Citizens support ambitious but costly regulation against food waste¹

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Abstract

About one-third of all food produced for human consumption worldwide is wasted, particularly in high-income countries. Reducing this waste is key to decreasing negative environmental impacts from the food sector and increasing food security in developing countries. Yet, achieving food waste reduction is challenging. It is widely presumed that efforts at stricter food waste regulation may increase food prices, and hence consumer and citizen opposition could render such ambitious regulation politically unfeasible. Here, we argue that appropriate policy framing, design, and feedbacks can ensure public support despite food price increases. Our empirical analysis uses survey experiments with a population-representative sample (N=3'329) from a typical high-income country, Switzerland. First, in a combined framing and conjoint experiment, we show that messages emphasizing national or international social norms in favor of reducing food waste (policy framing) can increase public support for more ambitious reduction targets. We also show that a majority of citizens support food waste regulation, even if this leads to substantial increases in food prices, but only if such policies set stringent reduction targets and are transparently monitored (policy design). Finally, in a vignette experiment, we show that voluntary industry initiatives do not crowd out individuals' support for stricter governmental regulation, but potentially crowd-in support if industry initiatives are unambitious (policy feedback). Our research offers an analytical template for studying public support for food waste regulation and shows that there is more political room for adopting ambitious policies than hitherto presumed.

Keywords: public opinion; food waste regulation; norms; public-private policy; survey experiment

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32 Main

33 Food waste is a major hurdle in trying to reach the Sustainable Development Goals (SDGs) and Paris
34 climate targets¹⁻⁴. Wasted and lost food accounts for at least 8%-10% of global anthropogenic
35 greenhouse gas (GHG) emissions, 20% of freshwater consumption, and 30% of global agricultural land
36 use^{5,6}. Yet, according to the recent Food Waste Index Report 2021 by the United Nations Environment
37 Programme (UNEP) “the opportunities provided by food waste reduction have remained largely
38 untapped and under-exploited”⁷. While low- to middle-income countries also cause substantial amounts
39 of food waste, high-income countries contribute disproportionately to such waste, especially of products
40 with large environmental footprints like animal products^{5,7-10}. Calls for a change in practices are
41 manifold, on the global (e.g., the UN's SDG # 12) and local level (e.g., civil society initiatives). Yet,
42 current efforts are not on track of reaching targets like SDG # 12.3, calling for a halving of food waste
43 by 2030. Still, around one-third of all food products are wasted, and waste is estimated to increase in the
44 upcoming years as low- and middle-income countries become richer^{9,10}. Ambitious public and private
45 food waste reduction measures are urgently needed, but only implemented in rare cases (see e.g., French
46 food waste law LOI n° 2016-138)^{9,10}. Potential measures include binding reduction targets for the food
47 industry, obligations for supermarkets not to destroy unsold food products, and food waste fines^{10,11}.

48 Ambitious regulation against food waste is widely presumed to be politically challenging because such
49 regulation may increase food prices. In turn, price increases may result in consumer and citizen
50 opposition that would render stricter regulation politically not feasible (e.g., leading to salient protests
51 and lacking majority support). In democracies, citizens, who are both consumers and voters, are key
52 stakeholders, and public opinion is hence an important determinant of the political feasibility of
53 ambitious food waste regulation¹². Yet, to the best of our knowledge, there is a lack of robust empirical
54 research on the mass public's preferences regarding food waste reduction regulation.

55 To address this research gap, we implemented a combination of framing, conjoint, and vignette
56 experiments with a representative random sample (N = 3'329) of voting age Swiss citizens and
57 consumers (see details in Methods). Switzerland is a typical example of a high-income country
58 responsible for large per capita shares of global food waste (around 300 kg per person and year are lost,
59 compared to around 120–170 kg per person and year in low-income countries^{5,11}). Our study design and
60 case selection also allows us to mimic choice situations that are realistic for our respondents: Switzerland
61 has a unique direct democratic decision-making setting in which Swiss voters regularly and directly vote
62 on public affairs in popular initiatives and referenda. Research has shown that survey-embedded choice
63 experiments indeed closely resemble real-world voting behaviors of Swiss citizens¹³. Swiss voters also
64 directly decide about the direction of food waste regulation because they can occasionally vote on food
65 and agricultural initiatives. For example, in June 2021 Swiss citizens voted on two politically salient
66 initiatives about pesticide use in agriculture. In 2018, they voted on the so-called “Fair Food initiative”
67 that would have obliged the federal government to promote environmentally sound, animal-friendly,
68 and fairly produced food products. While many voters supported the premises of the “Fair Food

initiative”, with 38,7% yes votes it did not reach the necessary majority threshold, mainly because many voters feared higher food prices¹⁴. While this example supports the widespread assumption that voters are unlikely to accept ambitious food waste regulation if this burdens them with direct costs, we argue in line with a burgeoning environmental policy literature, however, that appropriate policy framing, design, and feedbacks could ensure public support despite food price increases.

How policy framing, design and feedbacks can affect public support for food waste regulation

The environmental policy and public opinion literature suggests three important factors that could affect public support for ambitious food waste regulation. Building on this literature, our key argument is that policy framing^{15–20} and design^{12,17,21–23} are essential factors through which policymakers and the private sector can influence public support for ambitious but costly food waste regulation. At the same time, we argue that potential feedback effects from voluntary food waste reduction initiatives (i.e., private sector policies)^{24–33} do not crowd-out but potentially crowd-in public support for governmental food waste regulation.

These three factors have, so far, been studied mainly in isolation and hence also in different survey and/or country populations. Looking at all three factors simultaneously in one study speaks to real-world policymaking, where policy framing, design, and feedbacks usually occur together. We thus contribute to the literature by examining in a unified research design whether policy framing, design, and feedback can help increase public support for food waste reduction measures as public opinion research on related environmental policy fields suggests – and whether and how these three factors interrelate^{12,16–18,25,34}.

First, based on the existing social norms and environmental regulation literature^{35–39}, we investigate the public support effects of national and international social norm frames that emphasize the importance of strong food waste reduction. We expect that both increase public support for ambitious but costly food waste regulation. We also expect that signaling national norms of reducing food waste might lead voters to perceive norms to be more personally relevant and proximate, and hence trigger stronger public support effects than the more distant international norm frames. Existing literature^{35,36} on the effects of social norms on environmental policy attitudes and behaviors tends to support this argument, but we lack empirical evidence in the context of food waste regulation.

Second, we expect that public support for food waste policies is a function of policy design, especially a policy’s perceived binding nature, stringency, scope, public control, and consumer costs^{12,17,21–23}. In general, individuals tend to prefer environmental policies that they perceive as more ambitious and thus presumably more effective to solve the underlying problem⁴⁰, while opposing policies that they perceive as costly for themselves¹². Citizens thus experience a potential trade-off between policy ambitiousness and policy costs. Building on the environmental policy design literature^{12,17,22,41}, we argue that negative effects of policy-induced costs on public support can be compensated for by the positive support effects of those policy design attributes that increase the perceived policy ambitiousness. Consequently, food waste regulation leading to higher food prices (negative support effect) is most likely to receive majority

support if such regulation is also perceived as ambitious (positive support effects), i.e. is legally binding (instead of voluntary), sets stringent reduction targets for the food industry, applies to most firms in the sector, and involves strong transparency and public control mechanisms³⁴. In addition, existing research has fallen short of investigating how policy framing and policy design interact. We thus argue that social norm frames can increase the salience of stricter food waste reduction targets and increase support for more stringent targets and design elements that enlarge the perceived ambitiousness of policies to achieve food waste reductions.

