Teaming Up across Political Divides: Evidence from Climate Regulations[*]

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Why do political actors with competing interests work together? This paper argues that winning the ideal policy is purely instrumental as long as they can achieve a higher quality of policy implementation, which makes compromise arise endogenously. Using original data of policy comments on Greenhouse gas emission standards spanning 2010-2020, I reveal the systematic pattern that polluting firms and environmental groups invest in joint efforts to improve policy implementation. The policy outcome is biased in the direction of a high-capacity group (polluting firms) and a low-capacity group (environmental groups) is willing to make concessions to induce quality-enhancing efforts from the former. The analysis further shows that partnering with competing interests has a meaningful impact on a finalized policy outcome. 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 with competing interests collaborate? The question of how political actors influence a policy has been a central topic in the study of political economy. Over the last several decades, much progress has been made in understanding the process of developing policy where 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). We know, for example, 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 side," 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 illuminate. While the U.S. Chamber of Commerce opposed to pass cap-and-trade legislation during the 111th Congress, several of its 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] 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

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[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").

businesses since 1980s, and the group is actively partnering with 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, Xcel Energy, in addition to a group of environmental and consumer leaders.[3]

This is puzzling given the contrasting policy preferences of polluting 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. Even though some firms (e.g., Shell, BP) have begun to pursue diversification into other energy sources that have a lower greenhouse effect, none of these alternative energy sources can provide business opportunities on the same scale as that of oil and coal production (Stokes 2020). While placing a price on carbon emissions through a trading system or carbon taxes is considered to be the most efficient policy for reducing greenhouse gasses (Stern 2008), the policy has been politically contested (Hess 2014) as climate-related policy measures have an immediate impact on these corporations. Contrary to the concerns of polluting industries regarding losses, 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, polluting firms and environmental groups collaborate closely.

I argue that the concern over the quality of policy implementation is the reason behind collaborative efforts among political actors with contrasting policy preferences. In regula-

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[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.

tory 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 contribute to reducing uncertainties in policy implementation. Even though divergent policy goals are reconciled, political actors prefer a compromise with a higher quality of policy implementation to their own preferred policies with lower-quality implementation.[4]

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

My theory provides the microfoundations for the argument that interests 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). While pre-existing research on interest group politics is focused on financial resources including PAC contributions or lobbying expenditures as a measure of political power, the primary resource of power in the regulatory context is information.[5] Unlike the existing literature

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[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

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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, this paper systematically measures information, with a particular emphasis on expertise. I accomplish this by conducting an analysis of 15,883 publicly submitted comments on Greenhouse gas emissions standards between 2010 and 2020. I begin by filtering organization/entity comments for comparability and classifying comments by five types to 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 that joint coalitions have continuously submitted comments on emission standards.

I then dive into the political implication of joint efforts of polluting firms and environmental groups on climate regulations. In the regulatory process, the information regulators need is sometimes held only by the business interests they seek to regulate, and polluting firms are better positioned to know details concerning the environmental risks created by their production process (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. Using text embedding methods, I show that comments from environmental groups with business partners are relatively skewed to business-friendly topics compared to comments from environmental groups without any business partnerships. However, given that the former represents a compromised outcome, the extent of issue slant observed in comments from partnerships is comparatively less pronounced than that in comments from business interests.

I further explore the benefits that environmental groups and business interests gain

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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).

from strategic partnerships by quantifying information using the entity recognition technique. Consistent with my theoretical prediction, public comments written by strategic partnerships of firms and environmental groups contain more specific evidence and analytical reasoning compared to comments composed separately by each group. Specifically, collaborating with business partners substantially augmented the volume of information present in the comments associated with environmental groups, controlling for different characteristics across them. Next, I employ information theory to quantify the political influence of strategic partnerships on finalized policy outcomes. I find that comments produced through the collaborative efforts of firms and environmental groups exhibit a closer statistical distance to the finalized policy in comparison to comments composed by a single principal. This observation holds true even when controlling their proximity to the proposed policy to account for legal formalism or linguistic similarity. As a robustness check, I conduct an examination of the citation patterns among EPA officials. The results reveal that EPA officials tend to cite comments written by strategic partnerships more frequently compared to 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 resulting from strategic partnerships translates into political influence in regulatory politics.

