

Science Or Morality? The Effects of Frames on Stakeholder Dialogue, a Field Experiment

ABSTRACT

Achieving the ambitions set forth in international climate agreements requires stakeholder dialogue, which is often hindered by the adoption of different frames. While existing research focuses on the development and evolution of frames within stakeholder groups, we know little about how different frames influence perceptions and dialogue among stakeholders. The deployment of carbon dioxide removal (CDR), seen by some stakeholders as the ultimate solution while deeply contested by others, provides an interesting context for studying how different frames influence the process and outcome of dialogue. We conducted a series of five workshops with a quasi-experimental design, involving over 100 stakeholders from both the private sector and NGOs. Participants were primed to adopt either a logical/scientific or an emotional/moral frame in dialoguing about potential CDR-related policies. We find that dialogue reduces stakeholder polarization, especially when it is based on a logical/scientific frame, while it increases stakeholder skepticism toward CDR-supportive policies, especially when the adopted frame is aligned with the stakeholder group's value. Furthermore, when the adopted frame is aligned with the stakeholder group values, participants perceived other stakeholders as more reasonable and understanding. Understanding the frames of other stakeholders is therefore critical to encouraging a more open and constructive dialogue about climate solutions.

Keywords:

Stakeholder dialogue; framing; carbon dioxide removal; field experiment; climate policies

Addressing the major challenges of the century, and in particular climate change, increasingly requires the concerted efforts and support of multiple stakeholders in the private, governmental, and non-governmental sectors (Liu et al., 2018; Zimmermann et al., 2021). The measures needed to overcome these challenges and comply with international climate agreements necessarily involve multiple actors and require engagement in multi-stakeholder initiatives that involve both businesses and NGOs in their development and governance (de Bakker et al., 2019; Mena & Palazzo, 2012; Rasche, 2012). Stakeholder dialogue, defined as a "two-way interactive process of stakeholder engagement that involves breaking down existing assumptions and developing new ways of learning" (Burchell & Cook, 2006, p. 213), is therefore critical to addressing current environmental challenges.

Recent evidence, however, underlines the difficulties in reaching constructive dialogue between these different parties, given the stakeholders' different and even conflicting interests and perspectives (e.g. Dentoni et al., 2018; Ferraro et al., 2015; Gray & Purdy, 2018; Reinecke & Ansari, 2015). Stakeholders often hold different frames (i.e., schemes to interpret the world, as per Gofman, 1974) to delineate the problem, potential solutions, and to move forward their instances during multi-stakeholder dialogues (Gilek et al., 2016). While the literature on frames and stakeholder engagement features numerous inductive studies of how frames develop, evolve, and are used by different actors to advance their claims (Benford & Snow, 2000; Dewulf et al., 2009; Gray et al., 2015; Meyer et al., 2016), we know little about how the adoption of one frame over another affects the process and outcome of stakeholder dialogue. In short, this literature focuses on *framing*, more than *frames*. Different frames, for instance a logic/scientific frame as contraposed to an emotional/moral frame, have been proven to have different effects in stimulating public response to environmental issues (Jones, 2014; Moezzi et al., 2017; Nabi et al., 2018; Nisbet, 2009). Therefore, we aim at answering the following research question: What is the effect

of adopting different frames on the process and outcome of climate policy dialogue among different stakeholders?

To answer this question, we conducted a field experiment consisting of a series of 5 workshops with a quasi-experimental design and involving over 100 stakeholders, including members of environmental NGOs and the private sector (especially in the energy, transport, or agroforestry sectors). Participants were invited to discuss potential policies to achieve the net-zero emissions target in European countries by 2050 and in particular the potential role of carbon dioxide removals (CDR) practices and technologies, such as reforestation or direct air carbon capture and storage. CDR provide an interesting context to study how different frames affect the process and outcome of stakeholder dialogue. On the one hand, organizations and governments rely on such tools to achieve net-zero emissions at the organizational and societal levels. On the other hand, their deployment and potential are highly contested by some actors, especially environmental NGOs. The manipulation consists of priming stakeholders to adopt different frames in their dialogue, either a logical/scientific frame or an emotional/moral frame.

Through the analysis of data from a series of surveys administered before, during, and following the workshops, our results reveal that dialogue reduces the polarization of opinion between the two groups of stakeholders, whose agreement with potential CDR-related policies tended to converge, especially when dialogue is based on a logical/scientific frame. In addition, dialogue increased skepticism toward the topic discussed (i.e., CDR-supporting policies) in both groups, especially when the frame adopted in the dialogue is aligned with the values of the stakeholder group (i.e., the logical/scientific frame for the private sector, and the emotional/moral frame for the NGOs). Finally, we find that for NGOs, whose values are aligned with the emotional/moral framing, discussion based on a moral/emotional frame fostered greater openness

to dialogue and the perspectives of other stakeholders, while the opposite effect emerged for the private sector. These findings contribute to the literature on stakeholder dialogue and framing in at least two ways. First, our findings quantitatively demonstrate how the adoption of a logical/scientific frame versus an emotional/moral frame affects the process (i.e., stakeholder interaction and perception of other stakeholders) and outcome of stakeholder dialogue (i.e., polarization and skepticism toward the topic discussed). While evidence suggests that the frame adopted affects climate policy support (Jones, 2014; Nisbet, 2009) and decision making (Clarke et al., 2014; Hahn et al., 2014), we test the effect that adopting different frames has on stakeholder dialogue, going beyond the dominant inductive approach of stakeholder participation studies centered on describing the collective framing process of different stakeholders. Second, we provide evidence that dialogue, despite not being necessarily consensus-oriented, is effective in reducing polarization and overcoming the limits of consensus-oriented forms of stakeholder engagement emerging from the literature (Hardy & Philips, 1998; Gilek et al., 2016).

The rest of the paper is organized as follows: In the next section, we briefly introduce the literature on stakeholder dialogue and the role of frames, based on which we develop our hypotheses. We then briefly present the context of CDR-related policies and the methodology used for the field experiment. We next present key findings and conclude with a discussion of the contribution and implications of our results.

FRAMING AND STAKEHOLDER DIALOGUE

Stakeholder Dialogue and Climate Policies

Climate change is one of the grand challenges of the century (Ferraro et al., 2015). The European Union's path to net-zero emissions will be enormously challenging and requires the

concerted efforts and support of diverse stakeholders including private, governmental, and non-governmental sectors (Liu et al., 2018; Zimmermann et al., 2021). To meet the ambitious goals laid out in the Climate Pact of the European Green Deal, multilateral organizations and governments will need to engage the private sector and NGOs to develop and govern climate action measures (de Bakker et al., 2019; Mena & Palazzo, 2012; Rasche, 2012; Wittneben et al., 2012), as the complex interrelationships that characterize climate change require the concertation of multiple parties to enable the definition and adoption of effective measures (Clarke & Crane, 2018; Dentoni et al., 2018; Pedersen et al., 2020). For this reason, new forms of governance, transnational (Bulkeley et al., 2012) and collaborative (Ansell & Gash, 2008), are increasingly encouraged and used in decision-making processes concerning climate change. This form of governance includes multiple stakeholders in common forums that allow for dialogue with public agencies to participate in consensus-oriented decision making, conveying what has been called stakeholder democracy, i.e., the involvement of various stakeholders through deliberative democracy processes (Chambers, 2003; Matten & Crane, 2005). An example comes from Multi-stakeholder Initiatives, such as the Forest Stewardship Council or the United Nations Global Compact, which include different stakeholders in their governance to jointly establish and disseminate sustainable practices (de Bakker et al., 2019).