Third, voluntary industry food waste reduction initiatives are gaining ground^{44,43} and are more widespread than public forms of food waste regulation in contexts such as the US or Switzerland. It is of particular interest, therefore, to explore whether such voluntary industry initiatives crowd-out or crowd-in public demand for ambitious state-led food waste reduction regulation. While traditionally policy feedback research has focused on how earlier public policies influence latter public policies⁴⁴⁻⁴⁷, more recently research has started to also investigate how earlier voluntary industry initiatives (i.e., private sector policies) impact subsequent public policy-making^{25,26,33}. An argument in this line of environmental policy literature^{24,25,48,26-33} is that firms use voluntary initiatives as a political strategy to prevent stricter governmental regulations, and that even unambitious voluntary measures can crowd-out public demand for governmental interventions. In contrast to the existing literature, we propose that voluntary industry food waste reduction initiatives do not crowd-out but rather crowd-in public support for governmental food waste regulation. In particular, we expect that broad (visible) voluntary initiatives may increase the salience of the food waste problem, lead to more social norm pressure, and thereby crowd-in demand for stricter governmental regulation of firms and personal food waste reduction actions^{25,27,49}. Moreover, shallow (non-stringent) industry initiatives to reduce food waste are likely to be perceived as non-ambitious and ineffective, and thus citizens would in turn demand stiffer governmental regulation³⁴.

Overall, we expect that policy framing, design, and feedbacks not only individually affect public support for food waste regulation but also interact with each other and jointly influence public opinion. To test this expectation we combine framing, conjoint, and vignette experiments in an integrated study design using the same survey sample (i.e., 40% of our sample were exposed to the conjoint experiment. Within the conjoint experiment a third each was exposed to three conditions of the policy framing experiment. The other 60% of our sample were exposed to the vignette experiment on policy feedback). This allows us to empirically assess potential interactions between policy framing and design, i.e. whether social norm frames increase support for more strictly designed food waste regulations, by combining framing and conjoint experiments. Moreover, by varying the design of voluntary food waste initiatives in the vignette experiment we can also test how differently designed private sector initiatives feed back into public opinion formation and affect support for governmental food waste regulation (see details below and in the Methods section).

Results and Discussion

Policy design and framing can increase support for ambitious food waste regulation

Turning to the experimental evidence, our study supports the argument that policy design is a key factor in trying to increase public support for costly food waste policies, and that policy framing can increase public support for measures with ambitious reduction targets. First, Figure 1 outlines the set-up of the combined policy framing and policy design (conjoint) experiment (see further details in Methods).

Figure 1: Combined policy framing and policy design (conjoint) experiment (n = 1231). From the full sample, we randomly selected 1'231 respondents to participate in the combined framing and conjoint experiments (see Methods). In the first part, the policy framing experiment, respondents were randomly confronted with either a national social norm frame (n=389), an international social norm frame (n=405), or a control condition (n=437). The national norm frame provided information about Switzerland's national efforts and goal to reduce food waste by 50 percent until 2030, while the international social norm frame emphasized international efforts to reduce food waste by 50 percent until 2030. After respondents were randomly confronted with one of the three conditions, respondents rated different policy proposals to reduce food waste on a Likert scale from "Strongly opposed (1) to Strongly in favor (7)". Respondents also had to choose between policy proposals. The policy proposals consist of five different design attributes. These policy design attributes were a) the binding nature of the proposal, b) the policy target (until 2030), c) the policy scope (i.e., the number of firms covered by the policy), d) the monitoring mechanism, and e) an estimation of the policy-induced costs. For each of these five attributes, we randomly varied the specific design values. For instance, the proposal could entail a more or less stringent target varying from no increase of today's food waste to a 50 percent decrease until 2030. Respondents then chose and rated for four consecutive times two pairs of policy proposals, each consisting of five design attributes and randomly varying the design values. In general, we expect design features that increase the perceived ambitiousness of reducing food waste (see attributes 1-4) to increase public support, while higher policy-induced costs to decrease support (see attribute 5). We also expect that social norm frames, particularly the national norm frame, increase public support and positively interact with more stringent food waste reduction targets.

Second, in Figure 2, we present the average marginal component effects of the different design attributes on citizens' support for a policy proposal to reduce food waste. In contrast to our expectations, the results show that a proposal that entails purely voluntary measures by the food industry slightly increases support by around 0.1 scale points on a 7-point Likert scale compared to a proposal where measures are required by law. This effect is, however, very weak and compared to the other design elements does not substantially affect overall public support. For example, proposals with a reduction goal of 10 percent increase support by around 0.25 scale points compared to the baseline option of no increase in food waste until 2030. Policy proposals that include an ambitious reduction target of decreasing food waste until 2030 by 25 to 50 percent even substantially increase support by around 0.5 scale points on a 7-point Likert scale. Interestingly, and in contrast to our expectation, citizens do not prefer the most

stringent 50 percent reduction target significantly more compared to the less stringent 25 percent reduction target (p-value from a Wald test of equality of coefficients is 0.82 for the rating and 0.06 for the choice task).

Figure 2: Average marginal component effects of policy design attribute values on citizens' support for differently designed policy proposals to reduce food waste. Support was measured on a 7-point Likert scale. The dashed vertical line at 0 on the y axis denotes the baseline comparison of each policy attribute. See Appendix A.3 for the detailed regression outputs.

The insignificant difference between the two targets suggests a potential ceiling effect of higher policy stringency on policy support. In other words, citizens value more stringent policy targets, but a stringent target itself is insufficient to ensure majority support and other design elements are also needed. Other attributes, such as the scope of the policy (i.e., the number of firms covered) as well as the monitoring mechanism also significantly affect public support. In line with our expectations, citizens prefer policy proposals that cover all firms in the food sector to proposals that have smaller coverage. For example, a proposal that covers only half of firms receives around 0.22 scale points less support than a proposal that covers all firms in the sector. A proposal that covers only a few firms in the sector receives even 0.51 scale point less support to a proposal with the widest coverage. Similarly, in line with our expectations, a mandatory clause to publish reports (via internet) about firms' progress to reduce food waste increases support for a policy proposal by around 0.14 scale points, and an additional clause that public authorities control such reports increases support by around 0.21 scale points compared to voluntary reports.

Information about the policy-induced costs, however, may reduce support for food waste reduction policies. Yet, our results do not fully confirm our expectations. In contrast, we find that support for

policy proposals that only lead to a slight food price increase of around two to five percent do not significantly reduce policy support. Only a strong increase of food prices by around 10 percent significantly reduces policy support by about 0.35 scale points. This finding suggests that there is no linear negative effect of higher prices on policy support but that support for food waste regulation only decreases from a certain threshold of price increases (i.e., public support is price inelastic for smaller food price increases but becomes elastic if prices increase further⁵⁰).

To put these effects into perspective, our largest effects of half a scale point move respondents 7% along the scale from strongly opposed to strongly in favor of foodwaste-regulation, or 30% of the standard deviation of 1.67 of the rating scale that 68% of all observed variation fall into. This is a substantial effect, which also shows up in the relatively similar results for the conjoint choice tasks presented in Appendix Figure A.2 (where a 50% reduction target is 25 percentage points more likely to be chosen compared to the baseline of no foodwaste increase). Notably, as can be seen from Appendix Figure A.4 displaying the respective marginal means, favorable attribute levels push preferences to around 4.5 to 4.6 on the 7-point rating scale, which shifts an average respondent from indifference to approval of food waste regulation in absolute terms.

Next, we investigate to what extent the social norm frames increase public support and interact with the different policy design elements. Figure 3 shows the average marginal component effects of the different design attributes on respondents' support for a policy proposal to reduce food waste for the control group (in blue, no social norm information) compared to the combined national and international social norm frame group (in red, Swiss and global efforts to reduce food waste by 50% until 2030). The results of interacting policy frames and design elements indicate that both international and national social norms can increase the positive support effects of more ambitious reduction targets for the food industry. While a target of reducing food waste by 10 percent until 2030 does not significantly increase support in the control group without social norm emphasis, in the two social norm framing groups support increases substantially by 0.29 to 0.35 scale points. We observe a similar picture for the more stringent reduction targets. While in the control group support for policy proposals with a reduction target of 25 to 50 percent increases by around 0.35 scale points, in the two social norm framing groups support increases by around 0.60 scale points. The strong norm framing effect on the policy stringency attribute can be explained by the fact that both the national and international norm frame explicitly highlight the goal of reducing food waste by 50% until 2030. In essence, this might have primed respondents to pay special attention to the proposed stringency of the policy target (compared to other policy design features).