This article makes both theoretical and empirical contributions to the study of coalition lobbying in policymaking process(e.g., Bertrand et al. 2020; Dwidar 2022; Junk 2019; Phinney 2017; Heaney and Lorenz 2013; Nelson and Yackee 2012; Hula 1999), holding implications for our understanding of regulatory politics where interest groups with conflictual interests prioritize a higher quality of policy implementation. By examining the coalition of polluting firms and environmental groups and their effects on climate regulations, it also contributes to the empirical literature on the interest group influence 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 climate lobbying 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 pointed to the influence of interest groups over regulatory policymaking. Regulators have significant discretion in formulating regulations (McCarty 2017), and interest groups consider various actions to influence regulators' policy choices 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 in any coordinated efforts as a team, with the objective of advancing their interests. To explain why lobbying together is a more competitive strategy compared to lobbying alone, scholars have analyzed on the size of coalitions (Nelson and Yackee 2012) or the types of interests (e.g., broad versus narrow) represented in the coalition (Mahoney 2007). A recent growing body of work considers the effect of the composition of coalition such as organization types (e.g., trade association and a sectoral firm), partisan identities or interest diversity (e.g., organizations representing diverse industries) on lobbying success(Dwidar 2022; Heaney and Leifeld 2018; Lorenz 2020; Phinney 2017).

However, the dynamics of how competing interests compromise a policy "within a side" 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 their concern for high-quality policy implementation.

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

Our focus is the participation in the notice and comment process as this is the most common way for interest groups to get their voice 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 a direction of agenda is fixed (You 2017), thus it requires fine-grained, technical judgment concerning how to design major operations. 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 are at an advantage in this competition(Epstein et al. 2014).

Given the nature of regulatory policymaking, I argue that the demand for higher-quality policy implementation dictates through cooperative specialization despite the difference 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 areas of expertise are different and have varying impacts on regulators (Berry and Wilcox 2015; Yackee and Yackee 2006), and differing abilities at developing policy proposals influence the way they compromise within a team. The

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[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.

high-capacity group tends to be more engaging due to its superior resources (e.g., the impact of information, staff expertise, and funding) compared to the low-capacity group, and as a result, the imbalanced capabilities lead to a compromised policy outcome biased in the direction of the high-capacity group. However, while the compromised outcome relatively favors a high-capacity group, a low-capacity group gains advantages by inducing more participation from the high-capacity group assuming that preferences over *policy outcome* and *quality of policy implementation* are inseparable, and still get moderation of high-capacity groups' extreme policy preferences [7]

On the *quality of policy implementation* side, the joint product of two groups exceeds the sum of their 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). As the process of rulemaking is focused on improving the implementation of policy, the motivation for investing joint efforts is achieving a higher quality of implementation and a group prefers high-quality policy implementation with a compromised outcome to low-quality policy implementation with its ideal policy. Therefore, winning an ideal policy per se becomes purely instrumental, as long as a group can improve the implementation of a policy.

2.2. Empirical Evidence: Strategic Partnerships between Polluting 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

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[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 input when the compromised policy outcome is closer to its 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 inputs by one agent increase the productivity of another. The analysis of this paper assumes that inputs from political actors are complements.

squarely represent the properties of the theory outlined in the previous section.

First, polluting firms and environmental groups have asymmetric capacities as the regulatory system depends heavily on information supplied by the regulated entities. The information regulators need is often held only by industries or firms they should regulate (e.g., McCarty 2017; Wagner 2003; Coglianese and Lazer 2003), and 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). Likewise, 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 are the very firms that regulators seek to regulate. Although epidemiological research by scientists or researchers at environmental groups or government agencies can reveal as much about the health effect of pollutants, polluting firms typically know more 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 that polluting firms has 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 that introduces the compromised policy outcome biased towards the preferences of a higher-capacity group. While it is impossible to exactly divide the individual contribution of each group in designing policy outcomes due to jointness (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 to the topic emphasized by a

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

low-capacity group, we can infer that the compromised outcome favors the former.

