L))$, in which public demand for an additional unit of government policy (R) increases with the perceived environmental effectiveness of additional government policy (P) and decreases with the perceived marginal cost of additional environmental action (voluntary or not) by the private sector (M). P decreases, while M increases with the current perceived level of firms' voluntary self-regulation L.

In extension to this framework, the perceived level of self-regulation L likely depends on two related but distinct sub-dimensions. Specifically, L should be determined by a combination of i) the perceived environmental effectiveness, which is the expected problem-solving capacity given the 'depth' of private-sector commitments (Malhotra et al. 2019)), and ii) the perceived credibility of those commitments. The credibility aspect is crucial because, for the most part, citizens cannot verify the concrete benefits of firms' environmental actions themselves. Hence, given this information asymmetry, citizens may be more likely to rely on heuristics (cognitive shortcuts in decision-making under uncertainty) in evaluating firms' actions and forming preferences in response (Colombo and Steenbergen 2020). Specifically, assuming that it is common knowledge that firms maximise profits, whether environmental protection is perceived as congruent with firms' economic interest might be an important credibility heuristic. Put differently, the perceived credibility of private-sector environmental efforts should increase with the perceived synergy between environmental protection and corporate profits.

Consequently, accusations of greenwashing likely undermine both sub-dimensions of L by indicating i) that firms' current commitments do not contribute to environmental problem-solving and ii) that firms' claims of environmental stewardship are a strategy to conceal ongoing profit maximisation in environmentally harmful ways. As a result, greenwashing accusations should lead to a decrease in the perceived level of private-sector self-regulation L. Hypothesis H_1 summarises these arguments:

Hypothesis H$_1$: An accusation of greenwashing is i) likely to decrease citizens' perceived effectiveness of self-regulation and ii) likely to decrease citizens' perceived synergy of environmental protection and firms' economic interest.

In short, following the preference formation framework outlined above, a reduction in L would have a positive effect on P and a negative effect on M. As a result, demand for additional government regulation R should, on average, increase. Hypothesis H$_2$ summarises this expectation:

Hypothesis H$_2$: An accusation of greenwashing is likely to increase citizens' support for intervention by the government – both in terms of greater surveillance of voluntary action and in terms of replacing voluntary action by top-down regulation.

Many public opinion studies demonstrate that citizens' attitudinal responses to new information are not trivial because at least three dimensions other than the substantive content of information (about which I hypothesise) matter. First, the effect of information can be subject to messenger effects. This can lead citizens, who perceive their views to be at odds with the messenger's, to dismiss the information (Turner 2007). In our case, citizens could dismiss the accusation of greenwashing (for example, due to a bias against mainstream media) and, thus, fail to update L and consequently, R as well. Second, the prior informational ('pretreatment') environment and the strength of prior attitudes can influence the direction and magnitude of opinion updates in response to new evidence (Howe and Krosnick 2017). In the context of greenwashing, citizens could hold robust perceptions of voluntary environmental action by firms (due to frequent exposure to related information) and strong policy preferences (due to salient public debates). In such a scenario, greenwashing accusations hardly could move L, and thus, would likely fail to substantially shift R.

Study design

I test the theoretical argument using an experiment (Mutz 2011), which was embedded in an original survey. The data was collected between 25 November and 10 December 2019, relying on one of the most sizable commercial online panels in Switzerland (the Intervista panel), from which a quota sample of 2112 citizens of voting age (18+) was drawn. Quotas on respondents' age, gender (interlocked with age), education, and regional provenance ensured that the sample was representative (with respect to these properties) of the Swiss voting population (see Appendix Section A.3). The survey was implemented in Switzerland's three main languages: German, French, and Italian, and was approved by the ETH Zurich's Ethics Review Commission (decision EK 2019-N-143).

Case selection

As I aimed to test the theory in a setting, which was concrete and straightforward to respondents, I tailored the survey experiment to two real-world industry contexts.

The first context addressed disposable plastic waste (packaging) and the voluntary reduction thereof in the retail industry. The second context focused on greenhouse gas (GHG) emissions by cars, and specifically, car importers' self-regulation to reduce those emissions by increasing the share of climate-friendly (battery-electric) vehicles in their product range. Currently, there are no Swiss car manufacturing companies, so Switzerland imports all the vehicles sold on the market.

