What Drives Politicians to Act on Climate? A Field Experiment with Local Officials in Six Countries*

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Abstract

Local governments play a key role addressing the climate crisis. However, despite public support for climate action, local policy response has been limited. We argue that (1) biased beliefs about voter preferences, (2) the time horizon for credit claiming, and (3) source credibility are barriers for legislators to learn and adopt new environmental policies. We test our arguments in a field experiment embedded in a real policy-learning context: a webinar on climate solutions for local politicians. Representatives from six Western countries received different versions of the webinar invitation. Constituency opinion on climate made local officeholders more likely to follow public preferences. Invitations sent by a climate scientist and emphasizing short-term policy effects also increased interest in the webinar but did not convert into policy commitments. Only US officials responded negatively to climate scientists. The results reveal concrete steps to induce climate action and contribute to scholarship on policy learning.

Word count:

*We would like to thank the participants of the 2019 MPSA mini-conference on political institutions and elite behavior for the valuable feedback, and Research4Impact for making this collaborative project possible. Pre-analysis plan available at: https://osf.io/nygfa?view_only=916540a94f8a4b89a1357e73fd155668. We received permission from the Office for the Protection of Research Subjects at the University of Southern California (#UP-21-00157) and the Commission d'Éthique Universitaire at the University of Geneva to carry out the survey.

Climate change is the largest humanitarian threat of the XXI century. According to the 2018 special report from the Intergovernmental Panel on Climate Change (IPCC), carbon emissions need to be reduced to net-zero by 2050 to avoid the most drastic consequences of global warming. Addressing this crisis will require large-scale individual and collective action from all levels of government (Van der Linden et al. 2021).

While national governments and international organizations coordinate the global response to the climate crisis, local governments also play an important role. Cities and towns account for more that 70% of global greenhouse gas emissions and have the ability to tackle this large carbon footprint.[1] A combination of energy, mobility and planning policy solutions under the responsibility of local governments can effectively reduce carbon emissions and increase environmental resilience (Amundsen et al. 2018; Deangelo and Danny Harvey 1998). However, despite a few exceptions, the policy response from local governments has been timid. In this project we explore how local politicians can be mobilized to learn and adopt new policy solutions to address the climate crisis.

We identify three potential obstacles to climate action by local governments. *First*, politicians may underestimate constituency support for climate action. Environmental concerns only became a salient issue for the general population in recent years, as the consequences of global warming became more visible (Lee et al. 2015), and the ability of office-holders to update their beliefs about public preferences is constrained (Butler and Nickerson 2011; Pereira 2021). Existing evidence suggests that elected officials underestimate pro-climate positions (Mildenberger and Tingley 2019). The belief that voters do not support climate action may create incentives for time-constrained legislators to prioritize other issues. *Second*, we argue that the time horizon associated with structural environmental reforms can be an obstacle to re-election minded politicians. Legislators discount future benefits relative to those available in the shorter term (Sheffer et al. 2017). The payoffs of most climate change interventions are often beyond the political careers of individual representatives, making it a less desirable domain for credit claiming. *Third*, the

[1] "Cities, 'a cause of and a solution to' climate change", United Nations, September 18, 2019.

credibility of the actors disseminating new climate solutions can also influence the willingness of legislators to learn and adopt new policies. Information from credible sources is more persuasive and more likely to induce ambivalent subjects to seek out information (Brewer and Gross 2005; Druckman 2001; Mondak 1990). At the same time, at least in the United States, climate change has become increasingly politicized (Chinn et al. 2020). Hence, we expect that information by climate scientists or other actors external to the legislative process may be less persuasive than information from peer politicians.

We test these arguments in a pre-registered field experiment carried out in partnership with Oxford Net Zero (ONZ), a non-profit organization that promotes science-based policy solutions to achieve carbon neutrality. In the Spring of 2021, ONZ organized a webinar on strategies to achieve carbon neutrality in local governments. The target of the event were mayors and local council members. The event included presentations from policy experts, local officials with prior experience adopting similar policies, and representatives of different organizations that promote sustainable development in local governments. To study the motivations of local politicians to act on climate, we embedded an experiment in the webinar invitations sent by ONZ to local officials.

ONZ invited politicians from 1,651 local governments in six Western countries: France, Germany, Italy, Switzerland, United Kingdom, and the United States. The invitation varied along three dimensions: (1) whether it included local-level public opinion data on climate; (2) whether it highlighted the long-term or short-term policy effects of the policies; and (3) whether it was sent on behalf of a climate scientist or a peer legislator. We test the marginal effects of each treatment arm on legislators' interest in the webinar and willingness to commit to reduce carbon emissions after the event.

The results show that politicians do not underestimate public support for climate. Providing local-level public opinion estimates of support for pro-climate action, per se, does not increase interest in event. However, US local officials were responsive to public opinion signals. Representatives in the treatment group revealed more interest in the webinar and were more willing to make policy commitments as local support for climate action increased.

In turn, we only find suggestive evidence that the time horizon of climate action deters local officials. Invitations highlighting the longer-term effects of reducing carbon emissions generated less engagement with the webinar invitation as expected, but the effects are small, not robust to different outcomes, and do not translate into policy commitments. Finally, contrary to our predictions, we find that invitations sent by a climate scientist generated more interest in the event, relative to invitations sent from peer legislators. The exception to this pattern is the United States where local officials responded less positively to the policy expert. We speculate that this differential pattern results from the levels of politicization of climate change in the United States (Chinn et al. 2020).

Our empirical strategy offers generalizable evidence on mechanisms to mobilize local officials for climate action in advanced democracies. While the study focuses on local governments, we believe the findings are also informative to different levels of government. Misperceptions of public opinion may be less concerning for national legislators as estimates of constituency opinion are easier to obtain. However, we expect the time horizon for credit claiming and credibility biases to operate in the same way among national-level legislators.

Our study contributes to scholarship on elite behavior, environmental politics, and the role of expertise in policy learning. While research on climate politics is ultimately interested in the collective policy response to the climate crisis, our findings reveal the importance of understanding how resource-constrained legislators learn about policy. The results from the public opinion intervention are easily scalable and suggest that a large-scale information campaign to update perceptions of public support for climate action among office-holders can have meaningful policy consequences. The findings also show that despite increasing politicization of climate science (Druckman 2017), climate scientists remain a reliable source of information – above and beyond peer legislators in Europe. However, the results among United States officials suggest that the ability of policy experts to inform public policy cannot be taken for granted. Finally, the experimental design opens a new avenue for the study of policy learning and diffusion, allowing researchers to unobtrusively observe how legislators acquire information and respond to it.

Political obstacles for local climate action

Obstacles for local governments to act on climate come in many forms: ideological considerations of decision-makers, political resources (real or perceived), or different policy priorities (Measham et al. 2010). In this study we focus on three specific political obstacles that may influence the willingness of local elected officials to learn and adopt new policy solutions to reduce carbon emissions: misperceptions of public support for climate action; the time horizon of environmental reforms; and the credibility of the actors advocating new climate policies. While we do not argue that these factors are the best predictors of environmental policy learning, we believe they are important and underappreciated mechanisms that are potentially malleable. We discuss each mechanism in turn.

Public support for climate action and policy learning

Office-seeking politicians have incentives to be informed about constituency preferences (Downs 1957). Responsive incumbents increase their reelection chances (Bechtel and Hainmueller 2011). Consistent with this view, empirical evidence shows that politicians change their behavior in response to public opinion information (Butler and Nickerson 2011; Chu and Recchia 2022; Hager and Hilbig 2020). However, gauging public opinion is challenging and legislators often misperceive voter preferences, even on salient issues (Converse and Pierce 1986; Miller and Stokes 1963; Pereira 2021). For instance, Broockman and Skovron (2018) show that state legislators in the United States systematically misperceived public opinion on abortion or gun control.

Politicians may misperceive support for climate policies in their constituencies for two main reasons. On the one hand, public support for climate action has shifted meaningfully in the last decade as the consequences of global warming become more visible. In recent years, both opinion polls in Europe and the United States consistently show ample support for climate action policy (Ansolabehere and Konisky 2014; Ballew et al. 2019; Lewis et al. 2019; Stokes et al. 2015). Citizens deem environmental issues as increasingly salient and no longer conditional on other

considerations such as economic conditions (Mildenberger and Leiserowitz 2019). As an example, the share of Germans reporting that environmental protection was a very important challenge facing the country increased from 53 to 68% between 2016 and 2019 (Rubik et al. 2020). Few other policy areas have experienced a similar shift in public opinion in the last decade. On the other hand, there are important asymmetries in mobilization between a supportive but quiet majority in favor of more ambitious climate action and a vocal minority of opponents supported by resourceful interest groups (Meckling and Nahm 2021; Stokes 2016). Mass movements like Greta Thunberg's School Strike for Climate have tried to mitigate this imbalance in political voice with partial success (Sabherwal et al. 2021).

For these two reasons, we posit that local officials underestimate support for climate action in their constituencies. By correcting these misperceptions with public opinion data we predict that reelection-seeking officials will show more interest in acting on climate (H1a), particularly in constituencies where voters are more supportive of environmental reforms (H1b).[2]

The time horizon of climate policy reforms

Legislators face intertemporal trade-offs between supporting policies that maximize welfare in the present and investing in the future. In representative democracies, this trade-off also poses a political dilemma whenever the benefits of a given policy are not visible before the next election (Finnegan 2022; Jacobs 2016). Because the ability of legislators to remain in office and continue shaping policy is conditional on their performance in the next election, representatives discount future benefits relative to those available in the shorter term (Sheffer et al. 2017). Legislators recognize the challenge of reconciling political concerns with long-term policy goals. As a report from the UK House of Commons put it, "[g]overning for the future is [...] difficult because it rubs up against the short-termism that is inherent in the politics of the electoral cycle" (House of Commons 2006).

Climate action is a domain where the temporal dimension of policy-making is particularly

[2] All the hypotheses reported are pre-registered.

salient. On the one hand, many policy solutions to address climate change are expected to produce short-time benefits in areas such as employment (Garrett-Peltier 2017), innovation (Ambec et al. 2013), or public health (Shaw et al. 2019; Marshall and Ferenshak 2019). On the other hand, climate change is inherently a long-term phenomenon. According to the most optimistic predictions, it will take decades for the policy response to the climate crisis to stabilize the concentration of greenhouse gas emissions in the atmosphere at levels that prevent interference in the climate system. Moreover, some of the mitigation reforms may impose costs long before their benefits arrive (Moran et al. 2013).

Hence, we expect that the time horizon of structural environmental reforms can be a deterrent to reelection-seeking officials. We hypothesize that local officials may show more interest in pursuing new environmental policies once they learn about the more immediate benefits of acting on climate (H2).

The effects of time horizon may be less discernible in more party-centric systems. Party-centric systems can facilitate long-term commitments by obfuscating accountability mechanisms and increasing the electoral safety of decision-makers (Finnegan 2022; Jacobs 2016). Key policy decisions in party-centric systems depend more heavily on the positions of those in leadership positions, who may feel their positions less threatened than legislators in marginal seats. Still, existing behavioral research shows similar levels of temporal discounting among MPs in political systems with varying degrees of party discipline (Sheffer et al. 2017).

Source credibility and policy learning

Finally, we posit that source credibility plays a relevant role in explaining the willingness of legislators to pursue new policy solutions on climate. It is well established that information from more credible sources is more persuasive and more likely to induce ambivalent subjects to learn (Brewer and Gross 2005; Druckman 2001; Mondak 1990). What constitutes a credible source to legislators, and specifically in the context of climate politics, is less clear. While in some domains politicians are willing to listen to policy experts (Lee 2021), there is also evidence that public

officials are biased in favor of information provided by ideologically proximate peers and co-partisans (Butler et al. 2017; Pereira 2021).

Professional relationships and communication are a central aspect of the policy-making process. Legislators often take cues from their peers and these cues can be as effective at influencing behavior as direct policy information (Zelizer 2020). Given public officials' familiarity to this mechanism of information transmission, we hypothesize that peer legislators are more effective than non-political policy experts at driving public officials to act on climate (H3a). Finally, given the role of homophily on policy learning (Lee and Van de Meene 2012; Halberstam and Knight 2016), we expect that conational legislators can be more persuasive than peer legislators from another country (H3b).

Empirical Strategy

We test our predictions in a real-life policy learning setting. In April 2021, an environmental organization based in the United Kingdom – Oxford Net Zero (ONZ) – organized a webinar on policy solutions for achieving carbon neutrality in local governments. Webinars are a common tool used by nongovernmental organizations to share policy expertise with decision-makers. The event speakers included policy experts, representatives from the world's largest organizations of local governments promoting sustainable development, and legislators with prior experience adopting net zero policies. The webinar had two key goals: (1) to highlight specific strategies for local governments to set net zero policy commitments; and (2) to promote the Race to Zero Cities, a global campaign sponsored by the United Nations to promote carbon neutrality in subnational governments.

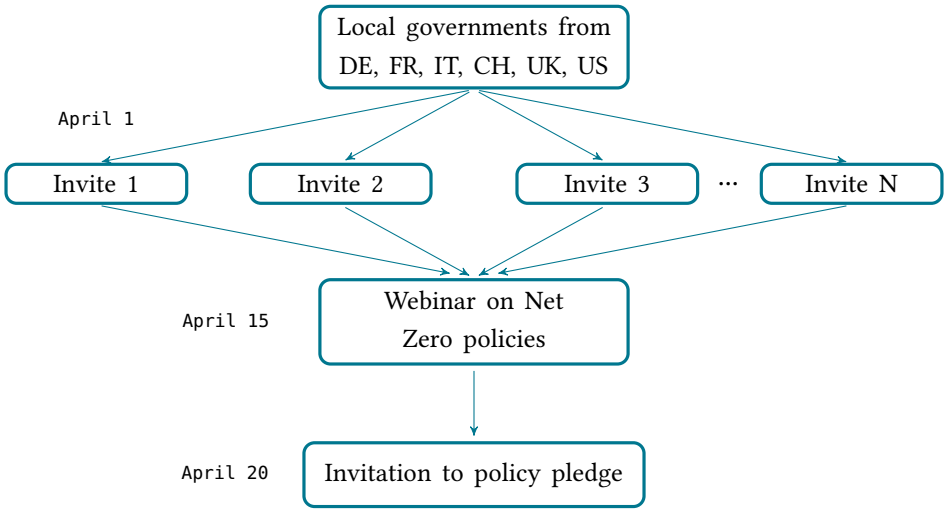
ONZ invited local elected officials from six countries: United States of America, United Kingdom, Switzerland, Italy, Germany, and France. All the presentations in the webinar were made in English but a team of interpreters provided simultaneous translations to French, German, and Italian.[3]

[3] All the webinar materials, including the invitations, flyers, and communications, were also translated.

To study the motivations of public officials to act on climate, we partnered with ONZ and randomly assigned different versions of the invitation to the webinar sent out to local officials in all six countries. Figure 1 illustrates the experimental design. The invitations were sent out to mayors and council members two weeks before the event, with one reminder sent out seven days after the original invitation. Five days after the event, a follow-up email included a link to register a policy pledge in the United Nations campaign Race to Zero Cities.

The empirical strategy offers three main advantages. First, the experimental component allows us to avoid endogeneity concerns that often make the study of policy learning and diffusion challenging Second, the harmonized, multi-site design makes us more confident about the generalizability of the findings to other established democracies. Finally, by partnering with a nongovernmental organization and embedding the study in a webinar with policy experts we were able to intervene and unobtrusively observe the behavior of legislators in a common policy learning context.

Figure 1: Design and time frame of field experiment



Treatments in the webinar invitation

We rely on a factorial experiment to randomly assign three features of the invitation. The core structure of the email remains constant, including the subject and the email address.