Yet many of these initiatives do not achieve their hoped-for effectiveness. Antagonism, preconceptions, diversity of interests and perspectives, and lack of trust among different stakeholders often lead to a decision-making impasse (Ansell & Gash, 2008). For example, in the conflict over Voyageurs National Park in northern Minnesota (USA), not even 18 months of mediation efforts were sufficient to find a collaborative solution between the different stakeholders (Gray, 2004). This phenomenon is labeled as the paradox of collaborative governance: While collaboration is often necessary to cope with complex challenges that involve a large and diverse

number of stakeholders in their solution, it often leads to a decline in decision-making effectiveness since reaching consensus among different actors is often impossible (Gilek et al., 2006; Turcotte & Pasquero, 2001). However, avoiding conflict to reach a decision is also suboptimal because it leads to the interests of some parties being ignored (Arenas et al., 2020; Moog et al., 2015; Poncelet, 2001).

To address this tension, some authors suggest avoiding the spasmodic search for consensus and instead favoring forms of governance oriented towards dialogue and the coexistence of different voices in the definition of environmental policies (Poncelet, 2001; van de Kerkhof, 2006). This type of governance allows policymakers "to critically assess arguments in favor of and against a broad range of policy options, and deal with stakeholder conflict in an early phase of the policy process" (van de Kerkhof, 2006, p. 279). Through dialogue, different stakeholders interact with each other in a critical but constructive manner, and the discussion points to the expression of concerns, listening, and learning, rather than the opposition incentivized in other deliberative processes (Burchell & Cook, 2006, 2008; Ferri et al., 2016).

Dialogue has two important advantages. First, although not necessarily oriented toward consensus but instead toward the expression of a plurality of voices (Dawkins, 2015), it allows parties to understand and approximate each other's interests and viewpoints, leading to an "agreement in diversity of voices" (Klitsie et al., 2018). For example, van Huijstee and Glasbergen (2008) analyze five case studies of dialogue between businesses and NGOs and report how dialogue fosters learning and understanding of different viewpoints between parties, traditionally in antagonistic positions. Because of this, different perspectives are brought together, reducing the polarization of opinion among different stakeholders. Therefore, we develop the following hypothesis:

Hypothesis 1: Dialogue reduces polarization of opinion about potential climate policies between stakeholder groups

Second, by not seeking to reduce dissent but rather by encouraging the expression of criticisms and concerns (Burchell & Cook, 2006), dialogue allows for clarity about potential risks and problems associated with different proposed solutions (van de Kerkhof, 2006). For example, Ratner and colleagues (2018) analyzed dialogue between different stakeholders related to large lake systems in Uganda, Zambia, and Cambodia, finding that dialogue allowed for the voice of local communities and their interest in natural resource management to be brought forward, revealing unexpected connections and externalities between proposed policies and community livelihoods. For this reason, stakeholder dialogue can lead to greater skepticism about the topic discussed, bringing to light their problematic areas. Therefore, we develop the following hypothesis:

Hypothesis 2: Dialogue increases stakeholder skepticism about the potential climate policies discussed

As dialogue is grounded in conversation and discourse (Hardy et al., 2005), dialogue outcomes in terms of polarization and skepticism are related to the frames adopted by stakeholders (Ferraro & Beunza, 2018). In the next section, we briefly describe the literature on frames to propose hypotheses about what their influence on stakeholder dialogue is.

Stakeholder Dialogue and Frames

To frame means to “select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation” (Entman, 1993, p. 52). Given

this definition, it becomes clear how frames are important in fostering or hindering dialogue between different stakeholders, especially on climate policies. Indeed, the adoption of different frames among stakeholders can exacerbate an environmental conflict if actors are unable to agree on a common definition of the problem and its potential solutions (Gilek et al., 2016; Shmueli, 2008). Especially concerning climate change, different frames characterize public opinion (Hoffman, 2011), creating fragmentation that results in social conflicts inside and outside the policy arena (Dewulf et al., 2011; Purdy et al., 2019).

The literature on frames is divided into two streams (Cornelissen & Werner, 2014; Dewulf et al., 2009). The first stream analyzes the process of framing at the macro level, studying how different frames develop and evolve dynamically through interaction and negotiation among actors involved in meaning-making related to a problem and its potential solutions (Goffman, 1974). The literature on social movements, for example, outlines how these movements develop frames "intended to mobilize potential adherents and constituents, to garner bystander support, and to demobilize antagonists" (Snow & Benford 1988, p. 198). Thus, the main goal of this analysis is to analyze how frames are socially constructed (Benford, 1993, 1997; Dewulf & Bouwen, 2012), how they come into existence (Dewulf et al., 2009; Gray et al., 2007), shift (Ansari et al, 2013; Reinecke & Ansari, 2016), and are used to mobilize action (Kaplan, 2008; Pellow, 1999), but also how they evolve through a process of negotiation and alignment through conversations and dialogue between different stakeholders adopting different frames (Dewulf et al., 2004; Le Ber & Branzei, 2010; Meyer et al., 2016; Vandenbussche et al., 2017). This stream therefore inductively describes frames and their emergence (i.e., framing) as a "bottom-up" phenomenon (Cornelissen & Werner, 2014), without discussing what the effects of particular frames are on stakeholder dialogue.

The second stream analyzes frames at the micro level, studying the effect on attitudes and behavior of the activation of different frames to describe an issue at stake (Cornelissen & Werner, 2014). These studies mostly take an experimental approach (see Borah, 2011 for a review), for example demonstrating how descriptions of climate change alternately focused on the losses of inaction or the potential gains of mitigation stimulate different attitudes and emotions toward climate change (Bilamdžić et al., 2017; Nabi et al., 2018). Specifically regarding climate policy, Severson and Coleman (2015) find that using scientific frames, secular moral frames, and economic equity frames to describe climate change and its effects are the most effective at boosting overall climate policy support. Although this stream shows that some frames used to define a problem are more effective than others in stimulating a response to the problem, these studies are concerned with individual attitudes and behaviors. Thus, we do not know how these effects play out in the dialogue among different stakeholders.