Both contexts share important properties: First, both contexts are characterised by favourable conditions for industry-level collective action since both industries revolve around a small number of large companies, which are members to industry-wide business associations. Second, respondents perceive both industry contexts as highly and similarly important. Appendix Table A.6 shows that (pre-experiment) around 44% (88%) of the sample selected either Swiss cars' GHG emissions or plastic waste as the most important (a top 3) environmental issue in Swiss politics. Accordingly, both contexts are present in public debates and mainstream media, which allowed me to rely on real-world corporate statements and media coverage in the treatment design. Third, regarding plastic waste, virtually no regulation, standards or financial incentives (such as taxes) neither for retailers nor for consumers exist. Similarly, although government standards (analogue to EU targets) for average CO_2 emissions of Swiss importers' car fleets have been implemented, policy incentives to increase the share of climate-friendly (especially, battery-electric) vehicles remain weak. As a result, the uptake of electric vehicles in Switzerland amounts only to around 2% of new car registrations and the Swiss car fleet has a comparatively poor emissions record (Brückmann and Bernauer 2020).

A relevant difference between the two industry contexts pertains to the availability of environmentally superior substitutes to current technology. In the car context, environmentally friendly alternatives – electric cars – exist and adoption depends largely on the interplay of market forces and government policy interventions. In contrast, in the retail industry context, the environmental superiority of substitutes to disposable plastic products is contested (Hunt et al. 2021). Since other unobserved differences might exist, I do not formulate theoretical expectations ex ante on how industry idiosyncrasies could influence the results.

Experimental treatment design

Respondents were randomly assigned to complete the entire survey experiment in one of the two contexts. The order of contents within the survey experiment was the following: Respondents were first provided with introductory information on their assigned industry context and the current policy debate on that matter. To pre-empt socially desirable response behaviour, these introductory texts indicated that extensive state-led measures to curb plastic waste or to reduce CO_2 emissions by imported cars could be costly to consumers. In the next step, respondents were assigned to the placebo group or one of the information treatment groups (see below). After reading the placebo or treatment vignette, respondents were confronted with the survey items operationalising the dependent variables. Respondents were then asked to indicate their policy preferences (items presented one per survey page in randomised order). Following that, respondents were asked to respond to the items

Table 1. Overview of experimental design

Treatment/Group	Placebo	Plastic Self-Reg.	Cars Self-Reg.	Plastic Green-washing	Cars Green-washing
Do firms engage in voluntary action?	No mention	Yes	Yes	Yes	Yes
Is voluntary action greenwashing?	No mention	No	No	Yes	Yes

measuring attitudes towards voluntary environmental action by firms (items presented one per survey page in randomised order).

Respondents were assigned at random to one of five groups – one placebo group and two treatment groups per industry. Table 1 summarises the setup of the treatment vignettes. Appendix Sections A.1.1 and A.1.2 report English translations of all original German components of the survey experiment.

The placebo consisted of a neutral description of a political tool called a "Motion", which is a procedural request at the disposal of Swiss parliamentarians to suggest drafts of legislative proposals in either chamber of the Swiss Parliament. In terms of content, the placebo transitioned well into either context introduction as in both cases, "Motions" have been put forth by members of Parliament.

In the next step, respondents, who were assigned to one of the self-regulation treatment arms, were presented a text containing information about voluntary measures by firms before moving to the dependent variable items. Specifically, the *self-regulation*-vignette conveyed the following key messages:

- Retail firms (car importers) consider themselves pioneers in environmental protection.
- Retail firms (car importers) are reducing the environmental impacts of their business activity already.
- Retail firms (car importers) are promising substantial results of their efforts soon.

As an example, the treatment vignette in the retail context read as follows:

"*Swiss companies in the retail trade (e.g. Migros, Coop) see themselves as pioneers in environmental protection. They are already voluntarily working intensively on how they can design packaging in an environmentally friendly manner and replace disposable plastic products. By 2025 they want to use only recyclable plastic or sustainable materials for packaging and disposable products (e.g. disposable tableware, cotton swabs). For this reason, plastic is largely replaced by vegetable materials (e.g. paper, cardboard) for these products. Retailers promise, for example, to reduce the use of plastic packaging by at least 12,000 tonnes by the end of 2020. This would mean a reduction of almost 5% of the total plastic waste of all Swiss households.*"

Participants who were assigned to one of the greenwashing treatment arms were also shown the same information about self-regulation first. The reason for this

design is that, naturally, private-sector claims about environmental stewardship are a necessary precondition for greenwashing accusations. On a related note, this experimental design replicates a real-world setting more closely, where citizens trade-off diverse (and potentially conflicting) pieces of information. Next, these respondents were shown an accusation of greenwashing framed and formatted to look like an excerpt from a magazine article, which conveyed the following information:

- Retail firms (car importers) are profiting from current unsustainable business practices.
- Retail firms (car importers) are exaggerating the extent to which they are environmentally progressive.
- Retail firms' (car importers') claims about voluntary environmental action are not trustworthy.