First, we randomly assigned local officials to receive information on public attitudes toward climate policy *in their constituency*. For data availability reasons, this intervention was implemented only in the United States and the United Kingdom. In the United States we rely on county-level public opinion estimates from the Yale Climate Opinion Maps (YCOM) 2020 (Howe et al. 2015). The estimates derive from statistical models using multilevel regression with post-stratification (MRP). In the United Kingdom we replicated the same estimation strategy based on data from the European Values Survey.[4]

Box 1 provides the wording of the public opinion intervention included in the invitation to local officials in the United States (See Appendix A for the equivalent vignette in the UK). Both statements referenced in the intervention are supported by an ample majority of American voters. According to YCOM, 71% of Americans nationwide agree that global warming will harm future generations and 75% support CO2 regulation. County-level estimates range from 53 to 82%, and from 65 to 85%, respectively. Our expectation is that legislators who have the opportunity to update their beliefs about constituency support for climate action are be more likely to show interest in the webinar, particularly in communities where support for climate action is higher.

Box 1: Public opinion intervention to US local officials

Voters in [County/City name] recognize the importance of acting on climate. According to the 2020 Yale Climate Opinion Maps, [XX]% of adults in [County/City name, state name], think global warming will harm future generations, and [XX]% support regulating CO2 pollution.

The public opinion intervention could violate the excludibility assumption if the politicians' response to the prompt was activated not by the public opinion estimates but simply by the reference to the legislators' constituency. Email personalization increases engagement (Sahni et al. 2018). To overcome this risk, we held the level of personalization constant across groups by including a reference to the officials' constituency in the core segment of the message.

Second, legislators were randomly assigned with equal probability to invitations that either

[4] Appendix C describes the estimation strategy and the sensitivity analyses performed to validate the MRP estimates used in the United Kingdom.

highlighted long-term or short-term economic arguments to respond to the climate crisis. The short-term prompt emphasized the ability of net zero strategies to provide an economic edge in the recovery to the COVID-19 pandemic, attracting labor intensive industries. The prompt also highlighted the symbolic relevance of the United Nations Climate Change Conference held later that year, the largest and most ambitious meeting of national and subnational policymakers since the Paris Climate Agreements in 2015. The long-term prompt, on the other hand, emphasized the importance of moving toward a sustainable future in the coming decades, including the ability to secure employment in more resilient sectors. Both vignettes focus on economic arguments to avoid conflating time horizon with other dimensions of climate policy. To provide evidence for the arguments conveyed while guaranteeing the symmetry of the intervention, both vignettes included a link to the same academic article that reports shorter- and longer-term economic predictions of the transition to green energy (Garrett-Peltier 2017). Appendix A includes the English version of the vignettes.

Finally, to assess the effect of source credibility the invitation was sent either by a climate scientist or a local elected official. The climate scientist was a professor at a leading academic institution in the UK and a co-author of the 2018 Special Report on Global Warming published by the Intergovernmental Panel on Climate Change. The local representative was a councillor from a mid-size city in the UK.[5] The invitations included links to the personal websites of the senders to further validate their identity. We held the email address of the sender constant to avoid the risk of differential open rates by sender. The identity of the sender is disclosed in the first sentences of the invitation, as described in Box 2, as well as in the email signature.[6]

All three factors are fully crossed, producing a $2(1) \times 2(3) \times 2$ factorial design summarized in Table A1. Depending on the specific variations adopted in each country, the design produced between four and eight versions of the invitation. However, as further described below, the analyses are performed along the margins to isolate the causal effects of each factor.

[5]Both subjects regularly collaborate with ONZ activities and agreed to contribute to the dissemination of the webinar.

[6]In Germany, a third group was randomly assigned to invitations sent by a German local official.

Box 2: Source credibility intervention

On behalf of [Professor/Councillor] [*names redacted*]

Dear [title, last name of local official]
I write you as a **[climate scientist/fellow local representative]** with an invitation to a webinar on setting and achieving net zero climate emissions at the local level.

Sampling and randomization

ONZ invited local elected officials with publicly available email addresses in the six countries included in the study, including cities and counties. We describe the specific sampling strategy adopted in each country in Appendix B. The starting sample included valid email addresses from 21,932 local officials.

Table 1 provides the number of emails delivered and opened by country. The overall open rate was 24.2%. There are no significant differences in open rates across conditions (Table B1). The analyses reported below are based on local officials who were exposed to the treatments by opening the email (N = 5,298; 1,651 local governments). Restricting the sample to those who were exposed to the invitation allows me to directly estimate the treatment effects.

Table 1: Webinar invitations sent and opened, by country

	Individual invitations			
Country	Sent	Opened	Open rate	Local governments
United States	7,719	1,953	13.7	559
United Kingdom	5,510	700	12.2	160
Switzerland	2,589	817	30.6	354
Italy	893	163	17.9	130
Germany	3,796	1,513	39.1	296
France	1,425	152	10.6	152
Total	21,932	5,298	24.2	1,651

We clustered random assignment at the local government level to minimize risks of interference (Zelizer 2020). Randomization was performed with multivariate continuous blocking within

country to maximize balance on population size, vote share of the largest party, constituency public opinion (UK and US), and local council size. Block randomization improves precision by minimizing the variance in factors other than the experimental conditions (Duflo et al. 2007). Table B2 reports covariate balance tests.

The subjects treated in the study are the officials' email addresses and not the representatives themselves. This practice is common in audit studies, and requires assuming that staffers who open the email acted on behalf of the respective elected official (Butler and Crabtree 2021). In the context of this study, this assumption is unlikely to have meaningful consequences since the vast majority of local offices have no resources available to support staffers.

Outcomes

To shed light on the motivations of local representatives to act on climate we measured how subjects engaged with the webinar invitation and the follow-up email sent out after the event. To do so, we used email marketing tools to track clicks on the links provided in the emails. With this unobtrusive method we produced three main behavioral outcomes: policy interest; policy engagement; and policy commitments.

Policy Interest is a binary measure that takes the value of 1 if a subject clicked in any of the links provided in the webinar invitation, and 0 otherwise. In the email, officials were able to register for the event by clicking on a hyperlink with the statement 'Learn more about the webinar and register.' Additionally, the message included links to the webinar host's website and to the personal website of the email sender. To better capture different levels of engagement with the invitation, we rely on a second outcome variable. **Policy Engagement** is a count measure of the number of links clicked. Among the subjects who clicked in any of the links provided, 77% clicked in more than one link. Hence, while both outcomes capture interest in learning about net zero policies, they measure different forms of engagement.

Finally, we measure the willingness of local officials to set net zero emissions targets in their municipality by tracking clicks to the the follow-up email sent out after the webinar (see Fig-

ure 1, above). **Policy Commitments** takes the value of 1 if officials clicked on the hyperlinked statement: "Click here to join the Race to Zero." The link gave access to the Cities Race to Zero website, a global campaign run by COP26 that encouraged local governments to make concrete pledges to achieve carbon neturality.[7] The follow-up message did not include any experimental manipulations. HeBy analyzing responses to the follow-up message, we also provide a test of the effects of the different treatments embedded in the webinar invitation sent 19 days earlier.

In the pre-analysis plan we registered three additional outcomes that eventually we were unable to measure: webinar registrations, webinar attendances, and policy commitments by municipalities. First, we were unable to match webinar registrations and attendances to the email list used for the invitations. This happened because the vast majority of officials who registered for the event used different email accounts or delegated the task to a staffer. Second, the organization that hosted the policy pledges' platform did not provide the necessary information to identify the date of individual pledges. In the concluding section we discuss how these constraints shape the scope of the findings, and what we can learn from it.

Estimation

We estimate the Average Marginal Component Effect (AMCE) of each of the three features randomly assigned in the invitation. This quantity corresponds to the marginal effect of each factor, averaged over the joint distribution of all factors. We derive estimates of the AMCE from OLS regressions with covariate adjustment. We test all main predictions in country-specific models and pooled models with country fixed effects.[8]

The unit of analysis in the models reported in the main text is the local government, the level of random assignment. According to Athey and Imbens (2017), cluster-level analyses are "more

[7]The same substantive findings are obtained with an ordinal measure of the number of clicks in the follow-up email (see Figure XXX).

[8]The models adjust for local vote share of largest party in most recent general election (only country-specific models), population size, constituency opinion on climate (UK and US), cluster size, and gender composition of the local government, following the pre-analysis plan. Unadjusted models reported in Figures E2- E3 provide substantively indistinguishable results.

transparent and more directly linked to the randomization framework" (113).[9] We aggregate the outcomes up to the local government level, the unit of random assignment, by taking the mean of each outcome at the individual level.

Ethical considerations

Our study shares similarities with government audits that are increasingly common in political science (Butler and Crabtree 2021). We discuss three main ethical concerns associated with this type of experimental research, and how we addressed them: deception, wasting public resources, and potential policy consequences.

We avoided deception by collaborating with a nongovernmental organization that regularly promotes initiatives like the one analyzed in this study. The webinar was part of a year-long campaign by ONZ to raise awareness for net zero policies. Continued consultation during the research design process ensured that the interventions resonated with the organization's experience. This close collaboration allowed us to observe politicians in a real policy learning environment, while avoiding that decision-makers were to policy information they would not be exposed to if it wasn't for the study.

In turn, we made an effort to minimize the cost to public officials involved in the study in two ways. First, we conducted power analyses to identify the smallest sample sizes that would allow us to have a sufficiently powered study. Based on these analyses, we reduced the starting sample of local officials by randomly selecting a subset of legislators in larger local councils (see Appendix A for more details). However, two features of the study required a relatively large baseline sample: the clustered design, and the uncertainty around the open rates that would ultimately determine the study sample. Second, the interventions – the different versions of the webinar invitation – add a residual amount of cost to local officials. Any given subject who opened the invitation but was not interested in the webinar could simply disregard the email. Alternative ways of administering the treatment, through individual meetings for instance, could represent

[9] Figures E4- E5 replicate the main findings at the individual level with clustered standard errors.

more powerful interventions but would also impose additional costs on local representatives. We believe this design feature may limit the scope of the study, and its ability to capture policy effects, but still provides a valid instrument to study the motivations of legislators to learn and adopt new policy.

Results

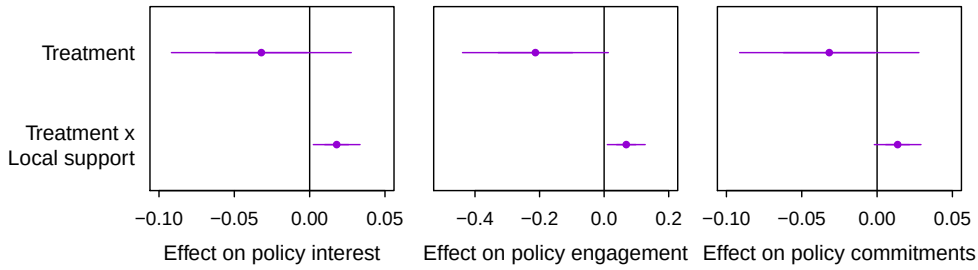
We report the effects of each factor separately. The effects of providing public opinion data to local officials in the United States and the United Kingdom are analyzed separately since the statements used in each country are not directly comparable. For the remaining factors we report the results from country-specific and pooled models.

Public opinion and policy action

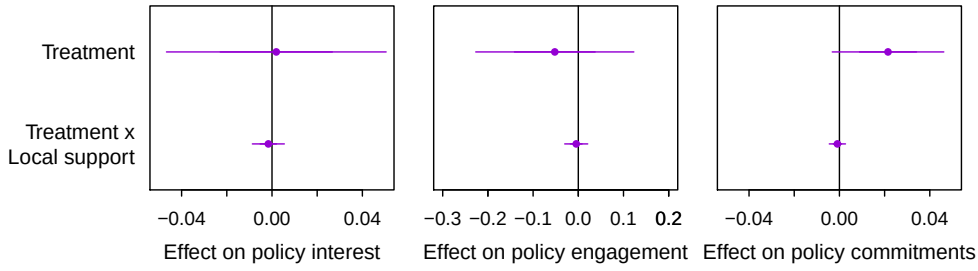
We randomly assigned public officials to information about constituency preferences on climate change. We predicted that legislators who received this information would be more likely to show interest in the webinar on net zero policies, especially in communities where there is more support for climate action. Figure 2 reports the main effects of the public opinion intervention in the United States (upper panels) and in the United Kingdom (lower panels). Each panel presents estimates from two models. The top estimate corresponds to the causal effect of opening an invitation with constituency opinion data on climate. The bottom estimate, in turn, is the coefficient for the interaction term in a model where treatment was interacted with the level of constituency support for climate action.

The results provide mixed support for our predictions. First, there is no evidence that public opinion information, per se, made politicians more likely to devote time to learn and adopt new climate solutions. The causal estimates are not precisely estimated, so we cannot rule out the possibility of smaller effects that the study was unable to capture. Still no clear directional pattern is discernible. One possible explanation for this result is that politicians no longer underestimate

Figure 2: The effects of receiving public opinion information on local support for climate action among United States legislators (panels a-c) and United Kingdom legislators (panels d-f)



Panels (a-c): United States



Panels (d-f): United Kingdom

Note: The top points in each panel are the AMCE estimate of the effect of providing public opinion information in the webinar invitation. The bottom points are the coefficient for the interaction term between treatment and constituency support for climate action. 95% confidence intervals surround point estimates; thicker lines represent one standard error intervals. Full model results in Tables D1 and D2.

public support for climate change, as prior work suggested (Broockman and Skovron 2018; Hertel-Fernandex et al. 2019). In the last few years we have witnessed a growing number of collective action efforts to raise awareness for the threats posed by climate change, and these initiatives may have allowed public officials to update their beliefs about issue salience and policy preference in the their constituencies (Gause 2022).[10]

On the other hand, we find evidence that public officials in the United States were responsive to the public opinion signals received. Legislators in the treatment group from constituencies that were supportive of climate action expressed more interest in the webinar on net zero policies (panels a and b). The effect sizes are meaningful. A 5 percentage point increase in constituency

[10]It is also possible that the treatment was simple to weak or not deemed credible by legislators. However, the interactive effect reported below suggests that at least for a subset of officials this was not the case.

support for regulating CO2 emissions is associated with a 9.0 percentage point increase in the probability of clicking in at least one link in the webinar invitation, relative to officials in the control group who received no public opinion information.[11] This effect is sustained for over two weeks. In the follow-up email, officials representing higher support constituencies who received public opinion information in the original webinar invitation were more likely to click on the link to register a net zero commitment in their municipality (.014; s.e. = .007; p-value = .08). The effect size is smaller but remains meaningful: a 5 point increase in support is associated with a 6.8 points change in the probability of clicking in the registration link. There is no evidence that local officials in the UK responded to the public opinion information. One possible explanation for this result is that the estimates of public opinion in the UK were aggregated at the NUTS 3 level for data availability reasons. These units sometimes aggregate counties and districts in ways that may have made the estimates less informative.[12]

Time horizon and policy action

Legislators who opened the webinar invitation were either exposed to a set of longer-term or shorter-term arguments for local governments to act on climate. Our prediction was that local politicians would show more interest in pursuing new climate policies after learning about the more immediate benefits of these policies. Figure 3 provides the main results from this test. Each panel corresponds to a different outcome and includes the main results from country-specific (green) and pooled (purple) models. The estimates corresponds to the causal effect of being exposed to an invitation that emphasized longer-term arguments to act on climate.

The results only provide marginal support for our prediction. The pooled effect of the long-term frame on policy interest (panel a) is negative, as predicted, but the effect is small and indistinguishable from zero ($-.015$; s.e. = $-.013$). The same pattern emerges more clearly when considering the levels of engagement with the invitation (panel b). The pooled effect from all

[11] Calculation based on bottom estimate in panel a: $5 \times .18 = 0.09$

[12] We tried to minimize this concern by providing a link to a website with a map of the UK and the regional estimates of public opinion. Local officials could easily find their constituency in the map and see the corresponding estimates of public opinion.

six countries is negative and distinguishable from zero ($-.092$; s.e. = .048; p-value = .059). The coefficient suggests that officials in municipalities that received the long-term frame on average clicked on .09 fewer links than their peers exposed to the short-term frame. The effect size is small, represents (8.6% of the standard deviation of the outcome) and mainly driven by US officials. The coefficient for the pooled model excluding the US provides a precisely estimated null result ($-.005$; s.e. = .038). Finally, we find no evidence that the effects of the intervention are sustained over time. The long-term frame did not meaningfully impact the willingness of legislators to register policy commitments in the Race to Zero platform 19 days later (panel c).