We decided to present the two norm frames jointly because, against our expectations, we find few significant differences between national and international social norm frame that only concern two policy design attributes. As shown in the Appendix, Table A.4 and Figure A.6., for the national norms treatment the effect of breadth is relatively stronger (compared to baseline) than the effect of the international norm treatment. For the obligatory reporting with monitoring, however, the effect of the

international norms treatment (compared to baseline) is relatively stronger than of the national norms treatment.

Figure 3: Average marginal component effects of policy design attribute values on citizens' support for differently designed policy proposals to reduce food waste by combined social norm frames. The control group effects are marked in blue while the combined norm treatment effects are marked in red. Support was measured on a 7-point Likert scale. The dashed vertical line at 0 on the y axis denotes the baseline comparison of each policy attribute. See Appendix A.3 for the detailed regression outputs (Table A.2) and respective marginal mean plots (Figure A.5). See A-Table A.4 and A-Figure A.6 for the average marginal component effects differentiated by the national and international norm frame.

Taken together, the combined framing and conjoint experiment clearly shows how important policy design is to ensure public support for costly food waste reduction policies. A majority of Swiss citizens appears to accept even substantial policy-induced food price increases up to 10 percent in case the proposal entails ambitious food waste reduction targets, wide firm coverage, and public monitoring mechanisms. Social norm frames emphasizing national or international efforts to reduce food waste can further enhance support for policy proposals with more stringent reduction targets.

Broad and unambitious voluntary industry initiatives to reduce food waste can crowd-in support for stricter governmental regulation

In order to test for the potential effect that voluntary industry initiatives against food waste have on public support for governmental interventions to reduce personal food waste, we conducted a second vignette survey experiment with a separate subsample (N=1897; see details in Figure 4 and Methods). Here, we varied similar attributes as in the conjoint experiment, but in the vignettes the voluntary and not legally binding nature of the initiative was communicated in any case. Rather than assessing

individual support for these differently designed voluntary food waste reduction initiatives, here we studied how such information would affect citizens' perception of the ambition of voluntary industry initiatives (manipulation check) and citizens' preferences for governmental regulations to reduce food waste.

Figure 4: Policy feedback (vignette) experiment (n = 1897).

From the full sample, we randomly selected a subsample of 1897 respondents (see details in Methods). While 614 respondents were randomly allocated to a placebo control group without any information about industry initiatives to reduce food waste, 1283 respondents were confronted with randomly varying information about a voluntary food waste reduction initiative. Each of the respondents was assigned to a single information treatment and afterward answered standard survey questions on perceived policy ambition and support for governmental food waste regulation. The vignette treatments randomly varied information about the scope of the voluntary industry initiative (i.e., the number of firms participating), the stringency of the food waste reduction target until 2030, the monitoring mechanism, and the expected impact of the voluntary industry initiative on food prices. As primary outcome variables of interest, we measured how the randomly varied information about the design of voluntary initiatives would affect citizens' perception of the ambition of voluntary industry initiatives (manipulation check) and citizens' preferences for governmental regulations to reduce food waste. In addition, we also assessed effects on citizens' intentions and perceived self-efficacy to reduce their own food waste (see Methods and Appendix Tables A.7 and A.8 for details).

Our manipulation check (see Appendix Table A.5) indicates that the different vignette attributes did affect citizens' perceived ambition of industries' voluntary initiatives to reduce food waste expectedly. Figure 5 shows the effect of randomly varied information on industry initiatives on citizens' preferences for governmental regulation of companies to reduce food waste. These results suggest that broad and unambitious voluntary initiatives do not reduce but rather increase demand for stricter governmental food waste regulation. A decrease in depth (i.e., the stringency of the voluntary food waste reduction targets) reduces the perceived level of ambitiousness of voluntary food waste reduction initiatives (see Appendix Table A.5) and leads to more demand for governmental food waste regulation (by around 0.14 points on a 5-point Likert scale, ceteris paribus). Also, in line with our expectation that broad voluntary initiatives can increase issue salience (visibility) and thus support for regulation, we find that an increase in breadth (i.e., the number of firms participating in the voluntary initiative) leads to higher demand for government regulation, in our case by around 0.13 points on a 5-point Likert scale

(compared to few participating companies). Information on monitoring and food price increases does not affect demand for regulation.

In sum, our experiment suggests more positive than negative feedback effects of voluntary firm actions. Note that the degree of such positive feedback effects should be interpreted with some caution as our robustness check analyses using the Benjamini and Hochberg⁶⁴ procedure support the robustness of our findings at a false discovery rate of 20% but not of 10% (see details in Methods and Appendix Section A.5). Overall, however, we find robust evidence that voluntary industry initiatives do not crowd-out public support for governmental food waste regulation.

Figure 5: Marginal means for citizens' preference for governmental food waste regulation based on average marginal component effects of vignette treatments. Marginal means for the total control and the average of all treatment groups are marked in blue, while marginal means for the specific vignette treatments are marked in red. Preferences for governmental food waste regulation were measured with an additive index of two items and a 5-point Likert scale with higher values indicating higher support ratings (see Methods). See Appendix Table A.6 for the detailed regression outputs.

Implications for policymaking and future research on food waste

Our study shows that policymakers can use appropriate policy framing and design to achieve sufficient public support and make ambitious but costly food waste regulation politically feasible. Our evidence suggests that policy frames emphasizing national or international social norms in favor of reducing food waste can increase public support for more ambitious reduction targets. Furthermore, a majority of Swiss citizens support food waste regulation even if this leads to substantial increases in food prices, but only if such policies set stringent reduction targets and are transparently monitored. We also show that the risk of shallow voluntary industry action to undermine support for ambitious governmental food waste reduction and to crowd-out consumers' intentions to reduce their food waste is rather low. On the contrary, we find that broad and unambitious voluntary industry initiatives potentially induce more support for ambitious governmental food waste regulation.

The main policy implication of our research is that Swiss citizens support ambitious but costly measures for reducing food waste and that majority backlash against such measures is not very likely. It also shows, however, that appropriate policy design and framing are key to ascertaining public support. Finally, policymakers do not have to be overly concerned that voluntary industry initiatives undermine support for ambitious governmental policies, as long as such public policies set stringent reduction targets, are transparently monitored, and policymakers explain to voters the importance of adopting these measures.

Our study offers a unified research design to simultaneously assess the effects of policy framing, design, and feedback on public opinion. Building on this analytical template, we see several fruitful avenues for future research. First, similar studies could be carried out comparing responses in high-, middle-, and low-income countries to explore to what extent demand for food waste reduction is income-elastic and/or dependent on institutional contexts. Doing so would help in assessing the external validity of our result (see also Appendix A.1). Second, further studies could employ natural experiments (e.g., during public referenda) or field experiments (e.g., in public cafeterias or supermarkets) to validate the results in different real-world settings. In particular, social norms and policy feedback effects evolve dynamically over time. Real-world exposure to voluntary industry food waste reduction campaigns over time and active deliberation about the importance of reducing food waste among friends and family are likely to trigger stronger social norm and feedback effects than treatments embedded into singular, cross-sectional survey experiments. Our experimental design does not allow us to draw causal inferences about the exact mechanisms through which the social norm frames affect public support. Future studies could investigate these mechanisms in more detail. Moreover, institutional signals and the adoption of binding governmental policies against food waste might lead to stronger social norm and feedback effects than the adoption of voluntary private regulation measures³⁸. Third, future research should also assess the risks of potentially negative feedback effects. For instance, previous research has shown that norm messages communicating the prevalence of non-sustainable behaviors can decrease policy support and increase unsustainable behaviors^{51,52}. Fourth, the effects of voluntary industry initiatives on public opinion might not only depend on the scope of covered firms but also on the type of firms (e.g., size of firms, role within the supply chain, public visibility). Further research could assess this in more detail. Finally, consumer misperceptions of their food waste might explain why citizens support supply-side policies that set stringent reduction targets for the food industry but oppose demand-side policies that directly target consumers¹². Future studies should investigate how to change such misperceptions and accelerate food waste reduction across different socio-economic contexts.