Hence, the treatment vignette in the retail context read:

Article title: **"Paper is not better"**

Article summary: *"It makes no ecological sense for retailers to replace plastic with paper. However, by making their business appear green, retailers can sell their customers a clear conscience."*

Article text: *"Sales of convenience products (e.g. salads, sandwiches) are currently growing strongly. Retail companies are benefiting greatly from this. However, finished products are available on the shelves only in disposable packaging. The retail trade has taken up the cause of using "sustainable materials" (e.g. paper) for packaging and other disposable products (e.g. cotton swabs). However, environmental experts say: "Disposable products made of paper do not perform better in the life cycle assessment than disposable products made of plastic. On the contrary: the production of paper fibres requires much more water and energy, and more chemicals must be used." So to be genuinely environmentally friendly, the retail trade would have to sell fewer convenience products and forego good business. When companies claim that their business is environmentally friendly, wariness is therefore called for. Frequently, this is a bold lie that we, as consumers, like to believe."*

Moreover, respondents in the greenwashing treatment group were shown a graphic underscoring the key message of the greenwashing treatment. I ensured that respondents understood the treatments by including a comprehension check. Respondents who did not provide the correct answer were prompted to reread the treatment text. Moreover, I nudged respondents to read the texts diligently by hiding the 'next' button on the bottom of the survey page for 15 seconds in the first reading of the *self-regulation*-vignette (10 seconds in a potential second reading) and for 20 seconds in the first reading of the *greenwashing*-vignette (15 seconds in a potential second reading). Finally, I included a manipulation check, which tasked respondents with rating the strength of retailers' (car importers') voluntary environmental action on a 7-point scale.

Dependent variables

To test Hypothesis H_1, I requested respondents to report their (dis)agreement concerning statements about the perceived effectiveness of firms' voluntary measures and the perceived synergy of environmental protection and firms' economic interest on 7-point scales:

- *The voluntary measures by retailers (car traders) substantially reduce the environmental (climate) impacts of disposable products (cars) in Switzerland.*
- *The protection of the environment (climate) is not in the economic interest of retailers (car traders).*

Hence, if Hypothesis H_1 holds, the *greenwashing*-treatment should *decrease* average agreement with the first statement and *increase* average agreement with the second statement relative to both other experimental conditions. To account for alternative attitude shifts, I recorded respondents' perceptions of consumers' (as opposed to firms') responsibility to reduce environmental impacts of plastic waste/cars and the perceived consumer cost consequences of new government regulation.

Respondents' policy preferences were also operationalised by two items requesting respondents to indicate (dis)agreement with statements on 7-point scales. The first of these items quantified support for mandatory reporting requirements for firms (i.e. government increasing surveillance/transparency of voluntary action):

- *New legislation should require retailers (car traders) to write a formal, public report on how exactly they are reducing the use of disposable plastic (CO_2-emissions).*

The second statement elicited respondents' support for top-down regulation (i.e. government stepping in to replace corporate self-regulation):

- *The use of disposable products, regardless of the material used (cars with petrol or diesel engines), should be drastically reduced by legislation.*

If Hypothesis H_2 holds, I should observe higher average agreement with both statements among respondents who were assigned to the *greenwashing* treatment, relative to respondents in both of the other experimental groups. I estimated a linear ordinary least squares (OLS) regression model to analyse the effects of the *greenwashing* treatment relative to the *self-regulation*-treatment and relative to the placebo. Due to small imbalances created by random assignment to both the treatment groups and the industry contexts (see Appendix Tables A.2 and A.1), I include control variables in the models.

