Teaming Up Across Political Divides: Evidence from Climate Regulations

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Why do interest groups with contrasting interests and policy goals work together? In this paper, I argue that interest groups prioritize high-quality implementation of policies even when it means compromising on their policy preferences. To test this argument, I introduce original measurement strategies that reveal systematic patterns in which firms and environmental groups invest in joint efforts to improve the implementation of greenhouse gas emissions standards. The analysis, using public comments spanning 2010-2020, demonstrates that comments written by joint efforts of environmental groups and firms contain more information that can contribute to the quality of policy implementation greater than individual efforts alone. Although the compromise is biased toward the firms' interests, environmental groups can exercise meaningful influence over the finalized policy outcome by inducing more participation from the firms. These findings highlight the hidden dynamics of regulatory politics, wherein divergent political goals are reconciled for high-quality policy implementation.

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1. Introduction

Why do political actors collaborate despite having competing interests and policy goals? The question of how political actors influence a policy has been a central topic in political economy. During the prior several decades, much progress has been made in understanding the process of developing policy when political actors with vested interests compete in varying institutional contexts (e.g., Hirsch and Shotts 2015, 2012; Baron and Ferejohn 1989; Krehbiel 2010; Crawford and Sobel 1982; Gilligan and Krehbiel 1989). One prominent argument is that actors use *policy-specific* expertise to effectively achieve a particular political goal. However, there are no clear explanations as to why and how political actors compromise their contrasting policy preferences "within a team," despite abundant empirical evidence pointing to the formation of "interest-diverse" coalitions (e.g., Nelson and Yackee 2012; Baumgartner et al. 2009; Dwidar 2022; Heaney and Leifeld 2018; Lorenz 2020; Phinney 2017).

This paper is motivated by several consistent empirical patterns in climate politics that classical accounts of policymaking literature do not explain. While the U.S. Chamber of Commerce opposed passing cap-and-trade legislation during the 111th Congress, several Chamber members joined the U.S. Climate Action Partnership (USCAP), a coalition of industry and environmental stakeholders that attempted to hammer out a workable compromise that could attract the necessary votes to become law (Livermore and Revesz 2015).[1] The Environmental Defense Fund (EDF), one of the mainstream nonprofit environmental advocacy groups, explicitly mentions on its website that it saw the need to partner with mainstream businesses since the 1980s. The group is actively partnering with

[1]See U.S. Climate Action Partnership, About U.S., http://www.us-cap.org/about-us/ (declaring USCAP's "pledge to work with the President, the Congress, and all other stakeholders to enact an environmentally effective, economically sustainable, and fair climate change program"); see also Eric Pooley, The Climate War: The Believers, Power Brokers, and the Fight to Save the Earth 142,170 (2010) (quoting Duke Energy executive Jim Rogers, a member of USCAP, responding to criticism of his participation by coal mining executive Robert Murray of Murray Energy: "Legislation is coming. We can help shape it, or we can sit on the sidelines and let others do it").

Walmart and FedEx.[2] Another example is the American Council for an Energy-Efficient Economy (ACEEE), one of the nonprofit coalitions supporting climate action. More explicitly, its Ally Program has listed utilities, manufacturers, and other energy industries as partners, such as the American Chemical Council, and Xcel Energy, in addition to a group of environmental and consumer leaders.[3]

These partnerships are puzzling given the contrasting policy preferences of firms and environmental groups. A closer analysis of business strategies in climate change reveals that restrictions on firms' polluting behaviors pose a significant challenge to particular industries. Although some firms (e.g., Shell, BP) have begun to diversify into other energy sources that produce less greenhouse gas emissions, none of these alternative energy sources can provide business opportunities on the same scale as those of oil and coal production (Stokes 2020). Contrary to industries' fear of adverse consequences from regulations, previous studies indicate that stringent regulations would primarily benefit environmental groups (Cheon and Urpelainen 2013; Bernauer and Caduff 2004; Keohane et al. 1998; Aidt 1998). However, despite the divergent effects of regulations leading to different policy preferences, firms and environmental groups collaborate closely.

I argue that the concern over the quality of policy implementation is the reason behind collaborative efforts between political actors who have contrasting policy preferences. In regulatory politics, the pursuit of *policy preference* is accompanied by concerns for *quality of policy implementation*. This holds true within the context of climate regulations, where the primary objective is achieving target emission reductions. Here, the instrumental motive of policy outcomes themselves becomes less significant (Hirsch 2022; McCarty 2020), as long as political actors are able to contribute to reducing uncertainties in policy implementation. Although the divergent policy goals are reconciled, political actors prefer

[2]See the website of Environmental Defense Fund, https://www.edf.org/partnerships/business-and-industry. EDF has collaborated with over 30% of Fortune 100 companies

[3]Please see the website of ACEEE for further details. https://www.aceee.org/aceee-ally-program. Allies receive benefits from ACEEE, including public recognition via ACEEE's website, early access to ACEEE research reports, and access to a network of energy efficiency experts, leaders, and decision-makers.

a compromise with a high-quality of policy implementation instead of their own preferred policies with a low-quality implementation.[4]

To analyze why political actors work together despite unaligned preferences, I draw upon the theoretical framework of McCarty (2020) and Alchian and Demsetz (1972) to incorporate the dynamics of rulemaking for which regulatory officials need quality information to make reasonably good policy decisions. Most regulations are created by bureaucrats (Warren 2018; Shipan 2004), a process that is particularly true for environmental policymaking where very few environmental laws have been passed (e.g., Rothenberg 2018; Lazarus 2014). Focusing on climate regulations, I show that firms and environmental groups, which have competing interests, invest in joint efforts to provide informative texts (defined as abundant analytical evidence and scientific reasoning) so that regulators can make fine-grained and technical judgments (Breyer 1982; Hawkins and Thomas 1989).

My theory provides micro-foundations for the argument that interest group competition in regulatory policymaking is centered on the provision of expertise (Epstein et al. 2014; Carpenter and Moss 2014; Huber and Shipan 2002; Weingast 1984). Existing research on interest group politics is focused on financial resources, such as PAC contributions or lobbying expenditures, as a measure of political power. However, the primary resource of power in the regulatory context is information.[5] In this paper, I describe systematic measurements of information, placing particular emphasis on expertise. This approach contrasts with existing literature on rulemaking, which has primarily focused on analyzing the frequency of submissions or the types of political actors involved in the notice-and-comment period. I accomplish this by conducting an analysis of 15,883 publicly submitted comments on greenhouse gas emissions standards between 2010 and 2020. I first filter organization/entity comments for comparability and classify comments by five types to

[4]Please see Choi (2023) for equilibrium characterization of the game where agents with contrasting preferences work together.

[5]The role of information in the regulatory process has been discussed in a wide range of literature. Magat et al. (2013) elaborates that higher quality information supporting a proposed regulation reduces opponents' ability to modify the regulations. Moreover, the timing of when information is received can influence the rulemaking decisions (Ingram and Ullery 1977).

capture who participates in rulemaking. To this end, I retrieve the history of environmental groups' websites using Wayback Machine, and reference IRS Form 990 tax returns from the charitable foundations funded by Fortune 500 and S&P 500 corporations (Bertrand et al. 2020), and Cory et al. (2021)'s classification framework. I provide descriptive patterns of comments on emission standards that joint coalitions have continuously submitted.