Methods

The research design for our study relies on the combination of a conjoint experiment⁵³ with framing and vignette experiments⁵⁴. These were embedded in a population-representative survey implemented in Switzerland from June 04, 2019 to October 21, 2019 (80% of fieldwork completed by July 07, 2019) within wave 3 of the Swiss Environmental Panel⁵⁵. The data and survey instruments for this study can be accessed via <https://doi.org/10.23662/FORS-DS-1220-1>. Replication code to reproduce the analyses presented in this study will be made available upon publication in the Harvard Dataverse.

Data and representativeness of our sample

The ongoing, multi-wave, dual-mode Swiss Environmental Panel focuses on the attitudes and preferences of the Swiss population on environmental issues. Wave 3 of this panel focuses on beliefs, behavior and policy preferences concerning food waste. The Swiss Environmental Panel is conceived by ETH Zurich in cooperation with the Swiss Federal Office for the Environment (FOEN). The fieldwork for the Swiss Environmental Panel was completed by ETH Zurich and the Decision Science Laboratory of the Department of Humanities, Social and Political Sciences, ETH Zurich. Pen and paper questionnaires and corresponding online questionnaires (administered with Qualtrics) are prepared by the authors. 3'229 participants responded to the survey, of which 601 (18.62%) replied via the pen-and-paper, and 2,627 (81.38%) via the online questionnaire. Also, note that we invited the survey population by postal mail, followed by two postal reminders to participate in the survey. All respondents received a personalized online token in the invitation letter and contact information if they preferred a mail-in pen-and-paper-questionnaire. With the second reminder, all respondents were sent a pen-and-paper questionnaire by default. As we had no interviewers present in households, interviewer effects cannot bias our results. Median interview length was 13.79 minutes (online sample). Due to Switzerland's multilingualism, we fielded the survey in the three major languages: German, French, and Italian. The survey was approved by the Ethics Commission of ETH Zurich (decision EK 2019-N-43). The response rate to this survey was 70.36% of wave 1 participants. Wave 1 participants were recruited based on a random sample of the Swiss population over 15 years of age from the population register of the Federal Statistical Office (BFS/SRPH). It therefore comprises Swiss residents. Sampling was conducted as a simple random sample on the level of NUTS-2 regions. There, the response rate was 32.17%. The BFS sample mirrors, besides random error and uneven response rates, the Swiss resident population. As discussed in Rudolph et al.⁵⁶, there is no evidence that take-up of the survey is particularly biased on socio-demographic respondent and population characteristics. As the sample is based on a random draw of the resident population, we do not have to worry about the oftentimes discussed match of online-access quota-samples to the general population^{57,58}. We hence conduct our experiment in a high-quality address-based representative sample of the Swiss population, and are confident that our survey speaks to the preference formation of Swiss citizens at large.

As presented in Rudolph et al.³⁹ assessing to what extent results from this Swiss sample generalize to other countries will require additional research, and our study hopefully provides a useful template for this. It is noteworthy, however, that Swiss citizens' hold very similar attitudes towards regulatory policy of business activities as citizens in other high-income countries. While regulation in the area of food waste is not addressed specifically (to date, there is a paucity of public and cross-country comparative research on this topic, unfortunately), it still indicates general preferences of Western countries towards government regulation. We follow Rudolph et al.³⁹, who show these similarities based on data from the 2016 International Social Survey⁵⁹. This suggests that using a similar or even identical study designs in other high-income democratic countries is likely to produce somewhat similar findings. Detailed results are reported in Appendix A.1, Figure A.1.

Research design

The research design for our study relies on standard survey items, as well as conjoint, framing and vignette survey experiments. All respondents saw the standard survey items first. Subsequently, 40% of our sample were exposed to the conjoint experiment (N=1'231 excl. missings), and within the conjoint experiment a third each was exposed to three conditions of the policy framing experiment. 60% of our sample (N=1'897 excl. missings) were exposed to the vignette experiment on policy feedback, with one third serving as placebo group therein, and two thirds receiving the vignette attributes in a full factorial design.

Conjoint experiment

In the conjoint experiment, we confronted respondents with four choice tasks. In each task, they had to choose between two policies, A and B, for dealing with food waste in Switzerland, choose their preferred policy and rate the policies individually (7-point scale). Policies A and B were displayed in a fully randomized way from the full set of levels. The Appendix (Figure A.2) illustrates how such a choice task was presented to respondents.

We chose the dimensions of the conjoint experiment such that they mirror our theoretical arguments (see Table M1 for an overview). The first attribute "Binding nature" varied whether food-waste policies are enacted via private or public regulation. The second attribute "Policy target" varied the policy stringency, i.e. how ambitious policies are (from 0% to 50% reduction). The third attribute, policy scope, measured industry coverage and varied from "a few" to "all firms" active in the sector. The fourth attribute, "Monitoring mechanism", covered whether corporations have to report and/or are being monitored in their food waste reduction efforts. We propose that respondents' perceived ambitiousness of the policy increases in all of attributes 2-4. Finally, the fifth and last attribute, "Policy induced costs", ranging from 0% to 10%, captured implications of the policy proposal on food prices.

Overall, these dimensions capture 1) whether respondent attitudes are shaped by private industry vs. public regulation, i.e. who implements a policy, 2) whether respondent attitudes are shaped by policy ambitiousness, as covered with the three dimensions of policy target, policy scope, and monitoring

mechanism and 3) cost implications, and hence the trade-off involved for citizens (policy coming at a price).

Table M1: Overview of conjoint experimental treatment attributes and values

Attributes	Levels
Binding nature:	<ul style="list-style-type: none"> • Required by a new law • Voluntary measures by the food industry
Policy target: Aim for food waste to...	<ul style="list-style-type: none"> • ...not increase further • reduce by one tenth (10%) by 2030 • reduce by a quarter (25%) by 2030 • reduce by half (50%) by 2030
Policy scope: How many companies in the food sector are covered?	<ul style="list-style-type: none"> • A few companies • Half of companies • All companies
Monitoring mechanism: Reporting of a corporation on food waste is...	<ul style="list-style-type: none"> • voluntary, without requirement to publish, without monitoring • ...mandatory, to be published online, without monitoring • ...mandatory, to be published online, monitored by a public agency
Policy-induced costs: Consequence for food prices:	<ul style="list-style-type: none"> • No increase (0%) • Increase by 2% • Increase by 5% • Increase by 10%

Framing experiment

In a framing experiment, we additionally assessed whether a social norm framing of the foodwaste reduction policy affected respondents preferences on regulation. For this, we presented experimentally varied emphasis frames to respondents. These were crossed over with the conjoint experiment as stated above. Before respondents entered the conjoint task, they were presented information as follows (translation from German original):

A placebo group saw a general statement that highlighted:

“There are different opinions on how to deal with food waste in Switzerland.”

A first framing treatment group then read an international (descriptive) social norm frame:

“**All countries in the world** have set themselves the **goal of reducing food waste** by companies and households **by half (50%)** until 2030 as part of the United Nations' Sustainable Development Agenda. This is supposed to better protect the environment and the climate. The

United Nations has called on all countries to develop an action plan against food waste. This shows that the issue enjoys **broad international support.**”

A second framing treatment group then read a national (descriptive) social norm frame:

“**Switzerland** has set itself the **goal of reducing food waste** by companies and households **by half (50%)** until 2030 as part of the sustainable development agenda. This is supposed to better protect the environment and the climate. A majority of the Swiss Parliament, with votes from all parliamentary groups, has mandated the Federal Council to develop an action plan against food waste. This shows that the issue enjoys **broad support in Switzerland.**”

Before each consecutive conjoint task, the treatment vignettes were restated as

“In view of the **broad international consensus on reducing food waste**, various packages of measures are now being discussed”, for the international social norm frame, and as

“In view of the **broad consensus in Switzerland on reducing food waste**, various packages of measures are now being discussed”, for the national social norm frame.