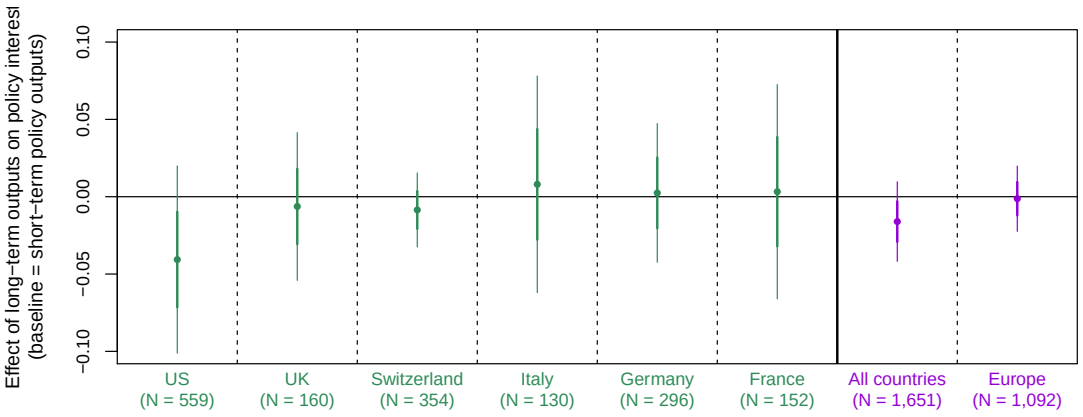
Given the simplicity of the intervention, with the frames occupying a secondary role in the webinar invitation, we interpret these results as preliminary but promising. The evidence suggests that the time horizon commonly associated with climate policies may discourage time-constrained local officials. However, only an alternative implementation strategy that increases treatment dosage can provide more definitive answer to this question. We discuss some of these alternative strategies in the concluding section.

The effects of source credibility

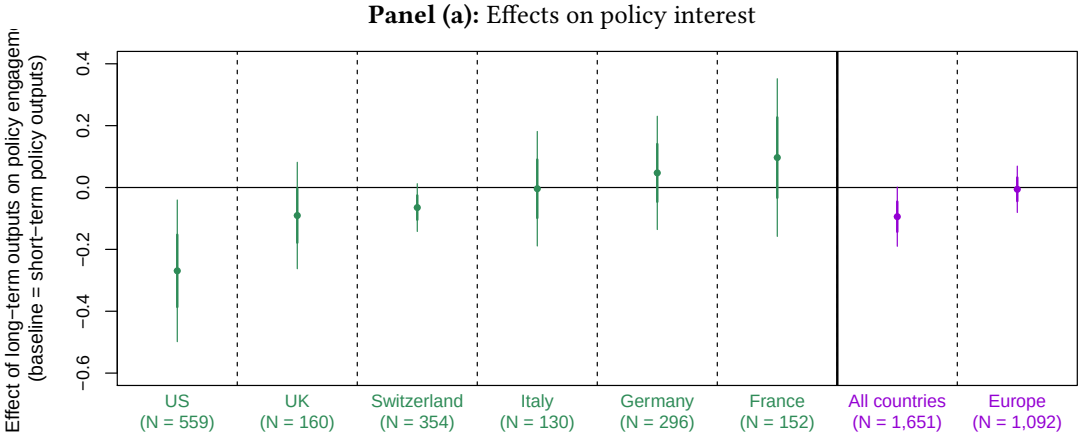
Finally, we report the effects of source credibility on the willingness of local officials to act on climate. We predicted that peer effects could make legislators more responsive to information received from another local representative. Figure **??** presents the main findings. The estimates reported in each panel correspond to the causal effects of receiving an invitation from a climate scientist, instead of a peer politician.

Overall the results contradict our prediction. With the exception of US legislators, officials in the study responded more positively to the invitation sent by a climate scientist than from a peer legislator. European local officials were 2.3 percentage points more likely to click in at least one link in the invitation when sent by a climate scientists (p-value = .03). The average differences by country range from 0.9 percentage points (Switzerland) to 5 percentage points (Italy). On the other hand, the probability of local officials in the US to express some interest in the net zero

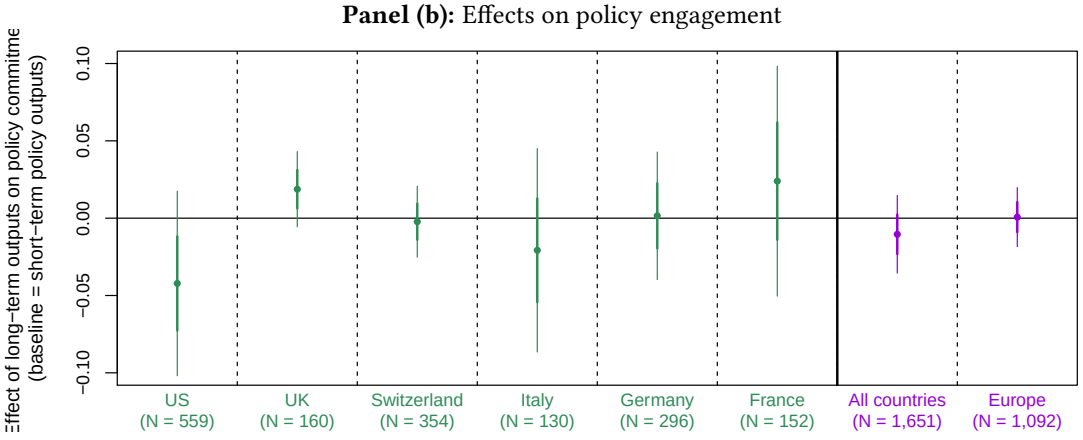
Figure 3: The effects of receiving a webinar invitation emphasizing long-term arguments to act on climate (v. short-term), by country and pooled



Panel (a): Effects on policy interest



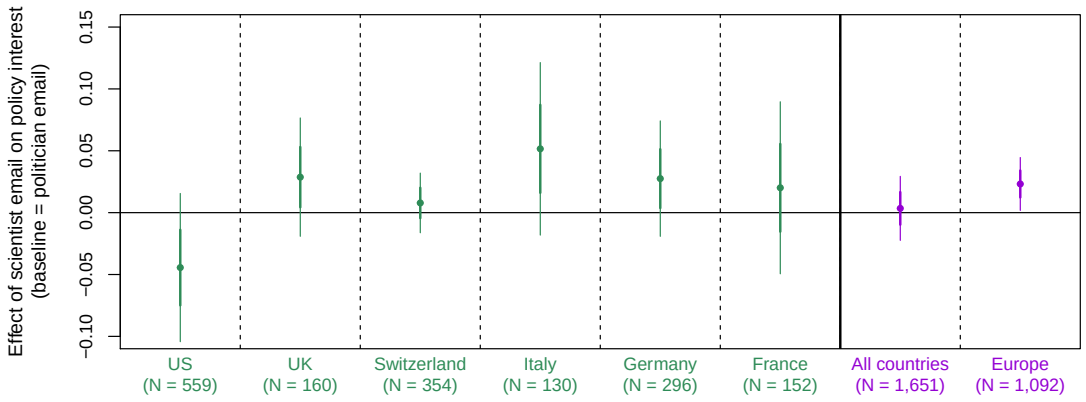
Panel (b): Effects on policy engagement



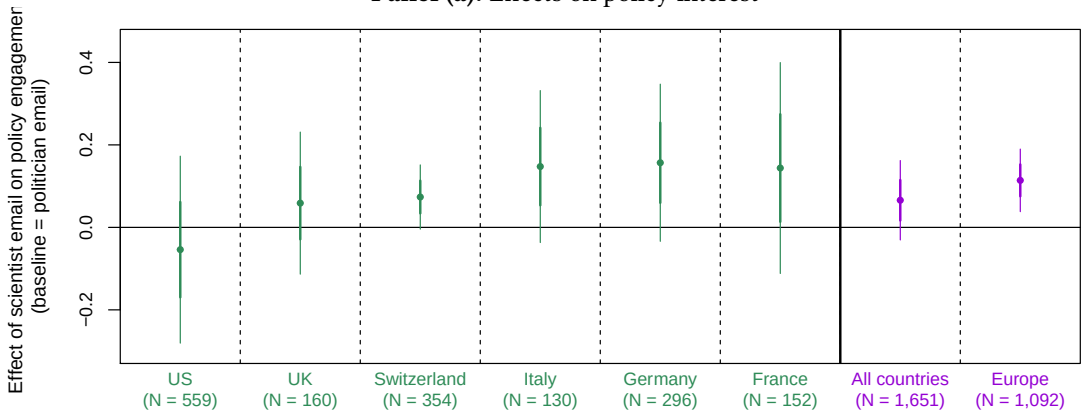
Panel (c): Effects of policy commitments

Note: Points are estimates of the causal effect of priming long-term policy goals in the invitation to the webinar on policy interest (panel a), policy engagement (panel b) and policy commitments (panel c). 95% confidence intervals surround point estimates; thicker lines represent one standard error. Full model results in Tables D3-D5.

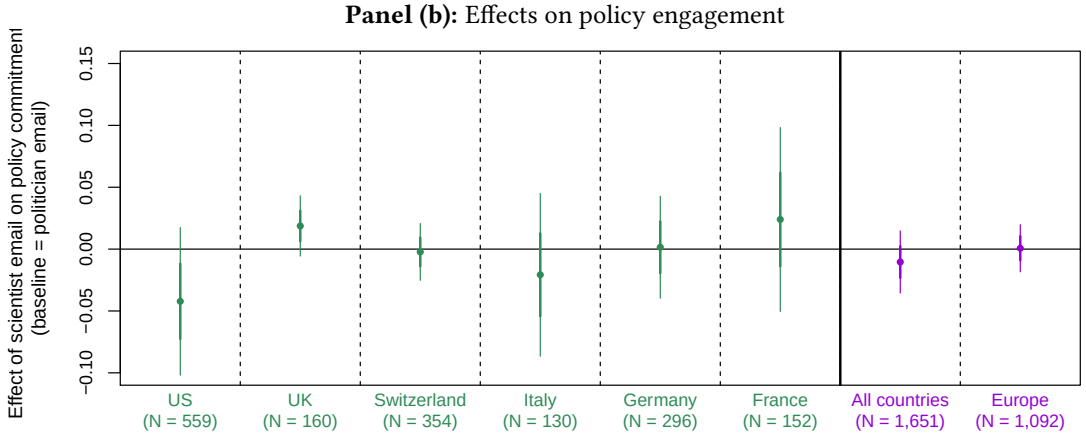
Figure 4: The effects of receiving a webinar invitation from a climate scientist (v. peer legislator), by country and pooled



Panel (a): Effects on policy interest



Panel (b): Effects on policy engagement



Panel (c): Effects of policy commitments

Note: Points are estimates of the causal effect of a webinar invitation from a climate scientist on policy interest (panel a), policy engagement (panel b) and policy commitments (panel c). 95% confidence intervals surround point estimates; thicker lines represent one standard error. Full model results in Tables D3-D5.

webinar decreased by 4.2 points when the invitation came from a climate scientist instead of a local official. However, the coefficient is not precisely estimated and is indistinguishable from zero (s.e. = .03; p-value = .17). The same pattern is discernible in the models with the number of clicks in invitation as the outcome (panel b). Local officials from European municipalities, on average, were more likely to engage with the invitation to register for the webinar on net zero policies when the message was sent by the climate scientist partnering with ONZ (.11; s.e. = .04). Only officials from US municipalities, on average, engaged less with the invitations sent by the policy expert, although this effect is not precisely estimated ($-.05$; s.e. = .11). Finally, we find no evidence that source credibility in the invitation to the webinar affected the willingness of officials to make policy commitments 19 days later (panel c). The pooled estimate across all six countries is small and indistinguishable from zero ($-.01$; s.e. = .01). Overall, the results suggest that the information conveyed by the policy expert generated more immediate interest, with the exception of local officials in the US. However, this effect was not sustained three weeks later when representatives were asked to make a policy pledge to reduce carbon emissions in their constituency.

Finally, we test whether the nationality of the peer official affected the persuasiveness of the intervention. The webinar invitations were sent either by a UK local official or a UK-based climate scientists. However, in Germany a third group was randomly assigned to invitations sent by a German local official that collaborated in the study. We predicted that peer effects would be larger with a co-national legislators inviting officials to the webinar. We find no evidence for this prediction (see Figure E1). Policy interest and policy engagement are virtually unchanged regardless of the nationality of the local official sending the message. This result is consistent with recent research showing no evidence of nationalistic bias in information-seeking by political elites (Butler et al. 2019).

Discussion

The response to the climate crisis requires an active role from local governments (IPCC 2014). However, environmental organizations have struggled to bring climate change to the top of the agenda in many subnational governments (Measham et al. 2010). We explore three possible political obstacles to climate action: (1) misperceptions of public opinion; (2) the time horizon of climate policies; and (3) source credibility.

To shed light on the ability of climate advocates to help policymakers overcome these obstacles, we designed a collaborative field experiment with representatives from six Western countries. We randomly assigned elected officials to different versions of an invitation to a webinar where policy experts and peer legislators shared strategies to achieve carbon neutrality. Webinars are a common tool used by non-profit organizations to share policy expertise. In a follow-up email we measure the willingness of politicians to register policy commitments in their constituency. The results suggest that politicians do not systematically underestimate voter preferences on climate policy, but that providing public opinion information can make legislators more responsive. We also find preliminary evidence that altering the time horizon of climate policies by highlighting more short-term policy consequences can encourage legislators to learn more about net zero policies. Finally, we show that politicians show more interest in the event when contacted by policy experts.

We interpret these results as promising although preliminary. Given the nature of the interventions, and the delivery of the treatments in the form of a cold email in a noisy information environment, we should not expect large effects that are sustained over time and result in policy change. Still, the consistency of the findings across countries and local governments with varying levels of political autonomy suggest that our arguments have traction. We believe that more in-depth interventions on either of the obstacles identified here could contribute more meaningfully to promote a more ambitious policy response to the climate crisis in local governments.

SUGGEST WAYS TO DO IT:

References

Ambec, Stefan, Mark A. Cohen, Stewart Elgie, and Paul Lanoie. 2013. "The Porter hypothesis at 20: can environmental regulation enhance innovation and competitiveness?" *Review of Environmental Economics and Policy* 7(1): 2-22.

Amundsen, Helene, Grete K. Hovelsrud, Carlo Aall, Marianne Karlsson, and Hege Westskog. 2018. "Local governments as drivers for societal transformation: Towards the 1.5 C ambition." *Current Opinion in Environmental Sustainability* 31: 23-29.

Ansolabehere, Stephen, and David M. Konisky. 2009. "Public attitudes toward construction of new power plants." emphPublic Opinion Quarterly 73(3): 566-577.

Ballew, Matthew T., et al. 2019. "Climate change in the American mind: Data, tools, and trends." emphEnvironment: Science and Policy for Sustainable Development 61(3): 4-18.

Bechtel, Michael M., and Jens Hainmueller. 2011. "How lasting is voter gratitude? An analysis of the short-and long-term electoral returns to beneficial policy." *American Journal of Political Science* 55(4): 852-868.

Butler, Daniel M., Catherine E. De Vries, and Hector Solaz. "Studying policy diffusion at the individual level: Experiments on nationalistic biases in information seeking." *Research Politics* 6(4): 1-7.

Butler, Daniel M., and Charles Crabtree. 2021. "Audit studies in political science." In James N. Druckman and Donald P. Green (eds.) *Advances in Experimental Political Science.* 42-55. Cambridge: Cambridge University Press.