I then dive into the political implication of joint efforts on climate regulations by firms and environmental groups. In the regulatory process, the information that regulators need is sometimes held only by the business interests they seek to regulate. For instance, polluting firms are better positioned to know details concerning the environmental risks created by their production processes (Coglianese and Lazer 2003; Wagner 2003). Hence, their inherent information advantage over the government and other political actors results in compromised policy outcomes that are relatively favorable to the firms. By incorporating text embedding methods with a *Paragraph Vector* framework, I show that comments from environmental groups with business partners are relatively skewed to business-friendly topics compared with comments from environmental groups that lack business partnerships. However, given that they represent a compromised outcome, the extent of the issue slant in comments from partnerships is comparatively less pronounced than the slant in comments from business interests alone.

I further explore the benefits that environmental groups and business interests gain from strategic partnerships by quantifying information using named entity recognition techniques. Public comments written by strategic partnerships of firms and environmental groups contain more specific evidence and analytical reasoning compared with comments composed individually by each group, which is consistent with my theoretical predictions. Specifically, a collaboration with business partners substantially augmented the volume of information present in the comments associated with environmental groups, even after controlling for different group characteristics. Lastly, I employ information theory to quantify the political influence of strategic partnerships on finalized policy outcomes. I find

that comments produced through collaborative efforts between firms and environmental groups exhibit a closer statistical distance to the finalized policy relative to comments composed by single entities. As a robustness check, I examine the citation patterns among EPA officials. The results reveal that EPA officials tend to cite comments written by strategic partnerships more frequently than they cite other types of comments. These findings provide further support for my argument on why political actors with conflicting interests engage in collaboration, and how the enhanced quality of information that results from strategic partnerships is translated into political influence in regulatory politics.

This article makes both theoretical and empirical contributions to the study of coalition lobbying in policymaking (e.g., Bertrand et al. 2020; Dwidar 2022; Junk 2019; Phinney 2017; Heaney and Lorenz 2013; Nelson and Yackee 2012; Hula 1999), with implications for understanding regulatory politics in which interest groups with conflicting interests prioritize a high quality of policy implementation. By examining the coalition of polluting firms and environmental groups and their effects on climate regulations, I also contribute to the empirical literature on the influence of interest groups on climate politics (e.g., Cory et al. 2021; Colgan et al. 2021; Culhane et al. 2021; Brulle and Downie 2022; Lerner and Osgood 2022; Sautner et al. 2020; Urpelainen and Van de Graaf 2018).

The rest of the paper is organized as follows. The next section discusses the broader literature on regulatory politics and outlines theoretical expectations regarding the strategic partnership of business interests and environmental groups. I then describe my dataset and empirical strategies and provide empirical evidence for my arguments. The final section discusses the implications of strategic partnership in environmental politics, as well as the contribution to broad literature on interest group politics.

2. Interest Groups Working Together in Regulatory Politics

Scholars have emphasized the influence that interest groups have over regulatory policymaking. Regulators have significant discretion in formulating regulations (McCarty

2017), and interest groups consider various actions to influence regulators' policy choices that are in their favor. Interest groups directly lobby bureaucrats (You 2017), serve on federal advisory committees (Balla and Wright 2001; Moffitt 2014), lobby legislators who wield oversight authority over bureaucrats (Hall and Miler 2008; Epstein and O'halloran 1995; McCubbins and Schwartz 1984), and participate in the notice and comment process (Gordon and Rashin 2021; Libgober et al. 2020; Yackee and Yackee 2006; Haeder and Yackee 2015; McKay and Yackee 2007; Furlong and Kerwin 2005).

Interest groups frequently engage in these political activities via formal partnerships or ad-hoc coalitions (Nelson and Yackee 2012; Baumgartner et al. 2009; Hula 1999; Heinz et al. 1993). They invest as teams in any coordinated efforts, with the objective of advancing their interests. To explain why lobbying together is a more advantageous strategy compared to lobbying alone, scholars have analyzed the size of coalitions (Nelson and Yackee 2012) or the types of their interests (e.g., broad versus narrow) represented in the coalition (Mahoney 2007). A recent growing body of work relates lobbying success to the effect of the composition of coalition such as organization types (e.g., trade association and sectoral firms), partisan identities, or interest diversity (e.g., organizations representing diverse industries) (Dwidar 2022; Heaney and Leifeld 2018; Lorenz 2020; Phinney 2017). However, the dynamics of how competing interests compromise a policy "within a team" and what incentivizes them to work together despite such compromises are rarely addressed. To bridge the gap, I propose a theoretical prediction wherein compromises between political actors emerge endogenously due to interest groups' concern for high-quality policy implementation.

2.1. Theory: Investing in Team Efforts for Improving the Quality of Policy Implementation

My focus is participation in the notice and comment process because this stage is the most common way for interest groups to get their voices heard regarding agency policies

(Baumgartner et al. 2009; Yackee and Yackee 2006; Baumgartner and Jones 2010).[6] The process of rulemaking is centered on improving the implementation of policy after an agenda is fixed (You 2017). Thus, it requires fine-grained, technical judgment concerning how major operations should be designed. Therefore, information, namely expertise, plays a vital role in regulatory politics (Libgober et al. 2020; Breyer 1982; Hawkins and Thomas 1989), and political actors with specialized knowledge of the complex policy arena have an advantage in this competition (Epstein et al. 2014).

Given the nature of regulatory policymaking, I argue that the demand for high-quality policy implementation is dictated through cooperative specialization despite differences in policy preferences. The competing political goals are reconciled to the extent that political agents are incentivized to contribute to joint products to improve the quality of policy implementation. On the *policy preference side,* political actors have asymmetric capacities in the sense that their different areas of expertise have varying impacts on regulators (Berry and Wilcox 2015; Yackee and Yackee 2006). These differing abilities at developing policy proposals influence the way political actors compromise within a team. The high-capacity group tends to be more engaging due to its superior resources (e.g., the impact of information, staff expertise, and funding) compared with the low-capacity group, and as a result, the imbalanced capabilities lead to a compromised policy outcome biased toward the high-capacity group. However, although the compromised outcome relatively favors a high-capacity group, a low-capacity group gains advantages by inducing more participation from the high-capacity group than otherwise, assuming that preferences over *policy outcome* and *quality of policy implementation* are inseparable, and assuming it elicits concessions from high-capacity groups' extreme policy preferences.[7]

[6] Under the Administrative Procedure Act (APA) of 1946, agencies typically must provide the notice and comment period in which a proposed policy is open for public review. During this stage, all interested parties are invited to provide written comments regarding the content of the proposed rule posted by agencies.

[7] Please see McCarty (2020) and Choi (2023) for further details concerning the joint policy production where agents with asymmetric capabilities work together. Agents are willing to invest more effort when a compromise is closer to their ideal policy. When inputs from agents are substitutes, a reduction of the inputs of one agent increases the marginal productivity of another. When inputs are complements, increased

On the *quality of policy implementation* side, a jointly generated product exceeds the sum of its individual contributions. Both agents can benefit from exchange and production in accord with the comparative advantage and save resources for gathering or processing information for crafting a proposal (Alchian and Demsetz 1972). Because the rulemaking process is focused on improving the implementation of policy, groups are motivated to invest in a joint effort to achieve a high quality of implementation. A group prefers high-quality policy implementation with a compromised outcome over an ideal policy that has a low-quality implementation. Therefore, despite the differences in policy preferences, both groups benefit from investing in joint efforts.

2.2. Empirical Evidence: Strategic Partnerships between Firms and Environmental Groups in Climate Regulations

I examine the strategic partnerships between polluting firms and environmental groups for empirical implications as the dynamics of environmental regulatory policymaking squarely represent the properties of the theory outlined in the previous section.