For analysis, I leverage the fact that polluting firms have strategically highlighted R&D and technological issues in the climate conversation. 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 leverage scientific research and technology to undermine efforts aimed at reducing emissions or emphasize the uncertain costs associated with climate policies(Schlichting 2013). This leads to the hypothesis that emphasizes the amplifying effect of business-friendly topics, R&D and technology, as the compromised policy outcome from joint efforts:

HYPOTHESIS 1. *(Compromised Policy Outcome) Comments from strategic partnerships between polluting firms and environmental groups would tend to be in R&D, and technology direction when compared to comments written by environmental groups without business partners. However, the extent of bias in the comments would be less pronounced than what is observed in comments authored solely by business interests.*

Second, while the compromised outcome is biased to firms' preferred policy, environmental groups can derive benefits from collaborating with firms, as firms are motivated to contribute more to generate higher output when the compromise aligns more with

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[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

their preferences.[10] Given that firms' contributions as a high-capacity group can have a more significant impact on the quality of policy of compared to 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 polluting firms(Alchian and Demsetz 1972). For instance, polluting 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 concerning the likely impact of further pollution (Bromley-Trujillo et al. 2014). And environmental groups can access private information that firms hold concerning the types of pollutants firms produce or the processes of generating them. Based on this inference, I posit that comments formulated through collaborative efforts between firms and environmental groups contain more comprehensive scientific reasoning and specific information sought by regulators to better develop and implement technical aspects of a policy, as compared to other forms of comments written separately by each group. This leads to our second hypothesis:

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

Lastly, implementing environmental regulations requires an understanding of various solutions to those problems for reducing pollutants and Greenhouse gas or the unexpected consequences of alternative regulatory standards (Coglianese 2007). Therefore, expertise plays a key role in the implementation of policy and regulators value the specialized knowledge that can provide insights into the intricacies of the policy landscape. Given

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[10]This is consistent with theoretical predictions in McCarty (2020) and Choi (2023)

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 through the collaboration of firms and environmental groups will have a greater impact on the finalization of the policy outcome compared to other comments written independently by either business interests or environmental groups. Hence, this leads us to our final hypothesis:

HYPOTHESIS 3. *(Political Influence): Comments from joint efforts would be more likely to influence policy amendments than other types of comments do.*

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, and therefore, the establishment of strategic partnerships or the production of high-quality comments may depend on these factors. To account for this, I construct a variable to control for group characteristics, such as staff size. Data for this variable is collected from various sources, including *InfluenceWatch*, which provides descriptions of political actors involved in public policy issues, as well as firms' websites, LinkedIn, Indeed, Buzzfile, Rocketreach, or Glassdoor.[11]

3.   Data and Stylized Facts

I utilize an original dataset containing 15,883 comments officially submitted on *Greenhouse Gas Emissions Standards* from 2011 to 2020 without duplicates.[12] The policy comments were for the EPA's regulatory review of the Greenhouse Gas Emissions Standards under sections 111 and 112 of the Clean Air Act, and the EPA has opened notice-and-comment period seven

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

[12]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 follows a regulation throughout its rulemaking process.

times.[13] 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, and the 10-year time period ensures that we observe how republican and democrat administrations respond to policy comments. As noted on the website of the Environmental Defense Fund,[14] the history of strategic partnerships with business interests traces back to the 1980s. These partnerships have consistently remained unchanged in terms of temporal variation between firms and environmental groups between 2011 and 2020. Comments from individuals without an organizational affiliation tend to be simple endorsements focused on support for or opposition against a proposed policy. For comparability of comments that provide substantive information, comments from individuals without any association with entities or organizations are dropped from the main analysis. Therefore, I filter 903 comments submitted by companies, entities, or organizations using company/organization identifiers and automated text analysis, and use the filtered comments as the basis of analysis.[15]

Comments are classified by five types: 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 including universities or government agencies.[16] One interesting pattern to note about the collection of comments is that recognizable polluting firms (e.g., Exxon, BP, Ford or General Motors) has submitted

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[13]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.