Results

In the empirical analysis, I first report pooled estimates of the treatment effects on the main outcome variables – i.e. whether accusations of greenwashing shift citizens'
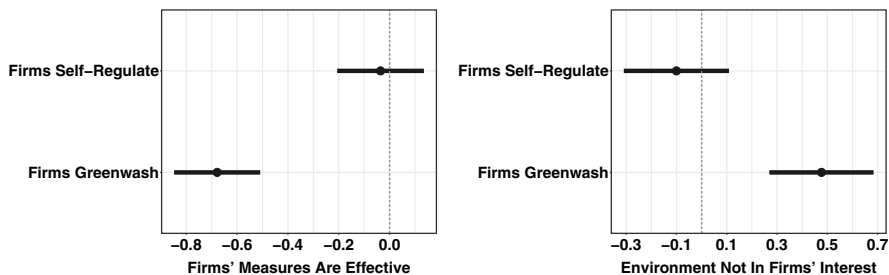
Figure 1 Pooled estimates of treatment effects relative to the placebo group on respondents' perceived effectiveness of self-regulation (left, N = 2037) and perceived synergy of environmental protection and firms' economic interest (right, N = 2051). Responses were measured on 7-point scales. Whiskers report 95% confidence intervals. Controls included.

perceived effectiveness of voluntary private-sector measures and perceived synergy of environmental protection and firms' economic interest (H_1). I then investigate if greenwashing accusations change citizens' support for government intervention (H_2). I further explore heterogeneous treatment effects across industry contexts and individual characteristics.

How greenwashing affects perceptions of self-regulation

To begin with, I test how the treatments affected the manipulation check included in the survey. This check asked respondents to rate the strength of retailers' (car importers') environmental efforts on a 7-point scale immediately after completing the treatment section of the survey experiment. Both the *self-regulation*-vignette and the *greenwashing*-vignette trigger significant and substantial movements in responses in the expected directions (that is, higher ratings for *self-regulation*, lower ratings for *greenwashing*) relative to the placebo group (thus, also relative to each other) (see Appendix Table A.3). Thus, respondents received the information treatments as intended by the study design.

Figure 1 illustrates the results concerning respondents' perceptions of voluntary corporate environmental action. Relative to the placebo, the *greenwashing*-vignette significantly decreases respondents' perceived effectiveness of private-sector measures (decrease by 0.68, on a 7-point-scale, 16.5% of the placebo group mean, significant at the 1% level). This estimated effect is substantial, namely about 41% of a placebo group standard deviation. I further observe significant and substantial movements in responses to the *greenwashing*-vignette on the perceived synergy item. On a 7-point scale, the average agreement with the statement increases (thus, perceived synergy decreases) by 0.48 relative to the placebo group (11.8 % of the placebo group mean, significant at the 1% level). This effect amounts to 24% of the placebo group standard deviation. Hence, the evidence reported in Figure 1 corroborates Hypothesis H_1. Accusing firms of greenwashing decreases citizens' perceived effectiveness of self-regulation as well as their perceived synergy of environmental protection and firms' economic interest.
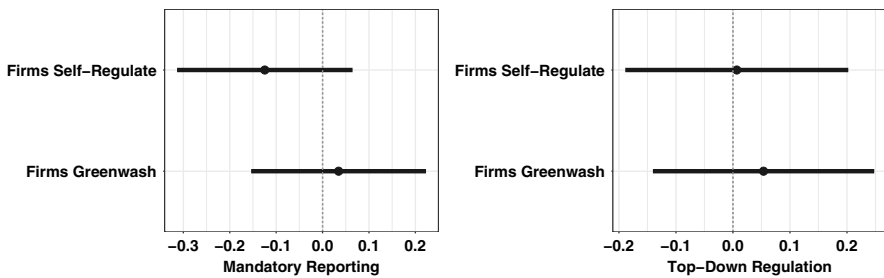
Figure 2 Pooled estimates of treatment effects relative to the placebo group on respondents' support for mandatory reporting requirements (left, N = 2082), and for top-down regulation (right, N = 2084). Responses were measured on 7-point scales. Whiskers report 95% confidence intervals. Controls included.

How greenwashing affects policy preferences

In the following, I assess the treatment effects on respondents' policy preferences pooled across industry contexts. I find that relative to the placebo, the *greenwashing*-vignette does not have substantial or statistically significant effects neither on support for mandatory reporting requirements for firms nor on support for top-down regulation. The *greenwashing*-vignette only induces a small difference relative to the *self-regulation*-vignette on respondents' support for mandatory reporting requirements (increase of 0.16 on a 7-point-scale, 3.25% of the placebo group mean, significant at the 10%-level). I do not observe significant differences between the *greenwashing*-vignette and the *self-regulation*-vignette on support for top-down regulation. In sum, the results summarised in Figure 2 suggest that greenwashing accusations barely shift citizens' policy preferences and, thus, do not support Hypothesis H_2.