First, polluting firms and environmental groups have asymmetric capacities because the regulatory system depends heavily on information supplied by the regulated entities. The information regulators need is often held only by the industries or firms that they should regulate (e.g., McCarty 2017; Wagner 2003; Coglianese and Lazer 2003). Regulated entities possess private information about costs, compliance, or the industry-level effects that would be useful for policymakers to know (Gailmard and Patty 2012). Particularly, in the realm of climate policymaking, regulators are poorly positioned to gather information about business operations, and the best source of information about mitigation costs or the feasibility of different reduction approaches is the very firms that regulators seek to regulate. Although epidemiological research by government or environmental scientists can reveal as much about the health effects of pollutants, firms typically know more

inputs by one agent increase the productivity of another. The analysis of this paper assumes that inputs from political actors are complements.

about what they produce, as well as how they produce it (Coglianese 2007; Coglianese and Lazer 2003).[8] Therefore, business interests have an information advantage about which pollution control measures will be effective in their facilities and which measures would yield unexpected costs or consequences.

Such information advantage of polluting firms in environmental regulations implies asymmetric capabilities of business interests and environmental groups. And correspondingly, the imbalances in capacities within a team present an intuitive pattern, where the compromised policy outcome is biased towards the preferences of the higher capacity group. Although it is impossible to exactly divide each group's individual contributions to a jointly designed policy outcome (Alchian and Demsetz 1972), we can empirically demonstrate whether the compromised policy outcome is biased in favor of a high-capacity group. If the compromised policy outcome is relatively skewed towards the topic favored by a high-capacity group compared with the topic emphasized by a low-capacity group, we can infer that the compromised outcome favors the high-capacity group.

For my analysis, I leverage the fact that polluting firms have strategically highlighted R&D and technological issues in the climate debates. Abundant qualitative evidence suggests that business actors attempt to reframe climate policy and weaken EPA's justification for emission cuts by strategically discussing R&D and technological issues (Grumbach 2015; Downie 2017).[9] To give an example, ExxonMobil highlights its contributions to climate actions with advertorials citing "our industry-leading investments in research and development," such as the Global Climate and Energy Project at Stanford University, which implies that current solar or wind technologies are inadequate (Supran and Oreskes 2021). According to related witnesses and testimonies, business interests strategically use sci-

[8] Coglianese and Lazer (2003) suggests that the EPA could not have regulated 160 industries without business actors involved in constructing regulatory standards.

[9] Still, large firms have not provided emissions reduction targets despite saying they want to reduce their impact on climate change. They have made R&D and technology commitments but have struggled to cut emissions. Eavis, P., & Krauss, C. (2021, May 12). What's Really Behind Corporate Promises on Climate Change? The New York Times. https://www.nytimes.com/2021/02/22/business/energy-environment/corporations-climate-change.html

entific research and technology to undermine efforts aimed at reducing emissions or to emphasize the uncertain costs associated with climate policies (Schlichting 2013). [10] This use of science to weaken antipollution efforts leads to my first hypothesis, namely, that comments written by strategic partnerships would emphasize R&D and technological issues more than comments written by environmental groups alone. However, the extent of the slant toward R&D topics in the comments would be less pronounced than what is observed in comments authored solely by business interests because comments written as an outcome of strategic partnerships are a compromise between the two.

HYPOTHESIS 1. *(Compromised Policy Outcome) Comments from strategic partnerships between firms and environmental groups would be slanted toward discussing R&D and technology topics, compared with comments written by environmental groups lacking business partners.*

Second, although the compromised outcome is biased toward the firms' preferred policies, environmental groups can derive benefits by collaborating with these firms. Benefits accrue because firms are motivated to help generate a higher output when the compromise aligns more with their preferences.[11] Given that firms' contributions as high-capacity groups can have a greater positive effect on the quality of policy compared with the contributions of environmental groups, environmental groups are willing to make concessions to achieve a higher-quality policy implementation.

Investing in joint efforts is more efficient than devoting separate, additive efforts in multiple ways, not only for environmental groups but also for firms (Alchian and Demsetz 1972). For instance, firms can better frame their private information in conjunction with environmental groups' expertise in climate mitigation strategies, community-level knowledge (Bolden et al. 2018), or scientific research presented by environmental groups that concern the likely impact of further pollution (Bromley-Trujillo et al. 2014). And envi-

[10] I empirically test the qualitative evidence in Appendix B.1 through granular analysis of Granger causality, using R&D coverage and CO2 data. The analysis reveals a strong correlation between CO2 measurements and R&D coverage, indicating that an increase in emissions is followed by an increase in R&D coverage.
[11] This is consistent with theoretical predictions in McCarty (2020) and Choi (2023)

ronmental groups can access private information that firms hold concerning the types of pollutants firms produce or the processes of generating those pollutants. On the basis of this inference, I posit that comments formulated by collaborative efforts between firms and environmental groups contain the comprehensive scientific reasoning and specific information sought by regulators to develop and implement technical aspects of a policy, as compared to other forms of comments written separately by each group. The nature of collaborative comments leads to my second hypothesis:

HYPOTHESIS 2. *(Augmented Expertise): Comments crafted through collaborative efforts between firms and environmental groups contain a greater amount of scientific evidence and specific information compared with comments written separately by either environmental groups or business interests.*

Lastly, regulators who implement environmental regulations require an understanding of various solutions to reducing pollutants and greenhouse gas or the unexpected consequences of alternative regulatory standards (Coglianese 2007). Therefore, expertise is a key factor in policy implementation and regulators value the specialized knowledge that reveals the intricacies of the policy landscape. Given that comments arising from the joint efforts of firms and environmental groups are more informative than other types of comments, I hypothesize that the comments produced by the collaboration of firms and environmental groups will have a greater impact on the finalization of the policy outcome compared with comments written independently by either business interests or environmental groups. Hence, my final hypothesis is the following:

HYPOTHESIS 3. *(Political Influence): Comments from joint efforts are more likely to influence policy amendments than other types of comments, among comparably resourced comments.*

Another potential explanation is the availability of resources. Interest groups possess diverse resources and capacities (Yackee and Yackee 2006; Berry and Wilcox 2015), as previously mentioned. Therefore, the establishment of strategic partnerships or the pro-

duction of high-quality comments may depend on these factors. To address this concern, I construct a variable to control for group characteristics, such as staff size. Data for this variable are collected from various sources, including *InfluenceWatch*, which provides descriptions of political actors involved in public policy issues, and from firms' websites, LinkedIn, Indeed, Buzzfile, Rocketreach, or Glassdoor.[12]

3. Data and Stylized Facts

I use an original dataset containing 15,883 comments officially submitted on *Greenhouse Gas Emissions Standards* from 2011 to 2020; the dataset does not have duplicates.[13] The policy comments were submitted for the EPA's regulatory review of the Greenhouse Gas Emissions Standards under sections 111 and 112 of the Clean Air Act, for which the EPA opened notice-and-comment periods seven times.[14] The year 2011 was chosen as a starting point because it immediately follows the new rules in which the EPA expanded emission regulations to a wide range of industries. The 10-year time period ensures that I am able to observe how both Republican and Democratic administrations respond to policy comments. As noted on the website of the Environmental Defense Fund,[15] the history of strategic partnerships with business interests traces back to the 1980s. Between 2011 and 2020, these partnerships have consistently remained unchanged in terms of temporal variation between firms and environmental groups. Comments from individuals without an organizational affiliation tend to be simple endorsements focused on support for or opposition to a proposed policy. To compare comments that provide substantive information, comments from individuals who lack any association with entities or organizations are dropped from the main analysis.

[12] When employment size is indicated in ranges, the upper bound is coded as the staffing size of the group.