With these framing treatments, we can test whether respondent preferences can be moved into support for more ambitious policy packages, while being more accepting of price increases by a strong statement on international or domestic norm setting. Following March and Olsen⁶⁰, a norm that effectively guides behavior needs to be 1) made aware to citizens, 2) be set by a dominant institution and 3) provide clear prescriptions and adequate resources (i.e. doable action in an unambiguous way). Our framing experiment was designed to fulfill these three criteria, as we assume that prior knowledge of citizens on an existing norm on the issue is low, dominant institutions were shown to have set the norm (UN and international consensus for the international norm frame, and the Swiss parliament in a non-partisan way in the domestic norm frame), including a clear prescription (50% policy goal for foodwaste reduction).

Vignette experiment on policy feedback

To test the effects of policy feedback, we build on current literature that works with experimental vignettes that provide varying descriptions on private industry initiatives on the policy matter before eliciting preferences on government regulation, attitudes towards the policy goal and consumers’ intentions to reduce their own food waste^{25,26}.

To this end, we randomly exposed participants in this study arm to varying information about voluntary measures by Swiss firms on food waste. In particular, participants were randomly assigned to either a placebo group or a treatment group that saw information on company behavior that varied along four dimensions: policy scope, policy target, monitoring mechanism and price increases (comp. conjoint dimensions). Table M2 provides an overview.

449 *Table M2: Overview of vignette experimental treatment groups*

Group	Placebo	Full factorial design with the following attributes levels:
Policy scope: How many companies engage?	No mention	<ul style="list-style-type: none"> • All companies • Half of companies • Few companies
Policy target: How ambitious are the goals of companies?	No mention	<ul style="list-style-type: none"> • No increase in foodwaste • Reduction by 10% • Reduction by 25% • Reduction by 50%
Monitoring mechanism: Are company efforts subject to reporting and public monitoring?	No mention	<ul style="list-style-type: none"> • No mention • Reporting and monitoring on foodwaste
Costs: How does this affect food prices of the companies?	No mention	<ul style="list-style-type: none"> • No mention • No price increase • Price increase by 10%

450

451 The placebo text that was administered to respondents read as follows (translation from German
452 original):

453 “Information: There are different opinions on how to deal with food waste in Switzerland.

454 We would like to hear your personal opinion on this”

455 The exact wordings of the experimental vignettes were composed of the levels of the attributes presented
456 in Table M2. Exemplary, we present here the most stringent, and the most lenient version of these
457 vignettes.

458 The most stringent vignette reads:

Information:

- **Almost all companies** in the Swiss food industry will take voluntary measures as part of a new campaign starting in fall 2019.
- These companies **voluntarily commit to reducing their food waste by one-half (50%)** by 2030.
- They also commit to accurately **record** the amount of **food waste** they produce, **publish** this information, and have it **monitored** by the state.
- These measures will make **food products** from these companies **no more expensive (0%)**.

459 The most lenient vignette reads:

“Information:

- **A few companies** in the Swiss food industry will take voluntary measures as part of a new campaign starting in fall 2019.
- These companies **voluntarily commit to maintaining their food waste at current levels until 2030 and thus not increase it any further.**”

460 After respondents read these vignettes, we elicited attitudes towards the perceived ambition of corporate
461 efforts and governmental food waste regulation with 5- and 7-point Likert scales.

462 A first item serves as a manipulation check to investigate whether the experimental vignettes affected
463 the perceptions of respondents on the ambition of companies to reduce food waste. The item read:

464 “How strong or weak do you consider the commitment of the Swiss food industry to voluntarily
465 reduce food waste? Please indicate your answer on a scale from 1 (very weak) to 7 (very strong).”

466 Subsequently, we fielded several items on preferences towards government regulation of the food sector.

467 As we use several outcome measures for the same underlying concept of demand for regulation, we
468 follow Mutz⁵⁴ who proposes to combine items into a more robust measurement of our dependent variable.

469 We use the following two items to build an additive index of individuals’ preferences for governmental
470 food waste regulation by adding the respective scores of the two items together and dividing the sum by
471 two. Higher scores indicated a higher preference for governmental food waste regulation. The two items
472 used to build the additive index of preferences for governmental food waste regulation read as follows:

473 To what extent do you agree or disagree with the statements below? Please indicate your answer on a
474 scale from 1 (completely disagree) to 5 (completely agree).

- 475 • Voluntary measures by companies and households are sufficient to reduce food waste in
476 Switzerland to an acceptable level. (*Reversed scale for this item to build additive index*)
- 477 • Government measures are needed to reduce food waste.

478

In addition, we also investigated treatment effects on individuals' perceived self-efficacy and intentions to reduce their personal food waste (compared to supporting governmental regulations for stricter industry food waste reductions). We measured respondents' perceived self-efficacy and intentions to reduce their own food waste via the two following two survey items:

To what extent do you agree or disagree with the statements below? Please indicate your answer on a scale from 1 (completely disagree) to 5 (completely agree).

- Individual consumers like me can do very little about the problem of food waste. (*In Table A.7 of the Appendix, we used a reversed scale for this item to make interpretation easier.*)
- In the future, I will do more myself to prevent food waste.

Our survey indicates that most Swiss citizens substantially underestimate their own food waste contributions (e.g., compared to retailers, see Appendix A.6, Figures A.7 and A.8). However, we do not see that voluntary industry initiatives crowd-out individuals' intentions to reduce their own food waste (see Appendix Table A.8). Instead, Appendix Table A.7 shows that such initiatives rather crowd-in consumers' perceived self-efficacy to reduce their food waste (by around 0.1 points on a 5-point Likert scale, *ceteris paribus*, though significant only at the 10%-level, and without substantial heterogeneity if we differentiate different types of voluntary company initiatives).

Taken together, we expect that compared to the control group the display of an experimental vignette, and even more so of stringent experimental vignettes, leads to a policy feedback process that in turn affects preferences for government regulation, consumers' perceived self-efficacy and intentions to reduce their own food waste. Importantly, this assumes that our vignettes actually moved respondent attitudes towards the stringency of voluntary industry initiatives. As outlined in our manipulation check (see Appendix Table A.5), we conclude that our vignette experiment successfully and strongly manipulated respondent beliefs on the ambition of the food industry to tackle food waste.

Estimation strategy

We analyzed the data collected in the conjoint experiment based on average marginal component effects (AMCEs, see Hainmueller et al.⁵³) for both the rating and binary choice outcome and additionally display marginal means in the Appendix (A.3) based on the suggestions by Leeper et al.⁶¹. We opt for the presentation of the rating outcome in the main paper, and only present the (substantially similar) results for the choice outcome in the Appendix, as ratings allow us a more fine-grade evaluation of respondent preferences, where also absolute levels of support or opposition to regulation can be assessed. Moreover, the rating scale allows a better comparison of treatment effects on public support for food waste regulation across the different experimental parts of the study.

Similarly, we analyzed the data on the vignette experiment on policy feedback data by comparing A) conditional means for the placebo group vs. any vignette treatment exposure, and B) average marginal component effects (AMCEs) based on the full factorial vignette design within the experimental

treatment group. AMCEs are estimated based on a linear regression model, from which we predict marginal means.