Due to random assignment to treatment/placebo, I only observe few significant effects of control variables (see Appendix Table A.4). The results show that respondents who place themselves further to the right on the left-right scale assign higher scores to the strength of environmental commitments by retailers (car importers) in the manipulation check. Accordingly, they are also more likely to perceive environmental action by firms as effective and congruent with firms' economic interest. Moreover, right-leaning respondents are further associated with lower levels of support for government policy, for both mandatory reporting requirements and top-down regulation. Finally, these respondents assign higher responsibility to consumers and perceive regulation to be more costly. As expected, self-identification with the Green Party (GPS, relative to self-identification with the BDP, a middle party) is associated with the opposite effects. Finally, controlling for survey duration has no substantial effect on the findings – see Appendix Table A.5.

Variation by industry context

In the next step, I explore variation in the treatment effects across the two industry contexts (see Table 2). In both industry contexts, the *greenwashing*-vignette significantly and substantially decreases respondents' perceived effectiveness of firms' voluntary measures (stronger effect in the retail context). Also in both contexts, it

Table 2. How greenwashing accusations affect public opinion – results by industry context

Dependent variable

	Vm Effective (p)	Vm Effective (c)	No Interest (p)	No Interest (c)	Reporting (p)	Reporting (c)	Regulation (p)	Regulation (c)	Cons. Resp. (p)	Cons. Resp. (c)	Reg. Cost (p)	Reg. Cost (c)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Firms Self-Regulate	−0.035	−0.076	−0.266*	0.137	−0.219	−0.029	−0.133	0.138	−0.311**	0.023	−0.122	0.066
	(0.116)	(0.122)	(0.147)	(0.150)	(0.137)	(0.136)	(0.128)	(0.138)	(0.136)	(0.133)	(0.125)	(0.133)
Firms Greenwash	−0.830***	−0.537***	0.257*	0.677***	−0.187	0.244*	−0.043	0.175	0.419***	0.055	0.139	−0.305**
	(0.117)	(0.119)	(0.148)	(0.146)	(0.138)	(0.134)	(0.128)	(0.135)	(0.136)	(0.130)	(0.126)	(0.131)
Constant	4.477***	4.571***	2.908***	3.799***	6.150***	5.067***	6.138***	5.151***	2.784***	4.354***	4.597***	4.801***
	(0.517)	(0.550)	(0.655)	(0.678)	(0.615)	(0.623)	(0.565)	(0.626)	(0.601)	(0.604)	(0.562)	(0.606)
Control mean	4.5	3.6	3.76	4.34	4.97	4.81	5.11	3.75	3.77	4.4	4.01	4.76
Control sd	1.55	1.63	1.97	2.00	1.88	1.93	1.74	2.03	1.83	1.82	1.68	1.8
Observations	1,036	1,001	1,042	1,009	1,048	1,034	1,052	1,032	1,057	1,037	1,019	984

Linear regression of treatment group indicators on regulatory preferences and indicators of perceptions of corporate environmental action (see model header). Columns labelled with '(p)' denote results for the retail industry context group, columns labelled with '(c)' denote results for the cars industry context group. Standard errors are displayed in parentheses. Placebo group mean and standard deviation are displayed in bottom rows. Control variables are used (gender, age group, education level, employment, rurality, language, region of Switzerland, self-placement on left-right scale, party ID, and self-stated interest in politics).
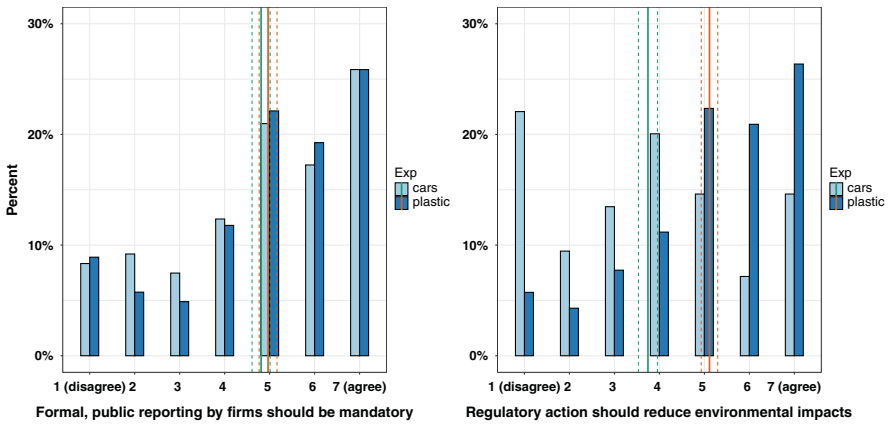**(*, ***) indicates $p < 0.05$ (0.1, 0.01).