[13] Regulations.gov includes data including the proposed policy, finalized amendments, and the comments associated with them. All rules and associated comments are linked by a docket number. A docket number is a unique identifier created by agencies that follow a regulation throughout its rulemaking process.

[14] Following is the list of starting dates the EPA posted for each notice and comment period: 1) November 30, 2011, 2) May 13, 2013 , 3) July 22, 2014, 4) January 5, 2015, 5) November 17, 2015, 6) April 1, 2016, and 7) August 9,2017.

[15] Please refer to Figure A.3, which displays a screenshot of the Environmental Defense Fund's website.

Ultimately, using company/organization identifiers and automated text analysis, I filter 903 comments submitted by companies, entities, or organizations and I use these filtered comments as the basis of my analysis.[16]

Comments are classified by five categories: 1) environmental groups with business partnerships, 2) environmental groups without business partnerships, 3) business associations (e.g., trade associations), 4) single businesses, and 5) others such as universities or government agencies.[17] One interesting pattern to note about this collection of comments is that recognizable polluting firms (e.g., Exxon, BP, Ford, or General Motors) have submitted relatively few comments by themselves. Most of the single firms that participated in the rulemaking process by themselves are "green firms" or small local businesses. The classification is operated by two measurement strategies. First, I provide the conservative measure of strategic partnerships between firms and environmental groups based on explicitly visible evidence. I retrieve the history of environmental groups' websites for the prior decade using the Wayback Machine, and code if environmental groups have explicitly posted polluting firms as partners. [18] Next, I construct a more generous measure by incorporating relatively invisible flows such as corporate donations into the explicitly visible channels, relying on IRS Form 990 series (Bertrand et al. 2020). Additionally, I reference the classification framework of Cory et al. (2021) to double-check the validity of the memberships lists that I collected from other sources.[19] The main analysis presented

[16]There is no systematic correlation between the number of comments by type and participation year.

[17]I used three criteria to identify environmental groups. First, these groups are required to have a mission primarily relating to climate change and public policy. Second, the groups should be membership-based organizations. Finally, the group's membership should include diverse categories of political actors, such as citizens, consumers, and environmentalists. For instance, even though it is introduced as a pro-climate coalition in the press, the group is categorized as a business association if the membership is limited to firms. The detailed codebook that provides the justification for classification is available under the separate cover.

[18]The measurement strategy focuses solely on partnerships between environmental groups and firms operating within polluting industries such as energy, transportation, oil, or coal. It does not take into account partnerships between environmental groups and green firms within renewable energy or green technology industries. Although there are a few instances of environmental groups collaborating with green firms, partnerships with polluting firms are more widespread.

[19]Unfortunately, Cory et al. (2021) classification covers approximately one hundred firm-centered climate coalitions. So it was not enough to fully validate the strategic partnerships of firms and environmental groups examined in this analysis.

in this paper is based on the most conservative measure of partnerships between polluting firms and environmental groups constructed from explicit evidence- environmental groups' websites. In total, I have 541 unique entities in my data. The summary statistics are provided in the Appendix,[20] and the codebook is available separately.

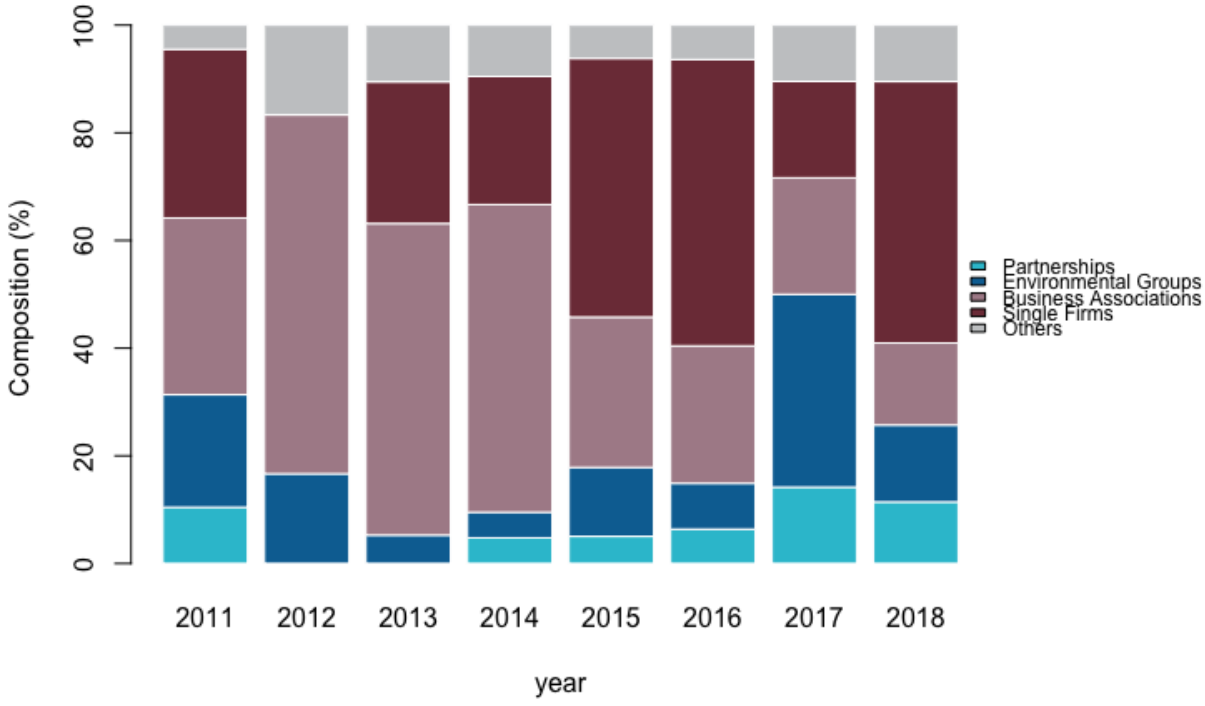


FIGURE 1. Comment Participation With Time

No comments were submitted by organizations in 2019 and 2020. EPA did not open the notice-and-comment period in 2012 and 2023, but comments were still submitted.

Figure 1 presents the composition of the comments across time. On the whole, policy comments by business associations and single firms represent the plurality of comments most of the time.[21] With time, there has been a gradual decrease in the percentage of comments from business associations and a stable trend in the percentage of comments from the partnerships between firms and environmental groups. The increase in the

[20] Please see Table A.3 in Appendix

[21] This observation is consistent with Golden (1998)'s finding that a huge percentage of comments are from business interests.

percentage of comments from single firms might mean an increase in participation from "green" firms. Although the frequency of joint coalitions' participation in rulemaking seems to be smaller than that based on other types of comments, the information conveyed by joint coalitions to regulators tends to be richer than the information of other types of comments. The next section substantiates this statement empirically.

4. Empirical Evidence

In this section, I provide empirical evidence that supports the theoretical argument. To do so, I use a text embedding method and computational techniques.

4.1. Compromised Policy Outcome Biased Towards a High-capacity Group

To investigate whether firms' information advantage leads to a compromised, business-preferred policy outcome, I construct two measures to capture the prevalence of the topics favorable to business interests: machine learning-based metrics of 1) R&D and technology coverage and 2)socioeconomic consequence coverage. There is an abundance of qualitative evidence that business interests strategically frame their climate communication by highlighting either scientific uncertainty or their contributions to R&D and technology (e.g., Supran and Oreskes 2021; Downie 2017; Grumbach 2015; Schlichting 2013). If the comments produced through collaborative efforts between firms and environmental groups primarily focus on or exhibit a bias towards business-friendly measures instead of emission reduction, we can deduce that the resulting compromised policy outcome is skewed in favor of a high-capacity group.