Chu, Jonathan Art, and Stefano Recchia. 2022. "Does public opinion affect the preferences of foreign policy leaders? Experimental evidence from the UK parliament" Available online at: `https://doi.org/10.1086/719007`.

Deangelo, Benjamin J., and L. D. Danny Harvey. 1998. "The jurisdictional framework for municipal action to reduce greenhouse gas emissions: Case studies from Canada, the USA and Germany." *Local Environment* 3(2): 111-136.

Druckman, James N. 2017. "The crisis of politicization within and beyond science." *Nature*

Human Behaviour 1(9): 615-617.

Duflo, Esther, Rachel Glennerster, and Michael Kremer. 2007. "Using randomization in development economics research: A toolkit." *Handbook of development economics* 4: 3895-3962.

Finnegan, Jared J. 2022. "Institutions, climate change, and the foundations of long-term policymaking." *Comparative Political Studies.* Available online: https://doi.org/10.1177/00104140211047416.

Garrett-Peltier, Heidi. 2017. "Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model." *Economic Modelling* 61: 439-447.

Gause, LaGina. 2022. "Revealing issue salience via costly protest: How legislative behavior following protest advantages low-resource groups." *British Journal of Political Science* 52(1): 259-279.

Lee, Taedong, and Susan Van de Meene. 2012. "Who teaches and who learns? Policy learning through the C40 cities climate network." Policy Sciences 45(3): 199-220.

Lee, Tien Ming, Ezra M. Markowitz, Peter D. Howe, Chia-Ying Ko, and Anthony A. Leiserowitz. 2015. "Predictors of public climate change awareness and risk perception around the world." Nature Climate Change 5(11): 1014-1020.

Lewis, Gregory B., Risa Palm, and Bo Feng. 2019. "Cross-national variation in determinants of climate change concern." *Environmental Politics* 28(5): 793-821.

Hager, Anselm, and Hanno Hilbig. 2020. "Does public opinion affect political speech?." *American Journal of Political Science* 64(4): 921-937.

Halberstam, Yosh, and Brian Knight. "Homophily, group size, and the diffusion of political information in social networks: Evidence from Twitter." Journal of public economics 143 (2016): 73-88.

House of Commons. (2007). *Governing the future.* Second Report of Session 2006–07, Volume I, Public Administration Select Committee, Ordered by The House of Commons. Available at: https://publications.parliament.uk/pa/cm200607/cmselect/cmpubadm/123/123i.pdf

Howe, Peter D., Matto Mildenberger, Jennifer R. Marlon, and Anthony Leiserowitz. 2015. "Geographic variation in opinions on climate change at state and local scales in the USA." *Nature Climate Change* 5(6): 596-603.

Measham, Thomas G., Benjamin L. Preston, Timothy F. Smith, Cassandra Brooke, Russell Gorddard, Geoff Withycombe, and Craig Morrison. 2011. "Adapting to climate change through local municipal planning: barriers and challenges." *Mitigation and adaptation strategies for global change* 16(8): 889-909.

Meckling, Jonas, and Jonas Nahm. 2021. "Strategic State Capacity: How States Counter Opposition to Climate Policy." *Comparative Political Studies.* Available online: https://doi.org/10.1177/00104140211024308.

Mildenberger, Matto, and Anthony Leiserowitz. 2017. "Public opinion on climate change: Is there an economy–environment tradeoff?." *Environmental Politics* 26(5): 801-824.

Moran, Dominic, Amanda Lucas, and Andrew Barnes. 2013. "Mitigation win–win." *Nature Climate Change* 3(7): 611-613.

Pereira, Miguel M. 2021. "How do Public Officials Learn About Policy? A Field Experiment on Policy Diffusion." *British Journal of Political Science.* Available at: https://doi.org/10.1017/S0007123420000770

Rubik, Frieder, Ria Müller, Richard Harnisch, Brigitte Holzhauer, Michael Schipperges, and Sonja Geiger. 2020. Umweltbewusstsein in Deutschland 2018 – Ergebnisse einer repräsentativen Bevölkerungsumfrage. BMU: Berlin. Available at: https://www.umweltbundesamt.de/en/topics/sustainability-strategies-international/environmental-awareness-in-germany.

Sabherwal, Anandita, Matthew T. Ballew, Sander van Der Linden, Abel Gustafson, Matthew H. Goldberg, Edward W. Maibach, John E. Kotcher, Janet K. Swim, Seth A. Rosenthal, and Anthony Leiserowitz. 2021. "The Greta Thunberg Effect: Familiarity with Greta Thunberg predicts intentions to engage in climate activism in the United States." *Journal of Applied Social Psychology* 51(4): 321-333.

Sahni, N. S., Wheeler, S. C., Chintagunta, P. (2018). Personalization in email marketing: The

role of noninformative advertising content. Marketing Science, 37(2), 236-258.

Shaw, Caroline, Simon Hales, Philippa Howden-Chapman, and Richard Edwards. "Health co-benefits of climate change mitigation policies in the transport sector." *Nature Climate Change* 4(6): 427-433.

Stokes, Bruce, Richard Wike, and Jill Carle. 2015. "Global concern about climate change, broad support for limiting emissions." *Pew Research Center* 5(11).

Van der Linden, Sander, Adam R. Pearson, and Leaf Van Boven. 2021. "Behavioural Climate Policy." *Behavioural Public Policy* 5(4): 430–38.

Supplementary Appendix to "What Drives Politicians to Act on Climate? A Field Experiment with Local Officials in Six Countries"

Appendix A - Versions of webinar invitation

- **Figure A1**: Example of the webinar invitation sent to United States local officials
- **Table A1**: Features and levels in the factorial design, along with the list of countries where they were implemented

Appendix B - Descriptives

- **Table B1**: Open rates by treatment group
- **Table B2**: Covariate balance test between treatment groups

Appendix C - MRP estimates of attitudes toward the environment in UK counties

- **Figure C1**:NUTS 3-level estimates of attitudes toward the environment (EVS 2017)
- **Figure C2**:Bootstrapped confidence intervals for NUTS 3-level share of support for the statement "protecting the environment is a priority"
- **Figure C3**:Bootstrapped confidence intervals for NUTS 3-level share of support for the statement "I would give part of my income [...] to prevent environmental pollution"
- **Figure C4**:Bootstrapped confidence intervals for NUTS 3-level share of support for the statement "claims about environmental threat are exaggerated"
- **Figure C5**:Bootstrapped confidence intervals for NUTS 3-level share of support for the statement "there are more important things in life than protect the environment"
- **Figure C6**:Differences in MRP estimates between models using original poststratification frame and Hanretty et al.'s poststratification frame.

Appendix D - Main results

- **Table D1**: The effects of receiving public opinion information on local support for climate action among United States legislators
- **Table D2**: The effects of receiving public opinion information on local support for climate action among United Kingdom legislators
- **Table D3**: The effects of source credibility and time horizon on policy interest, by country and pooled. Complement to Figure 4 (panel a) and Figure 3 (panel a)
- **Table D4**: The effects of source credibility and time horizon on policy engagement, by country and pooled. Complement to Figure 4 (panel b) and Figure 3 (panel b)

- **Table D5**: The effects of source credibility and time horizon on policy engagement, by country and pooled. Complement to Figure 4 (panel c) and Figure 3 (panel c)

Appendix E - Additional Analyses

- **Figure E1**: The effects of receiving a webinar invitation from a co-national local official, relative to a foreign local official, in Germany
- **Figure E2**: Unadjusted effects of receiving a webinar invitation from a climate scientist (v. peer legislator), by country and pooled
- **Figure E3**: Unadjusted effects of receiving a webinar invitation emphasizing long-term arguments to act on climate (v. short-term), by country and pooled
- **Figure E4**: Individual-level analyses of the effects of receiving a webinar invitation from a climate scientist (v. peer legislator)
- **Figure E5**: Individual-level analyses of the effects of receiving a webinar invitation emphasizing long-term arguments to act on climate (v. short-term)

Appendix A - Versions of webinar invitation

The electronic invitation to the webinar varied along three dimensions:

1. Source: The invitation was sent on behalf of a climate scientist or a peer local official.
2. Time horizon: The invitation emphasized either the short-term or long-term implications of adopting net zero strategies.
3. Public opinion: The invitation included or did not include local-level public opinion data on climate.

In France, Germany, Italy, and Switzerland the invitations only varied along the first two dimensions: source and time horizon. In Germany we included a third source group: a German local official. The public opinion treatment was fielded only in the United States and the United Kingdom. Below we present English translations of the varying text in each treatment group. Finally, in Figure A1 we provide an example of the full webinar invitation.

Source Credibility

UK Climate Scientist:
On behalf of Professor [redacted].
Dear [title, last name of local official],
I write you as a **climate scientist** with an invitation to a webinar on setting and achieving net zero climate emissions at the local level.

UK Peer Local Official:
On behalf of Councillor [redacted].

Dear [title, last name of local official],
I write you as **a fellow local representative** with an invitation to a webinar on setting and achieving net zero climate emissions at the local level.

Time Horizon

Short Term: **In this pivotal year**, local officials are playing a key role to mitigate the immediate impacts of the climate crisis. The webinar will explore how communities of all sizes including [County/City name, state name] can act now to build a sustainable community. A net zero strategy can give your community an **immediate economic edge** as green recovery policies attract labor intensive industries and create new jobs for your community.

Long Term: **In the coming decades**, local officials will play a key role in mitigating the long-term effects of the climate crisis. The webinar will explore how communities of all sizes including [County/City name, state name] can create a sustainable net zero future for all. A net zero strategy can help you secure sustainable **jobs for the future** of your community.

Public Opinion

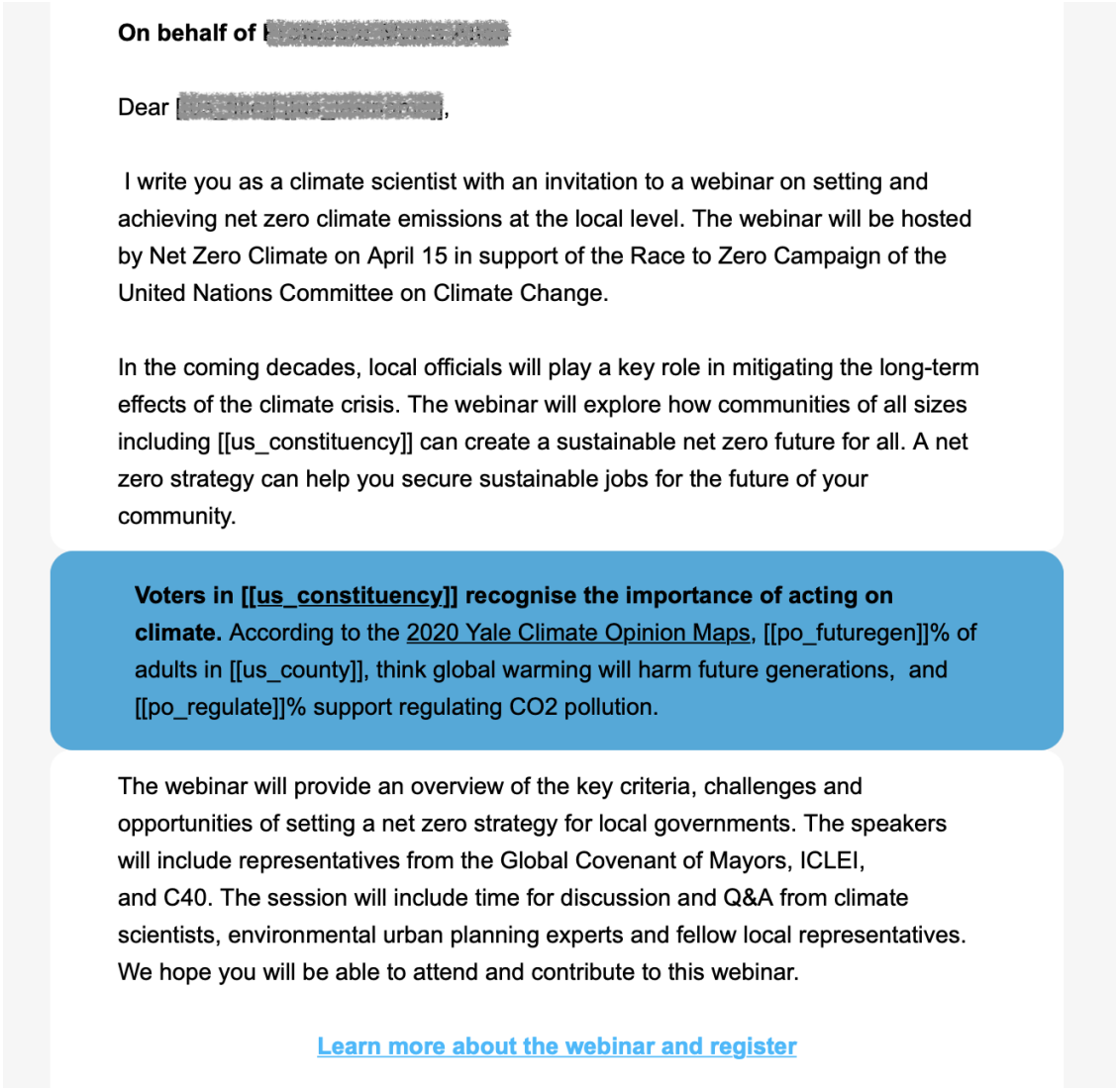
Public opinion treatment in the US: Voters in [County/City name] recognize the importance of acting on climate. According to the 2020 Yale Climate Opinion Maps, [XX]% of adults in [County/City name, state name], think global warming will harm future generations, and [XX]% support regulating CO2 pollution.

Public opinion treatment in the UK: Voters in [County/City name] recognize the importance of acting on climate. UK: According to the 2017 European Values Survey, [XX]% of adults in [County/City name] think that protecting the environment is a priority, and [XX]% would give part of their income to reduce pollution.

Table A1: Features and levels in the factorial design, along with the list of countries where they were implemented

Invitation feature	Levels	Countries of implementation
Public Opinion	No public opinion	US, UK
	Public opinion	US, UK
Email sender	Climate scientist	All countries
	UK local politician	All countries
	German local politician	Germany
Time horizon	Long term	All countries
	Short term	All countries

Figure A1: Example of the webinar invitation sent to United States local officials



Note: Screenshot of the invitation sent local officials on behalf of climate scientist, emphasizing long-term policy implications, and including public opinion data on climate.

Appendix B - Descriptives

Table B1 summarizes the difference in means of the open rates by treatment group. None of the difference in the open rate within each treatment groups are statistically significant. Table B2 reports the covariate balance test across treatment groups, tests suggesting that the randomization worked properly on these relevant dimensions.

Sampling strategies

In each country the sampling strategy took into account specificities of the institutional framework of local governments, the average size of municipalities, and data availability constraints. We used power analyses for clustered randomization to identify the necessary sample size to guarantee a sufficiently powered study without wasting resources. These criteria led to the following samples:

- **France** – Mayors with institutional email addresses from cities with more than 3,000 inhabitants.
- **Italy** – Mayors, vice-mayors, and councilors for the environment with institutional email addresses in municipalities with 15,000 inhabitants or more.
- **Germany** – Mayors and vice-mayors with institutional email addresses in municipalities with 15,000-100,000 inhabitants. Mayors, vice-mayors and councilmembers with institutional email addresses from municipalities with 100,000 inhabitants or more.
- **Switzerland** – Members of local executives (gemeindeexekutivmitglieder) with institutional email addresses in municipalities with over 3,000 inhabitants.
- **United Kingdom** – Councilors and mayors with institutional email addresses in municipalities with over 20,000 inhabitants. For local councils with more than 20 councilors, we randomly selected 15 councilors.
- **United States** – Mayors and councilmembers (or equivalent) from city and county governments in communities with 30,000 inhabitants or more. Data scraped from Google Civic Information API.

With the exception of the United States, all the email addresses were retrieved from visits to the local government websites by a team of RAs.