Figure 3 Placebo group mean and distribution of support for mandatory reporting requirements (left, N = 696) and top-down regulation (right, N = 698). Responses were measured on 7-point scales. Dashed lines report 95% confidence interval around the means. The dark (light) blue bars and brown (green) lines depict responses for the retail (car import) context.

induces significant positive shifts on the 'not in firms' economic interest' survey item, indicating a decrease in the perceived synergy of environmental protection and firms' economic interest. This effect is substantially stronger in the car context, which could reflect the low adoption rates of readily available environmental substitutes (electric cars). The estimated treatment effects on respondents' policy preferences do not reach conventional statistical significance levels in either industry context – the exception being the effect of the *greenwashing*-vignette on support for reporting requirements for car importers (increase of 0.24 (0.27) relative to the placebo (self-regulation) treatment, significant at the 10% and the 5% level). Furthermore, I observe three areas of industry-related variation in the treatment effects. First, Figure 3 illustrates that while support for increased corporate disclosure (left panel) is rather homogeneous, people are more supportive of regulating the use of disposable products top-down (right panel). Hence, the overall demand for government intervention seems to be higher in the retail context. Thus, the *greenwashing*-vignette might have hit a 'ceiling' in terms of increasing support for regulating plastic waste.

Second, in the retail context, the *self-regulation*-vignette significantly (relative to the placebo, at the 5% level) decreases the perceived responsibility of consumers by 0.31. In contrast, the *greenwashing*-vignette has a positive effect of 0.42 (relative to the placebo, at the 1% level) on perceived consumer responsibility. I do not observe significant effects on perceived consumer responsibility in the car context. Taken together, this might be interpreted as evidence of a more volatile perception of self-efficacy among citizens in the retail context. In other words, if firms greenwash, individuals may feel relatively more obliged to compensate for firms' greenwashing by avoiding goods generating non-recyclable plastic waste. Consequently, perceived self-efficacy might crowd out demand for government intervention in the plastic context. Third, in the car context (but not in the retail context), the *greenwashing*-vignette reduces the perceived cost of regulation to consumers (by 0.31 relative
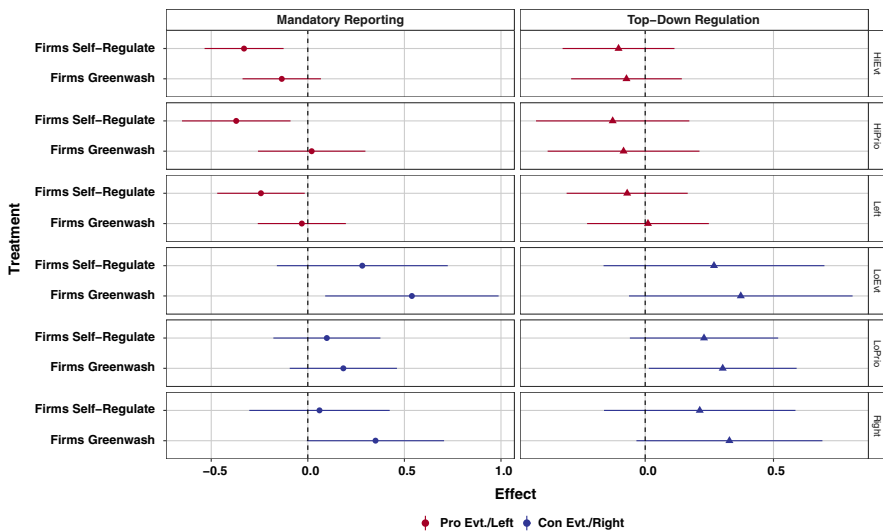
Figure 4 Pooled estimates of treatment effects relative to the placebo group on respondents' support for mandatory reporting requirements (circles, left panel) and top-down regulation (triangles, right panel). Coefficients are shown for subgroups at high ("HiEvt") and low ("LoEvt") levels of environmental attitudes: an environmental score of "higher" versus "lower or equal" than 3, the midpoint of the five-point scale developed by Diekmann and Preisendörfer (2003); for subgroups selecting ("HiPrio") and not selecting ("LoPrio") either cars' GHG emissions or plastic waste as the most important environmental issue in Swiss politics (see Appendix Section A.1.3); and for subgroups on the political left ("Left") and the political right ("Right"): "lower or equal to" versus "higher" than 6, the midpoint of the 11-point left-right self-placement scale. "Pro-Environmental/Left" subgroup results are depicted in red, "Con-Environmental/Right" subgroup results are depicted in blue. Whiskers report 95% confidence intervals.