Our goal is to build on insights from both of these streams, as we are interested in understanding the effect of different frames not on individual behavior, but the process and outcomes of dialogue between stakeholders. We first focus on the effects of frames on stakeholder dialogue outcomes. Indeed, evidence suggests that different frames have different effects on stakeholders' perceptions of environmental conflicts. For example, Reilly and Adamowski (2017) find that the frames adopted by stakeholders in terms of losses or gains have an effect on whether or not they want to dismantle an outdated dam, and thus the final decision is influenced by the frame used in the conversation. In particular, we focus on two frames that emerge in the literature as relevant to make decisions regarding climate change (Albertson & Busby, 2015; Nisbet, 2009; Severson & Coleman, 2015): the logical/scientific frame and the emotional/moral frame. The first frame is the one most commonly used in the climate change dialogue among stakeholders (Welp et al., 2005), especially by private sector actors whose values are more aligned with a logical

perspective (Shmueli & Ben Gal, 2005), and involves the use of arguments based on scientific evidence and data. This frame has been shown to be persuasive in supporting climate change policies and reducing the ideological divide among the population towards climate policies (Severson & Coleman, 2015). For example, Hassenforder and colleagues (2016) identified how adopting "rational problem solving" and invoking scientific evidence helped reduce stakeholder polarization in a participatory process for natural resource management in Fogera, Ethiopia. Therefore, we develop the following hypothesis:

Hypothesis 3: Dialogue adopting a logical/scientific frame reduces polarization of opinion about potential climate policies between stakeholder groups more than adopting an emotional/moral frame

In contrast, the emotional/moral frame relies on the use of normative arguments, based on ethics and morality. Because this frame allows the lived experiences of individuals and communities, as well as their values and rights, to be included in the discussion beyond the numbers (Gilek et al., 2016), it particularly resonates with the values of NGOs (Shmueli & Ben Gal, 2005). Therefore, because it allows issues of ethics, social justice, and equity related to climate policies to emerge and be discussed, we argue that this framework contributes to NGO skepticism of potential climate policies. Supporting evidence comes from several experiments showing that communication is particularly effective when the message takes on a frame that aligns with the values of the recipient (Hurst & Stern, 2020; Wolkso et al., 2016). For the same reason, we expect private sector actors to be less persuaded by emotional/moral arguments that are not aligned with their value system, and to become more skeptical of potential climate change policies when their potential downsides are discussed using a logical/scientific framework. Therefore, we develop the following hypothesis:

Hypothesis 4: Dialogue adopting a frame reflecting the values of a stakeholder group is more likely to increase its skepticism about potential climate policies

Having discussed the effect of frames on the outcomes of stakeholder dialogue (polarization and skepticism), we now discuss the effect of frames on the process of stakeholder dialogue, especially with regard to the interaction between different groups of stakeholders. Evidence from four environmental conflict cases suggests that when frames are aligned with the values of a group, cohesiveness within the group increases (Brummans et al., 2008). This is because the frames adopted by a given group reflect and reinforce the group's collective values and identity and are therefore used to circumscribe the stakeholder group and unite its members (Gray et al., 2007), creating an in-group positive bias that favors a positive perception of the other members of the group and their arguments (Fein & Spencer, 1997). Conversely, we expect that when the dialogue is based on a frame that is distant from the group's values, cohesion within the group suffers, as the group loses a fundamental unifying means. Therefore, we argue that when the frame used in the dialogue is in line with the stakeholder group's values, it increases the perception of group members as reasonable and understanding, as reported in the following hypothesis:

Hypothesis 5: Dialogue adopting a frame in line with the stakeholder group's values enhances the perception of other group members as reasonable and understanding

Similarly, we argue that adopting a frame aligned with the values of one stakeholder group in potential climate policy dialogue facilitates the perception that members of other groups also have greater reasonableness and understanding. Indeed, if an out-group negative bias (Fein & Spencer, 1997), i.e. a negative bias toward members of other groups, traditionally exists in the

dialogue, this bias is often fueled by the adoption of different frames (Ansell & Gash, 2008; Gray, 2004). In contrast, when frames are aligned, evidence suggests that tensions are reduced, and trust and understanding also increase for members of other groups (Tisenkopfs et al., 2014). We thus argue that if the dialogue is built on a single frame adopted by different parties, perceptions of other members are likely to improve, especially for the group whose values align with the adopted frame. Therefore, we develop the following:

Hypothesis 6: Dialogue adopting a frame in line with the stakeholder group's values enhances the perception of other stakeholder groups as reasonable and understanding

CONTEXT: CARBON DIOXIDE REMOVAL EUROPEAN POLICIES

Crucially, limiting global warming to 2°C above preindustrial levels, as enshrined in the Paris Agreement, is likely to require large-scale deployment of carbon dioxide removals (CDR), technologies and practices able to remove CO₂ from the atmosphere and reduce the net impact of human activities by compensating for residual emissions in hard-to-abate sectors and potential overshoot of the atmospheric concentration target. Indeed, it is estimated that by the end of the century, between 400 and 1,000 gigatons of carbon dioxide, approximately 10 to 25 years' worth of current emissions, may need to be securely removed from the atmosphere (Minx et al., 2018). CDR cover a wide range of practices and technologies that capture CO₂ through biological storage, as in the case of afforestation/reforestation or soil carbon sequestration, or geological storage, as in the case of bioenergy with carbon capture and storage or direct air carbon capture and storage (Fuss et al., 2018). CDR have different readiness levels, efficiencies, costs, and potential scalabilities that vary across time and geographies (Buck, 2016).

However, their deployment in the European Union remains a contested prospect, often associated with geoengineering (Cox et al., 2020; Carton et al., 2020; Dowd & James, 2014; Dowd et al., 2015). Anderson and Peters (2016) argue they are “not an insurance policy, but rather an unjust and high-stakes gamble”. Experts have raised serious ethical concerns associated with the reliance upon CDR to reach net-zero emissions (Aggarwal & Brockington, 2020; Beuttler et al., 2019). Even when CDR are considered essential to achieving climate targets, given the uncertainty about their effectiveness and scalability (Nemet et al., 2018; Smith et al., 2016), CDR may deter efforts to reduce emissions and represent a moral hazard (Carton et al., 2020; Lenzi, 2018; Lenzi et al., 2018). Recent evidence underlines the difficulties in reaching an agreement between the different parties, especially between businesses and NGOs, given stakeholders’ different and even conflicting interests and perspectives. For instance, a study involving different stakeholders involved in carbon capture projects in Australia revealed discrepancies on the level and timing of the dialogue among stakeholders that undermined the potential to establish a valuable and open communication about carbon capture among parties (Dowd & James, 2014).