Table B1: Open rates by treatment group

Treatment group	Opened	Open rate	Difference in means (p-value)
Source			
Scientist	803	34.8	−1.2 (0.41)
Local official	931	36.0	
Time horizon			
Long-term	868	35.5	0.2 (0.88)
Short-term	866	35.3	
Public opinion information			
Public opinion	397	47.7	−1.0 (0.74)
No public opinion	405	48.7	

Note: Open rates estimated at the level of random assignment – local government.

Appendix C - MRP estimates of attitudes toward the environment in UK counties

We use the 2017 wave of the European Values Study Survey (EVS) to generate subnational estimates of UK public opinion. The survey contains four relevant questions pertaining attitudes toward the environment. Respondents indicate from 1 to 5 (strongly agree to strongly disagree) their opinion for the following statements:

1. Q57. Protecting the environment is a priority,even if it slows economic growth and loss of jobs
2. Q56.A I would give part of my income if I were certain that the money would be used to prevent environmental pollution
3. Q56.E Many of the claims about environmental threats are exaggerated
4. Q56.C There are more important things to do in life than protect the environment

EVS contains individual responses for 1788 respondents in the United Kingdom (excluding Northern Ireland) from 127 different counties, unitary authorities, or districts in England. These correspond to UK's NUTS 3 regions.

MRP Estimation

The MRP estimates are built by fitting a multilevel logistic regression model with individual-level, NUTS 3-level and country-level predictors, to the individual EVS responses. We obtain this

Table B2: Covariate balance test between treatment groups

(a) Source Treatment Group

Covariate	Politician	Scientist	Diff. in Means (p-value)
Female %	0.25	0.25	0.98
Log. pop	164275	152213	0.64
Vote %	4.51	5.36	0.24
Cluster	3.39	3.02	0.11
Constituency Preferences	64.33	64.68	0.56
Future Generations	67.11	67.58	0.33
Give Income	55.05	54.17	0.43
German Language	0.19	0.17	0.27

(b) Time Horizon Treatment Group

Covariate	Long-term	Short-Term	Diff. in Means (p-value)
Female %	0.25	0.25	0.86
Log pop.	164005	152234	0.65
Vote %	4.60	5.28	0.35
Cluster	3.18	3.24	0.81
Constituency Preferences	64.72	64.26	0.44
Future Generations	67.20	67.60	0.41
Give Income	54.70	54.46	0.83
German Language	0.16	0.19	0.10

(c) Public Opinion Information Treatment Group

Covariate	No Public Opinion	Public Opinion	Diff. in Means (p-value)
Female %	0.27	0.26	0.51
Log pop.	312165	273266	0.48
Vote %	12.41	9.72	0.08
Cluster	3.76	3.63	0.69
Constituency Preferences	64.47	64.57	0.86
Future Generations	67.49	67.28	0.65
Give Income	55.46	53.68	0.10

information from the 2011 UK Census, the 2017 election results from the British Election Study, and the annual report on emissions of carbon dioxide from the UK Department for Business, Energy and Industrial Strategy.

For the individual-level predictors, we include random effects for the respondent's **gender**, **age range**, **employment status** and **education**. At the NUTS 3 level, the models include: individual NUTS 3 random effects; NUTS 3-level vote share for the Conservative Party and the Green Party in the 2017 municipal elections; general education levels in the NUTS 3 region; population density; unemployment rate; and NUTS 3-level C02 emissions per capita emissions. Finally, we include country random effects for England, Wales, and Scotland.

Therefore, each individual response in the survey is treated as a function of the demographic and geographic indicators described above.

$$Pr(y = 1) = logit^{-1}(\beta_0 + \alpha^{age}_{j[i]} + \alpha^{education}_{k[i]} + \alpha^{employment}_{l[i]} + \alpha^{gender}_{m[i]} + \alpha^{NUTS3}_{c[i]} + \alpha^{country}_{t[i]})$$

The individual-level random effects are modeled as:

$$\alpha^{age}_{j} \sim \mathcal{N}(0,\, \sigma^2_{age})\, for\, j = 1, ..., 9$$

$$\alpha^{education}_{k} \sim \mathcal{N}(0,\, \sigma^2_{education})\, for\, k = 1, 2, 3$$

$$\alpha^{employment}_{l} \sim \mathcal{N}(0,\, \sigma^2_{employment})\, for\, l = 1, 2, 3$$

$$\alpha^{gender}_{m} \sim \mathcal{N}(0,\, \sigma^2_{gender})\, for\, m = 1, 2$$

NUTS 3 region effects are modeled as a function of country, the NUTS 3's Green Party's and Conservative Party's vote share, C02 per capita, unemployment rate, and higher education level.

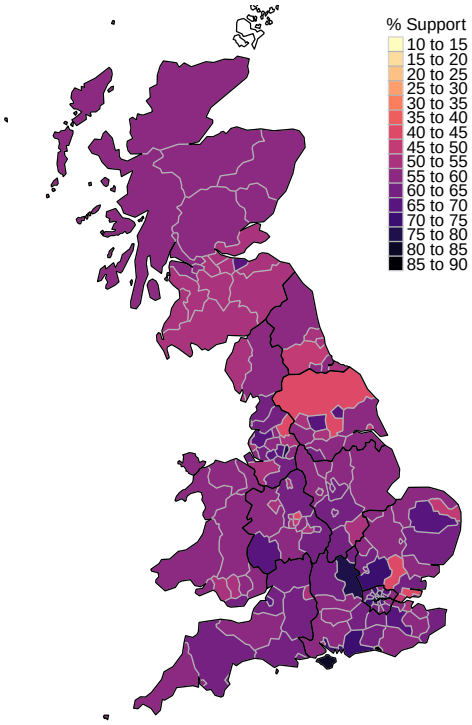
$$\begin{aligned}\alpha^{NUTS3}_{c} \sim \mathcal{N}(\alpha^{country}_{r[i]} &+ \beta_{GreenVote} + \beta_{ConservativeVote} + \beta_{HigherEducation} \\ &+ \beta_{Unemployment} + \beta_{CO2},\, \sigma^2_{NUTS3})\, for\, c = 1...168\end{aligned}$$

$$\alpha^{country}_{r} \sim \mathcal{N}(0,\, \sigma^2_{country})\, for\, m = 1, 2, 3$$

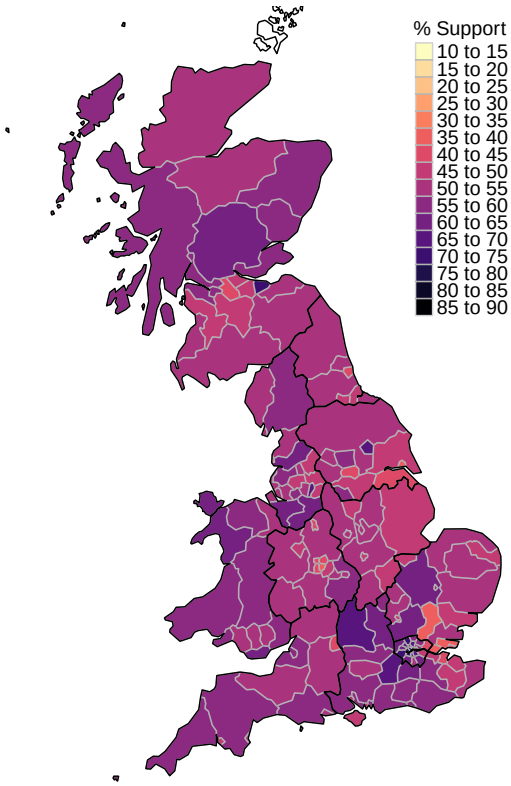
Poststratification Frame and MRP Weights

We use the 2011 UK Census to construct a postratification frame for NUTS 3-level estimates. The UK Census provides univariate counts for all demographic variables of interest at the NUTS 3-level, but no information on their joint distributions. To weight each respondent based on the average demographics in their NUTS 3 region, we generated a postratification frame through an iterative proportional fitting method (also known as raking). This procedure computes the weights for each combination of the variables of interest (age, sex, education and employment) based on their marginal distributions across the population sample for that NUTS 3 region.

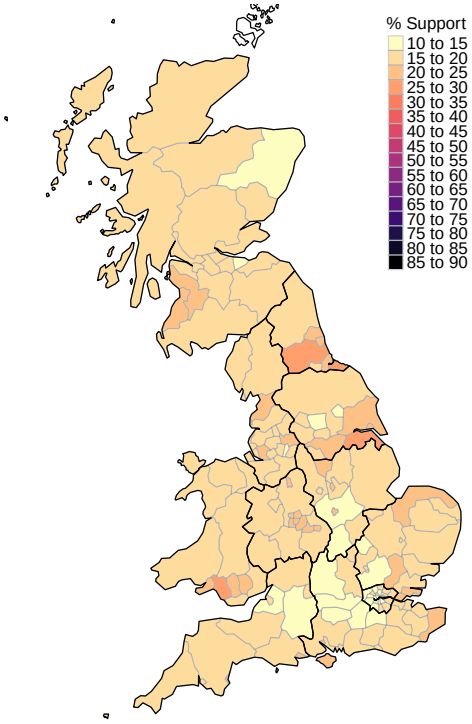
Figure C1: NUTS 3-level estimates of attitudes toward the environment (EVS 2017)



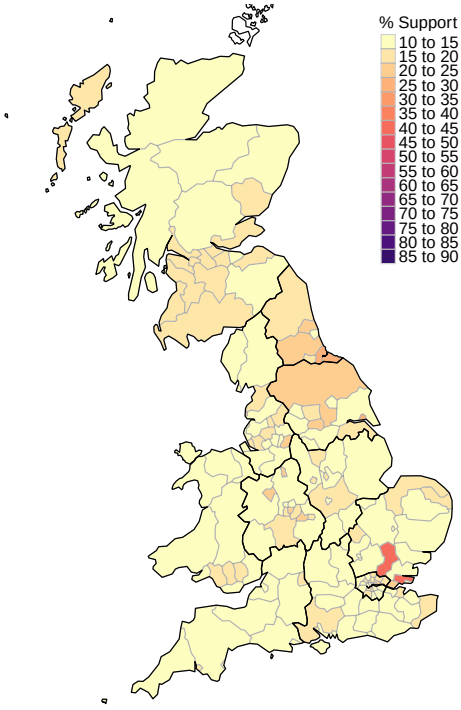
(a) Protecting the environment is a priority



(b) I would give part of my income [...] to prevent environmentaal pollution



(c) Claims about environmental threat are exaggerated



(d) There are more important things to do in life than protect the environment

For this method, we used the algorithm provided by the 'anesrake' R package from the American National Election Studies Raking Implementation. For each NUTS 3 region, we generated a matrix which combines the categories within each variable. For age, we create 9 categories following Hanretty et al. (2016); 16-19, 20-24, 25-29, 30-44, 45-59, 60-64, 65-69, 70-74, and 75+. For education, we distinguish three categories: less than primary/ primary education, secondary education, college degree or higher. For employment status: employed, unemployed, inactive. Therefore, our matrix was composed by 9 age range categories $\times$ 3 education categories $\times$ 3 employment categories $\times$ 2 gender categories.

Based on the known marginal distribution for each of these categories, the iterative proportional fitting algorithm estimated the joint distribution of variables, and then generated weights to account for how representative these combinations are in each NUTS 3 region.

Figure **??** plots the NUTS 3 region-level MRP estimates of public opinion toward the environment. Each panel represents one of the survey items included in EVS. As an example, panel (a) describes the geographical distribution of support for the statement "protecting the environment is a priority, even if it slows economic growth." The average values is 59.7%, ranging from 43% (Thames Gateway) to 88% (Brighton and Hove). In turn, the willingness to "give part of my income if I were certain that the money would be used to prevent environmental pollution" (panel b) ranges from 35.2% (Kingston upon Hull) to 79.0% (Camden and London), with an average of 54%.

Bootstrapped MRP Estimates

Following Kastellec et al. (2015) and Broockman and Skovron (2018), we bootstrap the predicted cell probabilities from each of the multilevel models and aggregate them using the poststratification weights in order to obtain NUTS 3-level estimates.

First, we generated 1000 bootstrapped estimates for each NUTS 3 region. We do this by randomly sampling with replacement from the EVS responses and running the MRP model with postratification weights. Second, we use these bootstrapped estimates to generate 95% confidence intervals for each NUTS 3-level result. Figures C2 to C5 show the upper and lower bounds of the confidence intervals for each statement.

Alternative Poststratification Frame

One concern with MRP estimates is that the results may be systematically biased by the poststratification frame adopted. This is particularly relevant in this context since the poststratification frame was estimated through raking. To assess the sensibility of the NUTS 3-level results to the frame created, we compared our estimates with an alternative set of estimates using Hanretty et al.'s (2019) postratification weights. The variables that directly match the European Value Survey data are age (8 categories), education (3 categories) and gender (2 categories).[13] After aggregating Hanretty et al.'s postratification weights to the NUTS 3 region level based on these three variables, we reestimated the MRP models.

Figure C6 plots the pooled distribution of differences in the MRP estimates obtained with our original frame and the frame used by Hanretty et al. The average difference is -1.62 percentage

[13]Contrary to our frame, Hanretty et al. do not use employment as a weighting variable.

points (std. dev = 6.22 percentage points). The dispersion of the estimates may be explained by the fact that two relevant predictors in our models – employment status and country – are not part of Hanretty's poststratification frame. Together, the results suggest that the post-stratification frame adopted did not bias our MRP estimates in a meaningful way.

Figure C2: Bootstrapped confidence intervals for NUTS 3-level share of support for the statement "protecting the environment is a priority"

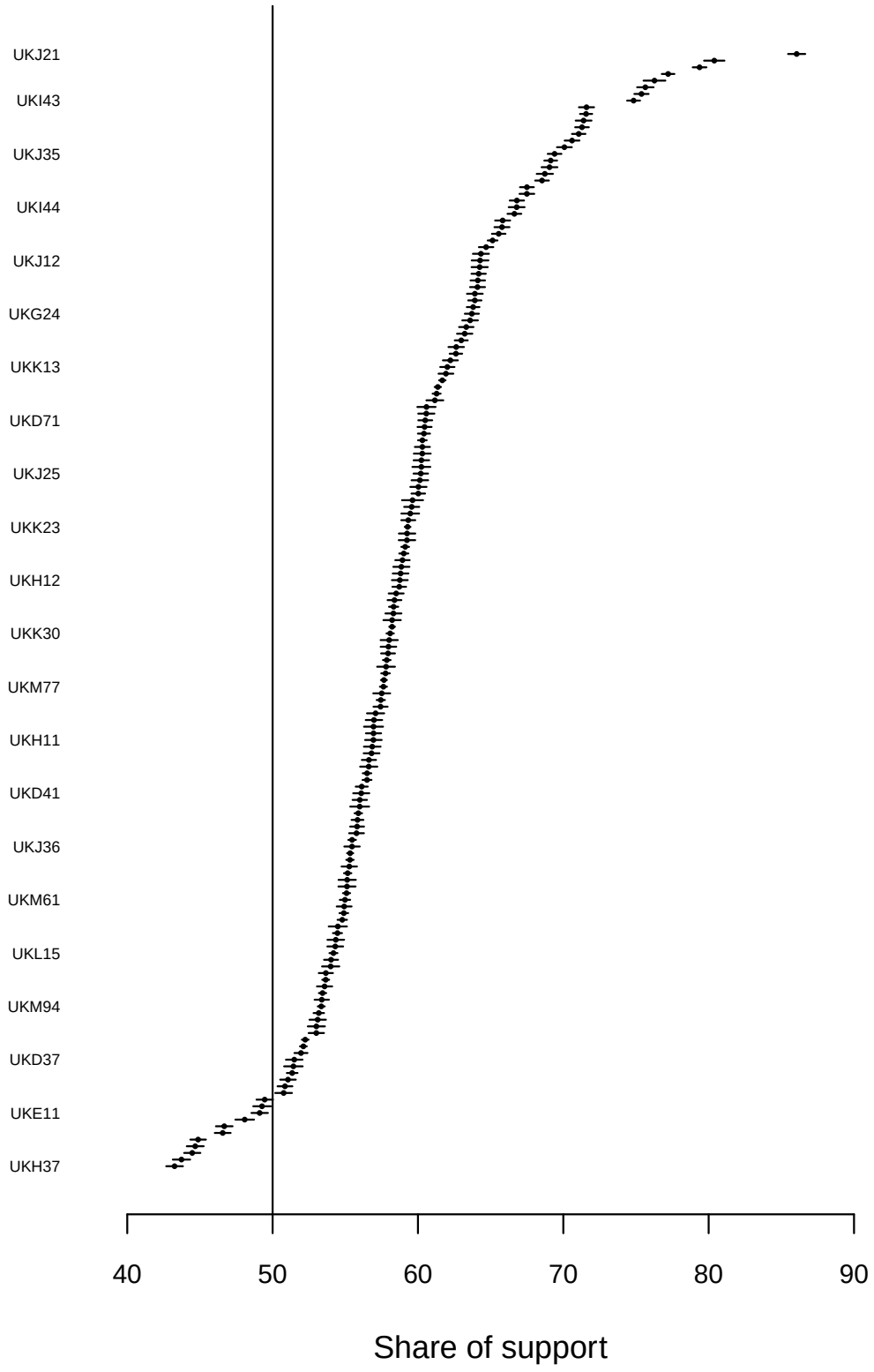


Figure C3: Bootstrapped confidence intervals for NUTS 3-level share of support for the statement "I would give part of my income [...] to prevent environmental pollution"