[14]Please see Figure A.3

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

[16]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 was limited to firms.

few separate comments; the majority of single firms participated in the rulemaking process are "green firms" or the small local businesses. The classification is operated by two measurement strategies. First, I provide the pessimistic measure of strategic partnerships between firms and environmental groups based on explicitly visible evidence. I retrieved the history of environmental groups' website for the recent decade using the Wayback Machine, and coded if environmental groups has explicitly posted polluting firms as partners.[17] Next, I construct a more generous measure 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 Cory et al. (2021)'s classification framework to double-check the validity of the memberships lists I collected from other sources.[18]. The main analysis presented in the paper utilizes the pessimistic measure of partnerships between polluting firms and environmental groups. We have 541 unique entities in our data and summary statistics are provided in Appendix.[19]

The composition of comments across time is presented in Figure 1. On the whole, policy comments by business associations and single firms represent the plurality of comments most of the time.[20] Over 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 of polluting firms and environmental groups. The increase in the percentage of comments from single firms might mean an increase in participation from

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[17] 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.

[18] 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.

[19] Please see Table A.3 in Appendix

[20] This observation is consistent with Golden (1998)'s finding that a huge percentage of comments are from business interests.
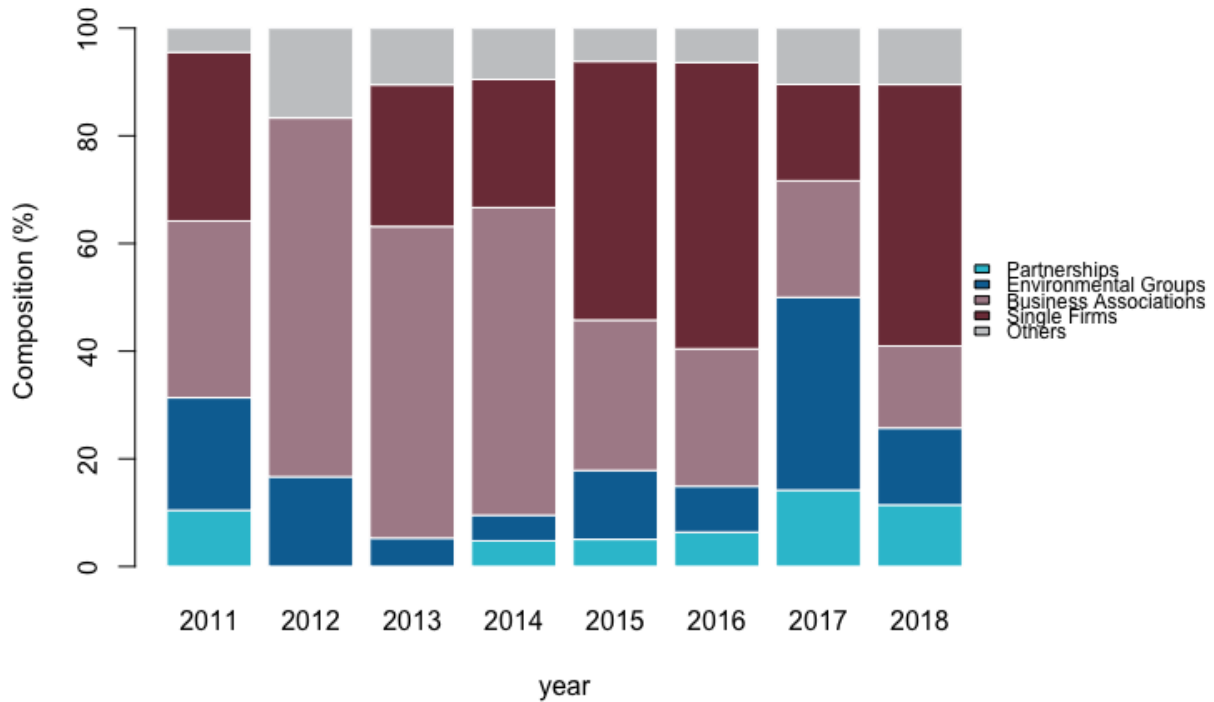
FIGURE 1. Comment Participation Over Time

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

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

4. Empirical Evidence

In this section, I provide empirical evidence supporting the theoretical argument. To do so, I use an advanced text embedding method and computational techniques.