This context is ideal for a study of stakeholder dialogue on potential climate policy, and particularly the effects that different frames have on it, for the following reasons. First, CDR is a hot topic that is gaining more and more space on major decision-making tables, from Washington to Brussels to COP26. The various stakeholders, and in particular environmental NGOs and companies in the energy, transport, and agroforestry sector, are therefore informing themselves and trying to influence the policymakers who will be called to establish policy proposals regarding CDR deployment in the coming months. As the dialogue among parties is ongoing, it is possible to shed light on it through our study. Second, stakeholders are forming their frames on the topic. While the topic has been at the center of the scientific debate in the past few years, it has only recently gained attention from mainstream media and policymakers. Stakeholders are developing

their opinions and adjusting them based on new information (O'Beirne et al., 2020; Wolske et al., 2019). Therefore, as frames are developing and not crystallized yet, it is easier to manipulate them. Third, the field is highly contested (Levy & Scully, 2007), as different stakeholders (and even actors within the same stakeholder group or even within the same organization) have divergent opinions on which CDR-related policies the European Union should adopt. In particular, CDR is generally viewed positively by private sector actors, which can count on industrial co-benefits of these technologies and the possibility of capturing emissions that are difficult to abate. Companies such as Microsoft, Shopify, and IKEA already expressed interest in investing in these technologies. In contrast, they are generally viewed more negatively by NGOs, which emphasize the threats that CDR technologies and practices pose to ecosystems and local communities, and the risk that investing in CDR will hinder efforts on emissions reduction (Arcanjo, 2019). As contestation and divergence are essential for dialogue (Ferraro & Beunza, 2018), the CDR policy arena is a suitable context to test our hypotheses. In the next section, we describe the methodology used in our study.

METHODOLOGY: FIELD EXPERIMENT

Sampling

We started by identifying the set of relevant stakeholders. Through an extensive internet search process, we compiled a database that included 298 environmental NGOs and 279 private sector organizations. Inclusion criteria were a substantive presence in Europe (even in the case of organizations with headquarters located on other continents) and an interest in European Union policies for climate change mitigation, either because of the sector, as in the case of climate organizations or companies in the energy sector, or because of a declared interest of the organization in the deployment of CDR, expressed through reports, public comments, or media

statements. A few relevant members from each organization were selected based on their expected knowledge and expertise, interest, and decision-making power within the organization they represented (e.g. senior policy officers for NGOs, CEOs for CDR developers, or carbon capture experts/project managers/sustainability managers in larger companies). The final database included a total of over 1000 stakeholder members' contacts.

As we are interested in understanding not just stakeholders' perceptions but also in their interactions and dialogue processes, we organized a series of five virtual two-hour workshops (with a field quasi-experimental design) to bring together different stakeholder groups. Unlike surveys or interviews, this methodology allows us to measure how perceptions change during dialogue with peers and other stakeholder groups.

A random selection of 200 participants (100 NGO members and 100 private sector members) were invited to participate in the pilot workshop in June 2021. Over 30 participants registered, and 22 participants attended the two-hour workshop (11% attendance rate). Following the results of the pilot workshop, we replicated the event with only some minor adjustments in the logistic of the event, while not altering the manipulation nor the data collection methods (therefore, we can integrate the pilot workshop data in the analysis as well). An additional four events were conducted in October 2021, where the remaining 800 stakeholders were invited. 126 participants registered to attend one of the four workshops, and 81 attended (respectively 23, 17, 20, 21 for each of the four events with a 10% attendance rate). In total, 103 stakeholders participated in the study. Keeping the number of participants around 20 allowed for meaningful stakeholder dialogue and interaction that would have been more difficult in larger groups.

Study Design

For the experimental manipulation, we randomly assigned each workshop a different frame for the potential role of CDR in reaching the European Green Deal emission targets. Each workshop began with a short, pre-recorded video that presented the various CDR using the two pre-selected frames. The control group was presented with a logical/scientific frame, which relied on scientific and numeric information to underline the pros and cons of CDR. Examples of the type of information provided include the permanence of each CDR and estimated costs and resource usage. The treatment group was instead presented with an emotional/moral frame of the topic; the video was very similar but underlined the pros and cons of various CDR from a moral perspective. Arguments included, for instance, opportunities for geographical and inter-generational fairness, risks of deterrence and double counting, or biodiversity concerns. Appendix A and B present the summary slide used in the two videos. Both videos lasted around 10 minutes and were pre-recorded by the same speaker, a well-established expert in the field. The video was presented at the beginning of the workshop, after a short welcome from the organizers.

After the video, participants were divided into two homogeneous sub-groups (NGOs and private sector) to further discuss the content of the video. They were specifically asked to refer to the pros and cons presented in the video to discuss and then collectively allocate the future European Union climate budget (for simplification estimated to be 50 billion euros/year) between conventional climate mitigation (e.g., switching away from fossil fuels) and CDR, the latter further divided into different CDR subgroups (ecological and geological storage). Participants were asked to discuss and provide rationales for their allocations of funds that drew on the video they had just viewed and to provide clear and detailed policy recommendations. The groups were encouraged to take notes on the discussion on a virtual whiteboard. The discussion was (minimally) moderated

by a member of the research team who provided the instructions and made sure participants understood the task. The discussion and the virtual board notes were recorded. After 20 – 30 minutes of discussion, the two sub-groups were reunited to share the results of their discussions, and comment on the other group's budget allocations in a dialogue form.

The decision to have initial homogeneous discussions followed by larger heterogeneous dialogue was made to track the effects of discussing these contested subjects with stakeholders of similar backgrounds and interests compared to multi-stakeholder dialogues. The goal is to understand whether the frame adopted in the dialogue affects the dialogue process (interaction within and between stakeholder groups) and outcome (polarization and skepticism) and whether these effects are differential for the two types of stakeholders considered. In the final 30 minutes, a member of the European Commission joined the workshop for a Q&A session with participants. While this section of the workshops was not part of the field experiment, the presence of European officials was used to help entice a greater response rate and participation than would be the case for a purely academic-led workshop.

The pilot workshop consisted of two parallel events, one with the control condition (i.e., the logical/scientific frame) and one with the treatment condition (i.e. the emotional/moral frame) to which participants were randomly assigned. For logistical concerns that could limit the time for the discussion, as well as participants' overall experience, the following four workshops only included one condition each. The workshops were paired so that the control and treatment conditions were either on the same day or on two consecutive days. Moreover, each condition was associated with a morning and an afternoon event.

Measures

A few days before attending the workshops, stakeholders were asked to fill out a pre-workshop survey to gather information about the organization (geographical presence and sector) and assess their awareness of CDR (used as control), their perceptions of the degree to which other stakeholder groups' (either private sector or NGOs, based on the participant's affiliation) have reasonable arguments on the topic and are willing to understand different points of views (11-point scale), to capture pre-existing out-group biases, and their perceptions potential European Union policies supporting the deployment of CDR. In particular, to measure the potential policy perceptions, we asked participants to rate their level of agreement/disagreement on a 9-point scale for four statements about potential policies related to the deployment of CDR and currently under discussion. Appendix C reports the items. The first and the third statement are on a reversed scale, therefore higher support for the statement indicates lower support for CDR. Importantly, these indicators are formative, not reflective, and therefore the measurements for validity and reliability are not applicable (Hair et al., 2010).