Robustness checks

One issue that needs to be discussed with respect to robustness concerns multiple hypothesis testing^{62,63}. First, we would like to highlight that multiple hypothesis testing is a less problematic issue in the context of conjoint compared to vignette experiments. Conjoint experiments have been specifically developed to allow researchers to test multiple hypotheses within the same study. Hainmueller et al.⁵³, e.g., state: “Practically, this implies that empirical researchers can apply the proposed methods to test multiple causal hypotheses about multidimensional preferences and choices.” Concerning multiple outcomes in the vignette experiment, we relate to best practices by creating index variables for related outcomes instead of separately testing them. This not only reduces measurement error⁵⁴, but also reduces potential problems associated with multiple hypothesis testing^{62,63}. Where we conduct tests on multiple experimental treatments simultaneously, we report adjusted p-values based on the procedure pioneered by Benjamini and Hochberg⁶⁴ to safeguard against reporting false discoveries. For an acceptable False Discovery Rate (FDR) of 20%, all our main conclusions uphold. For an acceptable FDR of 10%, the results of the policy design experiment uphold, while some results of the policy framing experiment become insignificant. Concerning the policy feedback experiment, our results on how the breadth and depth of voluntary business initiatives affect regulatory demand become insignificant at an FDR of 10% (see Appendix Section A.5 for further details)

533 **Data availability statement**

534 The datasets generated during and/or analyzed during the current study and relevant study
535 documentation are available for scientific use after registration at doi:10.23662/FORS-DS-1220-1.

536

537 **Code availability statement**

538 The R and Stata codes used to analyze the datasets during the current study will be made available upon
539 publication in the Harvard Dataverse public repository.

540

541 **Contributions**

542 L.R and L.P.F. contributed equally to this study. T.B. acquired the grant funding for data collection.
543 L.P.F., L.R., and T.B. contributed equally to developing the study concept and designing the survey
544 embedded experiment. L.R. had the lead in gathering the data. L.P.F. had the lead in developing the
545 theoretical argument. L.R. had the lead in data analysis. L.R and L.P.F. had the joint lead in writing the
546 paper.

547

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Online Appendix for “Citizens support ambitious but costly regulation against food waste”

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A.1 External validity

As presented in Rudolph, Kolcava and Bernauer (2019), the graphic below compares Swiss citizens’ attitudes towards regulation with regulatory preferences of citizens’ from other high-income countries. The graphic draws on ISSP data from the year 2016. The ISSP questionnaire 2016 focused on the “Role of Government”. The Figure below shows proportions of responses on binary indicator variables based on the following survey items. The item ordering in the list corresponds to the top to bottom order of the panels in the Figure. Text in square brackets indicates piped text or a battery item. The binary categories are ordered within the Figure panels such that the top category implies attitudes in favor of **more** government intervention.

- On the whole, do you think it should or should not be the government’s responsibility to [impose strict laws to make industry do less damage to the environment]. (4-point scale, “definitely should be” to “definitely should not be”, response categories 2 and below coded as “Pro”)
- In general, how often do you think that major private companies in [country] do the following? [Comply with laws and regulations?]. (4-point scale, “almost always” to “almost never”, response categories 3 and over coded as “Rarely”)
- Listed below are various areas of government spending. Please show whether you would like to see more or less government spending in each area. Remember that if you say ‘much more’, it might require a tax increase to pay for it. [The environment]. (5-point scale, “spend much more” to “spend much less”, response categories 2 and below coded as “More”)
- Here are some things the government might do for the economy. Please show which actions you are in favour of and which you are against. [Less government regulation of business]. (5-point scale, “strongly in favour of” to “Strongly against”, response categories 3 and over coded as “Disagree”).

Overall, we do not observe substantive differences in attitudes towards regulatory policy between Swiss and other high-income countries’ citizens. The only notable difference consists in that Swiss citizens are more likely to think that “firms comply with rules” (63% in Switzerland, 55% in other countries). This would imply that Swiss citizens should perceive self-regulation as slightly more trustworthy. These findings are robust to alternative

comparisons (e.g. excluding Scandinavian countries, or non-European countries). While these results do not imply that the experimental findings obtained in our paper also hold in other OECD countries, they provide suggestive evidence for the external validity of the experimental results and a starting point for further comparative research.

Figure A.1: Proportions on binary indicators of regulatory preferences of Swiss citizens (orange, N top to bottom = 1'025, 1000, 1026 998) and citizen of other high-income countries (green, N top to bottom = 16100, 15430, 16087, 15201). Whiskers denote 95% confidence intervals. High-income countries: Australia, Belgium, Denmark, Finland, France, Germany, Iceland, New Zealand, Norway, Sweden, United Kingdom, United States

A.2 Presentation of conjoint experiment

Appendix Figure A.2 displays an exemplary conjoint survey experimental choice and rating task as presented to survey respondents in the print mode (translated from German original).

	Policy package 1	Policy package 2
Type of obligation:	Required by a new law	Voluntary measures by the food industry
Aim for food waste to...	...not increase further	... reduce by half (50%) until 2030.
How many companies in the food industry are covered?	All companies	Few companies
Reporting of a corporation on food waste is ...	... voluntary, without requirement to publish, without monitoring.	...mandatory, to be published online, monitored by a public agency.
Consequence for food prices:	No increase (0%)	Increase by 10%

16. If you had to decide today, which of the policy packages would you support?

☐ Policy package 1

☐ Policy package 2

17. How strongly are you for or against each of the two policy packages? Please indicate your response on a scale from 1 (strongly opposed) to 7 (strongly in favor).

a. Policy package 1:

Strongly opposed

1

2

3

4

5

6

Strongly in favor

7

☐

☐

☐

☐

☐

☐

☐

b. Policy package 2:

Strongly opposed

1

2

3

4

5

6

Strongly in favor

7

☐

☐

☐

☐

☐

☐

☐

Figure A.2: Exemplary conjoint choice and rating task (print mode; translated)

A.3 Conjoint and framing experiment

Figure A.3: Effects of attributes on choice in conjoint task

Table A.1: Effects of attributes on rating of conjoint task – regression output

	(1) Support for policy (1-7)
Voluntary measures	(ref)
Required by law	-0.093** (0.036)
No increase of foodwaste	(ref)
10% decrease	0.25*** (0.048)
25% decrease	0.50*** (0.051)
50% decrease	0.51*** (0.049)
All firms participate	(ref)
Half of firms participate	-0.22*** (0.042)
Few firms participate	-0.51*** (0.042)
Voluntary report	(ref)
Obligatory report	0.14*** (0.041)
Obligatory with monitoring	0.20*** (0.044)
No price increase	(ref)
2% increase	0.023 (0.046)
5% increase	-0.085* (0.050)
10% increase	-0.36*** (0.051)
Constant	4.28*** (0.060)
N	9888
Clusters	1236

Linear regression models with respondent-level clustered standard errors. (Ref) indicates reference category.

** (*,**) indicates $p < 0.05$ (0.1, 0.01)

Figure A.4: Marginal means of attributes on rating in conjoint task

Figure A.5: Marginal means of attributes by no norms frame vs. international/national norms frame on rating in conjoint task

Table A.2: Effects of attributes by no norms frame vs. international/national norms frame on rating – regression output

	(1) Control	(2) International/National social norm
Voluntary measures	(ref)	(ref)
Required by law	-0.14** (0.059)	-0.068 (0.046)
No increase of foodwaste	(ref)	(ref)
10% decrease	0.12 (0.074)	0.32*** (0.063)
25% decrease	0.32*** (0.085)	0.59*** (0.065)
50% decrease	0.36*** (0.084)	0.58*** (0.061)
All firms participate	(ref)	(ref)
Half of firms participate	-0.29*** (0.065)	0.19*** (0.054)
Few firms participate	-0.50*** (0.069)	-0.51*** (0.053)
Voluntary report	(ref)	(ref)
Obligatory report	0.23*** (0.066)	0.080 (0.052)
Obligatory with monitoring	0.18** (0.074)	0.22*** (0.055)
No price increase	(ref)	(ref)
2% increase	0.0058 (0.070)	0.030 (0.061)
5% increase	-0.080 (0.082)	-0.090 (0.063)
10% increase	-0.43*** (0.084)	-0.31*** (0.065)
Constant	4.43*** (0.098)	4.19*** (0.077)
N	3512	6376
Clusters	439	797

Linear regression models with respondent-level clustered standard errors. (Ref) indicates reference category.