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

To investigate if firms' information advantage leads the compromised policy outcome to be in a business-preferred direction, I construct two measures to capture the prevalence of the topic favorable to business interests: machine learning-based metrics of 1) R&D and technology coverage and 2)socioeconomic consequence coverage. There has been abundant qualitative evidence that business interests strategically frame their climate communication by highlighting 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 rather than emission reductions, 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

To handle this limitation that the count-based metrics convey little information concerning the context in which words are used, I apply a text embedding method, allowing words to encode meaningful information about analogies. Political science research has utilized *Word2Vec* which embeds words in a low-dimensional vector space using neural network structure. This method results in a set of vectors where proximity in vector spaces implies similar meaning context-wise, while vectors distant from each other have different meanings. For instance, "diligent" and "industrious" would be close together while "diligent" and "lazy" would be relatively distant. Based on embedding methods, I let the algorithm assign each word to a vector in a shared space during the training stage, and this creates clusters of words semantically connected. As a result, the similar the context is, the closer the two words are located in geometric space.

Built on this advance in modern natural language processing technique, I employ

Paragraph Vector proposed by Le and Mikolov (2014), an unsupervised framework that learns continuous 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, and they are averaged to predict the next words in each sentence. Similar to Word2Vec's continuous-bag-of-words model, this approach uses distributed memory where document vectors can be acquired by the task of predicting a word based on an average in consideration of context and full document levels. I construct a model with a window size of five and do not consider words that are observed less than five times in the entire corpus.[21]

As explained above, 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: [22]

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

Therefore, the vector difference corresponds to the issue slant in the R&D direction and can be substantively interpreted as a degree to which a proposal is leaning toward the issue of R&D, compared to emission cuts. Note that word vectors and document vectors live in the same space by the way *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 connotation of this approach is measuring the similarity

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[21]The analysis reported in this paper was implemented by Doc2Vec Gensim and python3 on December 29, 2022. The parameters epochs is specified as 200. Typically epochs is set to be between 50 and 200.

[22]The vocabularies are geometrically close vocabularies in the embedding spaces trained on comments. 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.

of a comment to the dimension of the issue slant towards R&D and technology.[23]
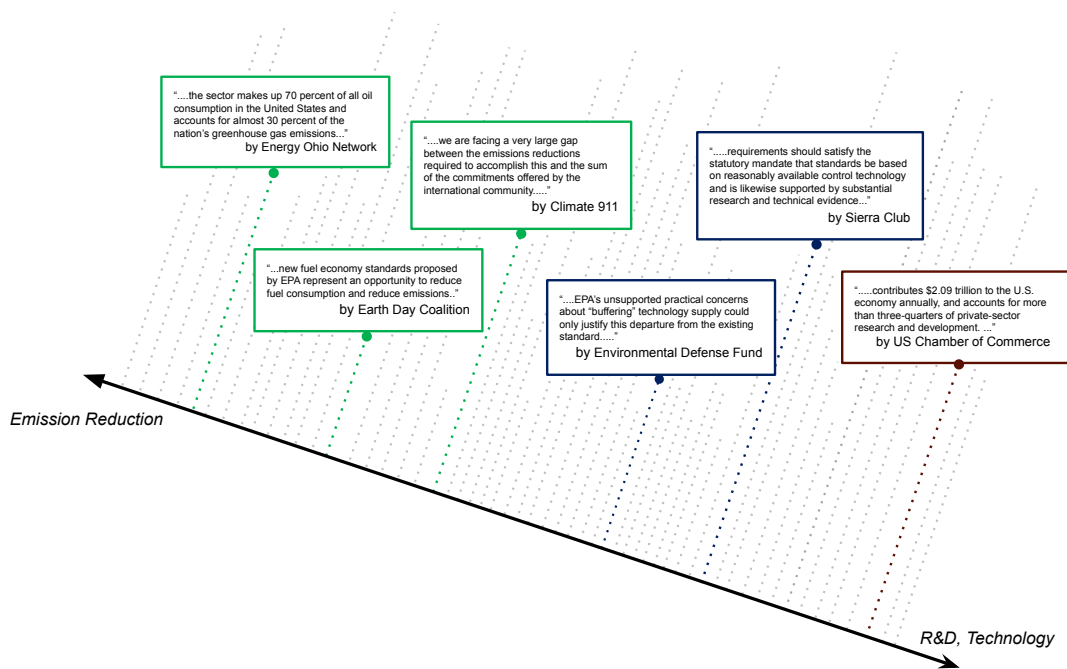

FIGURE 2. Schematic illustration of vector projection

The similarity score, ranging from -1 to 1, indicates the emphasis on RD compared to reductions in a document. A score close to 1 suggests a tendency to emphasize RD, while a negative score implies a skew toward emission reductions. 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 to comments from environmental groups without business partnerships. However, comments from these strategic partnerships are relatively less skewed compared to comments from business interests, which demonstrate a notable bias toward R&D directions.