Participants were asked to fill out two additional short surveys during and after the event. The manipulation check survey, following the video, was administered to track changes in the variables of interest. This survey focused on the effects of the manipulation, measuring the perceived persuasiveness of the video, the perceived focus on logical/scientific and emotional/moral arguments, and the change in the perception of CDR or confidence level of previously stated opinions following the video. Following the video, participants were asked to fill out a short survey to check the effectiveness of the manipulation. Participants were asked to rate, on a scale from 1 to 10, the perceived persuasiveness of the video message, and the degree to which the arguments were supported by logical/scientific reasoning or emotional/moral reasoning. While

there are no differences in the perceived persuasion of the two videos, the emotional/moral video was assessed as significantly ($p < 0.001$) more reliant on emotional/moral reasoning than the other video, confirming the effectiveness of the manipulation.

The final survey was administered at the end of the larger group discussion (before the Q&A session) and included a second measurement of stakeholders' perceptions of potential European CDR-related policies, using the same items and scale of the first survey, and their perceptions of other stakeholders' reasonableness and understanding (both for homogenous and heterogeneous groups). Specifically, the items are: 1) To what extent do you believe that, in general, other participants in the small group discussion (the allocation exercise) had reasonable motives and concerns on this topic? Please give your answer on a scale of 0 to 10, where 0 means "Not at all reasonable" and 10 means "Extremely reasonable" 2) To what extent do you believe that, in general, other participants in the small group discussion (the allocation exercise) were willing to understand the perspective of other participants on this topic? Please give your answer on a scale of 0 to 10, where 0 means "Not at all willing" and 10 means "Extremely willing". The same items were replicated for the larger group dialogue.

Importantly, in each survey, stakeholders provided sufficient personal information to allow us to generate a unique code in order to match up the responses from all three surveys while preserving respondent anonymity. We excluded 17 respondents from the final analysis because they either did not fill out all three surveys or their entries could not be matched due to mistakes in generating the unique code. The final matched sample was therefore 86 respondents: 46 representatives of NGOs, and 40 representatives of the private sector. Figure 1 shows the geographic distribution of stakeholders within four European macro-regions per the EuroVoc

classification. Figure 2 shows the allocation in the two conditions, the stakeholder group, and the date of the participation.

Insert Figure 1 about here

Insert Figure 2 about here

FINDINGS

Stakeholder Dialogue Effect on Opinions about Climate Policies

The first hypothesis refers to the effects of dialogue on the polarization of opinions about potential climate policies among stakeholder groups, while the second refers to the effects of dialogue on skepticism about CDR-supporting policies. To measure the effects of dialogue, we calculate the difference between stakeholder groups in the perception about each of the four policy statements in the pre-workshop and the post-workshop surveys. The averages for each of the two measures, distinguished by stakeholder groups, are reported in Figure 3.

Insert Figure 3 about here

As we expected, the figure illustrates that NGO members are generally more skeptical than the private sector about policies that encourage CDR deployment. They have higher levels of agreement with policies that limit the use of CDR (policy 1 and policy 3) and lower levels of agreement with policies that encourage their use (policy 2 and policy 4). In support of hypothesis 1, Figure 3 also illustrates how there is a convergence of opinion regarding the various policies

following the dialogue. For policies 1, 2, and 3, in fact, the difference between the average values of agreement with the policies between the two stakeholder groups is significantly reduced following the dialogue, indicating less polarization. The ANOVA illustrates that there is a significant ($p < 0.05$ in all cases) difference between the two stakeholder groups in the pre-workshop measurement for policies 1, 2, and 3, but there is no significant difference in the post-workshop one for any of these policies. The difference in agreement with policy 4 between groups, on the other hand, remains stable and not significant for both measurements. It is interesting to note how the convergence is mainly due to the more radical change in the opinions of the private sector, which following the dialogue are closer to those of the members of the NGOs.

Furthermore, in support of hypothesis 2, the figure also illustrates how there is, for both groups of stakeholders, a growth in skepticism towards policies in favor of CDR (policy 2 and policy 4) and greater agreement with those against (policy 1 and policy 3). The paired t-test (with 95% confidence interval) reveals how the differences are significant for both groups for policy 1 ($p < 0.001$) and for policy 3 ($p < 0.05$), while they are not significant for policy 2 and policy 4, suggesting that stakeholders did not change their level of agreement with these policies through dialogue. Therefore, we found only partial support for this hypothesis.

Frame Effect on Stakeholder Dialogue

Hypothesis 3 postulates that polarization between groups is lower when the stakeholder dialogue adopts a logical/scientific frame, while hypothesis 4 postulates that skepticism towards climate policies increases when the frame adopted is aligned with the stakeholder group's values. Figure 4 illustrates the average values of policy agreement (pre- and post-workshop) for the two stakeholder groups, distinguishing treatment (emotional/moral) and control group (logical/scientific).

Insert Figure 4 about here

As it is visible from Figure 4, hypothesis 3 is partially supported. There is no significant difference in convergence for policy 1 and policy 3 between the treatment and the control group, while higher convergence is found for the logical/scientific frame, in line with our hypothesis, for policy 2 and policy 4. In particular, the ANOVA shows significant differences ($p < 0.1$ and $p < 0.05$ respectively for policy 2 and 4) between stakeholder groups primed to adopt a logical/scientific frame in the pre-workshop measure, while the difference is not significant anymore in the post-workshop measure, signaling convergence. The same test is not significant for the groups adopting an emotional/moral frame, in line with our hypothesis, and agreement with policy 4 shows even an increase in polarization following the dialogue using this frame.

Similar to the test for hypothesis 2, to test hypothesis 4 we ran the paired t-test with 95% confidence interval for both stakeholder groups, but this time also distinguishing the treatment and control group. In support of this hypothesis, we found that, for private sector participants, the dialogue based on a logical/scientific frame significantly increased the skepticism toward CDR-supporting policies, as the agreement for each of the policies considered decreased (or increased, for reversed items) significantly ($p < 0.01$, $p < 0.1$, $p < 0.05$, and $p < 0.1$ respectively for policies 1, 2, 3, and 4). However, when adopting an emotional/moral frame, only the agreement with policy 1 decreased significantly ($p < 0.05$), while there was no significant change for the other policies, suggesting that the use of a frame in line with the stakeholder values is more likely to increase the skepticism towards the climate policies discussed. However, we find only partial support for the same effect to happen for NGOs. In line with our hypothesis, we found that NGOs increased their agreement toward policy 1 (reversed) significantly ($p < 0.05$) only when the dialogue adopted an

emotional/moral frame, in line with their values, and not when the dialogue was based on a logical/scientific frame. However, also due to the relatively low sample size of the four groups (compared to running the t-test only across stakeholder groups or treatment groups) none of the t-tests were significant for the other three policies for this stakeholder group.