Measuring issue slant towards R&D and Technology

Count-based metrics convey little information concerning the context in which words are used. To handle this limitation, I apply a text embedding method that allows words

to encode meaningful information about analogies. Political science research has used *Word2Vec* which embeds words in a low-dimensional vector space using neural network structure (e.g., Rodriguez and Spirling 2022). This method results in a set of vectors whereby proximity in vector spaces implies similar meaning context-wise, and vectors distant from each other have different meanings. For instance, “diligent" and “industrious" would be close together, whereas “diligent" and “lazy" would be relatively distant from each other. On the basis of embedding methods, I allow the algorithm to assign each word to a vector in a shared space during the training stage, and these assignments create clusters of words that are semantically connected. As a result, the more similar the context, the closer two words are located in geometric space.

Built on this advance in modern natural language processing technique, I use *Paragraph Vector* proposed by Le and Mikolov (2014), an unsupervised framework that learns continuously distributed vector representations at the comment level. In the *Paragraph Vector* framework, each document is mapped to a unique vector while each token is also mapped to another unique vector. They are then averaged to predict the next words in each sentence. Similar to Word2Vec’s continuous-bag-of-words model, this approach is based on a distributed memory model whereby document vectors can be acquired by the task of predicting a word based on an average in consideration of context and full document levels.[22] I construct a model with a window size of five, and I do not consider words that are observed less than five times in the entire corpus.[23]

As explained earlier, a key feature of word embeddings is that the difference between word vectors in the geometric space conveys meaning. For instance, the difference between the two vectors, $\overrightarrow{R\&D}$ – $\overrightarrow{Reductions}$, identifies an issue dimension in the space by taking the difference between the normalized vector across a set of research words and the average normalized vector across a set of emission words: [24]

[22] Please see Figure B.2 for further details about the paragraph vector framework.
[23] The analysis reported in this paper was implemented by Doc2Vec Gensim and python3 on December 29, 2022. The parameters epoch is specified as 200. Typically epochs are set to be between 50 and 200.
[24] The vocabularies are geometrically close vocabularies in the embedding spaces trained on comments.

$$\overrightarrow{R\&D} - \overrightarrow{Reduction} = \frac{\sum_n \overrightarrow{R\&D_n}}{|N_{R\&D}|} - \frac{\sum_n \overrightarrow{Reduction_n}}{|N_{Reduction}|}$$

Therefore, the vector difference corresponds to the issue slant towards the R&D direction and can be substantively interpreted as a degree to which a proposal is leaning towards the issue of R&D instead of emission cuts. Note that word vectors and document vectors live in the same space by the way that *Paragraph vector* is constructed. By the geometry of vector space, I measure the cosine of the angle between the inferred vectors of the issue slant and each document vector. The purpose of this approach is to measure the similarity of a comment to the dimension of the issue slant towards R&D and technology.[25]

The similarity score, from -1 to 1, indicates the emphasis in a document on R&D compared with the emphasis on reductions. A score close to 1 suggests a tendency to emphasize R&D, whereas a negative score implies a skew toward emission reductions. [26] Figure 2 depicts a schematic representation of the vector projection used in this method. It is evident that comments submitted by environmental groups in collaboration with business partners, such as the Sierra Club or Environmental Defense Fund, exhibit a tendency towards *R&D* and technology-related aspects compared with comments from environmental groups that lack business partnerships. However, comments from partnerships are relatively less skewed compared with comments from business interests, which demonstrates a notable bias toward *R&D* directions.

I use the similarity score for each comment i submitted by k in a time period t as a dependent variable and run an ordinary least squares regression.[27] Specifically, I estimate

Please see the Appendix for more details concerning R&D and Technology vocabularies and emission reduction vocabularies. The vector dimensionality of the analysis presented in the paper is 200, and the Appendix provides a robustness check using models with the dimensionality of 1,000, and 10,000.

[25] Please see the Equation B.3 for the mathematical formula.

[26] Please see Appendix B.3 for further discussions on the interpretation of cosine similarity.

[27] The cosine similarity score used in Table 1 is measured with 6 vocabularies. For robustness checks, the same analyses are repeated with a different number of vocabularies, 1,2,3, and 9. Please see details in the Appendix.

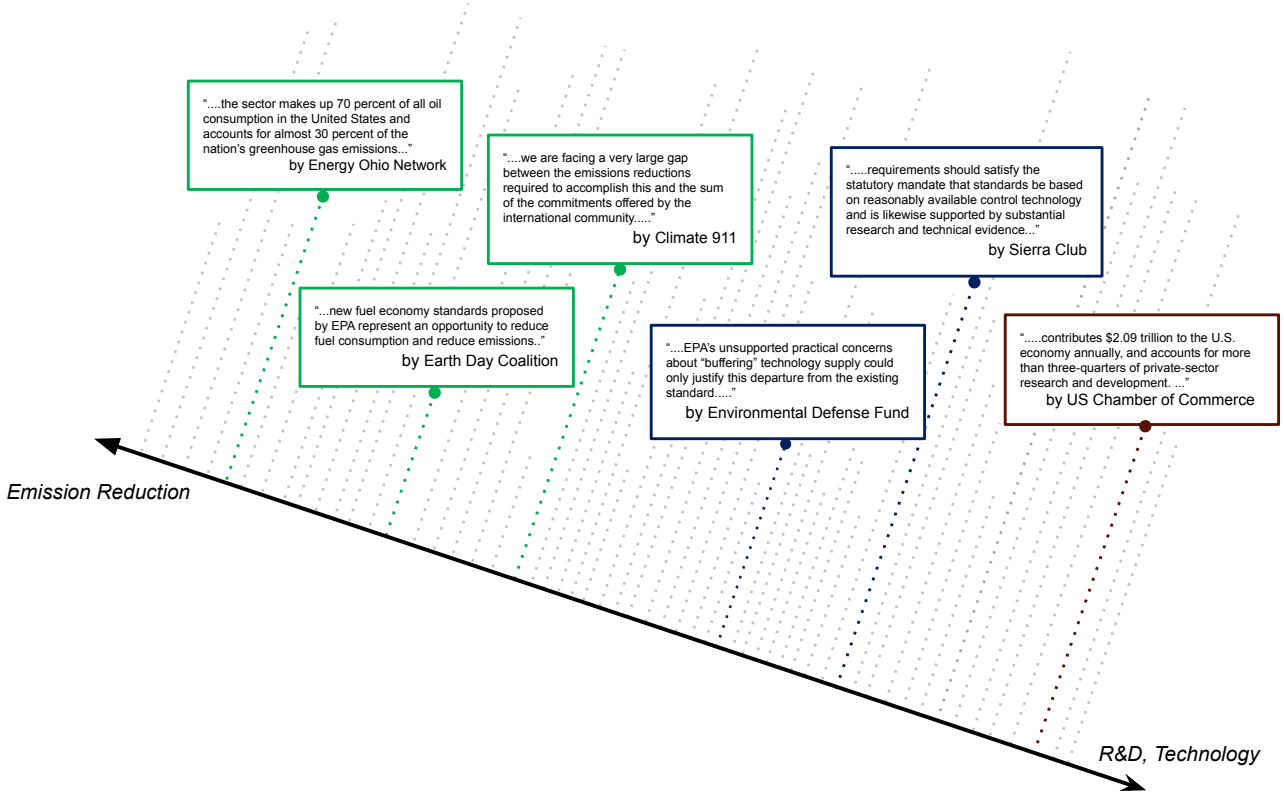


FIGURE 2. Schematic illustration of vector projection

the following model:

$$\text{Similarity Score}_{ikt} = \alpha + \beta_1 \text{Strategic Partnership}_i + \delta Z_k + \tau_t + \epsilon_{ikt}$$

, where Z denotes the group-level control variable and τ are year-fixed effects. The specification controls for group-level characteristics because there might be a systematic difference in research capacities due to staff size.[28] I also include commenter-fixed effects so that the effects are partially identified off within commenter variation. The error term is ϵ_{ikt}.