to the placebo, at the 5% level). In other words, if car importers are accused of greenwashing, citizens deduct that the potential costs of regulation passed on to consumers will be smaller. This is plausible as the marginal cost of environmental protection is likely smaller at lower levels of private-sector self-regulation (see the decision-making framework in the theory section). To sum up, the industry-specific effects indicate that the informational environment, in which citizens form preferences, differs by industry context. Although the pattern does not identify one specific driver, the availability of environmentally superior substitutes could be a potential source of variation.

Variation by individual characteristics

Having examined differences across industry contexts, I next test whether the results are partly driven by heterogeneous treatment effects on different types of citizens. To that end, I separate the main analysis by binary indicators of respondents' environmental attitudes and political ideology. Figure 4 summarises the results (see the Figure caption for details on the sample splits). Since I did not experimentally manipulate these covariates, I only observe correlational evidence. Still, these patterns might be useful to explore important variation in how greenwashing accusations affect citizens' policy preferences.

On the whole, I observe that respondents on the political left, as well as respondents with a high interest in environmental problem-solving (i.e. respondents holding strong environmental attitudes, assigning high political importance to either environmental issue) reduce their support for government intervention in response to the *self-regulation*-vignette. The contrary effects of the *greenwashing*-vignette are not substantial enough to shift preferences in favour of regulation beyond the placebo baseline.

The opposite is the case for respondents on the political right, respondents holding low environmental attitudes and respondents not assigning a high political importance to either environmental issue. That is, even the *self-regulation*-vignette increases support (albeit not significantly) for regulation in these subgroups. This might be interpreted as evidence that respondents in these subgroups perceive government regulation as a "floor-standard" following voluntary private-sector efforts. Whether this is the case is an interesting question for future research. In any case, Figure 4 illustrates that the effects of the *greenwashing*-vignette build on the initial treatment effect, which is why some of the coefficients reach statistical significance at the 5% level.

In sum, these findings point to a decreasing marginal effect of providing specific types of information to particular groups of citizens. Greenwashing accusations might achieve a net increase in public support for regulation among citizens featuring relatively low baseline support levels for environmental policy. In contrast, they are unlikely to shift preferences of citizens who already hold strong attitudes in favour of regulation to attain environmental goals and potentially, high ex-ante suspicions of greenwashing.

Conclusion

In this paper, I examine whether citizens' attitudes and policy preferences constitute a societal checks and balances mechanism of voluntary environmental action by firms. Thus, I link to a politically highly relevant debate concerning the appropriate mix of mandatory government rules and private-sector self-regulation to reduce environmental impacts of economic activity. Theoretically, the existing literature tells us a great deal about private politics (such as product boycotts) as a control mechanism of business conduct (Kam and Deichert 2020). By contrast, this study contributes to the literature interested in different modes of environmental public policy by assessing changes in public opinion – a public politics mechanism – in response to greenwashing allegations. In particular, this study examines if accusing firms of greenwashing is likely to shift citizens' attitudes and policy preferences in favour of the government stepping in and regulating. Thus, this study speaks to the larger matter of what societal control mechanisms of business conduct exist and whether short-run responses in mass public policy preferences could be a relevant force in expanding top-down accountability (implemented by the government).

In a similar vein, this study addresses to what extent cooperative self-regulation equilibria within specific industries are likely to be challenged in the political arena because of their modest environmental output. The scale of this political challenge matters because collective action between firms in specific sectors might be at stake here: If public demand for regulation is sensitive to denouncements of shallow private-sector measures, some firms might face incentives to break away from collective action, signal

stronger environmental commitments, and regain the competitive edge in interactions with policy-makers (Denicolò 2008) or citizens (Kolcava et al. 2021c).