The last two hypotheses refer to how stakeholders perceive the reasonableness and understanding of other stakeholders participating in the dialogue (either from the same or from another stakeholder group). In the pre-workshop survey, we asked participants to assess, on a scale from 0 to 10, the degree to which different stakeholders have reasonable concerns and understanding of other stakeholders' points of view, in order to capture potential in-group/out-group biases. We found that NGO representatives have a significantly lower ($p < 0.1$ in ANOVA) assessment of the reasonableness of the other stakeholder group (i.e., the private sector) (average: 4.99), compared to the private sector attendees' assessment of NGO reasonableness (average: 5.84). Moreover, the two groups do not significantly differ in their view of the national governments' reasonableness and understanding (average: 5.8 and 5.6 respectively).

After the workshop discussions, we asked participants to assess, again on a scale from 0 to 10, the degree to which the other participants were reasonable and understanding, distinguishing homogeneous groups (i.e., smaller group discussions with members of the same stakeholder group) and heterogeneous group (i.e., larger group dialogue with different stakeholder groups). NGO representatives had a significantly higher assessment of the reasonableness and understanding of their peers ($p < 0.01$ and $p < 0.05$ respectively), compared with private sector representatives' assessment of their peers. This finding indicates a higher degree of cohesiveness amongst NGO stakeholder groups. Moreover, NGO participants also provide a significantly higher assessment of the other stakeholder group's reasonableness and understanding ($p < 0.1$ and $p < 0.01$ respectively).

This is surprising considering that, when asked in abstract terms, NGO representatives assessed the private sector reasonableness and understanding as low.

However, when asked about the specific private sector representatives they interacted with during the workshop, this negative appraisal was less present. In other words, when asked in abstract terms, NGO representatives might underestimate the reasonableness and understanding of other stakeholder groups, potentially because of responding based on a stereotypical representation of other stakeholders that do not represent the variety of interests and activities of the whole sector. This evidence indicates that although there might be initial out-group biases toward different stakeholder groups, dialogue with representatives of the other group (or at least these particular representatives) reduced the bias. Table 1 presents the results of OLS regression models developed to test our hypotheses on the effects of frames on homogenous and heterogenous group perceptions of reasonableness and understanding. In this case, as a pre-workshop measure is not available (as participants could not evaluate other participants, if not in general terms, before meeting them), we run an OLS regression including controls, to strengthen the validity of our inferences. Confirming hypotheses 5 and 6, we find confirmation that NGO members tend to have a higher assessment of other participants' reasonableness and understanding, both other NGOs and from the private sector, when primed using the emotional/moral frame which is in line with their values ($p < 0.05$). By contrast, adopting an emotional/moral frame made the private sector representatives significantly more negative about both the heterogeneous and homogenous groups alike ($p < 0.05$ and $p < 0.1$ respectively). These findings suggest that stakeholder type moderates the effects of frames. In particular, adopting a moral frame is likely to increase the perceived discrepancy between stakeholder groups for stakeholders that are less inclined to adopt this frame, and to reduce them for stakeholder groups whose values are more aligned to it, as per our hypothesis.

Moreover, geographic differences can also be noticed. Eastern European and Europe-wide participants tend to have a significantly ($p < 0.1$ and $p > 0.05$ respectively) lower assessment of both homogenous and heterogeneous group's reasonableness, while Northern and Southern European participants tend to have a more positive assessment of homogenous and especially heterogeneous group understanding ($p < 0.05$). This difference might be explained with cultural differences in managing and perceiving conflicts (Hofstede et al., 2005), but also potentially with the fact that certain actors, as in the case of Europe-wide organizations that are based in Brussels, are more used to dialogues between different stakeholders and therefore have the differences in perspective more salient.

DISCUSSION AND CONCLUSION

Our study reveals how the dialogue on potential climate policies among different stakeholders has the effect of increasing the convergence of opinions, also through the reduction of the out-group negative bias that generally characterizes the discussion between different groups of stakeholders. Moreover, we find that dialogue allows bringing attention to the potential risks of climate policies, thus tending to increase skepticism towards them. The process and outcome of dialogue, however, are also affected by the frame used in the discussion. Logical/scientific frames further reduce the polarization of opinions, while opinions about the policies discussed and about other participants in the dialogue depend on the alignment between the frame adopted and the values of the stakeholder. If there is a match, then the stakeholder will likely have a more positive view of the dialogue and the other stakeholders and will be more inclined to find the other side's arguments persuasive, and change their opinion.

Our analysis contributes to the literature on stakeholder dialogue (Burchell & Cook, 2006, 2008; Ferri et al., 2016; Ratner et al., 2018; van Huijstee & Glasbergen, 2008) by providing

empirical evidence on its effects and in particular by showing how, although not directly consensus-based, dialogue allows for a reduction in polarization among participants, without obfuscating criticisms but rather providing a space for expressing concerns about climate policies. In this sense, we argue that dialogue is a particularly effective tool in reducing the tension typical of consensus-based collaborative governance approaches, where difficulties in reaching consensus are often found (Gilek et al., 2006; Turcotte & Pasquero, 2001), or criticism and contestation are eliminated to be able to reach an agreement (Moog et al., 2015; Poncelet, 2001). Our study reveals how, through dialogue, it is possible to reduce polarization while maintaining active contestation, which helps shed light on the risks and shadows of the policies discussed.

Second, our study contributes to the literature on frames adopted by stakeholders (Benford, 1993, 1997; Dewulf & Bouwen, 2012; Cornelissen & Werner, 2014) by shedding light on how different frames, and their alignment with stakeholder values, can influence the process and outcome of dialogue. While the literature has extensively discussed the framing process, i.e., the process by which the frames adopted by different stakeholders arise and evolve (Dewulf et al., 2009; Gray et al., 2007), as well as the effects of adopting conflicting frames by different stakeholders (Dewulf et al., 2011; Purdy et al., 2019), little attention has been paid to how approaching the discussion using one frame or another affects the dialogue. While existing studies suggest an alignment of frames among different stakeholders as necessary to reach an agreement (Dewulf et al., 2004; Le Ber & Branzei, 2010; Meyer et al., 2016; Vandebussche et al., 2017), our study explores how it is not only important to adopt a common frame, but also one that closely aligns with the values of the stakeholders involved, in order to foster constructive dialogue and reduce the negative bias toward the out-group while stimulating a conversation open to contestation.

Some key implications for policymakers emerge. First, our analysis reveals how different stakeholder groups vary in their assessment of different CDR, and in particular how NGOs tend to have a much more negative view of using CDR to meet European targets – they are significantly more likely than private sector representatives to believe that European Union policies should not rely on CDR to reach net-zero ambitions. A first implication is therefore the different perceptions about the ideal path to reach net-zero emissions among different stakeholder groups. Second, we find that dialogue between different stakeholders has an effect on changing opinions about CDR-related policies. In general, it appears that, through discussion, greater awareness of the risks associated with CDR and policies is achieved, as perceptions have, on average, become more negative as a result of the workshop. An important implication is therefore to ensure a dialogue between key constituents, as dialogue allows for the development and consolidation of stakeholder perceptions and increases the awareness of the risks associated with the use of CDR, and consequently favors policies that are more likely to limit them. Finally, we found that the frame adopted in the dialogue affects the polarization and skepticism toward climate-related policies. In essence, the mismatch between the frame used in the dialogue and the values of the stakeholder group reduces the opportunity for dialogue and its outcome. Implications of this finding suggest that, for NGOs and private sector representatives to be more successful in communicating with other stakeholder groups, they might try to adopt the other stakeholder’s preferred frame. Similarly, a policy might be more effective if they communicated using the appropriate frame with each stakeholder, which requires moving away from a one-size-fits-all approach to communications.