The first column of Table 1 examines comments from environmental groups, both with and without business partners, and the second column is focused on comments from

[28]The summary statistics are given in the Appendix.

TABLE 1. Regression Models Examining the Issue Slant toward R&D versus Greenhouse Gas Reductions

Sample	Partnerships + Environmental Groups	Partnerships + Business Association + Single Firms	Whole Sample
	(1)	(2)	(3)
Partnership	0.128**	−0.062***	0.016**
	(0.049)	(0.016)	(0.008)
Single firms		0.008	0.028***
		(0.013)	(0.005)
Business associations			0.042***
			(0.009)
Others			0.031***
			(0.007)
Staff Size	✓	✓	✓
Year FE	✓	✓	✓
Commenter FE	✓	✓	✓
Mean Outcome	0.06	0.092	0.085
Observations	225	683	903
R2 Adj.	0.318	0.456	0.066

*p < .1; **p < .05; ***p < .01. In the first column, the reference category is *environmental groups*, while in the second column, it is *business associations*. For the third column, the reference category remains *environmental groups*. Standard errors are clustered by notice and comment periods in parentheses.

environmental groups with business partners, business associations, and individual firms. The reference category for the second column is business associations. The last column identifies a correlation between the slant towards *R&D* and technology and the types of comments in the entire dataset. Comments from environmental groups without business partners serve as the reference category.

The results show a positive, statistically significant effect of strategic partnerships on the slant toward R&D and technology when environmental groups partner with firms (Column 1). More notably, comments from partnerships with environmental groups tend to be inclined towards emission reduction compared with comments from business associations or individual firms (Column 2). The magnitude of the coefficient related to partnerships in Column 1 is significantly greater than that in Column 2, indicating that environmental groups are more willing to make concessions to reach a compromise while the joint

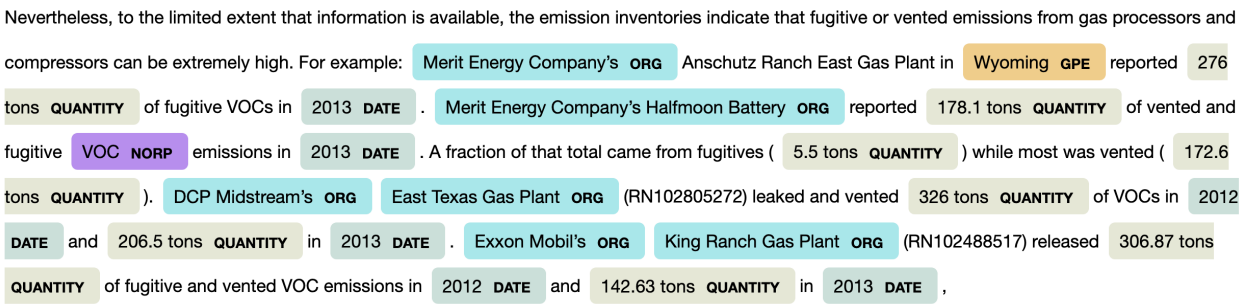
products are moderate to prevent extreme policies from business interests. In general, strategic partnerships between polluting firms and environmental groups exhibit a positive inclination towards *R&D* and technology (Column 3), but compared to environmental groups without business partners, its coefficient magnitude is considerably smaller than that of business interests. This empirical evidence lends support to the *Compromised Policy Outcome* hypothesis; the policy goals of firms and environmental groups are reconciled and the outcome favors the high-capacity group, to generate a compromise. The full results, including all control variables, can be found in the Appendix. For robustness check, I construct another measure to capture the prevalence of the topic, a frequency-based metric of *R&D* and technology coverage. The details concerning the analysis are also presented in Appendix B.5.

4.2. Achieving a Higher-Quality Proposal for a Higher-quality Policy Implementation

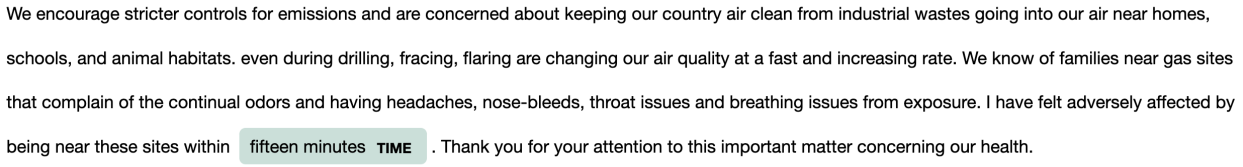
In this section, I examine whether environmental groups and firms achieve high-quality policy implementation despite a compromised policy. Focusing on the role of expertise in regulatory politics, I investigate the effect of strategic partnerships between firms and environmental groups by the amount of technical and analytical information in the comment.

To construct a measure of information quality, I apply an information retrieval technique to extract technical and informative chunks from unstructured raw text documents. The primary problem to be tackled when measuring information is the identification of scientific entities or languages that convey specific information. Although crowdsourcing is one method for performing manual, human-oriented tasks, the expertise required to extract scientific evidence or analytical facts makes crowd-sourcing impractical (Bonney et al. 2014, 2009). Therefore entity recognition techniques have been widely used in academic disciplines to quantify information (e.g., Liu et al. 2021; Hong et al. 2020). This technique operates by locating and classifying proper nouns into categories, such

as organizations (e.g., companies, government organizations, committees), local-level knowledge (e.g., cities, countries, rivers) or measurement.[29] In total, eighteen categories are used to measure the amount of scientific information.[30]



A. Comment Submitted by Clean Air Council



B. Comment Submitted by Citizens For Clean Water

FIGURE 3. Illustration of Information Retrieval Techniques for Public Comments

Figure 3 illustrates the application of the information retrieval technique to comments. The colored boxes represent the technical details identified by this approach. Each box is marked to display the named entities identified by the technique. For instance, the example demonstrates that the named entity recognition technique successfully captures organizations discussed in the comment submitted by the Clean Air Council, such as Merit Energy Company or Exxon Mobile, as well as various locations such as King Ranch Gas Plant, East Texas Gas Plant, or Wyoming. Furthermore, the technique identifies quantities

[29]The analysis presented in the paper is implemented by SpaCy v3.0, an open-source library for advanced language processing, on December 27, 2022. This transformer-based pipeline has an accuracy of 89.8.

[30]Eighteen classes include PERSON, NORP, FAC, ORG, GPE, LOC, PRODUCT, EVENT (Named hurricanes, battles, wars, sports events, etc.), WORK OF ART (titles of books, songs, etc), LAW (Named documents made into laws), LANGUAGE (any named language), DATE (absolute or relative dates or periods), TIME (times smaller than a day), PERCENT(percentage, including "%"), MONEY (monetary values, including unit), QUANTITY (measurements, as of weight or distance), ORDINAL("first", "second", etc.), CARDINAL (numerals that do not fall under another type). Please see the Appendix for further details.

of emissions (e.g., 326 tons) and specific dates. However, in the comment submitted by Citizens for Clean Water, there are only a few colored boxes because the comment does not include any specific or scientific evidence. During the validation process, the frequency of false-positive identifications is noticeably smaller than the frequency of false-negative identifications, suggesting that the named entity recognition provides a conservative measure of expertise. Additional details regarding human validations are presented in Appendix C.1.