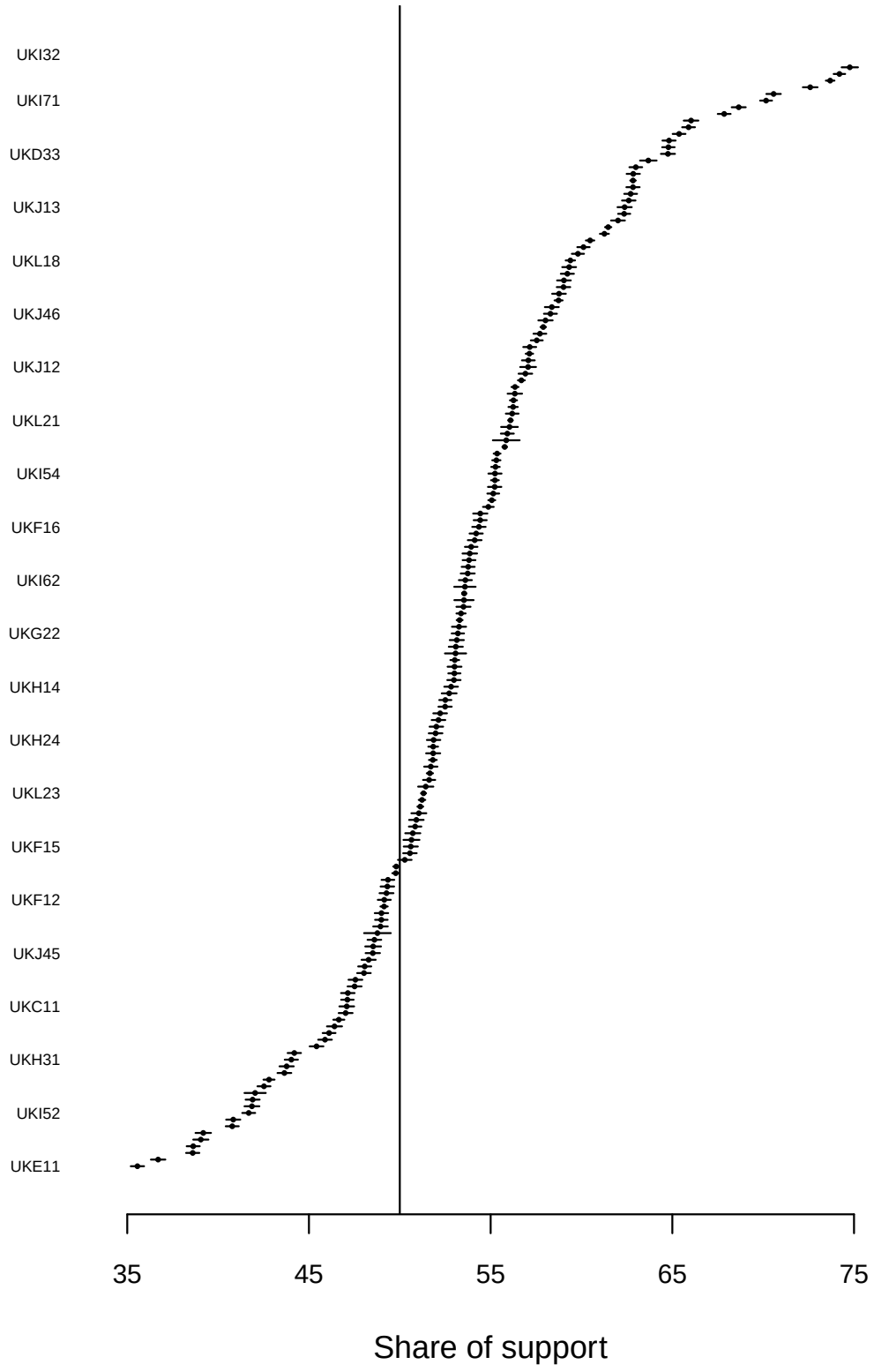


Figure C4: Bootstrapped confidence intervals for NUTS 3-level share of support for the statement "claims about environmental threat are exaggerated"

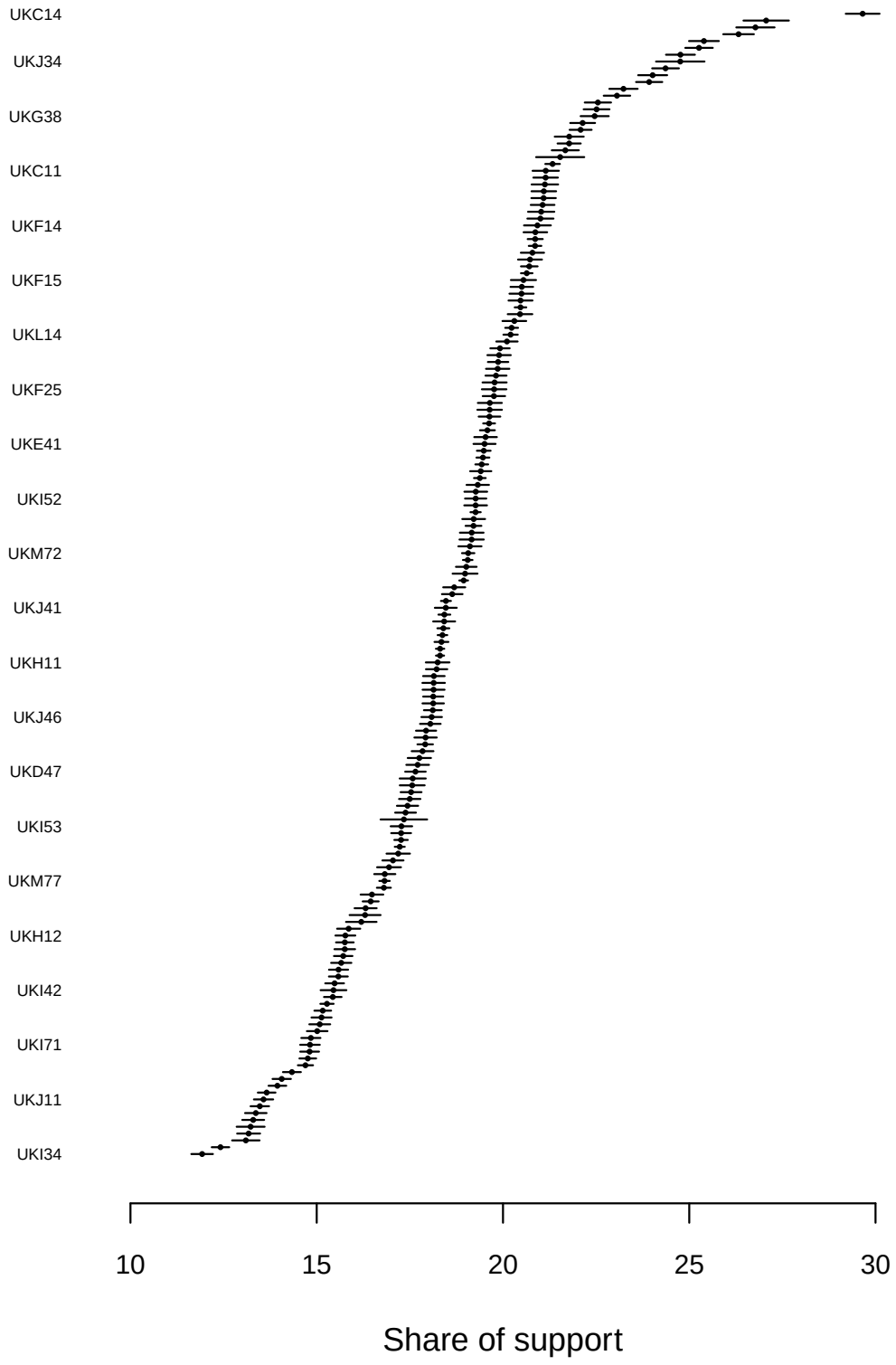


Figure C5: Bootstrapped confidence intervals for NUTS 3-level share of support for the statement "there are more important things in life than protect the environment"

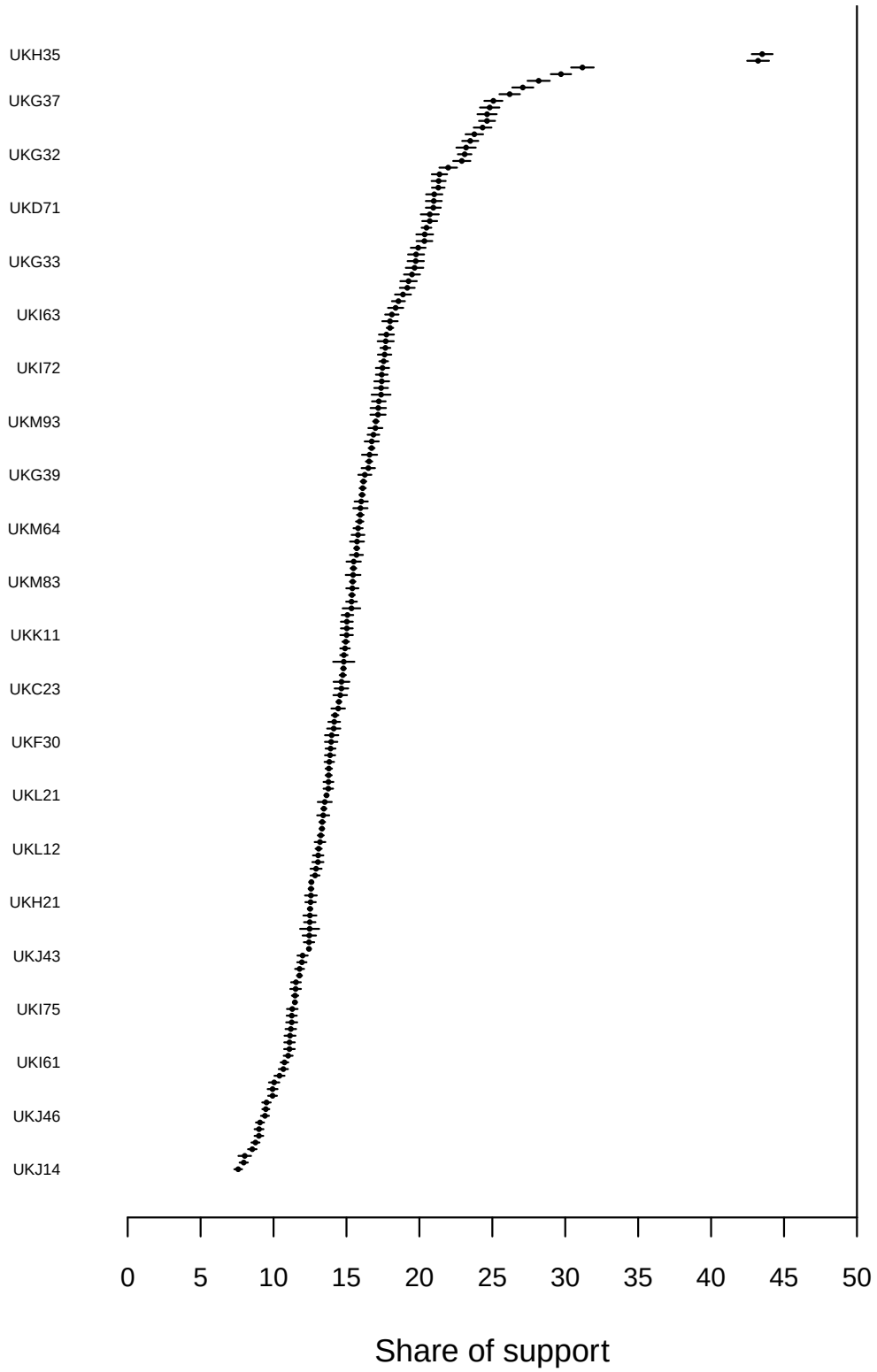
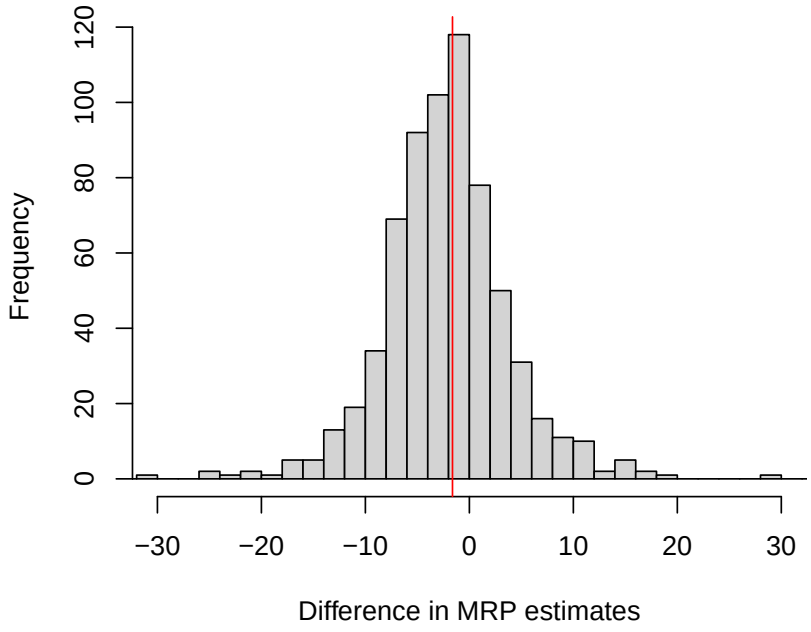


Figure C6: Differences in MRP estimates between models using original poststratification frame and Hanretty et al.'s poststratification frame.



Note: Distribution of differences in MRP estimates for climate attitudes. Mean difference = −1.62 percentage points (red line).