However, our work is not without limitations. First, in terms of methodology, the randomization was not performed at the individual participant level but at the event level (except in the pilot where we instead randomized at the participant level). Although this choice was made

to allow more room for discussion and the events were conducted on close days, this choice could weaken causal claims. Second, the limited number of participants in our study, chosen to facilitate discussion and invite only stakeholders who had both expertise and a strong interest in the topic, creates not only problems related to power in the analyses but also does not allow us to study more than two frames and two stakeholder groups. In fact, with two frames, the emotional/moral one and the logical/scientific one, and two stakeholder groups, NGOs and the private sector, we created a 2x2 matrix with little more than 20 observations per treatment, given our sample size. However, we invite future studies to test experimentally how other frames, such as the economic frame (Severson & Coleman, 2015), influence the dialogue between stakeholders, including other stakeholder groups, like local communities, scientists, or governmental organizations.

To conclude, our work suggests that the dialogue between different stakeholders is fundamental to the development of opinions about climate-related policies – opinions that should not be understood as static and crystallized but as dynamic and evolving through the dialogue, also depending on the frame adopted.

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TABLE 1
Effects of Frames on Perceptions of Other Stakeholders

Perception of other stakeholder groups				
	Homogenous group reasonableness	Homogenous group understanding	Heterogeneous group reasonableness	Heterogenous group understanding
NGOsci	0.591	0.507	1.119*	0.310
NGOmor	1.450**	1.640**	1.965***	0.922
PRImor	-1.353*	-0.957	-1.388**	0.144
Awareness of NETPs (total)	-0.094***	-0.022	-0.028	-0.059*
Confidence on NETPs perception (total)	0.042	0.027	0.023	0.051
Eastern Europe	-1.547*	-0.391	-1.387*	0.932
Northern Europe	-0.116	1.368**	0.489	2.646***
Southern Europe	-0.629	-0.978	-0.763	1.400**
Western Europe	-0.771	-0.637	-1.038	0.327
European Wide	-1.669***	-1.401*	-1.578**	0.204
Baseline perception (pre-workshop)			0.321***	0.174
_cons	10.605***	7.808***	6.454***	6.447***
N	64	63	56	54