I use the similarity score for each comment as a dependent variable and run an ordi-

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[23]Please see the equation B.2 for the mathematical formula.

nary least squares regression including commenter fixed effect so that effects are partially identified off within commenter variation.[24] The first column of Table 1 examines comments from environmental groups, both with and without business partners, while the second column focuses on comments from environmental groups with business partners, business associations, and individual firms. The reference category for the second column is business associations. The last column explores a correlation between the slant towards *R&D* and technology and the types of comments in the entire dataset, and comments from environmental groups without business partners serve as the reference category.

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	✓	✓	✓
Observations	225	683	903

*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.

The results show a positive, statistically significant effect of strategic partnerships on the slant toward R&D and technology when environmental groups partner with polluting firms

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[24]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.

(column 1). More notably, when partnering with environmental groups, comments tend to be more inclined towards emission reduction compared to 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 in order to reach a compromise while the joint products still have moderation, which is supposed to prevent extreme policies from business interests. In general, although strategic partnerships between polluting firms and environmental groups exhibit a positive inclination towards *R&D* and technology (column 3) compared to environmental groups without business partners, its coefficient magnitude is considerably smaller than that of business interests. This lends support to the *Compromised Policy Outcome* hypothesis; the policy goals of firms and environmental groups are reconciled while the outcome favors the high-capacity group, to generate a compromise. The full results, including all control variables, are presented in 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 presented in Appendix.

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

In this section, I examine if environmental groups and polluting firms achieve high-quality policy implementation despite the compromised policy. Focusing on the role of expertise in regulatory politics, I investigate the effect of strategic partnerships between polluting firms and environmental groups on 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. While crowdsourcing pro-

vides 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 technique has 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 identifying proper nouns into categories, such as organizations (e.g., companies, government organizations, committees) or local-level knowledge (e.g., cities, countries, rivers) or measurement .[25] In total, 18 categories are used to measure the amount of scientific information.[26]

Figure 3 illustrates how the information retrieval technique is applied to comments. The colored boxes represent technical details identified by this approach. Each colored box is marked up to show named entities identified by this technique. The example shows that the entity recognition technique can successfully capture organizations discussed in the comment, such as Merit Energy Company or Exxon Mobile, and identify locations such as Anschutz Ranch East Gas Plant, East Texas Gas Plant, or Wyoming. Additionally, it identifies the quantity of emissions (e.g., 326 tons) and the specific date. Further human-based evaluation of the entity recognition technique is presented in the Appendix.

I estimate the effect of a strategic partnership on the quality of information measured by the count of all the colored boxes in each comment. Formally, the dependent variable is a count variable that is coded how many detected names entities exist in the comment i submitted by j in a time period t. I use negative binomial models rather than a Poisson or ordinary least squares because there exists overdispersion in the distribution of the

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[25]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.

[26]18 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.

an be extremely high. For example: ☐ **CARDINAL** Merit Energy Company's **ORG** Anschutz Ranch East Gas Plant **ORG** in Wyoming **GPE** reported 276 tons **QUANTITY** of fugitive VOCs in 2013 **DATE** . 5 80 **CARDINAL** Fed **ORG** . Reg. at 56,644 **CARDINAL** . 6 **CARDINAL** See EPA **ORG** , Oil and Natural Gas Sector Leaks: Report for Oil and Natural Gas Sector Leaks Review Panel **ORG** 22 Tbl **ORG** . 2-7, 29 **CARDINAL** Tbl. 2-11 (2014 **DATE**). 7 **CARDINAL** Id. 5 **CARDINAL** ☐ Merit Energy Company's **ORG** Halfmoon Battery **LOC** reported 178.1 tons **QUANTITY** of vented and fugitive VOC emissions in 2013 **DATE** . A fraction of that total came from fugitives (5.5 tons **QUANTITY**) while most was vented (172.6 tons).8 **QUANTITY** ☐ DCP Midstream's **ORG** East Texas Gas Plant **ORG** (RN102805272 **PRODUCT**) leaked and vented 326 tons **QUANTITY** of VOCs in 2012 **DATE** and 206.5 tons **QUANTITY** in 2013 **DATE** . ☐ Exxon Mobil's **ORG** King Ranch Gas Plant **ORG** (RN102488517 **PERSON**) released 306.87 tons **QUANTITY** of fugitive and vented VOC emissions in 2012 **DATE** and 142.63 tons **QUANTITY** n 2013 **DATE** . While we have not included methane emissions in these tables because they are not reported directly to emission inventories, it should not be difficult to develop reasonable estimates based on he typical methane content of the gas from the fields that serve these plants. c. EPA **PERSON** Should Include Fugitive Emissions **ORG** from Reported Upsets and from Enforcement Investigations when