Appendix D - Main results

SUMMARIZE RESULTS HERE

Table D1: The effects of receiving public opinion information on local support for climate action among United States legislators

	Policy Interest		Policy Engagement		Policy Commitment	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-0.03	-1.33	-0.21	-5.19	-0.03	-1.02
	(0.03)	(0.58)	(0.12)	(2.18)	(0.03)	(0.58)
Local Support	-0.01	-0.02	-0.02	-0.06	-0.01	-0.01
	(0.01)	(0.01)	(0.03)	(0.04)	(0.01)	(0.01)
Female %	-0.16	-0.17	-0.64	-0.67	-0.18	-0.19
	(0.08)	(0.08)	(0.30)	(0.30)	(0.08)	(0.08)
Log Pop	-0.01	-0.01	-0.01	-0.01	-0.004	-0.004
	(0.02)	(0.02)	(0.06)	(0.06)	(0.02)	(0.02)
Cluster Size	0.04	0.04	0.16	0.16	0.04	0.04
	(0.004)	(0.004)	(0.01)	(0.01)	(0.004)	(0.004)
Party %	0.27	0.25	0.68	0.61	0.17	0.15
	(0.24)	(0.24)	(0.91)	(0.91)	(0.24)	(0.24)
Treatment*Local Support		0.02		0.07		0.01
		(0.01)		(0.03)		(0.01)
Constant	0.79	1.50	2.08	4.82	0.49	1.03
	(0.61)	(0.69)	(2.31)	(2.59)	(0.61)	(0.68)
N	559	559	559	559	559	559
Adj. R^2	0.19	0.20	0.20	0.20	0.18	0.18

Table D2: The effects of receiving public opinion information on local support for climate action among United Kingdom legislators

	Policy Interest		Policy Engagement		Policy Commitment	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	0.002	0.09	-0.05	0.20	0.02	0.07
	(0.02)	(0.20)	(0.09)	(0.71)	(0.01)	(0.10)
Local Support	0.002	0.003	0.01	0.01	-0.001	-0.0002
	(0.002)	(0.003)	(0.01)	(0.01)	(0.001)	(0.001)
Female %	0.01	0.01	0.22	0.21	-0.09	-0.09
	(0.10)	(0.10)	(0.35)	(0.35)	(0.05)	(0.05)
Log Pop.	0.01	0.01	0.04	0.04	-0.002	-0.002
	(0.02)	(0.02)	(0.08)	(0.08)	(0.01)	(0.01)
Cluster Size	0.03	0.03	0.09	0.09	0.01	0.01
	(0.003)	(0.003)	(0.01)	(0.01)	(0.002)	(0.002)
Party %	0.002	0.002	0.01	0.01	0.0003	0.0003
	(0.001)	(0.001)	(0.003)	(0.003)	(0.0005)	(0.0005)
Treatment*Local Support		-0.002		-0.005		-0.001
		(0.004)		(0.01)		(0.002)
Constant	-0.44	-0.48	-1.57	-1.69	0.05	0.03
	(0.30)	(0.31)	(1.07)	(1.12)	(0.15)	(0.16)
N	160	160	160	160	160	160
Adj. R^2	0.40	0.40	0.31	0.31	0.06	0.06

Table D3: The effects of source credibility and time horizon on policy interest, by country and pooled. Complement to Figure 4 (panel a) and Figure 3 (panel a)

	US	UK	CH	FR	DE	IT	Pooled	EU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Scientist	-0.04	0.03	0.01	0.02	0.03	0.05	0.003	0.02
	(0.03)	(0.02)	(0.01)	(0.04)	(0.02)	(0.04)	(0.01)	(0.01)
Long Term	-0.04	-0.01	-0.01	0.003	0.002	0.01	-0.02	-0.001
	(0.03)	(0.02)	(0.01)	(0.04)	(0.02)	(0.04)	(0.01)	(0.01)
Female %	-0.16	0.01	-0.03	-0.01	0.06	-0.01	-0.03	0.01
	(0.08)	(0.10)	(0.04)	(0.05)	(0.04)	(0.06)	(0.03)	(0.02)
Log Pop.	-0.01	0.01	0.01	-0.01	-0.01	0.08	-0.02	-0.002
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Cluster Size	0.04	0.03	0.02	-	-0.001	-0.01	0.01	0.003
	(0.004)	(0.003)	(0.005)	-	(0.002)	(0.04)	(0.001)	(0.001)
Party %	-0.12	0.002	-0.05	0.36	-0.23	-0.08		
	(0.20)	(0.001)	(0.08)	(0.37)	(0.18)	(0.19)		
Constant	-0.10	-0.44	-0.10	0.05	0.24	-0.72	0.12	0.04
	(0.32)	(0.29)	(0.10)	(0.19)	(0.20)	(0.25)	(0.01)	(0.01)
Control PO	Yes	Yes	-	-	-	-	Yes	Yes
N	559	160	354	152	296	130	1,651	1,092
Adj.R^2	0.19	0.40	0.04	-0.02	0.001	0.07	0.13	0.01

Table D4: The effects of source credibility and time horizon on policy engagement, by country and pooled. Complement to Figure 4 (panel b) and Figure 3 (panel b)

	US	UK	CH	FR	DE	IT	Pooled	EU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Scientist	-0.05	0.06	0.07	0.14	0.16	0.15	0.07	0.11
	(0.12)	(0.09)	(0.04)	(0.13)	(0.10)	(0.09)	(0.05)	(0.04)
Long Term	-0.27	-0.09	-0.06	0.10	0.05	-0.004	-0.09	-0.01
	(0.12)	(0.09)	(0.04)	(0.13)	(0.09)	(0.09)	(0.05)	(0.04)
Female %	-0.62	0.20	-0.11	-0.12	-0.04	-0.04	-0.20	-0.07
	(0.30)	(0.34)	(0.12)	(0.18)	(0.17)	(0.17)	(0.10)	(0.08)
Log Pop.	-0.01	0.04	0.01	-0.02	-0.04	0.07	-0.06	-0.03
	(0.06)	(0.08)	(0.03)	(0.07)	(0.06)	(0.06)	(0.03)	(0.02)
Cluster Size	0.16	0.09	0.08	-	-0.001	-0.07	0.05	0.01
	(0.01)	(0.01)	(0.01)	-	(0.01)	(0.09)	(0.01)	(0.004)
Party %	-0.58	0.02	0.01	-0.35	-0.04	-1.00	-0.78	
	(0.77)	(0.02)	(0.003)	(0.26)	(1.35)	(0.75)	(0.51)	
Constant	-0.70	-1.71	-0.09	0.20	0.91	-0.43	0.59	0.29
	(1.22)	(1.04)	(0.31)	(0.69)	(0.80)	(0.65)	(0.23)	(0.21)
Control PO	Yes	Yes	-	-	-	-	Yes	Yes
N	559	160	354	152	296	130	1,651	1,092
Adj. R^2	0.20	0.31	0.09	-0.02	-0.002	0.01	0.15	0.01

Table D5: The effects of source credibility and time horizon on policy engagement, by country and pooled. Complement to Figure 4 (panel c) and Figure 3 (panel c)

	US	UK	CH	FR	DE	IT	Pooled	EU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Scientist	-0.04	0.02	-0.002	0.02	0.002	-0.02	-0.01	0.001
	(0.03)	(0.01)	(0.01)	(0.04)	(0.02)	(0.03)	(0.01)	(0.01)
Long Term	-0.04	0.02	-0.02	0.04	0.003	-0.03	-0.01	0.001
	(0.03)	(0.01)	(0.01)	(0.04)	(0.02)	(0.03)	(0.01)	(0.01)
Female %	-0.18	-0.08	0.02	-0.08	-0.04	0.004	-0.07	-0.04
	(0.08)	(0.05)	(0.04)	(0.05)	(0.04)	(0.06)	(0.03)	(0.02)
log(pop)	-0.004	-0.01	0.01	0.07	-0.002	-0.01	-0.01	0.02
	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)
Cluster Size	0.04	0.005	0.02	-	-0.002	-0.03	0.01	-0.001
	(0.004)	(0.002)	(0.004)	-	(0.002)	(0.03)	(0.001)	(0.001)
Party %	-0.15	0.0002	-0.16	0.60	-0.30	-0.27		
	(0.20)	(0.0005)	(0.08)	(0.39)	(0.16)	(0.18)		
Constant	-0.18	0.10	-0.03	-0.71	0.19	0.27	0.09	-0.10
	(0.32)	(0.15)	(0.09)	(0.20)	(0.17)	(0.23)	(0.06)	(0.05)
Control PO	Yes	Yes	-	-	-	-	Yes	Yes
N	559	160	354	152	296	130	1,651	1,092
Adj. R^2	0.18	0.06	0.10	0.08	-0.001	-0.01	0.13	0.01

Appendix E - Additional Analyses

SUMMARIZE THE FINDINGS

Figure E1: The effects of receiving a webinar invitation from a co-national local official, relative to a foreign local official, in Germany

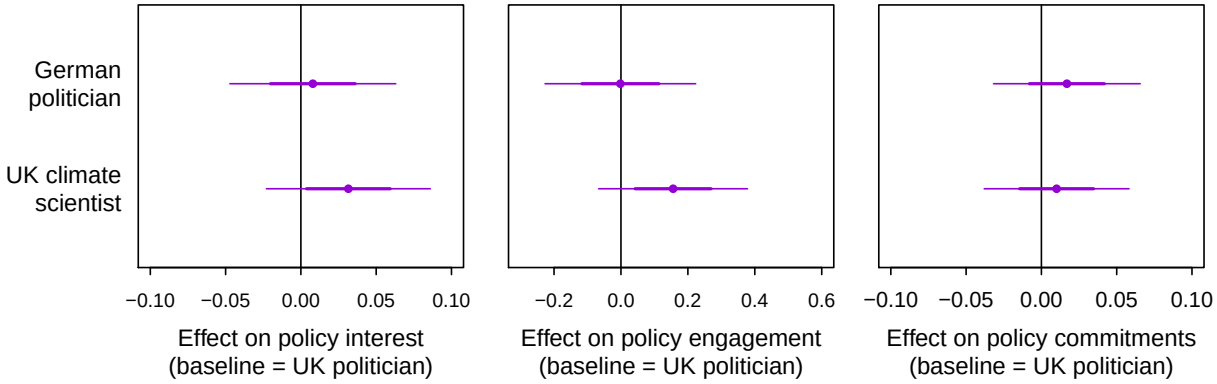
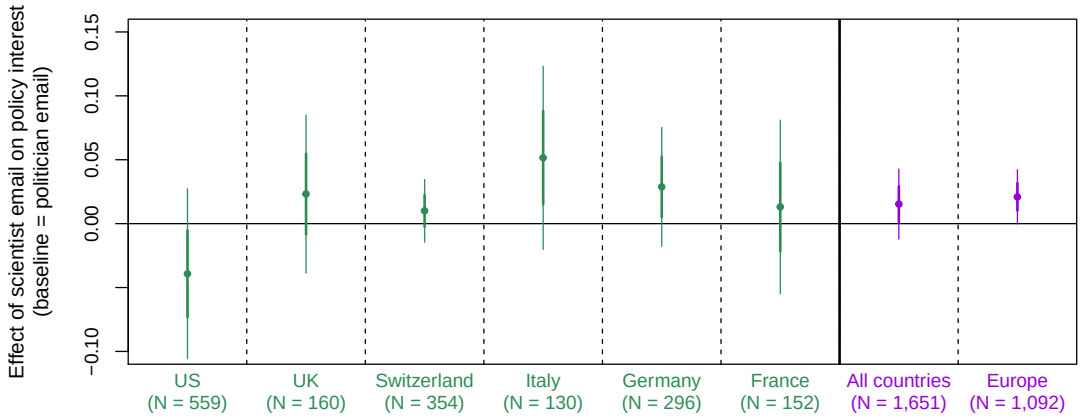
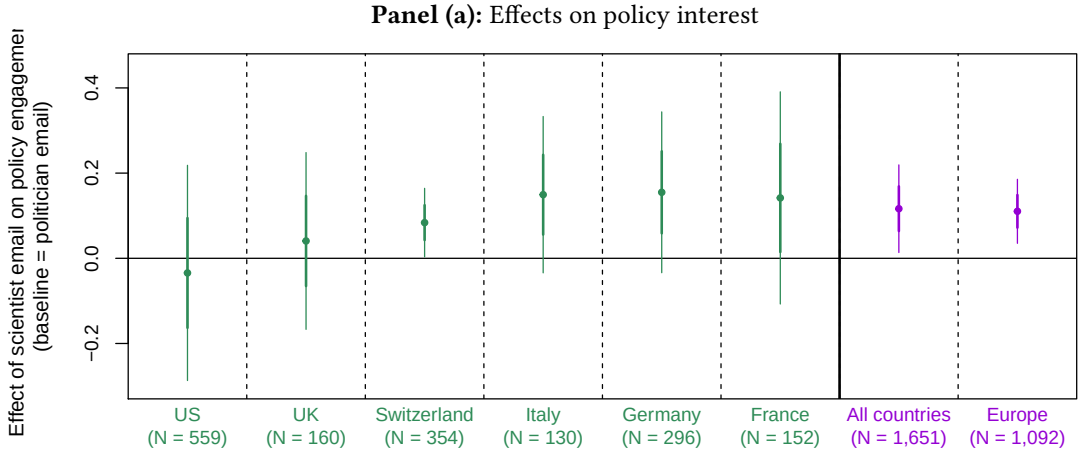


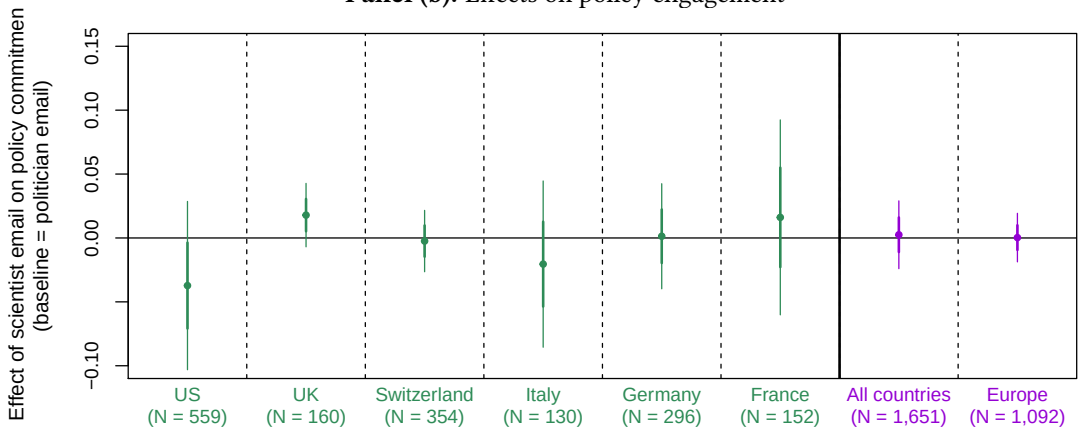
Figure E2: Unadjusted effects of receiving a webinar invitation from a climate scientist (v. peer legislator), by country and pooled



Panel (a): Effects on policy interest



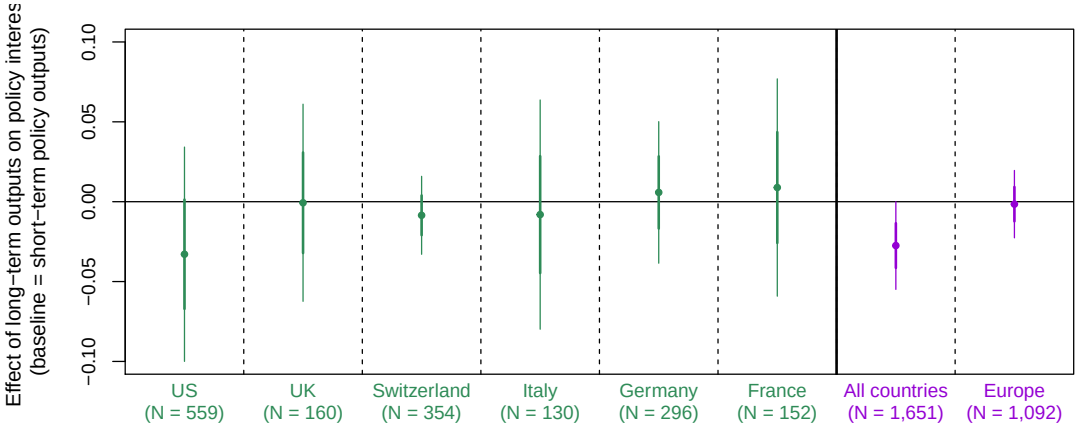
Panel (b): Effects on policy engagement



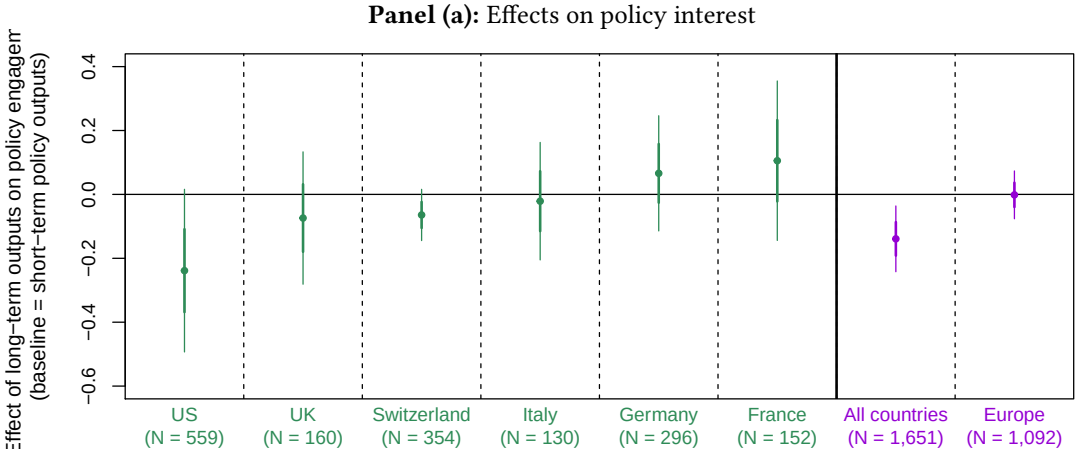
Panel (c): Effects of policy commitments

Note: Points are unadjusted estimates of the causal effect of a webinar invitation from a climate scientist on policy interest (panel a), policy engagement (panel b) and policy commitments (panel c). Estimates from models without the pre-registered covariate adjustment. 95% confidence intervals surround point estimates; thicker lines represent one standard error.