I use the number of all the colored boxes in each comment as a measure of expertise and estimate the effect of a strategic partnership on it. Formally, the dependent variable is a count variable that represents the number of detected named entities in each comment. Negative binomial models are presented in the main analysis, considering the count data. Quasi-Poisson models are used as a robustness check, and the analysis is presented in Tables C.3 and C.4.

TABLE 2. Negative binomial model estimating the quantity of information

Sample	Partnerships + Environmental Groups		Partnerships + Business Association + Single Firm		Whole Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Partnership	0.705***	2.670***	0.760***	1.878***	0.864***	0.730***
	(0.149)	(0.366)	(0.141)	(0.582)	(0.148)	(0.135)
Single Firm			−0.355***	−0.033	−0.200*	−0.334***
			(0.090)	(0.538)	(0.117)	(0.089)
Business associations					0.134	
					(0.123)	
Environmental groups						−0.134
						(0.123)
Others					0.167	0.033
					(0.167)	(0.152)
Issue Slant	1.301	−0.123	−0.429	0.069	−0.237	−0.237
(*R&D* and Technology)	(0.791)	(1.426)	(0.530)	(1.479)	(0.462)	(0.462)
Staff Size	✓	✓	✓	✓	✓	✓
Commenter FE		✓		✓		
Year FE	✓	✓	✓	✓	✓	✓
Observations	225	225	683	683	903	903

*p < .1; **p < .05; ***p < .01. Standard errors are clustered by notice and comment periods in parentheses. In the fifth column, the reference category is environmental groups, while in the sixth column, it is business associations.

Table 2 presents the estimation results with marginal effects in the main entries and standard errors in parentheses.[31] I include commenter-fixed effects so that the results are robust to commenter-level time-invariant confounders. I also control the issue slant toward R&D and technology constructed in the previous section because that topic is likely to be accompanied by technical details. The results suggest that comments from strategic partnerships generally have more technical information than comments from other entities. *Partnership* appears to be positive and significant at 0.01 level across all models. Both environmental groups and firms benefit from strategic partnerships; comments from environmental groups partnering with firms contain a higher quantity of information versus comments from environmental groups without business information (Columns 1 and 2). Similarly, comments from partnerships are likely to include more technical information than comments from firms without environmental group partners (Columns 3 and 4). Overall, we observe that the magnitude of the partnership effect is significantly larger when the reference category is environmental groups (Column 5) as opposed to when the reference category is business associations (Column 6). These findings lend confidence to the theoretical expectations that both firms and environmental groups derive advantages from investing in joint efforts. Additionally, the results suggest that environmental groups can attract greater participation from business interests, resulting in higher output. This finding is consistent with multiple robustness checks, including quasi-Poisson models. Please see the Appendix for further details.

4.3. Political Influence of Strategic Partnerships on Regulatory Outcome

I investigate the political influence of strategic partnerships on environmental regulations by examining whether comments from the joint efforts of firms and environmental groups affect policy amendments during the notice and comment period. Specifically, I estimate the effects of *Partnerships* on two dependent variables: (1) the divergence scores from

[31] To economize the space, I present the estimation results only for the key variable of interest throughout the paper. The full results, including the control variables, are presented in the Appendix.

information theory and (2) a binary variable that indicates whether a comment was cited by EPA officials in the final rule after the notice and comment period.

Quantifying Political Influence Using Information Theory

In this section, I examine if the increased quantity of knowledge translates into political power in regulatory politics by capturing distribution similarity. The intuition of this analysis is to examine how likely is it that a comment and policy amendment come from the same probability distribution. I particularly use divergence scores from information theory as relative entropy captured via divergence score denotes how close two samples are to each other. Given that the vectors in this context indicate probability distributions, the cosine angle is inappropriate because it fits for vector space modeling. Therefore, I employ Jensen-Shannon (JS) divergence score as a metric of statistical distance.[32] JS divergences have already been widely used in social science research as a similarity measure of sparse data.[33] Divergence scores close to 0 indicate a closer statistical distance, implying that two samples are likely to be from the same probabilistic distribution.[34]

A finalized rule is generally a hundred-page document, whereas policy comments tend to focus on a few provisions of a proposed policy. Capturing the statistical distance between each comment and a huge corpus of the entire policy would underestimate the influence of each comment on rulemaking, because a finalized rule is sparse and particular provisions are supposed to be examined during the notice-and-comment process. Therefore, I construct a set of clauses updated after the notice-and-the-comment period and use the set as a basis of analysis to quantify the influence of comments on finalized policy outcome. If a policy amendment is likely to be from the same distribution of comments

[32]The Kullback-Leibler (KL) measure is inappropriate in this context as it is an asymmetric measure, leading to different scores for A to B and B to A. The algebraic reason is that $D(P||O) - D(O||P)$ is equal to $\sum_i^n ln(\frac{P_i}{O_i})(P_i + O_i)$ and there is no reason for this to be 0. Please refer to the Appendix for further details.

[33]Please see Section D.2 in the Appendix for the mathematical proofs justifying the use of JS divergence as a test statistic and the detailed procedure of this analysis.

[34]Please see Appendix D for further details of the analysis.

by partnerships of environmental groups and firms, we can infer that the joint efforts of firms and environmental groups exercise political leverage over climate regulations. There might be some concerns that this analysis would capture linguistic similarity or legal formalism between comments and policies, instead of their influence on policy changes. To address this concern, I control the JS divergence score to a proposed policy posted by EPA officials before the notice and comment period. The model specification is similar to the one estimated in the previous section, with the exception that I include administration fixed effects because Republican politicians are generally considered business-friendly and prioritize policies that put business interests over environmental concerns.

Capturing Political Influence Using Citations by EPA officials

After the notice and comment period, EPA officials consider the comments submitted on a proposed policy and decide whether to revise the regulations accordingly when issuing a final rule.[35] When posting the finalized amendments, EPA officials add supplementary information; they provide a broad executive summary and explanations on the regulatory background of final standards. In addition, EPA officials summarize the significant comments, and they respond to those comments in a document that announces a final rule.

To estimate the influence of strategic partnerships on regulatory outcomes, I specifically focus on a final rule that was posted on March 12, 2018. The finalized policies posted by EPA officials take various inconsistent forms. In most cases, EPA officials make broad and generic statements that summarize the collection of comments without referencing specific commenters or comment IDs. However, for the March 2018 rule, the officials explicitly included comment IDs or commenters that regulators considered to update a

[35] Sometimes the agency extends or reopens a comment period because it has not received enough comments. Similarly, the agency may find that people have raised new issues in their comments that were not previously considered in the initial proposed policy. As new issues or additional complexity arises, the agency may publish a series of proposed rules in the Federal Register.

proposed policy. Using this final rule as the basis for analysis, I construct a binary indicator that is coded as 1 if a comment is specifically cited by EPA officials in their response.[36]

Alternative Explanations

The primary focus of the analysis centers on the quality of policy implementation to comprehend the dynamics of regulatory policymaking. However, the decision of firms and environmental groups to collaborate could result from a multifaceted strategic interaction. An alternative explanation as evidenced by prior studies could be that regulators may find the diversity within partnerships more appealing (Lorenz 2020; Phinney 2017; Mahoney 2007) because regulators typically seek indications of broad support for a policy proposal (Esterling 2009).[37] To consider this potential scenario, I combine a unique dataset of public comments on greenhouse gas emission standards with interest group ideal point estimates, referred to as "IGscore," introduced by Crosson et al. (2020). Then, I estimate the preference gap by calculating the absolute difference between the highest IGscore of firms and the lowest IGscore of environmental groups.[38] For single entities, the absolute difference is 0.