** (*,**) indicates $p < 0.05$ (0.1, 0.01)

Table A.3: Effects of attribute levels interacted with respondents receiving an international or national norms frame on rating of conjoint task – regression output

	(1) Support for policy (1-7)
Required by law	-0.14** (0.059)
10% decrease	0.12* (0.074)
25% decrease	0.32*** (0.085)
50% decrease	0.36*** (0.084)
Half of firms participate	-0.29*** (0.065)
Few firms participate	-0.50*** (0.069)
Obligatory report	0.23*** (0.066)
Obligatory with monitoring	0.18** (0.074)
2% increase	0.0058 (0.070)
5% increase	-0.080 (0.082)
10% increase	-0.43*** (0.084)
Norms	-0.24* (0.12)
Required by law $\times$ Norms	0.073 (0.075)
10% decrease $\times$ Norms	0.20** (0.097)
25% decrease $\times$ Norms	0.27** (0.11)
50% decrease $\times$ Norms	0.22** (0.10)
Half of firms participate $\times$ Norms	0.099 (0.085)
Few firms participate $\times$ Norms	-0.016 (0.087)
Obligatory report $\times$ Norms	-0.15* (0.084)
Obligatory with monitoring $\times$ Norms	0.038 (0.092)
2% increase $\times$ Norms	0.025 (0.093)
5% increase $\times$ Norms	-0.0095 (0.10)
10% increase $\times$ Norms	0.13 (0.11)
Constant	4.43*** (0.097)
N	9888
Clusters	1236

Linear regression models with respondent-level clustered standard errors

** (*,**) indicates $p < 0.05$ (0.1, 0.01)

Figure A.6: AMCEs of attribute levels for respondents receiving an international vs respondents receiving a national norms frame on rating of conjoint task (subgroup of respondents receiving any norms frame, only)

Table A.4: Effects of attribute levels interacted with respondents receiving an international vs a national norms frame on rating of conjoint task (subgroup of respondents receiving any norms frame, only) – regression output

	(1) Support for policy (1-7)
Required by law	-0.14** (0.065)
10% decrease	0.29*** (0.086)
25% decrease	0.57*** (0.086)
50% decrease	0.60*** (0.085)
Half of firms participate	-0.32*** (0.078)
Few firms participate	-0.61*** (0.080)
Obligatory report	0.056 (0.072)
Obligatory with monitoring	0.14* (0.073)
2% increase	0.064 (0.085)
5% increase	-0.0039 (0.089)
10% increase	-0.27*** (0.093)
National social norm	-0.24 (0.15)
Required by law $\times$ National social norm	0.14 (0.091)
10% decrease $\times$ National social norm	0.057 (0.13)
25% decrease $\times$ National social norm	0.059 (0.13)
50% decrease $\times$ National social norm	-0.038 (0.12)
Half of firms participate $\times$ National social norm	0.28** (0.11)
Few firms participate $\times$ National social norm	0.20* (0.11)
Obligatory report $\times$ National social norm	0.048 (0.10)
Obligatory with monitoring $\times$ National social norm	0.17 (0.11)
2% increase $\times$ National social norm	-0.069 (0.12)
5% increase $\times$ National social norm	-0.18 (0.13)
10% increase $\times$ National social norm	-0.064 (0.13)
Constant	4.31*** (0.11)
N	6376
Clusters	797

Linear regression models with respondent-level clustered standard errors
 ** (*, **) indicates $p < 0.05$ (0.1, 0.01)

A.4 Vignette on policy feedback

Table A.5: Effects of vignette on perceived ambition of companies (Manipulation check)
– regression output

	(1)	(2)
	Placebo vs. any treatment	Vignette full factorial
Control	(ref)	
Any treatment	0.47*** (0.066)	
All companies		(ref)
Half of companies		-0.093 (0.094)
Few companies		-0.14 (0.095)
No increase		(ref)
10% reduction		-0.15 (0.11)
25% reduction		0.13 (0.11)
50% reduction		0.24** (0.11)
No reporting/monitoring info		(ref)
Reporting and monitoring		0.18** (0.077)
No price info		(ref)
0% price increase		-0.013 (0.093)
10% price increase		-0.088 (0.095)
Constant	3.26*** (0.053)	3.70*** (0.11)
N	1896	1282

Linear regression models with standard errors in parentheses. Baseline levels: All firms; no increase/0% reduction; No info on reporting and monitoring; No info on price increases. Model 2 only draws on experimental group that saw the vignette experiment. (Ref) indicates reference category.

** (*, **) indicates $p < 0.05$ (0.1, 0.01)

Table A.6: Effects of vignette on general food-waste regulation preferences – regression output

	(1)	(2)
	Placebo vs. any treatment	Vignette full factorial
Control	(ref)	
Any treatment	0.015 (0.047)	
All companies		(ref)
Half of companies		-0.058 (0.063)
Few companies		-0.13** (0.063)
No increase		(ref)
10% reduction		0.028 (0.072)
25% reduction		0.0019 (0.071)
50% reduction		-0.14** (0.073)
No reporting/monitoring info		(ref)
Reporting and monitoring		-0.031 (0.052)
No price info		(ref)
0% price increase		0.033 (0.063)
10% price increase		0.0019 (0.064)
Constant	3.38*** (0.039)	3.49*** (0.076)
N	1882	1274

Linear regression models with standard errors in parentheses. Baseline levels: All firms; no increase/0% reduction; No info on reporting and monitoring; No info on price increases. Model 2 only draws on experimental group that saw the vignette experiment. (Ref) indicates reference category.

** (*, **) indicates $p < 0.05$ (0.1, 0.01)

Table A.7: Effects of vignette on consumers' perception of self-efficacy to reduce food waste – regression output

	(1) Placebo vs. any treatment	(2) Vignette full factorial
Control	(ref)	
Any treatment	0.099* (0.056)	
All companies		(ref)
Half of companies		-0.040 (0.082)
Few companies		-0.054 (0.081)
No increase		(ref)
10% reduction		0.088 (0.093)
25% reduction		0.031 (0.094)
50% reduction		0.14 (0.094)
No reporting/monitoring info		(ref)
Reporting and monitoring		-0.012 (0.066)
No price info		(ref)
0% price increase		-0.054 (0.079)
10% price increase		-0.084 (0.080)
Constant	3.63*** (0.046)	3.75*** (0.098)
N	1882	1275

Linear regression models with standard errors in parentheses. Dependent variable question wording: "Consumers like me can do little". Baseline levels: All firms; no increase/0% reduction; No info on reporting and monitoring; No info on price increases. Model 2 only draws on experimental group that saw the vignette experiment. (Ref) indicates reference category.

** (*,**) indicates $p < 0.05$ (0.1, 0.01)

Table A.8: Effects of vignette on consumers' intentions to reduce their own foodwaste
– regression output

	(1)	(2)
	Placebo vs. any treatment	Vignette full factorial
Control	(ref)	
Any treatment	-0.018 (0.047)	
All companies		(ref)
Half of companies		0.042 (0.066)
Few companies		0.046 (0.066)
No increase		(ref)
10% reduction		0.028 (0.075)
25% reduction		-0.00074 (0.073)
50% reduction		-0.075 (0.077)
No reporting/monitoring info		(ref)
Reporting and monitoring		-0.042 (0.054)
No price info		(ref)
0% price increase		-0.025 (0.065)
10% price increase		-0.0062 (0.066)
Constant	4.16*** (0.038)	4.15*** (0.077)
N	1845	1255

Linear regression models with standard errors in parentheses. Dependent variable question wording: "I will do more myself". Baseline levels: All firms; no increase/0% reduction; No info on reporting and monitoring; No info on price increases. Model 2 only draws on experimental group that saw the vignette experiment. (Ref) indicates reference category.