FIGURE 3. Example of Information Retrieval(Comment from Environmental Justice Health Alliance)

dependent variable across observations and the dependent variable cannot have negative values (King 1988). Specifically, I estimate the following model:

$$\text{Count of technical information}_{ikt} = \alpha + \beta_1 \text{Strategic Partnership}_i + \delta Z_k + \tau_t$$

, where Z denotes the group-level control variable and τ is year-fixed effects. Across the models, I include administration fixed effects as Republican politicians are generally considered business-friendly and in favor of policies that put business interests ahead of environmental concerns. The specification controls for group-level characteristics, as there might be a systematic difference in research capacities due to staff size.[27] I also control the issue slant toward R&D and technology constructed in the previous section because the topic is likely to be accompanied by technical details.

Table 2 presents the estimation results with marginal effects in the main entries and standard errors in parentheses.[28] I include commenter-fixed effects so that the results are robust to commenter-level time-invariant confounders. The results suggest that comments from strategic partnerships generally have a larger quantity of information compared to comments from other types. *Partnerships* appears to be positive and significant at 0.01 level across all models. Both environmental groups and firms benefit from strategic part-

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[27]The summary statistics of comments are given in the Appendix.

[28]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.

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)
Administration FE	✓	✓	✓	✓	✓	✓
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.

nerships; 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 a larger amount of technical information compared to comments from firms without a partnership with environmental groups (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) compared to when the reference category is business associations (column 6). These findings lend confidence in the theoretical expectations that both firms and environmental groups derive advantages from investing in joint efforts. Additionally, the results suggest that environmental groups are able to attract greater participation from business interests, resulting in higher output. [29]

[29]This finding is consistent with multiple robustness checks. Please see the appendix for 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 joint efforts of firms and environmental groups affect policy amendments after the notice and comment period. Specifically, I estimate the effects of *Partnerships* on two dependent variables: (1) the divergence scores from information theory and (2) a binary variable indicating whether a comment was cited by EPA officials 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 amendments come from the same probabilistic distribution. I particularly utilize divergence scores from information theory as relative entropy captured via divergence score denotes how close two samples are from each other. Given that the vectors in this context indicate probability distribution, the cosine angle is inappropriate as it fits for vector space modeling. Therefore, I employ Jensen-Shannon (JS) and Kullback-Leibler (KL) divergences as a metric of statistical distance. KL and JS divergences have already been widely used in advanced social science research as a similarity measure of sparse data.[30] Divergence scores close to 0 indicate a closer statistical distance.

A finalized rule is generally a hundreds-page-long document while 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, given that a finalized rule is sparse and that 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

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[30]Please see Section D in Appendix for details and justification of this analysis.

and use it 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 by partnerships of environmental groups and firms, we can infer that joint efforts of firms and environmental groups exercise political leverage over climate regulations. There might be some concerns that this analysis would end up capturing linguistic similarity or legal formalism between comments and policies, rather than their influence on policy changes. In response to this concern, I control JS divergence score to a proposed policy.

Capturing Political Influence Using Citations by EPA officials

After the notice and comment period, EPA officials consider comments submitted on a proposed policy, decide whether to revise the regulations accordingly and issue a final rule.[31] When posting 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 on a document announcing a final rule and respond to those comments.