I argued that accusations of greenwashing directed at voluntary private-sector measures would reduce citizens' perceived effectiveness and confidence in the synergy of environmental protection and firms' economic interest. Therefore, I further suggested that greenwashing accusations would increase citizens' support for both increased government surveillance of business conduct and competence to replace voluntary action by mandatory provisions top-down. I tested the theoretical argument using a survey experiment with a representative sample of Swiss voting-age citizens. Thereby, I focused on two industry contexts: disposable plastic in the Swiss retail industry and climate-friendly vehicles in the Swiss car trade. The findings reveal that in both contexts, greenwashing accusations decrease citizens' perceived effectiveness of private-sector measures and the perceived synergy of environmental protection and firms' economic interest. Nevertheless, they do not change citizens' policy preferences on the whole. Hence, as a societal control mechanism of corporate contributions to environmental goods, public support in favour of more government regulation appears to be of limited potency.

In addition, the following three inferences on citizens' policy preference formation can be derived: First, the data analysis indicates that the size of policy preference shifts in response to information depends on individuals' prior political and environmental attitudes. In particular, the findings are consistent with arguments holding that opinion formation follows a Bayesian learning process (Guess and Coppock 2020). Thus, empirically, greenwashing accusations tend to increase levels of support for government regulation among respondents, whose prior attitudes are associated with a preference for small government (to attain environmental goals). Second, policy preferences appear to be more malleable in some industry contexts than in others. The results imply that information on business conduct in specific industries induces different associations, some of which (such as self-efficacy) might crowd out support for government intervention. Similarly, the results suggest that citizens' policy preferences might be relatively insensitive to information about business conduct in familiar or politically salient sectors. This stability could be due to a pretreatment environment characterised by abundant information and active public debates (Druckman and Leeper 2012). This type of environment might facilitate the 'crystallisation' of policy-related priors, and in some cases, policy preferences on the 'ceiling' – that is, strongly in favour of regulation (of disposable products, for example).

Accordingly, the findings open pathways for further scientific inquiry in other industry contexts. This study has concentrated on two issues located 'downstream' of the supply chain. Hence, citizens, who are also consumers, might perceive control over some of the environmental consequences of economic activity via their individual consumption choices. Future work could systematically investigate the link between greenwashing accusations and public support for regulation of firms' business conduct in 'upstream' contexts. In these contexts, citizens of high-income countries arguably perceive rather low levels of self-efficacy concerning environmental impacts. Moreover, this study examined the first necessary step (a shift in citizens' policy preferences) of a societal control mechanism of business conduct. Future research could also test the second step (the responsiveness of government to

updated mass public policy preferences). Quasi-experimental studies taking advantage of unexpected events (scandals, accidents) could provide useful templates for such research (Koenig and Poncet 2019).

While this study focuses on Switzerland, the results address public policy controversies in other high-income democracies as well. Even though I encourage similar research in other countries, a comparison between Swiss and other high-income countries' citizens' policy preferences based on International Social Survey data (ISSP Research Group, 2018) indicates no substantial differences (see Appendix Section A.3). Moreover, just like Switzerland, many countries in Europe (and the European Union itself) slowly start to diminish disposable plastic waste quantities as well as mobility-related CO_2 emissions (Elliott et al. 2020; González et al. 2019). In the USA, environmental regulations have been rolled back during the Trump administration (Bomberg 2017) and a thorough understanding of voluntary corporate environmental action might be more necessary than ever before (Delmas et al. 2019).

My findings have important implications in that respect. Specifically, broad but shallow voluntary environmental collective action by firms is unlikely to be challenged by shifts in citizens' policy preferences even if its environmental shortcomings are publicly denounced. Consequently, the findings emphasise the strategic value of co-operation among firms in industries, in which firms use industry-wide but unambitious voluntary measures to shield themselves from societal scrutiny at large – that is, not only public opinion, but also more organised forms of public pressure. Hence, the findings cast doubt on policy designs that focus on mandating transparency since this approach might be insufficient to motivate firms to deepen their environmental commitments. Instead, the results suggest that substantial sustainability progress needs to be achieved via the 'monitoring' and 'regulatory threat' pillars of environmental governance (Kolcava et al. 2021a). In concrete terms, policymakers might have to rely more on ambitious targets/deadlines paired with provisions to introduce top-down rules for business conduct if private-sector-led governance fails to achieve these targets.

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