Table 3 presents the estimation results, separately for different reference categories. In all models, *Partnership* decreases the statistical distance and its effect is statistically significant (Columns 1- 2). A finalized policy outcome tends to have a closer statistical distance to comments from joint efforts, namely more informative comments that contain a larger amount of scientific reasoning and specific evidence. This demonstrates that

[36]The purpose of opening the notice and comment period in 2017 and 208 was to make amendments to two specific provisions related to the requirements for the collection of emission components at well sites. In the final rule, the agency announced the removal of the requirement for the repair of a component within 30 days of the detection of fugitive emissions. Please see Appendix D.5 for further details concerning the rule posted in March 2018.

[37]Most literature on coalition lobbying relies on a signaling model that policymakers find diverse coalitions' signal more credible for the following reasons. Interest-diverse coalitions can synergize their advocacy tactics and network, and they send a more heterogeneous signal to legislators about the quality of a legislative proposal. Third, diverse coalitions are harder to maintain, making their legislative signals costlier. Thus, legislators have reason to believe that bills favored by diverse coalitions are more deserving of their attention and support than those favored by homogeneous coalitions, all else equal. However, it is worth pointing out that the canonical signaling models including Crawford and Sobel (1982) do not lead to policy bias but only to the reduction of uncertainty.

[38]Environmental groups tend to work with multiple business partners.

TABLE 3. Regression Models Estimating JS Divergence Scores and Citation by EPA Officials

	JS Divergence Scores (OLS)		*Citation By EPA Officials* (Probit)	
	(1)	(2)	(3)	(4)
Partnership	−0.031***	−0.015*	0.512	1.737**
	(0.003)	(0.009)	(0.679)	(0.720)
Environmental groups	−0.015**		−1.225***	
	(0.007)		(0.396)	
Single firm	−0.001	0.014***	−0.445	0.779*
	(0.003)	(0.004)	(0.346)	(0.426)
Business associations		0.015**		1.225***
		(0.007)		(0.396)
Others	−0.015***	−0.0001	−5.014	−3.789
	(0.006)	(0.001)	(228.534)	(228.534)
Absolute difference between IGscores	0.002	0.002	0.207	0.207
	(0.004)	(0.004)	(0.497)	(0.497)
Staff Size	✓	✓	✓	✓
Administration FE	✓	✓		
JS Divergence to a proposed policy	✓	✓		
Observations	903	903	181	181

*p<0.1; **p<0.05; ***p<0.01. Standard errors are clustered by notice and comment periods in parentheses (columns 1 and 2). Since our analysis focuses on single notice and comment periods that overlap both the Obama and Trump administrations, we do not have control over the years of submission. Therefore, the analysis using citation patterns by EPA officials (Columns 3 and 4) does not consider the years of submission as a controlled factor. In the first and third columns, the reference category is business associations, while in the second and fourth columns, it is environmental groups.

enhanced expertise as a result of joint efforts by firms and environmental groups translates into political power in the rulemaking process, controlling the difference between IGscores. Columns 3-4 further show that comments from strategic partnerships are more cited by EPA officials. Which types of comments have the stronger influence on policy amendments? If the signaling perspective holds true, a higher absolute difference between IGscores would lead to a reduced statistical distance to a finalized policy or more citations by EPA officials. However, we do not find any effect of IGscores on the two measures.[39]

The analysis using two measures of political influence provides the evidence for my

[39] In Appendix, I run another analysis without any consideration of commenter types and observe a negative relationship between the absolute difference of IGscores and JS divergence scores. Please see Table D.2.

Political Influence hypothesis. Comments from joint efforts by firms and environmental groups tend to have a closer statistical distance to policy amendments and are likely to be cited by EPA officials. The full results are presented in Table D.1. One might assume that moderate and high-capacity groups are more likely to engage in strategic partnerships and that the capacity of individual groups would drive the result. However, although my model does point to the selection into partnerships, it is important to note that the analysis presented in this paper emphasizes the output from collaborative efforts instead of the capacities or moderation of individual groups. By working together, interest groups can generate more informative comments that cannot be attained by individual efforts. Enhanced expertise, as a result of collaboration, translates into political influence in regulatory politics, thereby contributing to better-quality policy implementation.

This finding presents a new empirical implication regarding the influence of interest groups on policy implementation. In contrast to the argument made by Yackee and Yackee (2006) that business comments are most commonly associated with policy changes, my research reveals that comments stemming from joint efforts involving experts with diverse expertise wield greater political influence during the rulemaking process. This empirical evidence reinforces the theoretical predictions put forth by the policymaking literature (e.g., McCarty 2020; Hirsch and Shotts 2012) that collaborative efforts by involved actors can increase the quality of policy implementation by conveying more informative proposals to regulators.

5. Conclusion

Interest groups play a crucial role in policymaking. Canonical models of policymaking focus primarily on how interest groups compete using their policy-relevant information to realize their political interests. Conversely, empirical evidence points to interest-diverse coalitions in which political actors with divergent interests cooperate. What incentivizes political actors to work together despite contrasting policy goals? What does a compromise

look like and why would they invest in joint efforts despite compromise?

In this paper, I tackle this question by focusing on the dynamics of regulatory policymaking. Given that regulatory policymaking involves the development of technical and fine-grained details of a policy, I expect that compromise arises endogenously because involved parties are incentivized to produce high-quality policy implementation. By using unique data of public comments officially submitted on greenhouse gas emission standards and employing information retrieval techniques, I demonstrate that environmental groups and polluting firms craft public comments that incorporate a greater amount of scientific evidence and analytical information in comparison with other types of comments. On the basis of information theory and citation patterns by EPA officials, I further show that the enhanced expertise of strategic partnerships between firms and environmental groups exercises the biggest leverage on the final policy, even when controlling for the difference in ideology scores of the partnered interest groups.

Specifically, this paper contributes to the growing literature on understanding the influence of interest groups on environmental regulations. By leveraging recent developments in machine learning techniques, I uncover that regulated firms' informational advantage leads to compromised policy outcomes that align with their preferences. However, despite these concessions, environmental groups with business partners gain advantages by accessing business information and resources, as well as attracting greater participation from business interests. As a result, partnered environmental groups achieve greater political leverage in regulation politics compared with environmental groups that lack business partnerships.

This study is primarily focused on high-quality policy implementation as an explanation for the motives behind investing in joint efforts amid political rivalry. However, an alternative explanation for partnerships could be competition among environmental groups. There has been ongoing disagreement among environmentalists regarding

strategies to reduce carbon emissions,[40] and some environmental groups may find it more beneficial to collaborate with business interests to amplify their voices, as opposed to working solely with other climate activists. These dynamics, particularly in relation to how interest groups select their partners and navigate these complex relationships, are the subject for further research.

My results contribute to our understanding of unexplored dynamics of regulatory politics. There are a variety of mechanisms used by interest groups that attempt to lobby agency rulemaking. By highlighting the strategic partnership of environmental groups and business interests - an overlooked channel of influence- I contribute to efforts in capturing diverse circuits of the political influence of interest groups. A broader set of political instruments are available to interest groups in regulation politics, and a valuable direction for future research is identifying and systematically measuring the role of other less visible channels of influence. Recognizing the various channels of influence, and their magnitudes of impacts, can contribute to a better understanding of interest group politics and its implication on regulatory politics.

[40] See Pulkkinen, Levi. (2021, March 12). Washington climate activists disagree about how to cut carbon,https://crosscut.com/environment/2021/03/washington-climate-activists-disagree-about-how-cut-carbon

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