*p<0.1; **p<0.05; ***p<0.01

FIGURE 1
Sample Geographical Distribution

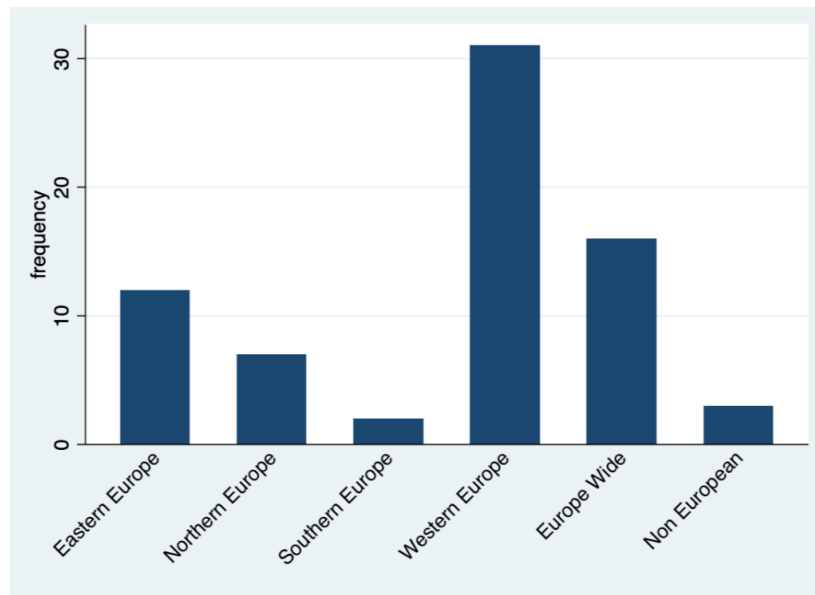


FIGURE 2
Participants Allocation

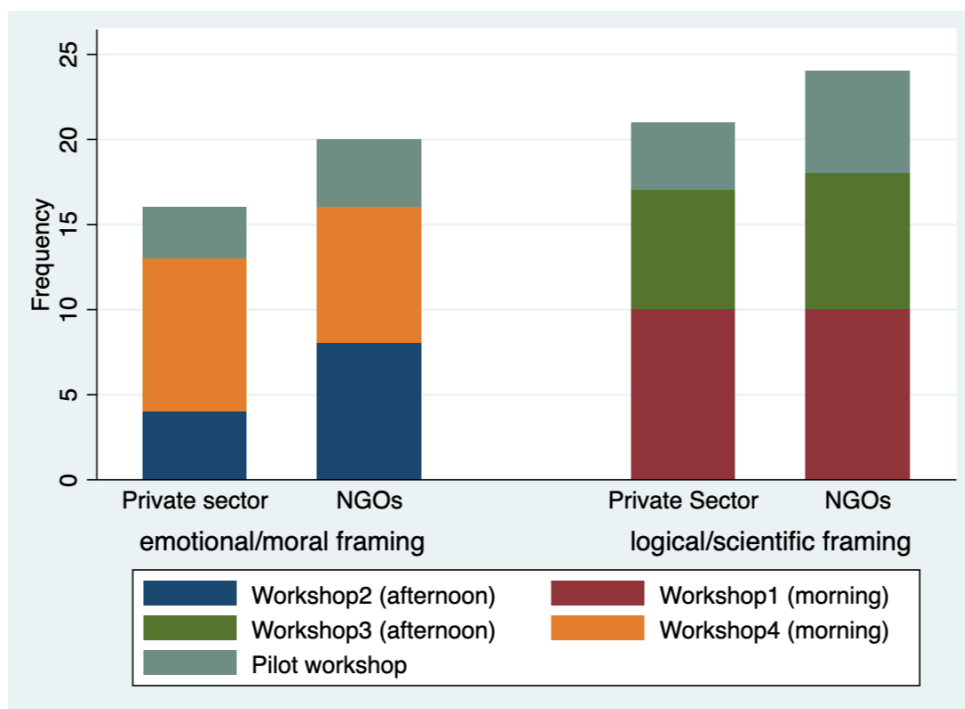


FIGURE 3

Pre- and Post-workshop measures of CDR-related Policy Agreement

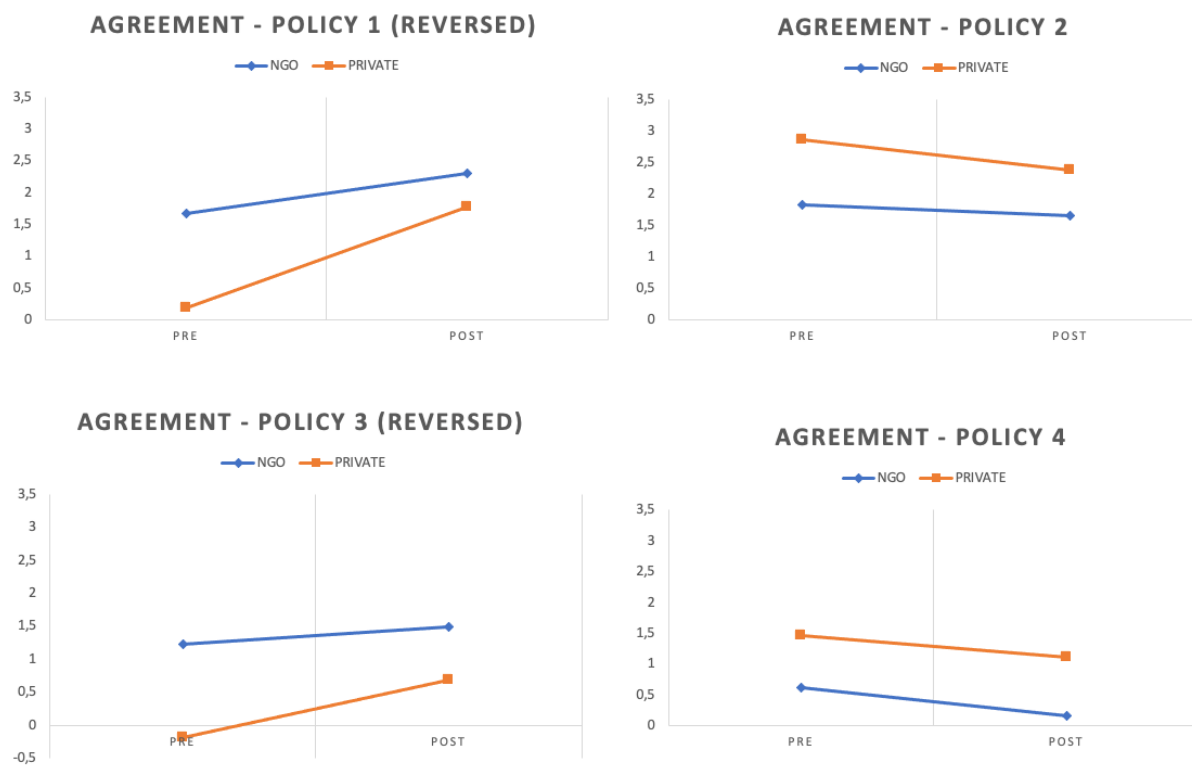
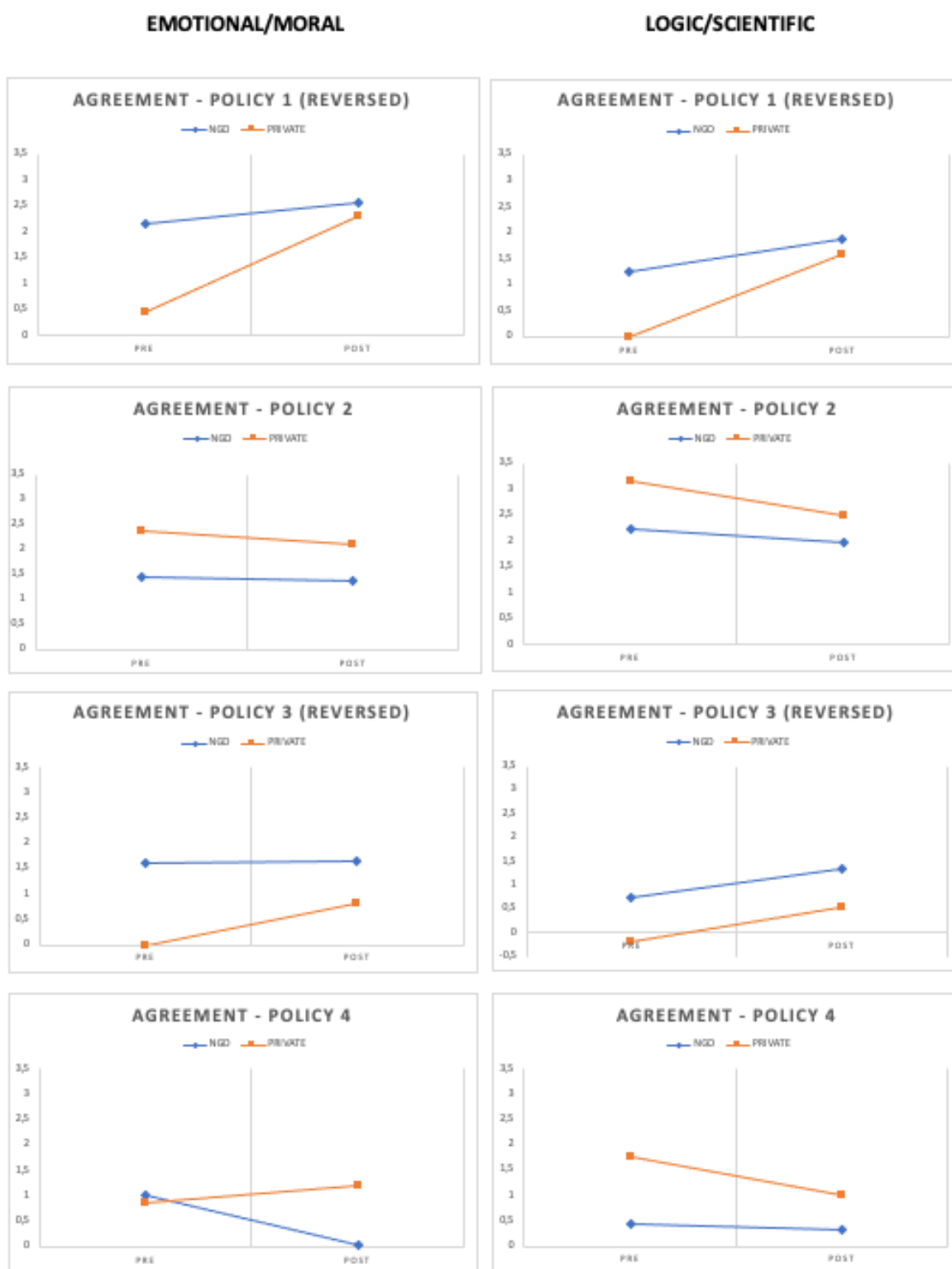


FIGURE 4

Pre- and Post-workshop measures of CDR-related Policy Agreement by Treatment



APPENDIX A

Summary slide for the logical/scientific video



APPENDIX B

Summary slide for the emotional/moral video