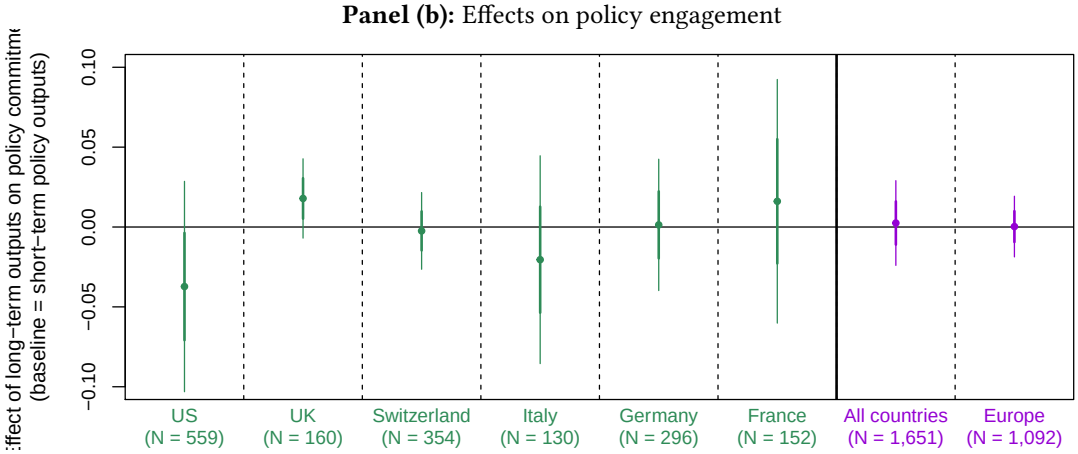
Figure E3: Unadjusted effects of receiving a webinar invitation emphasizing long-term arguments to act on climate (v. short-term), by country and pooled



Panel (a): Effects on policy interest



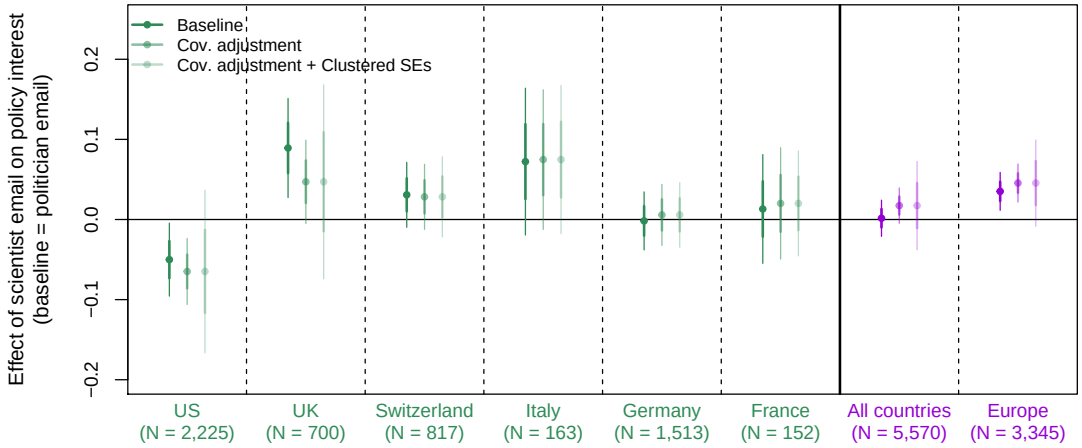
Panel (b): Effects on policy engagement



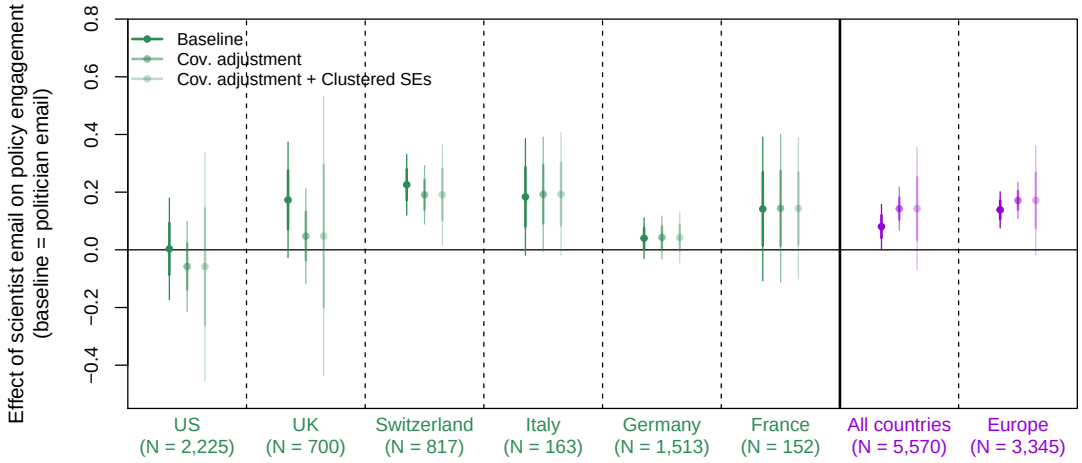
Panel (c): Effects of policy commitments

Note: Points are unadjusted estimates of the causal effect of priming long-term policy goals in the invitation to the webinar on policy interest (panel a), policy engagement (panel b) and policy commitments (panel c). Estimates from models without the pre-registered covariate adjustment. 95% confidence intervals surround point estimates; thicker lines represent one standard error.

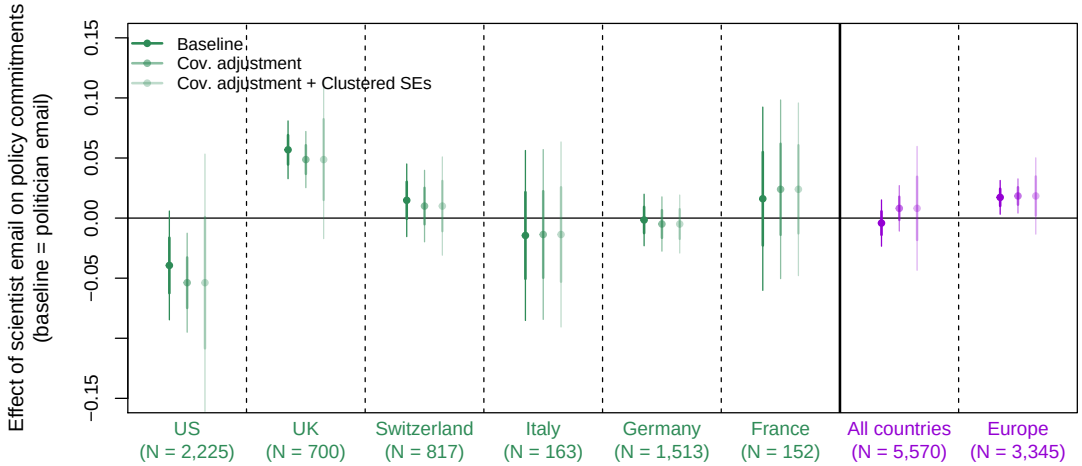
Figure E4: Individual-level analyses of the effects of receiving a webinar invitation from a climate scientist (v. peer legislator)



Panel (a): Effects on policy interest



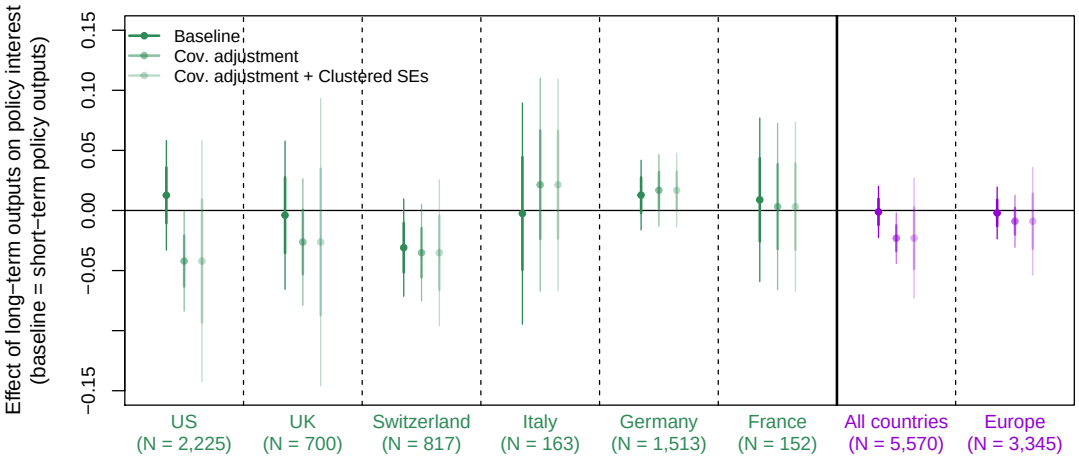
Panel (b): Effects on policy engagement



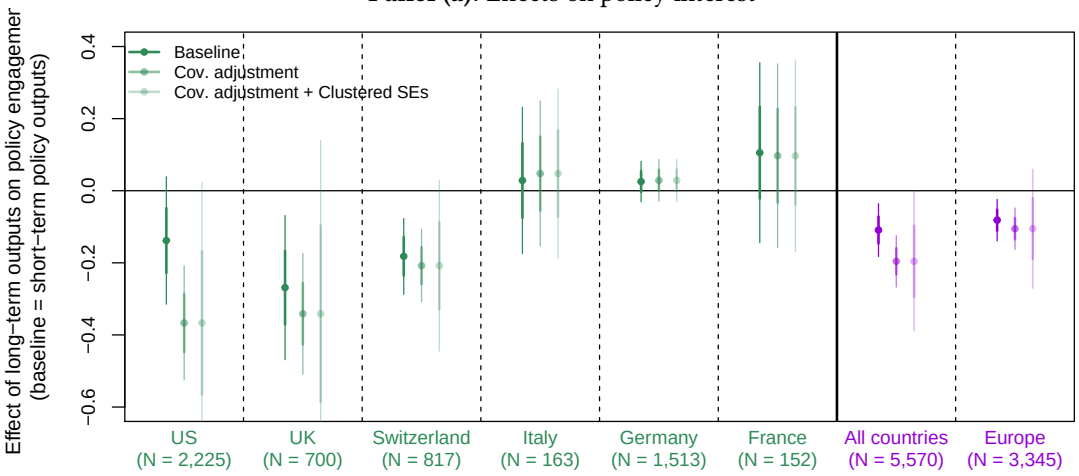
Panel (c): Effects of policy commitments

Note: Points are estimates of the causal effect of a webinar invitation from a climate scientist on policy interest (panel a), policy engagement (panel b) and policy commitments (panel c). 95% confidence intervals surround point estimates; thicker lines represent one standard error. Analyses at the individual level with three model specifications: unadjusted models (baseline); covariate adjustment; and covariate adjustment with clustered SEs.

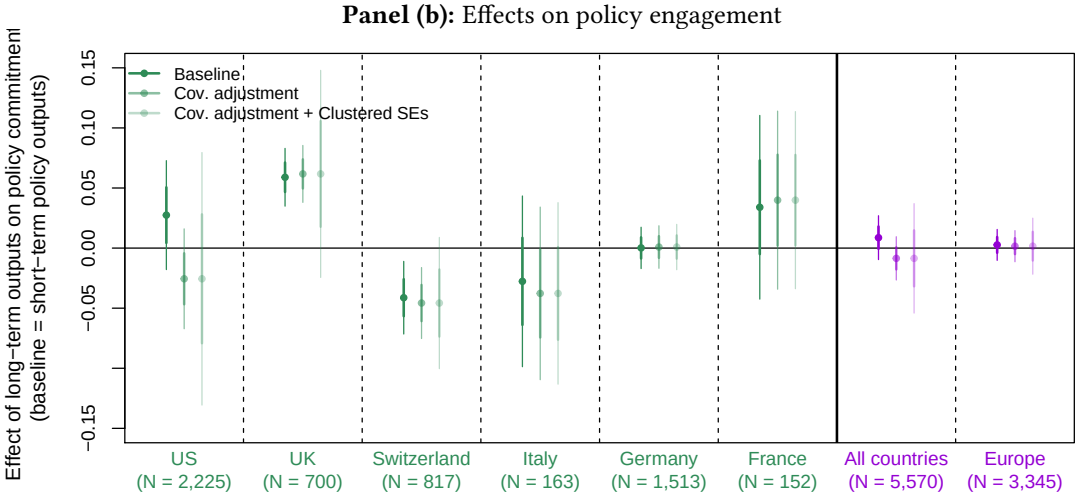
Figure E5: Individual-level analyses of the effects of receiving a webinar invitation emphasizing long-term arguments to act on climate (v. short-term)



Panel (a): Effects on policy interest



Panel (b): Effects on policy engagement



Panel (c): Effects of policy commitments

Note: Points are estimates of the causal effect of priming long-term policy goals in the invitation to the webinar on policy interest (panel a), policy engagement (panel b) and policy commitments (panel c). 95% confidence intervals surround point estimates; thicker lines represent one standard error. Analyses at the individual level with three model specifications: unadjusted models (baseline); covariate adjustment; and covariate adjustment with clustered SEs.

Supplementary Appendix References

Broockman, David E. and Christopher Skovron. 2018. "Bias in Perceptions of Public Opinion among Political Elites." *American Political Science Review* 112(3): 542-563.

Hanretty, Chris. 2020. "An introduction to multilevel regression and post-stratification for estimating constituency opinion." *Political Studies Review* 18(4): 630-645.

Hanretty, Chris, Benjamin E. Lauderdale, and Nick Vivyan. 2018. "Comparing strategies for estimating constituency opinion from national survey samples." *Political Science Research and Methods* 6(3): 571-591.

Kastellec, Jonathan, Jeffrey R. Lax, Michael Malecki, and Justin H. Phillips. 2015. "Polarizing the Electoral Connection: Partisan Representation in Supreme Court Confirmation Politics." Journal of Politics 77 (3): 787–804.