For the analysis, I specifically focus on a final rule that was posted on March 12, 2018, in order to estimate the influence of strategic partnerships on regulatory outcomes. 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, in the case of the rule posted on March 12, 2018, the officials explicitly include comment IDs or commenters that were considered by regulators to update a 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

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[31]Sometimes the agency extends or reopens a comment period because it has not received enough high-quality 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.

specifically cited by EPA officials in their response. The model specification is similar to the one estimated in the previous section, with the exception that I do not include year and administration fixed effects, as the sample is limited to 181 entity comments that were collected during this particular notice and comment period.[32]

Alternative Explanations

While the primary focus of the analysis centers around the quality of policy implementation to comprehend the dynamics of regulatory policymaking, the decision of firms and environmental groups to collaborate could result from a multifaceted strategic interaction. An alternative explanation could be that regulators may find the diversity within partnerships more appealing, as evidenced by prior studies (Lorenz 2020; Phinney 2017; Mahoney 2007) since they typically seek indications of broad support for a policy proposal (Esterling 2009).[33] To take into account this potential scenario, I combine a unique dataset of public comments on greenhouse gas emission standards with 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.[34] For single entities, the absolute difference is 0.

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[32]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.

[33]Most literature on coalition lobbying relies draw 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.

[34]Environmental groups sometimes have 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	✓	✓		
Year FE	✓	✓		
Observations	903	903	181	181

Note: *p<0.1; **p<0.05; ***p<0.01

*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 a binary indicating citation by EPA officials (Columns 3 and 4) does not consider the years of submission as a controlled factor.

Table 3 presents the estimation results, separately for different reference categories. At 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 enhanced expertise as a result of joint efforts of polluting 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 IG scores would lead to 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.

The analysis using two measures of political influence provides the evidence for my *Political Influence* hypothesis. Comments from joint efforts of polluting firms and environmental groups tend to have a closer statistical distance to policy amendments and are more likely to be cited by EPA officials. The full results are presented in Appendix Table D.1.

There may be concerns regarding whether sample selection could influence the results of the analysis. Due to the nature of coalition building, interest groups with moderate policy preferences or high capacity are more likely to engage in strategic partnerships, as predicted by the theoretical framework presented in the paper. However, it is important to note that this paper emphasizes the higher quality of joint output that interest groups attain through investing in collaborative efforts, rather than solely focusing on moderation or capacity, to comprehend the influence of interest groups on regulatory policymaking. By investing in team efforts, groups can generate a joint output of superior quality that cannot be achieved through individual efforts alone. This finding offers 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 areas of expertise wield greater political influence during the rulemaking process. This empirical evidence reinforces the theoretical predictions put forth in the policy-making literature (e.g., McCarty 2020; Hirsch and Shotts 2012) that collaborative efforts by involved actors can enhance 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 while empirical evidence points to interest-diverse coalitions where 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 for a 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 a compromise arises endogenously as involved parties are incentivized to improve the quality of policy implementation. Using unique data from public comments officially submitted on Greenhouse gas emission standards from 2011 to 2020, I show that environmental groups and polluting firms craft public comments that contain more scientific evidence and analytical information compared to any type of comments, which allows regulators to implement a policy better. Based on information theory and citation patterns by EPA officials, I further show that the enhanced expertise as a result of strategic partnerships between polluting firms and environmental groups exercise the biggest leverage on the finalized policy outcome, even when controlling the difference in ideology scores of interest groups participating in partnerships.

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, they achieve greater political leverage in the realm of

regulation politics compared to environmental groups without business partnerships.

While this paper primarily focuses on high-quality policy implementation as an explanation for the motives behind investing in joint efforts amid political rivalry, an alternative explanation could be competition among environmental groups. There has been ongoing disagreement among environmentalists regarding strategies to reduce carbon emissions[35], and some environmental groups may find it more beneficial to collaborate with business interests in order to amplify their voices, as opposed to working solely with other climate activists. Future studies can further explore these dynamics, particularly in relation to how interest groups select their partners and navigate these complex relationships.

My results contribute to our understanding of unexplored dynamics of regulatory politics. There are a variety of mechanisms used by interest groups trying 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. As a whole, my analysis highlights the challenges in identifying complexities involved in the process of developing policy implementation. 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, as well as their various magnitude of impacts, can contribute to a better understanding of interest group politics and its implication on regulatory politics.

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[35]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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