** (*,**) indicates $p < 0.05$ (0.1, 0.01)

A.5 Multiple hypothesis testing

This section reports whether our results are robust to the multiple comparisons problem (Viviano, Wuthrich and Niehaus 2021; Greenland 2021), which might arise when testing multiple hypotheses at the same time, where as a consequence p-values are not taking into account the true probability of committing a type-1 error. Concerning multiple outcomes in the vignette experiment, we relate to best practices by creating index variables for related outcomes instead of separately testing effects on them. This not only reduces measurement error (Mutz 2011), but also reduces potential problems associated with multiple hypothesis testing (Viviano, Wuthrich and Niehaus 2021). Concerning multiple experimental tests simultaneously conducted, we implemented the procedure pioneered by Benjamini and Hochberg (1995) to adjust our p-values for False Discovery Rates (FDR) of 10% and 20% (Benjamini 2010; Nakagawa 2004; Perneger 1998).

As can be seen from Appendix-Table A.9, the results for the conjoint experiment hold altogether, irrespective of the FDR used, and irrespective of whether we use the choice or rating outcome: Compared to the baseline levels, voluntary measures, increased depth, increased breadth, stricter monitoring and a price increase of 10% affect rating and choice probabilities significantly. Also, with an FDR of 10%, the norms experiment shifts evaluations of the 10%-, 25%, and 50%- foodwaste-reduction (depth) attribute level with any norms-treatment significantly (relative to baseline). With an FDR of 20%, this also confers to the obligatory reporting attribute level. Taken together, we conclude that even under control for false discoveries due to multiple comparisons, our core result that a social norm frame can affect the evaluation of depth and monitoring requirements for participating firms holds.

With respect to policy feedback, we see that experimental vignettes which communicated that firms seek to reduce foodwaste via reporting and monitoring requirements significantly shift respondents evaluations of company effort (both under a 10% and 20% FDR, relative to baseline). Under a 20% FDR, this holds also for the 50% reduction target (relative to baseline). Under a 20% FDR, we also see that regulation preferences are significantly affected if only few companies choose to engage in regulatory measures, and if they adopt a stringent 50% reduction target. Taken together, our main conclusions from the vignette experiment are robust when accepting a 20% False Discovery Rate.

Table A.9: Adjustment of p-values for main models with Benjamini-Hochberg procedure

PANEL A							
DV: conjoint rating							
Coefficient	OLS p-value	rank	critical value for p ((i/m)*Q)	sign. at FDR 0.1?	critical value for p ((i/m)*Q)	sign. at FDR 0.2?	
Few firms participate	4.95E-32	1	0.009090909	*	0.018181818	*	
50% decrease	8.88E-24	2	0.018181818	*	0.036363636	*	
25% decrease	3.38E-21	3	0.027272727	*	0.054545455	*	
10% price increase	5.44E-12	4	0.036363636	*	0.072727273	*	
Half of firms participate	1.15E-07	5	0.045454545	*	0.090909091	*	
10% decrease	3.62E-07	6	0.054545455	*	0.109090909	*	
Obligatory with monitoring	4.84E-06	7	0.063636364	*	0.127272727	*	
Obligatory report	0.00086973	8	0.072727273	*	0.145454545	*	
Required by law	0.01013499	9	0.081818182	*	0.163636364	*	
5% price increase	0.09201233	10	0.090909091		0.181818182	*	
2% price increase	0.62693282	11	0.1		0.2		
DV: conjoint choice							
Coefficient	OLS p-value	rank	critical value for p ((i/m)*Q)	sign. at FDR 0.1?	critical value for p ((i/m)*Q)	sign. at FDR 0.2?	
Few firms participate	8.39E-53	1	0.009090909	*	0.018181818	*	
50% decrease	2.11E-49	2	0.018181818	*	0.036363636	*	
25% decrease	4.93E-45	3	0.027272727	*	0.054545455	*	
Half of firms participate	1.17E-16	4	0.036363636	*	0.072727273	*	
10% price increase	4.26E-13	5	0.045454545	*	0.090909091	*	
Obligatory with monitoring	8.28E-11	6	0.054545455	*	0.109090909	*	
10% decrease	2.56E-09	7	0.063636364	*	0.127272727	*	
Obligatory report	0.00001509	8	0.072727273	*	0.145454545	*	
Required by law	0.02649126	9	0.081818182	*	0.163636364	*	
5% price increase	0.19904228	10	0.090909091		0.181818182		
2% price increase	0.5932819	11	0.1		0.2		
DV: conjoint rating given norms frame on conjoint							
Coefficient	OLS p-value	rank	FDR: 0.1		FDR: 0.2		
			critical value for p ((i/m)*Q)	sign. at FDR 0.1?	critical value for p ((i/m)*Q)	sign. at FDR 0.2?	
Few firms participate	7.38E-13	1	0.004347826	*	0.008695652	*	
10% price increase	3.35E-07	2	0.008695652	*	0.017391304	*	
Half of firms participate	0.00001069	3	0.013043478	*	0.026086957	*	
50% decrease	0.00001543	4	0.017391304	*	0.034782609	*	
25% decrease	0.00017764	5	0.02173913	*	0.043478261	*	
Obligatory report	0.00049506	6	0.026086957	*	0.052173913	*	
25% decrease#Global/Swiss norm	0.01014365	7	0.030434783	*	0.060869565	*	
Obligatory with monitoring	0.01390267	8	0.034782609	*	0.069565217	*	
Required by law	0.01693291	9	0.039130435	*	0.07826087	*	
50% decrease#Global/Swiss norm	0.03323769	10	0.043478261	*	0.086956522	*	
10% decrease#Global/Swiss norm	0.04427022	11	0.047826087	*	0.095652174	*	
Global/Swiss norm	0.05519125	12	0.052173913		0.104347826	*	
Obligatory report#Global/Swiss norm	0.07376631	13	0.056521739		0.113043478	*	
10% decrease	0.09970925	14	0.060869565		0.12173913		
10% price increase#Global/Swiss norm	0.23419926	15	0.065217391		0.130434783		
Half of firms participate#Global/Swiss norm	0.24056082	16	0.069565217		0.139130435		
Required by law#Global/Swiss norm	0.32924778	17	0.073913043		0.147826087		
5% price increase	0.33083267	18	0.07826087		0.156521739		
Obligatory with monitoring#Global/Swiss norm	0.68296832	19	0.082608696		0.165217391		
2% price increase#Global/Swiss norm	0.78980632	20	0.086956522		0.173913043		
Few firms participate#Global/Swiss norm	0.84931177	21	0.091304348		0.182608696		
5% price increase#Global/Swiss norm	0.92699242	22	0.095652174		0.191304348		
2% price increase	0.93411071	23	0.1		0.2		
PANEL B							
DV: manipulation check							
Coefficient	OLS p-value	rank	critical value for p ((i/m)*Q)	sign. at FDR 0.1?	critical value for p ((i/m)*Q)	sign. at FDR 0.2?	
Reporting and monitoring	0.02256995	1	0.011111111	*	0.022222222	*	
50% reduction	0.02568395	2	0.025		0.05	*	
Few companies	0.14087909	3	0.0375		0.075		
10% reduction	0.1492378	4	0.05		0.1		
25% reduction	0.2257749	5	0.0625		0.125		
Half of companies	0.31958269	6	0.075		0.15		
10% price increase	0.35229562	7	0.0875		0.175		
0% price increase	0.88750388	8	0.1		0.2		
DV: regulation preferences							
Coefficient	OLS p-value	rank	critical value for p ((i/m)*Q)	sign. at FDR 0.1?	critical value for p ((i/m)*Q)	sign. at FDR 0.2?	
Few companies	0.04212613	1	0.011111111		0.022222222	*	
50% reduction	0.04913638	2	0.025		0.05	*	
Half of companies	0.35726967	3	0.0375		0.075		
Reporting and monitoring	0.54920532	4	0.05		0.1		
0% price increase	0.59637562	5	0.0625		0.125		
10% reduction	0.69395102	6	0.075		0.15		
10% price increase	0.9766257	7	0.0875		0.175		
25% reduction	0.97885465	8	0.1		0.2		

* indicates p-value holds for given FDR.

A.6 Descriptive evidence

Figure A.7: Citizens' perceptions of food waste

Figure A.8: Citizens' subjective estimations of food waste contributions compared to objective estimations by the Swiss Federal Office for the Environment

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